# Appendix 5.1

## Air Quality Report

Prepared for
**The Newhall Land and Farming Company**
**Valencia, California**

Project Number
**1690011750-008**

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# AIR QUALITY TECHNICAL REPORT

## ENTRADA SOUTH AND VALENCIA COMMERCE CENTER LOS ANGELES COUNTY, CALIFORNIA

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AB | Assembly Bill |
| ACC | Advanced Clean Cars |
| AEA | Additional Environmental Analysis |
| AQMD | Air Quality Management District |
| AQMP | Air Quality Management Plan |
| ATCM | Airborne Toxic Control Measure |
| AQ | Air quality |
| BACT | Best Available Control Technology |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| CalEEMod® | California Emission Estimator Model® |
| CalRecycle | California Department of Resources Recycling and Recovery |
| CAR | Climate Action Reserve |
| CARB | California Air Resources Board |
| CCAP | Community Climate Action Plan |
| CCR | California Code of Regulations |
| CCX | Chicago Climate Exchange |
| CDFW | California Department of Fish and Wildlife |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| CNG | compressed natural gas |
| CO | carbon monoxide |
| $CO_2$ | Carbon Dioxide |
| CTMP | Construction Traffic Management Plan |
| DOGGR | Division of Oil and Gas and Geothermal Resource |
| DPM | diesel exhaust particulate matter |
| EF | Emission factor |
| EIR | Environmental Impact Report |
| EMFAC | EMission FACtor Model |
| Ramboll | Ramboll US Consulting, formerly ENVIRON US Corporation |
| EV | electric vehicle |
| FAR | floor area ratio |

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| FIP | Federal Implementation Plan |
| ft | feet |
| g | gram |
| g/m$^3$ | micrograms per cubic meter |
| GHG | Greenhouse Gas |
| hr | hour |
| HRA | health risk assessment |
| HVAC | heating, ventilation and air conditioning |
| KW | Kilowatt |
| lbs | pounds |
| LST | Localized Significance Threshold |
| m | meter |
| MM | Mitigation Measure |
| MMRP | Mitigation Monitoring and Reporting Program |
| $N_2O$ | Nitrous Oxide |
| NAAQS | national ambient air quality standards |
| NESHAP | National Emissions Standards for Hazardous Air Pollutant |
| NHTSA | National Highway Traffic Safety Administration |
| NO | Nitric oxide |
| $NO_2$ | Nitrogen Dioxide |
| $NO_X$ | Oxides of Nitrogen |
| OFFROAD | Emissions Inventory Program model |
| PDF | Project Design Feature |
| PM | Particulate Matter |
| $PM_{2.5}$ | Particulate Matter Less Than 2.5 Microns In Diameter |
| $PM_{10}$ | Particulate Matter Less Than 10 Microns In Diameter |
| ppm | Parts Per Million |
| PV | Photovoltaic |
| RCGP | Regional Comprehensive Guide and Plan |
| RFP | Reasonable Further Progress |
| RMDP | Resource Management and Development Plan |
| ROG | reactive organic gas |

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| RTP | Regional Transportation Plan |
| SB | Senate Bill |
| SCAB | South Coast Air Basin |
| SCAG | Southern California Association of Governments |
| SCAQMD | South Coast Air Quality Management District |
| SCP | Spineflower Conservation Plan |
| SCS | Sustainable Communities Strategy |
| SCVCTM | Santa Clarita Valley Consolidated Traffic Model |
| SF | square feet |
| SIP | State Implementation Plan |
| SJVAPCD | San Joaquin Valley Air Pollution Control District |
| SMAQMD | Sacramento Metropolitan Air Quality Management District |
| $SO_2$ | Sulfur Dioxide |
| SoCal | Southern California |
| SOx | sulfur oxides |
| sqft | square feet |
| TAC | toxic air contaminant |
| TDM | Transportation Demand Management |
| TOC | The Oaks Club |
| TSF | thousand square feet |
| UCS | Union of Concerned Scientists |
| US | United States |
| USEPA | United States Environmental Protection Agency |
| VCC | Valencia Commerce Center |
| VDECS | Verified Diesel Emission Control Strategies |
| VMT | Vehicle Miles Traveled |
| VOC | volatile organic compound |
| VTTM | Vesting Tentative Tract Map |
| ZEV | Zero emission vehicles |
| ZNE | Zero Net Energy |

# 1. INTRODUCTION

This technical report is to present the air quality impacts associated with design refinements of the Entrada South and Valencia Commerce Center Project (hereinafter referred to as the Modified Project). For reference, this analysis refers to the approved Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP; hereinafter referred to as the 2017 Approved Project) studied in the State-certified Environmental Impact Report (EIR; SCH No. 2000011025). This report describes the analyses that were used to evaluate the Modified Project's air quality emissions and health risk impacts.

## 1.1 Modified Project Description

**Entrada South:** The proposed incremental changes in Entrada South, as compared to the 2017 Approved Project analyzed in the State-certified EIR, include:

*Enhanced Environmental Protections*. The Modified Project increases environmental protections to wetlands and related biological resources within the Entrada Planning Area that result in increased open space, restored drainage areas, and habitat for species as compared to that evaluated in the State-certified EIR.

*Refinements to the Balance of Residential and Non-Residential Development*. The State-certified EIR for the 2017 Approved Project evaluated the environmental impacts of 1,725 dwelling units, 450,000 square feet of non-residential development, a public facilities area for a neighborhood park and a potential school site, private recreational amenities, a spineflower preserve, and trails and infrastructure within the Entrada Planning Area. The Modified Project includes a reduction in residential units to conform to the One Valley One Vision Area Plan, resulting in 1,574 dwelling units and a corresponding increase to 730,000 square feet of non-residential development, a public park and potential school site, a spineflower preserve, and trails and infrastructure within the Entrada Planning Area. As such, this analysis considers the air quality implications of reducing the number of residences by 151 units and increasing the amount of non-residential development by 280,000 square feet.

**Valencia Commerce Center:** As relevant background, VCC was approved for development by Los Angeles County through the issuance of various entitlements and certification of an EIR (SCH No. 1987-123005) in 1991 (referred to herein as the County-certified VCC EIR), which is incorporated by reference. The County's existing entitlement allows approximately 12.6 million square feet of industrial/business park space at build-out, of which approximately 9 million square feet has been constructed.

The VCC Planning Area evaluated herein is comprised of approximately 321 acres of an undeveloped portion of the partially completed VCC industrial/business park center. The VCC Planning Area will be developed with up to 3.4 million square feet of non-residential development under the Modified Project, consistent with the development of the VCC Planning Area assumed in the State-certified EIR. The VCC Planning Area development will be consistent with the existing County entitlements and Zoning Code; therefore, the Modified Project does not result in a change to the amount or nature of the development associated with the 2017 Approved Project.

The proposed minor changes and refinements under the Modified Project, as compared to the 2017 Approved Project analyzed in the State-certified EIR, include:

*Enhanced Environmental Protections*. The proposed minor changes and refinements within the VCC Planning Area include additional environmental protections for wetlands and related biological resources within the VCC Planning Area through a reduction in permanent impacts to Hasley Creek and Castaic Creek. This environmentally beneficial modification would result in increased open space, restored drainage areas, and habitat for species.

**Table 1-1** shows the change in land uses from the Approved Project for Entrada South and the Modified Project for Entrada South; and the total land use quantities for VCC. For additional information regarding the Modified Project, please see the Project Description Section of the Supplemental EIR.

## 1.2 Conclusions of the State-certified EIR

The State-certified EIR analyzed the potential adverse air quality impacts as follows.

- The construction emissions associated with Entrada South and VCC would exceed the South Coast Air Quality Management District (SCAQMD) thresholds of significance for VOC, $NO_X$, $PM_{10}$, and $PM_{2.5}$; thereby resulting in significant construction air quality impacts.
    - The State-certified EIR described recommended mitigation measures for construction-related emissions. These would potentially reduce some construction related air quality impacts; however, even with implementation of all feasible mitigation measures, construction-related air emissions were considered significant and unavoidable.
- SCAQMD recommended Localized Significance Threshold (LST) analysis was conducted to determine whether the construction emissions would have the potential to generate significant adverse local impacts on ambient air quality. The analysis results show that the 2017 Approved Project would result in significant air quality impacts for $PM_{10}$ and $PM_{2.5}$, and nitrogen dioxide ($NO_2$).
- The State-certified EIR included a health risk assessment (HRA) to evaluate health impacts associated with the emissions of diesel exhaust particulate matter (DPM) that would occur during construction activities related to the 2017 Approved Project. The HRA analysis concluded that the health impacts associated with construction were less than the significance criterion for cancer risk and noncancer hazard index and were, therefore, less than significant.
- Emissions associated with operation of both Entrada South and VCC would exceed the SCAQMD thresholds of significance for VOC, $NO_X$, CO, $PM_{10}$, and $PM_{2.5}$ in both winter and summer conditions; resulting in significant operational impacts.
    - The State-certified EIR incorporated mitigation measures to reduce operational air quality impacts for the 2017 Approved Project. However, the mitigated operational emissions for the 2017 Approved Project still exceeded the SCAQMD thresholds of significance for VOC, $NO_X$, CO, $PM_{10}$, and $PM_{2.5}$.

The State-certified EIR included a GHG analysis that included mitigation measures that will also include air quality co-benefits. In December 2022, CARB published the final 2022 Scoping Plan, California's roadmap to achieving carbon neutrality by 2045. The 2017 Approved Project includes a mitigation framework that results in net zero GHG emissions for the Newhall Ranch Resource Management Development Plan & Spineflower Conservation

Plan (RMDP/SCP), and as such, demonstrates alignment with the 2022 Scoping Plan.[1] The Scoping Plan specifically identifies Newhall Ranch within its discussion of projects that align with the State's climate goals and the Scoping Plan's framework for satisfying CEQA. Newhall is cited as an example of a project that demonstrates "an ability to design economically viable projects that create jobs, while contributing net-zero GHG emissions"[2] through its combination of on-site mitigation measures, local mitigation measures, and carbon offset credits from the voluntary market. In doing so, the State has identified Newhall as a leading example of net-zero project development in California.

## 1.3 Regulatory Measures (Quantified)

Regulatory Measures that have been incorporated into the analyses include the following.

- Compliance with SCAQMD Rule 403 regarding fugitive dust. The construction emission estimates include a fugitive dust control factor, which is a conservative representation of the level of fugitive dust control expected through compliance with South Coast Air Quality Management District (SCAQMD) Rule 403. Specifically, the Applicant or its successor shall implement control measures in accordance with SCAQMD Rule 403. The Applicant or its successor shall include in construction contracts the fugitive dust control measures in accordance with SCAQMD Rule 403. This analysis quantified the following aspects of compliance with SCAQMD Rule 403 (resulting in a 61 percent reduction of fugitive dust emissions during grading):
  - Watering active construction areas at least three times daily to minimize fugitive dust emissions[3]; and
  - Limiting vehicle speeds to 15 miles per hour or less in staging areas and on haul roads.
- Compliance with SCAQMD Rule 1113 regarding architectural coatings; the State-certified EIR's analysis assumed compliance with the version of the rule applicable at that time. The current analysis assumes compliance with the most recent version of the rule. This rule limits the volatile organic compound (VOC) content of architectural coatings used in the area under the jurisdiction of the SCAQMD. The rule provides various standards for the coating category.[4]
- Compliance with the California Energy Commission's (CEC) 2019 Building Energy Efficiency Standards (Title 24) are included in the operational energy use and emissions estimate for the Project.
- Heavy-duty Engines and Vehicles Fuel Efficiency Standards adopted by the United States Environmental Protection Agency (USEPA) and the National Highway Traffic Safety Administration (NHTSA) as described in Section 2.4.

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[1] CARB. November 2022. 2022 Scoping Plan, Appendix D: Local Actions. Page 20. Available at: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-d-local-actions.pdf. Accessed: June 2023.

[2] CARB. November 2022. 2022 Scoping Plan, Appendix D: Local Actions. Page 25. Available at: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-d-local-actions.pdf. Accessed: June 2023.

[3] SCAQMD. 2005. Rule 403. Fugitive Dust. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf. Accessed: April 2023.

[4] SCAQMD. 2016. Rule 1113. Architectural Coatings. Available at: http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf. Accessed: November 2021.

- The Pavley regulation mandating higher fuel efficiency standards for cars and light-duty vehicles and the Advanced Clean Cars (ACC) regulation, as included in the USEPA-approved EMFAC2017 model.

## 1.4 Proposed Project Design Features for the Modified Project

In addition to the previously approved mitigation, the following project design features are included as part of the Modified Project. Although all of these measures will be implemented as part of the Modified Project, conservatively, the air quality benefits of these measures (i.e., emission reductions) have not all have been quantified for purposes of this air quality analysis, as described in the parentheticals below:

**PDF-AQ-1:** During the Project's grading phase, 2010 or newer diesel haul trucks shall be used to transport on-site soil to the extent available. *(This measure will be binding on the Modified Project but the air quality benefits of this project design feature are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**PDF-AQ-2:** All off-road diesel-powered construction equipment greater than 50 horsepower shall meet Tier 4 emission standards, where available. At a minimum, all off-road diesel-powered construction equipment greater than 50 horsepower shall meet the Tier 3 emission standards for non-road diesel engines promulgated by the U.S. Environmental Protection Agency.

In addition, all off-road diesel-powered construction equipment shall be outfitted with Best Available Control Technology (BACT) devices certified by the California Air Resources Board (CARB), provided those devices are commercially available and: (1) achieve the standards of the California Division of Occupational Safety and Health (also known as Cal/OSHA); (2) are consistent with the construction equipment warranty requirements; (3) are compatible with equipment specifications of the construction equipment manufacturer; and (4) do not otherwise interfere with the proper functioning of the construction equipment. Any BACT devices used shall achieve emissions reductions that are equal to or greater than a Level 3 diesel emissions control strategy for a similarly-sized engine, as defined by California Air Resources Board (CARB) regulations, provided that the devices are commercially available and satisfy the four requirements enumerated above.

*(This measure will be binding on the Modified Project but the air quality benefits of this project design feature are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below)*

**PDF-AQ-3:** During the Project's construction contract bidding phase, each construction contractor shall be provided with informational materials regarding the South Coast Air Quality Management District's Surplus Off-Road Opt-In for $NO_X$ (SOON) Program. *(This measure will be binding on the Modified Project but the air quality benefits of this project design feature are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**PDF-AQ-4:** During the Project's construction phase, only street sweepers that are certified under Rule 1186 and Rule 1186.1 of the South Coast Air Quality Management District shall be used. *(This measure will be binding on the Modified Project but the air quality benefits of* *this project design feature are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**PDF-AQ-5:** During the Project's construction phase, electricity from on-site power poles shall be utilized where available (i.e., where accessible relative to the area of construction activity). In the event of an emergency or during a power outage, the use of generators shall be permissible. *(This measure will be binding on the Modified Project but the air quality benefits of this project design feature are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**PDF-AQ-6:** The Project shall install high-efficiency public street and area lighting. Area lighting is defined to include any private common space lighting (e.g., within or along parks, sidewalks, and landscaping) that is not otherwise regulated by the California Building Energy Efficiency Standards (Title 24). For purposes of this measure, the Project also may use solar-powered lighting in lieu of high-efficiency lighting. *(This measure will be binding on the Modified Project but the air quality benefits of this project design feature are conservatively not quantified for purposes of this analysis because electricity used for lighting does not result in Project-related criteria air pollutant emissions.)*

**PDF-AQ-7:** When residential appliances are offered by homebuilders, the Project shall install Energy Star appliances (specifically, clothes washers, clothes dryers, dish washers, fans, and refrigerators) in the single-family and multi-family residences. *(This measure will be binding on the Modified Project but the air quality benefits of this project design feature are conservatively not quantified for purposes of this analysis because electricity used for appliances does not result in Project-related criteria air pollutant emissions.)*

## 1.5 Adopted Mitigation Measures from the State-Certified EIR

The California Department of Fish and Wildlife (CDFW) previously adopted the following mitigation measures to minimize air quality impacts in connection with its adoption of the 2017 Approved Project and State-certified EIR. Where appropriate, italicized parentheticals are used to provide additional information and clarification regarding the implementation of a particular measure's requirements. Although all of these measures will be implemented as part of the Modified Project, conservatively, the air quality benefits of these measures (i.e., emission reductions) have not all have been quantified for purposes of this air quality analysis, as described in the parentheticals below.

**AQ-1:** Diesel-powered construction equipment shall use ultra-low sulfur diesel fuel, as defined in SCAQMD Rule 431.2. *(This measure would be achieved through regulatory compliance; specifically, compliance with SCAQMD Rule 431.2 would fulfill the requirements of this measure and no further action on this measure is required.)*

**AQ-2**: Develop a Construction Traffic Emission Management Plan to minimize emissions from vehicles including, but not limited to, scheduling truck deliveries to avoid peak hour traffic conditions, consolidating truck deliveries, and prohibiting truck idling in excess of 5 minutes. *(In part, this measure would be achieved through implementation of a traffic PDF requiring preparation of a Construction Traffic Management Plan (CTMP). This measure also would be achieved through regulatory compliance; specifically, compliance with CARB's airborne toxic control measure prohibiting diesel-fueled commercial vehicles from idling for* *more than five minutes would achieve the idling-prohibition requirements of this measure. No further action on this measure is required.)*

**AQ-3:** Suspend the use of all construction equipment during first-stage smog alerts. *(This measure will be binding on the Modified Project but the air quality benefits of this mitigation measure are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**AQ-4:** Use electricity or alternate fuels for on-site mobile equipment instead of diesel equipment to the extent feasible. *(This measure will be binding on the Modified Project but the air quality benefits of this mitigation measure are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**AQ-5:** Maintain construction equipment by conducting regular tune-ups according to the manufacturers' recommendations. *(This measure will be binding on the Modified Project but the air quality benefits of this mitigation measure are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**AQ-6:** Use electric welders to avoid emissions from gas or diesel welders, the extent feasible. *(This measure will be binding on the Modified Project but the air quality benefits of this mitigation measure are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**AQ-7:** Use on-site electricity or alternative fuels rather than diesel-powered or gasoline-powered generators, to the extent feasible. *(This measure will be binding on the Modified Project but the air quality benefits of this mitigation measure are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**AQ-8:** Prior to use in construction, the Project applicant will evaluate the feasibility of retrofitting the large off-road construction equipment that will be operating for significant periods. Retrofit technologies such as particulate traps, selective catalytic reduction, oxidation catalysts, air enhancement technologies, etc., will be evaluated. These technologies will be required if they are certified by CARB and/or the USEPA, and are commercially available and can feasibly be retrofitted onto construction equipment. *(This measure would be achieved through implementation of project design feature PDF-AQ-2 above, which identifies a retrofit technology and strategy that is consistent with the parameters of this measure. No further action on this measure is required.)*

**AQ-9:** Reduce Traffic speeds on all unpaved roads to 15 miles per hour or less. *(This measure would be achieved through regulatory compliance; specifically, compliance with SCAQMD Rule 403 would fulfill the requirements of this measure and no further action on this measure is required.)*

**AQ-10:** Water active sites at least three times daily during dry weather. *(This measure would be achieved through regulatory compliance; specifically, compliance with SCAQMD Rule 403 would fulfill the requirements of this measure and no further action on this measure is required.)*

**AQ-11:** Schedule construction activities that affect traffic flow to off-peak hours (e.g., between 7:00 PM and 6:00 AM, and between 10:00 AM and 3:00 PM). *(This measure would be achieved through implementation of the traffic PDF requiring preparation of a CTMP, and no further action on this measure is required.)*

**AQ-12:** Use construction equipment that complies with the requirements and compliance schedule of the adopted CARB Regulation for In-Use Off-Road Diesel Vehicles in effect at the time of use and use Tier 1 construction activities, only if Tier 2 or newer equipment is not available. *(This measure would be achieved through regulatory compliance; specifically, compliance with CARB's Regulation for In-Use Off-Road Diesel-Fueled Fleets would fulfill the requirements of this measure and no further action on this measure is required. Compliance with that regulation shall be demonstrated through the fleet's receipt of a CARB-issued certificate of reported compliance. See CCR Title 13, Section 2449(l). Further, this measure would be fulfilled through and exceeded by implementation of project design feature PDF-AQ-2. Therefore, no further action on this measure is required.)*

**AQ-12a:** Construction shall be planned in such a way as to minimize heavy construction activity involving the use of diesel-fueled construction equipment within 500 meters of an occupied residence to the extent practical. Heavy construction activity that occurs within 500 meters of an occupied residence that involves the use of diesel-fueled construction equipment shall prohibit non-essential idling and shall utilize equipment certified to the Tier 2 or newer emission standard. Equipment shall be routed in such a way as to minimize travel within 500 meters of an occupied residence to the extent practical. *(This measure will be binding on the Modified Project but the air quality benefits of this mitigation measure are conservatively not quantified for purposes of this analysis because construction emissions are not recalculated as part of the Supplemental EIR, as described further below.)*

**AQ-13:** All residential buildings on the applicant's land holdings that are facilitated by approval of the proposed Project shall be designed to provide improved insulation and ducting, low E glass, high efficiency air conditioning units, and radiant barriers in attic spaces, as needed, or equivalent to ensure that all residential buildings operate at levels fifteen percent (15%) better than the standards presently required by Title 24 (2008). (*This measure would be fulfilled through and exceeded by compliance with MM 2-1, provided in Section 2, Global Climate Change/Greenhouse Gas Emissions, of the State-certified EIR's Additional Environmental Analysis. No further action on this measure is required.)*

**AQ-14:** All commercial and public buildings on the applicant's land holdings that are facilitated by approval of the proposed Project shall be designed to provide improved insulation and ducting, low E glass, high efficiency HVAC equipment, and energy efficient lighting design with occupancy sensors or equivalent to ensure that all commercial and public buildings operate at levels fifteen percent (15%) better than the standards presently required by Title 24 (2008). Notwithstanding this measure, all nonresidential buildings shall be designed to comply with the then-operative Title 24 standards applicable at the time building permit applications are filed. For example, if new standards are adopted that supersede the 2008 Title 24 standards, the nonresidential buildings shall be designed to comply with those newer standards and, if necessary, exceed those standards by an increment that is equivalent to a 15-percent exceedance of the 2008 Title 24 standards. *(This measure would be fulfilled through and exceeded by MM 2-2, provided in Section 2, Global Climate Change/Greenhouse Gas Emissions, of the State-certified EIR's Additional Environmental Analysis. No further action on this measure is required.)*

**AQ-15:** The applicant shall produce or purchase renewable electricity equivalent to the installation of 2.0 kilowatt (kW) photovoltaic systems on all single-family detached residential units in the Specific Plan and Entrada planning areas that are facilitated by the approval of the proposed Project. 2.0 kW is roughly equivalent to the amount of electricity used annually by a single-family home. In lieu of this requirement and at the applicant's option, prior to the start of construction of any new phase of any individual subdivision on the Specific Plan or Entrada planning areas, the applicant shall secure carbon dioxide ($CO_2$) equivalent offsets or credits, similar to the $CO_2$ equivalent reduction that would be provided by the use the renewable electricity sources described above, from either: a) the Climate Action Reserve (CAR) or the California Climate Action Registry, or b) the Chicago Climate Exchange (CCX). Alternatively, and at the applicant's option, the applicant may pay the equivalent amount of funds that would be due to buy credits from the Climate Action Reserve (CAR) or the CCX to the SCAQMD for greenhouse gas emission mitigation purposes. In addition to the implementation of one of the electricity generation/greenhouse gas emission reduction measures described above, the use of individual photovoltaic systems shall be considered when undertaking the design and construction of all single-family detached residential units. *(This measure would be fulfilled through and exceeded by compliance with MM 2-1, provided in Section 2, Global Climate Change/Greenhouse Gas Emissions, of the State-certified EIR's Additional Environmental Analysis. No further action on this measure is required.)*

**AQ-16:** The applicant shall produce or purchase renewable electricity equivalent to the installation of photovoltaic systems on non-residential buildings on the Project site capable of producing 1,920 kW of electricity. In lieu of this requirement and at the applicant's option, prior to the start of construction of any phase of any individual subdivision on the Project sire that contains nonpresidential land uses, the applicant shall secure $CO_2$ equivalent to the offsets or credits, similar to the $CO_2$ equivalent reduction that would be provided by the use the renewable electricity sources described above, from either: a) the Climate Action Reserve (CAR) or the California Climate Action Registry, or b) the Chicago Climate Exchange (CCX). Alternatively, and at the applicant's option, the applicant may pay the equivalent amount of funds that would be due to buy credits from the CAR or the CCX to the SCAQMD for greenhouse gas mitigation purposes. In addition to the implementation of one of the electricity generation/greenhouse gas emission reduction measures described above, the installation of individual photovoltaic systems shall be considered when undertaking the design and construction of non-residential buildings on the Project site. *(This would be fulfilled through and exceeded by compliance with MM 2-2, provided in Section 2, Global Climate Change/Greenhouse Gas Emissions, of the State-certified EIR's Additional Environmental Analysis. No further action on this measure is required.)*

In addition, Section 2, Global Climate Change/Greenhouse Gas Emissions, of the State-certified EIR's Additional Environmental Analysis provided a comprehensive analysis of the 2017 Approved Project's GHG emissions. The State-certified EIR process culminated with the CDFW's adoption of a comprehensive mitigation framework for the attainment of net zero GHG emissions. The mitigation framework includes Mitigation Measures (MM) 2-1 through 2-13, as well as a Project Applicant-Proposed Supplemental Commitment that was incorporated into the adopted Mitigation Monitoring and Reporting Program (MMRP). Mitigation Measures 2-1 through 2-13 require the following overall GHG reduction strategies: zero net energy development; zero emission transportation; transportation demand management; reduction of construction and vegetation change emissions; and operational carbon neutrality.

The adopted GHG mitigation measures will result in corresponding air quality co-benefits, as described below. (The following descriptions highlight the air quality co-benefits of the GHG mitigation measures; please refer to the State-certified EIR's MMRP for the full text of the measures referenced below.)

**MM 2-1:** Residential Zero Net Energy: 2-1 requires the Project's residential development to achieve Zero Net Energy (ZNE) design. The improved energy efficiency required to achieve ZNE would reduce natural gas usage and thus reduce AQ emissions.

**MM 2-2:** Non-Residential Zero Net Energy: 2-2 requires the Project's non-residential development to achieve ZNE design. The improved energy efficiency required to achieve ZNE would reduce natural gas usage and thus reduce AQ emissions.

**MM 2-3**: Solar Swimming Pool Heating: 2-3 requires the use of solar water heaters for swimming pools located at private recreation centers. The use of solar water heaters would reduce natural gas usage and thus reduce AQ emissions.

**MM 2-4:** Residential Zero Emission Vehicle Incentives: 2-4 requires the installation of electric vehicle (EV) chargers in homes and provision of subsidies to residents toward the purchase of Zero Emission Vehicles (ZEVs). ZEVs do not produce tailpipe emissions, so criteria air pollutant emissions are reduced compared to conventional gasoline or diesel vehicles.

**MM 2-5:** On-Site Electric Vehicle Chargers: 2-5 requires the installation of on-site electric vehicle (EV) charging stations based on the number of the Project's commercial parking spaces. EVs do not produce tailpipe emissions when running on electric power, so criteria air pollutant emissions are reduced compared to conventional gasoline or diesel vehicles.

**MM 2-6:** Transportation Demand Management Plan: 2-6 requires implementation of a Transportation Demand Management (TDM) Plan to reduce vehicle miles traveled (VMT). Reductions in VMT result in corresponding decreases in vehicle-related AQ emissions.

**MM 2-7:** Traffic Signal Synchronization: 2-7 implements traffic signal synchronization to reduce traffic congestion. Reductions in congestion reduce tailpipe emissions are expected, as free flowing traffic has lower emissions than congested traffic.

**MM 2-8:** Zero Emission School Bus: 2-8 will provide funding to purchase zero emission school buses. Reductions in AQ emissions are expected from replacing a compressed natural gas (CNG) school bus with a zero emission school bus.

**MM 2-9:** Zero Emission Transit Bus: 2-9 will provide funding to purchase zero emission transit buses. Reductions in AQ emissions are expected from replacing a CNG transit bus with a zero emission transit bus.

**MM 2-10:** GHG Reduction Plan (Construction-Related Emissions): 2-10 requires the Project to directly undertake or fund Direct Reduction Activities or obtain and retire Carbon Offsets to reduce all construction and vegetation GHG emissions to zero. Because the exact programs associated with the Direct Reduction Activities and Carbon Offsets are not yet specified, it would be speculative to quantify the air quality co-benefits. However, it is likely that some of the programs will reduce AQ emissions either in the South Coast Air Basin or elsewhere where implemented.

**MM 2-11:** Building Retrofits: 2-11 requires off-site building retrofits in disadvantaged communities within Los Angeles County. Because the exact retrofits are not yet specified, it would be speculative to quantify air quality co-benefits. However, it is likely that the retrofits under this measure will reduce AQ emissions. For example, swimming pool covers would reduce the amount of natural gas combusted and thus reduce AQ emissions.

**MM 2-12:** Off-Site Electric Vehicle Chargers: 2-12 requires the installation of off-site EV charging stations based on the number of the Project's commercial parking spaces. EVs do not produce tailpipe emissions when running on electric power, so criteria air pollutant emissions are reduced compared to conventional gasoline or diesel vehicles.

**MM 2-13:** GHG Reduction Plan (Operational-Related Emissions): 2-13 requires the Project to directly undertake or fund Direct Reduction Activities or obtain and retire Carbon Offsets to reduce all operational GHG emissions to zero for the life of the Project. Because the exact programs associated with the Direct Reduction Activities and Carbon Offsets are not yet specified, it would be speculative to quantify air quality co-benefits. However, it is likely that some of the programs under this measure will reduce AQ emissions either in the South Coast Air Basin or elsewhere where implemented.

**Supplemental Commitment** – Additional EV Chargers: The supplemental commitment requires the installation of additional EV charging stations in the Southern California Association of Government (SCAG) region. EVs do not produce tailpipe emissions when running on electric power, so criteria air pollutant emissions are reduced compared to conventional gasoline or diesel vehicles.

## 1.6 Report Overview

The remainder of this report includes Environmental and Regulatory Setting (Section 2); Criteria Air Pollutant Emissions Inventory (Section 3); and Other Air Quality Evaluations (Section 4). In addition, four appendices are included, Appendix A (CalEEMod® Output Files), Appendix B (Traffic data from Stantec), Appendix C (Excerpts from the AEA), and Appendix D (Fugitive dust plan which highlights fugitive dust control measures in accordance with SCAQMD Rule 403).

# 2. ENVIRONMENTAL AND REGULATORY SETTING

## 2.1 Environmental Setting

### 2.1.1 Climate and Meteorology

Climate within the South Coast Air Basin (SCAB) is determined by its terrain and geographical location. The SCAB is a coastal plain with connecting broad valleys and low hills. The Pacific Ocean forms the southwestern border, and high mountains surround the rest of the SCAB. The region lies in the semi-permanent high-pressure zone of the eastern Pacific. The resulting climate is mild and tempered by cool ocean breezes. It maintains moderate temperatures and comfortable humidity, and limits precipitation to a few storms during the winter-wet season. This weather pattern is rarely interrupted. However, periods of extremely hot weather, winter storms, or Santa Ana winds do exist.

Although the SCAB has a semi-arid climate, air near the surface is generally moist because of the presence of a shallow marine layer. With very low average wind speeds, there is a limited capacity to disperse air contaminants horizontally. The typical wind flow pattern fluctuates only with occasional winter storms or strong north-easterly Santa Ana winds from the mountains and deserts northeast of the SCAB. Summer wind flow patterns represent worst-case conditions, as this is the period of higher temperatures and more sunlight, which results in ozone formation.

### 2.1.2 Local Air Quality Monitoring Data

The Project site is located within the SCAQMD jurisdiction. The SCAQMD maintains ambient air quality monitoring stations throughout the SCAB. The Santa Clarita Valley air monitoring station is the station closest to the Project site. The Santa Clarita Valley air monitoring station monitors carbon monoxide (CO), nitrogen dioxides ($NO_2$), ozone ($O_3$), and $PM_{10}$. However, $PM_{2.5}$ and sulfur dioxide ($SO_2$) are not monitored at this station. As a result, the $PM_{2.5}$ from the West San Fernando Valley station and $SO_2$ concentrations from Central LA, are shown since this monitor is the next closest to the Project site with such data.[5]

**Table 2-1** lists published data for calendar years 2017 – 2020 at the Santa Clarita Valley monitoring station for CO, $NO_2$, $O_3$, and $PM_{10}$, at the West San Fernando Valley station for $PM_{2.5}$, and at the Central LA for $SO_2$ and $PM_{2.5}$ which shows:

- $O_3$ levels have exceeded the State 1-hour, 8-hour standards and the federal standard in each of these four years;
- CO levels are below the State and federal standards;
- $NO_2$ levels are below the State and federal standards;
- $SO_2$ levels are below the State and federal standards;
- $PM_{10}$ levels exceeded the State 24-hour standard in 2017 and 2019, and the State annual standards in 2017, 2018, and 2020; $PM_{10}$ levels are below the federal 24-hour standard; and

[5] The SCAQMD West San Fernando Valley station is at approximately the same distance from the site as compared to the East San Fernando Valley station, and measured lower $PM_{2.5}$ concentration. Therefore, East San Fernando Valley station was conservatively chosen for $PM_{2.5}$ background concentration.

$PM_{2.5}$ levels are below the federal 24-hour standard and the State and federal annual standards.

### 2.1.3 Health Risks within the Air Basin

The following section discusses background mobile emissions within the SCAB to help inform the decision-makers and the public. SCAQMD has conducted several phases of the Multiple Air Toxics Exposure Study (MATES) to characterize health risks potentially posed by toxic air contaminants (TACs) in the SCAB. The first such study (MATES-I) was conducted in 1987. During 1998-1999, MATES-II was conducted as part of the Environmental Justice Initiatives adopted by SCAQMD's Governing Board in October 1997. MATES-II was a landmark urban air toxics monitoring and evaluation study that included a comprehensive monitoring program, compilation of an updated TAC emissions inventory, and urban and local scale air quality modeling to characterize SCAB risk.[6]

During 2004-2006, SCAQMD conducted the MATES-III study. In September 2008, SCAQMD released a final MATES-III report.[7] Based on these data, SCAQMD estimated that basin wide cancer risk was about 1,200 in a million, with TACs from mobile sources accounting for 94% of this risk on average. SCAQMD also conducted air quality modeling to calculate TAC concentrations and thus risk throughout the basin for 2005. Interactive maps showing model-calculated cancer risks are available on SCAQMD's website.[8] Note that as described in the MATES-III Final Report[9], "the assumptions [made in the Study] are consistent with current scientific knowledge, but are often designed to be conservative and on the side of health protection in order to avoid underestimation of public health risks…Thus the risk estimates should not be interpreted as actual rates of disease in the exposed population, but rather as estimates of potential risk, based on current knowledge and a number of assumptions."

In August 2021, SCAQMD released the final MATES-V report which showed that estimated Basin-wide population weighted cancer risk has decreased approximately 54% since MATES IV.[10] The report concludes that DPM dominates the overall cancer risk from air toxics, and the highest risks occur near ports and transportation corridors. Based on MATES-V, an

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[6] SCAQMD. 2000. "Multiple Air Toxics Exposure Study (MATES-II)." Final Report. South Coast Air Quality Management District, Diamond Bar, California. March. Available at: http://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-ii. Accessed: November 2021.

[7] SCAQMD. 2008. "Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES-III)." Final Report. South Coast Air Quality Management District, Diamond Bar, California. September. Available at: https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iii/mates-iii-final-report. Accessed: November 2021.

[8] SCAQMD. 2008. "Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES-III)." MATES III Interactive Carcinogenicity Map. Available at: http://www3.aqmd.gov/webappl/matesiii/. Accessed: November 2021.

[9] SCAQMD. 2008. MATES III Final Report. Available at: https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iii/mates-iii-final-report. Accessed: November 2021.

[10] SCAQMD. 2021. MATES V Final Report. Available at: http://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-v. Accessed: November 2021.

interactive map showing model-calculated cancer risks estimates that TAC-related cancer risk in the Modified Project area ranges from 239 to 316 in a million.[11]

## 2.2 Criteria Air Pollutants

Criteria air pollutants are defined as pollutants for which the federal and state governments have established ambient air quality standards, or criteria, for outdoor concentrations to protect public health. The federal and state standards have been set, with an adequate margin of safety, at levels above which concentrations could be harmful to human health and welfare. These standards are designed to protect the most sensitive people from illness or discomfort. Pollutants of concern include $O_3$, $NO_2$, CO, $SO_2$, $PM_{10}$, $PM_{2.5}$, and lead.[12] In California, sulfates, vinyl chloride, hydrogen sulfide, and visibility-reducing particles are also regulated as criteria air pollutants. These pollutants are discussed in the following paragraphs.

### 2.2.1 Ozone

Ozone is a colorless gas that is formed in the atmosphere when volatile organic compounds (VOCs), sometimes referred to as reactive organic gases, and $NO_x$ react in the presence of ultraviolet sunlight. $O_3$ is not a primary pollutant; it is a secondary pollutant formed by complex interactions of two pollutants directly emitted into the atmosphere. The primary sources of VOCs and $NO_X$, the precursors of $O_3$, are automobile exhaust and industrial sources. Meteorology and terrain play major roles in $O_3$ formation, and ideal conditions occur during summer and early autumn on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies. Short-term exposures (lasting for a few hours) to $O_3$ at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes.

### 2.2.2 Nitrogen Dioxide

Most $NO_2$, like $O_3$, is not directly emitted into the atmosphere but is formed by an atmospheric chemical reaction between nitric oxide (NO) and atmospheric oxygen. NO and $NO_2$ are collectively referred to as $NO_X$ and are major contributors to $O_3$ formation. The primary sources of NO, the precursor to $NO_2$, include automobile exhaust and industrial sources. High concentrations of $NO_2$ can cause breathing difficulties and result in a brownish-red cast to the atmosphere, causing reduced visibility. There is some indication of a relationship between $NO_2$ and chronic pulmonary fibrosis, and some increase in bronchitis in children (2 and 3 years old) has also been observed at concentrations below 0.3 parts per million by volume (ppm).

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[11] SCAQMD, "Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES-V)," MATES-V Data Visualization Dashboard Interactive Cancer Risk Map. 2021. https://experience.arcgis.com/experience/79d3b6304912414bb21ebdde80100b23/page/Main-Page/?data_id=dataSource_105-a5ba9580e3aa43508a793fac819a5a4d%3A225&views=Click-tabs-for-other-data%2CCancer-Risk. Accessed: October 2023.

[12] Combustion sources inside buildings include unvented kerosene and gas space heaters, woodstoves, fireplaces, and gas stoves. These sources have the potential to generate criteria air pollutants with respiratory health impacts inside of the buildings, namely carbon monoxide, nitrogen dioxide, and particulate matter. Additional details on the health and emission impacts of combustion sources are available at: https://www.epa.gov/indoor-air-quality-iaq/sources-combustion-products. Accessed: May 2023.

### 2.2.3 Carbon Monoxide

CO is a colorless and odorless gas formed by the incomplete combustion of fossil fuels. CO is emitted almost exclusively from motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains. In urban areas, such as the project location, automobile exhaust accounts for the majority of CO emissions. CO is a non-reactive air pollutant that dissipates relatively quickly; therefore, ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions, primarily wind speed, topography, and atmospheric stability. CO from motor vehicle exhaust can become locally concentrated when surface-based temperature inversions are combined with calm atmospheric conditions, a typical situation at dusk in urban areas between November and February. The highest levels of CO typically occur during the colder months of the year when inversion conditions, where a layer of warm air sits atop cool air, are more frequent and can trap pollutants close to the ground. In terms of health, CO competes with oxygen, often replacing it in the blood, thus reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can be dizziness, fatigue, and impairment of central nervous system functions.

### 2.2.4 Sulfur Dioxide

$SO_2$ is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. The main sources of $SO_2$ are coal and oil used in power plants and industries; as such, the highest levels of $SO_2$ are generally found near large industrial complexes. In recent years, $SO_2$ concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of $SO_2$ and limits placed on the sulfur content of fuels. $SO_2$ is an irritant gas that attacks the throat and lungs, and can cause acute respiratory symptoms and diminished ventilator function in children. $SO_2$ can also yellow plant leaves and erode iron and steel.

### 2.2.5 Particulate Matter

Particulate matter (PM) pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter can form when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. $PM_{2.5}$ and $PM_{10}$ represent fractions of particulate matter. Fine particulate matter, or $PM_{2.5}$, is roughly 1/28 the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (e.g., motor vehicles, power generation, and industrial facilities), residential fireplaces, and woodstoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur oxides ($SO_X$), $NO_X$, and VOCs. Inhalable or coarse particulate matter, or $PM_{10}$, is about one- seventh the thickness of a human hair. Major sources of $PM_{10}$ include crushing or grinding operations; dust stirred up by vehicles traveling on roads; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions.

$PM_{2.5}$ and $PM_{10}$ pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. $PM_{2.5}$ and $PM_{10}$ can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Very small particles of substances such as lead, sulfates, and nitrates can cause lung damage directly or be absorbed into the bloodstream, causing damage elsewhere in the body. Additionally, these substances can transport absorbed gases, such as chlorides or ammonium, into the lungs, also causing injury. Whereas $PM_{10}$ tends to collect in the upper portion of the respiratory system, $PM_{2.5}$ is so tiny that it can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, as well as produce haze and reduce regional visibility.

### 2.2.6 Lead

Lead (Pb) in the atmosphere occurs as particulate matter. Sources of lead include leaded gasoline, the manufacturing of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters. Prior to 1978, mobile emissions were the primary source of atmospheric lead. Between 1978 and 1987, the phase-out of leaded gasoline reduced the overall inventory of airborne lead by nearly 95%. With the phase-out of leaded gasoline, secondary lead smelters, battery recycling, and manufacturing facilities are becoming lead-emission sources of greater concern.

Prolonged exposure to atmospheric lead poses a serious threat to human health. Health effects associated with exposure to lead include gastrointestinal disturbances, anemia, kidney disease, and in severe cases, neuromuscular and neurological dysfunction. Of particular concern are low-level lead exposures during infancy and childhood. Such exposures are associated with decrements in neurobehavioral performance, including intelligence quotient performance, psychomotor performance, reaction time, and growth.

### 2.2.7 Sulfates

Sulfates are the fully oxidized form of sulfur, which typically occur in combination with metals or hydrogen ions. Sulfates are produced from reactions of $SO_2$ in the atmosphere. Sulfates can result in respiratory impairment, as well as reduced visibility.

### 2.2.8 Vinyl Chloride

Vinyl chloride is a colorless gas with a mild, sweet odor, which has been detected near landfills, sewage plants, and hazardous waste sites, due to the microbial breakdown of chlorinated solvents. Short-term exposure to high levels of vinyl chloride in air can cause nervous system effects, such as dizziness, drowsiness, and headaches. Long-term exposure through inhalation can cause liver damage, including liver cancer.

### 2.2.9 Hydrogen Sulfide

Hydrogen sulfide is a colorless and flammable gas that has a characteristic odor of rotten eggs. Sources of hydrogen sulfide include geothermal power plants, petroleum refineries, sewers, and sewage treatment plants. Exposure to hydrogen sulfide can result in nuisance odors, as well as headaches and breathing difficulties at higher concentrations.

### 2.2.10 Visibility-Reducing Particles

Visibility-reducing particles are any particles in the air that obstruct the range of visibility. Effects of reduced visibility can include obscuring the view shed of natural scenery, reduced airport safety, and discouraging tourism. Sources of visibility-reducing particles are the same as for $PM_{2.5}$ described above.

## 2.3 Non-Criteria Air Pollutants

### 2.3.1 Toxic Air Contaminants

A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure, or acute and/or chronic non-cancer health effects. A toxic substance released into the air is considered a TAC.

Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources such as automobiles; and area sources such as landfills. Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and non-carcinogenic effects. Non-carcinogenic effects typically affect one or more target organ systems and may be experienced either on short-term (acute) or long-term (chronic) exposure to a given TAC.

### 2.3.2 Diesel Particulate Matter

Diesel particulate matter (DPM) is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is composed of two phases, gas and particle, both of which contribute to health risks. CARB classified "particulate emissions from diesel-fueled engines" (DPM; 17 CCR 93000) as a TAC in August 1998. DPM is emitted from a broad range of diesel engines: on-road diesel engines of trucks, buses, and cars, and off-road diesel engines including locomotives, marine vessels, and heavy-duty construction equipment, among others. Diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State of California as a known carcinogen (California Environmental Protection Agency [Cal/EPA]).[13] Under California regulatory guidelines, DPM is used as a surrogate measure of exposure for the mixture of chemicals that make up diesel exhaust as a whole. The majority of all airborne cancer risk in the SCAB is associated with DPM , as described in Section 2.1.3. Exposure to DPM also may be a health hazard, particularly to children whose lungs are still developing and the elderly who may have other serious health problems. DPM levels and resultant potential health effects may be higher in close proximity to heavily traveled roadways with substantial truck traffic or near industrial facilities. According to CARB, DPM exposure may lead to the following adverse health effects: (1) aggravated asthma; (2) chronic bronchitis; (3) increased respiratory and cardiovascular hospitalizations; (4) decreased lung function in children; (5) lung cancer; and (6) premature deaths for people with heart or lung disease.[14,15]

## 2.4 Regulatory Setting

### 2.4.1 Federal and State Ambient Air Quality Standards for Criteria Air Pollutants

The Federal Clean Air Act (CAA) requires the adoption of national ambient air quality standards (NAAQS), which are periodically updated, to protect the public health and welfare from the effects of air pollution. Current federal standards are set for $SO_2$, CO, $NO_2$, $O_3$, $PM_{10}$, $PM_{2.5}$, and Pb.[16]

[13] Cal/EPA. 1998. Findings of the Scientific Review Panel on The Report on Diesel Exhaust. April. Available at: https://ww3.arb.ca.gov/toxics/dieseltac/de-fnds.htm. Accessed: November 2021.

[14] CARB. 2019. Overview: Diesel Exhaust & Health. Available at: https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health . Accessed: November 2021.

[15] CARB. 2008. Fact Sheet: Diesel Particulate Matter Health Risk Assessment Study for the West Oakland Community: Preliminary Summary of Results, March 2008. Available at:https://ww2.arb.ca.gov/sites/default/files/classic/ch/communities/ra/westoakland/documents/factsheet112508.pdf. Accessed: April 2023.

[16] NAAQS. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed: November 2021.

The State of California also has established additional standards, known as the California Ambient Air Quality Standards (CAAQS),[17] which are generally more restrictive than the NAAQS. The current NAAQS and CAAQS are shown in **Table 2-2**.

Specific geographic areas are classified as either "attainment" or "non-attainment" areas for each pollutant based upon the comparison of measured data with the NAAQS and CAAQS. Those areas designated as "non-attainment" for purposes of NAAQS compliance are required to prepare regional air quality plans, which set forth a strategy for bringing an area into compliance with the standards. These regional air quality plans developed to meet federal requirements are included in an overall program referred to as the State Implementation Plan (SIP).

Whenever the USEPA revises or establishes a new NAAQS, the State and the USEPA have specific obligations to ensure that the NAAQS is met.[18] These are listed below:

- The USEPA must designate areas as meeting (attainment areas) or not meeting (non-attainment areas) the NAAQS within two years after its promulgation.
- States must submit "infrastructure SIPs" to show that they have the basic air quality management program components in place to implement the NAAQS within three years after its promulgation.
- States must submit non-attainment area SIPs that outline the strategies and emission control measures that will improve air quality and make the area meet the NAAQS within 18 to 36 months after designation.

The steps involved in the SIP process are described below.[19]

- SIPs must be developed with public input and be formally adopted by the state and submitted to the USEPA by the Governor's designee (CARB in California).
- The USEPA reviews each SIP and proposes to approve or disapprove all or part it. The public is then provided with an opportunity to comment on the USEPA's proposed action. The USEPA considers public input before taking final action on a state's plan.
- If the USEPA approves all or part of a SIP, those control measures are enforceable in federal court. In the event a state fails to submit an approvable SIP or if the USEPA disapproves a SIP, the USEPA is required to develop a Federal Implementation Plan (FIP).

**Table 2-3** summarizes the attainment status of Los Angeles County for the pollutants regulated by the NAAQS and CAAQS.[20] As seen in **Table 2-3**, Los Angeles County is currently in attainment (or unclassified or maintenance) for: the federal 24-hour $PM_{10}$ standard, the federal and State CO standards, the federal and State $NO_2$ standards, the federal and State $SO_2$ standards, and the State hydrogen sulfide, vinyl chloride, sulfates, and

[17] CAAQS. Available at: www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed: November 2021.

[18] USEPA. State Implementation Plan Development Process. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-implementation-process. Accessed: November 2021.

[19] USEPA. State Implementation Plan Development Process. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-implementation-process. Accessed: November 2021.

[20] USEPA. The Green Book Non-Attainment Areas for Criteria Pollutants. Available at: https://www.epa.gov/green-book. Accessed: November 2021.

visibility-reducing particles standards. However, as also shown in **Table 2-3**, Los Angeles County is currently designated as nonattainment for the federal and State $O_3$ standards, the State $PM_{10}$ standards, the federal and State $PM_{2.5}$ standards, and the federal Pb standards.[21,22,23]

### 2.4.2 Federal Hazardous Air Pollutants Program

The 1977 CAA Amendments required the USEPA to identify National Emissions Standards for Hazardous Air Pollutants (NESHAPs) to protect the public health and welfare. Hazardous air pollutants include certain VOCs, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. Under the 1990 CAA Amendments, which expanded the control program for hazardous air pollutants, 189 substances and chemical families were identified as hazardous air pollutants.

### 2.4.3 California's Air Toxics Program

The state Air Toxics Program was established in 1983 under Assembly Bill (AB) 1807 (Tanner). The California TAC list identifies more than 700 pollutants, of which carcinogenic and non-carcinogenic toxicity criteria have been established for a subset of these pollutants pursuant to the California Health and Safety Code. In accordance with AB 2728, the state list includes the (federal) hazardous air pollutants.

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; however, AB 2588 does not reduce the quantity of air toxics emissions. Instead, under AB 2588, TAC emissions from individual facilities are quantified and prioritized. "High-priority" facilities are required to perform a health risk assessment, and if specific thresholds are exceeded, are required to communicate the results to the public in the form of notices and public meetings.

In 2000, CARB approved a comprehensive Diesel Risk Reduction Plan to reduce diesel emissions from both new and existing diesel-fueled vehicles and engines. The plan is anticipated to result in an 80% decrease in statewide diesel health risk in 2020 compared with the diesel risk in 2000. Additional regulations apply to new trucks and diesel fuel, including the On-Road Heavy Duty Diesel Vehicle (In-Use) Regulation, the On-Road Heavy Duty (New) Vehicle Program, the In-Use Off-Road Diesel Vehicle Regulation, and the New Off-Road Compression-Ignition (Diesel) Engines and Equipment program. All of these regulations and programs have timetables by which manufacturers must comply and existing operators must upgrade their diesel-powered equipment. There also are several Airborne Toxic Control Measures that reduce diesel emissions, including In-Use Off-Road Diesel-Fueled Fleets (13 CCR 2449 et seq.) and In-Use On-Road Diesel-Fueled Vehicles (13 CCR 2025).

### 2.4.4 California Health and Safety Code Section 41700

This section of the Health and Safety Code states that a person shall not discharge from any source whatsoever quantities of air contaminants or other material that cause injury,

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[21] USEPA. The Green Book Non-Attainment Areas for Criteria Pollutants, Available at: https://www.epa.gov/green-book. Accessed: November 2021.

[22] California standard attainment status based on CARB website. Available at: http://www.arb.ca.gov/desig/adm/adm.htm. Accessed: November 2021.

[23] SCAQMD. 2016. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin. February. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf. Accessed: November 2021.

detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property. This section also applies to sources of objectionable odors.

### 2.4.5 Federal Heavy-duty Engines and Vehicles Fuel Efficiency Standards

On August 9, 2011, the USEPA and the NHTSA announced fuel economy and greenhouse gas (GHG) standards for medium- and heavy-duty trucks. USEPA and NHTSA have adopted standards for $CO_2$ emissions and fuel consumption, respectively, tailored to each of three main vehicle categories: combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles.

The implementation of this program was adopted in two phases. Phase 1 was adopted in 2011, which applied to vehicles from model year 2014-2018.[24] This phase was intended to reduce fuel use and GHG emissions from medium and heavy-duty vehicles, semi-trucks, pickup trucks and vans, and all work trucks and buses. According to USEPA, this program will reduce GHG emissions and fuel consumption for affected vehicles by 9 percent to 23 percent over the 2010 baselines. Phase 2 was adopted in 2016 for medium- and heavy-duty trucks for model years 2018 and beyond.[25] This phase was intended to include technology-advancing standards that substantially reduce GHG emissions and fuel consumption resulting in an ambitious, yet achievable, program that will allow manufacturers to meet the applicable standards over time, at reasonable cost, through a mix of different technologies. For semi-trucks, large pickup trucks, vans, and other trucks, phase 2 standards will be phased in beginning with model year 2021 and culminating with model year 2027. While this regulation focuses on the reduction of GHG emissions, it is anticipated that this regulation would also help reduce criteria air pollutants.

The emissions reductions for Phase 1 and Phase 2 of this regulation were both included in the project emissions inventory, as they are incorporated into EMFAC2017 (described further below).

On January 6, 2020, the USEPA announced plans to undertake a new rulemaking – the Cleaner Trucks Initiative (CTI) – to update standards for $NO_x$ from highway heavy-duty vehicles and engines.[26] As of this writing, these standards have not been promulgated.

### 2.4.6 California's Pavley Standards

Assembly Bill 1493 ("the Pavley Standard" or AB 1493) required CARB to adopt regulations by January 1, 2005, to reduce GHG emissions from non-commercial passenger vehicles and light-duty trucks of model year 2009 through 2016.

CARB's approach to passenger vehicles (cars and light trucks), under AB 1493, combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of standards. This new approach also includes efforts to support and accelerate the numbers of plug-in hybrids and zero-emission vehicles in California. These standards will apply to all

[24] USEPA, Office of Transportation and Air Quality. 2011. Available at: https://www.gpo.gov/fdsys/pkg/FR-2011-09-15/pdf/2011-20740.pdf. Accessed: November 2021.

[25] USEPA, Office of Transportation and Air Quality. 2016. Available at: https://www.govinfo.gov/content/pkg/FR-2016-10-25/pdf/2016-21203.pdf. Accessed: November 2021.

[26] USEPA. 2019. Available at: https://www.epa.gov/sites/default/files/2020-10/documents/cti-overview-govt-ind-2020-01-22.pdf. Accessed: November 2021.

passenger and light duty trucks used by customers, employees of and deliveries to the Proposed Project. While AB 1493 focuses on the reduction of GHG emissions, it is anticipated that this regulation would also help reduce criteria air pollutants.

### 2.4.7 California's Advanced Clean Cars

In January 2012, CARB approved the ACC program, a new emissions-control program for model year 2017 through 2025. The program combines the control of smog, soot, and GHGs with requirements for greater numbers of zero-emission vehicles. By 2025, when the rules will be fully implemented, the new automobiles will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions. While ACC focuses on the reduction of GHG emissions, it is anticipated that this regulation would also help reduce criteria air pollutants.[27]

On September 27, 2019, the USEPA and NHTSA published the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One.[28] The SAFE rule (Part One) went into effect in November 2019, and revoked California's authority to set its own GHGs standards and set zero emission vehicle mandates in California. In December 2021, the National Highway Traffic Safety Administration repealed the SAFE rule and its withdrawal of California's Clean Air Act preemption waiver. [29]

In September 2020, CARB held a public workshop to solicit input on its development of the Advanced Clean Cars II regulations, which will seek to reduce criteria and greenhouse gas emissions from new light- and medium-duty vehicles beyond the 2025 model year, and increase the number of zero emission vehicles for sale. In February 2021, the State Auditor issued a report that CARB had not adequately supported the cost-effectiveness of its electric vehicle incentive programs relative to its regulatory programs, to which CARB responded with measures intended to address the findings.[30] In February 2021, the D.C. Circuit Court of Appeal granted the Biden administration's motion to stay litigation over Part 1 of the SAFE Rule, which had rescinded the waiver EPA granted California to regulate vehicle GHG emissions and to implement a zero emission vehicle program. CARB passed the Advanced Clean Cars II regulations in November 2022.[31]

### 2.4.8 California's Diesel Emissions Control Measures

CARB has adopted a number of Airborne Toxic Control Measures (ATCMs) to control diesel particulate emissions and emissions from in-use on- and off-road diesel-fueled vehicles. With the assistance of the Advisory Committee and its subcommittees, CARB developed and

[27] Note that in September, 2019, the Trump Administration announced that the USEPA would withdraw the Clean Air Act preemption waiver it granted to the State of California in January 2013 as it relates to California's GHG and ZEV programs. Available at: https://www.epa.gov/newsreleases/trump-administration-announces-one-national-program-rule-federal-preemption-state-fuel. Accessed: September 2019..

[28] One National Program. (84 Fed. Reg. 51,310 (Sept. 27, 2019.) Available at: https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-one-national-program-federal-preemption-state. Accessed: November 2021.

[29] US Department of Transportation. Corporate Average Fuel Economy (CAFÉ) Preemption (49 CFR Parts 531 and 533). Available at: https://perma.cc/RKK2-F7ZR. Accessed: April 2023.

[30] Auditor of the State of California. CARB: Improved Program Management Would Help California Work More Strategically to Meet Its Climate Change Goals. Available at: http://auditor.ca.gov/pdfs/reports/2020-114.pdf?mc_cid=d8efa40eae&mc_eid=d16aa0f2e1. Accessed: November 2021.

[31] CARB. Advanced Clean Cars II Regulations. Available at: https://ww2.arb.ca.gov/rulemaking/2022/advanced-clean-cars-ii. Accessed: February 2023.

approved the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*[32] and the *Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines*.[33] Various control measures adopted by CARB to reduce diesel emissions are summarized below.

#### 2.4.8.1 ATCM: School Bus Idling

This ATCM limits school bus idling and idling at or near schools. School bus, transit bus, and commercial motor vehicle drivers are required to turn off the engine upon arriving at a school, and restart it no more than 30 seconds before departing. School bus drivers also are prohibited from idling more than 5 minutes at locations beyond schools, such as at school bus stops or school activity destinations.[34] While this ATCM focuses on the reduction of diesel particulate emissions as a toxic, this regulation would also help reduce criteria air pollutants.

#### 2.4.8.2 ATCM: Diesel-Fueled Commercial Motor Vehicle Idling

This ATCM applies to diesel-fueled commercial motor vehicles with gross vehicular weight ratings of greater than 10,000 pounds that are or must be licensed for operation on highways. The measure limits idling of trucks to a maximum of 5 minutes, except when the vehicle is queuing. While this ATCM focuses on the reduction of diesel particulate emissions as a toxic, this regulation would also help reduce criteria air pollutants.

#### 2.4.8.3 ATCM: Stationary Compression Ignition Engines

This ATCM establishes emission standards and fuel use requirements for new and in-use stationary engines used in prime and emergency back-up applications (non-agricultural) and for new stationary engines used in agricultural applications. While this ATCM focuses on the reduction of diesel particulate emissions as a toxic, this regulation would also help reduce criteria air pollutants.

### 2.4.9 In-Use Off-Road Diesel-Fueled Fleets

These regulations reduce diesel PM and NOx emissions from in-use, off-road heavy-duty diesel vehicles in California. Such vehicles typically are used in construction, mining, and industrial operations. The regulations, among other requirements, impose limits on idling; require all vehicles to be reported to CARB (using the Diesel Off-Road Online Reporting System) and labeled; restrict the adding of older vehicles into fleets; and require fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing Verified Diesel Emission Control Strategies (VDECS) (i.e., exhaust retrofits).

The requirements and compliance dates of the regulations vary by fleet size. Large fleets have compliance deadlines each year from 2014 through 2023, medium fleets each year from 2017 through 2023, and small fleets each year from 2019 through 2028.

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32 CARB. 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles. Available at: https://www.arb.ca.gov/diesel/documents/rrpfinal.pdf. Accessed: November 2021.

33 CARB. California's Diesel Risk Reduction Plan: Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines. Available at: https://www.arb.ca.gov/diesel/documents/rmg.htm. Accessed: November 2021.

34 13 CCR 2480: Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools. Available at: https://casetext.com/regulation/california-code-of-regulations/title-13-motor-vehicles/division-3-air-resources-board/chapter-10-mobile-source-operational-controls/article-1-motor-vehicles-refs-annos/section-2480-airborne-toxic-control-measure-to-limit-school-bus-idling-and-idling-at-schools. Accessed: April 2023.

### 2.4.10 In-Use On-Road Diesel-Fueled Fleets

These regulations require diesel trucks and buses to be upgraded to reduce emissions; newer heavier trucks and buses must meet PM filter requirements; lighter and older heavier trucks must be replaced; and, by January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent.

The regulation applies to nearly all privately- and federally-owned diesel-fueled trucks and buses, and to privately- and publicly-owned school buses with a gross vehicle weight rating greater than 14,000 pounds. The regulation provides a variety of flexibility options tailored to fleets operating low use vehicles, fleets operating in selected vocations like agricultural and construction, and small fleets of three or fewer trucks.

### 2.4.11 Local Regulations and Guidance

Air pollution often does not conform to city and/or county jurisdictional boundaries, and the State has been divided into air basins based on geographical and meteorological conditions. Air pollution within each air basin is regulated by the regional air pollution control districts/air quality management districts, in a manner that is consistent with and in furtherance of standards adopted by the USEPA and CARB. The project site is located within the SCAB and the jurisdictional boundaries of the District.

### 2.4.12 South Coast Air Quality Management District

*District Rules and Regulations*

While CARB is responsible for the regulation of mobile emission sources within the state, local Air Quality Management Districts (AQMDs) and Air Pollution Control Districts (APCDs) are responsible for enforcing standards and regulating stationary sources. The project site is located within the SCAB and is subject to the guidelines and regulations of the SCAQMD.

The SCAQMD was created by the 1977 Lewis-Presley Act, which merged four county air pollution control bodies (i.e., Los Angeles, Orange, and Riverside Counties, and the non-desert portion of San Bernardino County) into one regional district for the SCAB. In SCAB, the SCAQMD is the agency responsible for protecting public health and welfare through the administration of federal and State air quality laws, regulations, and policies. Included in the SCAQMD's tasks are the monitoring of air pollution, the preparation of the Air Quality Management Plan (AQMP) for the SCAB, and the promulgation of rules and regulations. The AQMP includes strategies and tactics to be used to attain the NAAQS and CAAQS standards in SCAB, whereas the rules and regulations include procedures and requirements to control the emission of pollutants and to prevent adverse impacts.

Within the Project area, SCAG is the federally-designated Metropolitan Planning Organization and the state-designated transportation planning agency for six counties: Riverside, San Bernardino, Los Angeles, Ventura, Imperial, and Orange Counties.

The SCAQMD and SCAG are jointly responsible for preparing the AQMP for the SCAB. In particular, the 2022 AQMP is based on demographic growth forecasts for various socioeconomic categories (e.g., population, housing, employment by industry) developed by SCAG for their 2020 RTP, which forms part of SCAG's 2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Thus, consistency with the planning assumptions contained within the RTP/SCS demonstrates consistency with SCAQMD's 2022 AQMP. On September 1, 2020, SCAG's Regional Council adopted an updated RTP/SCS known as the 2020– 2045 RTP/SCS or Connect SoCal.[35] On September 3, 2020, SCAG's Regional Council unanimously voted to approve and fully adopt Connect SoCal (2020–2045 Regional Transportation Plan/Sustainable Communities Strategy), and the addendum to the Connect SoCal Program Environmental Impact Report. The next version of the RTP/SCS is expected in 2024.

*SCAQMD Rule 403: Fugitive Dust*

Regulates fugitive dust emissions from any commercial construction or demolition activity capable of generating fugitive dust emissions, including active operations, open storage piles, and disturbed surface areas, as well as track-out beyond an active operation.[36]

*SCAQMD Rule 1113: Architectural Coating*

Requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce VOC emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.[37]

### 2.4.13 State Implementation Plan Status

The AQMP and SIP processes generally occur concurrently: The SIP is required under the CAA to provide the framework for non-attainment areas to come into attainment, and the AQMP is prepared by the SCAQMD, in part, to satisfy the requirement for a SIP. The AQMP traditionally evaluates all criteria pollutants; portions of the AQMP represent the required SIP elements, which are then transmitted to the CARB for review, approval, and transmittal to the USEPA for inclusion in the overall California SIP.

The SCAQMD has been preparing AQMPs (and related SIP elements) since the 1989 AQMP. The following table lists the AQMPs prepared by the SCAQMD and a short summary of included SIP elements.

| AQMP | SIP Elements (major elements with federal deadlines only) |
|---|---|
| 1989 AQMP | 1-hour ozone SIP elements. |
| 1991 AQMP | 1-hour ozone SIP elements (attainment demonstration). |
| 1994 AQMP | 1-hour ozone SIP elements designed to forestall a potential FIP and $PM_{10}$ SIP elements describing Best Available Control Measures. |
| 1997 AQMP | $PM_{10}$ SIP elements (attainment demonstration) and updated 1-hour ozone SIP elements. |
| 1999 AQMP amendment | Revisions to 8-hour ozone SIP elements as part of the 1997 AQMP lawsuit settlement agreement. |
| 2003 AQMP | Update of some $PM_{10}$ and 1-hour ozone SIP elements. |

[35] SCAG. 2020. 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy. September. Available at: https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal-plan_0.pdf?1606001176. Accessed: April 2023.

[36] SCAQMD. 2005. Rule 403. Fugitive Dust. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf. Accessed: November 2021.

[37] SDAPCD. 2016. Rule 1113. Architectural Coatings. Available at: http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf. Accessed: November 2021.

| AQMP | SIP Elements (major elements with federal deadlines only) |
|---|---|
| 2007 AQMP | New federal standards requiring 8-hour ozone and $PM_{2.5}$ SIP elements (including new attainment demonstrations and control measures). |
| 2012 AQMP | New federal 24-hour $PM_{2.5}$ standard requiring 24-hour $PM_{2.5}$ SIP elements (attainment demonstration). |
| 2016 AQMP | Addressed 2006 8-hour ozone standard (75 parts per billion, "ppb") requirements, including a 2031 attainment demonstration, as well as several 1997 8-hour ozone standard (80 ppb) anti-backsliding provisions. |
| 2022 AQMP | Focuses on attaining the 2015 8-hour ozone standard of 70 parts per billion. |

As previously mentioned, **Table 2-3** shows that Los Angeles County is currently designated as nonattainment for the federal and State $O_3$ standards ("extreme"); the State $PM_{10}$ standards; and the federal and State $PM_{2.5}$ standards.[38,39] In addition, the southern portion of Los Angeles County is designated as nonattainment for the federal lead standard. The current status of the SIPs for these non-attainment pollutants are shown below:

- The 2007 AQMP provides attainment demonstrations for the annual PM2.5 standard by April 5, 2015 and of the 8-hour O3 standard by December 31, 2023; SCAQMD and CARB submitted the amendments to the USEPA. In 2009 and 2011, respectively, at the request of the USEPA, CARB provided clarifying revisions to the annual $PM_{2.5}$ and 8-hour $O_3$ SIP amendments. In 2011, the USEPA approved the control strategy, emission reduction commitment, and attainment demonstration of the annual $PM_{2.5}$ standard by April 5, 2015. In 2012, the USEPA approved the Basin's control strategy, emission reduction commitment, and attainment demonstration of the annual 8-hour ozone standard by June 15, 2024.[40]
- The 2012 AQMP provides attainment demonstrations for the 24-hour PM2.5 standard by 2019 and the 1-hour $O_3$ standard by 2023. In addition, it provides supplemental information for the approved 8-hour ozone SIP. On January 25, 2013, CARB approved the 2012 AQMP, which was subsequently submitted to the USEPA.
  - In 2015, the SCAQMD prepared a Supplement to the 24-hour PM2.5 SIP to address Subpart 4 provisions and requirements. The Supplement was submitted to CARB and is currently under review.
  - In addition, the SCAQMD proposed to include a "serious" area 24-hour PM2.5 SIP in the 2016 AQMP in anticipation of the SCAB being "bumped up" to a "serious" non-attainment designation for the 24-hour PM2.5 NAAQS. The acceleration of this

[38] USEPA. The Green Book Non-Attainment Areas for Criteria Pollutants, Available at: https://www.epa.gov/green-book. Accessed: November 2021.

[39] California standard attainment status based on CARB website. Available at: https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations. Accessed: April 2023.

[40] CARB. 2013. "South Coast Air Basin 2012 $PM_{2.5}$ and Ozone State Implementation Plans, Resolution No. 13-3." Available at: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-carb-epa-sip-submittal-(december-2012)/2012-aqmp-carb-epa-sip-submittal-board-agenda-item.pdf. Accessed: November 2021.

proposed SIP submittal, particularly how SCAQMD meets the Best Available Control Technology / Best Available Control Measures (BACT/BACM) for direct PM2.5 sources, as well as setting Reasonable Further Progress (RFP) emission levels, could affect all combustion sources.

- The 2016 AQMP provides the first attainment demonstration for the 8-hour O3 standard (0.075 ppm) by 2032, the annual PM2.5 from 2021 to 2025, the 8-hour O3 (0.080 ppm) by 2024, the 1-hour O3 (0.120 ppm) by 2030, and the 24-hour PM2.5 standard by 2019. On March 3, 2017 the SCAQMD adopted the 2016 AQMP, which was subsequently approved by the USEPA in October 2017 as the SIP for the air quality basin.
  - In October 2015, the USEPA reduced the 8-hour O3 standard from 0.075 ppm to 0.070 ppm. The 2016 AQMP provides an integrated approach to meet the 0.075 ppm standard; strategies to achieve the 0.070 ppm standard will be provided in future AQMPs.
  - The 2016 AQMP provides strategies for reducing emissions from all sources including stationary, on-road mobile, off-road mobile, and area sources.
- The 2022 AQMP was adopted by SCAQMD on December 2, 2022. This AQMP focuses on strategies to meet the more stringent 2015 8-Hour Ozone standard of 70 parts per billion.
  - In August 2018, the USEPA designated the SCAB as "extreme" nonattainment with this ozone standard. "Extreme" nonattainment areas must attain this standard by August 2038.
  - The 2022 AQMP builds upon measures already in place to reduce emissions, and includes a variety of additional strategies such as regulation, accelerated deployment of available cleaner technologies, best management practices, co-benefits from existing programs, incentives, and other measures to achieve this standard. These strategies are designed to reduce emissions for point and area sources, on-road and off-road mobile sources, ocean-going vessels, and aircraft.

The applicable emission budgets in SCAB are established by non-attainment (or maintenance) criteria pollutants by years of analysis (milestone, attainment, and planning horizon years) and are presented in several USEPA-approved SIP amendments and SCAQMD's adopted AQMPs. These emission budgets also serve as emission limits for projects included in the SCAG RTP.

## 2.5 Significance Thresholds

The SCAQMD has established significance thresholds to assess the impacts of project-related construction and operational emissions on regional and local ambient air quality. **Table 2-4** shows the mass daily thresholds for construction and operations as adopted by the SCAQMD for criteria air pollutant emissions and TACs.[41] The analysis summarized in this report estimates project-related construction and operational mass emissions and compares the emissions to these mass daily significance thresholds. This report also assesses the significance related to ambient air quality impacts and human health impacts from on-site

[41] SCAQMD 2019. Air Quality Significance Thresholds. March. Available at: https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf?sfvrsn=25. Accessed: April 2023.

construction activities to the federal, state, and local ambient air quality and risk standards and/or incremental change thresholds, consistent with the significance thresholds SCAQMD has established. For $PM_{10}$ and $PM_{2.5}$, the SCAQMD established incremental change significance thresholds based on SCAQMD Rule 1303. The Project does not include an evaluation of ambient air impacts for operational emissions because the Project does not include any of the land uses that typically require such an analysis to be performed based on SCAQMD's methodology. The primary emissions from operational activities that would require an evaluation of project emissions relative to ambient air quality significance thresholds include, but are not necessarily limited to, $NO_x$ and CO combustion emissions from stationary sources such as flares and turbines, and/or significant on-site mobile sources such as earth-moving equipment.

No additional environmental review would be necessary for the Modified Project unless a there is a new significant impact or a substantial increase in the severity of the operational CAP emissions associated with it. A substantial increase is defined as one that would result in an emissions increase greater than SCAQMD mass emissions significance thresholds. A substantial increase is defined as one that would result in an emissions increase greater than SCAQMD mass emissions significance thresholds.[42]

The analysis provided in this report evaluates the significance of the project's criteria air pollutant emissions by reference to the following questions from Section III, Air Quality, of Appendix G of the California Environmental Quality Act (CEQA) Guidelines:[43]

- Threshold 1. Would the project conflict with or obstruct implementation of the applicable air quality plan?
- Threshold 2. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?
- Threshold 3. Would the project expose sensitive receptors to substantial pollutant concentrations?

An evaluation of the project based on the CEQA and SCAQMD significance thresholds discussed below is provided in subsequent sections.

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[42] Per a communication with SCAQMD on September 27, 2018, the SCAQMD uses this same approach for projects when they are the lead agency; see SCAQMD, Addendum to the April 2007 Final MND for Southern California Edison: Mira Loma Peaker Project, Ontario, Section 5.1 (May 2019), available at http://www.aqmd.gov/docs/default-source/ceqa/documents/permit-projects/2019/mira-loma-addendum_final.pdf?sfvrsn=6.

[43] Note that the initial study determined that odor issues are less than significant, therefore the CEQA threshold for odor is not evaluated here.

# 3. CRITERIA AIR POLLUTANT EMISSIONS INVENTORIES

This section describes the methodology that Ramboll US Consulting (Ramboll) used to develop the criteria air pollution emission inventories associated with the Project modifications. The first section describes why the construction emissions will be substantially similar to the emissions reported in the State-certified EIR. The next sections describe the operational emissions quantification for the Modified Project and comparisons to thresholds of significance.

## 3.1 Construction Emissions

### 3.1.1 Entrada South

Construction emissions for the Modified Project will not exceed emissions reported in the State-certified EIR and will likely be reduced based on project design features included as part of the Modified Project. For Entrada South, the Project footprint for horizontal construction (e.g., site preparation, grading, demolition, and utilities installation) is consistent with that of the 2017 Approved Project.[44] There would be no overall increase in grading or soil movement needed for the Modified Project.[45] Accordingly, the construction emissions from horizontal construction phases are not anticipated to increase due to the Modified Project.

Furthermore, while the Modified Project will result in a change in building types compared to what was assumed in the State-certified EIR, the amount of vertical construction evaluated is not expected to change relative to what was evaluated in the State-certified EIR. Thus, the calculated construction emissions for the vertical construction also is not expected to increase. Specifically, for Entrada South, the land use mix associated with the Project modifications involves an increase in commercial square footage (from 450,000 SF to 730,000 SF) and a reduction in residential development (from 1,725 units to 1,574 units, or from 3,235,100 SF to 2,951,913 SF).[46] These Project modifications would result in approximately the same overall floor area ratio (FAR) as that assumed in the State-certified EIR.[47]. Because these land use types will require similar construction equipment and the FAR for the Modified Project is consistent with the FAR for the 2017 Approved Project, the type and number of construction equipment and the related construction intensity would fall within the envelope of construction activity that was previously analyzed. Therefore, the Project modifications for Entrada South would not increase construction emissions relative to those disclosed in the State-certified EIR.

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[44] Dirt movement within the Entrada Planning Area is proposed to balance within the limits of the project. A haul route approval will be necessary prior to grading to haul dirt across public rights of ways. There may be the need to move dirt across Magic Mountain Parkway and along The Old Road.

[45] Confirmed by Project Proponent, July 2023. The State-certified EIR estimated approximately 6.9 million cubic yards of dirt movement, while more recent analysis estimated 6.4 million cubic yards.

[46] The square footage totals for the residential units referenced in the parenthetical are calculated based on an average unit size of 1,875 square feet.

[47] The 2017 Approved Project included an estimated 3,685,100 SF of development area within the Entrada planning area (450,000 SF of commercial development and 3,235,100 SF of residential development). The Modified Project would include an estimated 3,681,913 SF of development area within the Entrada planning area (730,000 SF of commercial development and 2,951,913 SF of residential development). As such, the Modified Project would result in a net reduction of approximately 3,187 SF of development area within the Entrada planning area when compared to the 2017 Approved Project.

Overall, the construction equipment and construction equipment usage assumed for the 2017 Approved Project remains consistent with the Modified Project.

Although maximum daily and total construction activity is not anticipated to increase relative to the 2017 Approved Project, the project design features described in Section 1.4 that will be included in the Modified Project (which were not included in the State-certified EIR) will further reduce construction emissions.

For example, PDF-AQ-2 requires all construction off-road equipment over 50 horsepower to meet USEPA and CARB Tier 3 or more stringent emission certification standards and be equipped with diesel particulate filters to reduce particulate emissions, which will have the benefit of reducing construction emissions compared to the analysis presented in the State-certified EIR. **Table 3-1a** shows the percent emissions reduction in each pollutant by horsepower bin from Tier 1 and Tier 2 to Tier 3 with diesel particulate filters for diesel-powered off-road equipment. The State-certified EIR used the SCAB fleet-average off-road emission factors for each calendar year, as incorporated into the URBEMIS model.[48] This includes a combination of Tier 0, Tier 1, Tier 2, and Tier 3 equipment.

Based on the State-certified EIR, the maximum daily emissions for VOC, $NO_x$, CO, $SO_x$, $PM_{10}$, and $PM_{2.5}$ all occur during the first year of construction for Entrada, during which grading contributes a substantial portion of emissions. Emissions for VOC, $NO_x$, $PM_{10}$, and $PM_{2.5}$ were determined to be significant for the 2017 Approved Project in the State-certified EIR.[49] Entrada and Valencia Commerce Center direct grading were both modeled to take place in 2011.[50] **Table 3-1b** shows the difference in emission factors for each equipment type between the off-road construction fleet modeling performed for the direct grading phase of the State-certified EIR and the current fleet assumed to meet the requirements from PDF-AQ-2. As shown in Table 3-1b, emission factors for VOC would decrease 55% to 80%; emission factors for NOx would decrease 6% to 55%; and emission factors for PM would decrease 85% to 94% below that modeled in the State-certified EIR for all large equipment greater than 50 horsepower. These emission reductions would reduce the maximum daily and total emissions compared to the emissions presented in the State-certified EIR. These reductions would also correspond to reduced construction emissions, and lower ambient air quality, localized impacts and health risk impacts compared to those disclosed in the State-certified EIR. Similar reductions would be expected for other construction phases and equipment types.

Other project design features would further reduce construction emissions compared to the analysis presented in the State-certified EIR. For example, newer haul trucks would reduce exhaust emissions compared to older haul trucks (see PDF-AQ-1); certified street sweepers

[48] SCAQMD. Off-Road Model Mobile Source Emission Factors. Available at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/off-road-mobile-source-emission-factors. Accessed: September, 2019. These SCAB factors correspond approximately to the factors that were used to calculate emissions in the State-certified EIR (with minor differences possible due to non-default differences in horsepower).

[49] RMDP-SCP Final EIS/EIR (June 2010) Section 4.7 Air Quality. Table 4.7-11. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=21419.

[50] RMDP-SCP Final EIS/EIR (June 2010) assumptions for Valencia Commerce Center and Entrada Direct Grading. See Appendix 4.7a Construction Emissions: Grading and Improvements Emissions, Direct Emissions (Impact Sciences, 2008), PDF pg 8 and 30. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=11306.

would reduce fugitive dust emissions (see PDF-AQ-4); and on-site electricity used where available to power construction equipment would reduce exhaust emissions (see PDF-AQ-5).

In sum, maximum daily and total mitigated construction emissions are not expected to increase relative to the State-certified EIR. And with the implementation of new project design features included in the Modified Project, construction emissions will likely be reduced as compared to the emissions associated with the State-certified EIR. As a result, the Modified Project would not result in any new significant construction impacts or substantially increase the severity of previously identified significant impacts with respect to air quality.

### 3.1.2 Valencia Commerce Center

For VCC, the Project is consistent with the Project footprint and the building square footage that were assumed in the State-certified EIR. There also will be no overall increase in grading, soil movement, or equipment usage.[51] Accordingly, construction emissions for VCC are not anticipated to increase.

Although maximum daily and total construction activity is not anticipated to increase relative to the 2017 Approved Project, as discussed above, the project design features described in Section 1.4 that will be included in the Modified Project (which were not included in the State-certified EIR) will further reduce construction emissions.

Based on the State-certified EIR, the maximum daily emissions for $NO_x$, CO, $SO_x$, $PM_{10}$, and $PM_{2.5}$ all occur during the first year of construction for Valencia Commerce Center, during which grading contributes a substantial portion of emissions. Emissions for VOC, $NO_x$, $PM_{10}$, and $PM_{2.5}$ were determined to be significant.[52] **Table 3-1a** shows the percent emissions reduction in each pollutant by horsepower bin from Tier 1 and Tier 2 to Tier 3 with diesel particulate filters for diesel-powered off-road equipment. **Table 3-1b** further illustrates the difference in emission factors for each equipment type between the off-road construction fleet modeling performed for the direct grading phase of the State-certified EIR and the current fleet assumed to meet the requirements from PDF-AQ-2. As shown in Table 3-1b, emission factors would be measurably lower than those modeled in the State-certified EIR for all large equipment greater than 50 horsepower, resulting in reduced construction emissions and lower ambient air quality, localized significance thresholds, and health risk impacts than disclosed in the State-certified EIR. Similar reductions would be expected for other construction phases and equipment types. These improvements would reduce maximum daily and total emissions compared to the analysis presented in the State-certified EIR.

As discussed in Section 3.1.1, other project design features would further reduce construction emissions compared to the analysis presented in the State-certified EIR.

In sum, maximum daily and total mitigated construction emissions are not expected to increase relative to the State-certified EIR and with the implementation of project design features for the Modified Project, final construction emissions will likely be reduced as compared to the emissions associated with the State-certified EIR. As a result, the Modified

[51] Confirmed by Project Proponent, July 2023. The State-certified EIR estimated approximately 8.5 million cubic yards of dirt movement, while more recent analysis estimated 3.5 million cubic yards.

[52] RMDP-SCP Final EIS/EIR (June 2010) Section 4.7 Air Quality. Table 4.7-10. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=21419.

Project would not result in any new significant construction impacts or substantially increase the severity of previously identified significant impacts with respect to air quality.

## 3.2 Operational Emissions – Modified Project (Entrada South)

### 3.2.1 Overview of Approach

To evaluate air quality impacts, this SEIR section analyzes the incremental changes in estimated emissions resulting from the changes in land uses proposed under the Modified Project as compared to the land use mix and associated estimated emissions disclosed in the State-certified EIR for the 2017 Approved Project. This analysis discloses the estimated incremental emissions related to both regional and localized air quality impacts.

For Entrada South, because the Modified Project includes changes in land use, the incremental change in emissions resulting from those changes are calculated using current methodologies consistent with. SCAQMD and Los Angeles County guidance to use the California Emissions Estimator Model® (CalEEMod) (Version 2022.1). The calculation of the incremental change in mitigated emissions takes into account the mitigation measures set forth above as well as the air quality co-benefits of the "Net Zero Newhall" GHG mitigation measures, as discussed further below. For purposes of this air quality analysis, air quality emissions reductions are quantified by the following mitigation measures: Introduction of electric vehicle charging, zero emission buses, and zero net energy features. Details of these emissions reductions are discussed below.

### 3.2.2 Methodology for Calculating Mass Emissions

#### 3.2.2.1 California Emission Estimator Model®

Ramboll primarily utilized the CalEEMod® version 2022.1[53] to assist in quantifying the criteria air pollutant emissions in the inventories presented in this report for the Project. CalEEMod® provides a platform to calculate both construction emissions and operational emissions from a land use development project. For this analysis, CalEEMod® was used to calculate operational emissions. It calculates both the daily maximum and annual average for criteria pollutants as well as total or annual GHG emissions. The model also provides default values for water and energy use. Specifically, the model aids the user in the following calculations:

- Operational emissions associated with the fully built out land use development, such as on-road mobile vehicle traffic generated by the land uses, fugitive dust associated with roads, VOC emissions from architectural coating, off-road emissions from landscaping equipment, VOC emissions from consumer products and cleaning supplies, wood stoves and hearth usage, natural gas usage in the buildings, electricity usage in the buildings, water usage by the land uses, and solid waste disposal by the land uses.

CalEEMod® is a statewide program designed to calculate both criteria and GHG emissions from development projects in California. This model was developed under the auspices of the SCAQMD and received input from other California air districts and is currently supported by numerous lead agencies for use in quantifying the emissions associated with development projects undergoing environmental review. CalEEMod® utilizes widely accepted models for emission estimates combined with appropriate default data that can be used if site-specific information is not available. These models and default estimates use sources such as the

[53] CAPCOA. 2022. California Emissions Estimator Model®. Available at: http://www.CalEEMod.com/. Accessed: February 2023.

USEPA AP-42 emission factors,[54] CARB's on-road and off-road equipment emission models such as the EMission FACtor model (EMFAC) and the Emissions Inventory Program model (OFFROAD), and studies commissioned by California agencies such as the CEC and CalRecycle.

As mentioned above, CalEEMod® is based upon the CARB-approved OFFROAD and EMFAC models. OFFROAD[55] is an emission factor model used to calculate emission rates from off-road mobile sources (e.g., construction equipment, agricultural equipment). The off-road diesel emission factors used by CalEEMod® are based on the CARB OFFROAD2017 program. EMFAC is an emission factor model used to calculate emissions rates from on-road vehicles (e.g., passenger vehicles). The emission factors used by CalEEMod® 2022.1 are based on the CARB EMFAC2021 v1.0.1 program. However, EMFAC2021 v1.0.2 was released by CARB in May 2022 and incorporates newer regulations and data including the revocation of the SAFE rule and updated emission factors based on CARB's Heavy Duty Omnibus rules.[56] Therefore, EMFAC2021 v.1.0.2 emission factors have been incorporated into this analysis.

In addition, CalEEMod® contains default values and existing regulation methodologies to use in each specific local air district region. Appropriate statewide default values can be utilized if regional default values are not defined. Ramboll used default factors for Los Angeles county area (within the SCAQMD jurisdiction) for the emission inventory, unless otherwise noted in the methodology descriptions below. Details regarding the specific methodologies used by CalEEMod® can be found in the CalEEMod® User's Guide and associated appendices. CalEEMod® output files are included as **Appendix A.**

#### 3.2.2.2 Other Resources

Ramboll directly or indirectly relied on emissions estimation guidance from government-sponsored organizations, government-commissioned studies of energy use patterns, energy surveys by other consulting firms, Project-specific studies (e.g., ConSol Residential and Commercial Building Analysis and Fehr and Peers Transportation Demand Management Program (MM 2-6)[57] and emission estimation software as described above. In cases noted below, third-party studies were also relied upon to support analyses and calculations made outside of the approach described above.

### 3.2.3 Area Sources

Area sources in CalEEMod® are those emissions that are generally too small to be uniquely identified as point sources, and are thus generally aggregated as a group. CalEEMod® estimates emissions for the following sources, which are included under the category of "area" sources: landscaping equipment (e.g., lawn mowers), hearths, consumer products,

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[54] The USEPA maintains a compilation of Air Pollutant Emission Factors and process information for several air pollution source categories. The data is based on source test data, material balance studies, and engineering estimates. Available at: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors. Accessed: November 2021.

[55] CARB. 2017. Off Road Mobile Source Emission Factors. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road. Accessed: April 2023.

[56] CARB. 2022. EMFAC2021 Updates from v1.0.1 to v1.0.2 (May 2, 2022). Available at: https://ww2.arb.ca.gov/sites/default/files/2022-05/v102%20Updates%20Memo%20%281%29_0.pdf. Accessed: February 2023.

[57] These reports from the State-certified EIR are included in **Appendix C.**

and architectural coatings. Criteria pollutant emissions due to natural gas combustion in buildings could also be considered area sources, but are reported by CalEEMod® in the emissions associated with building energy use (described below). Emissions due to natural gas for hearths are excluded from this section for this analysis, since the Project-specific building energy modeling accounted for natural gas usage.

The criteria pollutant emissions generated by the Project were calculated using CalEEMod® defaults unless described otherwise below, based upon the change in land uses associated with the Modified Project.

### 3.2.3.1 Consumer Products

Consumer products are chemically formulated products used by household and institutional consumers, including, but not limited to, detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products; but does not include other paint products, furniture coatings, or architectural coatings. Ramboll did an evaluation of consumer product use compared to the total square footage of buildings in Los Angeles using data from CARB's consumer product Emission Inventory and the US Federal Emergency Management Agency's HAZUS-MH inventory. To calculate the VOC emissions from consumer product use, the following equation was used in CalEEMod®:

Emissions = EF x Building Area

Where:

EF = pounds of VOC per building square foot per day

Building Area = the total square footage of all buildings including residential square footage

The VOC emissions from area sources are primarily due to the use of consumer products. In order to estimate VOC emissions in 2010, Ramboll used an emission factor of $2.09 \times 10^{-5}$ lbs/sqft/day based on the total consumer product VOC emissions and total building square footage in Los Angeles County (from the CARB 2010 emission inventory[58] and the FEMA 2010 HAZUS-MH inventory[59] respectively).

An updated 2020 VOC emission factor of $2.18 \times 10^{-5}$ was estimated using the 2020 CARB emission inventory and a scaled building square footage based on the 2010 to 2020 population growth[60] in Los Angeles County. This derivation is shown in **Table 3-2.**

### 3.2.3.2 Architectural Coatings

VOC off-gassing emissions result from evaporation of solvents contained in surface coatings such as in paints and primers. The operational emission methodology from architecture coating is the same as the construction. All land use buildings are assumed to be repainted at a rate of 10% of area per year. This is based on the assumptions used by SCAQMD for CalEEMod®. Emissions are shown in **Appendix A**.

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[58] CARB. Almanac Emission Projection Data. Available at: https://www.arb.ca.gov/aqmis2/aqdselect.php. Accessed: April 2023.

[59] US Federal Emergency Management Agency. Hazus software (HAZUS-MH), Version 5.1. Available at: https://msc.fema.gov/portal/resources/hazus. Accessed: December 2021.

[60] US Census Bureau. QuickFacts. Available at: https://www.census.gov/quickfacts/fact/table/losangelescountycalifornia#. Accessed: December 2021.

### 3.2.4 Building Energy Use

Criteria pollutants are emitted as a result of activities in buildings for which natural gas is typically used as an energy source. Combustion of any type of fuel emits criteria pollutants directly into the atmosphere; when this occurs in a building, this is a direct emission source associated with that building. CalEEMod® default emission factors were used. For both residential and non-residential land-uses, climate zone 9, which best represents the County of Los Angeles, was selected based on the CalEEMod® forecast climate zone map.

In California, Title 24 governs energy consumed by the building envelope, including its mechanical systems, and some types of fixed lighting.[61] These so-called "regulated loads" are not the only source of building-related energy consumption. Instead, "unregulated loads," which are also sometimes referred to as "plug-in loads" (e.g., electronics, such as computers and televisions), also contribute to the total energy demand/consumption of the built environment.

For this analysis, the Modified Project's residential and non-residential land uses accord to the 2019 Title 24 Standards, as that code cycle became effective on January 1, 2020, before building construction activity commenced. To calculate the total residential and non-residential building energy input for the Project, Ramboll used energy use data prepared by ConSol as incorporated into the State-certified EIR. Energy use rates and resulting emissions are included in **Appendix A**.

### 3.2.5 Mobile Source Emissions

The emissions associated with on-road mobile sources are generated from residents, workers, customers, and delivery vehicles visiting the land use types in the Project. The emissions associated with on-road mobile sources includes running and starting exhaust emissions, evaporative emissions, idling emissions, brake and tire wear, and fugitive dust from paved and unpaved roads. Running emissions are dependent on VMT. Starting emissions are associated with the number of starts or time between vehicle uses, and the inputs used in determining these values are described below. The analysis accounts for the reductions from some adopted regulatory programs described in Section 2.

Ramboll calculated mobile source emissions using the trip rates, trip length, and internal trip capture information specified in the Traffic Data provided by Stantec (**Appendix B**), which was derived using the Santa Clarita Valley Consolidated Traffic Model (SCVCTM). The mobile source emissions were then calculated using CalEEMod®. The SCVCTM data and how it was used to derive CalEEMod® inputs are described in detail in the State-certified EIR. The CalEEMod® inputs for the mobile source emission estimates are shown in **Table 3-3a**.

To calculate fugitive dust emissions, CalEEMod® relies upon adjusted factors from AP-42. However, more recent and location-specific information is available. Ramboll updated the silt loading factor for Los Angeles County from the CARB 2021 Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust.[62] The derivation of this factor is shown in **Table 3-3b**. Ramboll calculated the fugitive dust emissions outside the model,

[61] Title 24, Part 6, of the California Code of Regulations: California's Energy Efficiency Standards for Residential and Nonresidential Buildings. Available at: http://www.energy.ca.gov/title24/. Accessed: July, 2019.

[62] CARB. 2021. Miscellaneous Process Methodology 7.9 Entrained Road Travel, Paved Road Dust. Available at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf. Accessed: April 2023.

using the methodology outlined in the CalEEMod® 2022.1 guidance documentation.[63] These off-model mobile source calculations are shown in **Tables 5-1, 5-2, and 5-3**.

The Unmitigated Modified Project VMT and emissions are shown in **Appendix A.**

### 3.2.6 Air Quality Co-Benefits of GHG Mitigation Measures

As described in Section 1.5, the GHG mitigation measures are applicable to the Modified Project and will result in reductions to the criteria air pollutant emissions. The measures are summarized as follows (see Section 1.5 for a full description of the measures), in accordance with the methodologies used in the State-certified EIR's GHG emissions analysis. Note that the air quality co-benefits of several measures (e.g., traffic signal synchronization, building retrofits, GHG Reduction Plan) are conservatively not quantified for purposes of this air quality analysis but would be expected to reduce emissions further.

**MM 2-1** – Residential Zero Net Energy: 2-1 requires the Project's residential development to achieve ZNE design. As detailed in the State-certified EIR, the improved energy efficiency required to achieve ZNE would reduce natural gas usage and thus reduce AQ emissions. The reduced natural gas use was incorporated into the CalEEMod® run based on the methodology established by the State-certified EIR.

**MM 2-2** – Non-Residential Zero Net Energy: 2-2 requires the Project's non-residential development to achieve ZNE design. As detailed in the State-certified EIR, the improved energy efficiency required to achieve ZNE would reduce natural gas usage and thus reduce AQ emissions. The reduced natural gas use was incorporated into the CalEEMod® run based on the methodology established by the State-certified EIR.

**MM 2-4** – Residential Electric Vehicle Chargers and Subsidies: 2-4 requires the installation of EV chargers in each residence and the provision of subsidies to residents toward the purchase of Zero Emission Vehicles (ZEVs). ZEVs do not produce tailpipe emissions, so criteria air pollutant emissions are reduced compared to conventional gasoline or diesel vehicles. **Table 3-4** shows the reductions in criteria air pollutant emissions due to the residential VMT driven in EVs instead of conventional vehicles based on the methodology established by the State-certified EIR.

**MM 2-5** – On-Site Electric Vehicle Chargers: 2-5 requires the installation of on-site EV charging stations based on the number of the Project's commercial parking spaces. As detailed in the State-certified EIR, EVs do not produce tailpipe emissions when running on electric power, so criteria air pollutant emissions are reduced compared to conventional gasoline or diesel vehicles. **Table 3-5** shows the reductions in criteria air pollutant emissions due to the VMT driven in EVs instead of conventional vehicles based on the methodology established by the State-certified EIR.

**MM 2-6** – Transportation Demand Management Plan: 2-6 requires implementation of a Transportation Demand Management (TDM) Plan to reduce VMT. As detailed in the State-certified EIR, reductions in VMT result in corresponding decreases in vehicle-related AQ emissions. Criteria air pollutant emissions reductions due to this measure are shown in **Table 3-6** based on the methodology established by the State-certified EIR.

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[63] CAPCOA. 2022. Appendix C: Emission Calculation Details for CalEEMod. Available at: https://www.caleemod.com/documents/user-guide/04_Appendix%20C.pdf. Accessed: February 2023.

**MM 2-12** – Off-Site Electric Vehicle Chargers: 2-12 requires the installation of off-site EV charging stations based on the number of the Project's commercial parking spaces. **Table 3-5** shows the reductions in AQ emissions due to the VMT driven in EVs instead of conventional vehicles based on the methodology established by the State-certified EIR.

**Supplemental Commitment** – Additional EV Chargers: The supplemental commitment requires the installation of additional EV charging stations in the SCAG region. **Table 3-5** shows the reductions in AQ emissions due to the VMT driven in EVs instead of conventional vehicles based on the methodology established by the State-certified EIR.

### 3.2.7 Operational Emissions Results

**Table 3-7** shows the change in maximum daily mitigated operational emissions from the emissions disclosed in the State-certified EIR to the Modified Project. Specifically, it shows a decrease in maximum daily emissions for ROG, CO, $SO_2$, $PM_{10}$, $PM_{2.5}$, and $NO_x$. The results are compared to the SCAQMD operational significance thresholds. As shown in **Table 3-7**, the change in mitigated emissions due to Project modifications is below significance thresholds for all pollutants. Therefore, the Modified Project will not result in a new significant impact or a substantial change in previously-identified significant impacts.

## 3.3 Operational Emissions – Valencia Commerce Center

### 3.3.1 Overview of Approach

This section reports the criteria air pollutant emissions associated for the Valencia Commerce Center. As described above for Entrada South, to evaluate air quality impacts, this methodology analyzes estimated emissions for the changes associated with the Modified Project. For the VCC Planning Area, because the land uses would not change compared to those analyzed in the State-certified EIR, the Modified Project's mitigated emissions are conservatively assumed to be equal to the mitigated emissions from the State-certified EIR. Actual mitigated emissions are expected to be reduced by improvements in vehicle fleets over time (i.e., as less polluting vehicles come to market) and the air quality co-benefits of the Net Zero Newhall GHG mitigation measures that reduce impacts. These co-benefits are conservatively not quantified, so the resulting net change of zero is compared to the SCAQMD operational mass emissions thresholds.

### 3.3.2 Operational Emissions Summary

**Table 3-8** shows there is no change in maximum daily operational emissions associated with Valencia Commerce Center from the emissions disclosed in the State-certified EIR to the Modified Project. Therefore, the Modified Project will not result in a new significant impact or a substantial change in previously-identified significant impacts.

## 3.4 Combined Operational Emissions Summary

The maximum daily incremental emissions (after mitigation) resulting from the changes in land use for the Modified Project are compared to the maximum daily mitigated emissions disclosed in the State-certified EIR for the Entrada and VCC Planning Areas. As noted in Section 3.3, this analysis assumes there would be no net changes in mitigated emissions for VCC because the land uses have not changed, even though emissions are expected to be lower. The resulting net change in incremental mitigated emissions for Entrada and VCC is then compared to the SCAQMD operational mass emissions thresholds to determine whether the net change constitutes a new significant impact or a substantial increase in the severity of a previously identified significant impact.

**Table 3-9** shows the net change in maximum daily operational emissions associated with the combined Entrada South and Valencia Commerce Center from the emissions disclosed in the State-certified EIR to the Modified Project. Specifically, it shows a decrease in maximum daily emissions for VOC, CO, $SO_2$, $PM_{10}$, $PM_{2.5}$ and $NO_x$. The results are compared to the SCAQMD operational significance thresholds. As shown in **Table 3-9**, the change in emissions due to the combined Project modifications is below significance thresholds for all pollutants. Therefore, the combined Modified Project will not result in a new significant impact or a substantial change in previously-identified significant impacts.

# 4. OTHER AIR QUALITY EVALUATIONS

## 4.1 Overview

This section assesses additional air quality issues for the Modified Project. This includes the Modified Project's construction ambient air concentrations, construction health risk assessment, localized carbon monoxide hotspots, odor sources, Valley Fever, AQMP consistency, and a cumulative analysis. Based on the minor changes in the Modified Project compared to the State-certified EIR, the results show no new significant impacts or substantial changes in severity of previously identified significant impacts.

## 4.2 Localized Ambient Air Quality Analysis (Construction)

As described in Section 3.1, maximum daily and total construction emissions from the Modified Project are not expected to increase and likely will be lower than that disclosed in the State-certified EIR with implementation of the mitigation measures described above. Therefore, localized ambient air quality impacts are also expected to be the same as or lower than what was analyzed in the State-certified EIR. As described in Section 3.1.1, PDF-AQ-2 requires all construction off-road equipment over 50 horsepower to meet USEPA and CARB Tier 3 or more stringent emission certification standards and be equipped with diesel particulate filters to reduce particulate emissions, which will have the benefit of reducing construction emissions compared to the analysis presented in the State-certified EIR. As shown in **Table 3-1b**, for the direct grading phase which contributed to the maximum impacts, emission factors for VOC would decrease 55% to 80%; emission factors for NOx would decrease 6% to 55%; and emission factors for PM would decrease 85% to 94% below that modeled in the State-certified EIR for all large equipment greater than 50 horsepower. Similar reductions are likely for all other construction sub-phases. The localized ambient air quality impacts are directly proportional to emissions; therefore, the reduction in emissions would reduce localized ambient air quality impacts. Therefore, the Modified Project is not expected to result in new significant impacts or substantial changes in severity of previously identified impacts to ambient air quality.

## 4.3 Health Risk Assessment (Construction)

As described in Section 3.1, the total construction emissions from the Modified Project are not expected to increase and likely will be lower than disclosed in the State-certified EIR. Therefore health risk impacts are also expected to be the same or lower than what was disclosed in the State-certified EIR because construction-related health risks are proportional to construction emissions (primarily DPM emissions). More specifically, as described in Section 3.1.1, PDF-AQ-2 requires all construction off-road equipment over 50 horsepower to meet USEPA and CARB Tier 3 emission certification standards or more stringent and be equipped with diesel particulate filters to reduce particulate emissions, which will have the benefit of reducing construction emissions compared to the analysis presented in the State-certified EIR. As shown in **Table 3-1b**, for the direct grading phase which contributed to the maximum impacts, emission factors for VOC would decrease 55% to 80%; emission factors for NOx would decrease 6% to 55%; and emission factors for PM would decrease 85% to 94% below that modeled in the State-certified EIR for all large equipment greater than 50 horsepower. For purposes of this analysis, and as studied in the State-certified EIR, DPM is the primary TAC of concern, and emitted by diesel-fueled construction equipment and on-road heavy-duty trucks. The State-certified EIR modelled DPM by assuming all $PM_{10}$ exhaust from diesel equipment and trucks would be DPM.[64] Therefore, the expected decrease in $PM_{10}$ would correlate to decrease in DPM and related health risks compared to what was disclosed in the State-certified EIR. As shown in **Tables 3-1a** and **3-1b**, this project design feature will reduce $PM_{10}$ exhaust emission factors 85% to 94% below that modeled in the State-certified EIR for all large equipment greater than 50 horsepower for the direct grading phases. Similar reductions are likely for all other construction sub-phases. Health risks are proportional to $PM_{10}$ exhaust emissions; therefore, the reduction in emissions would also reduce health risks. The SCAQMD significance thresholds for health risk are currently the same as that evaluated in the State-certified EIR. Therefore, the Modified Project is not expected to result in new significant impacts.

## 4.4 Localized Ambient Air Quality Analysis (Operational)

The Modified Project's net change in on-site criteria air pollutant emissions for the Entrada Planning Area, the VCC Planning Area, and the combined planning areas, as compared to the 2017 Approved Project are summarized in **Table 4-1**. These analyses evaluated the Modified Project's net change in on-site criteria air pollutant emissions that may occur during operations once residential or commercial buildings are completed (estimated to be in 2030), calculated as described in Sections 3.2 and 3.3. The net change in emissions are conservatively compared to the SCAQMD mass rate localized significance thresholds (mass rate LSTs)[65,] chosen for the shortest receptor distance of 25 meters, and for a Project less than or equal to five acres using the receptor area of Santa Clarita Valley.[66]

The analysis shows that the Modified Project's net change in operational emissions will not exceed the mass rate LSTs, and thus the Project operational emissions will not exceed the ambient air quality significance thresholds established by SCAQMD at new receptors created by the Project. On-site $NO_X$ emissions were also compared to a similar screening threshold for the federal 1-hour $NO_2$ NAAQS, since this threshold was introduced after the mass LSTs were published. As a conservative approximation, the screening mass rate threshold for the federal 1-hour $NO_2$ NAAQS would be at least 45% lower than that estimated by SCAQMD. This estimate is based on a ratio of the federal threshold (188 $\mu g/m^3$) to the 1-hour $NO_2$ SCAQMD/CAAQS threshold (339 $\mu g/m^3$), on which the $NO_2$ mass rate LST is based. Since the federal threshold is based on the 98$^{th}$ percentile and on a 3-year average, this estimate is a conservatively low estimate. This approach shows that the Project-on-Project on-site criteria air pollutant emissions will not exceed the federal 1-hour $NO_2$ standard.

## 4.5 Localized CO Hotspots

Based on the analysis presented below, a CO "hot spots" analysis is not needed to determine whether the change in the level of service (LOS) of an intersection in the Project would have the potential to result in exceedances of the CAAQS or NAAQS.

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[64] RMDP-SCP EIS/EIR (April 2008) Appendix 4.7e Construction Health Risk Assessment for the Newhall Ranch Resource Management and Development Plan and Specific Plan, page i.

[65] SCAQMD. Localized Significance Thresholds. Available at: [http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds](http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds). Accessed: November 2021.

[66] Per a phone discussion with Ian MacMillan at SCAQMD (August 29, 2014), this mass rate LST can be conservatively used to assess Project's greater than 5 - acres in size. This is conservative because it concentrates emissions from a larger area into a smaller site.

It has long been recognized that CO exceedances are caused by vehicular emissions, primarily when idling at intersections.[67,68,69] Accordingly, vehicle emissions standards have become increasingly more stringent. Before the first vehicle emission regulations, cars in the 1950's were typically emitting about 87 grams of CO per mile.[70] Since the first regulation of CO emissions from vehicles (model year 1966) in California, vehicle emissions standards for CO applicable to light duty vehicles have decreased by 96% for automobiles, and new cold weather CO standards have been implemented, effective for the 1996 model year. [71,72,73] Currently, the CO standard in California is a maximum of 3.4 grams/mile for passenger cars (with provisions for certain cars to emit even less).[74] With the turnover of older vehicles, introduction of cleaner fuels and implementation of control technology on industrial facilities, CO concentrations in the SCAQMD have steadily declined.

The analysis prepared for CO attainment in the SCAB by the SCAQMD can be used to assist in evaluating the potential for CO exceedances in the SCAB. CO attainment was thoroughly analyzed as part of the SCAQMD's 2003 Air Quality Management Plan (2003 AQMP) and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan).[75] As discussed in the 1992 CO Plan, peak CO concentrations in the SCAB are due to unusual meteorological and topographical conditions, and not due to the impact of particular intersections. Considering the region's unique meteorological conditions and the increasingly stringent CO emissions standards, CO modeling was performed as part of 1992 CO Plan and subsequent plan updates and air quality management plans.

In the 1992 CO Plan, a CO hot spot analysis was conducted for four busy intersections in Los Angeles at the peak morning and afternoon time periods. The intersections evaluated included: Long Beach Blvd. and Imperial Highway (Lynwood); Wilshire Blvd. and Veteran Ave. (Westwood); Sunset Blvd. and Highland Ave. (Hollywood); and La Cienega Blvd. and Century Blvd. (Inglewood). These analyses did not predict a violation of CO standards. The busiest intersection evaluated was that at Wilshire Blvd. and Veteran Ave., which has a daily traffic volume of approximately 100,000 vehicles per day. The 2003 AQMP estimated that the 1-hour concentration for this intersection was 4.6 ppm, which indicates that the most stringent 1-hour CO standard (20.0 ppm) would likely not be exceeded until the daily traffic at the intersection exceeded more than 400,000 vehicles per day.[76] The Los Angeles County Metropolitan Transportation Authority evaluated the LOS in the vicinity of the Wilshire

[67] USEPA. 2000. Air Quality Criteria for Carbon Monoxide. EPA 600/P-099/001F. June.

[68] SCAQMD. 1993. CEQA Air Quality Handbook. Section 4.5. April.

[69] SCAQMD. 2003. Air Quality Management Plan. August.

[70] USEPA. Available at: http://www3.epa.gov/otaq/consumer/milestones.htm. Accessed: November 2021.

[71] National Academy Board on Energy and Environmental Systems. 2008. Review of the 21st Century Truck Partnership. Appendix D: Vehicle Emission Regulations [excerpt from. Available at: http://books.nap.edu/openbook.php?record_id=12258&page=107]. Accessed: November 2021.

[72] Kavanagh, Jason. 2008. Untangling U.S. Vehicle Emissions Regulations.

[73] Title 13. California Code of Regulations. Section 1960.1(f)(2) [for 50,000 mile half-life].

[74] CARB. 2010. Available at: https://ww2.arb.ca.gov/our-work/programs/low-emission-vehicle-program. Accessed: November 2021.

[75] SCAQMD. (2005). Federal Attainment Plan for Carbon Monoxide. Carbon Monoxide Redesignation Request and Maintenance Plan. Available at: http://www.arb.ca.gov/planning/sip/sccosip05/sccosip_redesig_mplan.pdf. Accessed: November 2021.

[76] Based on the ratio of the CO standard (20.0 ppm) and the modeled value (4.6 ppm).

Blvd/Veteran Ave. intersection and found it to be Level E at peak morning traffic and Level F at peak afternoon traffic. [77,78]

At buildout of the Project, the highest average daily trips at an intersection is expected to be below the daily traffic volumes that would be expected to generate CO exceedances as evaluated in the 2003 AQMP. [79] There is no reason unique to SCAB meteorology to conclude that the CO concentrations at any intersections due to Project traffic would exceed the 1-hour CO standard if modeled in detail, based on the studies undertaken for the 2003 AQMP.

## 4.6 Valley Fever

"Valley Fever" is caused by inhalation of spores from a fungus called Coccidioides immitis (*C. immitis*), which is endemic to the San Joaquin Valley and is suspected in other central to southern California areas. Risk of exposure is increased during dusty periods in late summer and early fall, during crop harvesting, or after dust storms. [80,81]

For most people, this fungus causes flu-like symptoms from which the body recovers within weeks to months. Five to 10% of people can exhibit more serious or long-term symptoms, while 60% of people exposed to the fungus show no symptoms of infection.[82] One percent of people may experience a fatal form of the disease where the spores enter the bloodstream.[83]

In its air quality guidance, the San Joaquin Valley Air Pollution Control District (SJVAPCD) states that "[p]rograms to stabilize disturbed farmland…reduce the spread of Valley Fever spores." [84] The SJVAPCD board called for suggestions for managing Valley Fever and received recommendations from the Air Pollution Control Officer, including watering soils and supporting efforts to develop a vaccine. [85]

The number of Valley Fever cases in Los Angeles County has significantly increased since 2003, from an average of less than 100 cases a year, to approximately 300 cases in 2011.[86]

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[77] The Metropolitan Transportation Authority measured traffic volumes and calculated the LOS for the intersection Wilshire Blvd/Sepulveda Ave. which is a block west along Wilshire Blvd., still east of Highway 405.

[78] Metropolitan Transportation Authority. 2004. Congestion Management Program for Los Angeles County. Exhibit 2-6 and Appendix A. July 22.

[79] Stantec. 2020. Combined Entrada South and Valencia Commerce Center Traffic Impact Analysis. February.

[80] Kirkland, T.N., & Fierer, J. 1996. Coccidioidomycosis: A Reemerging Infectious Disease. Emerging Infectious Diseases, 3:2. July-September. Accessed on July 2019: https://wwwnc.cdc.gov/eid/article/2/3/96-0305_article.

[81] Kirkland, T.N., & Fierer, J. 1996. Coccidioidomycosis: A Reemerging Infectious Disease. Emerging Infectious Diseases, 3:2. July-September. Accessed on July 2019: https://wwwnc.cdc.gov/eid/article/2/3/96-0305_article.

[82] Centers for Disease Control and Prevention (CDC). 2014. Valley Fever (Coccidioidomycosis). Accessed on July 2019: http://www.cdc.gov/fungal/diseases/coccidioidomycosis/.

[83] Kolivras, K.N., Johnson, P.S., Comrie, A.C., & Yool, S.R. 2001. Environmental Variability and Coccidioidomycosis (Valley Fever). Aerobiologia, 17, 31-42.

[84] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2005. Air Quality Guidelines for General Plans. Accessed July 2019: http://www.valleyair.org/notIces/Docs/priorto2008/8-2-05/Entire-AQGGP.pdf.

[85] Sadredin, S. 2012. Re: District Options for Addressing Valley Fever [email to San Joaquin Valley Air Pollution Control District Board]. *Air Pollution Control Officer*. Accessed November 2021: http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2012/May/StudySession/FinalItem9-BAM_ValleyFever_May_2_2012.pdf.

[86] Guevava, R.E. 2014. Valley Fever in Los Angeles County: A Presentation for the Santa Susana Field Laboratory Community Advisory Group. Available at: http://clkrep.lacity.org/onlinedocs/2018/18-0201_pc_1_3-27-18.pdf. Accessed: April 2023.

The number of Valley Fever cases in the San Fernando Valley is 3.9-8.9 cases per 100,000 population in 2011. [87]

The Modified Project would not result in any increase in construction or grading relative to the 2017 Approved Project. Therefore, the Modified Project would not increase risks to Valley Fever.

## 4.7 AQMP Consistency

The State-certified EIR concluded that the 2017 Approved Project would not conflict or obstruct the implementation of the air quality management plan. It states, "Once fully developed and occupied, the proposed Project, as well as other projects being proposed and developed in the area, are expected to be within the growth forecasts contained in the Growth Management Chapter of SCAG's Regional Comprehensive Guide and Plan (RCGP), which forms the basis for the land use and transportation control portions of the SCAQMD's AQMP".[88] The Modified Project has minor changes compared to the 2017 Approved Project, but is consistent with the General Plan as is currently adopted and growth forecasts within the 2016-2040 RTP/SCS. Thus, the Modified Project would also not conflict or obstruct the implementation of the air quality management plan since the 2016 AQMP is based on the 2016-2040 RTP/SCS.

## 4.8 Siting Evaluation for Sensitive Receptors

This section provides an overview of the SCAQMD CEQA Handbook and CARB Air Quality and Land Use Handbook siting criteria for sensitive receptors. The SCAQMD CEQA Handbook recommends evaluating whether a sensitive receptor will be located within a quarter-mile of an existing facility that emits toxic air contaminants; will be located adjacent to a congested roadway or in an area with high background concentrations of CO; or will be located downwind of an existing source of odors.[89] The CARB Air Quality and Land Use Handbook provides recommended minimum distances from sensitive receptors to the relevant sources applicable to the Project as 500 feet from a freeway and 300 feet from a gasoline dispensing facility.[90] Residential and school uses are generally considered "sensitive receptors," meaning that they are particularly sensitive to adverse effects associated with environmental impacts (including air pollution).

The Project's sensitive receptors are not closer to emissions sources than these minimum distances recommended in the SCAQMD CEQA Handbook or the CARB Air Quality and Land Use Handbook. The freeway Interstate-5 (I-5) is a major roadway and the nearest Project residences, in planning area (PA) 12, are expected to be at least 1,000 feet from I-5, while the nearest potential school sites in PA-9 are more than 2,500 feet from I-5. As discussed

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[87] Guevava, R.E. 2014. Valley Fever in Los Angeles County: A Presentation for the Santa Susana Field Laboratory Community Advisory Group. Available at: http://clkrep.lacity.org/onlinedocs/2018/18-0201_pc_1_3-27-18.pdf. Accessed: April 2023.

[88] RMDP-SCP Final EIS/EIR. Section 6.5.7.2.2 Discussion of Cumulative Air Quality Impacts. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=21422. Accessed: November 2021.

[89] SCAQMD. Chapter 2: Air Quality Issues Regarding Land Use. Available at: http://www.aqmd.gov/docs/default-source/planning/air-quality-guidance/chapter-2---air-quality-issues-regarding-land-use.pdf. Accessed: March 2022.

[90] CARB. 2005. Air Quality and Land Use Handbook: A Community Health Perspective. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/california-air-resources-board-air-quality-and-land-use-handbook-a-community-health-perspective.pdf. Accessed: April 2023.

above in Section 4.5, there are not expected to be CO hotspots, and there are not expected to be existing sources of odors immediately upwind. Therefore, the Project's sensitive receptors will be sited consistent with SCAQMD and CARB Handbooks.

Since the time of publication of the SCAQMD and CARB siting guidelines, building filtration requirements have increased, which further reduces potential air pollution exposure for sensitive receptors. The Title 24 Building Energy Efficiency Standards (2019 Title 24) cited in this analysis required all buildings to include filtration systems that meet Minimum Efficiency Reporting Value levels of 13 (MERV13) or equivalent such that at least 50 percent of particles in the 0.30 to 1.0 micron range and 85 percent of particles in the 1.0 to 3.0 micron range are removed.[91,92,93,94] These filtration systems will reduce exposure to emissions such as those from mobile sources, dust, or wildfires.

## 4.9 Cumulative Analysis

The cumulative analysis for air quality is based on the guidance provided by SCAQMD.[95] "As Lead Agency, the [SCAQMD] uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR. The only case where the significance thresholds for project specific and cumulative impacts differ is the HI significance threshold for TAC emissions. Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

Based on the regional air quality attainment status, the SCAB is out of attainment for ozone (and thus its precursors $NO_X$, and VOC) and for $PM_{2.5}$. The State-certified EIR noted that "other large projects in the area are expected to have impacts" and that the 2017 Approved Project's "air quality impacts are significant when viewed in connection with the effects of other past, present, and reasonably foreseeable future projects."[96] Ultimately, the State-certified EIR concluded that the 2017 Approved Project's air quality impacts would be cumulatively significant and unavoidable.

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[91] California Energy Commission. 2020. 2019 Building Energy Efficiency Standards: What's New for Residential. Available at: https://www.energy.ca.gov/sites/default/files/2020-03/Title_24_2019_Residential_WhatsNew_ada.pdf. Accessed: March 2022.

[92] Subchapter 3 Nonresidential, High-Rise Residential, Hotel/Motel Occupancies, and Covered Processes – Mandatory Requirements. Section 120.1 Requirements for Ventilation and Indoor Air Quality. Available at: https://codes.iccsafe.org/content/CEC2019P1/subchapter-3-nonresidential-high-rise-residential-hotel-motel-occupancies-and-covered-processes-mandatory-requirements. Accessed: March 2022.

[93] Subchapter 7 Low-Rise Residential Buildings – Mandatory Features and Devices. Section 150. https://codes.iccsafe.org/content/CEC2019P1/subchapter-7-low-rise-residential-buildings-mandatory-features-and-devices. Accessed: March 2022.

[94] Note that MERV13 filters have a higher removal efficiency for particles larger than 3 microns (>90%), e.g., USEPA. What is a MERV Rating? Available at: https://www.epa.gov/indoor-air-quality-iaq/what-merv-rating-1. Accessed: March 2020.

[95] Available at: http://www.aqmd.gov/docs/default-source/Agendas/Environmental-Justice/cumulative-impacts-working-group/cumulative-impacts-white-paper-appendix.pdf?sfvrsn=4. Accessed: November 2021.

[96] RMDP-SCP Final EIS/EIR. June 2010. Revised Section 6.0, Cumulative Impacts. Section 6.5.7.2. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=21422. Accessed: November 2021.

As discussed above, if the project exceeds the SCAQMD's recommended significance thresholds for project-specific construction and operational air emissions, then the project would have a cumulatively considerable increase in emissions for those pollutants. For the Modified Project, construction emissions are not increasing; as such, the Modified Project would not result in a new significant cumulative impact and would not substantially increase the severity of the previously identified significant impact as disclosed in the State-certified EIR.

In addition, operational emissions would not exceed the SCAQMD's thresholds for VOC, $NO_X$, $SO_2$, CO, $PM_{10,}$ and $PM_{2.5}$ emissions, such that the Modified Project's incremental change from the 2017 Approved Project would not result in a new significant cumulative impact and would not substantially increase the severity of the previously identified significant impact as disclosed in the State-certified EIR.

# TABLES

**Table 1-1. Modified Project Land Uses**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Land Uses[1] | State-Certified EIR | Modified Project | Change | Units |
|---|---|---|---|---|
| **Entrada South[2]** | | | | |
| Residential | 1,725 | 1,574 | -151 | DU |
| Commercial | 450 | 730 | 280 | TSF |
| **Valencia Commerce Center** | | | | |
| Commercial | 3,400 | 3,400 | 0 | TSF |

**Notes:**
[1] Details of the land use sub-types as modeled are included in the CalEEMod® output files.

[2] Consistent with the State-certified EIR, the identified land uses are representative of allowable uses for the proposed residential and non-residential development within Entrada South and may be subject to change based on the project's final maps.

**Abbreviations:**
DU - dwelling unit
EIR - Environmental Impact Report
TSF - thousand square feet

# Table 2-1. Air Quality Data for Nearest SCAQMD Monitoring Stations[1,2]

Entrada South and Valencia Commerce Center
Los Angeles County, California

| Pollutant | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| **Ozone ($O_3$)[3] - Santa Clarita Valley** | | | | |
| Maximum Concentration 1-hr period, ppm | **0.151** | **0.132** | **0.128** | **0.148** |
| Maximum Concentration 8-hr period, ppm | **0.128** | **0.106** | **0.106** | **0.122** |
| Annual 4th Highest 8-hr maximum over 3 years | **0.104** | **0.097** | **0.101** | **0.106** |
| Days of Exceedances, California Standard Concentration 1-hr period | 45 | 21 | 34 | 44 |
| Days of Exceedances, California Standard Concentration 8-hr period | 73 | 52 | 56 | 73 |
| Days of Exceedances, National Standard Concentration 8-hr period | 73 | 52 | 56 | 73 |
| **Carbon Monoxide (CO) - Santa Clarita Valley** | | | | |
| Maximum Concentration 1-hr period, ppm | 1.3 | 1.0 | 1.5 | 1.2 |
| Maximum Concentration 8-hr period, ppm | 0.8 | 0.8 | 1.2 | 0.8 |
| Number of Exceedances, California Standard Concentration 1-hr period | 0 | 0 | 0 | 0 |
| Number of Exceedances, California Standard Concentration 8-hr period | 0 | 0 | 0 | 0 |
| Number of Exceedances, National Standard Concentration 1-hr period | 0 | 0 | 0 | 0 |
| Number of Exceedances, National Standard Concentration 8-hr period | 0 | 0 | 0 | 0 |
| **Nitrogen Dioxide ($NO_2$) - Santa Clarita Valley** | | | | |
| Maximum Concentration 1-hr period, ppm | 0.058 | 0.059 | 0.046 | 0.046 |
| 98th Percentile Daily Maximum Concentration 1-hr period, ppm | 0.038 | 0.038 | 0.035 | 0.036 |
| Annual Arithmetic Mean (AAM), ppm | 0.011 | 0.011 | 0.009 | 0.009 |
| Number of Exceedances, California Standard Concentration 1-hr period | 0 | 0 | 0 | 0 |
| Exceed California Standard Annual Arithmetic Mean (AAM)? | No | No | No | No |
| Number of Exceedances, National Standard Concentration 1-hr period | 0 | 0 | 0 | 0 |
| Exceed National Standard Annual Arithmetic Mean (AAM)? | No | No | No | No |
| **Sulfur Dioxide ($SO_2$)[4] - Central LA[6]** | | | | |
| Maximum Concentration 1-hr period, ppm | 0.006 | 0.018 | 0.010 | 0.004 |
| 99th Percentile Daily Maximum Concentration 1-hr period, ppm | 0.003 | 0.003 | 0.002 | 0.003 |
| Maximum Concentration 24-hr period, ppm | NM | NM | NM | NM |
| Annual Arithmetic Mean (AAM), ppm | NM | NM | NM | NM |
| Number of Exceedances, California Standard Concentration 1-hr period | 0 | 0 | 0 | 0 |
| Number of Exceedances, California Standard Concentration 24-hr period | N/A | N/A | N/A | N/A |
| Number of Exceedances, National Standard Concentration 1-hr period | 0 | 0 | 0 | 0 |
| Number of Exceedances, National Standard Concentration 24-hr period | N/A | N/A | N/A | N/A |
| Exceed National Standard Annual Arithmetic Mean (AAM)? | N/A | N/A | N/A | N/A |
| **Respirable Particulate Matter ($PM_{10}$) - Santa Clarita Valley** | | | | |
| Maximum Concentration 24-hr period, μg/m$^3$ | 66 | 49 | 62 | 48 |
| Annual Arithmetic Mean (AAM), μg/m$^3$ | **23.6** | **23.4** | 18.4 | **22.5** |
| Number of Exceedances, California Standard 24-hr period | 2 | 0 | 1 | 0 |
| Exceed California Standard Annual Arithmetic Mean? | **Yes** | **Yes** | No | **Yes** |
| Number of Exceedances, National Standard Concentration 24-hr period | 0 | 0 | 0 | 0 |
| **Fine Particulate Matter ($PM_{2.5}$)[5] - West San Fernando Valley** | | | | |
| Maximum Concentration 24-hr period, μg/m$^3$ | 35.2 | 31.0 | 30.0 | 27.6 |
| 98th Percentile Concentration 24-hr period, μg/m$^3$ | 20.7 | 22.6 | 26.3 | 26.4 |
| Annual Arithmetic Mean (AAM), μg/m$^3$ | 9.7 | 10.3 | 9.2 | 10.1 |
| Number of Exceedances, National Standard Concentration 24-hr period | 0 | 0 | 0 | 0 |
| Exceed National Standard Annual Arithmetic Mean (AAM)? | No | No | No | No |
| Exceed California Standard Annual Arithmetic Mean (AAM)? | No | No | No | No |

**Notes:**

[1] NM indicates pollutants that were Not Monitored. N/A indicates that information was not available.

[2] Bold values are Monitoring data that exceed the standards.

[3] The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard.

[4] USEPA adopted new $SO_2$ standards of 75 ppb for 99th percentile of 1-hr daily maximum concentrations over 3 years in 2010. Previous 24-hr and annual average standards were revoked.

[5] USEPA adopted new $PM_{2.5}$ annual average standard of 12.0 μg/m$^3$ in 2012.

[6] East San Fernando Valley no longer reporting Sulfur Dioxide post-2014, Central LA station used instead.

**Abbreviations:**

mg/m$^3$ - micrograms per cubic meter
CARB - California Air Resources Board
hr - hour

**References:**

SCAQMD. 2019. Historical Data by Year. Available at: https://www.aqmd.gov/home/air-quality/historical-air-quality-data/historical-data-by-year. Accessed: November 2021.

CARB. 2014. Ambient Air Quality Standards. Available at: https://ww2.arb.ca.gov/resources/documents/ambient-air-quality-standards-0. Accessed: November 2021.

**Table 2-2. Summary of NAAQS and CAAQS**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Pollutant | Averaging Period | California Standard[1] | Federal Standard[2] |
|---|---|---|---|
| Ozone ($O_3$) | 1 hour | 0.09 ppm (180 μg/$m^3$) | --- |
| | 8 hour | 0.070 ppm (137 μg/$m^3$) | 0.070 ppm (137 μg/$m^3$) |
| Respirable Particulate Matter ($PM_{10}$) | 24 hour | 50 μg/$m^3$ | 150 μg/$m^3$ |
| | Annual Arithmetic Mean | 20 μg/$m^3$ | --- |
| Fine Particulate Matter ($PM_{2.5}$) | 24 hour | --- | 35 μg/$m^3$ |
| | Annual | 12 μg/$m^3$ | 12.0 μg/$m^3$ |
| Carbon Monoxide (CO) | 1 hour | 20 ppm (23 mg/$m^3$) | 35 ppm (40 mg/$m^3$) |
| | 8 hour | 9.0 ppm (10 mg/$m^3$) | 9 ppm (10 mg/$m^3$) |
| Nitrogen Dioxide ($NO_2$) | 1 hour[3] | 0.18 ppm (339 μg/$m^3$) | 0.100 ppm (188 μg/$m^3$) |
| | Annual Arithmetic Mean | 0.030 ppm (57 μg/$m^3$) | 0.053 ppm (100 μg/$m^3$) |
| Lead (Pb) | 30 day average | 1.5 μg/$m^3$ | --- |
| | Rolling 3-month average | --- | 0.15 μg/$m^3$ |
| Sulfur Dioxide ($SO_2$) | 1 hour[4] | 0.25 ppm (655 μg/$m^3$) | 0.075 ppm (196 μg/$m^3$) |
| | 3 hour[5] | --- | 0.5 ppm (1300 μg/$m^3$) |
| | 24 hour | 0.04 ppm (105 μg/$m^3$) | --- |
| Hydrogen Sulfide ($H_2S$) | 1 hour | 0.03 ppm (42 μg/$m^3$) | --- |
| Vinyl Chloride | 24 hour | 0.01 ppm (26 μg/$m^3$) | --- |
| Sulfates | 24 hour | 25 μg/$m^3$ | --- |
| Visibility-Reducing Particles | 8 hour | Extinction coefficient of 0.23 per kilometer (visibility of ten miles or more due to particles when relative humidity is less than 70 percent) | --- |

**Notes:**

[1] California standards from CARB website (www.arb.ca.gov/research/aaqs/aaqs2.pdf), updated May 4, 2016.

[2] Federal standards from CARB website (www.arb.ca.gov/research/aaqs/aaqs2.pdf), updated May 4, 2016.

[3] To attain the federal 1-hour $NO_2$ standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average must not exceed the threshold.

[4] To attain the federal 1-hour $SO_2$ standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average must not exceed the threshold.

[5] This is a secondary standard.

**Abbreviations:**

μg/$m^3$ - micrograms per cubic meter
CAAQS - California Ambient Air Quality Standard
CARB - California Air Resources Board
EPA - Environmental Protection Agency
mg/$m^3$ - milligrams per cubic meter
NAAQS - National Ambient Air Quality Standard
ppm - parts per million

**Table 2-3. NAAQS and CAAQS Attainment Status**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Pollutant | Averaging Period | Los Angeles County Attainment Status | |
|---|---|---|---|
| | | **California Standard[1,3]** | **Federal Standard[2]** |
| Ozone ($O_3$) | 1 hour | Non-Attainment | --- |
| | 8 hour | Non-Attainment | Extreme Non-Attainment |
| Respirable Particulate Matter ($PM_{10}$) | 24 hour | Non-Attainment | Attainment |
| | Annual | Non-Attainment | --- |
| Fine Particulate Matter ($PM_{2.5}$) | 24 hour | --- | Non-Attainment |
| | Annual | Non-Attainment | Non-Attainment |
| Carbon Monoxide (CO) | 1 hour | Attainment | Attainment (Maintenance) |
| | 8 hour | Attainment | Attainment (Maintenance) |
| Nitrogen Dioxide ($NO_2$) | 1 hour | Attainment | Unclassified/Attainment |
| | Annual | Attainment | Unclassified/Attainment |
| Lead (Pb)[3,4] | 30 day average | Attainment | --- |
| | Rolling 3-month average | --- | Non-Attainment |
| Sulfur Dioxide ($SO_2$) | 1 hour | Attainment | Attainment |
| | 3 hour | --- | Attainment |
| Hydrogen Sulfide ($H_2S$) | 1 hour | Unclassified | --- |
| Vinyl Chloride | 24 hour | No information Available | --- |
| Sulfates | 24 hour | Attainment | --- |
| Visibility-Reducing Particles | 8 hour | Unclassified | --- |

**Notes:**

[1] California standard attainment status based on CARB website (www.arb.ca.gov/desig/adm/adm.htm).

[2] Federal standard attainment status based on USEPA Green book and Regional 9 Air Quality Maps, current as of June 30, 2019 (www.arb.ca.gov/desig/adm/adm.htm).

[3] Attainment status for the California standard is for the year 2017.

[4] Non-attainment applies to the southern portion of Los Angeles County only.

**Abbreviations:**

CAAQS - California Ambient Air Quality Standards
NAAQS - National Ambient Air Quality Standards
CARB - California Air Resources Board
USEPA - United States Environmental Protection Agency

**References:**

CARB. 2018. Area Designations Maps / State and National. Available at: www.arb.ca.gov/desig/adm/adm.htm. Accessed on: July 2019.

USEPA. 2019. The Green book of Nonattaiment Areas for Criteria Pollutants. Available at: https://www.epa.gov/green-book. Accessed on: July 2019.

USEPA. 2018. EPA Region 9 Air Quality Maps. Available at: https://www3.epa.gov/region9/air/maps/. Accessed on: July 2019.

**Table 2-4. SCAQMD Air Quality Significance Thresholds**[1]
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Mass Daily Thresholds (lbs/day) | | |
|---|---|---|
| **Pollutant** | **Construction** | **Operation** |
| $NO_X$ | 100 | 55 |
| VOC | 75 | 55 |
| $PM_{10}$ | 150 | 150 |
| $PM_{2.5}$ | 55 | 55 |
| $SO_X$ | 150 | 150 |
| CO | 550 | 550 |
| Lead | 3 | 3 |
| **Toxic Air Contaminants (TACs), Odor, and GHG Thresholds** | | |
| TACs | Maximum Incremental Cancer Risk ≥ 10 in 1 million<br>Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million)<br>Chronic & Acute Hazard Index ≥ 1.0 (project increment) | |
| Odor | Project creates an odor nuisance pursuant to SCAQMD Rule 402 | |
| GHG | 10,000 MT/yr $CO_2$eq for industrial facilities | |
| **Ambient Air Quality Standards for Criteria Pollutants** | | |
| $NO_2$<br>1-hour average<br>Annual Arithmetic Mean | SCAQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.18 ppm (state)<br>0.03 ppm (state) and 0.0534 ppm (federal) | |
| $PM_{10}$<br>24-hour Average<br>Annual Average | 10.4 μg/m$^3$ (construction); 2.5 μg/m$^3$ (operation)<br>1.0 μg/m$^3$ | |
| $PM_{2.5}$ 24-hour Average | 10.4 μg/m$^3$ (construction); 2.5 μg/m$^3$ (operation) | |
| $SO_2$<br>1-hour Average<br>24-hour Average | 0.25 ppm (state); 0.075 ppm (federal – 99$^{th}$ percentile)<br>0.04 ppm (state) | |
| CO<br>1-hour Average<br>8-hour Average | SCAQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards:<br>20 ppm (state) and 35 ppm (federal)<br>9.0 ppm (state/federal) | |

**Abbreviations:**

mg/m$^3$ - micrograms per cubic meter
CO - carbon monoxide
GHG - greenhouse gases
lbs - pounds
$NO_2$ - nitrogen oxide
NOx - nitrogen oxides
$PM_{10}$ - coarse particulate matter
$PM_{2.5}$ - fine particulate matter
ppm - parts per million
SCAQMD - South Coast Air Quality Management District
$SO_2$ - sulfur dioxide
$SO_x$ - sulfur oxides
TACs - toxic air contaminants
VOC - volatile organic compounds

**Reference:**

[1] SCAQMD Significance Thresholds Revision April 2019 Available at: http://sfprod.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2. Accessed: July 2019.

**Table 3-1a. Off-road Construction Equipment Tier Comparison**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Tier | Low HP | High HP | Percent Decrease to Tier 3 + BACT[1] | | | | |
|---|---|---|---|---|---|---|---|
| | | | CO | $NO_x$ | (exhaust) | (exhaust) | ROG |
| | | | % | % | % | % | % |
| Tier 1 | 25 | 49 | 0% | -12% | -91% | -91% | -83% |
| | 50 | 74 | -46% | -58% | -95% | -95% | -90% |
| | 75 | 119 | -46% | -58% | -95% | -95% | -90% |
| | 120 | 174 | -46% | -65% | -94% | -94% | -85% |
| | 175 | 299 | -62% | -61% | -88% | -88% | -68% |
| | 300 | 599 | -62% | -61% | -88% | -88% | -68% |
| | 600 | 750 | -62% | -61% | -88% | -88% | -68% |
| | 751 | 2000 | -62% | -61% | -88% | -88% | -68% |
| Tier 2 | 25 | 49 | 0% | 0% | -85% | -85% | 0% |
| | 50 | 74 | 0% | -42% | -85% | -85% | -48% |
| | 75 | 119 | 0% | -42% | -85% | -85% | -48% |
| | 120 | 174 | 0% | -44% | -87% | -87% | -37% |
| | 175 | 299 | 0% | -44% | -85% | -85% | 0% |
| | 300 | 599 | 0% | -39% | -85% | -85% | 0% |
| | 600 | 750 | 0% | -39% | -85% | -85% | 0% |
| | 751 | 2000 | 0% | -39% | -85% | -85% | 0% |

**Notes:**

[1] Emission factors from CalEEMod® based on the assumed Tier and BACT. Diesel particulate filters are assumed to represent Best Available Control Technology and assumed for all Tier 3 equipment. $SO_2$ and PM fugitive dust emissions do not have any benefit from improved offroad engine tiers, so these emissions are not calculated here.

**Abbreviations:**

CalEEMod - CALifornia Emissions Estimator MODel
BACT - Best Available Control Technology
CO - carbon monoxide
g/bhp-hr - grams per brakehorse power-hour
HP - horsepower
NOx - oxides of nitrogen
$PM_{10}$ - particulate matter with a diameter less than 10 microns
$PM_{2.5}$ - particulate matter with a diameter less than 2.5 microns
ROG - reactive organic gas
TOG - total organic gas

**Table 3-1b. Decrease in Emission Rates from Construction Off-Road Equipment**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | HP [2] | State-Certified EIR Emissions (2011 SCAB Composite) [1,2,3] (g/bhp-hr) | | | | Current Analysis Emission Factors (Tier 3 + DPF by Average HP) [4] (g/bhp-hr) | | | | Percent Change in Emission Rates [5] (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ROG | CO | $NO_X$ | $PM_{10}$ | ROG | CO | $NO_X$ | $PM_{10}$ | ROG | CO | $NO_X$ | $PM_{10}$ |
| Grading - Direct | Crawler Tractors | 212 | 0.38 | 1.33 | 2.79 | 0.172 | 0.12 | 2.60 | 2.32 | 0.013 | -68% | 96% | -17% | -92% |
| | Crushing/Proc. Equipment | 38 | 2.39 | 8.40 | 16.08 | 1.050 | 0.29 | 4.10 | 4.63 | 0.280 | -88% | -51% | -71% | -73% |
| | Excavators | 23 | 2.74 | 10.81 | 20.97 | 1.167 | 0.29 | 4.10 | 4.63 | 0.280 | -89% | -62% | -78% | -76% |
| | Graders | 188 | 0.39 | 1.50 | 3.23 | 0.170 | 0.12 | 2.60 | 2.32 | 0.013 | -69% | 74% | -28% | -92% |
| | Water Trucks (Other Material Handling Equipment) | 167 | 0.45 | 1.44 | 4.11 | 0.180 | 0.12 | 3.70 | 2.32 | 0.017 | -73% | 157% | -44% | -91% |
| | Off-Highway Trucks | 403 | 0.26 | 0.79 | 2.47 | 0.089 | 0.12 | 2.60 | 2.32 | 0.013 | -55% | 230% | -6% | -85% |
| | Rollers | 12 | 4.20 | 15.78 | 27.87 | 1.979 | 0.29 | 4.10 | 4.63 | 0.280 | -93% | -74% | -83% | -86% |
| | Rubber Tired Dozers | 249 | 0.59 | 2.42 | 5.16 | 0.220 | 0.12 | 2.60 | 2.32 | 0.013 | -80% | 8% | -55% | -94% |
| | Rubber Tired Loaders | 25 | 2.46 | 9.00 | 19.54 | 1.103 | 0.29 | 4.10 | 4.63 | 0.280 | -88% | -54% | -76% | -75% |
| | Scrapers | 367 | 0.38 | 1.44 | 3.38 | 0.145 | 0.12 | 2.60 | 2.32 | 0.013 | -68% | 80% | -31% | -91% |

**Notes:**

[1] Construction phases and equipment mix are consistent with the RMDP-SCP Final EIS/EIR (June 2010) assumptions for Valencia Commerce Center and Entrada Direct Grading. See Appendix 4.7a Construction Emissions: Grading and Improvements Emissions, Direct Emissions (Impact Sciences, 2008), PDF pg 8 and 30. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=11306. The SCAB fleet average emission factors are cited in the footnote on each of those pages.

[2] Average HP is not available for the SCAB composite emissions. Therefore, this is calculated based on CARB's OFFROAD2017 Orion v1.0.1 database. Available at: https://www.arb.ca.gov/orion/.

[3] SCAB composite factors are consistent with the factors used in the State-certified EIR, with potential variations in average horsepower. Available at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/off-road-mobile-source-emission-factors. Accessed: September, 2019. Average horsepower by equipment type from OFFROAD2017 used to convert pounds per hour to grams per brakehorse power-hour.

[4] CARB. Non-road Diesel Engine Certification Tier Chart. https://ww2.arb.ca.gov/resources/documents/non-road-diesel-engine-certification-tier-chart. Assumes an 85% reduction in PM emissions due to the DPF for equipment greater than 50 HP. This is conservative, as DPFs are likely to also reduce emissions from other pollutants.

[5] Percent Decrease = (2011 EF - Tier 3 + DPF EF) / 2011 EF.

**Abbreviations:**

CARB- California Air Resources Board
CO - carbon monoxide
EF - emission factor
EIR - Environmental Impact Report
g/bhp-hr - grams per brakehorsepower-hour
HP - horsepower
NOX - oxides of nitrogen
PM - particulate matter
ROG - reactive organic gas
SCAB - South Coast Air Basin
SOX - oxides of sulfur

**Table 3-2. Development of Updated VOC Emission Factor from Consumer Products**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Year[1] | Consumer Products VOC Inventory (tons/day)[2] | Los Angeles County Population[3] | Total Building Square Footage[4] | Consumer Products VOC Emission Factor (lb/square foot/day) |
|---|---|---|---|---|
| 2010 | 65.23 | 9,818,605 | 6,243,481,645 | 2.09E-05 |
| 2020 | 69.30 | 10,014,009 | 6,367,735,680 | 2.18E-05 |

**Notes:**

[1] 2010 data are used because total building square footage was available only for 2010. Building square footage for 2020 was estimated by multiplying 2010 building square footage with the ratio of population in 2020 to that in 2010.

[2] VOC inventory for LA County (including both South Coast Air Basin and Mojave Air Basin) obtained from CARB's emission inventory for Consumer Products under Solvent Evaporation for the respective years.

[3] Population estimates obtained from US Census Bureau's QuickFacts for Los Angeles County for the respective years.

[4] Total building square footage for 2010 obtained from FEMA HAZUS-MH software.

**References:**

California Air Resources Board. Almanac Emission Projection Data. Available online at https://www.arb.ca.gov/app/emsinv/emssumcat.php. Accessed November 2021.

US Census Bureau QuickFacts. Available online at https://www.census.gov/quickfacts/fact/table/losangelescountycalifornia#. Accessed December 2021.

US Federal Emergency Management Agency's Hazus software (HAZUS-MH), Version 5.1. Available online at https://msc.fema.gov/portal/resources/hazus.

**Abbreviations:**

CARB - California Air Resources Board
lb - pound
VOC - Volatile Organic Compound

**Table 3-3a. CalEEMod Inputs for Traffic**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Village | CalEEMod® Land Use[1] | Unit | Trip Rate (trips/day/unit)[2] Adjusted SCVCTM | Derived with CalEEMod® Data | | Trip Length (miles)[2,3] | | | | | | Trip Link Type (%)[4] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weekday | Saturday | Sunday | Home Work | Home Shopping | Home Other | Commercial Customer | Commercial Work | Commercial Non-Work | Primary | Diverted | Pass-By |
| ES | Condo/Townhouse | DU | 7.08 | 6.91 | 5.90 | 8.5 | 8.5 | 8.5 | 0 | 0 | 0 | 100 | 0 | 0 |
| | Regional Shopping Center | TSF | 35.15 | 41.14 | 20.78 | 0 | 0 | 0 | 11.15 | 11.15 | 11.15 | 100 | 0 | 0 |
| | Elementary School | STU | 1.36 | 0.00 | 0.00 | 0 | 0 | 0 | 13.36 | 13.36 | 13.36 | 100 | 0 | 0 |
| | General Office Building | TSF | 8.65 | 1.93 | 0.82 | 0 | 0 | 0 | 11.92 | 11.92 | 11.92 | 100 | 0 | 0 |
| | Health Club | TSF | 0.83 | 0.53 | 0.68 | 0 | 0 | 0 | 13.27 | 13.27 | 13.27 | 100 | 0 | 0 |

**Notes:**

[1] Land Use Type lists the nomenclature consistent with trip information. Data provided in Appendix B.

[2] The Adjusted SCVCTM Trip Rate for weekdays, as described in the State-certified EIR, was used as the basis to derive the weekend trip rates. The weekday to weekend ratios for each land use as provided by CalEEMod® were used for the derivation.

[3] Trip lengths are based on the adjusted SCVCTM data that removes the double counted internal trips. While CalEEMod ® has options to represent different trip lengths for different trip types, the same trip length was used for all trip types to ensure that the total annual VMT was accurately calculated by CalEEMod ® consistent with the VMT from the SCVCTM.

[4] The trip distribution and trip assignment processes utilized in SCVCTM accounts for primary trip, pass-by trips, and diverted trips. When utilizing traffic forecasts produced by the SCVCTM, it is unnecessary to undertake additional steps to calculate the number of diverted trips or pass-by trips since they are reflected in the total trip forecasts produced by the SCVCTM. As a result, this analysis assumes that all trips are "primary" trips.

**Abbreviations:**

CalEEMod® - California Emissions Model
DU - dwelling unit
ES - Entrada South
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
STU - student
TDM - Transportation Demand Management
TSF - thousand square feet

**Table 3-3b. Updated Silt Loading Factor**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Entrained Roadway Dust Constants for Los Angeles County (South Coast) | | |
|---|---|---|
| **Roadway Category** | **Silt Loading[1] ($g/m^2$)** | **Travel Fraction[1]** |
| Freeway | 0.015 | 44% |
| Major | 0.013 | 44% |
| Collector | 0.013 | 7% |
| Local | 0.14 | 5% |
| Weighted Silt Loading Factor | 0.020 | 100% |

**Notes:**

[1] Travel fraction by roadway category and silt loading is from the ARB's Entrained Road Travel Emission Inventory Source Methodology, Tables 2 and 4, respectively.

**Abbreviations:**

g - gram(s)

m - meter

**References:**

California Air Resources Board. 2021. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. March. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

**Table 3-4. ES AQ Co-Benefits from Residential EV Chargers**
Entrada South and Valencia Commerce Center
Los Angeles County, California

**Estimating Residential VMT that is Displaced by EVs due to This Measure**

| | | | | | | |
|---|---|---|---|---|---|---|
| Residential Average Yearly Traffic, before TDMs[1] | | | | | 33,632,226 | (miles/year) |
| Residential Average Yearly Traffic, after TDMs[2] | | | | | 28,621,024 | (miles/year) |
| Percent of Residential Miles Driven in Electric Vehicles due to This Measure[3] | | | | | 50% | |
| Residential VMT that is Displaced by EVs due to This Measure | | | | | 14,310,512 | (miles/year) |
| **Emission Factors (gram/mile)[4,5,6]** | | | | | | |
| | **VOC** | **$NO_X$** | **CO** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| Fleet | 0.04 | 0.15 | 1.04 | 0.0033 | 0.0022 | 0.0020 |
| **Emission Reductions (lb/day)[7]** | | | | | | |
| | **VOC** | **$NO_X$** | **CO** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| Fleet | 3.62 | 12.91 | 90.15 | 0.28 | 0.19 | 0.17 |

**Notes:**

[1] From CalEEMod® modeling, as shown in Appendix A.

[2] The 14.9% reduction in VMT due to TDMs (shown in Table 3-6) is applied prior to taking credit for the residential EV mitigation measure.

[3] This assumption is described in more detail in the State-certified EIR.

[4] Fleet-wide emission factors based on EMFAC2021 v.1.0.2, for calendar year 2030 in the Los Angeles (SC) sub-area. Fleet-wide factors are used to be consistent with the CalEEMod® methodology used to develop the emissions inventory.

[5] For emission factor determination, only emissions from exhaust are included. Brake wear and tire wear are excluded because these emissions would occur for both internal combustion engine vehicles and electric vehicles. Hot soak, running losses, resting losses and diurnal losses were not included in emission factor calculations. VOC emissions from these factors for conventional vehicles are considerably higher than electric vehicles, and thus this assumption is conservative.

[6] $SO_2$ emission factor is assumed to be equal to EMFAC emission factor for $SO_X$. Per USEPA, $SO_2$ is the component of greatest concern and is used as the indicator for the larger group of $SO_X$. Available at: https://www.epa.gov/so2-pollution/sulfur-dioxide-basics.

[7] Emission reduction calculations are based on VMT that is assumed to be driven by electric vehicles due to this measure.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
CO - carbon monoxide
EMFAC - EMission FACtors model
lb - pound
$NO_X$ - oxides of nitrogen
$PM_{10}$ - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
$SO_X$ - sulfur oxide
VOC - volatile organic compounds
VMT - vehicles miles traveled

**Table 3-5. ES AQ Co-Benefits from EV Chargers**
Entrada South and Valencia Commerce Center
Los Angeles County, California

**Estimating Vehicle Miles Traveled Conversion from Replacement of Gasoline Vehicle with Electric Vehicle**

| Description | Value | Units |
|---|---|---|
| Fuel Economy of Electric Vehicle[1] | 0.25 | (kWh/mile) |
| Charge Rate[2] | 6.25 | (kW = kWh/hr) |
| Miles of Charge per kWh | 4 | (mile/kWh) |

**Estimating VMT Replaced by Electric Vehicles for Each Mitigatio**

| Description | Value | Units |
|---|---|---|
| MM 2-5 Number of Parking Spots Provided Chargers[3] | 166 | (parking spaces) |
| MM 2-5 Annual Electricity Use for Charging Stations | 3,786,875 | (kWh/year) |
| MM 2-5 Annual VMT Reduction from Stations (Based on Charge)[4] | 15,147,500 | (miles/year) |
| MM 2-12 Number of Parking Spots Provided Chargers[3] | 157 | (parking spaces) |
| MM 2-12 Annual Electricity Use for Charging Stations | 3,574,806 | (kWh/year) |
| MM 2-12 Annual VMT Reduction from Stations (Based on Charge)[4] | 14,299,224 | (miles/year) |
| Supplemental Commitment Number of Parking Spots Provided Chargers[3] | 78 | (parking spaces) |
| Supplemental Commitment Annual Electricity Use for Charging Stations | 1,779,375 | (kWh/year) |
| Supplemental Commitment Annual VMT Reduction from Stations (Based on Charge)[4] | 7,117,500 | (miles/year) |

**Emissions Reductions**

| | VOC | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| Vehicle Emission Factor (gram/mile)[5,6] | 0.0365 | 0.0640 | 0.9905 | 0.0028 | 0.0014 | 0.0013 |
| MM 2-5 Emissions Reduction for Gasoline/Diesel Vehicles (lb/day) | 3.3 | 5.9 | 90.6 | 0.3 | 0.1 | 0.1 |
| MM 2-12 Emissions Reduction for Gasoline/Diesel Vehicles (lb/day) | 3.2 | 5.5 | 85.5 | 0.2 | 0.1 | 0.1 |
| **Total Reduction from Mitigation Measures** | **6.5** | **11.4** | **176.2** | **0.5** | **0.2** | **0.2** |
| Supplemental Commitment Emissions Reduction for Gasoline/ Diesel Vehicles (lb/day) | 1.6 | 2.8 | 42.6 | 0.1 | 0.1 | 0.1 |

**Notes:**

[1] National Renewable Energy Laboratory (NREL). 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025 (Table C.1). Available at: https://www.nrel.gov/docs/fy18osti/70893.pdf.

[2] Estimated charge rate of 6.25 kW based on capability of existing battery-electric vehicles and Level 2 charging stations.

[3] Number of charging stations based on project commitment. This assumes 7.5 percent of required commercial parking spaces will be serviced by a charging station. The off-site mitigation measure 2-12 assumes a ratio of one parking space serviced by an electric vehicle charging station per 30 residential dwelling units and one parking space serviced by an electric vehicle charging station per 7,000 commercial square feet. The supplemental commitment assumes 1 parking space shall be served by an electric vehicle charging station for every 50 dwelling units, and 1 parking space shall be served by an electric vehicle charging station for every 15,900 square feet of commercial development.

[4] Annual VMT reduction is the total kWh per year multiplied by the fuel economy in miles per kWh. Consistent with the State-certified EIR, this is equivalent to ten hours of charge time per day for a Level 2 charging station that charges at a rate of 25 driving range per hour.

[5] Emission Factors based on EMFAC 2021 for calendar year 2030 in Los Angeles County. EF were weighted according to LDA, LDT1 and LDT2 fleet-mix VMT and trips. Only exhaust emissions are included. All other losses including heat soak, diurnal, tire wear, break wear, etc. are not considered as these emissions are also expected to occur for electric vehicles. However, emissions from these sources for the conventional fleet are considerably higher than electric vehicles, and thus this omission is conservative.

[6] $SO_2$ emission factor is assumed to be equal to EMFAC emission factor for $SO_X$. Per USEPA, $SO_2$ is the component of greatest concern and is used as the indicator for the larger group of $SO_X$. Available at: https://www.epa.gov/so2-pollution/sulfur-dioxide-basics.

**Abbreviations:**

CARB - California Air Resources Board
EF - Emission Factors
EMFAC - EMission FACtors model
EV - electric vehicle
lb - pound
kWh - kilowatt-hour
LDA - Light Duty Auto (passenger cars)
LDT - Light Duty trucks
$NO_X$ - oxides of nitrogen
PM - particulate matter
VOC - volatile organic compounds
VMT - vehicles miles traveled

**Table 3-6. ES AQ Co-Benefits due to Transportation Demand Management**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Item | Value | Units |
|---|---|---|
| Total VMT per Year[1] | 98,065,578 | (miles/yr) |
| Total VMT Reduction due to TDMs[2] | 14.9% | |
| Reduction in VMT per Year due to TDMs | 14,611,771 | (miles/yr) |

| Variable | VOC | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| **Emission Factors (g/mile)[3,4]** | 0.114 | 0.149 | 1.043 | 0.003 | 0.026 | 0.009 |
| **Emission Reductions (lb/day)** | 10.0 | 13.2 | 92.0 | 0.3 | 2.3 | 0.8 |

**Notes:**

[1] Total VMT based on the Project-specific traffic study. Trips were modeled using CalEEMod® version 2022.1. See Appendix A for VMT output.

[2] TDM reduction is consistent with the State-certified EIR.

[3] Fleet wide emission factors based on EMFAC2021 v.1.0.2 exhaust emissions, for calendar year 2030 in the Los Angeles (SC) sub-area. $PM_{10}$ and $PM_{2.5}$ fugitive dust reductions are added in Table 3-7.

[4] $SO_2$ emission factor is assumed to be equal to EMFAC emission factor for $SO_X$. Per USEPA, $SO_2$ is the component of greatest concern and is used as the indicator for the larger group of $SO_X$. Available at: https://www.epa.gov/so2-pollution/sulfur-dioxide-basics.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
CO - carbon monoxide
DEIR - Draft Environmental Impact Report
EMFAC - EMission FACtors model
g - gram
GHG - greenhouse gas
LA - Los Angeles
lb - pound
$NO_X$ - oxides of nitrogen
$PM_{10}$ - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
$SO_2$ - sulfur dioxide
TDM - Transportation Demand Management
VOC - volatile organic compounds
VMT - vehicles miles traveled

Conversion Factor:

| | |
|---|---|
| 453.6 | grams/lb |
| 365 | days/year |

**Table 3-7. Summary of ES Project Operational Criteria Air Pollutant Emissions**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Category | | Summer Emissions | | | | | | Winter Emissions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VOC | $NO_x$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ | VOC | $NO_x$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| | | (lbs/day) | | | | | | (lbs/day) | | | | | |
| Modified Project[1] | Total Unmitigated Emissions | 121 | 86 | 841 | 2 | 62 | 18 | 107 | 92 | 644 | 2 | 61 | 17 |
| | Total Emissions with Net Zero Newhall Mitigation | 101 | 49 | 482 | 1 | 59 | 16 | 87 | 54 | 285 | 1 | 59 | 16 |
| State-certified EIR Air Quality Analysis, ES [2] | Total Unmitigated Emissions | 171 | 84 | 703 | 2.0 | 324 | 63 | 174 | 106 | 647 | 1.7 | 325 | 64 |
| | Estimated Emissions with State-certified EIR Air Quality Mitigation | 167 | 73 | 668 | 2.0 | 309 | 60 | 170 | 95 | 613 | 1.7 | 310 | 61 |
| **Net Change** | **Current Mitigated ES minus State-certified EIR Mitigated ES** | **-67** | **-25** | **-186** | **-1** | **-250** | **-44** | **-83** | **-41** | **-328** | **-1** | **-251** | **-45** |
| | **SCAQMD Operational Threshold** | 55 | 55 | 550 | 150 | 150 | 55 | 55 | 55 | 550 | 150 | 150 | 55 |
| | **Net Change Exceeds Threshold?** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** |

**Notes:**

[1] Emissions modeled using CalEEMod version 2022.1.0 for year 2030. Reduction from Net Zero Newhall mitigation measures include electric vehicle chargers, zero net energy buildings, and a 14.9% TDM VMT reduction, consistent with the State-certified EIR GHG analysis. The mobile analysis is conducted using EMFAC2021 v.1.0.2, which is updated to reflect the federal government's revocation of the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule.

[2] RMDP/SCP FEIR Section 4.7 Air Quality, June 2010, Table 4.7-15 Indirect Operational Emissions (Entrada) ' Unmitigated (2030) shows the unmitigated ES emissions. Table 4.7-16 shows unmitigated emissions for the entire RMDP/SCP Project Site, while Table 4.7-17 shows the mitigated emissions for the entire RMDP/SCP Project Site. The reductions due to mitigation measures for the entire site are from Impact Sciences, Inc., "Operational Emissions with Mitigation: Summary of Alternatives with Entrada and VCC" (April 2008) and show that percent reductions apply relatively evenly among land use types (e.g., residential, commercial, and industrial); therefore, it is reasonable to apply these reductions to the Unmitigated ES emissions to estimate the Mitigated ES emissions.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
CO - carbon monoxide
EMFAC - EMission FACtors model
ES - Entrada South
EV - electric vehicle
FEIR - Final Environmental Impact Report
lbs - pounds
RMDP/SCP - Resource Management and Development Plan / Spineflower Conservation Plan
SCAQMD - South Coast Air Quality Management District
TDM - transportation demand management
VCC - Valencia Commerce Center
VMT - vehicle miles traveled

**Table 3-8. Summary of VCC Project Operational Criteria Air Pollutant Emissions**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Category | | Summer Emissions | | | | | | Winter Emissions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VOC | $NO_x$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ | VOC | $NO_x$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| | | (lbs/day) | | | | | | (lbs/day) | | | | | |
| State-certified EIR Air Quality Analysis, VCC[1] | Total Unmitigated Emissions | 99 | 65 | 729 | 2.2 | 360 | 70 | 101 | 78 | 680 | 1.8 | 360 | 70 |
| | Estimated Emissions with State-certified EIR Air Quality Mitigation | 97 | 57 | 693 | 2.2 | 343 | 67 | 99 | 70 | 644 | 1.8 | 343 | 67 |
| Modified Project[2] | Total Unmitigated Emissions | 99 | 65 | 729 | 2 | 360 | 70 | 101 | 78 | 680 | 2 | 360 | 70 |
| | Total Emissions with State-certified EIR Air Quality Mitigation | 97 | 57 | 693 | 2 | 343 | 67 | 99 | 70 | 644 | 2 | 343 | 67 |
| **Net Change** | **Current Mitigated VCC minus State-certified EIR Mitigated VCC** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **SCAQMD Operational Threshold** | | **55** | **55** | **550** | **150** | **150** | **55** | **55** | **55** | **550** | **150** | **150** | **55** |
| **Net Change Exceeds Threshold?** | | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** |

**Notes:**

[1] RMDP/SCP FEIR Section 4.7 Air Quality, June 2010, Table 4.7-14 Indirect Operational Emissions (Commerce Center)' Unmitigated (2030) shows the unmitigated VCC emissions. Table 4.7-16 shows unmitigated emissions for the entire RMDP/SCP Project Site, while Table 4.7-17 shows the mitigated emissions for the entire RMDP/SCP Project Site. The reductions due to mitigation measures for the entire site are from Impact Sciences, Inc., "Operational Emissions with Mitigation: Summary of Alternatives with Entrada and VCC" (April 2008) and show that percent reductions apply relatively evenly among land use types (e.g., residential, commercial, and industrial); therefore, it is reasonable to apply these reductions to the Unmitigated VCC emissions to estimate the Mitigated VCC emissions.

[2] The Modified Project will not result in changes to building square footage compared to what was assumed in the State-certified EIR. Therefore, VCC operational emissions are not anticipated to increase relative to the State-certified EIR. The more stringent Net Zero Newhall GHG mitigation framework that will apply to the Modified Project would likely reduce emissions further.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
CO - carbon monoxide
EV - electric vehicle
FEIR - Final Environmental Impact Report
lbs - pounds
$NO_x$ - nitrogen oxides
$PM_{2.5}$ - fine particulate matter
$PM_{10}$ - coarse particulate matter
$SO_2$ - sulfur dioxide
TDM - Transportation Demand Management
VCC - Valencia Commerce Center
VOC - volatile organic compounds

**Table 3-9. Summary of Combined ES and VCC Project Operational Criteria Air Pollutant Emissions**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Category | | Summer Emissions[1] | | | | | | Winter Emissions[1] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **VOC** | **$NO_x$** | **CO** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** | **VOC** | **$NO_x$** | **CO** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| | | **(lbs/day)** | | | | | | **(lbs/day)** | | | | | |
| **Net Change** | Current Mitigated ES minus State-certified EIR Mitigated ES | -67 | -25 | -186 | -1 | -250 | -44 | -83 | -41 | -328 | -1 | -251 | -45 |
| | Current Mitigated VCC minus State-certified EIR Mitigated VCC | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Sum of ES and VCC Net Change** | **-67** | **-25** | **-186** | **-1** | **-250** | **-44** | **-83** | **-41** | **-328** | **-1** | **-251** | **-45** |
| **SCAQMD Operational Threshold** | | 55 | 55 | 550 | 150 | 150 | 55 | 55 | 55 | 550 | 150 | 150 | 55 |
| **Net Change Exceeds Threshold?** | | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** |

**Notes:**

[1] ES Emissions modeled using CalEEMod 2022.1 for year 2030. Reduction from Net Zero Newhall mitigation measures include electric vehicle chargers, zero net energy buildings, and a 14.9% TDM VMT reduction, consistent with the State-certified EIR GHG analysis. State-certified EIR Air Quality emissions are shown in Table 3-7.

**Abbreviations:**

CalEEMod® - CALifornia Emi
CO - carbon monoxide
EV - electric vehicle
FEIR - Final Environmental I
$NO_x$ - nitrogen oxides
lbs - pounds
$PM_{2.5}$ - fine particulate matter
$PM_{10}$ - coarse particulate matter
$SO_2$ - sulfur dioxide
TDM - Transportation Demand Management
VCC - Valencia Commerce Center
VOC - volatile organic compounds

**Table 4-1. Comparison of Combined ES and VCC Modified Project's Net Change in Operational Emissions to SCAQMD Localized Significance Thresholds**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| Location | SRA No. | Size (acres)[1] | Distance To Receptor (m)[2] | SCAQMD LSTs[3] (lb/day) | | | | | Modified Project's Incremental Maximum Daily On-site Emissions[3] (lb/day) | | | | Exceeds SCAQMD LSTs? (lb/day) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CO | $NO_x$ | 1-hour $NO_X$[4] | $PM_{10}$ Operation | $PM_{2.5}$ Operation | CO | $NO_x$ | $PM_{10}$ Operation | $PM_{2.5}$ Operation | CO | $NO_x$ | 1-hour $NO_X$ | $PM_{10}$ Operation | $PM_{2.5}$ Operation |
| Entrada South | 13 | 5 | 25 | 1,644 | 246 | 137 | 3 | 2 | 87 | -29 | -0.80 | -0.77 | NO | NO | NO | NO | NO |
| Valencia Commerce Center | | | | | | | | | 0 | 0 | 0 | 0 | NO | NO | NO | NO | NO |
| **Total ES + VCC** | | | | | | | | | 87 | -29 | -0.80 | -0.77 | NO | NO | NO | NO | NO |

**Notes:**

1 Per a phone discussion with Ian MacMillan at SCAQMD (August 29, 2014), this mass rate LST can be conservatively used to assess Project's greater than 5 - acres in size.

2 The closest offsite receptor is conservatively assumed to be within 25 meters. Per the LST guidance, "It is possible that a project may have receptors closer than 25 meters. Projects with boundaries located closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters." (page 3-3). Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2.

3 LSTs based on the construction LSTs for Santa Clarita Valley. LSTs are based on the project size and distance to receptor for each on-site location and are considered to be conservative for larger sites. Obtained from the 2008 SCAQMD Final Localized Significance Threshold Methodology, Appendix C, Mass Rate LST Look-up Tables. Available at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds. Accessed: July 2019. On-site ES emissions for the Modified Project are modeled using CalEEMod 2016.3.2 for year 2030 and compared to the emissions from the State-certified EIR.

4 An approximated LST was estimated to evaluate the federal 1-hour $NO_2$ standard, as the SCAQMD LST has not been updated to reflect this standard. This value was estimated by scaling the SCAQMD LST that represents the state 1-hr $NO_2$ standard with the ratio of the federal to state 1-hr $NO_2$ standard (0.10 ppm/0.18 ppm). As a conservative approximation, the screening mass rate threshold for the federal 1-hour NO2 NAAQS would be at least 45% lower than that estimated by SCAQMD. This estimate is based on a ratio of the federal threshold (188 $\mu g/m^3$) to the 1-hour NO2 SCAQMD/CAAQS threshold (339 $\mu g/m^3$), on which the NO2 mass rate LST is based. Since the federal threshold is based on the 98th percentile and on a 3-year average, this estimate is a conservatively low estimate.

**Abbreviations:**

CO - carbon monoxide
lb - pounds
LST - localized significance threshold
$NO_2$ - nitrogen dioxide
$NO_X$ - nitrogen oxides
$PM_{10}$ - particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter
ppm - parts per million
SCAQMD - South Coast Air Quality Management District
SRA - Source receptor area

**Table 5-1. On Road Fugitive Dust Emission Factors**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| | $PM_{10}$ | $PM_{2.5}$ | Units |
|---|---|---|---|
| Particle Size Multiplier[1] | 1.00 | 0.25 | g/VMT |
| Silt Loading Factor[2] | 0.02 | 0.02 | $g/m^2$ |
| Mean Vehicle Weight[3] | 2.40 | 2.40 | tons |
| Number of "Wet" Days[3] | 16 | 16 | days |
| **On Road Road Dust Emission Factor[4]** | **0.069** | **0.017** | **g/VMT** |

**Notes:**

[1] Particle size multiplier values are from EPA AP-42 Compilation of Air Emissions Factors, Table 13.2.1-1. The guidance is available here: https://www.epa.gov/sites/default/files/2020-10/documents/13.2.1_paved_roads.pdf

[2] Silt loading factor values are derived in Table 3-3b.

[3] Mean vehicle weight and number of wet days are CalEEMod® Version 2022.1 default values for the South Coast region.

[4] Emission factor is calculated following guidance in the CalEEMod® Version 2022.1 User's Guide, Appendix C, Page C-45. CalEEMod® guidance is based on AP-42, Section 13.2.1 for vehicles traveling on paved roads. The equation is:

$$EF = [k \times (sL)^{0.91} \times (W)^{1.02}] \times (1-P/4N), \text{ where:}$$

k = particle size multiplier (g/VMT)
sL = silt loading factor ($g/m^2$)
W = mean vehicle weight (tons)
P = number of "wet" days
N = 365 = total days in a year

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
EF - emission factor
EPA - Environmental Protection Agency
g - gram
m - meter
$PM_{10}$ - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
VMT - vehicle miles traveled

**Table 5-2. On Road Fugitive Dust Emissions**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| | $PM_{10}$ | $PM_{2.5}$ | Units |
|---|---|---|---|
| Entrained Road Dust Emission Factor[1] | 0.069 | 0.017 | g/VMT |
| **Maximum Daily Emissions** | | | |
| Weekday Vehicle Miles Traveled[2] | 289,064 | 289,064 | VMT/day |
| Maximum Daily Emissions[3] | 43.78 | 10.95 | lbs/day |
| **Annual Emissions** | | | |
| Annual Vehicle Miles Traveled[2] | 98,065,578 | 98,065,578 | VMT/year |
| Annual Emissions[4] | 7.43 | 1.86 | tons/year |

**Notes:**

[1] Emission factors are derived in Table 5-1.

[2] Weekday and annual vehicle miles traveled are estimated using CalEEMod® Version 2022.1.

[3] Maximum daily emissions are estimated by multiplying weekday vehicle miles traveled and road dust emission factor. Note that daily summer and winter PM dust emissions are identical.

[4] Annual emissions are estimated by multiplying annual vehicle miles traveled and road dust emission factor.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
g - gram
lb - pound
$PM_{10}$ - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
VMT - vehicle miles traveled

**Table 5-3. Total Operational Emissions from Particulate Matter**
Entrada South and Valencia Commerce Center
Los Angeles County, California

| | $PM_{10}$ | $PM_{2.5}$ | Units |
|---|---|---|---|
| **Maximum Daily Emissions - Summer** | | | |
| Running, Idling, and Starting Exhaust Emissions[1] | 1.46 | 1.37 | lbs/day |
| Exhaust Fugitive Dust Emissions[1] | 16.14 | 5.03 | lbs/day |
| On Road Fugitive Dust Emissions[2] | 43.78 | 10.95 | lbs/day |
| Total Mobile Emissions[3] | 61.38 | 17.35 | lbs/day |
| **Maximum Daily Emissions - Winter** | | | |
| Running, Idling, and Starting Exhaust Emissions[1] | 1.46 | 1.37 | lbs/day |
| Exhaust Fugitive Dust Emissions[1] | 16.14 | 5.03 | lbs/day |
| On Road Fugitive Dust Emissions[2] | 43.78 | 10.95 | lbs/day |
| Total Mobile Emissions[3] | 61.38 | 17.35 | lbs/day |
| **Annual Emissions** | | | |
| Running, Idling, and Starting Exhaust Emissions[1] | 0.23 | 0.22 | tons/year |
| Exhaust Fugitive Dust Emissions[1] | 2.52 | 0.79 | tons/year |
| On Road Fugitive Dust Emissions[2] | 7.43 | 1.86 | tons/year |
| Total Mobile Emissions[3] | 10.18 | 2.86 | tons/year |

**Notes:**

[1] Exhaust emissions and mobile exhaust fugitive dust emissions are estimated within CalEEMod® using EMFAC2021 v1.0.2. for Calendar Year 2030 in the Los Angeles (South Coast) region. Exhaust fugitive dust emissions refer to emissions from PM tire wear and brake wear. These factors are combined with project-specific trip data in CalEEMod® to estimate total mobile emissions.

[2] On road fugitive dust emissions are derived in Table 5-2.

[3] Total emissions are calculated as a sum of total exhaust, mobile exhaust fugitive dust, and on road fugitive dust emissions.

**Abbreviations:**

CalEEMod® - CALifornia Emissions Estimator MODel
EMFAC - Emission Factors Model
EPA - Environmental Protection Agency
g - gram
m - meter
$PM_{10}$ - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter

# APPENDIX A
# CALEEMOD® OUTPUT FILES

# ES 2030 Operational Run - EMFAC v102 Corrected v3 Detailed Report

## Table of Contents

# 1. Basic Project Information

## 1.1. Basic Project Information

| Data Field | Value |
|---|---|
| Project Name | ES 2030 Operational Run - EMFAC v102 Corrected v3 |
| Lead Agency | — |
| Land Use Scale | Project/site |
| Analysis Level for Defaults | County |
| Windspeed (m/s) | 2.50 |
| Precipitation (days) | 16.0 |
| Location | 34.415271381501015, -118.5915600736055 |
| County | Los Angeles-South Coast |
| City | Unincorporated |
| Air District | South Coast AQMD |
| Air Basin | South Coast |
| TAZ | 3615 |
| EDFZ | 7 |
| Electric Utility | Southern California Edison |
| Gas Utility | Southern California Gas |

## 1.2. Land Use Types

| Land Use Subtype | Size | Unit | Lot Acreage | Building Area (sq ft) | Landscape Area (sq ft) | Special Landscape Area (sq ft) | Population | Description |
|---|---|---|---|---|---|---|---|---|
| Office Park | 365 | 1000sqft | 8.38 | 365,000 | 0.00 | — | — | — |
| Elementary School | 750 | Student | 1.44 | 62,703 | 0.00 | 0.00 | — | — |
| City Park | 5.00 | Acre | 5.00 | 0.00 | 0.00 | 0.00 | — | — |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Health Club | 2.50 | 1000sqft | 0.06 | 2,500 | 0.00 | — | — | — |
| Condo/Townhouse | 1,574 | Dwelling Unit | 98.4 | 1,668,440 | 0.00 | — | 4,659 | — |
| Regional Shopping Center | 365 | 1000sqft | 8.38 | 365,000 | 0.00 | — | — | — |

### 1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

# 2. Emissions Summary

### 2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Un/Mit. | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 73.9 | 121 | 86.3 | 841 | 2.32 | 1.64 | 32.9 | 34.6 | 1.57 | 7.58 | 9.14 | 1,739 | 267,879 | 269,618 | 186 | 12.0 | 558 | 278,411 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 59.0 | 107 | 91.8 | 644 | 2.23 | 1.56 | 32.9 | 34.5 | 1.47 | 7.58 | 9.04 | 1,739 | 258,353 | 260,093 | 186 | 12.4 | 28.9 | 268,464 |
| Average Daily (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 60.8 | 109 | 80.5 | 657 | 1.93 | 1.40 | 28.2 | 29.6 | 1.34 | 6.50 | 7.84 | 1,739 | 228,017 | 229,757 | 185 | 10.8 | 216 | 237,809 |
| Annual (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 11.1 | 20.0 | 14.7 | 120 | 0.35 | 0.26 | 5.15 | 5.41 | 0.24 | 1.19 | 1.43 | 288 | 37,751 | 38,039 | 30.6 | 1.79 | 35.7 | 39,372 |

### 2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Sector | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 59.4 | 50.1 | 84.0 | 716 | 2.31 | 1.46 | 32.9 | 34.4 | 1.37 | 7.58 | 8.95 | — | 238,551 | 238,551 | 9.67 | 11.1 | 543 | 242,656 |
| Area | 14.3 | 70.7 | 1.13 | 124 | 0.01 | 0.08 | — | 0.08 | 0.10 | — | 0.10 | — | 381 | 381 | 0.02 | 0.04 | — | 392 |
| Energy | 0.14 | 0.07 | 1.23 | 0.78 | 0.01 | 0.10 | — | 0.10 | 0.10 | — | 0.10 | — | 13,175 | 13,175 | 1.54 | 0.17 | — | 13,265 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 272 | 1,565 | 1,837 | 28.0 | 0.68 | — | 2,742 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 1,468 | 0.00 | 1,468 | 147 | 0.00 | — | 5,136 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 14.8 | 14.8 |
| Vegetation | — | — | — | — | — | — | — | — | — | — | — | — | 14,207 | 14,207 | — | — | — | 14,207 |
| Total | 73.9 | 121 | 86.3 | 841 | 2.32 | 1.64 | 32.9 | 34.6 | 1.57 | 7.58 | 9.14 | 1,739 | 267,879 | 269,618 | 186 | 12.0 | 558 | 278,411 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 58.9 | 49.5 | 90.6 | 643 | 2.22 | 1.46 | 32.9 | 34.4 | 1.37 | 7.58 | 8.95 | — | 229,406 | 229,406 | 9.98 | 11.5 | 14.1 | 233,100 |
| Area | — | 57.3 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Energy | 0.14 | 0.07 | 1.23 | 0.78 | 0.01 | 0.10 | — | 0.10 | 0.10 | — | 0.10 | — | 13,175 | 13,175 | 1.54 | 0.17 | — | 13,265 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 272 | 1,565 | 1,837 | 28.0 | 0.68 | — | 2,742 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 1,468 | 0.00 | 1,468 | 147 | 0.00 | — | 5,136 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 14.8 | 14.8 |
| Vegetation | — | — | — | — | — | — | — | — | — | — | — | — | 14,207 | 14,207 | — | — | — | 14,207 |
| Total | 59.0 | 107 | 91.8 | 644 | 2.23 | 1.56 | 32.9 | 34.5 | 1.47 | 7.58 | 9.04 | 1,739 | 258,353 | 260,093 | 186 | 12.4 | 28.9 | 268,464 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 50.8 | 42.7 | 78.5 | 571 | 1.92 | 1.25 | 28.2 | 29.5 | 1.17 | 6.50 | 7.67 | — | 198,810 | 198,810 | 8.55 | 9.91 | 201 | 202,177 |
| Area | 9.81 | 66.5 | 0.77 | 85.1 | < 0.005 | 0.05 | — | 0.05 | 0.07 | — | 0.07 | — | 261 | 261 | 0.01 | 0.02 | — | 268 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy | 0.14 | 0.07 | 1.23 | 0.78 | 0.01 | 0.10 | — | 0.10 | 0.10 | — | 0.10 | — | 13,175 | 13,175 | 1.54 | 0.17 | — | 13,265 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 272 | 1,565 | 1,837 | 28.0 | 0.68 | — | 2,742 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 1,468 | 0.00 | 1,468 | 147 | 0.00 | — | 5,136 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 14.8 | 14.8 |
| Vegetation | — | — | — | — | — | — | — | — | — | — | — | — | 14,207 | 14,207 | — | — | — | 14,207 |
| Total | 60.8 | 109 | 80.5 | 657 | 1.93 | 1.40 | 28.2 | 29.6 | 1.34 | 6.50 | 7.84 | 1,739 | 228,017 | 229,757 | 185 | 10.8 | 216 | 237,809 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 9.28 | 7.80 | 14.3 | 104 | 0.35 | 0.23 | 5.15 | 5.38 | 0.21 | 1.19 | 1.40 | — | 32,915 | 32,915 | 1.42 | 1.64 | 33.3 | 33,473 |
| Area | 1.79 | 12.1 | 0.14 | 15.5 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 43.2 | 43.2 | < 0.005 | < 0.005 | — | 44.4 |
| Energy | 0.03 | 0.01 | 0.23 | 0.14 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 2,181 | 2,181 | 0.25 | 0.03 | — | 2,196 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 45.0 | 259 | 304 | 4.64 | 0.11 | — | 454 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 243 | 0.00 | 243 | 24.3 | 0.00 | — | 850 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 2.46 | 2.46 |
| Vegetation | — | — | — | — | — | — | — | — | — | — | — | — | 2,352 | 2,352 | — | — | — | 2,352 |
| Total | 11.1 | 20.0 | 14.7 | 120 | 0.35 | 0.26 | 5.15 | 5.41 | 0.24 | 1.19 | 1.43 | 288 | 37,751 | 38,039 | 30.6 | 1.79 | 35.7 | 39,372 |

# 4. Operations Emissions Details

## 4.1. Mobile Emissions by Land Use

### 4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Office Park | 6.45 | 5.36 | 9.68 | 83.8 | 0.28 | 0.17 | 3.95 | 4.13 | 0.16 | 0.91 | 1.07 | — | 28,553 | 28,553 | 1.11 | 1.31 | 65.2 | 29,035 |
| Elementary School | 2.16 | 1.77 | 3.40 | 29.8 | 0.10 | 0.06 | 1.43 | 1.49 | 0.06 | 0.33 | 0.39 | — | 10,316 | 10,316 | 0.39 | 0.46 | 23.6 | 10,488 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Health Club | < 0.005 | < 0.005 | 0.01 | 0.06 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | — | 20.8 | 20.8 | < 0.005 | < 0.005 | 0.05 | 21.2 |
| Condo/Townhouse | 20.7 | 17.8 | 27.0 | 225 | 0.70 | 0.45 | 9.95 | 10.4 | 0.42 | 2.29 | 2.71 | — | 72,454 | 72,454 | 3.14 | 3.49 | 164 | 73,737 |
| Regional Shopping Center | 30.1 | 25.1 | 43.9 | 377 | 1.23 | 0.78 | 17.6 | 18.4 | 0.73 | 4.05 | 4.77 | — | 127,207 | 127,207 | 5.04 | 5.87 | 290 | 129,373 |
| Total | 59.4 | 50.1 | 84.0 | 716 | 2.31 | 1.46 | 32.9 | 34.4 | 1.37 | 7.58 | 8.95 | — | 238,551 | 238,551 | 9.67 | 11.1 | 543 | 242,656 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | 6.39 | 5.29 | 10.4 | 74.6 | 0.27 | 0.17 | 3.95 | 4.13 | 0.16 | 0.91 | 1.07 | — | 27,454 | 27,454 | 1.14 | 1.35 | 1.69 | 27,886 |
| Elementary School | 2.14 | 1.75 | 3.67 | 26.3 | 0.10 | 0.06 | 1.43 | 1.49 | 0.06 | 0.33 | 0.39 | — | 9,918 | 9,918 | 0.40 | 0.48 | 0.61 | 10,072 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Health Club | < 0.005 | < 0.005 | 0.01 | 0.05 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | — | 20.0 | 20.0 | < 0.005 | < 0.005 | < 0.005 | 20.4 |
| Condo/Townhouse | 20.6 | 17.6 | 29.1 | 205 | 0.67 | 0.45 | 9.95 | 10.4 | 0.42 | 2.29 | 2.71 | — | 69,695 | 69,695 | 3.26 | 3.61 | 4.26 | 70,858 |
| Regional Shopping Center | 29.8 | 24.8 | 47.3 | 337 | 1.18 | 0.78 | 17.6 | 18.4 | 0.73 | 4.05 | 4.77 | — | 122,319 | 122,319 | 5.19 | 6.07 | 7.52 | 124,264 |
| Total | 58.9 | 49.5 | 90.6 | 643 | 2.22 | 1.46 | 32.9 | 34.4 | 1.37 | 7.58 | 8.95 | — | 229,406 | 229,406 | 9.98 | 11.5 | 14.1 | 233,100 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Office Park | 0.88 | 0.73 | 1.46 | 10.7 | 0.04 | 0.02 | 0.55 | 0.57 | 0.02 | 0.13 | 0.15 | — | 3,490 | 3,490 | 0.14 | 0.17 | 3.54 | 3,548 |
| Elementary School | 0.28 | 0.23 | 0.48 | 3.56 | 0.01 | 0.01 | 0.19 | 0.19 | 0.01 | 0.04 | 0.05 | — | 1,186 | 1,186 | 0.05 | 0.06 | 1.21 | 1,205 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Health Club | < 0.005 | < 0.005 | < 0.005 | 0.01 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | — | 3.09 | 3.09 | < 0.005 | < 0.005 | < 0.005 | 3.14 |
| Condo/Townhouse | 3.64 | 3.11 | 5.20 | 37.5 | 0.12 | 0.08 | 1.77 | 1.85 | 0.07 | 0.41 | 0.48 | — | 11,344 | 11,344 | 0.52 | 0.58 | 11.4 | 11,542 |
| Regional Shopping Center | 4.47 | 3.73 | 7.18 | 52.5 | 0.18 | 0.12 | 2.65 | 2.77 | 0.11 | 0.61 | 0.72 | — | 16,893 | 16,893 | 0.71 | 0.83 | 17.1 | 17,175 |
| Total | 9.28 | 7.80 | 14.3 | 104 | 0.35 | 0.23 | 5.15 | 5.38 | 0.21 | 1.19 | 1.40 | — | 32,915 | 32,915 | 1.42 | 1.64 | 33.3 | 33,473 |

## 4.2. Energy

### 4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | — | 3,520 | 3,520 | 0.42 | 0.05 | — | 3,546 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | — | 255 | 255 | 0.03 | < 0.005 | — | 256 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | — | 16.5 | 16.5 | < 0.005 | < 0.005 | — | 16.7 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Condo/T | — | — | — | — | — | — | — | — | — | — | — | — | 5,080 | 5,080 | 0.61 | 0.07 | — | 5,117 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | — | 2,783 | 2,783 | 0.34 | 0.04 | — | 2,804 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 11,654 | 11,654 | 1.40 | 0.17 | — | 11,740 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | — | 3,520 | 3,520 | 0.42 | 0.05 | — | 3,546 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | — | 255 | 255 | 0.03 | < 0.005 | — | 256 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | — | 16.5 | 16.5 | < 0.005 | < 0.005 | — | 16.7 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | — | 5,080 | 5,080 | 0.61 | 0.07 | — | 5,117 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | — | 2,783 | 2,783 | 0.34 | 0.04 | — | 2,804 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 11,654 | 11,654 | 1.40 | 0.17 | — | 11,740 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | — | 583 | 583 | 0.07 | 0.01 | — | 587 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | — | 42.2 | 42.2 | 0.01 | < 0.005 | — | 42.5 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | — | 2.74 | 2.74 | < 0.005 | < 0.005 | — | 2.76 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | — | 841 | 841 | 0.10 | 0.01 | — | 847 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | — | 461 | 461 | 0.06 | 0.01 | — | 464 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 1,929 | 1,929 | 0.23 | 0.03 | — | 1,944 |

### 4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | 0.04 | 0.02 | 0.37 | 0.31 | < 0.005 | 0.03 | — | 0.03 | 0.03 | — | 0.03 | — | 442 | 442 | 0.04 | < 0.005 | — | 443 |
| Elementary School | 0.01 | < 0.005 | 0.07 | 0.06 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 80.4 | 80.4 | 0.01 | < 0.005 | — | 80.6 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Health Club | < 0.005 | < 0.005 | 0.03 | 0.03 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 37.9 | 37.9 | < 0.005 | < 0.005 | — | 38.0 |
| Condo/Townhouse | 0.07 | 0.04 | 0.63 | 0.27 | < 0.005 | 0.05 | — | 0.05 | 0.05 | — | 0.05 | — | 801 | 801 | 0.07 | < 0.005 | — | 803 |
| Regional Shopping Center | 0.01 | 0.01 | 0.13 | 0.11 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 159 | 159 | 0.01 | < 0.005 | — | 160 |
| Total | 0.14 | 0.07 | 1.23 | 0.78 | 0.01 | 0.10 | — | 0.10 | 0.10 | — | 0.10 | — | 1,521 | 1,521 | 0.13 | < 0.005 | — | 1,525 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Office Park | 0.04 | 0.02 | 0.37 | 0.31 | < 0.005 | 0.03 | — | 0.03 | 0.03 | — | 0.03 | — | 442 | 442 | 0.04 | < 0.005 | — | 443 |
| Elementary School | 0.01 | < 0.005 | 0.07 | 0.06 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 80.4 | 80.4 | 0.01 | < 0.005 | — | 80.6 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Health Club | < 0.005 | < 0.005 | 0.03 | 0.03 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 37.9 | 37.9 | < 0.005 | < 0.005 | — | 38.0 |
| Condo/Townhouse | 0.07 | 0.04 | 0.63 | 0.27 | < 0.005 | 0.05 | — | 0.05 | 0.05 | — | 0.05 | — | 801 | 801 | 0.07 | < 0.005 | — | 803 |
| Regional Shopping Center | 0.01 | 0.01 | 0.13 | 0.11 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 159 | 159 | 0.01 | < 0.005 | — | 160 |
| Total | 0.14 | 0.07 | 1.23 | 0.78 | 0.01 | 0.10 | — | 0.10 | 0.10 | — | 0.10 | — | 1,521 | 1,521 | 0.13 | < 0.005 | — | 1,525 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | 0.01 | < 0.005 | 0.07 | 0.06 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 73.2 | 73.2 | 0.01 | < 0.005 | — | 73.4 |
| Elementary School | < 0.005 | < 0.005 | 0.01 | 0.01 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 13.3 | 13.3 | < 0.005 | < 0.005 | — | 13.3 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Health Club | < 0.005 | < 0.005 | 0.01 | < 0.005 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 6.28 | 6.28 | < 0.005 | < 0.005 | — | 6.29 |
| Condo/Townhouse | 0.01 | 0.01 | 0.12 | 0.05 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 133 | 133 | 0.01 | < 0.005 | — | 133 |
| Regional Shopping Center | < 0.005 | < 0.005 | 0.02 | 0.02 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 26.3 | 26.3 | < 0.005 | < 0.005 | — | 26.4 |
| Total | 0.03 | 0.01 | 0.23 | 0.14 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 252 | 252 | 0.02 | < 0.005 | — | 252 |

## 4.3. Area Emissions by Source

### 4.3.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Source | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Consumer Products | — | 53.6 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Architectural Coatings | — | 3.71 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Landscape Equipment | 14.3 | 13.4 | 1.13 | 124 | 0.01 | 0.08 | — | 0.08 | 0.10 | — | 0.10 | — | 381 | 381 | 0.02 | 0.04 | — | 392 |
| Total | 14.3 | 70.7 | 1.13 | 124 | 0.01 | 0.08 | — | 0.08 | 0.10 | — | 0.10 | — | 381 | 381 | 0.02 | 0.04 | — | 392 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Consumer Products | — | 53.6 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Architectural Coatings | — | 3.71 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | 57.3 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Consumer Products | — | 9.79 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Architectural Coatings | — | 0.68 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Landsca Equipment | 1.79 | 1.68 | 0.14 | 15.5 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 43.2 | 43.2 | < 0.005 | < 0.005 | — | 44.4 |
| Total | 1.79 | 12.1 | 0.14 | 15.5 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 43.2 | 43.2 | < 0.005 | < 0.005 | — | 44.4 |

## 4.4. Water Emissions by Land Use

### 4.4.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | 89.6 | 492 | 582 | 9.25 | 0.23 | — | 880 |
| Element ary School | — | — | — | — | — | — | — | — | — | — | — | 2.51 | 36.5 | 39.0 | 0.26 | 0.01 | — | 47.6 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 38.0 | 38.0 | < 0.005 | < 0.005 | — | 38.3 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | 0.55 | 3.01 | 3.56 | 0.06 | < 0.005 | — | 5.38 |
| Condo/T ownhous e | — | — | — | — | — | — | — | — | — | — | — | 142 | 790 | 932 | 14.6 | 0.36 | — | 1,403 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | 37.3 | 205 | 243 | 3.85 | 0.09 | — | 367 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 272 | 1,565 | 1,837 | 28.0 | 0.68 | — | 2,742 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | 89.6 | 492 | 582 | 9.25 | 0.23 | — | 880 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Element School | — | — | — | — | — | — | — | — | — | — | — | 2.51 | 36.5 | 39.0 | 0.26 | 0.01 | — | 47.6 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 38.0 | 38.0 | < 0.005 | < 0.005 | — | 38.3 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | 0.55 | 3.01 | 3.56 | 0.06 | < 0.005 | — | 5.38 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | 142 | 790 | 932 | 14.6 | 0.36 | — | 1,403 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | 37.3 | 205 | 243 | 3.85 | 0.09 | — | 367 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 272 | 1,565 | 1,837 | 28.0 | 0.68 | — | 2,742 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | 14.8 | 81.5 | 96.4 | 1.53 | 0.04 | — | 146 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | 0.42 | 6.05 | 6.46 | 0.04 | < 0.005 | — | 7.87 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 6.29 | 6.29 | < 0.005 | < 0.005 | — | 6.34 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | 0.09 | 0.50 | 0.59 | 0.01 | < 0.005 | — | 0.89 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | 23.4 | 131 | 154 | 2.42 | 0.06 | — | 232 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | 6.18 | 34.0 | 40.2 | 0.64 | 0.02 | — | 60.7 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 45.0 | 259 | 304 | 4.64 | 0.11 | — | 454 |

## 4.5. Waste Emissions by Land Use

### 4.5.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | 3.93 | 0.00 | 3.93 | 0.39 | 0.00 | — | 13.8 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | 28.3 | 0.00 | 28.3 | 2.83 | 0.00 | — | 99.0 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 2.10 | 0.00 | 2.10 | 0.21 | 0.00 | — | 7.35 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | 0.34 | 0.00 | 0.34 | 0.03 | 0.00 | — | 1.18 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | 1,431 | 0.00 | 1,431 | 143 | 0.00 | — | 5,007 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | 1.97 | 0.00 | 1.97 | 0.20 | 0.00 | — | 6.88 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 1,468 | 0.00 | 1,468 | 147 | 0.00 | — | 5,136 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | 3.93 | 0.00 | 3.93 | 0.39 | 0.00 | — | 13.8 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | 28.3 | 0.00 | 28.3 | 2.83 | 0.00 | — | 99.0 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 2.10 | 0.00 | 2.10 | 0.21 | 0.00 | — | 7.35 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | 0.34 | 0.00 | 0.34 | 0.03 | 0.00 | — | 1.18 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | 1,431 | 0.00 | 1,431 | 143 | 0.00 | — | 5,007 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | 1.97 | 0.00 | 1.97 | 0.20 | 0.00 | — | 6.88 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 1,468 | 0.00 | 1,468 | 147 | 0.00 | — | 5,136 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | 0.65 | 0.00 | 0.65 | 0.07 | 0.00 | — | 2.28 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | 4.68 | 0.00 | 4.68 | 0.47 | 0.00 | — | 16.4 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.35 | 0.00 | 0.35 | 0.03 | 0.00 | — | 1.22 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | 0.06 | 0.00 | 0.06 | 0.01 | 0.00 | — | 0.20 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | 237 | 0.00 | 237 | 23.7 | 0.00 | — | 829 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | 0.33 | 0.00 | 0.33 | 0.03 | 0.00 | — | 1.14 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 243 | 0.00 | 243 | 24.3 | 0.00 | — | 850 |

## 4.6. Refrigerant Emissions by Land Use

### 4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.89 | 0.89 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elementary | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.24 | 0.24 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 11.9 | 11.9 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1.75 | 1.75 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 14.8 | 14.8 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.89 | 0.89 |
| Elementary School | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.24 | 0.24 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.01 | 0.01 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 11.9 | 11.9 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1.75 | 1.75 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 14.8 | 14.8 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Office Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.15 | 0.15 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elementary | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.04 | 0.04 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Health Club | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | < 0.005 | < 0.005 |
| Condo/Townhouse | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1.98 | 1.98 |
| Regional Shopping Center | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.29 | 0.29 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 2.46 | 2.46 |

## 4.7. Offroad Emissions By Equipment Type

### 4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Equipment Type | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

# 4.8. Stationary Emissions By Equipment Type

## 4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Equipment Type | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

# 4.9. User Defined Emissions By Equipment Type

## 4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Equipment Type | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

## 4.10. Soil Carbon Accumulation By Vegetation Type

### 4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Vegetation | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

### 4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Shrubland | — | — | — | — | — | — | — | — | — | — | — | — | 13,595 | 13,595 | — | — | — | 13,595 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grassland | — | — | — | — | — | — | — | — | — | — | — | — | 612 | 612 | — | — | — | 612 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 14,207 | 14,207 | — | — | — | 14,207 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Shrubland | — | — | — | — | — | — | — | — | — | — | — | — | 13,595 | 13,595 | — | — | — | 13,595 |
| Grassland | — | — | — | — | — | — | — | — | — | — | — | — | 612 | 612 | — | — | — | 612 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 14,207 | 14,207 | — | — | — | 14,207 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Shrubland | — | — | — | — | — | — | — | — | — | — | — | — | 2,251 | 2,251 | — | — | — | 2,251 |
| Grassland | — | — | — | — | — | — | — | — | — | — | — | — | 101 | 101 | — | — | — | 101 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 2,352 | 2,352 | — | — | — | 2,352 |

### 4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

| Species | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Avoided | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Sequestered | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Removed | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Avoided | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Sequestered | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Removed | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Avoided | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Sequestered | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Removed | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

# 5. Activity Data

## 5.9. Operational Mobile Sources

### 5.9.1. Unmitigated

| Land Use Type | Trips/Weekday | Trips/Saturday | Trips/Sunday | Trips/Year | VMT/Weekday | VMT/Saturday | VMT/Sunday | VMT/Year |
|---|---|---|---|---|---|---|---|---|
| Office Park | 3,157 | 704 | 299 | 875,479 | 37,634 | 8,397 | 3,568 | 10,435,705 |
| Elementary School | 1,020 | 0.00 | 0.00 | 265,929 | 13,627 | 0.00 | 0.00 | 3,552,806 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Health Club | 2.07 | 1.33 | 1.70 | 699 | 27.5 | 17.6 | 22.6 | 9,272 |
| Condo/Townhouse | 11,144 | 10,876 | 9,287 | 3,956,732 | 94,723 | 92,449 | 78,936 | 33,632,226 |
| Regional Shopping Center | 12,830 | 15,016 | 7,585 | 4,523,369 | 143,052 | 167,430 | 84,569 | 50,435,569 |

## 5.10. Operational Area Sources

### 5.10.1. Hearths

#### 5.10.1.1. Unmitigated

### 5.10.2. Architectural Coatings

| Residential Interior Area Coated (sq ft) | Residential Exterior Area Coated (sq ft) | Non-Residential Interior Area Coated (sq ft) | Non-Residential Exterior Area Coated (sq ft) | Parking Area Coated (sq ft) |
|---|---|---|---|---|
| 3187350 | 1,062,450 | 1,192,804 | 397,601 | 0.00 |

### 5.10.3. Landscape Equipment

| Season | Unit | Value |
|---|---|---|
| Snow Days | day/yr | 0.00 |
| Summer Days | day/yr | 250 |

## 5.11. Operational Energy Consumption

### 5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

| Land Use | Electricity (kWh/yr) | CO2 | CH4 | N2O | Natural Gas (kBTU/yr) |
|---|---|---|---|---|---|
| Office Park | 4,690,250 | 274 | 0.0330 | 0.0040 | 1,379,700 |
| Elementary School | 339,221 | 274 | 0.0330 | 0.0040 | 250,810 |
| City Park | 0.00 | 274 | 0.0330 | 0.0040 | 0.00 |
| Health Club | 22,050 | 274 | 0.0330 | 0.0040 | 59,150 |
| Condo/Townhouse | 6,768,200 | 274 | 0.0330 | 0.0040 | 2,499,512 |
| Regional Shopping Center | 3,708,400 | 274 | 0.0330 | 0.0040 | 496,400 |

## 5.12. Operational Water and Wastewater Consumption

### 5.12.1. Unmitigated

| Land Use | Indoor Water (gal/year) | Outdoor Water (gal/year) |
|---|---|---|
| Office Park | 46,753,755 | 63,669,838 |
| Elementary School | 1,310,359 | 7,486,699 |
| City Park | 0.00 | 9,539,735 |
| Health Club | 285,583 | 388,910 |
| Condo/Townhouse | 73,909,407 | 103,529,764 |
| Regional Shopping Center | 19,485,149 | 26,535,115 |

## 5.13. Operational Waste Generation

### 5.13.1. Unmitigated

| Land Use | Waste (ton/year) | Cogeneration (kWh/year) |
|---|---|---|
| Office Park | 7.30 | 0.00 |
| Elementary School | 52.5 | 0.00 |
| City Park | 3.90 | 0.00 |

| | | |
|---|---|---|
| Health Club | 0.63 | 0.00 |
| Condo/Townhouse | 897 | 0.00 |
| Regional Shopping Center | 3.65 | 0.00 |

## 5.14. Operational Refrigeration and Air Conditioning Equipment

### 5.14.1. Unmitigated

| Land Use Type | Equipment Type | Refrigerant | GWP | Quantity (kg) | Operations Leak Rate | Service Leak Rate | Times Serviced |
|---|---|---|---|---|---|---|---|
| Office Park | Household refrigerators and/or freezers | R-134a | 1,430 | 0.02 | 0.60 | 0.00 | 1.00 |
| Office Park | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| Elementary School | Household refrigerators and/or freezers | R-134a | 1,430 | 0.02 | 0.60 | 0.00 | 1.00 |
| Elementary School | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| Elementary School | Stand-alone retail refrigerators and freezers | R-134a | 1,430 | < 0.005 | 1.00 | 0.00 | 1.00 |
| Elementary School | Walk-in refrigerators and freezers | R-404A | 3,922 | < 0.005 | 7.50 | 7.50 | 20.0 |
| City Park | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| City Park | Stand-alone retail refrigerators and freezers | R-134a | 1,430 | 0.04 | 1.00 | 0.00 | 1.00 |
| Health Club | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| Health Club | Stand-alone retail refrigerators and freezers | R-134a | 1,430 | 0.04 | 1.00 | 0.00 | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Condo/Townhouse | Average room A/C & Other residential A/C and heat pumps | R-410A | 2,088 | < 0.005 | 2.50 | 2.50 | 10.0 |
| Condo/Townhouse | Household refrigerators and/or freezers | R-134a | 1,430 | 0.12 | 0.60 | 0.00 | 1.00 |
| Regional Shopping Center | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| Regional Shopping Center | Stand-alone retail refrigerators and freezers | R-134a | 1,430 | 0.04 | 1.00 | 0.00 | 1.00 |

## 5.15. Operational Off-Road Equipment

### 5.15.1. Unmitigated

| Equipment Type | Fuel Type | Engine Tier | Number per Day | Hours Per Day | Horsepower | Load Factor |
|---|---|---|---|---|---|---|

## 5.16. Stationary Sources

### 5.16.1. Emergency Generators and Fire Pumps

| Equipment Type | Fuel Type | Number per Day | Hours per Day | Hours per Year | Horsepower | Load Factor |
|---|---|---|---|---|---|---|

### 5.16.2. Process Boilers

| Equipment Type | Fuel Type | Number | Boiler Rating (MMBtu/hr) | Daily Heat Input (MMBtu/day) | Annual Heat Input (MMBtu/yr) |
|---|---|---|---|---|---|

## 5.17. User Defined

| Equipment Type | Fuel Type |
|---|---|
| — | — |

### 5.18. Vegetation

#### 5.18.1. Land Use Change

##### 5.18.1.1. Unmitigated

| Vegetation Land Use Type | Vegetation Soil Type | Initial Acres | Final Acres |
| --- | --- | --- | --- |

#### 5.18.1. Biomass Cover Type

##### 5.18.1.1. Unmitigated

| Biomass Cover Type | Initial Acres | Final Acres |
| --- | --- | --- |
| Shrubland | 157 | 0.00 |
| Grassland | 23.5 | 0.00 |

#### 5.18.2. Sequestration

##### 5.18.2.1. Unmitigated

| Tree Type | Number | Electricity Saved (kWh/year) | Natural Gas Saved (btu/year) |
| --- | --- | --- | --- |

# 6. Climate Risk Detailed Report

## 6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

| Climate Hazard | Result for Project Location | Unit |
| --- | --- | --- |
| Temperature and Extreme Heat | 22.9 | annual days of extreme heat |
| Extreme Precipitation | 5.90 | annual days with precipitation above 20 mm |
| Sea Level Rise | 0.00 | meters of inundation depth |

| | | |
|---|---|---|
| Wildfire | 13.6 | annual hectares burned |

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

## 6.2. Initial Climate Risk Scores

| Climate Hazard | Exposure Score | Sensitivity Score | Adaptive Capacity Score | Vulnerability Score |
|---|---|---|---|---|
| Temperature and Extreme Heat | 2 | 0 | 0 | N/A |
| Extreme Precipitation | N/A | N/A | N/A | N/A |
| Sea Level Rise | 1 | 0 | 0 | N/A |
| Wildfire | 1 | 0 | 0 | N/A |
| Flooding | N/A | N/A | N/A | N/A |
| Drought | N/A | N/A | N/A | N/A |
| Snowpack Reduction | N/A | N/A | N/A | N/A |
| Air Quality Degradation | 0 | 0 | 0 | N/A |

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

## 6.3. Adjusted Climate Risk Scores

| Climate Hazard | Exposure Score | Sensitivity Score | Adaptive Capacity Score | Vulnerability Score |
|---|---|---|---|---|
| Temperature and Extreme Heat | 2 | 1 | 1 | 3 |

| | | | | |
|---|---|---|---|---|
| Extreme Precipitation | N/A | N/A | N/A | N/A |
| Sea Level Rise | 1 | 1 | 1 | 2 |
| Wildfire | 1 | 1 | 1 | 2 |
| Flooding | N/A | N/A | N/A | N/A |
| Drought | N/A | N/A | N/A | N/A |
| Snowpack Reduction | N/A | N/A | N/A | N/A |
| Air Quality Degradation | 1 | 1 | 1 | 2 |

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

## 6.4. Climate Risk Reduction Measures

# 7. Health and Equity Details

## 7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

| Indicator | Result for Project Census Tract |
|---|---|
| Exposure Indicators | — |
| AQ-Ozone | 84.6 |
| AQ-PM | 45.1 |
| AQ-DPM | 24.4 |
| Drinking Water | 70.8 |
| Lead Risk Housing | 0.10 |
| Pesticides | 31.3 |
| Toxic Releases | 34.9 |
| Traffic | 88.0 |

| | |
|---|---|
| Effect Indicators | — |
| CleanUp Sites | 0.00 |
| Groundwater | 70.3 |
| Haz Waste Facilities/Generators | 88.9 |
| Impaired Water Bodies | 66.7 |
| Solid Waste | 97.3 |
| Sensitive Population | — |
| Asthma | 4.31 |
| Cardio-vascular | 10.1 |
| Low Birth Weights | 61.9 |
| Socioeconomic Factor Indicators | — |
| Education | 9.29 |
| Housing | 23.4 |
| Linguistic | 37.7 |
| Poverty | 5.09 |
| Unemployment | 21.1 |

## 7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

| Indicator | Result for Project Census Tract |
|---|---|
| Economic | — |
| Above Poverty | 93.67380983 |
| Employed | 76.78686 |
| Median HI | — |
| Education | — |
| Bachelor's or higher | 84.97369434 |
| High school enrollment | 21.05735917 |

| | |
|---|---|
| Preschool enrollment | 58.19325035 |
| Transportation | — |
| Auto Access | 98.98626973 |
| Active commuting | 34.73630181 |
| Social | — |
| 2-parent households | 74.38727063 |
| Voting | 67.39381496 |
| Neighborhood | — |
| Alcohol availability | 92.46759913 |
| Park access | 36.76376235 |
| Retail density | 47.77364301 |
| Supermarket access | 23.22597203 |
| Tree canopy | 62.74862056 |
| Housing | — |
| Homeownership | 68.57436161 |
| Housing habitability | 81.30373412 |
| Low-inc homeowner severe housing cost burden | 60.46451944 |
| Low-inc renter severe housing cost burden | 67.75311177 |
| Uncrowded housing | 74.48992686 |
| Health Outcomes | — |
| Insured adults | 86.30822533 |
| Arthritis | 0.0 |
| Asthma ER Admissions | 98.4 |
| High Blood Pressure | 0.0 |
| Cancer (excluding skin) | 0.0 |
| Asthma | 0.0 |
| Coronary Heart Disease | 0.0 |

| | |
|---|---|
| Chronic Obstructive Pulmonary Disease | 0.0 |
| Diagnosed Diabetes | 0.0 |
| Life Expectancy at Birth | 71.8 |
| Cognitively Disabled | 87.2 |
| Physically  Disabled | 81.6 |
| Heart Attack ER Admissions | 83.3 |
| Mental Health Not Good | 0.0 |
| Chronic Kidney Disease | 0.0 |
| Obesity | 0.0 |
| Pedestrian Injuries | 19.6 |
| Physical Health Not Good | 0.0 |
| Stroke | 0.0 |
| Health Risk Behaviors | — |
| Binge Drinking | 0.0 |
| Current Smoker | 0.0 |
| No Leisure Time for Physical Activity | 0.0 |
| Climate Change Exposures | — |
| Wildfire Risk | 88.1 |
| SLR Inundation Area | 0.0 |
| Children | 92.2 |
| Elderly | 92.1 |
| English Speaking | 69.3 |
| Foreign-born | 49.0 |
| Outdoor Workers | 66.6 |
| Climate Change Adaptive Capacity | — |
| Impervious Surface Cover | 89.1 |
| Traffic Density | 75.3 |

| | |
|---|---|
| Traffic Access | 23.0 |
| Other Indices | — |
| Hardship | 14.5 |
| Other Decision Support | — |
| 2016 Voting | 38.9 |

## 7.3. Overall Health & Equity Scores

| Metric | Result for Project Census Tract |
|---|---|
| CalEnviroScreen 4.0 Score for Project Location (a) | 26.0 |
| Healthy Places Index Score for Project Location (b) | 87.0 |
| Project Located in a Designated Disadvantaged Community (Senate Bill 535) | No |
| Project Located in a Low-Income Community (Assembly Bill 1550) | No |
| Project Located in a Community Air Protection Program Community (Assembly Bill 617) | No |

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

## 7.4. Health & Equity Measures

No Health & Equity Measures selected.

## 7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

## 7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

# 8. User Changes to Default Data

| Screen | Justification |
|---|---|
| Operations: Vehicle EF | Updated vehicle emission factors derived from EMFAC2021 v.1.0.2 |
| Operations: Fleet Mix | Updated fleet mix derived from EMFAC2021 v.1.0.2 |

| | |
|---|---|
| Characteristics: Project Details | Updated locational context to Rural |
| Characteristics: Utility Information | Updated SCE CO2 2030 forecasted intensity factor to 273.94 lb/MWh to align with most recent SCE utility report |
| Operations: Vehicle Data | Trip rates and lengths updated per trip data in Stantec traffic report |
| Operations: Road Dust | Road silt loading updated to 0.02 |
| Operations: Hearths | No fireplaces and wood stoves so values adjusted to zero |
| Operations: Consumer Products | Consumer product emission factor updated per new methodology |
| Operations: Architectural Coatings | Architectural coating values updated to non-defaults used in previous run |
| Operations: Energy Use | Energy use values updated to non-defaults used in previous run |
| Operations: Water and Waste Water | Water use (gals/year) updated to non-defaults used in CalEEMod2020 run |
| Operations: Solid Waste | Solid waste rates updated to non-defaults used in previous run |
| Vegetation: Land Use Change | CO2 Accumulation rate updated to match CalEEMod2020 default values |

# APPENDIX B
# TRAFFIC DATA (STANTEC)

**Entrada South**

| Average Productions & Attractions Trip Lengths by Purpose | Total Trips | Ave. Trip Length | VMT | Average Productions Only Trip Lengths by Purpose Total Trips | Ave. Trip Length | VMT | Average Attractions Only Trip Lengths by Purpose Total Trips | Ave. Trip Length | VMT |
|---|---|---|---|---|---|---|---|---|---|
| Home-to-Work | 4936 | 13.309 | 65693.068 | 2518 | 10.696 | 26932.528 | 2418 | 16.030 | 38760.54 |
| Home-to-Shopping | 3810 | 10.478 | 39921.551 | 1763 | 5.179 | 9130.577 | 2047 | 15.042 | 30790.974 |
| Home-to-Other | 8875 | 10.001 | 88762.544 | 4659 | 7.040 | 32799.36 | 4216 | 13.274 | 55963.184 |
| Other-to-Work | 2164 | 10.004 | 21648.656 | 1082 | 8.906 | 9636.292 | 1082 | 11.102 | 12012.364 |
| Other-to-Other | 12406 | 9.074 | 112565.841 | 6203 | 7.620 | 47266.86 | 6203 | 10.527 | 65298.981 |

source: SCVCTM

## Entrada South Trip Rates, Trip Generation, and P&A Trips Summary

| Description | Amount | Unit | AM Peak Hour | | | PM Peak Hour | | | ADT |
|---|---|---|---|---|---|---|---|---|---|
| | | | In | Out | Total | In | Out | Total | |
| **TRIP RATES** | | | | | | | | | |
| Condominium/Townhouse | | DU | .10 | .48 | 0.58 | .47 | .26 | 0.73 | 8.00 |
| Commercial Center (>30ac) | | TSF | .47 | .30 | 0.77 | 1.64 | 1.78 | 3.42 | 40.06 |
| Elementary/Middle School | | Students | .36 | .31 | 0.67 | .08 | .09 | 0.17 | 1.89 |
| Commercial Office | | TSF | 1.00 | .16 | 1.16 | .18 | .97 | 1.15 | 9.74 |
| Developed Park | | Acres | .01 | .01 | 0.02 | .06 | .05 | 0.11 | .78 |
| **TRIP GENERATION** | | | | | | | | | |
| Condominium/Townhouse | 1,574 | DU | 157 | 756 | 913 | 740 | 409 | 1,149 | 12,592 |
| Commercial Center (>30ac) | 365.0 | TSF | 172 | 110 | 282 | 599 | 650 | 1,249 | 14,622 |
| Elementary/Middle School | 750 | Students | 270 | 233 | 503 | 60 | 68 | 128 | 1,418 |
| Commercial Office | 365.0 | TSF | 365 | 58 | 423 | 66 | 354 | 420 | 3,555 |
| Developed Park | 5.0 | Acres | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Total Gross Trips | | | 964 | 1,157 | 2,121 | 1,465 | 1,481 | 2,946 | 32,191 |

| Land Use Type | Amount | Unit | P's/A's | H-W | H-S | H-O | O-W | O-O | Total | P&A Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 4. Condominium/Townhouse | 1574 | DU | P's | 2,518 | 1,763 | 4,659 | 252 | 1,133 | 10,325 | |
| | | | A's | 0 | 0 | 881 | 252 | 1,133 | 2,266 | 12,591 |
| 10. Commercial Center(<30ac) | 365 | TSF | P's | 0 | 0 | 0 | 439 | 4,387 | 4,826 | |
| | | | A's | 1,316 | 2,047 | 1,608 | 439 | 4,387 | 9,797 | 14,623 |
| 20. Elementary/Middle School | 750 | STU | P's | 0 | 0 | 0 | 0 | 43 | 43 | |
| | | | A's | 142 | 0 | 1,191 | 0 | 43 | 1,376 | 1,419 |
| 40. Commercial Office | 365 | TSF | P's | 0 | 0 | 0 | 391 | 640 | 1,031 | |
| | | | A's | 960 | 0 | 533 | 391 | 640 | 2,524 | 3,555 |
| 51. Developed Park | 5 | AC | P's | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | A's | 0 | 0 | 3 | 0 | 0 | 3 | 3 |
| | | | P's | 2,518 | 1,763 | 4,659 | 1,082 | 6,203 | 16,225 | |
| TOTAL | | | A's | 2,418 | 2,047 | 4,216 | 1,082 | 6,203 | 15,966 | 32,191 |

## Entrada South Trip and Tripend Summary - Internal/External Estimates

| | | HBW | | | HBO | | | NHB | | | Ps & As Totals | | | ADT Tripend Totals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Int. | Internal | External | % Int. | Internal | External | % Int. | Internal | External | % Int. | Internal | External | % Int. | Internal | External | Total |
| Residential | P's | 11.0% | 277 | 2,241 | 25.4% | 1,631 | 4,791 | 30.0% | 416 | 970 | 22.5% | 2,324 | 8,001 | 23.0% | 2,896 | 9,695 | 12,591 |
| | A's | 0.0% | 0 | 0 | 17.8% | 157 | 724 | 30.0% | 416 | 970 | 25.3% | 572 | 1,694 | | | | |
| Non-Residential | P's | 0.0% | 0 | 0 | 0.0% | 0 | 0 | 28.9% | 1,693 | 4,164 | 28.9% | 1,693 | 4,164 | 24.1% | 4,381 | 13,797 | 18,178 |
| | A's | 11.0% | 250 | 2,026 | 17.8% | 745 | 3,443 | 28.9% | 1,693 | 4,164 | 21.8% | 2,688 | 9,633 | | | | |
| Schools/Parks | P's | 0.0% | 0 | 0 | 0.0% | 0 | 0 | 53.0% | 23 | 20 | 53.0% | 23 | 20 | 56.3% | 801 | 621 | 1,422 |
| | A's | 19.0% | 27 | 115 | 61.0% | 728 | 466 | 53.0% | 23 | 20 | 56.4% | 778 | 601 | | | | |
| Total | P's | 11.0% | 277 | 2,241 | 25.4% | 1,631 | 4,791 | 29.3% | 2,131 | 5,154 | 24.9% | 4,039 | 12,186 | 25.1% | 8,078 | 24,113 | 32,191 |
| | A's | 11.5% | 277 | 2,141 | 26.0% | 1,631 | 4,632 | 29.3% | 2,131 | 5,154 | 25.3% | 4,039 | 11,927 | | | | |
| | | | | | | | | | | | | | | | ADT Trip Totals | | |
| | | | | | | | | | | | | | | | Internal | External | Total |
| Residential | | | | | | | | | | | | | | | 1,448 | 9,695 | 11,143 |
| Non-Residential | | | | | | | | | | | | | | | 2,191 | 13,797 | 15,987 |
| Schools/Parks | | | | | | | | | | | | | | | 400 | 621 | 1,022 |
| Total | | | | | | | | | | | | | | | 4,039 | 24,113 | 28,152 |

# APPENDIX C
# EXCERPTS FROM THE AEA

# APPENDIX C.1
# DRAFT AEA APPENDIX 1:
# GREENHOUSE GAS TECHNICAL REPORT (NO APPENDICES)

# AEA Appendix 1

## Greenhouse Gas Emissions
## Technical Report and Appendices

Prepared for
**The Newhall Land and Farming Company**
**Valencia, California**

Project Number
**0534264Q**

Date
**October 2016**

# GREENHOUSE GAS EMISSIONS TECHNICAL REPORT

## RESOURCE MANAGEMENT DEVELOPMENT PLAN & SPINEFLOWER CONSERVATION PLAN LOS ANGELES COUNTY, CALIFORNIA

RAMBOLL ENVIRON

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## TABLES

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## APPENDICES

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AB | Assembly Bill |
| ACC | Advanced Clean Cars |
| AR | Assessment Report |
| BAAQMD | Bay Area Air Quality Management District |
| CalEEMod® | California Emission Estimator Model® |
| CalGreen | California Green Building Standards |
| CalRecycle | California Department of Resources Recycling and Recovery |
| CAPCOA | California Air Pollution Control Officers Association |
| CARB | California Air Resources Board |
| CCAP | Community Climate Action Plan |
| CCR | California Code of Regulations |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| CEUS | Commercial End-Use Survey |
| CFC | Chlorofluorocarbon |
| $CH_4$ | Methane |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | $CO_2$ Equivalents |
| CPUC | California Public Utilities Commission |
| DOE | Department of Energy |
| DOT | Department of Transportation |
| EIR | Environmental Impact Report |
| EIS | Environmental Impact Statement |
| EMFAC | EMission FACtor Model |
| Ramboll Environ | Ramboll Environ US Corporation, formerly ENVIRON US Corporation |
| ES | Executive Summary |
| GHG | Greenhouse Gas |
| GWP | Global Warming Potential |
| HFCs | Hydrofluorocarbons |
| IPCC | Intergovernmental Panel on Climate Change |
| kW | Kilowatt |

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| lbs | Pounds |
| LCFS | Low Carbon Fuel Standard |
| MSW | Municipal Solid Waste |
| MT | Metric Tonnes |
| $MTCO_2e$ | Metric Tonnes of $CO_2$ Equivalent |
| MT/year | Metric Tonnes per Year |
| MW | Megawatt |
| MWh | Megawatt-Hour |
| $N_2O$ | Nitrous Oxide |
| NHTSA | National Highway Traffic Safety Administration |
| NRSP | Newhall Ranch Specific Plan |
| OFFROAD | Emissions Inventory Program model |
| PDF | Project Design Features |
| PUP | Power/Utility Protocol |
| PV | Photovoltaic |
| RMDP | Resource Management and Development Plan |
| RPS | Renewables Portfolio Standard |
| SCAQMD | South Coast Air Quality Management District |
| SCE | Southern California Edison |
| SCP | Spineflower Conservation Plan |
| SCVCTM | Santa Clarita Valley Consolidated Traffic Model |
| TDM | Transportation Demand Management |
| USEPA | United States Environmental Protection Agency |
| VMT | Vehicle Miles Traveled |
| WRP | Water Reclamation Plant |
| ZNE | Zero Net Energy |

# EXECUTIVE SUMMARY

This report presents the unmitigated and mitigated greenhouse gas (GHG) emissions inventories prepared for the Newhall Ranch Resource Management and Development Plan and the Spineflower Conservation Plan (RMDP/SCP) Project, as further described in the Additional Environmental Analysis (AEA).

This Executive Summary includes a short description of the scope, methodology, and Project GHG emissions.

The GHG emissions inventory presented in Section 2 of this analysis includes the following sources of emissions: (1) area sources (e.g., landscaping-related fuel combustion sources); (2) energy use associated with residential and non-residential buildings; (3) water and wastewater treatment and distribution; (4) solid waste; (5) mobile sources (e.g., passenger vehicles); (6) construction; and (7) vegetation changes. The ongoing operational emissions consist of the first five categories, while the one-time emissions are associated with construction and vegetation changes. The typical types of GHG emissions resulting from mixed-use developments such as the Project are emissions of carbon dioxide ($CO_2$), methane ($CH_4$) and nitrous oxide ($N_2O$). GHG emissions are typically measured in terms of tonnes of $CO_2$ equivalents ($CO_2e$), calculated as the product of the mass emitted of a given GHG and its specific global warming potential (GWP).

This analysis primarily utilized the California Emission Estimator Model version 2013.2.2 (CalEEMod®)[1] to assist in quantifying the GHG emissions in the inventories presented in this report for the Project. CalEEMod® is a statewide program designed to calculate both criteria and GHG emissions from development projects in California. Third-party studies were also relied upon to support analyses and assumptions made outside of CalEEMod®.

As discussed in Sections 3.1 and 5.1, this report estimates the GHG emissions resulting from the Project. As documented in subsequent portions of this report and shown in **Table Executive Summary (ES)-1**, the Project site – in its existing condition – emits 11,021 metric tonnes (MT) of $CO_2e$ per year, whereas the Unmitigated Project will emit 526,103 metric tonnes of carbon dioxide equivalent ($MTCO_2e$) per year and the Mitigated Project will emit zero (0) $MTCO_2e$ per year (as shown in **Table ES-2**). There will not be a net increase in GHG emissions as compared to the existing GHG emission levels. **Table ES-3** shows the GHG reductions achieved by each of the thirteen recommended mitigation measures.

While the recommended mitigation measures ensure that the Mitigated Project's emissions are reduced to zero (0), as presented in Sections 3.2 and 5.2, there is also evidence that the evolving regulatory framework and improving technologies will result in the Project's emissions inventory decreasing with time. Therefore, it is reasonable to expect the Mitigated Project's emissions level to decline further, below zero (0), as the regulatory initiatives identified by California Air Resources Board (CARB) in the 2014 First Update are implemented, and other technological innovations occur. Stated differently, the Project's emissions total at build-out represents the maximum emissions inventory for the Project as California's emissions sources are being regulated (and foreseeably expected to continue to be regulated in the future) in furtherance of the State's environmental policy objectives.

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[1] SCAQMD. 2013. California Emissions Estimator Model®. Available at: http://www.CalEEMod.com/. Accessed: September 2016.

# 1. INTRODUCTION

The purpose of this technical report is to present the quantitative analyses that were used to evaluate the Project's greenhouse gas (GHG) emissions. Emissions during both construction and operation of the Project were quantified. For purposes of the latter category of emissions, both Unmitigated and Mitigated Project emissions were quantified in the Project's build-out year (2030). Legislation and rules regarding climate change, as well as the scientific understanding of the extent to which different activities emit GHGs, continue to evolve; as such, the inventory in this report is a reflection of the guidance and knowledge currently available. The "Project" is the Newhall Ranch Resource Management and Development Plan and the Spineflower Conservation Plan (RMDP/SCP) as described in Section 1 of the Additional Environmental Analysis (AEA).

## 1.1 Regulatory Framework Compliance

As a matter of law, the Project will comply with applicable Federal, State, Regional, and County requirements. Many of the applicable regulatory standards are summarized in **Table 1-1** and apply to different GHG-generating activities/sources, including construction, landscape equipment, building energy, passenger vehicles, medium- and heavy-duty trucks, solid waste, water usage, and vegetation. **Table 1-1** notes whether the emission reductions resulting from implementation of the regulatory standards are quantified in the Project's unmitigated and mitigated emissions inventories. As illustrated in **Table 1-1**, several regulatory standards were not incorporated due to the difficulty associated with modeling and quantifying the reductions. Incorporating these regulations would further reduce Project emissions; as such, the emissions estimates presented in this report provide a conservative representation of Project emissions.

## 1.2 Mitigation Measures

Mitigation measures are recommended to reduce the Project's emissions to levels below significance for purposes of California Environmental Quality Act (CEQA). The mitigation measures ultimately achieve growth without increased GHG emissions.

The mitigation measures recommended for the Project place high emphasis on and prioritize on-site, innovative energy efficiencies and renewable energy generation within the community's homes and buildings. Additionally, the transportation-oriented mitigation measures include the implementation of a robust Transportation Demand Management (TDM) Plan that focuses on reducing vehicle miles traveled, and provide incentives to accelerate the deployment of various categories of zero-emission electric vehicles. The details of these mitigation measures and their effectiveness at reducing Project emissions are presented in Section 4.

## 1.3 Existing Condition

The Project site is generally comprised of vacant land, some agricultural uses, water wells, active oil and gas operations, abandoned oil wells, and associated access roads. The area for agricultural uses is approximately 2,166.3 acres; for purposes of this analysis, it is conservatively assumed that nearly all of the agricultural acreage would be permanently eliminated during Project buildout.[2] The Project site is periodically leased to the movie industry for set locations. All existing emission sources would be eliminated during Project

[2] Of the 2,166.3 acres currently utilized for agricultural purposes, approximately 138 acres will be conserved for continued agricultural-related uses.

buildout. **Appendix A** of this report describes in detail the existing land use and associated GHG emissions from those existing on-site land uses. The existing condition emissions inventory is estimated as 11,021 Metric Tonnes (MT) $CO_2e$ per year, as shown in **Table ES-1**. If any existing emissions (e.g., from agricultural uses) are permanently removed due to the Project development, the GHG emissions associated with those existing operations could be considered permanently removed from the global GHG emissions inventory.[3]

[3] This analysis does not quantitatively account for the Project's elimination of some existing sources of GHG emissions located within the Project site's development footprint. This analytical approach is conservative because, as recognized by the Bay Area Air Quality Management District, if a proposed project involves the removal of existing emission sources, the existing emissions level should be subtracted from the emissions level estimated for the new proposed land uses in order to accurately quantify the change to environmental conditions. See BAAQMD, 2012. California Environmental Quality Act Air Quality Guidelines. Page 4-5. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/baaqmd-ceqa-guidelines_final_may-2012.pdf?la=en. Accessed: September 2016.

# 2. GHG EMISSIONS INVENTORY

This section describes the methodology that Ramboll Environ US Corporation (Ramboll Environ) used to develop the GHG emission inventories associated with the Project, which include one-time emissions (construction emissions and emissions due to vegetation changes), and operational emissions. Sub-categories of GHG operational emissions include: **area sources, energy use**, **water supply and wastewater**, **solid waste,** and **mobile sources**. **Table 2-1** summarizes the land use approved for the RMDP/SCP Project area and the related CalEEMod® modeling terms. **Table 2-2** summarizes the emission inventories discussed in this section.

## 2.1 Measurement and Resources

### 2.1.1 Units of Measurement: Tonnes of $CO_2$ and $CO_2e$

In this report, the term "GHGs" includes gases that contribute to the natural greenhouse effect, such as carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$,) and water, as well as gases that are only man-made and that are emitted through the use of modern industrial products, such as hydroflurocarbons (HFCs) and chlorofluorocarbons (CFCs). GHG emissions are typically measured in terms of mass of $CO_2$ equivalent ($CO_2e$). $CO_2e$ are calculated as the product of the mass of a given GHG and its specific Global Warming Potential (GWP)[4]; GWPs of 25 and 298 were used for $CH_4$ and $N_2O$, respectively, for this analysis. In many sections of this report, including the final summary sections, emissions are presented in units of $CO_2e$ either because the GWPs of $CH_4$ and $N_2O$ were accounted for explicitly, or the $CH_4$ and $N_2O$ are assumed to contribute a negligible amount of GWP when compared to the $CO_2$ emissions from that particular emissions category.

In this report, a tonne refers to MT (1,000 kilograms). Additionally, exact totals presented in all tables and report sections may not equal the sum of components due to independent rounding of numbers.

### 2.1.2 Resources

#### 2.1.2.1 CalEEMod®

Ramboll Environ primarily utilized the California Emission Estimator Model® (CalEEMod®) version 2013.2.2[5] to assist in quantifying the GHG emissions in the inventories presented in this report for the Project. CalEEMod® provides a platform to calculate both construction emissions and operational emissions from a land use development project. It calculates both the daily maximum and annual average for criteria pollutants as well as total or annual GHG emissions. The model also provides default values for water and energy use. Specifically the model aids the user in the following calculations:

- One-time short-term construction emissions associated with site preparation, demolition, grading, utility installation, building, coating, and paving from off-road construction equipment, and on-road mobile equipment associated with workers, vendors, and hauling.

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4 CalEEMod®, the primary tool used to develop the emissions inventory uses GWPs from the IPCC Second Assessment Report, which is 310 for $N_2O$ and 21 for $CH_4$. The GWPs in the IPCC Fourth Assessment Report of 298 for $N_2O$ and 25 for $CH_4$ have been manually incorporated to CalEEMod® output.

5 SCAQMD. 2013. California Emissions Estimator Model®. Available at: http://www.CalEEMod.com/. Accessed: September 2016.

- One-time vegetation sequestration changes, such as permanent vegetation land use changes and new tree plantings.
- Operational emissions associated with the fully built out land use development, such as on-road mobile vehicle traffic generated by the land uses, off-road emissions from landscaping equipment, natural gas usage in the buildings, electricity usage in the buildings, water usage by the land uses, and solid waste disposal by the land uses.

CalEEMod® is a statewide program designed to calculate both criteria and GHG emissions from development projects in California. This model was developed under the auspices of the SCAQMD and received input from other California air districts, and is currently supported by numerous lead agencies for use in quantifying the emissions associated with development projects undergoing environmental review. CalEEMod® utilizes widely accepted models for emission estimates combined with appropriate default data that can be used if site-specific information is not available. These models and default estimates use sources such as the United States Environmental Protection Agency (USEPA) AP-42 emission factors,[6] CARB's on-road and off-road equipment emission models such as the EMission FACtor model (EMFAC) and the Emissions Inventory Program model (OFFROAD), and studies commissioned by California agencies such as the California Energy Commission (CEC) and California Department of Resources Recycling and Recovery (CalRecycle).

As mentioned above, CalEEMod® is based upon the California Air Resources Board (CARB)-approved OFFROAD and EMFAC models. OFFROAD[7] is an emission factor model used to calculate emission rates from off-road mobile sources (e.g., construction equipment, agricultural equipment). The off-road diesel emission factors used by CalEEMod® are based on the CARB OFFROAD2011 program. EMFAC is an emission factor model used to calculate emissions rates from on-road vehicles (e.g., passenger vehicles). The emission factors used by CalEEMod® are based on the CARB EMFAC2011 program.

However, CARB has released EMFAC2014, which includes various updates, notably the incorporation of USEPA and CARB regulations and standards. The updates were in response to regulations enacted through California's Advanced Clean Cars (ACC) Program and National Highway Traffic Safety Administration (NHTSA) Phase 1. Therefore, to more accurately assess the GHG emission inventories, EMFAC2014 information was incorporated into the analysis, in lieu of CalEEMod®'s default utilization of EMFAC2011 information.[8]

Notably, EMFAC2014 (unlike EMFAC2011) excludes GHG emission reductions from the Low Carbon Fuel Standard (LCFS). The omission of LCFS-related emission reduction benefits from EMFAC2014, which EMFAC2011 previously estimated would reduce GHG emissions from mobile sources by approximately 10% in 2020, results in a more conservative approach to estimate (i.e., over-estimation) the Project's emissions from mobile sources compared to if EMFAC2011 was used.

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6 The USEPA maintains a compilation of Air Pollutant Emission Factors and process information for several air pollution source categories. The data is based on source test data, material balance studies, and engineering estimates. Available at: http://epa.gov/ttnchie1/ap42/. Accessed: September 2016.

7 CARB. 2011. Off Road Mobile Source Emission factors. Available at: http://www.arb.ca.gov/msei/msei.htm. Accessed: September 2016.

8 CARB. 2015. Release. Available at: https://www.arb.ca.gov/msei/msei.htm. Accessed: September 2016.

In addition, CalEEMod® contains default values and existing regulation methodologies to use in each specific local air district region. Appropriate statewide default values can be utilized if regional default values are not defined. Ramboll Environ used default factors for Los Angeles county area (within the South Coast Air Quality Management (SCAQMD) jurisdiction) for the GHG emission inventory, unless otherwise noted in the methodology descriptions below.

CalEEMod® uses GWPs from the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report(AR), which are 310 for $N_2O$ and 21 for $CH_4$. Therefore, the GWPs in the IPCC Fourth Assessment Report of 298 for $N_2O$ and 25 for $CH_4$ have been manually incorporated to CalEEMod® output as the Fourth Assessment Report is the basis for the GWPs in the 2014 First Update to the Scoping Plan.

#### 2.1.2.2 Other Resources

Ramboll Environ directly or indirectly relied on emissions estimation guidance from government-sponsored organizations, government-commissioned studies of energy use patterns, energy surveys by other consulting firms, Project specific studies (e.g., ConSol Residential and Commercial Building Analysis[9], Fehr and Peers Transportation Demand Management Program[10] and Stantec Traffic Signal Synchronization Analysis[11]), and emission estimation software as described above. In cases noted below, third-party studies were also relied upon to support analyses and assumptions made outside of the approach described above.

Details regarding the specific methodologies used by CalEEMod® can be found in the CalEEMod® User's Guide and associated appendices.[12] The CalEEMod® output files are provided for reference in **Appendix B** to this report.

### 2.1.3 Indirect GHG Emissions from Electricity Use

Project-related electricity use results in indirect emissions, due to electricity generation activities occurring at off-site power plant locations. For this Project, electrical power will be supplied by Southern California Edison (SCE). The indirect GHG emissions created as a result of Project-related electricity use are estimated through application of the following methodology. For purposes of electricity use, intensity factors are GHG emission rates from a given source relative to the energy generation activities, and are expressed in terms of the amount of GHG released per megawatt (MW) of energy produced. The default electricity intensity for SCE in CalEEMod® for $CO_2$, $CH_4$, and $N_2O$ are 641.26, 0.029, and 0.011 pounds (lbs) of GHG per megawatt-hour (MWh), respectively. The $CO_2$ default factor is based on SCE's 2007 Power/Utility Protocol (PUP) report.[13] The $CH_4$ and $N_2O$ default factors are based on CARB's and E-Grid values. The SCE's PUP reports show that renewable energy sources do not result in any new $CO_2$ emissions. While CalEEMod®'s emission factors for $CH_4$ and $N_2O$ conservatively were used for this Project, CalEEMod®'s $CO_2$

[9] ConSol, 2016. Residential and Commercial Building Analysis.

[10] Fehr & Peers. 2016. RMDP/SCP Project: Transportation Demand Management Program.

[11] Stantec. 2016. Newhall Ranch RMDP/SCP – GHG Reductions from Traffic Signal Coordination.

[12] SCAQMD. 2013. California Emissions Estimator Model® User's Guide. Version 2013.2.2. Available at: http://www.CalEEMod.com/. Accessed: September 2016.

[13] SCE Power/Utility Protocol (PUP) Report. Available at: http://www.climateregistry.org/tools/carrot/carrot-public-reports.html. Accessed: September 2016. The 2007 report is the most recent available data. For this analysis, the 2006 and 2007 PUP reports were both used to conservatively represent.

intensity factor was modified based on the SCE's 2006 and 2007 PUP reports, to account for the renewables portfolio standard (RPS) requirements for 2020 (33 percent RPS) and 2030 (50 percent RPS).[14] The 2006 and 2007 PUP, which report the mix of renewable and non-renewable energy sources in SCE's energy supply, were both used to conservatively calculate the emission factors.[15] This data provides the basis for the estimate of the intensity factors for the non-renewable energy, this is the value used as the basis to project what the intensity factor will be when SCE achieves the RPS requirements in 2020 and 2030. The intensity factors assuming the RPS is achieved is calculated by multiplying the percentage of energy delivered by SCE from non-renewable energy resources with the intensity factor for non-renewable energy as calculated (see **Section 2.3.2** below).

## 2.2 One-Time Emissions

One-time emissions are those emissions that are not reoccurring over the life of the Project. This includes emissions associated with construction and emissions associated with land use changes.

### 2.2.1 Construction

This section describes the estimation of GHG emissions from construction activities at the Project site. While the exact construction schedule and equipment mix may vary from the current analysis, the GHG emissions are not expected to be higher than that estimated given the conservative assumptions included in this analysis.

The Project's construction schedule consists of six stages, with construction-related activities commencing in March 2018 and concluding in December 2030, as shown in **Table 2-3**. This schedule conservatively assumes that construction may continue to the end of 2030 when the Project reaches full operation. While some construction phases are conservatively identified to conclude in the second half of the 2030 calendar year in this table, the Project's absorption schedule anticipates that the Project will be fully constructed and occupied during the 2030 calendar year. For each of the stages, the major construction phases included in this analysis are:

- Grading: involves the cut and fill of land to ensure the proper base and slope for the construction foundation. (During the grading phase, vegetation will be removed from the Project site. The construction emissions inventory presented here, in Section 2.2.1, accounts for the GHG emissions resulting from the construction equipment utilized during the grading phase. Section 2.2.2 below separately accounts for the GHG emissions associated with the removal of vegetation and subsequent revegetation of the Project site.)
- Trenching or Improvements: involves trenching and associated activities to install vital utilities.
- Paving: involves the laying of concrete or asphalt such as in parking lots or roads.

[14] The $CH_4$ and $N_2O$ intensity factors from CalEEMod® are based on emissions from California's mix of power generation sources in 2009. As more renewable energy is integrated into the electricity grid, these intensity factors will also decrease.

[15] The CalEEMod® default electricity intensity factor for SCE is based on the 2007 PUP report. However, the $CO_2$ emissions per total non-renewable energy is higher in the 2006 PUP report than the 2007 PUP report (e.g., the non-renewable power generation mix was 'dirtier' in 2006 than 2007). Averaging the 2006 and 2007 intensity factors results in a higher intensity factor used in the Project calculations than would be if only the 2007 data was relied upon.

- Building Construction: involves the construction of structures and buildings.
- Architectural Coating: involves the application of coatings to both the interior and exterior of buildings or structures.

GHG emissions from these construction phases are largely attributable to fuel use from construction equipment and worker commuting vehicles.[16]

Ramboll Environ used CalEEMod® version 2013.2.2 to quantify the construction emissions. The construction schedule, off-road equipment lists and equipment specifications are Project specific estimates, and consistent with the total level of construction equipment activity analysed in the *Final Joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the RMDP and SCP Project* GHG analysis.[17]

This analysis incorporated various updated assumptions including: the use of CalEEMod® version 2013.2.2 (which relies upon OFFROAD 2011 and EMFAC 2011) and an updated construction schedule based on the currently anticipated start date for construction.[18] The construction-related assumptions are shown in **Table 2-4a thru 2-4f, Table 2-5 and Table 2-6**. **Table 2-5** presents the CalEEMod® default worker, vendor, and hauling trip assumptions. CalEEMod®'s default parameters result in an over-estimation of the number of vendor and worker trips during the building construction and architectural coating phases due to the model's assumption that all buildings are constructed simultaneously during every year of construction activity. This Project proposes to phase development such that construction-related activities will occur on various portions of the total development area from year-to-year. Therefore, **Table 2-6** calculates an adjustment factor that is used to correct CalEEMod®'s number of vendor and worker trips based on the estimated number of residential dwelling units and non-residential square footage being built and painted in each calendar year.

#### 2.2.1.1 Emissions from Construction Equipment

The emission calculations associated with construction equipment are from off-road equipment engine use based on the equipment list and phase length, and on-road vehicle trips and phase length.

Since the majority of the off-road construction equipment used for construction projects are diesel fueled, CalEEMod® assumes all of the equipment operates on diesel fuel. The calculations associated with this screen include the running exhaust emissions from off-road equipment. Since the equipment is assumed to be diesel, there are no starting emissions associated with the equipment, as these are *de minimis* for diesel-fueled equipment. CalEEMod® calculates the exhaust emissions based on CARB's OFFROAD2011 methodology using the equation presented below.[19]

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[16] In addition to the worker and vendor trips, haul truck trips were added to the site preparation to account for the truck trips hauling vegetation waste.

[17] California Department of Fish & Wildlife, *Final Joint EIS/EIR for the RMDP and SCP Project* (June 2010; SCH No. 2000011025), Volume VII – Appendix F8.0 [ENVIRON International Corporation, *Climate Change Technical Addendum* (October 2009)].

[18] Due to limitations with CalEEMod®, this was not updated to EMFAC2014.

[19] SCAQMD. 2013. California Emissions Estimator Model® User's Guide, Appendix A. Available at: http://www.CalEEMod.com/. Accessed: September 2016.

$$Emissions_{Diesel} = \sum_i (EF_i \times Pop_i \times AvgHP_i \times Load_i \times Activity_i)$$

Where:

EF = Emission factor in grams per horsepower-hour (g/bhp-hr) as processed from OFFROAD2011

Pop = Population, or the number of pieces of equipment

AvgHp = Maximum rated average horsepower

Load = Load factor

Activity = Hours of operation

i = equipment type

The GHG emissions associated with off-road construction equipment are shown in **Table 2-7**.

#### 2.2.1.2 Emissions from On-Road Construction Trips

Construction generates on-road vehicle GHG emissions from personal vehicles for worker and vendor commuting, and trucks for soil and material hauling. These emissions are based on the number of trips and vehicle miles traveled (VMT) along with emission factors from EMFAC2011. As mentioned above, there will be no offsite soil hauling trucks for the Project. However, the analysis conservatively assumes that there will be 64 trips a day for hauling vegetation waste during the grading phase.

The emissions from mobile sources were calculated in CalEEMod® with the trip rates, trip lengths and emission factors for running from EMFAC2011 as follows:[20]

$$Emissions_{pollutant} = VMT * EF_{running,\ pollutant}$$

Where:

$Emissions_{pollutant}$ = emissions from vehicle running for each pollutant

VMT = vehicle miles traveled

$EF_{running,\ pollutant}$ = emission factor for running emissions

Starting and idling emissions were also calculated in CalEEMod® by multiplying the number of trips by the respective emission factor for each pollutant. The GHG emission from on-road vehicles associated with construction is shown in **Table 2-8**.

#### 2.2.1.3 Total Construction Emissions

The total emissions from construction are summarized in **Table 2-9**. Total GHG emissions from all phases for off-road and on-road emissions are 141,612 and 51,507 metric tonnes of $CO_2$ equivalent $MTCO_2e$, respectively. Total GHG emissions from the construction activities are 193,119 $MTCO_2e$.[21] When amortized over 30-year project lifetime, the

[20] SCAQMD. 2013. California Emissions Estimator Model® User's Guide, Appendix A. Available at: http://www.CalEEMod.com/. Accessed: September 2016.

[21] The up-to 18 on-site on-road vehicle emissions are included as on-road emissions.

construction GHG emissions are 6,437 $MTCO_2e$/year.[22] Detailed emission inventory from the CalEEMod® output files are included in **Appendix B**.

### 2.2.2 Vegetation Changes

This section presents the calculation of the positive and negative GHG emissions associated with vegetation removal and re-vegetation at the site. Permanent vegetation changes that occur as a result of land use development constitute a one-time change in the carbon sequestration capacity of a project site. In this case, undeveloped land will be converted to different land uses with landscaped areas with trees. This will result in an overall net loss of carbon sequestration once the vegetation reaches a steady state (i.e., new vegetation replaces dying vegetation). Consequently, vegetation change results in a GHG emissions increase.

#### 2.2.2.1 Vegetation Change Emissions

CalEEMod® was used to calculate GHG emissions associated with the vegetation activities of land use change and the planting of new trees, as according to the IPCC protocol for vegetation. Overall Change in Sequestered $CO_2$ can be estimated with this equation: [23]

$$\text{Overall Change in Sequestered CO2 } = \sum_{i}\left((\text{SeqCO}_2)_i \times \text{area}_i\right) - \sum_{j}\left((\text{SeqCO}_2)_j \times \text{area}_j\right)$$

Where:

$SeqCO_2$ = mass of sequestered $CO_2$ per unit area [$MTCO_2$/acre]

area = area of land for specific land use type [acre]

i = index for final land use type

j = index for initial land use type

Conservatively, there is no reduction in GHG emissions associated with preservation of a land. The vegetation changes result in net loss of carbon sequestration. The detail is shown in **Tables 2-10a and 2-10b**.

## 2.3 Unmitigated Annual Operational Emissions

### 2.3.1 Area Sources

Area sources in CalEEMod® are direct sources of GHG emissions. The area source GHG emissions included in this analysis result from landscaping-related fuel combustion sources, such as lawn mowers. GHG emissions due to natural gas combustion in buildings, including hearths, are excluded from this section since they are included in the emissions associated with building energy use.

The resulting GHG emissions for the Unmitigated Project are shown in **Table 2-11.**

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[22] This approach to one-time construction and vegetation change GHG emissions is based on the GHG Threshold Working Group Meeting #13 Minutes from August 26, 2009. Available at: http://sfprod.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-13/ghg-meeting-13-minutes.pdf?sfvrsn=2. Accessed: September 2016.

[23] SCAQMD. 2013. California Emissions Estimator Model® User's Guide, Appendix A. Available at: http://www.CalEEMod.com/. Accessed: September 2016.

### 2.3.2 Energy Use

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits $CO_2$ and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Climate Zone 9 was selected based on the CEC forecast climate zone map shown in the CalEEMod® User's Guide.

**Table 2-12** identifies the emission factors for electricity (i.e., pounds of $CO_2$ per megawatt-hour delivered) used in this analysis. As illustrated in **Table 2-12**, an SCE-specific emission factor that accounts for the 50 percent RPS required by 2030, as discussed in Section 2.1.3, was calculated.

In California, Title 24 governs energy consumed by the building envelope, including its mechanical systems and some types of fixed lighting.[24] These so-called "regulated loads" are not the only source of building-related energy consumption. Instead, "unregulated loads", which are also sometimes referred to as "plug-in loads", also contribute to the total energy demand/consumption of the built environment.

The Unmitigated Project analysis assumes that the Project's residential and non-residential land uses accord to the 2016 Title 24 Standards, as that code cycle will be effective on January 1, 2017, before the Project's building construction activity commences.

To calculate the total residential building energy input for the Project (i.e., electricity and natural gas use from the residential development's regulated and unregulated loads), and in lieu of using CalEEMod® default data, Ramboll Environ utilized residential building energy use data prepared by ConSol using the CEC-approved CBECC-Res 2016 software. The total residential energy use rates input to CalEEMod® are shown in **Table 2-13a**.

To calculate the total non-residential building energy input for the Project (i.e., electricity and natural gas use from the non-residential development's regulated and unregulated loads), Ramboll Environ utilized default values provided in CalEEMod®, which are based on the Commercial End-Use Survey (CEUS),[25] in combination with building energy use data prepared by ConSol using CEC-approved building energy modeling software (EnergyPro 6.8 and 7.1). Since CalEEMod® is based on the 2008 Title 24 Standards, ConSol calculated percentage reductions for application to the relevant CalEEMod® default energy intensity factors to estimate the energy savings resulting from implementation of the 2016 Title 24 Standards. For non-residential buildings, the changes in energy consumption from 2008 to 2016 that ConSol calculated were applied to the total of the default 2008 energy use factors. The total non-residential energy use rates input to CalEEMod® are shown in **Table 2-13b** (see also **Appendix C**).[26]

The swimming pools at the Project's private recreation centers are assumed to use electricity for filters and pumps, and natural gas for water heating for the Unmitigated

[24] Title 24, Part 6, of the California Code of Regulations: California's Energy Efficiency Standards for Residential and Nonresidential Buildings. Available at: http://www.energy.ca.gov/title24/. Accessed: September 2016.

[25] A detailed explanation how the CEUS data was processed for use in CalEEMod® is available in CalEEMod® User's Guide Appendix E.

[26] ConSol, Newhall Land & Farming Company Residential and Commercial Building Analysis (2016).

Project as shown in **Table 2-14a**. For the Unmitigated Project, $CO_2e$ emissions from swimming pool energy were estimated to be 24,917 $MTCO_2e$/year, as shown in **Table 2-14a**. $CO_2e$ emissions from the electricity demand and natural gas consumption of residential and non-residential buildings were estimated to be 36,833 and 21,030 $MTCO_2e$/year, respectively, or 57,862 $MTCO_2e$/year total, as shown in **Table 2-14b**.

### 2.3.3 Water Supply, Treatment and Distribution

Indirect GHG emissions result from the production of electricity used to convey, treat, and distribute the Project's water and wastewater. The amount of electricity required to convey, treat, and distribute water depends on the volume of water, as well as the source(s) of the water. Additionally, direct $CH_4$ and $N_2O$ emissions result from the treatment of wastewater.

The Project's water demand, recycled water usage, and wastewater generation values were based on Alternative D2 of the *Final Joint EIS/EIR for the RMDP and SCP Project*[27], and scaled by the change in land use square footage and number of dwelling units between the Project and Alternative D2. The scaling factors and subsequent water use quantities are shown in **Tables 2-15a** and **2-15b**, respectively**. Table 2-15a** derives percentages for Newhall Ranch Specific Plan (NRSP), ES, and VCC to scale the water use from the water demand in Alternative D2 of the *Final Joint EIS/EIR for the RMDP and SCP Project*. These percentages are applied to all water demand rows in **Table 2-15b**, resulting in slightly lower water demand than the old Alternative D2.

The Unmitigated Project's estimated water usage reflects a demand reduction for indoor potable water that is based on compliance with applicable regulatory water conservation and recycled water requirements. Specifically, the Project will comply with the California Green Building Standards (Part 11 of Title 24) (CalGreen Standards), which require a 20 percent reduction in indoor potable water use through the use of water saving fixtures and/or flow restrictors.[28] Because the CalGreen Standards were adopted in 2010, after the development of the water usage estimates presented in the *Final Joint EIS/EIR for the RMDP and SCP Project*, the indoor water usage was reduced to reflect Project compliance with the CalGreen Standards.

The Unmitigated Project's estimated water usage also reflects that recycled water will be used to satisfy a portion of the outdoor, irrigation-related water demand, consistent with the State Water Resources Control Board's recycled water policy.[29] The recycled water totals, and subsequent emission reductions attributable to its use, are shown in **Table 2-15c.**

The CalGreen Standards, as well as the County of Los Angeles' Green Building Standards Code (Municipal Code Title 31) and previously adopted NRSP mitigation measures, and the local water purveyor (Valencia Water Company), will also require the incorporation of

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[27] California Department of Fish & Wildlife, *Final Joint EIS/EIR for the RMDP and SCP Project* (June 2010; SCH No. 2000011025), Volume VII – Appendix F8.0 [ENVIRON International Corporation, *Climate Change Technical Addendum* (October 2009)].

[28] CSBC. 2010. 2010 California Green Building Standards. 4.303.1. Available at: http://www.documents.dgs.ca.gov/bsc/calgreen/2010_ca_green_bldg.pdf. Accessed: September 2016.

[29] The California Water Resources Control Board adopted the recycled water policy in 2009 and revised the policy in 2013. Available at: http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2013/rs2013_0003_a.pdf. Accessed: September 2016.

features to reduce the Project's outdoor water demand. The analysis conservatively does not reduce the Project's outdoor water usage to reflect these requirements.

For indirect emissions associated with the supply, treatment, and distribution of the Project's water, Ramboll Environ used CalEEMod® default assumptions the Project's Valencia Commerce Center and Entrada planning areas, which would rely upon a blend of locally-sourced and State Water Project water. The default assumptions represent the average embodied energy[30] for the supply, treatment, and distribution of water for Southern California, as determined by a study commissioned by the CEC.[31] (This study published recommended electricity intensities for the supply, treatment and distribution of water, as well as the treatment of wastewater, for Northern and Southern California.) Because the NRSP area will exclusively use locally-sourced groundwater, different factors were used to account for the energy embodied in the NRSP's water use. The different energy intensities associated with the Project's water supply sources are presented Note 2 in **Table 2-15d**.

The CalEEMod® default assumptions conservatively estimate the GHG emissions associated with the distribution of the wastewater generated by the Project's NRSP area, since the Newhall Ranch water reclamation plant (WRP) will be located within the NRSP area, and not outside the Project as assumed by the default electricity intensity factor for wastewater treatment.

The direct and indirect emissions associated with the Newhall Ranch WRP's wastewater treatment processes are captured through the wastewater emissions estimates for each of the Project land uses in the NRSP that will send wastewater to the WRP.[32] However, because the WRP is designed with the capacity to treat 6.8 million gallons per day of wastewater, **Table 2-15e** shows the calculation used to represent the direct and indirect emissions associated with the additional wastewater not already accounted for in **Table 2-15b** for the Newhall Ranch WRP treating wastewater up to this maximum designed capacity.

As shown in **Table 2-15d**, the Project was estimated to have 1,662 and 4,059 thousand gallons per year of indoor and outdoor water usages before applying the regulatory-based emission reduction for recycled outdoor water. After applying the regulatory reduction for recycled outdoor water, the Project was estimated to result in 6,158 $MTCO_2e$/year as shown in **Table 2-15d**.

### 2.3.4 Solid Waste

Municipal solid waste (MSW) is the amount of material that is disposed of by land filling, recycling, or composting. CalEEMod® calculates the indirect GHG emissions associated with waste that is disposed of at a landfill using waste disposal rates by land use and overall

[30] Embodied energy refers to the amount of energy that was used in delivering water to the specific land use.

[31] CEC. 2006. Refining Estimates of Water-Related Energy Use in California. Available at: http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF. Accessed: September 2016.

[32] Note that the building and mobile related emissions for the WRP are captured through the building energy and mobile related emissions, based on the anticipated land use to be developed.

composition. The emission estimates in this Project were based on City of Santa Clarita 2012 actual disposal rate.[33]

CalEEMod® uses the overall California Waste Stream composition to generate the necessary types of different waste disposed into landfills. The program quantifies the GHG emissions associated with the decomposition of the waste, which generates methane based on the total amount of degradable organic carbon. The program also quantifies the $CO_2$ emissions associated with the combustion of methane, if applicable. Default landfill gas concentrations were used as reported in Section 2.4 of the USEPA's AP-42. The IPCC has a similar method to calculate GHG emissions from MSW in its 2006 Guidelines for National Greenhouse Gas Inventories.

The analysis assumes that additional waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting to meet the statewide goal of 75 percent waste diversion.[34] The remainder of the waste not diverted will be disposed of at a landfill.

Various plans and regulations support achievement of the statewide diversion goal, including: (1) SW-1: Waste Diversion Goal of the County's Community Climate Action Plan (CCAP)[35], which calls for compliance with all State mandates associated with diverting at least 75 percent of waste from landfill disposal by 2020; (2) the County's Green Building Standards Code (Municipal Code Title 31), which includes a number of sustainability requirements that apply to waste diversion; and, (3) Assembly Bill (AB) 1826, which requires applicable commercial businesses to separate food scraps and yard trimmings, and arrange for recycling services for that organic waste. Various design elements of the Project's facilitated development also would further the achievement of AB 341, such as the provision and location of recycling receptacles.

GHG emissions from landfills are associated with the anaerobic breakdown of material. The CalEEMod® version 2013.2.2 solid waste module determines the GHG emissions associated with the disposal of solid waste into landfills in quantities that are based upon land use type according to waste disposal studies conducted by California Department of Resources Recycling and Recovery. For this module, CalEEMod® version 2013.2.2 used City of Santa Clarita actual disposal rate.[36]

GHG emissions associated with non-landfill diverted waste streams are not considered, because it is generally assumed that these diversions do not result in any appreciable amounts of GHG emissions when operated effectively.[37] These waste diversion alternatives may result in differences in life-cycle emissions of GHGs, but it is not appropriate to

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[33] CalRecycle. Available at: http://www.calrecycle.ca.gov/LGCentral/reports/diversionprogram/JurisdictionDiversionPost2006.aspx. Accessed: September 2016.

[34] CalRecycle. 2013. California's 75 Percent Initiative. Available at: http://www.calrecycle.ca.gov/75percent/. Accessed: September 2016.

[35] LA County. 2015. Community Climate Action Plan. Page 4-8. Available at: http://planning.lacounty.gov/CCAP. Accessed: September 2016.

[36] Actual disposal rates are equivalent to a 50 percent diversion rate based on the jurisdiction-specific average of per capita generation rates for years 2003 to 2006. Therefore, the actual disposal rates were divided by 50 percent to estimate the disposal rate without any diversion.

[37] CARB. 2010. Local Government Operations Protocol. Chapter 9.4.

combine life-cycle emissions for only one category of emissions.[38] Biogenic $CO_2$ emissions were not included when CARB analyzed the GHG emissions inventory under AB 32. Therefore, they are not included in the Project emissions inventory.

The Unmitigated Project was estimated to generate 46,091 tons/year of solid waste and was estimated to result in 23,179 $MTCO_2e$/year as shown in **Table 2-16.**

### 2.3.5 Mobile Sources

The GHG emissions associated with on-road mobile sources are generated from residents, workers, customers, and delivery vehicles visiting the land use types in the Project. The GHG emissions associated with on-road mobile sources includes running and starting exhaust emissions. Running emissions are dependent on VMT. Starting emissions are associated with the number of starts or time between vehicle uses and the assumptions used in determining these values are described below. Ramboll Environ estimated mobile source emissions using the trip rates and trip length information specified in the Traffic Data provided by Stantec (**Appendix D**), which was derived using the Santa Clarita Valley Consolidated Traffic Model (SCVCTM), the same model used to generate the trip information in the *Final Joint EIS/EIR for the RMDP and SCP Project*. The mobile source emissions were estimated using CalEEMod®.

The analysis includes the benefit of reductions from some adopted regulatory programs, which are accounted for as follows:

- AB 1493 ("the Pavley Standard") required CARB to adopt regulations by January 1, 2005, to reduce GHG emissions from non-commercial passenger vehicles and light-duty trucks of model year 2009 and thereafter. CalEEMod® and EMFAC2014 include emission reductions for non-commercial passenger vehicles and light-duty trucks of model year 2017 – 2025.
- The ACC program, introduced in 2012, combines the control of smog, soot causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2015 through 2025. While this regulation has not been incorporated into CalEEMod®, EMFAC2014 includes reductions associated with this regulation that are represented in this analysis.
- The USEPA/NHTSA advanced fuel economy and GHG standards (Phase 1) were adopted in 2011 for medium and heavy duty trucks for model years 2014-2018.[39] This Heavy-Duty National Program is intended to reduce fuel use and GHG emissions from medium- and heavy-duty vehicles, semi-trucks, pickup trucks and vans, and all types and sizes of work trucks and buses in between. This regulation has not been incorporated into CalEEMod®; however, EMFAC2014 emission factors used for the analyses in this report include reductions associated with this regulation.

[38] This inventory represents scope 1 and 2 emission categories. A life-cycle analysis of waste diversion would be a scope 3 inventory. CARB's Local Government Operations Protocol Version 1.1 (May 2010) clearly states that scope 3 emissions should not be combined with scope 1 and 2 emissions.

[39] USEPA, Office of Transportation and Air Quality. 2011. Available at: https://www3.epa.gov/otaq/climate/documents/420f11031.pdf. Accessed: September 2016.

- The USEPA/NHTSA advanced fuel economy and GHG standards (Phase 2) were adopted in 2016 for medium- and heavy-duty trucks for model years 2018 and beyond.[40] The Phase 2 program includes technology-advancing standards that substantially reduce GHG emissions and fuel consumption resulting in an ambitious, yet achievable, program that will allow manufacturers to meet the applicable standards over time, at reasonable cost, through a mix of different technologies. The Phase 2 program's standards will be phased in, beginning with model year 2021 and culminate with model year 2027. Since the introduction of this standard is very recent, associated reductions are included for mobile source emissions are calculated outside of CalEEMod® as shown in **Table 2-18b**.

#### 2.3.5.1 Estimating Mobile Source Emissions

The Santa Clarita Valley Consolidated Traffic Model (SCVCTM) was used to estimate the total annual VMT from the Project, which, in turn, was used to estimate the Project mobile source GHG emissions. The SCVCTM is a computerized travel demand model jointly maintained by the City of Santa Clarita and County of Los Angeles in which existing and future land uses are quantified and corresponding traffic distribution patterns are estimated based on standardized modeling techniques. The following sections described the SCVCTM data and how it was used derive the inputs for CalEEMod®, which is the model used to estimate the GHG emissions.

#### 2.3.5.2 SCVCTM Data

Project traffic forecasts were derived using the SCVCTM taking into account the five standardized trip types as described below:

- H-W: Home-based work trips
- H-S: Home-based shopping trips
- H-O: Home-based "other" (i.e., non-work, non-shopping) trips
- O-W: Other-based work trips
- O-O: Other-based other trips

Each trip type has unique characteristics, which are reflected in the SCVCTM. All trips that are generated within the SCVCTM limits are first categorized into one of the five trip types, as shown in **Table 2-17a**. The SCVCTM then calculates the distribution of the trips in each traffic analysis zone (TAZ) based on the trip type and the corresponding regional trip distribution factors utilized by the SCVCTM. From the resulting distribution of vehicle trips, an estimate of the average trip length for each trip type is derived, as shown in **Table 2-17b**. The underlying data provided by the traffic engineer, Stantec, is included in **Appendix D**.

#### 2.3.5.3 Adjusting for Trip Generation Numbers

The daily tripend generation numbers derived from the traffic model, as shown in **Table 2-17a** overestimate actual trips by "double-counted" trips resulting from trip internalization. The double-counted trips in the traffic model need to be adjusted to reflect actual trip generation for purposes of the GHG emissions model. In other words, to present

[40] USEPA, Office of Transportation and Air Quality. 2016. Available at: https://www3.epa.gov/otaq/climate/documents/420f16044.pdf. Accessed: September 2016.

an accurate account of emissions from actual vehicle trips, the double-counted trips in the traffic model need to be adjusted to reflect actual trips.

Trip internalization (or internal trip capture) for planned communities or mixed-use developments describes the portion of trips generated by those developments that both begin and end within the development boundary. These trips, which have both tripends (origin and destination, or productions and attractions) within the project site, are known as internal trips. The internal trip capture rate is the percentage of tripends for trips that remain internal to the project site; in this case, the rate was derived by the SCVCTM.

The internal tripend percentages for the Project, by trip type, are illustrated in **Table 2-17c**; the overall tripend internalization rate calculated for the project by the SCVCTM is 47 percent. Planned communities like Newhall Ranch have higher internal trip capture rates than single-use developments. This is because such planned communities include different integrated, complementary, and interacting land uses, such as residential, school, recreation, office, retail, restaurants, and entertainment uses, such that residents or workers need not travel outside of the project boundaries for many services.[41]

In calculating total VMT, it is necessary in the case of a mixed-use development, such as this Project, to make an adjustment in order to avoid the double-counting of vehicle trips related to internal capture. For example, in the case of a roundtrip between an *on-site* residence and an *on-site* store, the traffic engineer produces trip generation estimates that include two tripends assigned to the residential portion of the Project (to and from) *and* two tripends assigned to the commercial portion of the project (to and from). Thus, a total of *four* tripends were assigned for one roundtrip by the resident to the store, even though there would be a total of only *two* trips – the resident driving from his/her home to the store to shop and then returning home again.

To avoid the double counting of VMT, one-half of the total number of daily internal tripends for each land use and trip type (e.g., in the case of residential H-W tripends, 11 percent [22 percent divided by 2]) is subtracted from the unadjusted daily number. This approach is applied to each individual land use (i.e., residential; non-residential; schools/parks) and each individual trip type (i.e., H-W, H-S, H-O, O-W, O-O), while also accounting for whether the land use is producing or attracting the vehicle trip. For example, as shown on **Table 2-17d**, the total daily H-W trips attributed to single-family dwellings for the Entrada planning area was reduced from 932 (see **Table 2-17a**) to 829 total daily trips (i.e., 932 daily trips was reduced by 11 percent, or 22 percent divided by 2). With this adjustment, the total amount of Project VMT can be determined without double-counting the internal trips.

**Table 2-17e** shows the estimated Project VMT. The VMT is calculated by multiplying the trip lengths as shown in **Table 2-17b** with the total number of daily trips as calculated in **Table 2-17d**.

### 2.3.5.4 Deriving CalEEMod® Inputs

The VMT calculations described above are used to derive the appropriate inputs for CalEEMod® to estimate the GHG emissions associated with mobile sources. To conduct the

[41] Ewing, Reid and Cervero, Robert. 2010. Travel and the Built Environment. Journal of the American Planning Association, 76: 3, 265 — 294. May 11.

analysis, CalEEMod® requires the input of average trip lengths and trip generation rates for each different land use type (e.g., single-family, condominium/townhouse, etc.). The average trip length is calculated by dividing the total daily VMT shown in **Table 2-17e** by the total daily trips shown in **Table 2-17d**. The trip generation rate, on the other hand, is calculated by dividing the total daily trip generation shown in **Table 2-17d** with the number of applicable units (e.g., number of dwelling units in the case of the single family dwelling use). The resulting Average Trip Length (in miles) and Trip Rate (number of trips per unit per weekday) is shown in **Table 2-17f**.

#### 2.3.5.5 Summary of CalEEMod® Inputs

The CalEEMod® inputs for the mobile source emission estimates are shown in **Table 2-17g**. To estimate the annual VMT, CalEEMod® incorporates weekend trip rates. Since the SCVCTM trip generation data is a weekday trip generation rate estimate, the Project weekend trip rates were derived from the ratio of weekday to weekend trip rates from CalEEMod® applied to the SCVCTM adjusted weekday trip rates.

The average trip lengths shown in **Table 2-17f** were used as inputs as shown in **Table 2-17g**. While CalEEMod® has options to represent different trip lengths for different trip types, the same trip length was used for all trip types to ensure that the total annual VMT was accurately estimated by CalEEMod® consistent with the VMT estimates from the SCVCTM.

In calculating trip distribution, the SCVCTM does not distinguish between primary, pass-by, or diverted trips; instead, the traffic model simply calculates the origin and destination of all trips without distinction. From this distribution of vehicle trips, a trip length is derived that represents an average distance that accounts for all trips, both internal and external, and includes primary, pass-by, and diverted trips.

In conducting the GHG emissions analysis, CalEEMod®'s default approach is to specify a certain percentage of vehicle trips as pass-by or diverted trips and, thereby, assign a shorter trip length to such trips. However, to do so in this case would be to over-compensate for these shorter pass-by or diverted trips, which have shorter trip lengths already accounted for in the average trip length derived using the traffic model. To remedy this, all trips input into CalEEMod® for the GHG emissions analysis were input as primary trips, thereby effectively overriding the model's default settings to ensure that the VMT is accurately accounted for in CalEEMod®. This is illustrated in **Table 2-17g**, CalEEMod® Input Assumptions for Traffic, of the GHG Emissions Technical Report, which shows that 100 percent of the trips input into CalEEMod® were assumed to be primary trips, with zero percent assumed to be diverted and/or pass-by trips. Therefore, no adjustments (i.e., reductions) were applied as part of the analysis to account for diverted or pass-by trips additive to internal capture.

#### 2.3.5.6 Mobile Source Emissions

The 2030 Unmitigated Project was estimated to generate 1,211,961,903 VMT/year and was estimated to result in 403,814 $MTCO_2e$/year as shown in **Table 2-18a**. The Unmitigated Project emissions include emissions reductions due to the NHTSA Phase 2 regulation of 7,041 $MTCO_2e$/year, as calculated in **Table 2-18b.**

# 3. PROJECT INVENTORY (UNMITIGATED)

While identified at length in Section 2 of this report, **Table 3-1** also summarizes the relevant modeling assumptions used in this report to estimate the emissions associated with the Unmitigated and Mitigated Project conditions.

As previously documented, the Project site – in its existing condition – emits 11,021 $MTCO_2e$ per year, and the Unmitigated Project emits 526,103 $MTCO_2e$ per year (see **Table ES-1** and **Table ES-2**). These are also summarized in **Table 3-2**.

# 4. MITIGATION MEASURES

This section quantifies the emissions reduction benefits of the thirteen mitigation measures developed for the Project that are recommended for adoption in the AEA.

## 4.1 List of Mitigation Measures

The 13 mitigation measures set forth below are recommended for system-wide implementation across the applicant's land holdings where development would be facilitated by California Department of Fish and Wildlife's Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP) Project.

Building Energy Efficiency

- GCC-1: Prior to the issuance of residential building permits, the Project applicant or its designee shall submit a Zero Net Energy Confirmation Report (ZNE Report) prepared by a qualified building energy efficiency and design consultant to Los Angeles County for review and approval. A ZNE Report shall demonstrate that the residential development within the RMDP/SCP Project site subject to application of Title 24, Part 6, of the California Code of Regulations (CCR) has been designed and shall be constructed to achieve Zero Net Energy, as defined by the California Energy Commission in its 2015 Integrated Energy Policy Report, or otherwise achieve an equivalent level of energy efficiency, renewable energy generation or greenhouse gas emissions savings.

  A ZNE Report may, but is not required to:

  (1) Evaluate multiple buildings and/or land use types. For example, a ZNE Report may cover all of the residential and commercial buildings, as well as the private recreation centers and public facilities, within a neighborhood/community, or a subset thereof.

  (2) Rely upon aggregated or community-based strategies to support its determination that the subject buildings are designed to achieve Zero Net Energy. For example, short falls in renewable energy generation for one or more buildings may be offset with excess renewable generation from one or more other buildings, or off-site renewable energy generation. As such, a ZNE Report could determine a building is designed to achieve ZNE based on aggregated or community-based strategies even if the building on its own may not be designed to achieve ZNE.

  (3) Make reasonable assumptions about the estimated electricity and natural gas loads and energy efficiencies of the subject buildings.

- GCC-2: Prior to the issuance of building permits for commercial development and private recreation centers, and prior to the commencement of construction for the public facilities, respectively, the Project applicant or its designee shall submit a Zero Net Energy Confirmation Report (ZNE Report) prepared by a qualified building energy efficiency and design consultant to Los Angeles County for review and approval. A ZNE Report shall demonstrate that the commercial development, private recreation centers and public facilities within the RMDP/SCP Project site subject to application of Title 24, Part 6, of the CCR have been designed and shall be constructed to achieve Zero Net Energy, as defined by the California Energy Commission in its 2015 Integrated Energy Policy Report, or otherwise achieve an equivalent level of energy efficiency, renewable energy generation or greenhouse gas emissions savings. ("Commercial development" includes retail, light industrial, office, hotel, and mixed-use buildings. "Public facilities" are fire stations, libraries, and elementary middle/junior high and high schools.)

A ZNE Report may, but is not required to:

(1) Evaluate multiple buildings and/or land use types. For example, a ZNE Report may cover all of the residential and commercial buildings, as well as the private recreation centers and public facilities, within a neighborhood/community, or a subset thereof.

(2) Rely upon aggregated or community-based strategies to support its determination that the subject buildings are designed to achieve Zero Net Energy. For example, short falls in renewable energy generation for one or more buildings may be offset with excess renewable generation from one or more other buildings, or off-site renewable energy generation. As such, a ZNE Report could determine a building is designed to achieve ZNE based on aggregated or community-based strategies even if the building on its own may not be designed to achieve ZNE.

(3) Make reasonable assumptions about the estimated electricity and natural gas loads and energy efficiencies of the subject buildings.

- GCC-3: Prior to the issuance of private recreation center building permits, the Project applicant or its designee shall submit swimming pool heating design plans to Los Angeles County for review and approval. The design plans shall demonstrate that all swimming pools located at private recreation centers on the RMDP/SCP Project site have been designed and shall be constructed to use solar water heating or other technology with an equivalent level of energy efficiency.

<u>Mobile Sources</u>

- GCC-4: Prior to the issuance of residential building permits, the Project applicant or its designee shall submit building design plans, to Los Angeles County for review and approval, which demonstrate that each residence within the RMDP/SCP Project site subject to application of Title 24, Part 6, of the CCR shall be equipped with a minimum of one single-port electric vehicle charging station. Each charging station shall achieve a similar or better functionality as a Level 2 charging station.

  Additionally, prior to the issuance of the first building permit for the RMDP/SCP Project site, the Project applicant or its designee shall establish and fund a dedicated account for the provision of subsidies for the purchase of zero emission vehicles, as defined by the California Air Resources Board. The Project applicant or its designee shall provide proof of the account's establishment and funding to Los Angeles County.

  The dedicated account shall be incrementally funded, for each village-level project, in an amount that equals the provision of a $1,000 subsidy per residence – on a first-come, first-served basis – for 50 percent of the village's total residences subject to application of Title 24, Part 6, of the CCR.

- GCC-5: Prior to the issuance of commercial building permits, the Project applicant or its designee shall submit building design plans, to Los Angeles County, which demonstrate that the parking areas for commercial buildings on the RMDP/SCP Project site shall be equipped with electric vehicle charging stations that provide charging opportunities to 7.5 percent of the total number of required parking spaces.

("Commercial buildings" include retail, light industrial, office, hotel and mixed-use buildings.)

The electric vehicle charging stations shall achieve a similar or better functionality as a Level 2 charging station. In the event that the installed charging stations utilize more superior functionality/technology than Level 2 charging stations, the parameters of the mitigation obligation (i.e., number of parking spaces served by electric vehicle charging stations) shall reflect the comparative equivalency of Level 2 charging stations to the installed charging stations on the basis of average charge rate per hour. For purposes of this equivalency demonstration, Level 2 charging stations shall be assumed to provide charging capabilities of 25 range miles per hour.

- GCC-6: The Newhall Ranch Transportation Demand Management Plan (TDM Plan), located in **Appendix E**, shall be implemented in order to reduce vehicle miles traveled resulting from Project build out with oversight from Los Angeles County. The TDM Plan is designed to influence the transportation choices of residents, students, employees, and visitors, and serves to enhance the utilization of alternative transportation modes both on and off the Project site through the provision of incentives and subsidies, expanded transit opportunities, bikeshare and carshare programs, technology-based programs, and other innovative means. Accordingly, the TDM Plan identifies key implementation actions that are critical to the effectiveness of the vehicle miles traveled-reducing strategies, as well as timeline and phasing requirements, monitoring standards, and performance metrics and targets tailored to each of the strategies.

  In accordance with the TDM Plan, a non-profit Transportation Management Organization (TMO) or equivalent management entity shall be established to provide the services required, as applicable.

- GCC-7: Prior to the issuance of traffic signal permits, the Project applicant or its designee shall work with Los Angeles County and the California Department of Transportation (DOT), as applicable, to facilitate traffic signal coordination along:

  (1) State Route 126 from the Los Angeles County line to the Interstate 5 north-bound ramps;

  (2) Chiquito Canyon Road, Long Canyon Road, and Valencia Boulevard within the RMDP/SCP Project site;

  (3) Magic Mountain Parkway from Long Canyon Road to the Interstate 5 north-bound ramps; and,

  (4) Commerce Center Drive from Franklin Parkway to Magic Mountain Parkway.

  In order to effectuate the signal synchronization and specifically the operational and timing adjustments needed at affected traffic signals, the Project applicant or its designee shall submit traffic signal plans for review and approval, and/or pay needed fees as determined by Los Angeles County or the California Department of Transportation, as applicable.

- GCC-8: Consistent with the parameters of the Newhall Ranch Transportation Demand Management Plan, the Project applicant or its designee shall provide Los Angeles County with proof that funding has been provided for the purchase, operation and maintenance of electric school buses in furtherance of the school bus program identified in the

Project's Transportation Demand Management Plan. The proof of funding shall be demonstrated incrementally as the school bus program is paced to village-level occupancy and student enrollment levels.

- GCC-9: Prior to the issuance of the first 2,000th residential building permit within the RMDP/SCP Project site and every 2,000th residential building permit thereafter, the Project applicant or its designee shall provide Los Angeles County with proof that it has provided a subsidy of $100,000 per bus for the replacement of up to 10 diesel or compressed natural gas transit buses with electric buses to the identified transit provider(s).

<u>Construction Sources</u>

- GCC-10: Prior to issuing grading permits for village-level development within the RMDP/SCP Project site, Los Angeles County shall confirm that the Project applicant or its designee shall fully mitigate the related construction and vegetation change GHG emissions (the "Incremental Construction GHG Emissions") by relying upon one of the following compliance options, or a combination thereof, in accordance with the Newhall Ranch GHG Reduction Plan (GHG Reduction Plan; see **Appendix F**):

  (1) Directly undertake or fund activities that reduce or sequester GHG emissions and retire the associated GHG reduction credits in a quantity equal to the Incremental Construction GHG Emissions; or

  (2) Obtain and retire carbon credits that have been issued by a recognized and reputable carbon registry, as described in the GHG Reduction Plan, in a quantity equal to the Incremental Construction GHG Emissions.

<u>Off-Site Measures</u>

- GCC-11: Prior to the issuance of building permits for every 100 residential units or 100,000 square feet of commercial development for each village-level project, the Project applicant or its designee shall provide proof of funding of the proportional percentage of the Building Retrofit Program (Retrofit Program), as included in **Appendix G**, to Los Angeles County. ("Commercial development" includes retail, light industrial, office, hotel and mixed-use buildings.) Building retrofits covered by the Retrofit Program can include, but are not limited to: cool roofs, solar panels, solar water heaters, smart meters, energy efficient lighting (including, but not limited to, light bulb replacement), energy efficient appliances, energy efficient windows, insulation, and water conservation measures.

  The Retrofit Program shall be implemented within the geographic area defined to include Los Angeles County and primarily within disadvantaged communities, as defined by the Retrofit Program, or in other areas accepted by the Los Angeles County Planning Director. Funding shall be applied to implement retrofits strategies identified in the Retrofit Program or other comparable strategies accepted by the Los Angeles County Planning Director.

- GCC-12: Prior to the issuance of the first building permit for the RMDP/SCP Project site, the Project applicant or its designee shall provide Los Angeles County with proof of installation of electric vehicle charging stations capable of serving 20 off-site parking spaces. Thereafter, the Project applicant or its designee shall provide Los Angeles County with proof of installation of electric vehicle charging stations prior to the issuance of residential and commercial building permits per the following ratios: one (1) off-site parking space shall be served by an electric vehicle charging station for every 30 dwelling units, and one (1) off-site parking space shall be served by an electric vehicle charging station for every 7,000 square feet of commercial development. ("Commercial development" includes retail, light industrial, office, hotel and mixed-use buildings.) Off-site electric vehicle charging stations capable of servicing 2,036 parking spaces would be required if the maximum allowable development facilitated by the RMDP/SCP Project occurs; fewer electric vehicle charging stations would be required if maximum build-out under the RMDP/SCP Project does not occur.

The electric vehicle charging stations shall achieve a similar or better functionality as a Level 2 charging station and may service one or more parking spaces. In the event that the installed charging stations utilize more superior functionality/technology than Level 2 charging stations, the parameters of the mitigation obligation (i.e., number of parking spaces served by electric vehicle charging stations) shall reflect the comparative equivalency of Level 2 charging stations to the installed charging stations on the basis of average charge rate per hour. For purposes of this equivalency demonstration, Level 2 charging stations shall be assumed to provide charging capabilities of 25 range miles per hour.

The electric vehicle charging stations shall be located within the geographic area defined to include Los Angeles County, and in areas that are generally accessible to the public. For example, the charging stations may be located in areas that include, but are not limited to, retail centers, employment centers, recreational facilities, schools, and other categories of public facilities.

- GCC-13: Prior to issuing building permits for development within the RMDP/SCP Project site, Los Angeles County shall confirm that the Project applicant or its designee shall fully offset the Project's remaining (i.e., post-CEQA mitigation) operational GHG emissions over the 30-year Project life associated with such building permits ("Incremental Operational GHG Emissions") by relying upon one of the following compliance options, or a combination thereof, in accordance with the Newhall Ranch GHG Reduction Plan (GHG Reduction Plan; **Appendix F**):

  (1) Demonstrate that it has directly undertaken or funded activities that reduce or sequester GHG emissions ("Direct Reduction Activities") that are estimated to result in GHG reduction credits, as described in the GHG Reduction Plan, and retire such GHG reduction credits in a quantity equal to the Incremental Operational GHG Emissions;

  (2) Provide a guarantee that it shall retire carbon credits issued in connection with Direct Reduction Activities in a quantity equal to the Incremental Operational GHG Emissions;

  (3) Undertake or fund Direct Reduction Activities and retire the associated carbon credits in a quantity equal to the Incremental Operational GHG Emissions; or

  (4) If it is impracticable to fully offset Incremental Operational Emissions through the Direct Reduction Activities, the Project Applicant or its designee may purchase and retire carbon credits that have been issued by a recognized and reputable carbon registry, as described in the GHG Reduction Plan, in a quantity equal to the Incremental Operational GHG Emissions.

### 4.1.1 Mobile-Related Emissions Reduction Methodology

The combined emission reductions related to the mitigation measures addressing mobile source emissions need to be estimated sequentially, in order to avoid double counting the emission reductions. For purposes of this analysis, the emission reductions are calculated and applied in the following order: (1) Transportation Demand Management (TDM) Plan, (2) incentives for residential electric vehicles (EVs); and (3) traffic signal synchronization. The emission reductions due to commercial development area EV charging stations, and the utilization of electric transit and school buses, are independent of the TDM Plan's reductions, since they are based on a fixed number of replaced vehicles, and do not need to be accounted for in a particular sequence.

## 4.2 Mitigation Measures

The following section describes the estimates for the GHG reductions.

### 4.2.1 GCC-1. Residential ZNE

The residential development within the RMDP/SCP Project site subject to application of Title 24, Part 6, of the CCR shall be designed and constructed to achieve Zero Net Energy (ZNE), as defined by the CEC in its 2015 Integrated Energy Policy Report.[42,43] Specifically, this mitigation assumes the following definition of ZNE: A ZNE building is one "where the value of the net amount of energy produced by on-site renewable energy resources is equal to the value of the energy consumed annually by the building at the level of a single 'project' seeking development entitlements and building code permits measured using the California Energy Commission's Time Dependent Valuation metric."[44]

Achieving ZNE represents "a unique opportunity to manage energy costs and meet greenhouse gas (GHG) reduction goals."[45] CEC proposes to meet ZNE through a variety of energy efficiency improvements coupled with on-site renewable energy generation. While energy efficient design required by "future updates of the building and appliance energy efficiency standards" serves to minimize energy demand, CEC anticipates that "onsite renewable electricity generation such as solar photovoltaic systems or wind-driven electricity generators" will generate the remainder of a building's energy needs to achieve ZNE.[46,47]

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[42] California Energy Commission. Integrated Energy Policy Report. 2015. Available at: http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-01/TN210527_20160224T115023_2015_Integrated_Energy_Policy_Report__Small_Size_File.pdf. Accessed: September 2016.

[43] As stated in the CEC IEPR, the ZNE goal is also supported "by the CPUC in the Long-Term Energy Efficiency Strategic Plan, by California Air Resources Board (ARB) in the First Update to the Climate Change Scoping Plan, and in Governor Brown's Clean Energy Jobs Plan."

[44] The CEC and CPUC concept of TDV "is based on the cost for utilities to provide energy at different times." This valuation accounts for the variable value of electricity and natural gas based on hour, day, or season.

[45] California Energy Commission. Achieving Energy Savings in California Buildings. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-400-2011-007/CEC-400-2011-007-SD.pdf. Accessed: September 2016.

[46] California Energy Commission. Achieving Energy Savings in California Buildings. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-400-2011-007/CEC-400-2011-007-SD.pdf. Accessed: September 2016.

[47] California Energy Commission. Integrated Energy Policy Report. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf. Accessed: September 2016.

Estimated GHG Reduction

The main variables contributing to the calculated GHG benefit of achieving residential ZNE are as follows:

- Residential Building Prototypes: The residential building prototypes modeled by ConSol are used as the basis for this estimate of GHG emission reductions from achieving ZNE (see **Appendix C**). ConSol studied two residential building prototypes in its analysis that are representative of the development that would be facilitated by the Project, a single family home and a multifamily home, and evaluated how each residential home could achieve ZNE.
- Residential Energy Efficiency: ConSol's modeling estimates the energy consumption of a home that is designed to achieve ZNE by exceeding the 2016 Title 24 standards through the combined use of building envelope efficiencies and on-site Photovoltaic (PV) systems.[48] The electricity and natural gas consumption of this "2019 Title 24 Standards" home are shown **Appendix C**, and the GHG reductions from upgrading the 2016 Title 24 homes to 2019 Title 24 (approximated) homes are shown in **Table 4-1a and 4-1b**.
- PV System Design: The estimated GHG reductions achieved through residential ZNE are based, in part, on the additional PV system requirements as estimated by ConSol. Specifically, ConSol calculated the rated PV system size required for the single family and multifamily building prototypes to achieve ZNE using the CEC's California Solar Initiative Incentive Calculator. Based on ConSol's analysis, a 5.0-kW system per single family home and a 21.9-kW system per multifamily home were required to meet ZNE. These PV systems are sized to achieve ZNE by exceeding the Energy Design Rating (EDR) and Time Dependent Valuation (TDV) energy consumption of the modeled homes, as described in more detail in **Appendix C**. The calculations shown in **Table 4-1c** estimate the GHG reduction from installing the PV systems necessary to achieve ZNE.
- Emission Factors: The analysis is based on the assumption that the 50 percent RPS for 2030 is achieved.

**Table 4-1d** shows the total GHG reduction achieved through the Project's development of ZNE residences.

### 4.2.2 GCC-2. Non-Residential ZNE

The non-residential development within the RMDP/SCP Project site subject to application of Title 24, Part 6, of the CCR shall be designed and constructed to achieve Zero Net Energy, as defined by the CEC, or otherwise achieve an equivalent level of energy efficiency or greenhouse gas emissions savings.[49,50]

Estimated GHG Reduction

[48] The ConSol modeling represents one option of many that may be feasible to achieve residential ZNE.

[49] California Energy Commission. Integrated Energy Policy Report. 2015. Available at: http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-01/TN210527_20160224T115023_2015_Integrated_Energy_Policy_Report__Small_Size_File.pdf. Accessed: September 2016.

[50] As stated in the CEC IEPR, the ZNE goal is also supported "by the CPUC in the Long-Term Energy Efficiency Strategic Plan, by California Air Resources Board (ARB) in the First Update to the Climate Change Scoping Plan, and in Governor Brown's Clean Energy Jobs Plan."

The main variables contributing to the calculated GHG benefit of achieving residential ZNE are as follows:

- Non-Residential Building Prototypes: The commercial building prototypes modeled by ConSol are used as the basis for this estimate of GHG emission reductions from achieving ZNE (see **Appendix C**). ConSol studied three commercial building prototypes in its analysis that are representative of the development that would be facilitated by the Project: an office building, a light industrial building, and a retail building. ConSol's modeling showed that ZNE could be achieved through a combination of additional energy efficiency design improvements beyond the 2016 Title 24 Standards and adequate on-site PV systems.[51] The estimated GHG reductions by building prototype were mapped to the land uses represented for the Project. For example, "regional shopping center" was mapped to retail, and "industrial park"[52] was mapped to industrial.

- Non-Residential Energy Efficiency: In ConSol's analysis, the estimated improvements in building design are applied to each building prototype in order to estimate the GHG reductions. Given the variability in energy usage in the building prototypes, the required energy efficiency improvements vary across the three prototypes modeled. **Table 4-2a** and **4-2b** presents the GHG reductions from improving building energy efficiencies beyond the 2016 Title 24 Standards to 2019 Title 24 Standards (approximated).

- PV System Design: The estimated GHG reductions achieved through additional PV system requirements, as estimated by ConSol, contribute to the overall GHG reduction resulting from the Project's development of ZNE commercial buildings. As shown in **Table 4-2c**, ConSol identified the rated PV system size required for each of the building prototypes to achieve ZNE. **Table 4-2c** also identifies the annual GHG reduction attributable to the PV systems identified for the commercial building prototypes.

- Emission Factors: The analysis is based on the assumption that the 50 percent RPS for 2030 is achieved.

**Table 4-2d** shows the total GHG reduction achieved through the Project's development of ZNE non-residential buildings.[53]

### 4.2.3 GCC-3. Swimming Pool Heating

All swimming pools located at the private recreation centers on the RMDP/SCP Project site shall be designed and constructed to use solar water heating or other technology with an equivalent level of energy efficiency (e.g., use solar energy (or equivalent) to replace natural gas for purposes of heating the swimming pool waters).

Estimated GHG Reduction

The main variables contributing to the calculated GHG benefit of solar heating the swimming pools are as follows:

[51] The ConSol modeling represents one option of many that may be feasible to achieve commercial ZNE.

[52] Note that building related emissions (i.e., energy, water, and solid waste) generated by the WRP are captured in the "industrial park" square footage (please see **Table 3-1** of this Technical Report). Project-related traffic trips, including the WRP trips, are encompassed in the Santa Clarita Valley Consolidated Traffic Model.

[53] No GHG benefits were included for shifting load from peak to off-peak hours.

- Energy sources: The swimming pools are assumed to use electricity for filters and pumps and use natural gas for water heating for the Unmitigated Project. The mitigation measure requires that solar heating (or equivalent) replaces all natural gas heating at the swimming pools.
- Energy use factor: The electricity and natural gas energy usage factors for swimming pools are based on the energy consumption of filter pumps and water heaters included in a published pools study by the City of Oakland (Pools Study),[54] and scaled to represent energy consumption per year per volume of the pool. The Pools Study data included pool volume, number of heaters, heater rating, operation schedule, and annual electricity usage. Annual Natural Gas Usage was calculated by multiplying the number of hours per day, days per year, heaters, and the heating rating. The calculated Annual Natural Gas Usage was adjusted to account for (1) the higher average ambient temperature in Southern California compared to Oakland (i.e., an average temperature of 55.5°F for Oakland and 63.3°F for Santa Clarita), and (2) savings from newer energy efficient heater standards, i.e., Ramboll Environ assumed that the Oakland pools used 78 percent efficient heaters, which is the minimum efficiency legally required (see 10 CFR Part 431). According to the U.S. Department of Energy, newer pools are likely to use heaters with 89-95 percent efficiency.[55] Ramboll Environ conservatively assumed 90 percent efficiency for Santa Clarita pool heaters, resulting in a 12 percent savings over the Pool Study data. Average Annual Electricity Usage was calculated from the Annual Electricity Usage of the Pool Study data divided by the swimming pools total pool volume.
- Emission Factors: The utility emission factors are consistent with the analyses for the project.
- Swimming pool size: All the swimming pools are assumed to be 50 meters x 25 yards x 8 feet.[56]

The calculations shown in **Table 2-14a** estimate the GHG reduction from replacing natural gas with solar energy for heating the swimming pools. The GHG emissions reduction is the difference between the total GHG emissions from the unmitigated and mitigated emission estimates.

### 4.2.4 GCC-4. Residential EV Chargers and Vehicle Subsidy

Each residence within the RMDP/SCP Project site subject to application of Title 24, Part 6, of the CCR shall be equipped with a minimum of one single-port electric vehicle charging station. Each charging station will achieve a similar or better functionality as a Level 2 charging station. Additionally, a $1,000 subsidy shall be available for 50 percent of the RMDP/SCP Project site's residences subject to application of Title 24, Part 6, of the CCR, on a first-come, first-served basis, for the purchase of a zero emission vehicle, as defined by the California Air Resources Board.

[54] City of Oakland/Oakland Unified School District. October 2006. Energy Efficient Commercial Pool Program; Preliminary Facility Reports for DeFremery Pool, Fremont Pool, Live Oak Pool, Lyons Pool, and Temescal Pool.

[55] Energy.gov. Energy Saver. Available at: http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13170. Accessed: September 2016.

[56] ENVIRON International Corporation. October 2009. Prepared for The Newhall Land and Farming Company, Valencia, CA. Climate Change Technical Addendum: Resource Management and Development Plan Spineflower Conservation Plan.

These measures will complement the Project's commitments to install Level 2 charging stations for 7.5 percent of the parking spaces within the RMDP/SCP Project site and to install Level 2 charging stations at publicly available areas within the Southern California Association of Governments region. Through these commitments, the Project will help support an increasingly inter-connected web of charging infrastructure, making it easier to own and use EVs, consistent with goals aimed to increase EV penetration.

Mobile GHG emissions are a major component of overall land use development emission inventories. Conventional gasoline and diesel vehicles emit GHGs from the tailpipe, whereas EVs minimize these emissions. EVs including battery-electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) comprise a growing fraction of the passenger vehicles on the roads in California, and EV adoption is expected to greatly increase over the upcoming decades due in part to improvements in battery technology and public initiatives and goals. In addition to the discussion below, a study that forecasts electric vehicle purchases in the Newhall Ranch Community is included in **Appendix H**.

A variety of external factors will complement Newhall Ranch's commitment to facilitate the use of EVs and the growth of electric vehicle penetration. There are dozens of electric vehicle models available for purchase in California, and the costs of batteries and BEVs continues to decrease. Batteries for electric vehicles have seen rapidly decreasing costs in recent years, averaging roughly fourteen percent annually from 2007 to 2014.[57] Furthermore, the impact of learning-by-doing cost reductions (resulting from a doubling in production), is between six and nine percent. This has resulted in the industry-wide average cost of a battery pack declining from $1000/kWh to $410/kWh (2007 to 2014), and an even greater reduction among market-leading battery electric vehicle manufacturers, to around $300/kWh. There are statewide and regional initiatives to help fund electric vehicle and infrastructure purchases, and ambitious goals to increase the number of EVs on the road by 2025. Peer-reviewed studies show that vehicle electrification is necessary to achieve California's long-term greenhouse gas reduction goals. Reliable access to EV chargers is an important factor contributing to people's comfort levels when buying electric vehicles.

<u>Statewide Initiatives</u>

- As discussed in Section 2.2.2.7 above, California has programs and initiatives already in place to further the progress of EV penetration. These include vehicle fuel efficiency standards, executive orders, and purchase incentives.

<u>Electric Vehicles Necessary to Achieve Statewide GHG Goals</u>

As described in Section 2.2.2, California has goals to reduce GHGs to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. Meeting these GHG reduction goals will require an increase in vehicle electrification, according to several recent studies. In a 2012 *Science* paper on achieving California's 2050 goal,[58] Williams concludes that "[t]he most important finding of this research is that, after other emission reduction measures were employed to the maximum feasible extent, there was no alternative to

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[57] Nykvist, B. and Nilsson, M. Rapidly falling costs of battery packs for electric vehicles. *Nature: Climate Change* (2015), 5, pg. 329-332.

[58] Williams, J.H., et al. 2012. The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity. *Science, 335.*

widespread switching of direct fuel uses (e.g., gasoline in cars) to electricity in order to achieve the reduction target." The study parameters displace 75 percent of light-duty gasoline use with EVs and PHEVs in 2050. A 2015 UC Davis study[59] reiterates that EVs are needed to reach California's 2050 goal and also federal and national GHG reduction targets, stating that "passenger vehicles will not be able to achieve an 80 percent GHG reduction…using hydrocarbon fuels."

Widespread EV adoption is necessary *before* 2050 to achieve California's 2030 goals. Energy + Environmental Economics (E3) developed a modeling tool called PATHWAYS to chart the GHG impact of different scenarios of fuel usage, technology adoptions, and other California policy changes that may affect future GHG emissions. They used PATHWAYS to show potential pathways to meeting the 2030 and 2050 California state goals and national goals. The pathways presented to meet California's 2030 goal[60] include six to seven million ZEVs and PHEVs on the road by 2030, which is significantly higher than the EO B-16-2012 target of 1.5 million EVs by 2025. E3 shows that EVs should have a new vehicle market share of 35 to 40 percent by 2025 and over 50 percent by 2030. Based on E3's sensitivity analysis, zero-emission vehicles are the single most important contributor to GHG reductions for the 2050 goal.

<u>Residential EV Charging is an Important Factor for Increasing EV Penetration</u>

While charging stations at work places and retail stores are becoming more widespread, most EV charging has historically taken place at homes, and will continue to do so.[61] An average vehicle spends 90 percent of its time at home and work, with over 70 to 80 percent of EV charging taking place at home, followed by workplace charging.[62] [63] In fact, the availability and accessibility of a plug at home increases a person's propensity to buy an electric vehicle.[64] National Renewable Energy Laboratory's assessment for the CEC[65] found that home charging is the predominant location for charging, followed by

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[59] Brown, R., et al. 2015. Achieving California's Greenhouse Gas Goals: A Focus on Transportation. Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-15-14. http://www.its.ucdavis.edu/research/publications/publication-detail/?pub_id=2529. Accessed: September 2016.

[60] Energy + Environmental Economics (E3). 2015. California PATHWAYS: GHG Scenario Results. April 6. https://ethree.com/documents/E3_PATHWAYS_GHG_Scenarios_Updated_April2015.pdf. Accessed: September 2016.

[61] Holland, B. 2013. How important is charging infrastructure to EV adoption? GreenBiz. January 17. Available at: (https://www.greenbiz.com/blog/2013/01/17/how-important-charging-infrastructure-ev-adoption). Accessed: September 2016.

[62] Holland, B. 2013. How important is charging infrastructure to EV adoption? GreenBiz. January 17. Available at: (https://www.greenbiz.com/blog/2013/01/17/how-important-charging-infrastructure-ev-adoption). Accessed: September 2016.

[63] Leemput, N. et al. 2015. MV and LV Residential Grid Impact of Combined Slow and Fast Charging of Electric Vehicles. Energies (2015), 8, 1760-1783. Available at: http://www.mdpi.com/1996-1073/8/3/1760. Accessed: September 2016.

[64] Hidrue, M.K., G.R. Parsons, W. Kempton, and M.P. Gargner. 2011. Willingness to pay for electric vehicles and their attributes. Resource Energy Econ. doi:10.1016/j.reseneeco.2011.02.002. Available at: (http://www.udel.edu/V2G/resources/HidrueEtAl-Pay-EV-Attributes-correctedProof.pdf). Accessed: September 2016.

[65] National Renewable Energy Laboratory (NREL). 2014. California Statewide Plug-In Electric Vehicle Infrastructure Assessment. Available at: (http://www.energy.ca.gov/2014publications/CEC-600-2014-003/CEC-600-2014-003.pdf). Accessed: September 2016.

workplace/retail charging, then public charging. In the near term, the CEC believes that "can't miss" locations are homes and multi-unit dwellings, followed by workplaces.[66]

Research shows that access to charging infrastructure at home plays an important role in decisions regarding purchase of EVs. A 2013 study conducted by the Institute of Transportation Studies at UC Davis explored the characteristics of 1,200 households who actually purchased a new plug-in vehicle in California during 2011-2012, with the overall target population of the survey being new PEV owners in California.[67] This study reveals that purchasing a PEV is associated in most cases with the installation of electric vehicle supply equipment (EVSE) at home and the ability to plug the car to the power for charging.[68] In 2011, a report released by the National Research Council of the National Academies on the barriers to electric vehicle deployment pointed to lack of charging infrastructure deployment as one of the barriers to EV deployment, with 21.3 percent of survey respondents stating concern about access to charging infrastructure as the barrier.[69] Another study revealed that when asked about the critical factors that may influence their decision, the highest percentage (63 percent) of respondents cited the ability to charge at home [other factors included battery range, total operating cost, government subsidy].[70]

The Plug-in Electric Vehicle Owner Survey, managed by the Center for Sustainable Energy, further highlighted the importance of subsidized or discounted chargers.[71] Of those with an installed Level 2 charger at home, 64 percent received a free or subsidized charger and 80 percent of them found the importance of the subsidy to install a Level 2 charger influential. Thus, a home with an already installed (free) charger might influence residents to purchase a PHEV. Another study reveals that 83.1 percent of the participants of a consumer survey on plug-in hybrid electric vehicles stated that it would increase their comfort in purchasing or leasing a PHEV by "a lot" or would be "a deciding factor" if they have recharge facilities at home for easy overnight recharge.[72] This evidence suggests that

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[66] Ibid.

[67] Tal, G., M.A. Nicholas, J. Woodjack, and D. Scrivano. February 2013. Who Is Buying Electric Cars in California? Exploring Household and Vehicle Fleet Characteristics of New Plug-In Vehicle Owners. Institute of Transportation Studies at University of California, Davis. Research Report – UCD-ITS-RR-13-02. Available at: (https://merritt.cdlib.org/d/ark:%252F13030%252Fm56692z3/1/producer%252F2013-UCD-ITS-RR-13-02.pdf). Accessed: September 2016.

[68] Tal, G., M.A. Nicholas, J. Woodjack, and D. Scrivano. February 2013. Who Is Buying Electric Cars in California? Exploring Household and Vehicle Fleet Characteristics of New Plug-In Vehicle Owners. Institute of Transportation Studies at University of California, Davis. Research Report – UCD-ITS-RR-13-02. Available at: https://merritt.cdlib.org/d/ark:%252F13030%252Fm56692z3/1/producer%252F2013-UCD-ITS-RR-13-02.pdf. Accessed: September 2016.

[69] Slavin, M.I. December 2013. Drivers and Barriers to Electric Vehicle Adoption. Published in EV World. Available at: http://evworld.com/article.cfm?storyid=2076. Accessed: September 2016.

[70] Accenture. 2011. Plug In Electric Vehicles Changing Perceptions, Hedging Bets - Accenture end-consumer survey on the electrification of private transport. Available at: https://www.accenture.com/us-en/~/media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_9/Accenture-Plug-in-Electric-Vehicle-Consumer-Perceptions.pdf. Accessed: September 2016.

[71] California Center for Sustainable Energy (CCSE) and California Environmental Protection Agency - Air Resources Board (ARB). 2012. California Plug-in Electric Vehicle Owner Survey. Available at: https://energycenter.org/sites/default/files/docs/nav/policy/research-and-reports/California%20Plug-in%20Electric%20Vehicle%20Owner%20Survey%20Report-July%202012.pdf. Accessed: September 2016.

[72] Krupa, J.K., D.M. Rizzo, M.J. Eppstein, D.B. Lanute, D.E. Gaalema, K. Lakkaraju, and C.E. Warrender. 2014. Analysis of a Consumer Survey on Plug-in Hybrid Electric Vehicles. Transportation Research Part A 64 (2014)

investment in a residential charging infrastructure could result in an increased probability of a household purchasing an EV. Another study also identified the importance of residential parking and charging, suggesting that:[73]

- Fleet penetration of EVs beyond 22 percent will require residential infrastructure investment to increase access to outlets near home parking;
- Fleet penetration beyond 39 percent may require significant residential infrastructure investment because many households will need to upgrade their electrical infrastructure to charge multiple vehicles;
- Fleet penetration beyond 47 percent will require residential charging to be available for renters; and
- Fleet penetration beyond 56 percent may require not only new chargers but also additional residential parking, with associated logistics, space implications, and environmental impacts.

The program to install charging stations in residential areas has the potential to fulfill an important component to facilitate the level of conversion to EV that will be necessary if California is to meet its stated penetration targets and associated emission reduction goals. Increased market penetration often results in a 'neighbor effect' of adoption, meaning that as more people see neighbors and friends successfully adopting EVs, the fewer perceived barriers remain.[74] In short, as EVs become more common due to reduced costs, increased availability of infrastructure and other incentives, members of the neighborhood/community without an EV will be increasingly more likely to purchase and use an EV.

Subsidies Incentivise EV Adoption

Given the rapid pace of EV technological improvement and the many policy efforts to encourage EV adoption, economists and policy researchers have considered the effectiveness of rebates and other incentives with influencing the rate of EV adoption. Research suggests that rebates and other policies that reduce the overall price of EV purchase and operations are one of the most effective at increasing rates of adoption.[75] Policies that provide other benefits such as increasing the availability of public chargers, carpool lane access, and emissions testing exemptions were also shown to be effective. Economic models of EV purchasing behavior suggest that price is still a significant barrier to

14-34. Available at: http://www.sciencedirect.com/science/article/pii/S0965856414000500. Accessed: September 2016.

[73] Traut, E.J., T.C. Cherng, C. Hendrickson, and J.J. Michalek. 2013. US Residential Charging Potential for Electric Vehicles. Transportation Research Park D 25 (2013) 139-145. Available at: http://www.cmu.edu/me/ddl/publications/2013-TRD-Traut-etal-Residential-EV-Charging.pdf. Accessed: September 2016.

[74] Nelson-Nygaard Consulting Associates Inc. 2014. Removing Barriers to Electric Vehicle Adoption by Increasing Access to Charging Infrastructure. Seattle Office of Sustainability & Environment. Available at: http://www.seattle.gov/Documents/Departments/OSE/FINAL%20REPORT_Removing%20Barriers%20to%20EV%20Adoption_TO%20POST.pdf. Accessed: September 2016.

[75] Jin, Lingzhi, Stephanie Searle, and Nic Lutsey, 2014. Evaluation of State-Level U.S. Electric Vehicle Incentives, White Paper for the International Council on Clean Transportation, October. Available at: http://www.theicct.org/sites/default/files/publications/ICCT_state-EV-incentives_20141030.pdf. Accessed: September 2016.

adoption of EVs. Many models have evaluated the decision to select EVs compared with internal combustion engine vehicles (ICEVs), as a function of cost, range, income of the buyer, driving habits, price of gas, recharging infrastructure, 'greenness' including the influence of neighbors and friends among other determinants of EV adoption.

Rebates and other incentives fundamentally work to reduce the cost of purchasing and then operating an EV.[76] While policies differ from state to state,[77] adoption of EVs does correlate strongly to subsidies and rebates offered.

California is currently one of the largest markets for EVs in the United States, and has, in fact, been referred to as "America's capital of plug-in cars."[78] Based on sales figures tracked by the California Air Resources Board, Californians buy approximately 40 percent of all plug-in vehicles sold in the United States[79] (36 percent in 2015).[80]

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[76] Clinton, Bentley, Austin Brown, Carolyn Davidson, and Daniel Steinberg, 2015. Impact of Direct Financial Incentives in the Emerging Battery Electric Vehicle Market: A Preliminary Analysis. National Renewable Energy Laboratory. Department of Economics, University of Colorado – Boulder. February.

[77] See DeShazo, J.R., CC Song, Michael Sin, and Thomas Gariffo, 2015. State of the Sates' Plug-in Electric Vehicle Policies, UCLA Luskin School of Public Affairs, March. Available at: http://innovation.luskin.ucla.edu/sites/default/files/EV_State_Policy.pdf. Accessed: September 2016.

[78] Jeff Cobb. February 2016. California Plug-in Sales Led the US Last Year with Nearly Five-Times Greater Market Share. HybridCars.com. Available at: http://www.hybridcars.com/california-plug-in-sales-led-us-last-year-with-nearly-five-times-greater-market-share/. Accessed: September 2016.

[79] Dana Hull. September 2014. California charges ahead with electric vehicles. San Jose Mercury News. Available at: http://www.mercurynews.com/business/ci_26493736/california-charges-ahead-electric-vehicles. Accessed: September 2016.

[80] Extrapolated from Data Provided in: California New Car Dealers Association (CNCDA). February 2016. California New Vehicle Registrations Expected to Remain Above 2 Million Units in 2016. Registrations through December 2015 since 2011. Revised figures for 2014. Available at: http://www.cncda.org/CMS/Pubs/Cal%20Covering%204Q%2015.pdf. Accessed: September 2016.

AND

Electric Drive Transportation Association (EDTA). 2016. Electric Drive Sales Dashboard. Sales figures sourced from HybridCars.com and direct reports submitted by EDTA member companies. Available at: http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952#sthash.5QBifqpG.EyVW8gqf.dpuf and http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952. Accessed: September 2016.

EV Usage Rate Exceeds Conventional Vehicles

An annual survey of California PEV owners[81] shows that even though many households with EVs also own a conventional gasoline or diesel car, they use the PEV for over 85 percent of work commute, personal errands, and shopping, while the conventional vehicle is the primary vehicle for vacation travel. The following year's survey shows that the average PEV owner drives 28.9 miles per day, which is well within the electric range of many eligible PEVs available in 2013.[82]

A survey conducted by the Union of Concerned Scientists (UCS)[83] found that 64 percent of respondents live in a household with two or more vehicles. This is consistent with a survey of EV users, which reported that 79.4 percent of EV owners and potential owners had two or more vehicles in the household.[84] Conventional wisdom as well as economic theory suggests that when households have at least one EV and one ICEV, they favour the EV and use the more costly-to-drive ICEV for longer distance trips on the weekend, for hauling, or if there is a need for more than five passengers.[85] One detailed study found exactly this in a broad survey of different types of households that have EVs. For example, one-car households that switch from one ICEV to one EV showed very little difference in daily driving distances nor the number of daily trips taken when they invested in an EV.[86] But the households that had one (or more) EV and at least one ICEV all showed that after three months of EV ownership, the daily distance driven for the ICE declined, and the EV increased so that the EV usage was about 45 percent higher in use. This is consistent with survey data from Norway, which showed that 90 percent of EV owners said that the EV car "Completely" or "To a High Degree" replaced their ICEV, with 66 percent of the respondents living in two car households.[87] This is also consistent with preliminary data from Ford, which also suggests that with time – six months – the frequency of use of the EV increases, and the ICEV use decreases.[88]

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[81] California Center for Sustainable Energy. 2012. California Plug-in Electric Vehicle Owner Survey. Available at: https://energycenter.org/sites/default/files/docs/nav/policy/research-and-reports/California%20Plug-in%20Electric%20Vehicle%20Owner%20Survey%20Report-July%202012.pdf. Accessed: September 2016.

[82] California Center for Sustainable Energy. 2013. California Plug-in Electric Vehicle Driver Survey Results. Available at: https://energycenter.org/sites/default/files/docs/nav/transportation/cvrp/survey-results/California_Plug-in_Electric_Vehicle_Driver_Survey_Results-May_2013.pdf. Accessed: September 2016.

[83] Union of Concerned Scientists. 2013. Electric Vehicle Survey Methodology and Assumptions; American Driving Habits, Vehicle Needs, and Attitudes toward Electric Vehicles, December. Available at: http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_vehicles/UCS-and-CU-Electric-Vehicle-Survey-Methodology.pdf. Accessed: September 2016.

[84] Shahan, Zachary. 2015. Electric Cars: What Early Adopters and First Followers Want. Important Media. Available at: http://cleantechnica.us2.list-manage.com/subscribe?u=a897522b53d0853c85abbf9fa&id=a264ba3c49. Accessed: September 2016.

[85] UCS. 2013.

[86] Hwang, Sang-kyu, and Sang-hoon Son. 2015. Electric Vehicle User Mobility Analysis with Dashboard Camera in Jeju Island, Korea. Paper presented at Electric Vehicle Symposium, EVS28, in Kintex, Korea, May 3-6, 2015.

[87] Haugneland, Petter, and Hans Havard Kvisle. 2013. Norwegian Electric Car User Experiences, paper presented at EVS27, Barcelona Spain, November.

[88] Castrucci Alexandria, Mike. 2015. Good Habits Pay Dividends for Electric Car Drivers. Posted on October 7, 2013. Available at: http://www.mikecastruccialexandria.com/blog/electric-car-driving-habits/; Based on data from MyFord Mobile app. Available at: https://www.myfordmobile.com/content/mfm/app/site/my-car/home.html. Accessed: September 2016.

Accordingly, as EV penetration increases, the amount of miles driven for residential trips by EV compared to conventional vehicles will grow at a disproportionately higher rate because households with EVs will tend to rely on the EV for a large majority of their trips.

Estimated GHG Reduction

The main variables contributing to the calculated GHG benefit of installing residential EV chargers and providing EV vehicle subsidies include the following assumptions:

- Electric Vehicle Penetration: Based on the discussion above, a variety of factors will contribute to high rates of electric vehicle penetration near Newhall Ranch. First, there are already dozens of electric vehicle models available for purchase in California, and the costs of batteries continue to decrease. Second, there are numerous statewide and regional initiatives to help fund electric vehicle and infrastructure purchases, and many policy goals aim to increase the number of EVs because vehicle electrification is critical to achieving California's long-term greenhouse gas reduction goals. Third, reliable access to EV chargers is an important factor contributing to buying electric vehicles. Therefore, the Project's mitigation measures requiring that EV charging infrastructure be made widely available and the provision of EV purchase incentives will encourage EV ownership and use. Given the market trends, policy goals, infrastructure growth and incentives, this analysis assumes that half the residential units facilitated by the RMDP/SCP will have an EV by 2030.
- Electrical Vehicle Usage Rate: As explained above, even though many households with EVs also own a conventional gasoline or diesel car, they use the EV for over 85 percent of work commute, personal errands, and shopping, while the conventional vehicle is the primary vehicle for vacation travel. Therefore, the evidence supports an assumption that households with an EV will have a very high usage rate for residential trips, even if the households also own a conventional vehicle.
- EV Miles Driven From Residential Land Uses: Based on the commitment to install EV chargers in all dwelling units, the subsidy for EV purchase, published peer reviewed studies regarding EV usage behavior and EV adoption trends, and the state's ongoing effort to encourage EV adoption, it is anticipated that at least half of the dwelling units in the Project will have an EV. As discussed above, studies have shown that households tend to preferentially use the EV. Numerous other factors (e.g., declining costs of EVs) are also anticipated to push the number of EV's used by Project residents to be even higher than that estimated here. Thus, the overall effect of this mitigation measure is estimated to displace 50 percent of the miles driven from residential land uses from traditional gasoline/diesel vehicles with electric vehicles.
- Emission Factors: The analysis is based on the assumption that the 50 percent RPS for 2030 is achieved, and the gasoline/diesel $CO_2$ emission factors are derived using California Air Resource Board's EMFAC2014 software model.

The calculations shown in **Table 4-3** estimate the GHG reduction from replacing conventional gasoline or diesel light-duty vehicles with electric vehicles. The table calculates the estimated emission reduction for each mile driven in an electric vehicle compared to the default emission factor calculated by CalEEMod® in the mobile emissions inventory. To ensure that the Project benefit is in addition to the existing EVs that may be present, the emission factor and emissions inventory incorporates the existing EVs. This ensures that the benefit of VMT that is reduced due to the Project EVs reduces emissions relative to the unmitigated inventory without double counting the benefit of the existing EVs. The calculation then estimates the average annual residential traffic, after the reduction in VMT due to transportation demand management strategies is applied. The GHG emissions reduction is the total miles displaced by EVs from this measure multiplied by the emissions reduction per mile. The remaining project traffic GHG emissions (289,921 $MTCO_2e$/year) results after subtracting the GHG emissions reductions due to residential EV (53,724 $MTCO_2e$/year, respectively) from the remaining mobile GHG emissions after TDMs (343,646 $MTCO_2e$/year).

### 4.2.5 GCC-5. Commercial Development Area EV Chargers

The parking areas for commercial buildings on the RMDP/SCP Project site shall be equipped with electric vehicle charging stations that provide charging opportunities to 7.5 percent of the total number of required parking spaces. ("Commercial buildings" include retail, light industrial, office, hotel, and mixed-use buildings.) The electric vehicle charging stations shall achieve a similar or better functionality as a Level 2 charging station. This mitigation measure will complement the Project's residential commitment to install charging station for each single family and multifamily dwelling unit and subsidize the purchase of electric vehicles. Overall, the Project will help support an increasingly inter-connected web of charging infrastructure; the combination of commercial development area and residential charging stations will encourage EV ownership and use.

As discussed in greater detail in the Residential EV Charger section above, a variety of factors will contribute to high rates of electric vehicle penetration near Newhall Ranch. There are already dozens of electric vehicle models available for purchase in California, and the costs of batteries continue to decrease. There are statewide and regional initiatives to help fund electric vehicle and infrastructure purchases, and ambitious goals to increase the number of EVs on the road by 2025. Peer-reviewed studies show that vehicle electrification is necessary to achieve California's long-term greenhouse gas reduction goals. Reliable access to EV chargers is an important factor contributing to buying electric vehicles.

<u>Estimated GHG Reduction</u>

The main variables contributing to the calculated GHG benefit of installing commercial development area EV charging stations are as follows:

- <u>Electric Vehicle Penetration and Usage Rate</u>: Charge station usage will vary from zero hours per day to 24 hours per day for each electric vehicle charging station. Ramboll Environ assumes a ten hour per day charger usage rate when in consideration of the anticipated increase in EV adoption throughout the state.[89] As discussed in above, the state will need to further its efforts to improve and increase EV penetration rates such that the prevalence of EV will be greater and the use of the EV chargers will continue to increase for EV chargers in a variety of locations. Furthermore, as discussed by Bakker[90] the fundamental challenge with EV adoption is range anxiety.

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[89] Chang, D., et al. 2012. Financial Viability of Non-Residential Electric Vehicle Charging Stations. Available at: http://innovation.luskin.ucla.edu/content/financial-viability-non-residential-electric-vehicle-charging-stations. Accessed: September 2016.

[90] Bakker, J.J. 2011. Contesting range anxiety: The role of electric vehicle charging infrastructure in the transportation transition. Available at: http://alexandria.tue.nl/extra2/afstversl/tm/Bakker_2011.pdf. Accessed: September 2016.

- Charge Rate: The charge rate refers to the amount of power supplied from the charger to the car battery per hour, or the range of miles the charger enables the car to travel per hour (RPH). The US Department of Energy (USDOE) writes that a Level 2 charging station is expected to charge 10 to 20 miles of RPH, depending on the circuitry.[91] ChargePoint commercial Level 2 electric vehicle charging stations charge up to 25 RPH.[92] DC "fast charging" stations and future three-phase charging options allow for much higher rates of charging.[93] These charge rates are influenced based on the technology for the actual charge rate of kilowatts (kW) per hour and also the vehicle fuel efficiency (discussed further below). The technology for chargers, batteries, and electric vehicle efficiency is expected to improve into the future. Thus, we have assumed that the charging stations can provide 25 miles of driving range per hour of charging.
- Electric Vehicle Fuel Economy: Electric vehicle fuel economy reflects the amount of electricity needed to drive a certain distance. Based on 2013 USDOE data, the range of fuel economy in currently available electric vehicles ranges from 25 to 40 kilowatt-hours per 100 miles (kWh/100 mi).[94] This fuel economy varies depending on the vehicle model, with examples of a 2012 Nissan Leaf achieving 34 kWh/100 mi and a Tesla Roadster achieving 21.7 kWh/100 mi. The technology for batteries and electric vehicle fuel economy is expected to improve into the future. Thus, we have assumed that the electric vehicles will achieve a fuel economy of 25 kWh/100 mi to represent the near-future electric vehicle fleet.
- Emission Factors: The analysis is based on the assumption that the 50 percent RPS for 2030 is achieved, and the gasoline/diesel $CO_2$ emission factors are derived using California Air Resource Board's EMFAC2014 software model.

The calculations shown in **Table 4-4** estimate the GHG reduction from replacing conventional gasoline or diesel light-duty vehicles with electric vehicles. The table calculates the estimated range that each charging station is estimated to provide to electric vehicles in miles per year, based on the charge station usage and charge station rate. The range for one station is multiplied by the total number of stations in the mitigation commitment. This results in a total number of miles per year that will be driven in electric vehicles instead of conventional vehicles. The difference between the total GHG emissions from the conventional vehicles and the GHG emissions from the electric vehicles is the emissions benefit from the charging stations.

### 4.2.6 GCC-6. Transportation Demand Management Program

The Newhall Ranch Transportation Demand Management (TDM) Plan (see **Appendix E** shall be implemented in order to reduce vehicle miles traveled resulting from Project build out. The TDM Plan is designed to influence the transportation choices of residents, students, employees, and visitors, and serves to enhance the utilization of alternative transportation modes both on and off the Project site through the provision of incentives

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[91] US Department of Energy (USDOE) Alternative Fuels Data Center. 2016. Charging Equipment. Available at: http://www.afdc.energy.gov/fuels/electricity_infrastructure.html. September 2016.

[92] ChargePoint. 2015. Available at: http://www.chargepoint.com/news/2015/0702/defining-rph-miles-range-per-hour-an-ev-charging-station-delivers/. Accessed: September 2016.

[93] USDOE. *op. cit*.

[94] USDOE. 2015. Available at: http://www.afdc.energy.gov/fuels/electricity_benefits.html. Accessed: September 2016.

and subsidies, expanded transit opportunities, bikeshare and carshare programs, technology-based programs, and other innovative means.

Estimated GHG Reduction

The TDM program reduces annual vehicle miles traveled by 14.9 percent from the Unmitigated Project. Since mobile GHG emissions are directly proportional to vehicle miles traveled, this equates to a 14.9 percent reduction in mobile emissions. This reduction calculation is shown in **Table 4-5**.

### 4.2.7 GCC-7. Traffic Signal Synchronization

The applicant or its designee shall work with the applicable agency(ies) with jurisdiction over the local roadway network to facilitate traffic signal coordination throughout the Project area. This program is described in detail in **Appendix I**.

Estimated GHG Reduction

The traffic signal coordination program reduces mobile GHG emissions by 3.28 percent from the Unmitigated Project. This percent was determined using California Air Pollution Control Officers Association (CAPCOA) GHG reduction methodology for measure RPT-2.[95] The percent reduction is applied sequentially with the other mobile GHG mitigation measures to avoid double-counting. This reduction calculation is shown in **Table 4-6**.

### 4.2.8 GCC-8. Electric School Bus Funding Program

The applicant or its designee shall provide funding for electric school buses.

Estimated GHG Reduction

The main variables contributing to the calculated GHG benefit of the Project's commitment to subsidizing the conversion to electric school buses are as follows:

- Annual Average VMT: The annual average VMT refers to the number of miles a vehicle runs each year. For school buses and transit buses, this metric is derived using California Air Resource Board's EMFAC2014 software model, based on vehicle model years and speeds in Los Angeles County. EMFAC2014 data shows that school buses' annual VMT is 13,780 miles per year (mi/yr) in 2030.
- Electric Bus Fuel Economy: Electric vehicle fuel economy reflects the amount of electricity needed to drive a certain distance. Buses from two existing electric bus manufacturers are Proterra and BYD are used to estimate electric bus fuel economy. Proterra's 40-foot and BYD's electric bus fuel economy is 1.7 kilowatt-hours per mile (kWh/mi) [96] and 1.87 kWh/mi,[97] respectively. The fuel economy used to calculate the electric bus electricity usage was an average of Proterra and BYD's specification: 1.8 kWh/mi. The technology for batteries and electric vehicle fuel economy is expected to improve into the future, so using current electric bus specifications is a conservative assumption.

[95] CAPCOA. Available at: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf. Accessed: September 2016.

[96] Proterra. Available at: http://byd.com/na/ebus/ebus.html. Accessed: September 2016.

[97] BYD. Available at: http://byd.com/na/ebus/ebus.html. Accessed: September 2016.

- Emission Factors: The analysis is based on the assumption that the 50 percent RPS for 2030 is achieved, and the gasoline/diesel $CO_2$ emission factors are derived using California Air Resource Board's EMFAC2014 software model.

  The data from the California Air Resource Board's EMFAC2014 software model provided the GHG emission factors for the CNG buses. The CNG emission factors were identified through data from the web-based EMFAC2014 tool and the desktop application. The web-based EMFAC2014 model provided an 'urban transit diesel emission factor' which represents a composite of both CNG and diesel buses. To get separated CNG and diesel emission factors for urban transit buses, the EMFAC2014 Desktop Application was run in the Project-Level Assessment Mode to generate an estimate of the ratio of CNG and diesel buses. For the EMFAC2014 Desktop Application analysis, the temperature and relative humidity were based on the EMFAC2014 Los Angeles County default values. The data from the web-based EMFAC2014 program and the ratio of CNG and diesel buses from the EMFAC Desktop application were used to derive the CNG bus emission factor for 2030. Conservatively, emissions from idling and starting the engine for the CNG buses were not included in the emissions calculations.

The calculations shown in **Table 4-7** estimate the GHG reduction from replacing CNG school buses with electric buses for 2030. The tables show the total number of miles per year that will be driven in electric buses instead of CNG buses, the GHG emissions if CNG buses were used, and the GHG emissions for the total miles based on electric vehicle fuel economy and the electric grid emission factor. The difference between the total GHG emissions from the CNG buses and the GHG emissions from the electric buses is the emissions benefit from the electric bus replacement of CNG buses.

### 4.2.9 GCC-9. Subsidy for Electric Transit Buses

The applicant or its designee shall provide a subsidy of $100,000 per bus for the replacement of up to 10 diesel or compressed natural gas transit buses with electric buses.

Estimated GHG Reduction

The calculation is the same as for school buses, except for transit buses; EMFAC2014 data shows annual VMT of 38,089 mi/yr in 2030.

The calculations shown in **Table 4-8** estimate the GHG reduction from replacing CNG transit buses with electric buses for 2030. The tables show the total number of miles per year that will be driven in electric buses instead of CNG buses, the GHG emissions if CNG buses were used, and the GHG emissions for the total miles based on electric vehicle fuel economy and the electric grid emission factor. The difference between the total GHG emissions from the CNG buses and the GHG emissions from the electric buses is the emissions benefit from the electric bus replacement of CNG buses.

### 4.2.10 GCC-10. Carbon Credits Construction and Vegetation Change Emissions

Prior to obtaining grading permits for village-level development within the RMDP/SCP Project site, the Project applicant or its designee will fully mitigate the related construction and vegetation change GHG emissions.

Estimated GHG Reduction

The estimated emissions for construction and vegetation change will be offset.

### 4.2.11 GCC-11. Off-Site Retrofit Program

The Project applicant or its designee shall fund the Building Retrofit Program (Retrofit Program), located in **Appendix G**. Building retrofits covered by the Retrofit Program can include, but are not limited to: cool roofs, solar panels, solar water heaters, smart meters, energy efficient lighting (including, but not limited to, light bulb replacement), energy efficient appliances, energy efficient windows, insulation, and water conservation measures.

Estimated GHG Reduction

The Building Retrofit Program provides funding that will be used to implement various improvements to the built environment. **Table 4-9** provides a reasonable calculation of how the Building Retrofit Program may achieve the estimated GHG reductions (see also **Appendix J**). The emission estimates illustrate a conservative estimate of how much the funding may achieve in terms of GHG emission reductions. The emission ratios in the Retrofit Program are based on an estimate of the 80 percent of the emission reductions being achieved in connection with the Project's residential development, and 20 percent of the emission reductions being achieved in connection with the Project's with commercial development.

### 4.2.12 GCC-12. Off-Site Electric Vehicle Chargers

The Project applicant or its designee shall install, or cause to be installed, an off-site electric vehicle charging stations. Off-site electric vehicle charging stations capable of servicing 2,036 parking spaces would be required if the maximum allowable development facilitated by the RMDP/SCP Project occurs; fewer electric vehicle charging stations would be required if maximum build-out under the RMDP/SCP Project does not occur. The electric vehicle charging stations shall achieve a similar or better functionality as a Level 2 charging station and may service one or more parking spaces.

Estimated GHG Reduction

The estimated GHG reductions follow the same methodology as described above (see **Table 4-4** and Section 4.2.5). The installation ratios are based on an estimate of the ratio of residential and non-residential emissions without off-site electric vehicle chargers reduction. This results in one parking spot serviced by an EV charging station per 30 dwelling units, and one parking spot serviced by an EV charging station per 7,000 square feet of commercial non-residential. It is estimated that 2,036 parking spaces will have access to a charging station to estimate the GHG emission reductions benefit.

### 4.2.13 GCC-13. GHG Reduction Plan

This section evaluates the amount of GHG reductions that will be required to fully offset all remaining GHG emissions to zero over the Project life, defined as 30 years.[98] The analysis here estimates how the reductions over time would be accounted in determining the necessary GHG reductions.

[98] The SCAQMD GHG Working Group proposed that off-site mitigation could be used to mitigate GHG emissions from a project under CEQA. The SCAQMD indicated that offsets should have a 30-year project life unless a shorter project life could be ensured based on a binding permit condition or other legal limit. SCAQMD, 2008. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2. Accessed: September 2016.

The figure shown in **Appendix K** illustrates the interpolation of the emissions modeled in CalEEMod® starting in 2020 through the Project life for the last piece of development completed in 2030 to estimate the GHG offsets required. The reason for the 2020 CalEEMod® model run is to develop factors to account for the anticipated reduction in emissions due to existing regulatory programs (i.e., the reductions of energy and water-related emissions due to the 50 percent RPS and the reductions of mobile-related emissions due to the fleet fuel efficiency improvements predicted by EMFAC2014) that will reduce GHG emissions over the lifetime of the Project. The full description of offsets calculation methodology is shown in **Table K-1** through **Table K-9** in **Appendix K**. This analysis shows that the offsets requirement for the Project will be 234,228 MT per year for the Project life. This estimate is considered a conservative estimate as it is anticipated that further regulatory programs and technology will develop in the future to further reduce GHG emissions.

Prior to obtaining building permits for an incremental level of development within the Project site, the incremental operational GHG emissions over the Project life associated with such building permits that must be offset (the "Incremental Operational GHG Emissions") will be equal to the sum of: (1) the number of proposed residential units covered by the applicable building permit multiplied by 108.89 $MTCO_2e$; and (2) every thousand square feet ("TSF") of proposed commercial development covered by the applicable building permit multiplied by 506.86 $MTCO_2e$. For example, to obtain a building permit for 75 residential units and 40,000 square feet of commercial development, the Incremental Operational GHG Emissions would be: 75 units x 108.89 $MTCO_2e$/unit + 40 TSF. x 506.86 MTCO2e/TSF = 28,441 $MTCO_2e$.

# 5. PROJECT INVENTORY (MITIGATED)

As previously documented, the Project site – in its existing condition – emits 11,021 $MTCO_2e$ per year, and the Mitigated Project emits zero $MTCO_2e$ per year (see **Tables ES-1** and **ES-2**). In addition, **Table 5-1** summarizes the GHG reductions associated with the mitigation measures and **Table 5-2** summarizes the Unmitigated and Mitigated Project GHG emissions.

# TABLES

**Table ES-1. Summary of Existing On-Site GHG Emissions**
RMDP/SCP
Los Angeles County, California

| Category | Existing $CO_2e$ Emissions (MT/yr)[1] |
|---|---|
| $CH_4$ emissions associated with oil wells | 3,790 |
| Energy use associated with oil wells | 3,682 |
| Energy use associated with water | 2,987 |
| $N_2O$ emissions associated with fertilizer use | 412 |
| Emissions associated with diesel fuel usage | 152 |
| **Total** | 11,021 |

Notes:
[1] Emissions calculations shown in Appendix A.

Abbreviations:
$CH_4$ - methane
$CO_2e$ - carbon dioxide equivalents
GHG - greenhouse gases
MT - metric tonnes
$N_2O$ - nitrous oxide
yr - year

**Table ES-2. Summary of 2030 Project GHG Emissions**
RMDP/SCP
Los Angeles County, California

| Category[1] | Total $CO_2e$ Emissions[2] | | | | |
|---|---|---|---|---|---|
| | Unmitigated Project | | | | Mitigated Project |
| | ES | NRSP | VCC | Total | Total |
| | MT/yr | | | | |
| Area | 30 | 337 | 0.09 | 367 | 367 |
| Energy Use | 4,835 | 68,790 | 9,155 | 82,780 | 3,312 |
| Residential Zero Net Energy (GCC-1) | -- | -- | -- | -- | -30,656 |
| Commercial Zero Net Energy (GCC-2) | -- | -- | -- | -- | -25,456 |
| Swimming Pool Heating (GCC-3) | -- | -- | -- | -- | -22,356 |
| Building Retrofit Program (GCC-11) | -- | -- | -- | -- | -1,000 |
| Water Use | 1,295 | 6,379 | 516 | 8,190 | 8,190 |
| Waste Disposed | 1,438 | 18,141 | 3,601 | 23,179 | 23,179 |
| Traffic | 26,294 | 354,557 | 22,963 | 403,814 | 202,011 |
| Residential EV Chargers and Vehicle Subsidy (GCC-4) | -- | -- | -- | -- | -53,724 |
| Commercial Development Area EV Chargers (GCC-5) | -- | -- | -- | -- | -39,109 |
| Transportation Demand Management Plan (GCC-6) | -- | -- | -- | -- | -60,168 |
| Traffic Signal Synchronization (GCC-7) | -- | -- | -- | -- | -8,212 |
| Electric School Bus Program (GCC-8) | -- | -- | -- | -- | -157 |
| Electric Transit Bus Subsidy (GCC-9) | -- | -- | -- | -- | -619 |
| Off-Site EV Chargers (GCC-12) | -- | -- | -- | -- | -39,813 |
| **Sub-Total** | **33,892** | **448,204** | **36,234** | **518,330** | **237,059** |
| Construction Amortized[3] | 413 | 5,578 | 446 | 6,437 | 6,437 |
| Vegetation Amortized[3] | 28 | 1,312 | -5 | 1,335 | 1,335 |
| Carbon Credits (GCC-10) | -- | -- | -- | -- | -7,773 |
| **Sub-Total** | **442** | **6,889** | **441** | **7,773** | **0** |
| GHG Reduction Plan (GCC-13) | -- | -- | -- | -- | -237,059 |
| **Total** | **34,333** | **455,093** | **36,676** | **526,103** | **0** |

Notes:

[1] $CO_2e$ emissions were primarily estimated using CalEEMod® version 2013.2.2.

[2] CO2e includes $CO_2$, $CH_4$, and $N_2O$ emissions, which are weighted by their respective AR4 global warming potentials. Source: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4): Climate Change 2007. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed: September 2016.

[3] One-time emissions from construction and vegetation removal were amortized over a 30-year period. Source: SCAQMD. 2009. Minutes for the GHG CEQA Significance Threshold Stakeholder Working Group #13. August. Available at: http://sfprod.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-13/ghg-meeting-13-minutes.pdf?sfvrsn=2. Accessed: September 2016.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CEQA - California Environmental Air Quality Act
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalents
ES - Entrada South
EV - electric vehicle
GHG - greenhouse gases
MT - metric tonnes
$N_2O$ - nitrous oxide
NRSP - Newhall Ranch Specific Plan
SCAQMD - South Coast Air Quality Management District
VCC - Valencia Commerce Center
yr - year

**Table ES-3. Summary of GHG Emissions Reductions due to Mitigation Measures (2030)**
RMDP/SCP
Los Angeles County, California

| Emission Reductions due to Mitigation Measures | | |
|---|---|---|
| Mitigation Measure Number[1] | Mitigation Measure Description | $CO_2$e Emissions Reduction Due to Mitigation Measure[2,3] MT/yr |
| GCC-1 | Residential Zero Net Energy | 30,656 |
| GCC-2 | Commercial Zero Net Energy | 25,456 |
| GCC-3 | Swimming Pool Heating | 22,356 |
| GCC-4 | Residential EV Chargers and Vehicle Subsidy | 53,724 |
| GCC-5 | Commercial Development Area EV Chargers | 39,109 |
| GCC-6 | Transportation Demand Management Plan | 60,168 |
| GCC-7 | Traffic Signal Synchronization | 8,212 |
| GCC-8 | Electric School Bus Program | 157 |
| GCC-9 | Electric Transit Bus Subsidy | 619 |
| GCC-10 | Carbon Credits | 7,773 |
| GCC-11 | Building Retrofit Program | 1,000 |
| GCC-12 | Off-Site EV Chargers | 39,813 |
| GCC-13 | GHG Reduction Plan | 237,059 |
| | **Total Emission Reductions from Mitigation Measures** | **526,103** |

Notes:
[1] These mitigation measures are described in more detail in the technical report.
[2] $CO_2$e emissions were primarily estimated using CalEEMod® version 2013.2.2.
[3] $CO_2$e includes $CO_2$, $CH_4$, and $N_2O$ emissions, which are weighted by their respective AR4 global warming potentials. Source: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4): Climate Change 2007. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed: September 2016.

Abbreviations:
CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EV - electric vehicle
GHG - greenhouse gases
MT - metric tonnes
$N_2O$ - nitrous oxide
yr - year

**Table 1-1. List of Applicable Regulatory Standards**
RMDP/SCP
Los Angeles County, California

| Project-Related Emissions Sources | Adopted Regulatory Standards | Reduction Benefits Quantified in Analysis? Yes | No |
|---|---|---|---|
| Construction | California Cap-and-Trade Program | | √ |
| | USEPA/NHTSA Standards Phase 1 (through model year 2018) | | √ |
| | California ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling | | √ |
| | California In-Use Off-Road Regulation | √ | |
| | California In-Use On-Road Heavy-Duty Diesel Vehicles Regulation | | √ |
| Vegetation Amortization | County CCAP Land Conservation and Tree Planning (LC) | | √ |
| Building Energy Consumption | Energy Independence and Security Act | | √ |
| | California Cap-and-Trade Program | | √ |
| | California Title 20 Standards – 2015 | | √ |
| | California Title 24, Part 6 Standards – 2016 | √ | |
| | California Title 24, Part 11 Standards (CalGreen) | | √ |
| | California Renewable Portfolio Standard (50% in 2030) | √ | |
| | California AB 1470 (Solar Water Heating) | √ | |
| | Million Solar Roofs | | √ |
| | Los Angeles County Green Building Standards (Title 31) | | √ |
| Traffic (Medium- and Heavy-Duty Trucks) | California Cap-and-Trade Program | | √ |
| | USEPA/NHTSA Standards Phase 1 (through model year 2018) | √ | |
| | USEPA/NHTSA Standards Phase 2 (through model year 2030) | √ | |
| | California ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling | | √ |
| | California In-Use On-Road Heavy-Duty Diesel Vehicles Regulation | | √ |
| | SCAQMD Rule 1193 (Clean On-Road Residential And Commercial Refuse Collection Vehicles) | | √ |
| | SCAQMD 1195 (Clean On-Road Buses) | | √ |
| Traffic (Passenger Vehicles, cars & light-duty trucks) | California AB 1493/Pavley Standards (through model year 2016) | √ | |
| | California Advanced Clean Cars Standards (through model year 2025) | √ | |
| | California Cap-and-Trade Program | | √ |
| | California Low Carbon Fuel Standard | | √ |
| | USEPA/NHTSA CAFE Standards (through model year 2021) | √ | |
| Solid Waste | California AB 341 Standards (Solid Waste Diversion) | √ | |
| | California Cap-and-Trade Program | | √ |
| Water Use | California Cap-and-Trade Program | | √ |
| | California Title 24, Part 11 Standards (CalGreen) | √ | |
| | California Renewable Portfolio Standard (50% in 2030) | √ | |
| | California Recycled Water Policy | √ | |

Abbreviations:
AB - Assembly Bill
ATCM - Airborne Toxic Control Measure
CAFE - Corporate Average Fuel Economy
CCAP - Community Climate Action Plan
NHTSA - National Highway Traffic Safety Administration
SCAQMD - South Coast Air Quality Management District
USEPA - United States Environmental Protection Agency

**Table 2-1. Project Land Uses and Square Footage**
RMDP/SCP
Los Angeles County, California

| Area | Project Assumptions[1] | | Land Use Category | CalEEMod® Analysis | | |
|---|---|---|---|---|---|---|
| | | | | Land Use Subtype[2] | Land Use Unit Amount | Size Metric |
| ES | Condo/townhouse general | 1,297 DU | Residential | Condo/Townhouse | 1,297 | DU |
| | Elementary/Middle School[3] | 60 TSF | Educational | Elementary School | 750 | STU |
| | Commercial Office | 62.5 TSF | Commercial | General Office Building | 62.5 | TSF |
| | Recreational Center | 6.7 TSF | Recreational | Health Club | 6.7 | TSF |
| | Hotel[4] | 200 TSF | Recreational | Hotel | 286 | rooms |
| | Commercial Center | 187.5 TSF | Retail | Regional Shopping Center | 187.5 | TSF |
| | Single Family Housing | 428 DU | Residential | Single Family Housing | 428 | DU |
| NRSP | Condo/townhouse general | 11,201 DU | Residential | Condo/Townhouse | 11,201 | DU |
| | Elementary/Middle School[3] | 357.6 TSF | Educational | Elementary School | 4,500 | STU |
| | Fire Station | 33.1 TSF | Industrial | General Light Industry | 33.1 | TSF |
| | Commercial Office | 1,023 TSF | Commercial | General Office Building | 1,023 | TSF |
| | Golf Course | 180 acres | Recreational | Golf Course | 180 | AC |
| | Recreational Center | 43.3 TSF | Recreational | Health Club | 43.3 | TSF |
| | High School[3] | 142.4 TSF | Educational | High School | 2,500 | STU |
| | Hotel[4] | 100 TSF | Recreational | Hotel | 143 | rooms |
| | Industrial Park[5] | 756 TSF | Industrial | Industrial Park | 756 | TSF |
| | Library | 36.0 TSF | Educational | Library | 36.0 | TSF |
| | Business Park | 324 TSF | Commercial | Office Park | 324 | TSF |
| | Commercial Center | 3,247 TSF | Retail | Regional Shopping Center | 3,247 | TSF |
| | Single Family Housing | 8,316 DU | Residential | Single Family Housing | 8,316 | DU |
| VCC | Industrial Park | 2,300 TSF | Industrial | Industrial Park | 2,300 | TSF |
| | Business Park | 1,100 TSF | Commercial | Office Park | 1,100 | TSF |

Notes:

[1] Project assumptions based on Project description.

[2] Land uses as defined in CalEEMod®. When an exact mapping of a land use was not available in CalEEMod® relative to the "Project Assumptions," a land use with similar emission characteristics was chosen.

[3] Number of students in elementary/middle school and high school are consistent with trip rate assumptions. The elementary school in Entrada South has 750 students. The middle school and 4 elementary schools in NRSP have 900 students each. The high school in NRSP has 2,500 students.

[4] Consistent with trip rate assumptions, the hotel listed square footage is converted to rooms using a factor of 700 sqft GFA/Room.

[5] The building-related emissions for the Newhall Ranch Water Reclamation Plant (WRP) (i.e., energy, water, solid waste) are included in the NRSP "Industrial Park" square footage. The traffic-related emissions are captured in the Santa Clarita Valley Consolidated Traffic Model. The direct and indirect emissions associated with the wastewater treatment are captured through the wastewater emission estimates for each of the other Project land uses that will send wastewater to the WRP.

Abbreviations:

AC - acre
CalEEMod® - CALifornia Emissions Estimator MODel
DU - dwelling units
ES - Entrada South
GFA - gross floor area
NRSP - Newhall Ranch Specific Plan
sqft - square feet
STU - students
TSF - thousand square feet
VCC - Valencia Commerce Center

**Table 2-2. Analyzed Emissions Inventories**

RMDP/SCP

Los Angeles County, California

| Year | Emissions Inventory Description |
| --- | --- |
| 2030 | Unmitigated Project |
| 2030 | Mitigated Project |

**Table 2-3. Construction Schedule Assumptions - Stages 1 through 6**
RMDP/SCP
Los Angeles County, California

| Stage | Construction Phase[1] | Number of Work Days[2] | Start Date | End Date[4] |
|---|---|---|---|---|
| Stage 1[3] | Mass Grading - Utility Corridor | 261 | 3/1/2018 | 2/28/2019 |
| | Mass Grading | 885 | 3/1/2018 | 7/21/2021 |
| | Trenching - Sewer | 681 | 11/1/2018 | 6/10/2021 |
| | Trenching - Storm Drain | 340 | 3/1/2019 | 6/18/2020 |
| | Trenching - Water | 374 | 5/1/2019 | 10/5/2020 |
| | Paving - Street | 230 | 10/13/2020 | 8/30/2021 |
| | Paving | 1,109 | 12/1/2020 | 7/17/2028 |
| | Building Construction | 1,239 | 1/1/2021 | 8/14/2028 |
| | Architectural Coating | 1,173 | 3/1/2021 | 8/14/2028 |
| | Fine Grading - Stabilization | 40 | 5/26/2021 | 7/20/2021 |
| Stage 2[3] | Grading - Direct | 120 | 7/1/2018 | 12/14/2018 |
| | Grading - Indirect | 368 | 8/1/2018 | 12/27/2019 |
| | Improvements - Sewers | 160 | 2/1/2019 | 9/12/2019 |
| | Improvements - Storm Drains | 80 | 9/13/2019 | 1/2/2020 |
| | Improvements - Water | 100 | 1/3/2020 | 5/21/2020 |
| | Paving | 64 | 1/3/2020 | 4/1/2020 |
| | Improvements - Streets | 20 | 5/22/2020 | 6/18/2020 |
| | Building Construction | 1,021 | 6/19/2020 | 11/4/2024 |
| | Architectural Coating | 1,021 | 8/21/2020 | 11/20/2024 |
| Stage 3 | Grading - Direct (Phase 1) | 80 | 1/1/2020 | 4/21/2020 |
| | Grading - Indirect (Phase 1) | 462 | 1/1/2020 | 10/7/2021 |
| | Grading - Direct (Phase 2) | 40 | 6/1/2023 | 7/26/2023 |
| | Grading - Indirect (Phase 2) | 392 | 6/1/2024 | 12/2/2025 |
| | Improvements - Sewers | 320 | 1/1/2021 | 3/24/2022 |
| | Improvements - Storm Drains | 140 | 3/26/2022 | 10/7/2022 |
| | Improvements - Water | 220 | 10/8/2022 | 8/13/2023 |
| | Improvements - Streets | 40 | 8/14/2023 | 10/6/2023 |
| | Paving | 768 | 10/8/2021 | 9/17/2024 |
| | Building Construction | 2,408 | 10/8/2021 | 12/31/2030 |
| | Architectural Coating | 2,321 | 2/8/2022 | 12/31/2030 |
| Stage 4 | Grading - Direct (Phase 1) | 100 | 1/1/2023 | 5/19/2023 |
| | Grading - Indirect (Phase 2) | 783 | 1/1/2023 | 12/31/2025 |
| | Improvements - Sewers (Phase 2) | 240 | 1/1/2024 | 11/29/2024 |
| | Improvements - Storm Drains (Phase 2) | 120 | 12/3/2025 | 5/19/2026 |
| | Improvements - Water (Phase 2) | 160 | 5/20/2026 | 12/29/2026 |
| | Improvements - Streets/Roads (Phase 2) | 40 | 1/1/2027 | 2/25/2027 |
| | Grading - Indirect (Phase 3) | 567 | 1/1/2024 | 3/3/2026 |
| | Improvements - Sewers (Phase 3) | 140 | 1/1/2025 | 7/15/2025 |
| | Improvements - Storm Drains (Phase 3) | 60 | 7/16/2025 | 10/7/2025 |
| | Improvements - Water (Phase 3) | 80 | 10/8/2025 | 1/27/2026 |
| | Improvements - Streets (Phase 3) | 20 | 1/28/2026 | 2/24/2026 |
| | Paving | 257 | 1/1/2026 | 12/25/2026 |
| | Building Construction | 1,304 | 1/1/2026 | 12/31/2030 |
| | Architectural Coating | 1,218 | 5/1/2026 | 12/31/2030 |
| Stage 5 | Grading - Indirect | 351 | 1/1/2018 | 5/6/2019 |
| | Improvements - Sewers | 220 | 7/1/2018 | 5/3/2019 |
| | Improvements - Storm Drains | 100 | 5/6/2019 | 9/20/2019 |
| | Improvements - Water | 160 | 9/23/2019 | 5/1/2020 |
| | Improvements - Streets (Year 2020) | 20 | 5/4/2020 | 5/29/2020 |
| | Improvements - Streets (Year 2021) | 20 | 5/4/2021 | 5/31/2021 |

**Table 2-3. Construction Schedule Assumptions - Stages 1 through 6**
RMDP/SCP
Los Angeles County, California

| Stage | Construction Phase[1] | Number of Work Days[2] | Start Date | End Date[4] |
|---|---|---|---|---|
| Stage 5 *(Continued)* | Paving | 129 | 6/1/2020 | 11/26/2020 |
| | Building Construction | 1,719 | 6/1/2020 | 12/31/2026 |
| | Architectural Coating | 1,631 | 10/1/2020 | 12/31/2026 |
| Stage 6[3] | Grading - Direct | 150 | 1/1/2020 | 7/28/2020 |
| | Grading - Indirect | 341 | 1/1/2020 | 4/21/2021 |
| | Improvements - Sewers | 160 | 7/1/2020 | 2/9/2021 |
| | Improvements - Storm Drains | 80 | 2/10/2021 | 6/1/2021 |
| | Improvements - Water | 100 | 6/2/2021 | 10/19/2021 |
| | Improvements - Streets | 20 | 10/20/2021 | 11/16/2021 |
| | Paving | 108 | 11/1/2020 | 3/31/2021 |
| | Building Construction | 2,000 | 11/1/2020 | 10/8/2030 |
| | Architectural Coating | 2,001 | 3/1/2021 | 10/8/2030 |

Notes:
[1] Construction phases and duration based on Project specific estimates.
[2] The construction work week was assumed to be 5 days per week.
[3] For Stages 1, 2, and 6, building construction and architectural coating phases are not expected to occur on every day during the shown durations.
[4] While some construction phases are conservatively identified to conclude in the second half of the 2030 calendar year in this table, the Project's absorption schedule anticipates that the Project will be fully constructed and occupied during the 2030 calendar year.

**Table 2-4a. Construction Equipment Mix Assumptions - Stage 1**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Mass Grading - Utility Corridor | Crawler Tractors | 171,216 |
| | Excavators | 655,632 |
| | Off Highway Trucks | 795,528 |
| | Rubber Tired Loaders | 417,600 |
| | Water Trucks (Other Material Handling Equipment) | 409,248 |
| Mass Grading | Crawler Tractors | 2,902,800 |
| | Excavators | 2,778,900 |
| | Graders | 2,867,400 |
| | Off Highway Trucks | 6,743,700 |
| | Rubber Tired Dozers | 6,336,600 |
| | Scrapers | 25,204,800 |
| | Tractors/Loaders/Backhoes | 858,450 |
| | Water Trucks (Other Material Handling Equipment) | 10,407,600 |
| Trenching - Sewer | Cranes | 1,231,248 |
| | Excavators | 855,336 |
| | Other Material Handling Equipment | 1,067,808 |
| | Tractors/Loaders/Backhoes | 528,456 |
| | Water Trucks (Other Material Handling Equipment) | 1,067,808 |
| Trenching - Storm Drain | Cranes | 614,720 |
| | Excavators | 427,040 |
| | Other Material Handling Equipment | 533,120 |
| | Tractors/Loaders/Backhoes | 263,840 |
| | Water Trucks (Other Material Handling Equipment) | 533,120 |
| Trenching - Water | Cranes | 676,192 |
| | Excavators | 469,744 |
| | Other Material Handling Equipment | 586,432 |
| | Tractors/Loaders/Backhoes | 290,224 |
| | Water Trucks (Other Material Handling Equipment) | 586,432 |
| Building Construction | Cranes | 1,960,098 |
| | Forklifts | 2,646,504 |
| | Generator Sets | 832,608 |
| | Tractors/Loaders/Backhoes | 2,523,843 |
| | Welders | 455,952 |
| Architectural Coating | Air Compressors | 548,964 |
| Paving - Street | Graders | 298,080 |
| | Pavers | 163,760 |
| | Rollers | 154,560 |
| | Scrapers | 655,040 |
| | Water Trucks (Other Material Handling Equipment) | 360,640 |
| Paving | Pavers | 789,608 |
| | Paving Equipment | 1,455,008 |
| | Rollers | 1,117,872 |
| Fine Grading - Stabilization | Crawler Tractors | 26,240 |
| | Crushing/Processing Equip | 27,200 |
| | Excavators | 50,240 |
| | Graders | 51,840 |
| | Off Highway Trucks | 243,840 |
| | Rollers | 26,880 |
| | Rubber Tired Dozers | 114,560 |
| | Scrapers | 455,680 |
| | Tractors/Loaders/Backhoes | 31,040 |
| | Water Trucks (Other Material Handling Equipment) | 62,720 |

Notes:

[1] Construction phases and equipment mix are consistent with the Final Joint EIR/EIS for the RMDP/SCP Project.

[2] Unit HP-Hours is calculated as the product of the number of work days, units of equipment, hours of equipment usage per day and equipment horsepower.

Abbreviations:

EIR - Environmental Impact Report
EIS - Environmental Impact Statement
HP - horsepower

**Table 2-4b. Construction Equipment Mix Assumptions - Stage 2**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Grading - Direct | Crawler Tractors | 108,240 |
| | Crushing/Processing Equip | 112,200 |
| | Excavators | 207,240 |
| | Graders | 213,840 |
| | Water Trucks (Other Material Handling Equipment) | 258,720 |
| | Off-Highway Trucks | 502,920 |
| | Rollers | 221,760 |
| | Rubber Tired Dozers | 472,560 |
| | Rubber Tired Loaders | 264,000 |
| | Scrapers | 2,819,520 |
| Grading - Indirect | Crawler Tractors | 1,327,744 |
| | Excavators | 1,271,072 |
| | Graders | 1,311,552 |
| | Water Trucks (Other Material Handling Equipment) | 4,760,448 |
| | Off-Highway Trucks | 3,084,576 |
| | Rubber Tired Dozers | 2,898,368 |
| | Scrapers | 12,969,792 |
| Improvements - Sewers | Bore/Drill Rigs | 360,800 |
| | Cranes | 397,760 |
| | Excavators | 552,640 |
| | Rollers | 147,840 |
| | Rubber Tired Loaders | 352,000 |
| Improvements - Storm Drains | Cranes | 198,880 |
| | Excavators | 138,160 |
| | Graders | 142,560 |
| | Rollers | 73,920 |
| | Rubber Tired Loaders | 176,000 |
| Improvements - Water | Cranes | 248,600 |
| | Excavators | 345,400 |
| | Rollers | 92,400 |
| | Rubber Tired Loaders | 220,000 |
| Improvements - Streets | Graders | 35,640 |
| | Pavers | 19,580 |
| | Rollers | 18,480 |
| | Scrapers | 78,320 |
| Paving | Pavers | 45,568 |
| | Paving Equipment | 83,968 |
| | Rollers | 64,512 |
| Building Construction | Cranes | 1,615,222 |
| | Forklifts | 2,180,856 |
| | Generator Sets | 686,112 |
| | Tractors/Loaders/Backhoes | 2,079,777 |
| | Welders | 375,728 |
| Architectural Coating | Air Compressors | 477,828 |

[1] Construction phases and equipment mix are consistent with the Final Joint EIR/EIS for the RMDP/SCP Project.

[2] Unit HP-Hours is calculated as the product of the number of work days, units of equipment, hours of equipment usage per day and equipment horsepower.

Abbreviations:
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
HP - horsepower

**Table 2-4c. Construction Equipment Mix Assumptions - Stage 3**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Grading - Direct (Phase 1) | Crawler Tractors | 393,600 |
| | Crushing/Proc. Equipment | 326,400 |
| | Excavators | 753,600 |
| | Graders | 777,600 |
| | Water Trucks (Other Material Handling Equipment) | 1,693,440 |
| | Off-Highway Trucks | 1,463,040 |
| | Rollers | 403,200 |
| | Rubber Tired Dozers | 1,718,400 |
| | Rubber Tired Loaders | 960,000 |
| | Scrapers | 4,101,120 |
| Grading - Indirect (Phase 1) | Crawler Tractors | 3,182,256 |
| | Excavators | 4,352,040 |
| | Graders | 4,490,640 |
| | Water Trucks (Other Material Handling Equipment) | 9,779,616 |
| | Off-Highway Trucks | 10,561,320 |
| | Rubber Tired Dozers | 9,923,760 |
| | Scrapers | 23,683,968 |
| Grading - Direct (Phase 2) | Crawler Tractors | 196,800 |
| | Crushing/Proc. Equipment | 163,200 |
| | Excavators | 376,800 |
| | Graders | 388,800 |
| | Water Trucks (Other Material Handling Equipment) | 846,720 |
| | Off-Highway Trucks | 731,520 |
| | Rollers | 201,600 |
| | Rubber Tired Dozers | 859,200 |
| | Rubber Tired Loaders | 480,000 |
| | Scrapers | 2,050,560 |
| Grading - Indirect (Phase 2) | Crawler Tractors | 2,700,096 |
| | Excavators | 3,692,640 |
| | Graders | 3,810,240 |
| | Water Trucks (Other Material Handling Equipment) | 8,297,856 |
| | Off-Highway Trucks | 8,961,120 |
| | Rubber Tired Dozers | 8,420,160 |
| | Scrapers | 20,095,488 |
| Improvements - Sewers | Bore/Drill Rigs | 3,164,160 |
| | Cranes | 3,471,360 |
| | Excavators | 2,411,520 |
| | Rubber Tired Loaders | 3,072,000 |
| | Scrapers | 5,468,160 |
| Improvements - Storm Drains | Cranes | 1,518,720 |
| | Excavators | 1,055,040 |
| | Graders | 1,088,640 |
| | Rollers | 564,480 |
| | Rubber Tired Loaders | 1,344,000 |
| Improvements - Water | Cranes | 2,386,560 |
| | Excavators | 1,657,920 |
| | Rollers | 887,040 |
| | Rubber Tired Loaders | 2,112,000 |
| Improvements - Streets | Graders | 311,040 |
| | Pavers | 170,880 |
| | Rollers | 161,280 |
| | Scrapers | 683,520 |
| Paving | Pavers | 546,816 |
| | Paving Equipment | 881,664 |
| | Rollers | 645,120 |
| | Cement and Mortar Mixers | 138,240 |
| Building Construction | Cranes | 8,163,120 |
| | Forklifts | 10,286,976 |
| | Generator Sets | 3,640,896 |
| | Tractors/Loaders/Backhoes | 9,810,192 |
| | Welders | 3,101,504 |
| Architectural Coating | Air Compressors | 2,172,456 |

Notes:
[1] Construction phases and equipment mix are consistent with the Final Joint EIR/EIS for the RMDP/SCP Project.
[2] Unit HP-Hours is calculated as the product of the number of work days, units of equipment, hours of equipment usage per day and equipment horsepower.

Abbreviations:
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
HP - horsepower

**Table 2-4d. Construction Equipment Mix Assumptions - Stage 4**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Grading - Direct (Phase 1) | Crawler Tractors | 90,200 |
| | Crushing/Proc. Equipment | 93,500 |
| | Excavators | 172,700 |
| | Graders | 178,200 |
| | Water Trucks (Other Material Handling Equipment) | 215,600 |
| | Off-Highway Trucks | 419,100 |
| | Rollers | 184,800 |
| | Rubber Tired Dozers | 393,800 |
| | Rubber Tired Loaders | 220,000 |
| | Scrapers | 2,349,600 |
| Grading - Indirect (Phase 3) | Crawler Tractors | 1,022,868 |
| | Excavators | 979,209 |
| | Graders | 1,010,394 |
| | Water Trucks (Other Material Handling Equipment) | 3,667,356 |
| | Off-Highway Trucks | 2,376,297 |
| | Rubber Tired Dozers | 2,232,846 |
| | Scrapers | 11,101,860 |
| Improvements - Sewers (Phase 3) | Bore/Drill Rigs | 317,240 |
| | Cranes | 348,040 |
| | Excavators | 241,780 |
| | Rollers | 129,360 |
| | Rubber Tired Loaders | 308,000 |
| Improvements - Storm Drains (Phase 3) | Cranes | 149,160 |
| | Excavators | 207,240 |
| | Graders | 106,920 |
| | Rollers | 55,440 |
| | Rubber Tired Loaders | 132,000 |
| Improvements - Water (Phase 3) | Cranes | 198,880 |
| | Excavators | 276,320 |
| | Rollers | 73,920 |
| | Rubber Tired Loaders | 176,000 |
| Improvements - Streets (Phase 3) | Graders | 35,640 |
| | Pavers | 19,580 |
| | Rollers | 18,480 |
| | Scrapers | 78,320 |
| Grading - Indirect (Phase 2) | Crawler Tractors | 9,181,458 |
| | Excavators | 10,817,928 |
| | Graders | 11,162,448 |
| | Water Trucks (Other Material Handling Equipment) | 33,762,960 |
| | Off-Highway Trucks | 26,252,424 |
| | Rubber Tired Dozers | 24,667,632 |
| | Scrapers | 91,986,840 |
| Improvements - Sewers (Phase 2) | Bore/Drill Rigs | 543,840 |
| | Cranes | 596,640 |
| | Excavators | 828,960 |
| | Rollers | 221,760 |
| | Rubber Tired Loaders | 1,056,000 |
| Improvements - Storm Drains (Phase 2) | Cranes | 298,320 |
| | Excavators | 414,480 |
| | Graders | 213,840 |
| | Rollers | 110,880 |
| | Rubber Tired Loaders | 528,000 |

**Table 2-4d. Construction Equipment Mix Assumptions - Stage 4**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Improvements - Water (Phase 2) | Cranes | 397,760 |
| | Excavators | 552,640 |
| | Rollers | 147,840 |
| | Rubber Tired Loaders | 704,000 |
| Improvements - Streets/Roads (Phase 2) | Graders | 142,560 |
| | Pavers | 39,160 |
| | Rollers | 73,920 |
| | Scrapers | 156,640 |
| Paving | Pavers | 182,984 |
| | Paving Equipment | 337,184 |
| | Rollers | 259,056 |
| Building Construction | Cranes | 7,072,896 |
| | Forklifts | 9,284,480 |
| | Generator Sets | 3,067,008 |
| | Tractors/Loaders/Backhoes | 8,854,160 |
| | Welders | 1,679,552 |
| Architectural Coating | Air Compressors | 1,995,084 |

Notes:
[1] Construction phases and equipment mix are consistent with the Final Joint EIR/EIS for the RMDP/SCP Project.
[2] Unit HP-Hours is calculated as the product of the number of work days, units of equipment, hours of equipment usage per day and equipment horsepower.

Abbreviations:
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
HP - horsepower

**Table 2-4e. Construction Equipment Mix Assumptions - Stage 5**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Grading - Indirect | Crawler Tractors | 863,460 |
| | Excavators | 1,102,140 |
| | Graders | 1,137,240 |
| | Water Trucks (Other Material Handling Equipment) | 2,751,840 |
| | Off-Highway Trucks | 2,674,620 |
| | Rubber Tired Dozers | 2,513,160 |
| | Scrapers | 7,497,360 |
| Improvements - Sewers | Bore/Drill Rigs | 1,359,600 |
| | Cranes | 1,491,600 |
| | Excavators | 1,036,200 |
| | Rollers | 554,400 |
| | Rubber Tired Loaders | 1,320,000 |
| Improvements - Storm Drains | Cranes | 678,000 |
| | Excavators | 471,000 |
| | Graders | 486,000 |
| | Rollers | 252,000 |
| | Rubber Tired Loaders | 600,000 |
| Improvements - Water | Cranes | 1,084,800 |
| | Excavators | 753,600 |
| | Rollers | 403,200 |
| | Rubber Tired Loaders | 960,000 |
| Improvements - Streets (Year 1) | Graders | 97,200 |
| | Pavers | 53,400 |
| | Rollers | 50,400 |
| | Scrapers | 213,600 |
| Improvements - Streets (Year 2) | Graders | 97,200 |
| | Pavers | 53,400 |
| | Rollers | 50,400 |
| | Scrapers | 213,600 |
| Paving | Pavers | 91,848 |
| | Paving Equipment | 148,092 |
| | Rollers | 108,360 |
| | Cement and Mortar Mixers | 16,254 |
| Building Construction | Cranes | 3,107,952 |
| | Forklifts | 3,212,811 |
| | Generator Sets | 1,443,960 |
| | Tractors/Loaders/Backhoes | 2,667,888 |
| | Welders | 1,660,554 |
| Architectural Coating | Air Compressors | 1,017,744 |

Notes:

[1] Construction phases and equipment mix are consistent with the Final Joint EIR/EIS for the RMDP/SCP Project.

[2] Unit HP-Hours is calculated as the product of the number of work days, units of equipment, hours of equipment usage per day and equipment horsepower.

Abbreviations:

EIR - Environmental Impact Report
EIS - Environmental Impact Statement
HP - horsepower

**Table 2-4f. Construction Equipment Mix Assumptions - Stage 6**
RMDP/SCP
Los Angeles County, California

| Construction Phase[1] | Equipment Type[1] | Unit HP-Hours[2] |
|---|---|---|
| Grading - Direct | Crawler Tractors | 319,800 |
| | Crushing/Proc. Equipment | 165,750 |
| | Excavators | 306,150 |
| | Graders | 631,800 |
| | Water Trucks (Other Material Handling Equipment) | 764,400 |
| | Off-Highway Trucks | 742,950 |
| | Rollers | 327,600 |
| | Rubber Tired Dozers | 698,100 |
| | Rubber Tired Loaders | 390,000 |
| | Scrapers | 4,165,200 |
| Grading - Indirect | Crawler Tractors | 727,012 |
| | Excavators | 695,981 |
| | Graders | 718,146 |
| | Water Trucks (Other Material Handling Equipment) | 2,606,604 |
| | Off-Highway Trucks | 1,688,973 |
| | Rubber Tired Dozers | 1,587,014 |
| | Scrapers | 7,890,740 |
| Improvements - Sewers | Bore/Drill Rigs | 428,480 |
| | Cranes | 470,080 |
| | Excavators | 653,120 |
| | Rollers | 174,720 |
| | Rubber Tired Loaders | 416,000 |
| Improvements - Storm Drains | Cranes | 235,040 |
| | Excavators | 163,280 |
| | Graders | 168,480 |
| | Rollers | 87,360 |
| | Rubber Tired Loaders | 208,000 |
| Improvements - Water | Cranes | 293,800 |
| | Excavators | 204,100 |
| | Rubber Tired Loaders | 260,000 |
| | Scrapers | 462,800 |
| Improvements - Streets | Graders | 42,120 |
| | Pavers | 23,140 |
| | Rollers | 21,840 |
| | Scrapers | 92,560 |
| Paving | Pavers | 76,896 |
| | Paving Equipment | 106,272 |
| | Rollers | 108,864 |
| Building Construction | Cranes | 3,164,000 |
| | Forklifts | 4,272,000 |
| | Generator Sets | 1,344,000 |
| | Tractors/Loaders/Backhoes | 4,074,000 |
| | Welders | 736,000 |
| Architectural Coating | Air Compressors | 936,468 |

Notes:
[1] Construction phases and equipment mix are consistent with the Final Joint EIR/EIS for the RMDP/SCP Project.
[2] Unit HP-Hours is calculated as the product of the number of work days, units of equipment, hours of equipment usage per day and equipment horsepower.

Abbreviations:
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
HP - horsepower

**Table 2-5. Summary of Construction Worker, Vendor and Hauling Trips**
RMDP/SCP
Los Angeles County, California

| Construction Stage | Construction Phase | Year | Worker Trips Per Day[1] | Vendor Trips Per Day[1] | Total Hauling Trips[1,2] |
|---|---|---|---|---|---|
| Stage 1 | Mass Grading - Utility Corridor | 2018-2019 | 15 | 0 | 16,704 |
| | Mass Grading | 2018-2021 | 68 | 0 | 56,640 |
| | Trenching - Sewer | 2018-2021 | 13 | 0 | 0 |
| | Trenching - Storm Drain | 2019-2020 | 13 | 0 | 0 |
| | Trenching - Water | 2019-2020 | 13 | 0 | 0 |
| | Building Construction [3] | 2021-2028 | -- | -- | 0 |
| | Architectural Coating [3] | 2021-2028 | -- | -- | 0 |
| | Paving - Street | 2020-2021 | 13 | 0 | 0 |
| | Paving | 2020-2028 | 13 | 0 | 0 |
| | Fine Grading - Stabilization | 2021 | 35 | 0 | 0 |
| Stage 2 | Grading - Direct | 2018 | 40 | 0 | 0 |
| | Grading - Indirect | 2018-2019 | 68 | 0 | 23,552 |
| | Improvements - Sewers | 2019 | 15 | 0 | 0 |
| | Improvements - Storm Drains | 2019-2020 | 13 | 0 | 0 |
| | Improvements - Water | 2020 | 13 | 0 | 0 |
| | Paving | 2020 | 13 | 0 | 0 |
| | Improvements - Streets | 2020 | 10 | 0 | 0 |
| | Building Construction[3] | 2020-2024 | -- | -- | 0 |
| | Architectural Coating[3] | 2020-2024 | -- | -- | 0 |
| Stage 3 | Grading - Direct (Phase 1) | 2020 | 148 | 0 | 0 |
| | Grading - Indirect (Phase 1) | 2020-2021 | 120 | 0 | 29,568 |
| | Improvements - Sewers | 2021-2022 | 50 | 0 | 0 |
| | Building Construction[3] | 2021-2030 | -- | -- | 0 |
| | Paving | 2021-2024 | 23 | 0 | 0 |
| | Architectural Coating[3] | 2022-2030 | -- | -- | 0 |
| | Improvements - Storm Drains | 2022 | 50 | 0 | 0 |
| | Improvements - Water | 2022-2023 | 40 | 0 | 0 |
| | Grading - Direct (Phase 2) | 2023 | 148 | 0 | 0 |
| | Improvements - Streets | 2023 | 40 | 0 | 0 |
| | Grading - Indirect (Phase 2) | 2024-2025 | 120 | 0 | 25,088 |
| Stage 4 | Grading - Direct (Phase 1) | 2023 | 40 | 0 | 0 |
| | Grading - Indirect (Phase 2) | 2023-2025 | 238 | 0 | 50,112 |
| | Grading - Indirect (Phase 3) | 2024-2026 | 35 | 0 | 36,288 |
| | Improvements - Sewers (Phase 2) | 2024 | 18 | 0 | 0 |
| | Improvements - Sewers (Phase 3) | 2025 | 13 | 0 | 0 |
| | Improvements - Storm Drains (Phase 3) | 2025 | 15 | 0 | 0 |
| | Improvements - Water (Phase 3) | 2025-2026 | 13 | 0 | 0 |
| | Improvements - Storm Drains (Phase 2) | 2025-2026 | 18 | 0 | 0 |
| | Building Construction[3] | 2026-2030 | -- | -- | 0 |
| | Paving | 2026 | 13 | 0 | 0 |
| | Improvements - Streets (Phase 3) | 2026 | 10 | 0 | 0 |
| | Architectural Coating[3] | 2026-2030 | -- | -- | 0 |
| | Improvements - Water (Phase 2) | 2026 | 15 | 0 | 0 |
| | Improvements - Streets/Roads (Phase 2) | 2027 | 15 | 0 | 0 |
| Stage 5 | Grading - Indirect | 2018-2019 | 53 | 0 | 22,464 |
| | Improvements - Sewers | 2018-2019 | 38 | 0 | 0 |
| | Improvements - Storm Drains | 2019 | 38 | 0 | 0 |
| | Improvements - Water | 2019-2020 | 30 | 0 | 0 |
| | Improvements - Streets | 2020-2021 | 30 | 0 | 0 |
| | Building Construction[3] | 2020-2026 | -- | -- | 0 |
| | Paving | 2020 | 18 | 0 | 0 |
| | Architectural Coating[3] | 2020-2026 | -- | -- | 0 |

**Table 2-5. Summary of Construction Worker, Vendor and Hauling Trips**
RMDP/SCP
Los Angeles County, California

| Construction Stage | Construction Phase | Year | Worker Trips Per Day[1] | Vendor Trips Per Day[1] | Total Hauling Trips[1,2] |
|---|---|---|---|---|---|
| Stage 6 | Grading - Direct | 2020 | 48 | 0 | 0 |
| | Grading - Indirect | 2020-2021 | 35 | 0 | 21,824 |
| | Improvements - Sewers | 2020-2021 | 15 | 0 | 0 |
| | Building Construction[3] | 2020-2030 | -- | -- | 0 |
| | Paving | 2020-2021 | 15 | 0 | 0 |
| | Improvements - Storm Drains | 2021 | 13 | 0 | 0 |
| | Architectural Coating[3] | 2021-2030 | -- | -- | 0 |
| | Improvements - Water | 2021 | 10 | 0 | 0 |
| | Improvements - Streets | 2021 | 10 | 0 | 0 |

Notes:

[1] Worker and vendor trips are presented as one-way trips. One round trip consists of two one-way trips, e.g. for a worker/vendor to come to the Site and leave the Site. Hauling trips are total trips for the phase. The one-way trip lengths for worker, vendor, and hauling trips are 19.8, 7.9, and 20 miles, respectively, based on CalEEMod® defaults.

[2] The Project's estimate of hauling trips conservatively assumes that there will be 64 trips per day for hauling vegetation waste during the grading phase. There will be no off-site soil hauling truck trips for the Project, as the on-site development is based on a balanced cut-and-fill design.

[3] CalEEMod® default trip rates for construction-related activities do not account for phased construction activities. Therefore, Table 2-6 presents an adjustment calculation for the CalEEMod® defaults in order to more accurately represent the Project's worker and vendor trips.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

**Table 2-6. Building Construction and Architectural Coating Worker and Vendor Trips Adjustment**
RMDP/SCP
Los Angeles County, California

| Category | Buildout Year | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **Total** |
| **Land Use Data for Building Construction[1]** | | | | | | | | | | | | | | |
| ***Residential [Dwelling Units]*** | | | 664 | 3,204 | 4,348 | 2,645 | 1,866 | 1,272 | 1,257 | 2,717 | 2,116 | 754 | 397 | 21,242 |
| ***Non Residential [1,000 sq ft]*** | | | 49 | 909 | 1,159 | 1,364 | 1,823 | 1,164 | 570 | 1,049 | 1,225 | 519 | 148 | 9,979 |
| **Land Use Data for Architectural Coating[1]** | | | | | | | | | | | | | | |
| ***Residential [Dwelling Units]*** | | | 664 | 1,558 | 2,996 | 4,162 | 2,575 | 1,441 | 1,365 | 2,885 | 2,291 | 838 | 466 | 21,242 |
| ***Non Residential [1,000 sq ft]*** | | | 0 | 756 | 789 | 1,937 | 1,823 | 1,164 | 570 | 1,049 | 1,225 | 519 | 148 | 9,979 |
| **Maximum Daily One-Way Trips** | | | | | | | | | | | | | | |
| **Stage 1 (Non BC, AC Phase Worker Trips)** | 96 | 122 | 133 | 142 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 0 | 0 | 584 |
| **Stage 2 (Non BC, AC Phase Worker Trips)** | 108 | 96 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 253 |
| **Stage 3 (Non BC, AC Phase Worker Trips)** | 0 | 0 | 268 | 193 | 163 | 251 | 143 | 120 | 0 | 0 | 0 | 0 | 0 | 1,138 |
| **Stage 4 (Non BC, AC Phase Worker Trips)** | 0 | 0 | 0 | 0 | 0 | 278 | 291 | 332 | 104 | 15 | 0 | 0 | 0 | 1,020 |
| **Stage 5 (Non BC, AC Phase Worker Trips)** | 91 | 159 | 78 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 358 |
| **Stage 6 (Non BC, AC Phase Worker Trips)** | 0 | 0 | 113 | 98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 211 |
| ***RMDP/SCP Building Construction*** | | | | | | | | | | | | | | |
| **Worker Trips** | | | **401** | **2,214** | **2,973** | **2,085** | **1,833** | **1,216** | **958** | **1,994** | **1,724** | **649** | **289** | **16,338** |
| Residential | | | 380 | 1,832 | 2,486 | 1,512 | 1,067 | 727 | 719 | 1,554 | 1,210 | 431 | 227 | |
| Non Residential | | | 21 | 382 | 487 | 573 | 766 | 489 | 239 | 441 | 514 | 218 | 62 | |
| **Vendor Trips** | | | **79** | **491** | **655** | **506** | **498** | **327** | **228** | **462** | **427** | **166** | **67** | **3,906** |
| Residential | | | 71 | 343 | 465 | 283 | 199 | 136 | 134 | 290 | 226 | 81 | 42 | |
| Non Residential | | | 8 | 149 | 190 | 224 | 299 | 191 | 93 | 172 | 201 | 85 | 24 | |
| ***RMDP/SCP Architectural Coating*** | | | | | | | | | | | | | | |
| **Worker Trips** | | | **76** | **242** | **409** | **639** | **448** | **263** | **204** | **418** | **365** | **139** | **66** | **3,268** |
| *Residential* | | | 76 | 178 | 343 | 476 | 294 | 165 | 156 | 330 | 262 | 96 | 53 | |
| *Non Residential* | | | 0 | 63 | 66 | 163 | 153 | 98 | 48 | 88 | 103 | 44 | 12 | |
| **Vendor Trips** | | | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| *Residential* | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| *Non Residential* | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ***Hauling Trips[2]*** | 192 | 256 | 256 | 192 | 0 | 64 | 192 | 192 | 64 | 0 | 0 | 0 | 0 | 1,408 |
| **Total Trips** | **487** | **633** | **1,453** | **3,602** | **4,213** | **3,837** | **3,418** | **2,463** | **1,571** | **2,903** | **2,529** | **954** | **422** | **28,483** |

**Table 2-6. Building Construction and Architectural Coating Worker and Vendor Trips Adjustment**
RMDP/SCP
Los Angeles County, California

| **Derivation of Adjustment Factor**[3] | |
|---|---|
| **Total Emissions from Building Construction and Architectural Coating Worker/Vendor Daily Trips ($MTCO_2e$)**[4] | **39,969** |
| **Building Construction and Architectural Coating Worker/Vendor Trip Emissions as Estimated by CalEEMod ($MTCO_2e$)** | **293,515** |
| **% Actual Emissions Relative to CalEEMod-Estimated Emissions**[5] | **13.6%** |

Notes:
[1] Total land use was distributed by year based on the building construction and architectural coating schedule.
[2] This analysis assumed 64 daily vegetation hauling trips for the grading phases.

[3] For purposes of this Project, CalEEMod®'s default parameters result in an over-estimation of the number of vendor and worker trips during the building construction and architectural coating phases due to the model's assumption that all buildings are constructed simultaneously during every year of construction activity. This Project proposes to phase development, such that construction-related activities will occur on various portions of the total development area from year-to-year. Therefore, this table calculates an adjustment factor that is used to correct CalEEMod®'s number of vendor and worker trips based on the estimated number of residential dwelling units and non-residential square footage being built and painted in each calendar year.

[4] The estimated emissions generated from worker and vendor trips during the Project's building construction and architectural coating phases are based on a Project-specific construction schedule along with CalEEMod® default trip lengths, trip rate factors, and fleet mix. Emission factors used are based on EMFAC2011, running and starting emissions for $CO_2$ and $CH_4$ only

[5] The adjustment factor is calculated by dividing the corrected emissions with CalEEMod®'s overestimated results. This percentage is applied to the emissions from worker and vendor trips during the building construction and architectural coating phases for each construction stage.

Abbreviations:
AC - architectural coating
BC - building construction
CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalent
EMFAC - California Air Resources Board Emission Factor Model
MT - metric tonnes
sqft - square feet

**Table 2-7. Annual GHG Construction Emissions from Off-Road Equipment - Stages 1 through 6**
RMDP/SCP
Los Angeles County, California

| Stage | Construction Phase | $CO_2e$ Emissions (MT)[1, 2, 3] Offroad Equipment | Total |
|---|---|---|---|
| 1 | Grading | 12,793 | **17,014** |
| | Trenching | 1,688 | |
| | Paving | 944 | |
| | Building Construction | 1,439 | |
| | Architectural Coating | 150 | |
| 2 | Grading | 7,015 | **9,010** |
| | Trenching | 644 | |
| | Paving | 35 | |
| | Building Construction | 1,185 | |
| | Architectural Coating | 131 | |
| 3 | Grading | 28,770 | **41,835** |
| | Trenching | 5,791 | |
| | Paving | 422 | |
| | Building Construction | 6,258 | |
| | Architectural Coating | 593 | |
| 4 | Grading | 48,689 | **56,410** |
| | Trenching | 1,746 | |
| | Paving | 141 | |
| | Building Construction | 5,288 | |
| | Architectural Coating | 545 | |
| 5 | Grading | 3,943 | **8,741** |
| | Trenching | 2,208 | |
| | Paving | 69 | |
| | Building Construction | 2,243 | |
| | Architectural Coating | 278 | |
| 6 | Grading | 5,143 | **8,604** |
| | Trenching | 799 | |
| | Paving | 53 | |
| | Building Construction | 2,352 | |
| | Architectural Coating | 256 | |
| | | **Grand Total** | **141,612** |

Notes:

[1] Emissions estimated using CalEEMod® version 2013.2.2.

[2] $CO_2e$ includes $CO_2$, $CH_4$, and $N_2O$ emissions, weighted by their respective Fourth Assessment Report (AR4) global warming potential (GWP). Based on Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report released in 2007, the GWPs for $CH_4$ and $N_2O$ were updated from 21 to 25 and from 310 to 298, respectively. Available at: https://www.ipcc.ch/publications_and_data/ ar4/wg1/en/ch2s2-10-2.html, Table 2.14. Accessed: September 2016.

[3] This analysis assumes that the off-road, diesel-powered construction equipment greater than 50 horsepower used to grade the Project site shall meet the USEPA's Tier 3 standards at a minimum; construction equipment shall achieve the Tier 4 standards, where feasible.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalent
GHG - greenhouse gases
MT - metric tonnes
$N_2O$ - nitrous oxide
USEPA - United States Environmental Protection Agency

**Table 2-8. Annual GHG Construction Emissions from On-Road Vehicles - Stages 1 through 6**
RMDP/SCP
Los Angeles County, California

| Stage | Construction Phase | $CO_2e$ Emissions (MT)[1,2] | | | |
|---|---|---|---|---|---|
| | | Worker[3] | Vendor[3] | Hauling | Total |
| 1 | Grading | 415 | 0 | 2,372 | **8,418** |
| | Trenching | 114 | 0 | 0 | |
| | Paving | 101 | 0 | 0 | |
| | Building Construction | 3,335 | 1,451 | 0 | |
| | Architectural Coating | 631 | 0 | 0 | |
| 2 | Grading | 194 | 0 | 766 | **2,735** |
| | Trenching | 31 | 0 | 0 | |
| | Paving | 5 | 0 | 0 | |
| | Building Construction | 1,052 | 477 | 0 | |
| | Architectural Coating | 210 | 0 | 0 | |
| 3 | Grading | 716 | 0 | 1,723 | **16,152** |
| | Trenching | 199 | 0 | 0 | |
| | Paving | 104 | 0 | 0 | |
| | Building Construction | 8,362 | 3,441 | 0 | |
| | Architectural Coating | 1,608 | 0 | 0 | |
| 4 | Grading | 1,216 | 0 | 2,714 | **15,757** |
| | Trenching | 77 | 0 | 0 | |
| | Paving | 19 | 0 | 0 | |
| | Building Construction | 6,668 | 3,818 | 0 | |
| | Architectural Coating | 1,244 | 0 | 0 | |
| 5 | Grading | 122 | 0 | 738 | **3,662** |
| | Trenching | 116 | 0 | 0 | |
| | Paving | 14 | 0 | 0 | |
| | Building Construction | 1,709 | 639 | 0 | |
| | Architectural Coating | 324 | 0 | 0 | |
| 6 | Grading | 117 | 0 | 690 | **4,782** |
| | Trenching | 28 | 0 | 0 | |
| | Paving | 9 | 0 | 0 | |
| | Building Construction | 1,999 | 1,539 | 0 | |
| | Architectural Coating | 400 | 0 | 0 | |
| | | | | **Grand Total** | **51,507** |

Notes:

[1] Emissions estimated using CalEEMod® version 2013.2.2.

[2] $CO_2e$ includes $CO_2$, $CH_4$, and $N_2O$ emissions, weighted by their respective Fourth Assessment Report (AR4) global warming potential (GWP). Based on Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report released in 2007, the GWPs for $CH^4$ and $N_2O$ were updated from 21 to 25 and from 310 to 298, respectively. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html, Table 2.14. Accessed: September 2016.

[3] Emissions associated with worker and vendor trips for building construction and architectural coating were scaled by the adjustment factor to account for the inaccuracy in how CalEEMod® evaluates phased construction.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalent
GHG - greenhouse gases
MT - metric tonnes
$N_2O$ - nitrous oxide

**Table 2-9. Summary of GHG Construction Emissions - Stages 1 through 6**
RMDP/SCP
Los Angeles County, California

| Stage | Year | $CO_2e$ Emissions (MT)[1] | | |
|---|---|---|---|---|
| | | **Off-Road** | **On-Road** | **Total** |
| 1 | 2018 | 3,487 | 1,045 | 4,532 |
| | 2019 | 4,465 | 801 | 5,266 |
| | 2020 | 4,320 | 692 | 5,013 |
| | 2021 | 2,827 | 1,089 | 3,916 |
| | 2022 | 272 | 699 | 970 |
| | 2023 | 272 | 690 | 961 |
| | 2024 | 272 | 686 | 958 |
| | 2025 | 272 | 680 | 952 |
| | 2026 | 272 | 674 | 946 |
| | 2027 | 272 | 669 | 941 |
| | 2028 | 284 | 694 | 978 |
| | **Total** | **17,014** | **8,418** | **25,432** |
| | | | **30-yr amortized[3]** | **848** |
| 2 | 2018 | 2,909 | 311 | 3,220 |
| | 2019 | 4,564 | 670 | 5,234 |
| | 2020 | 396 | 249 | 645 |
| | 2021 | 285 | 382 | 667 |
| | 2022 | 285 | 377 | 662 |
| | 2023 | 285 | 372 | 657 |
| | 2024 | 286 | 372 | 659 |
| | **Total** | **9,010** | **2,735** | **11,745** |
| | | | **30-yr amortized[3]** | **391** |
| 3 | 2020 | 10,233 | 796 | 11,029 |
| | 2021 | 8,812 | 949 | 9,761 |
| | 2022 | 2,751 | 1,593 | 4,345 |
| | 2023 | 3,290 | 1,600 | 4,890 |
| | 2024 | 5,268 | 1,924 | 7,192 |
| | 2025 | 7,722 | 2,116 | 9,837 |
| | 2026 | 737 | 1,455 | 2,192 |
| | 2027 | 737 | 1,444 | 2,181 |
| | 2028 | 734 | 1,429 | 2,163 |
| | 2029 | 737 | 1,426 | 2,163 |
| | 2030 | 816 | 1,419 | 2,235 |
| | **Total** | **41,835** | **16,152** | **57,987** |
| | | | **30-yr amortized[3]** | **1,933** |
| 4 | 2023 | 15,236 | 907 | 16,143 |
| | 2024 | 17,162 | 1,494 | 18,656 |
| | 2025 | 17,004 | 1,480 | 18,484 |
| | 2026 | 2,200 | 2,448 | 4,648 |
| | 2027 | 1,234 | 2,382 | 3,616 |
| | 2028 | 1,145 | 2,355 | 3,500 |
| | 2029 | 1,149 | 2,351 | 3,501 |
| | 2030 | 1,279 | 2,341 | 3,620 |
| | **Total** | **56,410** | **15,757** | **72,166** |
| | | | **30-yr amortized[3]** | **2,406** |

**Table 2-9. Summary of GHG Construction Emissions - Stages 1 through 6**
RMDP/SCP
Los Angeles County, California

| Stage | Year | $CO_2e$ Emissions (MT)[1] | | |
|---|---|---|---|---|
| | | Off-Road | On-Road | Total |
| 5 | 2018 | 3,587 | 676 | 4,263 |
| | 2019 | 2,101 | 276 | 2,378 |
| | 2020 | 656 | 266 | 922 |
| | 2021 | 473 | 422 | 894 |
| | 2022 | 384 | 411 | 795 |
| | 2023 | 384 | 406 | 789 |
| | 2024 | 387 | 407 | 793 |
| | 2025 | 385 | 401 | 786 |
| | 2026 | 385 | 398 | 783 |
| | **Total** | **8,741** | **3,662** | **12,403** |
| | | | **30-yr amortized[3]** | **413** |
| 6 | 2020 | 4,763 | 727 | 5,491 |
| | 2021 | 1,535 | 596 | 2,131 |
| | 2022 | 252 | 394 | 646 |
| | 2023 | 252 | 390 | 642 |
| | 2024 | 252 | 388 | 640 |
| | 2025 | 252 | 385 | 637 |
| | 2026 | 252 | 382 | 634 |
| | 2027 | 252 | 380 | 632 |
| | 2028 | 252 | 378 | 630 |
| | 2029 | 252 | 376 | 628 |
| | 2030 | 289 | 385 | 674 |
| | **Total** | **8,604** | **4,782** | **13,386** |
| | | | **30-yr amortized[3]** | **446** |
| | | | **Grand Total** | **193,119** |
| | | | **30-yr amortized[3]** | **6,437** |

Notes:

[1] Emissions estimated using CalEEMod® version 2013.2.2. See Tables 2-7 and 2-8 for detailed emission inventories of the Off-Road Equipment, and On-Road Vehicles categories, respectively.

[2] $CO_2e$ includes $CO_2$, $CH_4$, and $N_2O$ emissions, weighted by their respective Fourth Assessment Report (AR4) global warming potential (GWP). Based on Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report released in 2007, the GWPs for $CH_4$ and $N_2O$ were updated from 21 to 25 and from 310 to 298, respectively. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html,
Table 2.14. Accessed: September 2016.

[3] This approach to one-time construction and vegetation change GHG emissions is based on the GHG Threshold Working Group Meeting #13 Minutes from August 26, 2009. Available at: http://sfprod.aqmd.gov/ docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-13/ghg-meeting-13-minutes.pdf?sfvrsn=2. Accessed: September 2016.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalents
GHG - greenhouse gases
MT - metric tonnes
$N_2O$ - nitrous oxide
yr - year

**Table 2-10a. Number of Net New Trees**
RMDP/SCP
Los Angeles County, California

| Area | Tree Type | Number of Net New Trees[1] |
|---|---|---|
| **ES** | Miscellaneous | 2,500 |
| **NRSP** | Miscellaneous | 35,000 |
| **VCC** | Miscellaneous | 5,000 |
| **Total** | | **42,500** |

Notes:
[1] Number of new trees was based on Project specific estimates.

Abbreviations:
ES - Entrada South
NRSP - Newhall Ranch Specific Plan
VCC - Valencia Commerce Center

**Table 2-10b. Vegetation Change Evaluation**
RMDP/SCP
Los Angeles County, California

| Area | Type of Vegetation Change | Land Use Change[1] Initial (acres) | Final (acres) | $CO_2$ emissions[2] (MT) |
|---|---|---|---|---|
| ES | Cropland | 44.0 | 0.0 | 273 |
| | Grassland | 5.8 | 0.0 | 25 |
| | Trees | 1.7 | 0.0 | 189 |
| | Scrub | 149.3 | 0.0 | 2135 |
| | **Total vegetation change** | **200.8** | **0** | **2621** |
| NRSP | Agricultural, Developed, or Disturbed | 2,036.3 | 138.0 | 11,769 |
| | Bog and Marsh | 8.8 | 0.0 | 0 |
| | Broad Leaf Upland Trees | 107.0 | 0.0 | 11,877 |
| | Grass and Herbs | 950.5 | 0.0 | 4,097 |
| | Riparian and Bottomland | 82.6 | 0.0 | 9,169 |
| | Scrub and Chaparral | 1,903.4 | 0.0 | 27,219 |
| | **Total vegetation change** | **5088.6** | **138** | **64,130** |
| VCC | Cropland | 86.0 | 0.0 | 533 |
| | Grassland | 63.3 | 0.0 | 273 |
| | Trees | 18.5 | 0.0 | 2,054 |
| | Scrub | 37.6 | 0.0 | 538 |
| | Wetlands | 0.6 | 0.0 | 0 |
| | **Total vegetation change** | **206.0** | **0** | **3,397** |
| **Total** | | **5,495** | **138** | **70,149** |
| **$CO_2$e sequestered from Net New Trees (MT)[4]** | | | | **-30,090** |
| **Total $CO_2$e emissions released (MT)** | | | | **40,059** |
| **30-yr amortized (MT/yr)** | | | | **1,335** |

Notes:

[1] Land use change was based on the California Department of Fish & Wildlife, Draft Joint EIS/EIR for the RMDP and SCP Project (April 2009; SCH No. 2000011025), Volume XVI – Appendix 8.0 [ENVIRON International Corporation, Climate Change Technical Report (February 2009)]. Table 4-2-B.

[2] Emissions were estimated using CalEEMod® version 2013.2.2.

[3] Two sets of tree land use change were modeled, based on the land designations of 'Broad Leaf Upland' and 'Riparian and Bottomland' in the table cited in Note 1.

[4] Total $CO_2$e sequestered over 20 year active growth period of new trees, as recommended by the Intergovernmental Panel on Climate Change (IPCC). The negative value indicates $CO_2$e emissions sequestration, as opposed to emissions. See Table 3-10a for number of net new trees.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
ES - Entrada South
NRSP - Newhall Ranch Specific Plan
MT - metric tonnes
VCC - Valencia Commerce Center
yr - year

**Table 2-11. GHG Emissions from Area Sources**
RMDP/SCP
Los Angeles County, California

| Area | Area Sources[1] | Condition[2] |
|---|---|---|
| | | Unmitigated Project |
| **ES** | Landscaping | 30 |
| **NRSP** | Landscaping | 337 |
| **VCC** | Landscaping | 0.09 |
| **Total $CO_2$e Emissions (MT)** | | **367** |

Notes:

[1] Categories that CalEEMod® classifies as "Area Sources." CalEEMod® does not associate any $CO_2$e emissions with architectural coatings or consumer products. Any emissions from hearths are assumed to be captured in the ConSol residential building energy modeling.

[2] Emissions were estimated using CalEEMod® version 2013.2.2.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2$e - carbon dioxide equivalents
ES - Entrada South
GHG - greenhouse gases
NRSP - Newhall Ranch Specific Plan
MT - metric tonnes
VCC - Valencia Commerce Center

References:

ConSol. 2016. *Newhall Land & Farming Company, Residential and Commercial Building Analysis.*

**Table 2-12. Utility GHG Intensity Factor Associated with Renewable Portfolio Standard**
RMDP/SCP
Los Angeles County, California

| Energy Delivered[1] [MWh] | | | | |
|---|---|---|---|---|
| | **2006** | **2007** | **Average** | **Units** |
| Total Energy Delivery[1] | 82,776,309 | 83,958,770 | -- | MWh |
| from renewables[2] | 12,670,583 | 12,476,219 | | MWh |
| from non-renewables | 70,105,726 | 71,482,551 | -- | MWh |
| % of Total Energy From Renewables[2] | 15% | 15% | -- | |
| % of Total Energy From Non-Renewables | 85% | 85% | -- | |
| Total $CO_2$ Emissions[1] | 24,077,133 | 24,026,108 | -- | MT $CO_2$ |
| | | | | |
| $CO_2$ Intensity Factor per Total Energy Delivered[1] | 641.26 | 630.89 | 636.07 | lbs $CO_2$/MWh delivered |
| $CO_2$ Intensity Factor per Total Non-Renewable Energy[3] | 757.16 | 741.00 | -- | lbs $CO_2$/MWh delivered |
| | | | | |
| **Estimated Intensity Factors for Total Energy Delivered[4]** | | | | |
| 2010 RPS (20%) | **605.7** | **592.8** | **599.26** | lbs $CO_2$/MWh delivered |
| 2020 RPS (33%) | **507.3** | **496.5** | **501.88** | lbs $CO_2$/MWh delivered |
| 2030 RPS (50%) | **378.6** | **370.5** | **374.54** | lbs $CO_2$/MWh delivered |

Notes:

[1] Total energy delivery and total $CO_2$ emissions are provided in SCE Power/Utility Protocol (PUP) Reports. Available at: http://www.climateregistry.org/tools/carrot.html. Accessed: September 2016.

[2] Renewable energy delivered is the sum of biogenic, geothermal and other renewable generations in PUP reports.

[3] The emissions metric presented here is calculated based on the total $CO_2$ emissions divided by the energy delivered from non-renewable sources.

[4] The intensity factors for default RPS assumption are estimated by multiplying the percentage of energy delivered from non-renewable energy by the $CO_2$ emissions per total non-renewable energy metric calculated above. Three emission factors are presented here: the 20% RPS for 2010, the 33% RPS for 2020, and 50% RPS for 2030. The estimate provided here and the PUP reports issued by SCE assume that renewable energy sources do not result in any $CO_2$ emissions.

Abbreviations:

$CO_2$ - carbon dioxide
GHG - greenhouse gases
lbs - pounds
MT - metric tonnes
MWh - megawatt-hour
RPS - Renewable Portfolio Standards
SCE - Southern California Edison

**Table 2-13a. Residential Electricity and Natural Gas Usage Rates**
RMDP/SCP
Los Angeles County, California

| Unmitigated Condition: Title 24 - 2016 Standards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CalEEMod® Land Use Subtype** | **ConSol Land Use Subtype[1]** | **Title 24 Electricity[2]** | **Non-Title 24 Electricity[3]** | **Lighting Electricity[4]** | **Title 24 Natural Gas[5]** | **Non-Title 24 Natural Gas[6]** | **Total Electricity[7]** | **Total Natural Gas[7]** |
| | | **kWh/unit/yr** | **kWh/unit/yr** | **kWh/unit/yr** | **kBTU/unit/yr** | **kBTU/unit/yr** | **kWh/unit/yr** | **kBTU/unit/yr** |
| Condo/Townhouse | Multifamily | 499 | 2,855 | 308 | 8,700 | 1,200 | 3,662 | 9,900 |
| Single Family Housing | Single Family | 879 | 4,244 | 767 | 20,500 | 1,500 | 5,890 | 22,000 |

Notes:
[1] CalEEMod® land use types were mapped to the most representative land use types from ConSol based on the similarity of emission factors in CalEEMod®.
[2] Title 24 electricity is the "regulated loads" kWh shown in the ConSol Report (see Appendix C).
[3] Non-Title 24 electricity is the sum of "Appliance & Cooking kWh" and "Plug Load kWh" shown in ConSol Report (see Appendix C).
[4] Lighting electricity is the sum of "Interior Lighting kWh" and "Exterior Lighting kWh" shown in ConSol Report (see Appendix C). Sum may differ from Appendix C due to rounding.
[5] Title 24 natural gas is the "regulated loads" Therms shown in Appendix C.
[6] Non-Title 24 natural gas is the "Appliance & Cooking Therms" shown in ConSol Report (see Appendix C).
[7] Total electricity and total natural gas are not used in CalEEMod® inputs.

Abbreviations:
CalEEMod® - CALifornia Emissions Estimator MODel
CEC - California Energy Commission
kBTU - 1,000 British thermal units
kWh - kilowatt-hour
yr - year

References:

CEC. 2016. 2016 Building Energy Efficiency Standards Approved Computer Compliance Programs. Available at: http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html. Accessed: September 2016.

ConSol. 2016. *Newhall Land & Farming Company, Residential and Commercial Building Analysis.*

**Table 2-13b. Non-Residential Electricity and Natural Gas Usage Rates**
RMDP/SCP
Los Angeles County, California

| Non-residential Electricity Usage Rates | | | | | | |
|---|---|---|---|---|---|---|
| CalEEMod® Land Use Subtype | ConSol Land Use Prototype[1] | 2008 Title 24 Electricity[2] | Total Lighting and Non-2008 Title 24 Electricity | Total 2008 Electricity | Reduction to Total 2016 Electricity[3] | Total 2016 Electricity |
| | | kWh/unit/yr | kWh/unit/yr | kWh/unit/yr | % | kWh/unit/yr |
| Elementary School | Office | 2.13 | 4.57 | 6.70 | 7.7% | 6.18 |
| General Light Industry | Industrial | 2.75 | 9.30 | 12.05 | 21.5% | 9.46 |
| General Office Building | Office | 5.62 | 8.91 | 14.53 | 7.7% | 13.41 |
| Health Club | Industrial | 2.75 | 9.30 | 12.05 | 21.5% | 9.46 |
| High School | Office | 2.13 | 4.57 | 6.70 | 7.7% | 6.18 |
| Hotel | Office | 3.12 | 5.38 | 8.50 | 7.7% | 7.84 |
| Industrial Park | Industrial | 5.62 | 8.91 | 14.53 | 21.5% | 11.41 |
| Library | Industrial | 2.75 | 9.30 | 12.05 | 21.5% | 9.46 |
| Office Park | Office | 6.86 | 9.04 | 15.90 | 7.7% | 14.67 |
| Regional Shopping Center | Retail | 4.90 | 10.27 | 15.17 | 21.6% | 11.89 |
| **Non-residential Natural Gas Usage Rates** | | | | | | |
| CalEEMod® Land Use Subtype | ConSol Land Use Prototype[2] | 2008 Title 24 Natural Gas[2] | Total Lighting and Non-2008 Title 24 Natural Gas | Total 2008 Natural Gas | Reduction in Total 2016 Natural Gas[3] | Total 2016 Natural Gas |
| | | kBTU/unit/yr | kBTU/unit/yr | kBTU/unit/yr | % | kBTU/unit/yr |
| Elementary School | Office | 9.81 | 1.08 | 10.89 | 13.8% | 9.39 |
| General Light Industry | Industrial | 14.36 | 4.45 | 18.81 | -2.4% | 19.27 |
| General Office Building | Office | 10.54 | 0.39 | 10.93 | 13.8% | 9.43 |
| Health Club | Industrial | 14.36 | 4.45 | 18.81 | -2.4% | 19.27 |
| High School | Office | 9.81 | 1.08 | 10.89 | 13.8% | 9.39 |
| Hotel | Office | 20.96 | 4.06 | 25.02 | 13.8% | 21.58 |
| Industrial Park | Industrial | 10.54 | 0.39 | 10.93 | -2.4% | 11.20 |
| Library | Industrial | 14.36 | 4.45 | 18.81 | -2.4% | 19.27 |
| Office Park | Office | 10.10 | 0.19 | 10.29 | 13.8% | 8.87 |
| Regional Shopping Center | Retail | 1.21 | 0.49 | 1.70 | 22.3% | 1.32 |

Notes:

1 CalEEMod® land use types were mapped to the most representative land use types from ConSol based on the similarity of emission factors in CalEEMod®.

2 Default energy use rates from CalEEMod® Appendix D, Table 8.1 were used for 2008 Title 24 electricity and natural gas. The reduction from 2008 Title 24 to 2016 Title 24 is based on ConSol building energy modeling as described in Appendix C.

3 The majority of energy consumption in non-residential buildings is regulated under the 2016 California Building Code. Rather than split electricity and gas use into "Title 24", "Lighting", and "Non-Title 24", ConSol modeled the change in total electricity use and total natural gas use for non-residential buildings. These changes were applied to the total default 2008 energy use factors from CalEEMod® (e.g. the sum of the "Title 24", "Lighting", and "Non-Title 24" factors). A negative sign (-) indicates an increase in gas use.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CEC - California Energy Commission
kBTU -1,000 British thermal units
kWh - kilowatt-hour
yr - year

References:

CEC. 2016. 2016 Building Energy Efficiency Standards Approved Computer Compliance Programs. Available at: http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html. Accessed: September 2016.

ConSol. 2016. *Newhall Land & Farming Company Residential and Commercial Building Analysis.*

**Table 2-14a. GHG Emissions Associated with Swimming Pools**
RMDP/SCP
Los Angeles County, California

**I. OAKLAND STUDY TO CALCULATE EMISSIONS FROM SWIMMING POOLS**

| Facility Name[1] | Pool Volume[1] (gal) | Number of Heaters[1] | Heater Rating[1] (BTU/hr) | Operation Schedule[1] (hrs/day) | Operation Schedule[1] (days/yr) | Annual Natural Gas Usage[2] (MMBTU/yr) | Average Annual Natural Gas Usage[3] (MMBTU/gal/yr) | Adjusted Average Annual Natural Gas Usage[3] (MMBTU/gal/yr) | Annual Electricity Usage[4] (kWh/yr) | Average Annual Electricity Usage[5] (kWh/gal/yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| Fremont Pool | 215,000 | 4 | 350,000 | 12 | 243 | 4,082 | 0.023 | **0.014** | 106,872 | **0.496** |
| DeFremery Pool | 226,659 | 1 | 1,738,800 | 10 | 243 | 4,225 | | | 105,120 | |
| Live Oak Pool | 260,000 | 4 | 350,000 | 12 | 365 | 6,132 | | | 95,309 | |
| Lyons Pool | 240,000 | 4 | 350,000 | 12 | 365 | 6,132 | | | 110,376 | |
| Temescal Pool | 227,605 | 4 | 350,000 | 12 | 365 | 6,132 | | | 162,060 | |

**II. ENERGY USE FACTORS AND EMISSION FACTORS TO CALCULATE EMISSIONS FROM NEWHALL LAND SWIMMING POOLS[6]**

| Energy Use Factor | | Emission Factors[7,8,9] (lb $CO_2e$/unit) 2030 Unmitigated | 2030 Mitigated | (unit) | Emission Factors (lb $CO_2e$/gal/yr) 2030 Unmitigated | 2030 Mitigated |
|---|---|---|---|---|---|---|
| 0.496 | (kWh/gal/yr) | 0.377 | 0.377 | (kWh) | 1.82 | 0.19 |
| 0.014 | (MMBTU/gal/yr) | 118.3 | -- | (MMBTU) | | |

**III. EMISSIONS FROM NEWHALL LAND SWIMMING POOLS**

| Villages | Pool Volume[10] (cubic feet) | Pool Volume[10] (gal) | Emissions (MT $CO_2e$/yr) 2030 Unmitigated | Emissions (MT $CO_2e$/yr) 2030 Mitigated | Emission Reductions (MT $CO_2e$/yr) 2030 Unmitigated - Mitigated |
|---|---|---|---|---|---|
| **ES - 2 Pools** | 196,850 | 1,472,543 | 1,215 | 125 | 1,091 |
| **NRSP - 39 Pools** | 3,838,583 | 28,714,595 | 23,702 | 2,436 | 21,266 |
| **Total** | 4,035,433 | 30,187,139 | 24,917 | 2,561 | 22,356 |

Notes:

[1] To estimate the baseline electricity and natural gas energy usage factors for Newhall Land pools, Ramboll Environ calculated the energy consumption of filter pumps and water heaters of 5 pools in Oakland, California and scaled them to present energy consumption per year per volume of the pool. Oakland pools data including pool volume, number of heaters, heater rating, operation schedule, and annual electricity usage are provided in the City of Oakland Energy Efficient Commercial Pool Program Preliminary Facility Reports: City of Oakland / Oakland Unified School District. October 2006. Energy Efficient Commercial Pool Program; Preliminary Facility Reports for DeFremery Pool, Fremont Pool, Live Oak Pool, Lyons Pool, and Temescal Pool.

[2] Annual Natural Gas Usage calculated by multiplying the following factors: (Number of hrs/day) x (Number of days/yr) x (Number of Heaters) x (Heater Rating). Each of these factors were taken from the City of Oakland. Preliminary Facility Reports for DeFremery Pool, Fremont Pool, Live Oak Pool, Lyons Pool, and Temescal Pool.

[3] Average Annual Natural Gas Usage calculated from the Annual Natural Gas Usage of all 5 pools divided by the total Pool Volume of all 5 pools, then was adjusted to account for the higher average ambient temperature in Southern California compared to Oakland (i.e., an average temperature of 55.5 F for Oakland and 63.3 F for Santa Clarita) and also adjusted to account for savings from newer energy efficient heater standards (i.e., Ramboll Environ assumed that the Oakland pools used 78% efficient heaters, which is the minimum efficiency legally required (see 10 CFR Part 431). According to the U.S. Department of Energy, newer pools are likely to use heaters with 89-95% efficiency (see http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13170). Ramboll Environ conservatively assumed 90% efficiency for Santa Clarita pool heaters, resulting in a 12% savings over the Oakland pools).

[4] Annual Electricity Usage for each pool is shown as reported in the City of Oakland Preliminary Facility Reports for DeFremery Pool, Fremont Pool, Live Oak Pool, Lyons Pool, and Temescal Pool.

[5] Average Annual Electricity Usage calculated from the Annual Electricity Usage of all 5 pools divided by the total Pool Volume of all 5 pools.

[6] Similar to the Oakland pools, the Newhall land swimming pools are assumed to use electricity for filters and pumps, and natural gas for water heating.

[7] Only $CO_2$ emissions are estimated and are assumed to be equivalent to total GHG emissions. For this calculation, the contributions from methane ($CH_4$) and nitrous oxide ($N_2O$) are considered negligible when compared to total GHG for emissions associated with electricity generation and natural gas combustion. The emission factors in the California Climate Action Registry General Reporting Protocol show that $CH_4$ and $N_2O$ emissions (in $CO_2e$) are less than 1% of $CO_2$ emissions for these processes.

[8] The emission factor for electricity was obtained from the California Climate Action Registry Database. The electricity generation emission factor was adjusted to reflect 50% RPS for the 2030 Unmitigated Project. The emission factor for natural gas is obtained from CalEEMod® appendix D Table 8.2.

[9] It is assumed that the solar cover replaces all natural gas heating. Thus the estimated mitigated emissions represent those for the electric pumping only.

[10] Project specific estimate for swimming pool dimensions (50m x 25yd x 8ft) based on California Department of Fish & Wildlife, Final Joint EIS/EIR for the RMDP and SCP Project (June 2010; SCH No. 2000011025), Volume VII – Appendix F8.0 [ENVIRON International Corporation, Climate Change Technical Addendum (October 2009). Table 3-F-2.

Abbreviations:

BTU - British thermal units
CalEEMod® - CALifornia Emissions Estimator MODel
CFR - Code of Federal Regulations
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalents
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
ES - Entrada South
F - Fahrenheit
ft - feet
gal - gallon
GHG - greenhouse gases
hr - hour
hrs - hours
kWh - kilowatt-hour
lb - pound
m - meter
MMBTU - million British thermal units
MT - metric tonnes
NRSP - Newhall Ranch Specific Plan
RPS - Renewable Portfolio Standards
yd - yard
yr - year

**Table 2-14b. GHG Emissions Associated with Electricity and Natural Gas**
RMDP/SCP
Los Angeles County, California

| Area | CalEEMod® Land Use | Project Entitlement | Electricity Use[1] kWh/yr | Natural Gas Use[1] kBTU/yr | Associated with Electricity Use MT $CO_2e$/yr | Associated with Natural Gas Burning MT $CO_2e$/yr | Unmitigated Total MT $CO_2e$/yr |
|---|---|---|---|---|---|---|---|
| ES | Condo/Townhouse | Condo/townhouse general | 4,749,610 | 12,840,300 | 812 | 689 | 1,502 |
| | Elementary School | Elementary/Middle School | 370,800 | 563,400 | 63 | 30 | 94 |
| | General Office Building | Commercial Office | 838,125 | 589,375 | 143 | 32 | 175 |
| | Health Club | Recreational Center | 63,382 | 129,109 | 11 | 7 | 18 |
| | Hotel | Hotel | 1,568,000 | 4,316,000 | 268 | 232 | 500 |
| | Regional Shopping Center | Commercial Center | 2,229,380 | 247,500 | 381 | 13 | 395 |
| | Single Family Housing | Single Family Housing | 2,520,920 | 9,416,000 | 431 | 505 | 937 |
| | | **Sub-Total** | **12,340,217** | **28,101,684** | **2,111** | **1,509** | **3,619** |
| NRSP | Condo/Townhouse | Condo/townhouse general | 41,018,100 | 110,890,000 | 7,015 | 5,953 | 12,968 |
| | Elementary School | Elementary/Middle School | 2,209,970 | 3,357,860 | 378 | 180 | 558 |
| | General Light Industry | Fire Station | 313,126 | 637,837 | 54 | 34 | 88 |
| | General Office Building | Commercial Office | 13,718,430 | 9,646,890 | 2,346 | 518 | 2,864 |
| | Golf Course | Golf Course | 0 | 0 | 0 | 0 | 0 |
| | Health Club | Recreational Center | 409,618 | 834,391 | 70 | 45 | 115 |
| | High School | High School | 880,032 | 1,337,140 | 151 | 72 | 222 |
| | Hotel | Hotel | 784,000 | 2,158,000 | 134 | 116 | 250 |
| | Industrial Park | Industrial Park | 8,625,960 | 8,467,200 | 1,475 | 455 | 1,930 |
| | Library | Library | 340,560 | 693,720 | 58 | 37 | 95 |
| | Office Park | Business Park | 4,753,080 | 2,873,880 | 813 | 154 | 967 |
| | Regional Shopping Center | Commercial Center | 38,606,800 | 4,286,040 | 6,603 | 230 | 6,833 |
| | Single Family Housing | Single Family Housing | 48,981,200 | 182,952,000 | 8,377 | 9,821 | 18,198 |
| | | **Sub-Total** | **160,640,876** | **328,134,958** | **27,474** | **17,615** | **45,089** |
| VCC | Industrial Park | Industrial Park | 26,243,000 | 25,760,000 | 4,488 | 1,383 | 5,871 |
| | Office Park | Business Park | 16,137,000 | 9,757,000 | 2,760 | 524 | 3,284 |
| | | **Sub-Total** | **42,380,000** | **35,517,000** | **7,248** | **1,907** | **9,155** |
| | | **Total** | **215,361,093** | **391,753,642** | **36,833** | **21,030** | **57,862** |

Notes:

[1] Energy and natural gas usage for each land use category was estimated assuming compliance with 2016 Title 24. Emissions were estimated using CalEEMod ® version 2013.2.2, with energy use estimates adjusted based on ConSol building energy analysis (see Appendix C and Tables 2-13a and 2-13b). Energy use and emissions from the recreational swimming pools are added separately to the emissions inventory and not included here.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2e$ - carbon dioxide equivalents
ES - Entrada South
GHG - greenhouse gases
kBTU - 1,000 British thermal units
kWh - kilowatt-hour
MT - metric tonnes
NRSP - Newhall Ranch Specific Plan
SCAQMD - South Coast Air Quality Management District
VCC - Valencia Commerce Center
yr - year

References:

SCAQMD. 2013. CalEEMod® User's Guide. Available at: http://caleemod.com/. Accessed: September 2016.
ConSol, *Newhall Land & Farming Company Residential and Commercial Building Analysis* (2016)

**Table 2-15a. Derivation of Ratios to Calculate Water Demand**
RMDP/SCP
Los Angeles County, California

| Area | Description | RMDP/SCP Alternative 2, 2010 Analysis | Project | Units |
|---|---|---|---|---|
| | | Quantity | | |
| NRSP | Residential Dwelling Units[1] | 20,885 | 19,517 | DU |
| | Commercial Building Area[1] | 5,550 | 5,450 | TSF |
| | Residential % of Potable Demand[2] | 93.7% | | -- |
| | Commercial % of Potable Demand[2] | 6.3% | | |
| | Weighted Ratio of Project DU and TSF to 2010 Project DU and TSF[3] | 93.8% | | |
| ES | Residential Dwelling Units[1] | 1,725 | 1,725 | DU |
| | Commercial Building Area[1] | 495 | 450 | TSF |
| | Residential % of Water Demand[4] | 76.7% | | -- |
| | Commercial % of Water Demand[4] | 23.3% | | |
| | Weighted Ratio of Project DU and TSF to 2010 Project DU and TSF[3] | 97.9% | | |
| VCC | Residential Dwelling Units[1] | -- | -- | DU |
| | Commercial Building Area[1] | 3,400 | 3,400 | TSF |
| | Residential % of Water Demand[5] | -- | | -- |
| | Commercial % of Water Demand[5] | 100% | | |
| | Weighted Ratio of Project TSF to 2010 Project TSF[3] | 100.0% | | |

Notes:

[1] Residential land use DU and commercial land use TSF values are from the 2010 EIR and current Project analyses. Land uses for the current Project are shown in Table 2-1.

[2] The potable water demand for NRSP is from Figure 1 in the 2008 GSI Water Study for NRSP. Total potable demand is 8,135 acre-ft/yr. Residential potable demand is 7,620 acre-ft/yr. Nonresidential potable demand is 500 acre-ft/yr. Demand for the Open Area (15 acre-ft/yr) is assigned to the nonresidential land use type so that all water is included in the scaling factor.

[3] The water demand percentages are used to adjust the water demand from the 2010 EIR to the Project analysis.

[4] The split between residential and non-residential water demand is based on the ratio of water that would be used for residential versus non-residential land uses if CalEEMod® defaults were used to calculate water demand. A reference CalEEMod® run, using the ES land use types and unit counts, results in total default water demand of 183.2 Mgal/yr for residential land uses and 55.7 Mgal/yr for non-residential land uses, which equates to 76.7% and 23.3% of total water demand, respectively.

[5] VCC does not include any residential dwelling units. Thus, all water is allocated to non-residential land uses for purpose of adjusting total water demand from the 2010 EIR to the Project analysis.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
EIR - Environmental Impact Report
ES - Entrada South
DU - dwelling unit
ft - feet
Mgal - million gallons
NRSP - Newhall Ranch Specific Plan
TSF - thousand square feet
VCC - Valencia Commerce Center
yr - year

**Table 2-15b. Project Water Demand**
RMDP/SCP
Los Angeles County, California

| Area | Description[1] | RMDP/SCP Alternative 2, 2010 FEIR[2] | | | | Water Demand (2030 Project)[3] | |
|---|---|---|---|---|---|---|---|
| | | Quantity | Units | Quantity | Units | Quantity | Units |
| NRSP | Indoor Water Demand | 5,230 | Acre-ft/yr | 1,704 | Mgal/yr | 1,278 | Mgal/yr |
| | Outdoor Water Demand | 11,170 | Acre-ft/yr | 3,640 | Mgal/yr | 3,412 | Mgal/yr |
| | Total Water Demand | 16,400 | Acre-ft/yr | 5,344 | Mgal/yr | 4,690 | Mgal/yr |
| | Recycled Water | 8,265 | Acre-ft/yr | 2,693 | Mgal/yr | 2,525 | Mgal/yr |
| | % Recycled Water (of outdoor water) | 74% | | | | 74% | |
| ES | Indoor Water Demand | 1,106 | Acre-ft/yr | 361 | Mgal/yr | 282 | Mgal/yr |
| | Outdoor Water Demand | 1,323 | Acre-ft/yr | 431 | Mgal/yr | 422 | Mgal/yr |
| | Total Water Demand | 2,429 | Acre-ft/yr | 791 | Mgal/yr | 704 | Mgal/yr |
| | Recycled Water | 979 | Acre-ft/yr | 319 | Mgal/yr | 312 | Mgal/yr |
| | % Recycled Water (of outdoor water)[4] | 74% | | | | 74% | |
| VCC | Indoor Water Demand | 391 | Acre-ft/yr | 127 | Mgal/yr | 102 | Mgal/yr |
| | Outdoor Water Demand | 689 | Acre-ft/yr | 225 | Mgal/yr | 225 | Mgal/yr |
| | Total Water Demand | 1,080 | Acre-ft/yr | 352 | Mgal/yr | 326 | Mgal/yr |
| | Recycled Water | 510 | Acre-ft/yr | 166 | Mgal/yr | 166 | Mgal/yr |
| | % Recycled Water (of outdoor water)[4] | 74% | | | | 74% | |

Notes:

[1] The sum of indoor water demand and outdoor water demand equals total water demand. The recycled water is assumed to only be used outdoors. Recycled water percentage is calculated as the recycled water divided by the outdoor water demand.

[2] Water usage based on California Department of Fish & Wildlife, Final Joint EIS/EIR for the RMDP and SCP Project (June 2010; SCH No. 2000011025), Volume VII – Appendix F8.0 [ENVIRON International Corporation, Climate Change Technical Addendum (October 2009), Tables 3-E-2-NRSP, 3-E-2-Entrada, and 3-E-2-VCC. Converted from acre-ft/yr to Mgal/yr to input into CalEEMod®.

[3] The weighted ratio of project DU and TSF to 2010 DU and TSF shown in Table 2-15a were used to calculate the 2030 water demand. An additional 20% reduction of indoor water usage was taken based on regulations requiring water efficient fixtures passed since the water study performed for the 2010 EIR.

[4] The percentage of outdoor water that is recycled for ES and VCC is assumed to be the same as for NRSP.

Abbreviations

CalEEMod® - CALifornia Emissions Estimator MODel
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
ES - Entrada South
DU - dwelling unit
FEIR - Final Environmental Impact Report
ft - feet
Mgal - million gallons
NRSP - Newhall Ranch Specific Plan
TSF - thousand square feet
VCC - Valencia Commerce Center
yr - year

**Table 2-15c. GHG Emissions Reductions Associated with Recycled Water**
RMDP/SCP
Los Angeles County, California

| Area | | ES | | | | NRSP | | | | VCC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category | | Unmitigated Project (if no recycled water) | | Unmitigated Project | | Unmitigated Project (if no recycled water) | | Unmitigated Project | | Unmitigated Project (if no recycled water) | | Unmitigated Project | |
| Total Outdoor Water Use (Mgal/yr)[1] | | 422 | | 422 | | 3,412 | | 3,412 | | 225 | | 225 | |
| Outdoor Water Source | | Recycled Water | Potable Water | Recycled Water | Potable Water | Recycled Water | Potable Water | Recycled Water | Potable Water | Recycled Water | Potable Water | Recycled Water | Potable Water |
| Percentage by Source[1] | | 0% | 100% | 74% | 26% | 0% | 100% | 74% | 26% | 0% | 100% | 74% | 26.0% |
| Water Use by Source (Mgal/yr) | | 0 | 422 | 312 | 110 | 0 | 3,412 | 2,525 | 887 | 0 | 225 | 166 | 58 |
| Electricity Intensity Factors (kWh/Mgal)[2] | Supply | -- | 9,727 | -- | 9,727 | -- | 2,917 | -- | 2,917 | -- | 9,727 | -- | 9,727 |
| | Treat | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 111 | 111 |
| | Distribute | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 | 1,272 |
| Annual Energy Use by Source (kWh/yr)[3] | | 0 | 4,686,453 | 431,702 | 1,218,478 | 0 | 14,672,721 | 3,492,176 | 3,814,907 | 0 | 2,494,728 | 229,807 | 648,629 |
| Total Annual Energy Use (kWh/yr) | | 4,686,453 | | 1,650,180 | | 14,672,721 | | 7,307,083 | | 2,494,728 | | 878,436 | |
| Electricity Intensity Factors[4] | (lb $CO_2$/MWh) | 374.54 | | 374.54 | | 374.54 | | 374.54 | | 374.54 | | 374.54 | |
| | (lb $CH_4$/MWh) | 0.029 | | 0.029 | | 0.029 | | 0.029 | | 0.029 | | 0.029 | |
| | (lb $N_2O$/MWh) | 0.006 | | 0.006 | | 0.006 | | 0.006 | | 0.006 | | 0.006 | |
| GHG Emissions[5] | (MT $CO_2$/yr) | 796.17 | | 280.35 | | 2,492.73 | | 1,241.39 | | 423.83 | | 149 | |
| | (MT $CH_4$/yr) | 0.06 | | 0.02 | | 0.19 | | 0.10 | | 0.03 | | 0.01 | |
| | (MT $N_2O$/yr) | 0.013 | | 0.004 | | 0.040 | | 0.020 | | 0.007 | | 0.002 | |
| Global Warming Potentials[6] | $CO_2$ | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| | $CH_4$ | 25 | | 25 | | 25 | | 25 | | 25 | | 25 | |
| | $N_2O$ | 298 | | 298 | | 298 | | 298 | | 298 | | 298 | |
| **Total GHG Emissions (MT $CO_2e$ / yr)** | | **801.5** | | **282.2** | | **2,509.5** | | **1,249.7** | | **426.7** | | **150.2** | |
| **GHG Reduction due to Recycled Water (MT $CO_2e$ / yr)[7]** | | **519** | | | | **1,260** | | | | **276** | | | |

Notes:

[1] Outdoor and recycled water usage based on Water Demand as shown in Table 2-15a.

[2] CalEEMod® default assumptions are used for average embodied energy for the supply and conveyance, treatment and distribution of water, as well as treatment of wastewater, for Southern California. For NRSP, the electricity intensity value of 2,917 was used to represent on-site groundwater as the source of water.

[3] For potable water, the water use is multiplied by the sum of the electricity intensity factors to supply, treat and distribute the water. For recycled water, the water use is multiplied by the sum of the electricity intensity factors to treat and distribute the water, since the Project has an onsite water treatment facility which supplies the water.

[4] The $CO_2$ emission intensity factor reflects 50% RPS for 2030 for the Project Condition.

[5] GHG emissions were calculated by multiplying the annual energy use by the electricity intensity factor for each pollutant.

[6] Global warming potentials are the AR4 global warming potentials. Source: IPCC Fourth Assessment Report: Climate Change 2007. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed: September 2016.

[7] GHG reduction from using recycled water for outdoor use was calculated as the difference between GHG emissions from using 100% potable water minus GHG emissions from using 74.0% recycled water (Project) for outdoor water usage.

Abbreviations:

AR4 - Fourth Assessment Report
CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalents
$CH_4$ - methane
ES - Entrada South
GHG - greenhouse gases
IPCC - Intergovernmental Panel on Climate Change
kWh - kilowatt-hour
lb - pound
Mgal - million gallons
MT - metric tonnes
$N_2O$ - nitrous oxide
NRSP - Newhall Ranch Specific Plan
RPS - Renewable Portfolio Standard
VCC - Valencia Commerce Center
yr - year

**Table 2-15d. GHG Emissions Associated with Water Usage**
RMDP/SCP
Los Angeles County, California

| Area | CalEEMod® Land Use | Project Assumption | Indoor Water Use[1] | Outdoor Water Use[1] | Unmitigated Project $CO_2e$ Emissions[2] |
|---|---|---|---|---|---|
| | | | Mgal/yr | | MT/yr |
| ES | Condo/Townhouse | Condo/townhouse general | 162.31 | 244.33 | 1046.63 |
| | Elementary School | Elementary/Middle School | 3.49 | 21.44 | 53.27 |
| | General Office Building | Commercial Office | 21.51 | 31.47 | 136.98 |
| | Health Club | Recreational Center | 0.76 | 1.11 | 4.85 |
| | Hotel | Hotel | 13.93 | 3.70 | 57.02 |
| | Regional Shopping Center | Commercial Center | 26.75 | 39.14 | 170.35 |
| | Single Family Housing | Single Family Housing | 53.56 | 80.63 | 345.40 |
| | **Sub-Total** | | **282** | **422** | **1,814** |
| **GHG Reduction due to Outdoor Recycled Water (MT $CO_2e$/yr)[3]** | | | | | **519** |
| **Sub-Total** | | | | | **1,295** |
| NRSP | Condo/Townhouse | Condo/townhouse general | 475.13 | 1145.62 | 1993.96 |
| | Elementary School | Elementary/Middle School | 7.10 | 69.85 | 68.58 |
| | General Light Industry | Fire Station | 4.97 | 0.00 | 12.04 |
| | General Office Building | Commercial Office | 118.38 | 277.49 | 490.93 |
| | Golf Course | Golf Course | 0.00 | 534.03 | 392.74 |
| | Health Club | Recreational Center | 1.66 | 3.88 | 6.87 |
| | High School | High School | 7.17 | 70.51 | 69.23 |
| | Hotel | Hotel | 2.36 | 1.00 | 6.46 |
| | Industrial Park | Industrial Park | 113.82 | 0.00 | 275.83 |
| | Library | Library | 0.73 | 4.39 | 5.00 |
| | Office Park | Business Park | 37.49 | 87.88 | 155.49 |
| | Regional Shopping Center | Commercial Center | 156.59 | 367.06 | 649.41 |
| | Single Family Housing | Single Family Housing | 352.75 | 850.55 | 1480.38 |
| | **Sub-Total** | | **1,278** | **3,412** | **5,607** |
| **GHG Reduction due to Outdoor Recycled Water (MT $CO_2e$/yr)[3]** | | | | | **1,260** |
| **Sub-Total** | | | | | **4,347** |
| VCC | Industrial Park | Industrial Park | 74.51 | 0.00 | 267.35 |
| | Office Park | Business Park | 27.39 | 224.55 | 524.93 |
| | **Sub-Total** | | **102** | **225** | **792** |
| **GHG Reduction due to Outdoor Recycled Water (MT $CO_2e$/yr)[3]** | | | | | **276** |
| **Sub-Total** | | | | | **516** |
| **RMDP/SCP Total[4]** | | | | | **6,158** |

Notes:

[1] The indoor and outdoor water use determined in Table 2-15a.

[2] Emissions associated with water usage were estimated using CalEEMod® version 2013.2.2 and includes $CO_2$, $CH_4$, and $N_2O$ emissions, which are weighted by their respective AR4 global warming potentials. Source: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4): Climate Change 2007, Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed: September 2016. Electricity intensity factor used in these calculation reflects 50% RPS. NRSP uses groundwater on-site, and hence a lower electricity intensity factor to represent the supply via groundwater (2,917 kWh/Mgal) was used. For ES and VCC, CalEEMod® default electricity intensity factor to supply (9,727 kWh/Mgal) was used. The CalEEMod® wastewater treatment intensity values incorporate electricity required for pumping of wastewater.

[3] The project assumes some water will be non-potable/recycled water consistent with the Final Joint EIS/EIR for the RMDP and SCP Project and the mandate by the State Water Resources Board. See Table 2-15b.

[4] The direct and indirect emissions associated with the Newhall Ranch Water Reclamation Plant (WRP) are captured through the wastewater emission estimates for each of the other Project land uses that will send wastewater to the WRP. Additional wastewater emissions to the full capacity of the WRP are shown in Table 2-15e and conservatively added to the total NRSP water emissions in the summary tables. The analysis assumes the CalEEMod default mix of approaches to wastewater treatment for 'Los Angeles - South Coast'.

[5] To be consistent with the required California regulatory standards, the project assumes 20 percent reduction in the indoor water usage.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalents
ES - Entrada South
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
GHG - greenhouse gases
kWh - kilowatt-hour
Mgal - million gallons
MT - metric tonnes
$N_2O$ - nitrous oxide
NRSP - Newhall Ranch Specific Plan
RPS - Renewable Portfolio Standard
VCC - Valencia Commerce Center
yr - year

References:

GSI Water Solutions. 2014. Water Demand Projections for Entrada North Village. September.

**Table 2-15e. Additional GHG Emissions Associated with the Water Reclamation Plant**
RMDP/SCP
Los Angeles County, California

| **Amount of Wastewater** | **Amount** | **Units** |
|---|---|---|
| Generated by NRSP (Mgal)[1] | 1,278 | Mgal/yr |
| Maximum Capacity for the WRP (Mgal)[2] | 2,482 | Mgal/yr |
| Additional Wastewater Assumed to Represent Maximum Capacity of the WRP (Mgal) | 1,204 | Mgal/yr |
| **Indirect Emissions Associated with Additional Wastewater[3]** | **--** | **--** |
| Electricity to Treat Wastewater | 1,911 | kWh/Mgal |
| Electricity Intensity Factor | 377.05 | lb $CO_2$e/MWh |
| Indirect Emissions | 393 | MT $CO_2$e/yr |
| **Direct Emissions Associated with Additional Wastewater[4]** | -- | -- |
| Septic Tank Emission Factor | 5.91E-06 | MT $CO_2$e/gal |
| Aerobic Emission Factor | 6.14E-07 | MT $CO_2$e/gal |
| Facultative Lagoon Emission Factor | 9.70E-06 | MT $CO_2$e/gal |
| Direct Emissions | 1,639 | -- |
| **Total Emissions** | **2,032** | **MT $CO_2$e/yr** |

Notes:

[1] Wastewater Generated by NRSP is equal to the indoor water consumption shown in Table 2-15d with a 20% reduction due to regulatory measures.

[2] Based on the water demand estimate for NRSP and with the improved water efficiency standards since the WRP EIR was certified, it is not assumed that the WRP will treat to the full 6.8 MGD capacity. To be conservative, the direct and indirect emissions from treatment of additional wastewater up to 6.8 MGD are estimated here. The 6.8 MGD is multiplied by 365 days to represent a full year.

[3] Indirect electricity emissions associated with wastewater treatment use a CalEEMod® default factor for 'Los Angeles - South Coast' of 1,911 kWh per Mgal of wastewater (CalEEMod® Appendix D Table 9.2). The 2030 emission factor assumes 50% RPS.

[4] Emissions are calculated based on the CalEEMod® default factors for 'Los Angeles - South Coast'. Direct emissions are based on a default split between septic tank, aerobic, and anaerobic wastewater treatment types (10.33%, 87.46%, and 2.21% respectively), as shown in CalEEMod® Appendix D Table 9.4. The gas produced by anaerobic digesters may be flared or sent to a cogeneration process; in this calculation, it is assumed all gas is flared or released as fugitive methane, as this is the default described in CalEEMod® Appendix A section 8.4.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2$e - carbon dioxide equivalents
EIR - Environmental Impact Report
gal -gallons
GHG - greenhouse gases
lb - pound
kWh - kilowatt-hour
Mgal - million gallons
MGD - million gallons per day
MT - metric tonnes
MWh - megawatt-hour
NRSP - Newhall Ranch Specific Plan
WRP - Water Reclamation Plant
yr - year

**Table 2-16. GHG Emissions Associated with Solid Waste**
RMDP/SCP
Los Angeles County, California

| Area | CalEEMod® Land Use | Project Assumption | Unmitigated Project Waste Disposed[1] tons/yr | Unmitigated Project $CO_2e$ Emissions Associated with Waste[1] MT $CO_2e$/yr |
|---|---|---|---|---|
| ES | Condo/Townhouse | Condo/townhouse general | 1,417 | 712 |
| | Elementary School | Elementary/Middle School | 35 | 18 |
| | General Office Building | Commercial Office | 176 | 88 |
| | Health Club | Recreational Center | 3 | 2 |
| | Hotel | Hotel | 235 | 118 |
| | Regional Shopping Center | Commercial Center | 527 | 265 |
| | Single Family Housing | Single Family Housing | 467 | 235 |
| | **Sub-Total** | | **2,859** | **1,438** |
| NRSP | Condo/Townhouse | Condo/townhouse general | 12,234 | 6,153 |
| | Elementary School | Elementary/Middle School | 176 | 88 |
| | General Light Industry | Fire Station | 53 | 27 |
| | General Office Building | Commercial Office | 2,873 | 1,445 |
| | Golf Course | Golf Course | 49 | 25 |
| | Health Club | Recreational Center | 21 | 11 |
| | High School | High School | 35 | 18 |
| | Hotel | Hotel | 117 | 59 |
| | Industrial Park | Industrial Park | 1,592 | 801 |
| | Library | Library | 35 | 18 |
| | Office Park | Business Park | 682 | 343 |
| | Regional Shopping Center | Commercial Center | 9,120 | 4,586 |
| | Single Family Housing | Single Family Housing | 9,083 | 4,568 |
| | **Sub-Total** | | **36,072** | **18,141** |
| VCC | Industrial Park | Industrial Park | 4,844 | 2,436 |
| | Office Park | Business Park | 2,317 | 1,165 |
| | **Sub-Total** | | **7,160** | **3,601** |
| | | **Total Residential** | 23,202 | 11,668 |
| | | **Total** | **46,091** | **23,179** |

Notes:

[1] Solid waste disposal rates were based on actual 2012 disposal rates for the City of Santa Clarita. Solid waste generation and associated emissions for the Project scenario assume 75 percent waste diversion, based on California (statewide) waste diversion goal. Available at: http://www.calrecycle.ca.gov/75percent/. Accessed: September 2016.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2e$ - carbon dioxide equivalents
ES - Entrada South
MT - metric tonnes
NRSP - Newhall Ranch Specific Plan
VCC - Valencia Commerce Center
yr - year

**Table 2-17a. SCVCTM Daily Tripend Generation**
RMDP/SCP
Los Angeles County, California

| Area | Land Use Type[1] | Units | | Productions or Attractions | Daily Tripend Generation[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | H-W | H-S | H-O | O-W | O-O | Total | Total |
| ES | Single Family (6-10du/ac) | 428 | DU | P | 932 | 636 | 1,143 | 85 | 466 | 3,262 | **4,238** |
| | | | | A | 0 | 1 | 424 | 85 | 466 | 976 | |
| | Condominium/Townhouse | 1,297 | DU | P | 2,075 | 1,764 | 3,527 | 207 | 935 | 8,508 | **10,376** |
| | | | | A | 0 | 0 | 726 | 207 | 935 | 1,868 | |
| | Commercial Center (10-30ac) | 188 | TSF | P | 0 | 0 | 2 | 304 | 2,541 | 2,847 | **10,164** |
| | | | | A | 914 | 2,034 | 1,524 | 304 | 2,541 | 7,317 | |
| | Hotel | 286 | rooms | P | 0 | 0 | 0 | 141 | 424 | 565 | **2,354** |
| | | | | A | 282 | 0 | 942 | 141 | 424 | 1,789 | |
| | Elementary/Middle School | 750 | STU | P | 0 | 0 | 0 | 0 | 33 | 33 | **1,088** |
| | | | | A | 109 | 630 | 283 | 0 | 33 | 1,055 | |
| | Commercial Office | 63 | TSF | P | 0 | 0 | 0 | 80 | 131 | 211 | **729** |
| | | | | A | 198 | 0 | 109 | 80 | 131 | 518 | |
| | Developed Park | 10.5 | AC | P | 0 | 0 | 0 | 0 | 3 | 3 | **27** |
| | | | | A | 0 | 0 | 21 | 0 | 3 | 24 | |
| | **Subtotal Trip Ends** | | | **P** | **3,007** | **2,400** | **4,672** | **817** | **4,533** | **15,429** | **28,976** |
| | | | | **A** | **1,503** | **2,665** | **4,029** | **817** | **4,533** | **13,547** | |
| NRSP | Single Family (1-5du/ac) | 81 | DU | P | 176 | 120 | 216 | 16 | 89 | 617 | **802** |
| | | | | A | 0 | 0 | 80 | 16 | 89 | 185 | |
| | Single Family (6-10du/ac) | 8,235 | DU | P | 17,935 | 12,228 | 22,020 | 1,628 | 8,968 | 62,779 | **81,526** |
| | | | | A | 0 | 0 | 8,151 | 1,628 | 8,968 | 18,747 | |
| | Condominium/Townhouse | 11,201 | DU | P | 17,918 | 15,234 | 30,466 | 1,796 | 8,063 | 73,477 | **89,608** |
| | | | | A | 0 | 0 | 6,272 | 1,796 | 8,063 | 16,131 | |
| | Commercial Center (10-30ac) | 3,247 | TSF | P | 0 | 0 | 0 | 5,265 | 43,883 | 49,148 | **175,533** |
| | | | | A | 15,798 | 35,110 | 26,329 | 5,265 | 43,883 | 126,385 | |
| | Hotel | 143 | rooms | P | 0 | 0 | 0 | 71 | 212 | 283 | **1,177** |
| | | | | A | 141 | 0 | 470 | 71 | 212 | 894 | |
| | Elementary/Middle School | 4,500 | STU | P | 0 | 0 | 0 | 0 | 196 | 196 | **6,526** |
| | | | | A | 654 | 3,784 | 1,696 | 0 | 196 | 6,330 | |
| | High School | 2,500 | STU | P | 0 | 0 | 0 | 0 | 134 | 134 | **4,475** |
| | | | | A | 448 | 1,790 | 1,969 | 0 | 134 | 4,341 | |
| | Library | 36 | TSF | P | 0 | 0 | 0 | 275 | 520 | 795 | **3,059** |
| | | | | A | 489 | 0 | 980 | 275 | 520 | 2,264 | |
| | Industrial Park | 756 | TSF | P | 0 | 0 | 0 | 318 | 953 | 1,271 | **4,536** |
| | | | | A | 1,767 | 0 | 227 | 318 | 953 | 3,265 | |
| | Business Park | 324 | TSF | P | 0 | 0 | 0 | 232 | 694 | 926 | **3,304** |
| | | | | A | 1,287 | 0 | 165 | 232 | 694 | 2,378 | |
| | Utilities | 133 | TSF | P | 0 | 0 | 0 | 28 | 53 | 81 | **317** |
| | | | | A | 60 | 0 | 95 | 28 | 53 | 236 | |
| | Commercial Office | 1,023 | TSF | P | 0 | 0 | 0 | 1,300 | 2,128 | 3,428 | **11,825** |
| | | | | A | 3,195 | 0 | 1,774 | 1,300 | 2,128 | 8,397 | |
| | Golf Course | 180 | AC | P | 0 | 0 | 0 | 0 | 387 | 387 | **1,433** |
| | | | | A | 115 | 0 | 544 | 0 | 387 | 1,046 | |
| | Developed Park | 100 | AC | P | 0 | 0 | 0 | 0 | 32 | 32 | **261** |
| | | | | A | 2 | 0 | 195 | 0 | 32 | 229 | |
| | **Subtotal Trip Ends** | | | **P** | **36,029** | **27,582** | **52,702** | **10,929** | **66,312** | **193,554** | **384,382** |
| | | | | **A** | **23,956** | **40,684** | **48,947** | **10,929** | **66,312** | **190,828** | |
| VCC | Industrial Park | 2,300 | TSF | P | 0 | 0 | 0 | 966 | 2,897 | 3,863 | **13,800** |
| | | | | A | 5,384 | 0 | 690 | 966 | 2,897 | 9,937 | |
| | Business Park | 1,100 | TSF | P | 0 | 0 | 0 | 786 | 2,356 | 3,142 | **11,220** |
| | | | | A | 4,374 | 0 | 562 | 786 | 2,356 | 8,078 | |
| | **Subtotal Trip Ends** | | | **P** | **0** | **0** | **0** | **1,752** | **5,253** | **7,005** | **25,020** |
| | | | | **A** | **9,758** | **0** | **1,252** | **1,752** | **5,253** | **18,015** | |
| **Total Trip Ends** | | | | | **74,253** | **73,331** | **111,602** | **26,996** | **152,196** | **438,378** | **438,378** |

Notes:
[1] Land Use Type lists the nomenclature consistent with trip information.
[2] The tripends are provided by Stantec as included in Appendix D. These include the double-counted internal trip ends for the five different trip categories: Home to Work, Home to Shopping, Home to Other, Other to Work, Other to Other from the SCVCTM. Productions are the trips that the building produces, and attractions refer to the trips that the building attracts.

Abbreviations:
A - Attraction
AC/ac - acre
DU/du - dwelling unit
ES - Entrada South
H-O - Home to Other
H-W - Home to Work
H-S - Home to Shopping
NRSP - Newhall Ranch Specific Plan
O-W - Other to Work
O-O - Other to Other
P - Production
STU - students
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
TSF - thousand square feet
VCC - Valencia Commerce Center

**Table 2-17b. SCVCTM Average Trip Length Data**
RMDP/SCP
Los Angeles County, California

| | Productions or Attractions | Trip Types | | | | |
|---|---|---|---|---|---|---|
| | | H-W | H-S | H-O | O-W | O-O |
| Average Trip Lengths by Trip Type (miles)[1] | P | 10.696 | 5.179 | 7.040 | 8.906 | 7.620 |
| | A | 16.030 | 15.042 | 13.274 | 11.102 | 10.527 |

Notes:
[1] The trip lengths are modeled by Stantec using the SCVCTM as shown in Appendix D.

Abbreviations:
A - Attraction
H-O - Home to Other
H-W - Home to Work
H-S - Home to Shopping
O-W - Other to Work
O-O - Other to Other
P - Production
SCVCTM - Santa Clarita Valley Consolidated Traffic Model

**Table 2-17c. SCVCTM Tripend Internalization Percentages**
RMDP/SCP
Los Angeles County, California

| Tripend Internalization % Type[1] | Productions or Attractions | H-W | H-S | H-O | O-W | O-O |
|---|---|---|---|---|---|---|
| Residential | P | 22% | 59% | 59% | 47% | 47% |
| | A | 0% | 60% | 60% | 44% | 44% |
| Non-Residential | P | 0% | 0% | 0% | 47% | 47% |
| | A | 25% | 46% | 46% | 48% | 48% |
| Schools/Parks | P | 0% | 0% | 0% | 65% | 65% |
| | A | 24% | 86% | 86% | 65% | 65% |

Notes:

[1] The tripend internalization percentage represents the percentage of the tripends for each land use type which are internal to the Project. This was modeled by Stantec using the SCVCTM that was used to generate the tripends and trip lengths as shown in Appendix D.

Abbreviations:

A - Attraction
H-O - Home to Other
H-W - Home to Work
H-S - Home to Shopping
O-W - Other to Work
O-O - Other to Other
P - Production
SCVCTM - Santa Clarita Valley Consolidated Traffic Model

**Table 2-17d. Daily Trip Generation (Adjusted Internal Trips)**
RMDP/SCP
Los Angeles County, California

| Area | Land Use Type[1] | Productions or Attractions | Daily Trip Generation (Adjusted Internal Trips)[2] H-W | H-S | H-O | O-W | O-O | Total | Total Daily Trips |
|---|---|---|---|---|---|---|---|---|---|
| ES | Single Family (6-10du/ac) | P | 829 | 449 | 806 | 65 | 356 | 2,506 | 3,233 |
| | | A | 0 | 1 | 297 | 66 | 363 | 727 | |
| | Condominium/Townhouse | P | 1,846 | 1,245 | 2,488 | 158 | 715 | 6,452 | 7,851 |
| | | A | 0 | 0 | 508 | 161 | 729 | 1,399 | |
| | Commercial Center (10-30ac) | P | 0 | 0 | 2 | 233 | 1,944 | 2,178 | 7,882 |
| | | A | 802 | 1,566 | 1,173 | 231 | 1,931 | 5,704 | |
| | Hotel | P | 0 | 0 | 0 | 108 | 324 | 432 | 1,834 |
| | | A | 247 | 0 | 725 | 107 | 322 | 1,402 | |
| | Elementary/Middle School | P | 0 | 0 | 0 | 0 | 22 | 22 | 660 |
| | | A | 96 | 359 | 161 | 0 | 22 | 638 | |
| | Commercial Office | P | 0 | 0 | 0 | 61 | 100 | 161 | 579 |
| | | A | 174 | 0 | 84 | 61 | 100 | 418 | |
| | Developed Park | P | 0 | 0 | 0 | 0 | 2 | 2 | 16 |
| | | A | 0 | 0 | 12 | 0 | 2 | 14 | |
| | **Subtotal Trips** | **P** | **2,675** | **1,693** | **3,297** | **625** | **3,465** | **11,754** | **22,057** |
| | | **A** | **1,319** | **1,926** | **2,961** | **627** | **3,470** | **10,302** | |
| NRSP | Single Family (1-5du/ac) | P | 157 | 85 | 152 | 12 | 68 | 474 | 612 |
| | | A | 0 | 0 | 56 | 12 | 69 | 138 | |
| | Single Family (6-10du/ac) | P | 15,953 | 8,627 | 15,535 | 1,245 | 6,861 | 48,221 | 62,192 |
| | | A | 0 | 0 | 5,706 | 1,270 | 6,995 | 13,971 | |
| | Condominium/Townhouse | P | 15,938 | 10,748 | 21,494 | 1,374 | 6,168 | 55,722 | 67,802 |
| | | A | 0 | 0 | 4,390 | 1,401 | 6,289 | 12,080 | |
| | Commercial Center (10-30ac) | P | 0 | 0 | 0 | 4,028 | 33,570 | 37,598 | 136,121 |
| | | A | 13,863 | 27,035 | 20,273 | 4,001 | 33,351 | 98,523 | |
| | Hotel | P | 0 | 0 | 0 | 54 | 162 | 216 | 917 |
| | | A | 124 | 0 | 362 | 54 | 161 | 701 | |
| | Elementary/Middle School | P | 0 | 0 | 0 | 0 | 133 | 133 | 3,960 |
| | | A | 574 | 2,155 | 966 | 0 | 132 | 3,828 | |
| | High School | P | 0 | 0 | 0 | 0 | 91 | 91 | 2,715 |
| | | A | 393 | 1,019 | 1,121 | 0 | 91 | 2,625 | |
| | Library | P | 0 | 0 | 0 | 210 | 398 | 608 | 2,396 |
| | | A | 429 | 0 | 755 | 209 | 395 | 1,788 | |
| | Industrial Park | P | 0 | 0 | 0 | 243 | 729 | 972 | 3,664 |
| | | A | 1,551 | 0 | 175 | 242 | 724 | 2,691 | |
| | Business Park | P | 0 | 0 | 0 | 177 | 531 | 708 | 2,669 |
| | | A | 1,129 | 0 | 127 | 176 | 527 | 1,960 | |
| | Utilities | P | 0 | 0 | 0 | 21 | 41 | 62 | 249 |
| | | A | 53 | 0 | 73 | 21 | 40 | 187 | |
| | Commercial Office | P | 0 | 0 | 0 | 995 | 1,628 | 2,622 | 9,397 |
| | | A | 2,804 | 0 | 1,366 | 988 | 1,617 | 6,775 | |
| | Golf Course | P | 0 | 0 | 0 | 0 | 262 | 262 | 934 |
| | | A | 101 | 0 | 310 | 0 | 262 | 672 | |
| | Developed Park | P | 0 | 0 | 0 | 0 | 22 | 22 | 156 |
| | | A | 2 | 0 | 111 | 0 | 22 | 134 | |
| | **Subtotal Trips** | **P** | **32,048** | **19,459** | **37,181** | **8,361** | **50,663** | **147,712** | **293,785** |
| | | **A** | **21,022** | **30,209** | **35,791** | **8,375** | **50,677** | **146,074** | |
| VCC | Industrial Park | P | 0 | 0 | 0 | 739 | 2,216 | 2,955 | 11,147 |
| | | A | 4,724 | 0 | 531 | 734 | 2,202 | 8,192 | |
| | Business Park | P | 0 | 0 | 0 | 601 | 1,802 | 2,404 | 9,062 |
| | | A | 3,838 | 0 | 433 | 597 | 1,791 | 6,659 | |
| | **Subtotal Trips** | **P** | **0** | **0** | **0** | **1,340** | **4,019** | **5,359** | **20,209** |
| | | **A** | **8,563** | **0** | **964** | **1,332** | **3,992** | **14,850** | |
| **Total Trips** | | | **65,626** | **53,287** | **80,194** | **20,659** | **116,285** | **336,051** | **336,051** |

Notes:

[1] Land Use Type lists the nomenclature consistent with trip information.

[2] Given that many trips have both their starting point and destination within the planning area, there is a double counting of trips, with a production for one building comprising the same trip as an attraction for another building. For example, per the SCVCTM, 22% of H-W residential production trip ends are internal; therefore, if all H-W residential production trip ends are summed without adjustment, there will be a 11% (22/2) overestimation of the actual number of trip ends. The SCVCTM trip ends are adjusted to eliminate the double counting by subtracting 11% of the trip ends from the H-W residential production SCVCTM data (see Appendix D and Table 2-17a). The resulting value represents the trip generation. This method is carried out for each trip category (H-W, H-S, H-O, O-W, and O-O), each land use type (Residential, Non-Residential, and Schools/Parks) and each trip type (Production and Attraction). Internalization percentages are shown in Table 2-17c.

Abbreviations:

A - Attraction
ac - acre
du - dwelling unit
ES - Entrada South
H-O - Home to Other
H-W - Home to Work
H-S - Home to Shopping
NRSP - Newhall Ranch Specific Plan
O-W - Other to Work
O-O - Other to Other
P - Production
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
VCC - Valencia Commerce Center

**Table 2-17e. Calculating Total Daily VMT**
RMDP/SCP
Los Angeles County, California

| Land Use | | | | VMT from SCVCTM with Adjusted Internal Trips | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | Land Use Type[1] | Units[4] | | Productions or Attractions | H-W (mi)[2] | H-S (mi)[2] | H-O (mi)[2] | O-W (mi)[2] | O-O (mi)[2] | Total Daily VMT with Adjusted Internal Trips[3] (mi) | |
| ES | Single Family (6-10du/ac)[5] | 428 | DU | P | 8,867 | 2,324 | 5,677 | 579 | 2,716 | 20,163 | 28,676 |
| | | | | A | 0 | 11 | 3,940 | 736 | 3,826 | 8,512 | |
| | Condominium/Townhouse | 1,297 | DU | P | 19,742 | 6,445 | 17,518 | 1,410 | 5,450 | 50,565 | 66,781 |
| | | | | A | 0 | 0 | 6,746 | 1,793 | 7,677 | 16,215 | |
| | Commercial Center (10-30ac) | 187.5 | TSF | P | 0 | 0 | 14 | 2,071 | 14,812 | 16,898 | 91,783 |
| | | | | A | 12,857 | 23,559 | 15,576 | 2,565 | 20,329 | 74,886 | |
| | Hotel | 286 | rooms | P | 0 | 0 | 0 | 961 | 2,472 | 3,432 | 21,609 |
| | | | | A | 3,967 | 0 | 9,628 | 1,190 | 3,392 | 18,176 | |
| | Elementary/Middle School | 750 | STU | P | 0 | 0 | 0 | 0 | 170 | 170 | 9,475 |
| | | | | A | 1,534 | 5,397 | 2,139 | 0 | 235 | 9,305 | |
| | Commercial Office | 62.5 | TSF | P | 0 | 0 | 0 | 545 | 764 | 1,309 | 6,931 |
| | | | | A | 2,785 | 0 | 1,114 | 675 | 1,048 | 5,622 | |
| | Developed Park | 6.7 | TSF | P | 0 | 0 | 0 | 0 | 15 | 15 | 196 |
| | | | | A | 0 | 0 | 159 | 0 | 21 | 180 | |
| | **Subtotal VMT** | | | | | | | | | **225,451** | **225,451** |
| NRSP | Single Family (1-5du/ac) | 81 | DU | P | 1,674 | 438 | 1,073 | 109 | 519 | 3,814 | 556,945 |
| | | | | A | 0 | 0 | 743 | 139 | 731 | 1,613 | |
| | Single Family (6-10du/ac) | 8,235 | DU | P | 170,635 | 44,678 | 109,367 | 11,092 | 52,277 | 388,050 | |
| | | | | A | 0 | 0 | 75,735 | 14,098 | 73,636 | 163,469 | |
| | Condominium/Townhouse | 11,201 | DU | P | 170,474 | 55,662 | 151,316 | 12,236 | 47,002 | 436,689 | 576,723 |
| | | | | A | 0 | 0 | 58,276 | 15,553 | 66,205 | 140,034 | |
| | Commercial Center (10-30ac) | 3,247 | TSF | P | 0 | 0 | 0 | 35,871 | 255,807 | 291,678 | 1,585,167 |
| | | | | A | 222,223 | 406,660 | 269,099 | 44,424 | 351,083 | 1,293,489 | |
| | Hotel | 143 | rooms | P | 0 | 0 | 0 | 484 | 1,236 | 1,720 | 10,802 |
| | | | | A | 1,983 | 0 | 4,804 | 599 | 1,696 | 9,082 | |
| | Elementary/Middle School | 4,500 | STU | P | 0 | 0 | 0 | 0 | 1,011 | 1,011 | 56,847 |
| | | | | A | 9,205 | 32,416 | 12,821 | 0 | 1,395 | 55,836 | |
| | High School | 2,500 | STU | P | 0 | 0 | 0 | 0 | 691 | 691 | 38,169 |
| | | | | A | 6,305 | 15,334 | 14,884 | 0 | 954 | 37,477 | |
| | Library | 36.0 | TSF | P | 0 | 0 | 0 | 1,874 | 3,031 | 4,905 | 28,280 |
| | | | | A | 6,879 | 0 | 10,016 | 2,320 | 4,160 | 23,375 | |
| | Industrial Park | 756 | TSF | P | 0 | 0 | 0 | 2,167 | 5,555 | 7,722 | 45,205 |
| | | | | A | 24,856 | 0 | 2,320 | 2,683 | 7,624 | 37,483 | |
| | Business Park | 324 | TSF | P | 0 | 0 | 0 | 1,581 | 4,046 | 5,626 | 32,926 |
| | | | | A | 18,104 | 0 | 1,686 | 1,958 | 5,552 | 27,300 | |
| | Utilities | 33.1 | TSF | P | 0 | 0 | 0 | 191 | 309 | 500 | 2,975 |
| | | | | A | 844 | 0 | 971 | 236 | 424 | 2,475 | |
| | Commercial Office | 1,023 | TSF | P | 0 | 0 | 0 | 8,857 | 12,405 | 21,262 | 112,329 |
| | | | | A | 44,943 | 0 | 18,131 | 10,969 | 17,025 | 91,068 | |
| | Golf Course | 180 | AC | P | 0 | 0 | 0 | 0 | 1,996 | 1,996 | 10,481 |
| | | | | A | 1,619 | 0 | 4,112 | 0 | 2,754 | 8,485 | |
| | Developed Park | 43.3 | TSF | P | 0 | 0 | 0 | 0 | 165 | 165 | 1,895 |
| | | | | A | 28 | 0 | 1,474 | 0 | 228 | 1,730 | |
| | **Subtotal VMT** | | | | | | | | | **3,058,743** | **3,058,743** |

**Table 2-17e. Calculating Total Daily VMT**
RMDP/SCP
Los Angeles County, California

| Land Use | | | | VMT from SCVCTM with Adjusted Internal Trips | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area** | **Land Use Type[1]** | **Units[4]** | | **Productions or Attractions** | **H-W (mi)[2]** | **H-S (mi)[2]** | **H-O (mi)[2]** | **O-W (mi)[2]** | **O-O (mi)[2]** | **Total Daily VMT with Adjusted Internal Trips[3] (mi)** | |
| **VCC** | Industrial Park | 2,300 | TSF | P | 0 | 0 | 0 | 6,581 | 16,887 | 23,469 | 137,583 |
| | | | | A | 75,734 | 0 | 7,052 | 8,151 | 23,177 | 114,114 | |
| | Business Park | 1,100 | TSF | P | 0 | 0 | 0 | 5,355 | 13,734 | 19,089 | 111,841 |
| | | | | A | 61,527 | 0 | 5,744 | 6,632 | 18,849 | 92,752 | |
| | **Subtotal VMT** | | | | | | | | | **249,424** | **249,424** |
| | **Total VMT** | | | | | | | | | **3,533,618** | **3,533,618** |

Notes:
[1] Land Use Type lists the nomenclature consistent with trip information.
[2] The VMT were calculated by multiplying the trip length for production trips or attraction trips by trip type as provided from the SCVCTM (Table 2-17b) with the daily trip generation for the respective category (See Table 2-17d).
[3] This column is the sum of the calculated VMT by trip types.
[4] For certain land uses, unit type or size is mapped from the traffic outputs in Table 2-17a into a form that accurately represents the CalEEMod® inputs in Table 2-17f. The commercial center and commercial office in ES include a decimal place for CalEEMod®. The developed parks are modeled based on building square footage rather than park acreage so that building energy consumption is calculated. The fire station is modeled as a "General Light Industry" building in CalEEMod®. Therefore, the land use TSF is the value of the fire station building instead of the entire land acreage referred as "Utilities." VMT has been calculated using the total trip rate for each of the land uses from Table 2-17a.
[5] Example calculation for ES single family housing:
H-W VMT for Production = (Daily Trip Generation x Trip Length)
8,867 H-W VMT for Production = (829 daily trips) x (10.696 miles)

Abbreviations:
A - Attraction
AC/ac - acre
CalEEMod® - CALifornia Emissions Estimator MODel
DU/du - dwelling unit
ES - Entrada South
H-O - Home to Other
H-W - Home to Work
H-S - Home to Shopping
mi - mile
NRSP - Newhall Ranch Specific Plan
O-W - Other to Work
O-O - Other to Other
P - Production
STU - students
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
TSF - thousand square feet
VCC - Valencia Commerce Center
VMT - vehicle miles traveled

**Table 2-17f. Trip Lengths and Trip Rates for CalEEMod®**
RMDP/SCP
Los Angeles County, California

| Land Use | | | | | Total Daily Trip Generation[2] (# of trips) | Total Daily VMT (mi)[3] | CalEEMod® Input Derivation | |
|---|---|---|---|---|---|---|---|---|
| Area | Land Use Type[1] | CalEEMod® Land Use Subtype[1] | Units | | | | Average Trip Length[4] (mi) | Trip Rate[5] (# of trips/ unit/weekday) |
| ES | Single Family (6-10du/ac)[6] | Single Family Housing | 428 | DU | 3,233 | 28,676 | 8.9 | 7.55 |
| | Condominium/Townhouse | Condo/Townhouse | 1,297 | DU | 7,851 | 66,781 | 8.5 | 6.05 |
| | Commercial Center (10-30ac) | Regional Shopping Center | 187.5 | TSF | 7,882 | 91,783 | 11.6 | 42.04 |
| | Hotel | Hotel | 286 | rooms | 1,834 | 21,609 | 11.8 | 6.41 |
| | Elementary/Middle School | Elementary School | 750 | STU | 660 | 9,475 | 14.4 | 0.88 |
| | Commercial Office | General Office Building | 62.5 | TSF | 579 | 6,931 | 12.0 | 9.27 |
| | Developed Park[7] | Health Club | 6.7 | TSF | 16 | 196 | 12.2 | 2.39 |
| | | | | **Subtotal** | **22,057** | **225,451** | -- | -- |
| NRSP | Single Family (1-5du/ac)[7] | Single Family Housing | 81 | DU | 62,803 | 556,945 | 8.9 | 7.55 |
| | Single Family (6-10du/ac)[7] | | 8,235 | DU | | | | |
| | Condominium/Townhouse | Condo/Townhouse | 11,201 | DU | 67,802 | 576,723 | 8.5 | 6.05 |
| | Commercial Center (10-30ac) | Regional Shopping Center | 3,247 | TSF | 136,121 | 1,585,167 | 11.6 | 41.92 |
| | Hotel | Hotel | 143 | rooms | 917 | 10,802 | 11.8 | 6.41 |
| | Elementary/Middle School | Elementary School | 4,500 | STU | 3,960 | 56,847 | 14.4 | 0.88 |
| | High School | High School | 2,500 | STU | 2,715 | 38,169 | 14.1 | 1.09 |
| | Library | Library | 36.0 | TSF | 2,396 | 28,280 | 11.8 | 66.56 |
| | Industrial Park | Industrial Park | 756 | TSF | 3,664 | 45,205 | 12.3 | 4.85 |
| | Business Park | Office Park | 324 | TSF | 2,669 | 32,926 | 12.3 | 8.24 |
| | Utilities[8] | General Light Industry | 33.1 | TSF | 249 | 2,975 | 11.9 | 7.53 |
| | Commercial Office | General Office Building | 1,023 | TSF | 9,397 | 112,329 | 12.0 | 9.19 |
| | Golf Course | Golf Course | 180 | AC | 934 | 10,481 | 11.2 | 5.19 |
| | Developed Park[9] | Health Club | 43.3 | TSF | 156 | 1,895 | 12.1 | 3.61 |
| | | | | **Subtotal** | **293,785** | **3,058,743** | -- | -- |

**Table 2-17f. Trip Lengths and Trip Rates for CalEEMod®**
RMDP/SCP
Los Angeles County, California

| Land Use | | | | | Total Daily Trip Generation[2] (# of trips) | Total Daily VMT (mi)[3] | CalEEMod® Input Derivation | |
|---|---|---|---|---|---|---|---|---|
| Area | Land Use Type[1] | CalEEMod® Land Use Subtype[1] | Units | | | | Average Trip Length[4] (mi) | Trip Rate[5] (# of trips/ unit/weekday) |
| VCC | Industrial Park | Industrial Park | 2,300 | TSF | 11,147 | 137,583 | 12.3 | 4.85 |
| | Business Park | Office Park | 1,100 | TSF | 9,062 | 111,841 | 12.3 | 8.24 |
| | | | | **Subtotal** | **20,209** | **249,424** | -- | -- |
| | | | | **Total** | **336,051** | **3,533,618** | -- | -- |

Notes:

[1] Land Use Type lists the nomenclature consistent with trip information. These were matched to land use names for CalEEMod®.

[2] The Total Daily Trip Generation was calculated in Table 2-17d which removes the doubled-counted internal trips.

[3] The Total Daily VMT were calculated as shown in Table 2-17e.

[4] Average trip length to input into CalEEMod® is calculated by dividing the Total Daily VMT by the Total Daily Trip Generation. This trip length differs from the trip lengths from Stantec because of the adjustments to remove the double-counted internal trips and because this is a calculated average trip length for all trip purpose types (e.g., H-W, H-S, H-O, O-W, O-O). CalEEMod® only accepts one decimal place for average trip length, so slight differences in calculated totals may result from rounding.

[5] The trip rate to input into CalEEMod® is calculated by dividing the Total Daily Trip Generation with the corresponding land use's unit (e.g., DU, TSF, Room, Student, AC). This differs from the trip rate from Appendix D because of the adjustments to remove the double-counted internal trips. CalEEMod® only accepts two decimal places for trip rate so slight differences in calculated totals may result from rounding.

[6] Example calculation for ES single family housing:
- Total Daily Trip Generation calculated in Table 2-17d.
- Total Daily VMT with Adjusted Internal Trips is 28,676 miles per weekday (Table 2-17e).
- Average trip length for CalEEMod® is calculated by dividing the Total Daily VMT by the Total Daily Trip Generation: 28,389/3,233 = 8.9.
- Trip Rate for CalEEMod® is calculated by dividing the Total Daily Trip Generation by the number of units: 3,233/428 = 7.55.

[7] Single family housing traffic info was combined in CalEEMod® as one category.

[8] The fire station was modeled as a "General Light Industry" building in CalEEMod®. Therefore, the land use TSF is the value of the fire station building instead of the entire land acreage referred as "Utilities." Trip rate has been calculated by dividing the total trip generation number for "Utilities" by the square footage of the fire station.

[9] "Developed Park" was modeled as "Health Club" to represent the building in the "Developed Park". Therefore, the land use TSF is the value of the "Health Club" building. Trip rate has been calculated by dividing the total trip generation numbers for "Developed Park" by the square footage of the "Health Club."

Abbreviations:

AC/ac - acre
CalEEMod® - CALifornia Emissions Estimator MODel
DU/du - dwelling unit
ES - Entrada South
H-O - Home to Other
H-W - Home to Work
H-S - Home to Shopping
mi - mile
NRSP - Newhall Ranch Specific Plan
O-W - Other to Work
O-O - Other to Other
STU - students
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
TSF - thousand square feet
VCC - Valencia Commerce Center
VMT - vehicle miles traveled

**Table 2-17g. CalEEMod® Input Assumptions for Traffic**
RMDP/SCP
Los Angeles County, California

| Area | CalEEMod® Land Use[1] | Unit | Trip Rate (trips/day/unit)[2] | | | Trip Length (miles)[2,3] | | | | | | Trip Link Type (%)[4] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Adjusted SCVCTM | Derived with CalEEMod® Data | | | | | | | | | | |
| | | | Weekday | Saturday | Sunday | Home Work | Home Shop | Home Other | Commercial Customer | Commercial Work | Commercial Non-Work | Primary | Diverted | Pass-By |
| ES | Condo/Townhouse | DU | 6.05 | 6.58 | 5.58 | 8.5 | 8.5 | 8.5 | 0 | 0 | 0 | 100 | 0 | 0 |
| | Elementary School | STU | 0.88 | 0.00 | 0.00 | 0 | 0 | 0 | 14.4 | 14.4 | 14.4 | 100 | 0 | 0 |
| | General Office Building | TSF | 9.27 | 2.00 | 0.83 | 0 | 0 | 0 | 12.0 | 12.0 | 12.0 | 100 | 0 | 0 |
| | Health Club | TSF | 2.39 | 1.52 | 1.94 | 0 | 0 | 0 | 12.2 | 12.2 | 12.2 | 100 | 0 | 0 |
| | Hotel | rooms | 6.41 | 6.43 | 4.67 | 0 | 0 | 0 | 11.8 | 11.8 | 11.8 | 100 | 0 | 0 |
| | Regional Shopping Center | TSF | 42.04 | 48.92 | 24.71 | 0 | 0 | 0 | 11.6 | 11.6 | 11.6 | 100 | 0 | 0 |
| | Single Family Housing | DU | 7.55 | 7.96 | 6.92 | 8.9 | 8.9 | 8.9 | 0 | 0 | 0 | 100 | 0 | 0 |
| NRSP | Condo/Townhouse | DU | 6.05 | 6.58 | 5.58 | 8.5 | 8.5 | 8.5 | 0.0 | 0.0 | 0.0 | 100 | 0 | 0 |
| | Elementary School | STU | 0.88 | 0.00 | 0.00 | 0 | 0 | 0 | 14.4 | 14.4 | 14.4 | 100 | 0 | 0 |
| | General Light Industry | TSF | 7.53 | 1.43 | 0.73 | 0 | 0 | 0 | 11.9 | 11.9 | 11.9 | 100 | 0 | 0 |
| | General Office Building | TSF | 9.19 | 1.98 | 0.82 | 0 | 0 | 0 | 12.0 | 12.0 | 12.0 | 100 | 0 | 0 |
| | Golf Course | AC | 5.19 | 5.99 | 6.06 | 0 | 0 | 0 | 11.2 | 11.2 | 11.2 | 100 | 0 | 0 |
| | Health Club | TSF | 3.61 | 2.28 | 2.93 | 0 | 0 | 0 | 12.1 | 12.1 | 12.1 | 100 | 0 | 0 |
| | High School | STU | 1.09 | 0.39 | 0.16 | 0 | 0 | 0 | 14.1 | 14.1 | 14.1 | 100 | 0 | 0 |
| | Hotel | rooms | 6.41 | 6.43 | 4.67 | 0 | 0 | 0 | 11.8 | 11.8 | 11.8 | 100 | 0 | 0 |
| | Industrial Park | TSF | 4.85 | 1.73 | 0.51 | 0 | 0 | 0 | 12.3 | 12.3 | 12.3 | 100 | 0 | 0 |
| | Library | TSF | 66.56 | 55.09 | 30.17 | 0 | 0 | 0 | 11.8 | 11.8 | 11.8 | 100 | 0 | 0 |
| | Office Park | TSF | 8.24 | 1.18 | 0.55 | 0 | 0 | 0 | 12.3 | 12.3 | 12.3 | 100 | 0 | 0 |
| | Regional Shopping Center | TSF | 41.92 | 48.79 | 24.64 | 0 | 0 | 0 | 11.6 | 11.6 | 11.6 | 100 | 0 | 0 |
| | Single Family Housing | DU | 7.55 | 7.95 | 6.92 | 8.9 | 8.9 | 8.9 | 0.0 | 0.0 | 0.0 | 100 | 0 | 0 |
| VCC | Industrial Park | TSF | 4.85 | 1.73 | 0.51 | 0 | 0 | 0 | 12.3 | 12.3 | 12.3 | 100 | 0 | 0 |
| | Office Park | TSF | 8.24 | 1.18 | 0.55 | 0 | 0 | 0 | 12.3 | 12.3 | 12.3 | 100 | 0 | 0 |

Notes:

[1] Land Use Type lists the nomenclature consistent with trip information.

[2] The Adjusted SCVCTM Trip Rate for weekdays, as calculated in Table 2-17f, was used as the basis to derive the weekend trip rates. The weekday to weekend ratios for each land use as provided by CalEEMod® were used for the derivation.

[3] Trip lengths are calculated in Table 2-17f and based on the adjusted SCVCTM data that removes the double counted internal trips. While CalEEMod® has options to represent different trip lengths for different trip types, the same trip length was used for all trip types to ensure that the total annual VMT was accurately calculated by CalEEMod® consistent with the VMT from the SCVCTM.

[4] The trip distribution and trip assignment processes utilized in SCVCTM accounts for primary trip, pass-by trips, and diverted trips. When utilizing traffic forecasts produced by the SCVCTM, it is unnecessary to undertake additional steps to calculate the number of diverted trips or pass-by trips since they are reflected in the total trip forecasts produced by the SCVCTM. As a result, this analysis assumes that all trips are "primary" trips.

Abbreviations:

AC - acre
CalEEMod® - California Emissions Estimator Model
DU - dwelling unit
ES - Entrada South
NRSP - Newhall Ranch Specific Plan
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
STU - students
TSF - thousand square feet
VCC - Valencia Commerce Center
VMT - vehicle miles traveled

**Table 2-18a. GHG Emissions Associated With Traffic**
RMDP/SCP
Los Angeles County, California

| Area | CalEEMod® Land Use | Project Assumption | Vehicles Miles Traveled VMT/yr | $CO_2e$ Emissions Associated with Traffic[1,2] MT/yr |
|---|---|---|---|---|
| ES | Condo/Townhouse | Condo/townhouse general | 24,312,550 | 8,247 |
| | Elementary School | Elementary/Middle School | 2,471,040 | 838 |
| | General Office Building | Commercial Office | 1,918,020 | 651 |
| | Health Club | Recreational Center | 65,500 | 22 |
| | Hotel | Hotel | 7,572,376 | 2,569 |
| | Regional Shopping Center | Commercial Center | 32,101,173 | 10,889 |
| | Single Family Housing | Single Family Housing | 10,424,866 | 3,536 |
| | **Sub-Total** | | **78,865,526** | **26,753** |
| NRSP | Condo/Townhouse | Condo/townhouse general | 209,965,209 | 71,192 |
| | Elementary School | Elementary/Middle School | 14,826,240 | 5,027 |
| | General Light Industry | Fire Station | 815,400 | 276 |
| | General Office Building | Commercial Office | 31,119,660 | 10,552 |
| | Golf Course | Golf Course | 3,983,616 | 1,351 |
| | Health Club | Recreational Center | 633,704 | 215 |
| | High School | High School | 10,998,000 | 3,729 |
| | Hotel | Hotel | 3,786,188 | 1,284 |
| | Industrial Park | Industrial Park | 12,808,911 | 4,343 |
| | Library | Library | 9,234,778 | 3,131 |
| | Office Park | Business Park | 8,896,401 | 3,016 |
| | Regional Shopping Center | Commercial Center | 554,339,841 | 187,957 |
| | Single Family Housing | Single Family Housing | 202,515,689 | 68,666 |
| | **Sub-Total** | | **1,063,923,637** | **360,739** |
| VCC | Industrial Park | Industrial Park | 38,968,909 | 13,162 |
| | Office Park | Business Park | 30,203,831 | 10,201 |
| | **Sub-Total** | | **69,172,740** | **23,363** |
| **Total Residential** | | | 447,218,315 | 151,641 |
| **Total** | | | **1,211,961,903** | **410,855** |
| **Emissions Reduction due to Phase 2 NHTSA Regulations[3]** | | | -- | 7,041 |
| **Total Including NHTSA Regulations** | | | -- | **403,814** |

Notes:

[1] Emissions were estimated using CalEEMod® version 2013.2.2. Emission factors for 2030 Unmitigated Project updated to use EMFAC2014. Emissions associated with Traffic included emissions during running, idling, and startup of vehicles. Emissions by land use were calculated by distributing the total traffic emissions based on the VMT for each land use.

[2] TDM and mitigation measure reductions are not reflected in the Traffic emissions in this table.

[3] Emissions reductions due to the NHTSA Phase 2 GHG standards are calculated in Table 2-18b.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2e$ - carbon dioxide equivalents
EMFAC - California Air Resources Board Emissions Factor Model
ES - Entrada South
GHG - greenhouse gases
MT - metric tonnes
NHTSA - National Highway Traffic Safety Administration
NRSP - Newhall Ranch Specific Plan
TDM - Transportation Demand Management
VMT - vehicle miles traveled
VCC - Valencia Commerce Center
yr - year

**Table 2-18b. GHG Emissions Reductions Due to Phase 2 Program for Medium-Duty and Heavy-Duty Engines and Vehicles**
RMDP/SCP
Los Angeles County, California

| Item | ES | NRSP | VCC | Total |
|---|---|---|---|---|
| $CO_2e$ Emissions Associated with Traffic (Unmitigated)[1], MT | 26,753 | 360,739 | 23,363 | 410,855 |
| % of Running $CO_2$ Emissions from NHTSA Vehicle Categories (weighted)[3] | 29% | 29% | 29% | 29% |
| Approx $CO_2e$ Emissions Associated with Medium or Heavy-Duty Fleet | 7,771 | 104,779 | 6,786 | 119,336 |
| % of Running $CO_2$ Emissions from NHTSA Vehicle Categories for MY 2021-2031 (weighted)[4] | 59% | 59% | 59% | 59% |
| Approx $CO_2e$ Emissions Associated with Medium or Heavy-Duty Fleet MY 2021-2031 | 4,585 | 61,819 | 4,004 | 70,407 |
| % Reduction assumed in 2021-2031 GHG for Medium/Heavy Duty[5] | 10% | 10% | 10% | 10% |
| **Total $CO_2e$ Reduction** | **458** | **6,182** | **400** | **7,041** |

Notes:

[1] Unmitigated emissions associated with Project related traffic movement for CY 2030 (see Table 2-18a).

[2] Percentage of NHTSA fleet mix from the total CalEEMod® EMFAC2014 fleet mix. Vehicle classes applicable to NHTSA include -- LHD1, LHD2, MHD, HHD, OBUS, UBUS, SBUS, MH. NHTSA applicable vehicle classes are obtained from https://www3.epa.gov/otaq/climate/documents/420r16900.pdf. Accessed: September, 2016. Note that, Motor Homes (MH) are recognized as a part of NHTSA reg.

[3] Percentage (weighted) of $CO_2$ emissions of NHTSA applicable fleet mix from total fleet mix.

[4] EMFAC2014 model run for CY 2030, shows that about 58% of the weighted $CO_2$ emissions for the medium or heavy-duty fleet are associated with EPA-NHTSA vehicle classes for MY 2021-2031.

[5] Based on US EPA and NHTSA Phase 2 program documentation, Phase 2 achieves 10 percent more GHG reductions. Available at: https://www3.epa.gov/otaq/climate/documents/420f16044.pdf. Accessed: September, 2016.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2$ - carbon dioxide
$CO_2e$ - carbon dioxide equivalents
CY - calendar year
EMFAC - California Air Resources Board Emissions Factor Model
EPA - Environmental Protection Agency
ES - Entrada South
GHG - greenhouse gases
HHD - heavy-heavy duty
LHD - light-heavy duty
MHD - medium-heavy duty
MH - motor home
MT - metric tonnes
MY - model year
NHTSA - National Highway Traffic Safety Administration
NRSP - Newhall Ranch Specific Plan
OBUS - other buses
SBUS - school buses
UBUS - urban buses
VCC - Valencia Commerce Center

**Table 3-1. Summary of Assumptions**
RMDP/SCP
Los Angeles County, California

| | Unmitigated Project | Mitigated Project |
|---|---|---|
| **Electricity $CO_2$ intensity factor** | •SCE intensity factor adjusted for 50% RPS. | |
| **Mobile:** | | |
| **Number of trips generated** | •Trip rates, trip length, and internal trip capture provided by Stantec for each individual land use and/or trip type. | |
| **Vehicle emission factor** | • EMFAC2014<br>• HHD/OBUS idling factors based on EMFAC2011 because not available in EMFAC2014.<br>• Includes reduction from Pavley regulations and Advanced Clean Cars program.<br>• Exclude reduction from LCFS regulations.<br>• Reduction due to NHTSA Phase 2 GHG regulations applied | |
| **VMT Reductions Due to Mitigation Measures** | None | • 14.9% reduction in VMT per year due to TDM measures. |
| **GHG Reductions Due to Mitigation Measures** | None | • Residential EV chargers and vehicle subsidy<br>• Commercial development area and off-site EV chargers<br>• Traffic signal synchronization.<br>• Electric school bus program<br>• Electric transit bus subsidy |
| **Energy use** | • Building energy intensity based on Title 24 - 2016.<br>• Recreational swimming pool is heated by natural gas. | • Building energy intensity based on Title 24 - 2016.<br>• Recreational swimming pool is heated by solar power or equivalent.<br>• Zero Net Energy (ZNE) for residential and commercial land uses. |
| **Water use** | • Scale from California Department of Fish & Wildlife, Final Joint EIS/EIR for the RMDP and SCP Project, Climate Change Technical Addendum (October 2009), Tables 3-E-2-NRSP, 3-E-2-Entrada, and 3-E-2-VCC, based on the changes in land use sqft and dwelling units.<br>• 20 Percent Reduction for Indoor Water Consumption per CalGreen Building Standards (Title 24, Part 11)<br>• Potable/non-potable and indoor/outdoor water split based on Final Joint EIS/EIR assumptions.<br>• Conservatively estimate emissions associated with full capacity of Newhall Ranch Water Reclamation Plant | |

**Table 3-1. Summary of Assumptions**
RMDP/SCP
Los Angeles County, California

| | Unmitigated Project | Mitigated Project |
|---|---|---|
| **Solid Waste generation** | • Based on Santa Clarita's 2012 CalRecycle disposal rates for residents and employees.<br>• 75% diversion rate based on State's goal. | |
| **Vegetation** | • Based on Draft Joint EIS/EIR for the RMDP and SCP Project, Climate Change Technical Report (February 2009), Table 4-2-B. | • Based on Draft Joint EIS/EIR for the RMDP and SCP Project, Climate Change Technical Report (February 2009), Table 4-2-B.<br>• Change in GHG emissions are offset. |
| **Construction** | • Total level of construction equipment activity consistent with Final Joint EIS/EIR for the RMDP and SCP Project, Climate Change Technical Addendum (October 2009). | • Total level of construction equipment activity consistent with Final Joint EIS/EIR for the RMDP and SCP Project, Climate Change Technical Addendum (October 2009).<br>• Construction GHG emissions are offset. |
| **Others** | None | • Off-site EV chargers<br>• Building retrofit program<br>• GHG Reduction Plan |

Abbreviations:

$CO_2$ - carbon dioxide
EMFAC - California Air Resources Board Emissions Factor Model
EIR - Environmental Impact Report
EIS - Environmental Impact Statement
EV - electric vehicle
HHD - heavy-heavy duty
GHG - greenhouse gases
LCFS - Low Carbon Fuel Standard
NHTSA - National Highway Traffic Safety Administration
NRSP - Newhall Ranch Specific Plan
OBUS - other buses
RPS - Renewable Portfolio Standard
SCE - Southern California Edison
sqft - square feet
TDM - Traffic Demand Management
VCC - Valencia Commerce Center
VMT - vehicle miles travelled

**Table 3-2. Summary of Existing and Unmitigated Project Emissions**
RMDP/SCP
Los Angeles County, California

| Emissions Activity | Emissions (MT $CO_2e$ / year) | | References[1] |
|---|---|---|---|
| | Existing | Unmitigated | |
| Mobile | 152 | 403,814 | Tables ES-1 and ES-2 |
| Electricity | -- | 39,393 | Tables 2-14a and 2-14b |
| Natural Gas | -- | 43,386 | Tables 2-14a and 2-14b |
| Area Sources | 7,883 | 367 | Tables ES-1 and ES-2 |
| Water Consumption and Wastewater Treatment | 2,987 | 8,190 | Tables ES-1 and ES-2 |
| Solid Waste Generation | -- | 23,179 | Table ES-2 |
| Vegetation Removal | -- | 1,335 | Table ES-2 |
| Construction | -- | 6,437 | Table ES-2 |
| **Total Annual Emissions** | 11,021 | 526,103 | Tables ES-1 and ES-2 |

[1] Reference identifies where these values were first summarized. Additional background regarding these emission estimates are included in the tables within this Technical Report.

Abbreviations:
$CO_2e$ - carbon dioxide equivalents
MT - metric tonnes

**Table 4-1a. Residential GHG Emissions based on 2019 Title 24 Building Features**
RMDP/SCP
Los Angeles County, California

| CalEEMod® Land Use | ConSol Land Use Subtype (assigned)[1] | Number of Dwelling Units[2] | 2016 Title 24 | | | | | 2019 Title 24 Building Features (Approximated) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Electricity[3] | Natural Gas[3] | Electricity GHG Emissions | Natural Gas GHG Emissions | Total GHG Emissions[4] | Total Electricity[3] | Total Natural Gas[3] | Electricity GHG Emissions | Natural Gas GHG Emissions | Total GHG Emissions[5] |
| | | DU | kWh / DU / yr | kBTU / DU / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | kWh / DU / yr | kBTU / DU / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr |
| Single Family Housing | Single Family | 8,744 | 5,890 | 22,000 | 8,808 | 10,326 | 19,135 | 6,878 | 8,900 | 10,286 | 4,178 | 14,463 |
| Condo/Townhouse | Multifamily | 12,498 | 3,662 | 9,900 | 7,828 | 6,642 | 14,469 | 4,300 | 1,588 | 9,191 | 1,065 | 10,257 |
| **Total** | | **21,242** | **-** | **-** | **16,636** | **16,968** | **33,604** | **11,178** | **10,488** | **19,477** | **5,243** | **24,720** |

Notes:
[1] CalEEMod® land use types were mapped to the most representative land use type modeled by ConSol. ConSol modeling is shown in Appendix C.
[2] Number of dwelling units includes single family and multifamily homes from NRSP and ES. VCC does not include residential land uses.
[3] Total electricity is the sum of regulated and unregulated electricity loads. Total natural gas is the sum of regulated and unregulated natural gas loads. Values are shown in table 2-13a and Appendix C.
[4] Total GHG emissions are also shown in Table 2-14b.
[5] Total GHG emissions for the 2019 Title 24 Building Features home are the emissions remaining after efficient building before the application of solar PV. GHG reductions from solar PV are shown in Table 4-

Abbreviations:
CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2e$ - carbon dioxide equivalents
DU - dwelling unit
ES - Entrada South
GHG - greenhouse gases
kBTU - 1,000 British thermal units
kWh - kilowatt-hour
MT - metric tonnes
PV - photovoltaic
NRSP - Newhall Ranch Specific Plan
VCC - Valencia Commerce Center
yr - year

References:
ConSol, *Newhall Land & Farming Company Residential and Commercial Building Analysis* (2016)

**Table 4-1b. GHG Emissions Reduction due to Residential 2019 Title 24 Building Features**
RMDP/SCP
Los Angeles County, California

| CalEEMod® Land Use | ConSol Land Use Subtype (assigned)[1] | Number of Dwelling Units[2] | GHG Reduction from Electricity[3] | GHG Reduction from Natural Gas | GHG Reduction from All Building Features |
|---|---|---|---|---|---|
| | | DU | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr |
| Single Family Housing | Single Family | 8,744 | -1,478 | 6,149 | 4,671 |
| Condo/Townhouse | Multifamily | 12,498 | -1,364 | 5,577 | 4,213 |
| **Total** | | **21,242** | **-2,841** | **11,726** | **8,884** |

Notes:

[1] CalEEMod® land use types were mapped to the most representative land use type modeled by ConSol. ConSol modeling is shown in Appendix C.

[2] Number of dwelling units includes single family and multifamily homes from NRSP and ES. VCC does not include residential land uses.

[3] The negative numbers represent an increase in electricity emissions between 2016 Title 24 and 2019 Title 24 Building Features.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
$CO_2e$ - carbon dioxide equivalents
DU - dwelling unit
ES - Entrada South
GHG - greenhouse gases
MT - metric tonnes
NRSP - Newhall Ranch Specific Plan
VCC - Valencia Commerce Center
yr - year

References:

ConSol, *Newhall Land & Farming Company Residential and Commercial Building Analysis* (2016)

**Table 4-1c. GHG Emissions Reduction due to Residential ZNE Building Solar PV**
RMDP/SCP
Los Angeles County, California

| Land Use | Rated Solar PV Production[1] | Number of Dwelling Units[2] | Number of Solar PV Systems[3] | Annual Renewable Energy Generated[4] | Total Annual Renewable Energy Generated | Total Annual Solar PV $CO_2e$ Reduction[5] |
|---|---|---|---|---|---|---|
| | kW / system | DU | system | kWh / yr / system | kWh / yr | MT $CO_2e$ / yr |
| Single Family | 5.0 | 8,744 | 8,744 | 8,167 | 71,412,248 | 12,213 |
| Multifamily | 21.9 | 12,498 | 1,562 | 35,772 | 55,884,807 | 9,558 |
| **Total** | | **21,242** | **10,306** | **43,939** | **127,297,055** | **21,771** |

Notes:

[1] Based on ConSol study to achieve CEC definition of ZNE for residences (Appendix C). For Single Family, a 2-story 2,700 sqft home constructed to approximate 2019 Title 24 standards, would need a 5.0 kW solar power system to reach Zero Net Energy in Climate Zone 9, Santa Clarita. For Multifamily, a 6,960 sqft, 2-story multi-family, 8-plex would need a 21.9 kW system.

[2] Number of dwelling units includes single family and multifamily homes from NRSP and ES. VCC does not include residential land uses.

[3] Total number of PV systems assumes 8,744 single family homes and 1,562 multifamily homes (8 units each) each contain PV systems.

[4] Annual renewable energy generated per unit from Appendix C.

[5] Annual Photovoltaic GHG Reduction is based on the $CO_2e$ emission factor for SCE in 2030, assuming 50% RPS. Note this reduction does not account for potential improvements in emission factors due to shifting of loads from peak to off-peak hours.

Abbreviations:

CEC - California Energy Commission
$CO_2e$ - carbon dioxide equivalents
DU - dwelling unit
ES - Entrada South
GHG - greenhouse gases
MT - metric tonnes
kW - kilowatt
kWh - kilowatt-hour
NRSP - Newhall Ranch Specific Plan
PV - photovoltaic
RPS - Renewable Portfolio Standards
SCE - Southern California Edison
sqft - square feet
VCC - Valencia Commerce Center
yr - year
ZNE - Zero Net Energy

References:

CEC. Integrated Energy Policy Report. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf. Accessed: September 2016.

ConSol, *Newhall Land & Farming Company Residential and Commercial Building Analysis* (2016)

**Table 4-1d. Total GHG Emissions Reduction due to Residential ZNE Buildings and Solar PV**
RMDP/SCP
Los Angeles County, California

| GHG Reduction from 2016 Title 24 to 2019 Title 24 Building Features (Approximated) Residences[1,3] (Electricity) | GHG Reduction from 2016 Title 24 to 2019 Title 24 Building Features (Approximated) Residences[1] (Natural Gas) | GHG Reduction from Solar PV[2] (Electricity) | Total GHG Reduction |
|---|---|---|---|
| MT $CO_2e$ / yr | | | |
| -2,841 | 11,726 | 21,771 | **30,656** |

Notes:

[1] Reduction calculation shown in Tables 4-1a and 4-1b.

[2] Reduction calculation shown in Table 4-1c.

[3] The negative numbers represent an increase in electricity emissions between 2016 Title 24 and 2019 Title 24 Building Features.

Abbreviations:

$CO_2e$ - carbon dioxide equivalents
GHG - greenhouse gas
MT - metric tonnes
PV - photovoltaic
yr - year
ZNE - Zero Net Energy

**Table 4-2a. Non-Residential Energy Usage based on 2019 Title 24 Building Features**
RMDP/SCP
Los Angeles County, California

| Area | Project Assumption | CalEEMod® Land Use Subtype | ConSol Land Use Type (assigned)[1,2] | Total Size | Total Approximate Energy Use Rates | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2016 Electricity[3] | 2016 Natural Gas[3] | Reduction to 2019 Electricity[4] | Reduction to 2019 Natural Gas[4] | 2019 Electricity | 2019 Natural Gas |
| | | | | TSF | kWh/SF/yr | kBTU/SF/yr | % | % | kWh/SF/yr | kBTU/SF/yr |
| ES | Elementary/Middle School | Elementary School | Office | 60 | 6.18 | 9.39 | 12% | 57% | 5.41 | 4.00 |
| | Commercial Office | General Office Building | Office | 63 | 13.41 | 9.43 | 12% | 57% | 11.74 | 4.02 |
| | Recreational Center | Health Club | Industrial | 7 | 9.46 | 19.27 | 7% | -23% | 8.82 | 23.66 |
| | Hotel | Hotel | Office | 200 | 7.84 | 21.58 | 12% | 57% | 6.87 | 9.19 |
| | Commercial Center | Regional Shopping Center | Retail | 188 | 11.89 | 1.32 | 15% | -3% | 10.16 | 1.36 |
| NRSP | Elementary/Middle School | Elementary School | Office | 358 | 6.18 | 9.39 | 12% | 57% | 5.41 | 4.00 |
| | Fire Station | General Light Industry | Industrial | 33 | 9.46 | 19.27 | 7% | -23% | 8.82 | 23.66 |
| | Commercial Office | General Office Building | Office | 1,023 | 13.41 | 9.43 | 12% | 57% | 11.74 | 4.02 |
| | Recreational Center | Health Club | Industrial | 43 | 9.46 | 19.27 | 7% | -23% | 8.82 | 23.66 |
| | High School | High School | Office | 142 | 6.18 | 9.39 | 12% | 57% | 5.41 | 4.00 |
| | Hotel | Hotel | Office | 100 | 7.84 | 21.58 | 12% | 57% | 6.87 | 9.19 |
| | Industrial Park | Industrial Park | Industrial | 756 | 11.41 | 11.20 | 7% | -23% | 10.64 | 13.75 |
| | Library | Library | Industrial | 36 | 9.46 | 19.27 | 7% | -23% | 8.82 | 23.66 |
| | Business Park | Office Park | Office | 324 | 14.67 | 8.87 | 12% | 57% | 12.85 | 3.78 |
| | Industrial Park | Regional Shopping Center | Retail | 3,247 | 11.89 | 1.32 | 15% | -3% | 10.16 | 1.36 |
| VCC | Business Park | Office Park | Office | 1,100 | 14.67 | 8.87 | 12% | 57% | 12.85 | 3.78 |
| | Industrial Park | Industrial Park | Industrial | 2,300 | 11.41 | 11.20 | 7% | -23% | 10.64 | 13.75 |
| **Total** | | | | **9,979** | - | - | - | - | - | - |

Notes:

[1] ConSol land use prototypes include a 100,000 square foot, 4-story office building; a 75,000 square foot, one-story light industrial building (20,000 square feet conditioned); and a 40,000 square foot, one-story suburban retail building.

[2] CalEEMod® land use types were mapped to the most representative land use type from ConSol based on the similarity of emission factors in CalEEMod®.

[3] Derivations for 2016 Title 24 energy use rates are presented in Table 2-13b.

[4] Energy use reductions from 2016 Title 24 to 2019 Title 24 based on ConSol building energy modeling.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CEC - California Energy Commission
ES - Entrada South
kBTU- 1,000 British thermal units
kWh - kilowatt-hour
NRSP - Newhall Ranch Specific Plan
SF - square feet
TSF- thousand square feet
VCC - Valencia Commerce Center
yr - year

References:


CEC. 2016 Building Energy Efficiency Standards Approved Computer Compliance Programs. Available at: http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html. Accessed: September 2016.

CEC. Integrated Energy Policy Report. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf. Accessed: September 2016.

**Table 4-2b. GHG Emissions Reduction due to Non-Residential 2019 Title 24 Building Features**
RMDP/SCP
Los Angeles County, California

| Area | Project Assumption | CalEEMod® Land Use Subtype | ConSol Land Use Type (assigned)[1,2] | Total Size | Total Approximate Energy Emissions 2016 Elec | 2016 NG | 2019 Elec | 2019 NG | GHG Reduction from Electricity | GHG Reduction from Natural Gas | GHG Reduction from 2016 to Approximate 2019 Title 24[3,4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TSF | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr | MT $CO_2e$ / yr |
| ES | Elementary/Middle School | Elementary School | Office | 60 | 63 | 30 | 56 | 13 | 8 | 17 | 25 |
| | Commercial Office | General Office Building | Office | 63 | 143 | 32 | 126 | 13 | 18 | 18 | 36 |
| | Recreational Center | Health Club | Industrial | 7 | 11 | 7 | 10 | 8 | 1 | -2 | -1 |
| | Hotel | Hotel | Office | 200 | 268 | 232 | 235 | 99 | 33 | 133 | 166 |
| | Commercial Center | Regional Shopping Center | Retail | 188 | 381 | 13 | 326 | 14 | 55 | 0 | 55 |
| NRSP | Elementary/Middle School | Elementary School | Office | 358 | 378 | 180 | 331 | 77 | 47 | 104 | 150 |
| | Fire Station | General Light Industry | Industrial | 33 | 54 | 34 | 50 | 42 | 4 | -8 | -4 |
| | Commercial Office | General Office Building | Office | 1,023 | 2,346 | 518 | 2,055 | 220 | 292 | 297 | 589 |
| | Recreational Center | Health Club | Industrial | 43 | 70 | 45 | 65 | 55 | 5 | -10 | -5 |
| | High School | High School | Office | 142 | 151 | 72 | 132 | 31 | 19 | 41 | 60 |
| | Hotel | Hotel | Office | 100 | 134 | 116 | 117 | 49 | 17 | 67 | 83 |
| | Industrial Park | Industrial Park | Industrial | 756 | 1,475 | 455 | 1,376 | 558 | 99 | -103 | -4 |
| | Library | Library | Industrial | 36 | 58 | 37 | 54 | 46 | 4 | -8 | -5 |
| | Business Park | Office Park | Office | 324 | 813 | 154 | 712 | 66 | 101 | 89 | 190 |
| | Industrial Park | Regional Shopping Center | Retail | 3,247 | 6,603 | 230 | 5,642 | 238 | 961 | -8 | 953 |
| VCC | Business Park | Office Park | Office | 1,100 | 2,760 | 524 | 2,417 | 223 | 343 | 301 | 644 |
| | Industrial Park | Industrial Park | Industrial | 2,300 | 4,488 | 1,383 | 4,187 | 1,698 | 301 | -315 | -13 |
| **Total** | | | | **9,979** | **20,197** | **4,061** | **17,890** | **3,449** | **2,306** | **612** | **2,919** |

Notes:

[1] ConSol land use prototypes include a 100,000 square foot, 4-story office building; a 75,000 square foot, one-story light industrial building (20,000 square feet conditioned); and a 40,000 square foot, one-story suburban retail building.

[2] CalEEMod® land use types were mapped to the most representative land use type from ConSol based on the similarity of emission factors in CalEEMod®.

[3] Electricity intensity factor for $CO_2e$ is for SCE in 2030, assuming 50% RPS.

[4] Reduction does not account for potential improvements in emission factors due to shifting of loads from peak to off-peak hours.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CEC - California Energy Commission
$CO_2e$ - carbon dioxide equivalents
ES - Entrada South
MT - metric tonnes
NG - natural gas
NRSP - Newhall Ranch Specific Plan
RPS - Renewable Portfolio Standard
SCE - Southern California Edison
TSF- thousand square feet
VCC - Valencia Commerce Center
yr - year

References:


CEC. 2016 Building Energy Efficiency Standards Approved Computer Compliance Programs. Available at: http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html. Accessed: September 2016.

CEC. Integrated Energy Policy Report. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf. Accessed: September 2016.

ConSol, *Newhall Land & Farming Company Residential and Commercial Building Analysis* (2016)

**Table 4-2c. GHG Emissions Reduction due to Non-Residential ZNE Building Solar PV**
RMDP/SCP
Los Angeles County, California

**ConSol Appendix C Analysis: Solar PV Generation Required to Achieve ZNE**

| ConSol Land Use Type[1] | 2019 Title 24 Energy Demand | PV Size | Solar PV Generation Required for ZNE | % of 2019 kWh Required for ZNE |
|---|---|---|---|---|
| | kWh | kW DC | kWh | % |
| Office | 808,029 | 536.9 | 902,871 | 112% |
| Industrial | 150,882 | 126.6 | 199,604 | 132% |
| Retail | 361,550 | 299.1 | 486,764 | 135% |

| Area | Project Assumption | CalEEMod® Land Use Subtype | ConSol Land Use Type[1,2] | Total Size | Approximate 2019 Electricity Consumption[3] | % of 2019 kWh Required from Solar PV for ZNE[4] | Solar PV Generation Needed to Achieve ZNE | Annual PV GHG Reduction[5,6] |
|---|---|---|---|---|---|---|---|---|
| | | | | TSF | kWh/yr | % | kWh/yr | MT $CO_2e$/yr |
| ES | Elementary/Middle School | Elementary School | Office | 60 | 324,721 | 112% | 362,835 | 62 |
| | Commercial Office | General Office Building | Office | 63 | 733,973 | 112% | 820,122 | 140 |
| | Recreational Center | Health Club | Industrial | 7 | 58,832 | 132% | 77,829 | 13 |
| | Hotel | Hotel | Office | 200 | 1,373,148 | 112% | 1,534,320 | 262 |
| | Commercial Center | Regional Shopping Center | Retail | 188 | 1,905,005 | 135% | 2,564,757 | 439 |
| NRSP | Elementary/Middle School | Elementary School | Office | 358 | 1,935,334 | 112% | 2,162,493 | 370 |
| | Fire Station | General Light Industry | Industrial | 33 | 292,100 | 132% | 386,423 | 66 |
| | Commercial Office | General Office Building | Office | 1,023 | 12,013,666 | 112% | 13,423,764 | 2,296 |
| | Recreational Center | Health Club | Industrial | 43 | 382,406 | 132% | 505,891 | 87 |
| | High School | High School | Office | 142 | 770,678 | 112% | 861,135 | 147 |
| | Hotel | Hotel | Office | 100 | 686,574 | 112% | 767,160 | 131 |
| | Industrial Park | Industrial Park | Industrial | 756 | 8,046,729 | 132% | 10,645,135 | 1,821 |
| | Library | Library | Industrial | 36 | 317,691 | 132% | 420,279 | 72 |
| | Business Park | Office Park | Office | 324 | 4,162,423 | 112% | 4,650,986 | 795 |
| | Industrial Park | Regional Shopping Center | Retail | 3,247 | 32,989,609 | 135% | 44,414,753 | 7,596 |
| VCC | Business Park | Office Park | Office | 1,100 | 14,131,685 | 112% | 15,790,384 | 2,701 |
| | Industrial Park | Industrial Park | Industrial | 2,300 | 24,480,789 | 132% | 32,385,994 | 5,539 |
| **Total** | | | | **9,979** | **104,605,362** | - | **131,774,261** | **22,537** |

Notes:

[1] ConSol land use prototypes include a 100,000 square foot, 4-story office building; a 75,000 square foot, one-story light industrial building (20,000 square feet conditioned); and a 40,000 square foot, one-story suburban retail building.

[2] CalEEMod® land use types were mapped to the most representative land use type from ConSol based on the similarity of emission factors in CalEEMod®.

[3] Approximate 2019 electricity consumption based on percent reductions in electricity use from 2016 Title 24 to 2019 Title 24 derived from ConSol building energy modeling, as shown in table 4-2a.

[4] Percentages of baseline electricity required to achieve CEC definition of ZNE are approximate because they are based on assumed building features and reflect time-dependant valuation of energy. Based on ConSol's building-specific energy use and solar system-specific assumptions.

[5] Electricity intensity factor for $CO_2e$ is for SCE in 2030, assuming 50% RPS.

[6] Reduction does not account for potential improvements in emission factors due to shifting of loads from peak to off-peak hours.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CEC - California Energy Commission
$CO_2e$ - carbon dioxide equivalents
ES - Entrada South
GHG - greenhouse gases
kWh - kilowatt-hour
MT - metric tonnes
NRSP - Newhall Ranch Specific Plan
PV - photovoltaic
RPS - Renewable Portfolio Standards
SCE - Southern California Edison
TSF - thousand square feet
VCC - Valencia Commerce Center
yr - year
ZNE - Zero Net Energy

References:

CEC. 2016 Building Energy Efficiency Standards Approved Computer Compliance Programs. Available at: http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html. Accessed: September 2016.

CEC. Integrated Energy Policy Report. 2011. Available at: http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf. Accessed: September 2016.

ConSol, *Newhall Land & Farming Company Residential and Commercial Building Analysis* (2016).

**Table 4-2d. Total GHG Emissions Reduction due to Non-Residential ZNE Building Features and Solar PV**
RMDP/SCP
Los Angeles County, California

| Reduction from 2016 Title 24 to Approximate 2019 Title 24[1] (Electricity) | Reduction from 2016 Title 24 to Approximate 2019 Title 24[1] (Natural Gas) | Reduction from Solar PV[2] (Electricity) | Total Reduction |
|---|---|---|---|
| MT $CO_2e$ / yr | | | |
| 2,306 | 612 | 22,537 | **25,456** |

Notes:
[1] Reduction calculation shown in Tables 4-2a and 4-2b.
[2] Reduction calculation shown in Table 4-2c.

Abbreviations:
$CO_2e$ - carbon dioxide equivalents
GHG - greenhouse gas
MT - metric tonnes
PV - photovoltaic
yr - year
ZNE - Zero Net Energy

**Table 4-3. GHG Emissions Reduction for Residential Electric Vehicles**
RMDP/SCP
Los Angeles County, California

| | | |
|---|---|---|
| **Estimating GHG Emissions Reduction from Replacement of Gasoline Vehicle with Electric Vehicle** | | |
| SCE Electricity Emission Factor[1] | 0.17 | (MT $CO_2$e/MWh) |
| Fuel Economy of Electric Vehicle[2] | 0.25 | (kWh/mile) |
| Electric Vehicle GHG Emissions | 42.6 | (gms/mile) |
| GHG Emissions for the Residential Miles Traveled as Estimated by CalEEMod® (including NHTSA Phase 2 reduction)[3] | 324.9 | (gms $CO_2$/mile) |
| GHG Emissions Reduction from Additional Electric Vehicles, per mile | 282.3 | (gms/mile) |
| **Estimating Project Residential-Related Traffic GHG Emissions** | | |
| Residential Average Yearly Traffic, before TDMs[4] | 447,218,315 | (miles/year) |
| Residential Average Yearly Traffic, After TDMs[5] | 380,582,786 | (miles/year) |
| Percent of Residential Miles Driven in Electric Vehicles due to This Measure[6] | 50% | |
| Residential VMT that is Displaced by EVs due to This Measure | 190,291,393 | (miles/year) |
| **Estimated Benefit from Residential EV Chargers and Vehicle Subsidy** | | |
| GHG Emissions Reduction from Residential Electric Vehicles[7] | 53,724 | (MT $CO_2$e/year) |
| Total Project Traffic GHG Emissions, After TDMs and Residential EV Mitigation[8] | 289,921 | (MT $CO_2$e/year) |

Notes:

[1] $CO_2$ intensity factor for SCE accounts for the 50% Renewable Portfolio Standard consistent with assumptions for the 2030 emissions inventories. This analysis only uses $CO_2$ and $CH_4$ emissions, and $N_2O$ is not included.

[2] US Department of Energy, 2013. Benefits and Considerations of Electricity as a Vehicle Fuel. Available at: http://www.afdc.energy.gov/fuels/electricity_benefits.html. Accessed: September 2016.

[3] The emissions factor (324.9 gms/mile) is consistent with the CalEEMod® input, and includes default reductions for the ACC Program and Pavley Standards. The emissions factor also is consistent with EMFAC2014's running exhaust emission rate for $CO_2$ for vehicles in Los Angeles County, as aggregated for all models and speeds, and averaged over all seasons for 2030, except includes the emissions reduction due to NHTSA Phase 2 regulations since this benefit is estimated post-CalEEMod®. The emissions inventory includes a small amount of $CH_4$ and $N_2O$, so when they are excluded from the reductions, it is a conservative approach. To ensure that the Project mitigation's emissions reduction benefit does not take credit for EVs that EMFAC2014 already forecasts will be part of the vehicle fleet, the emissions factor and emissions inventory includes the existing EVs. CalEEMod® conservatively includes medium- and heavy-duty vehicle emissions factors proportional to EMFAC2014's default fleet mix when calculating mobile emissions for all land use types.

Calculation methodology from EMFAC2014 output: Weighted average running emissions $CO_2$ (g/mi) = % of mi by vehicle type x $CO_2$ running EF (g/mi)

1. EF in CalEEMod®: 330.5 g/mi
2. EF including NHTSA Phase 2, used in calculation: 324.9 g/mi
3. EF if no EVs were included in CalEEMod®, including NHTSA Phase 2: 347.3 g/mi

Available at: http://www.arb.ca.gov/emfac/. Accessed: September 2016.

[4] From CalEEMod® modeling, as shown in Table 2-18a.

[5] The 14.9% reduction in VMT due to TDMs (shown in Table 4-5) is applied prior to taking credit for the residential EV mitigation measure.

[6] This assumption is described in more detail in the Appendix H.

[7] Calculated by multiplying the GHG reduction per mile from EVs by the miles displaced by EVs. Assuming that 50% of the 21,242 dwelling units use a subsidy to purchase an EV, the reduction per subsidy equals the total GHG emissions reduction divided by the number of subsidies = 53,735 MT / (21,242 x 50%) = 5.06 MT $CO_2$e per year per subsidy.

[8] Remaining mobile emissions after TDMs and Residential EV Mitigation.

Abbreviations:

ACC - Advanced Clean Cars
CalEEMod® - CALifornia Emissions Estimator MODel
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EF - emission factor
EMFAC - California Air Resources Board Emissions Factor Model
EV - electric vehicle
g/gms - grams
GHG - greenhouse gases
kWh - kilowatt-hour
mi - mile
MT - metric tonnes
MWh - megawatt-hour
$N_2O$ - nitrous oxide
NHTSA - National Highway Traffic Safety Administration
SCE - Southern California Edison
TDM - Transportation Demand Management
VMT - vehicle miles traveled

**Table 4-4. GHG Emissions Reduction for Commercial Development Area Electric Vehicle Charging Stations**
RMDP/SCP
Los Angeles County, California

| Estimating GHG Emissions Reduction from Replacement of Gasoline Vehicle with Electric Vehicle | | |
|---|---|---|
| SCE Electricity Emission Factor[1] | 0.17 | (MT $CO_2$e/MWh) |
| Fuel Economy of Electric Vehicle[2] | 0.25 | (kWh/mile) |
| Gasoline/Diesel $CO_2$e Emission while Running[3] | 257 | (gms/mile) |
| Annual VMT Reduction per Parking Spot[4] | 91,250 | (miles/charging station/year) |
| Number of On-Site Commercial Parking Spots Provided Chargers[5] | 2,000 | |
| Annual VMT Reduction All Stations (Based on Charge) | 182,500,000 | (miles/year) |
| **Estimated Benefit from Installing Electric Vehicle Charging Stations in Commercial Development Areas** | | |
| GHG Emissions of Gasoline/Diesel Vehicle[6] | 46,875 | (MT $CO_2$e/year) |
| GHG Emissions of Electric Vehicle[7] | 7,766 | (MT $CO_2$e/year) |
| GHG Emissions Reduction[8] | 39,109 | (MT $CO_2$e/year) |
| GHG Reduction per Parking Space with Charging per Year | 20 | (MT CO2e/year) |
| Total Project Traffic GHG Emissions, After TDMs and Residential and Commercial EV Mitigation[9] | 250,812 | (MT $CO_2$e/year) |
| Number of Off-Site Parking Spots Provided Chargers[5] | 2,036 | |
| GHG Emissions Reduction from Off-Site Parking Spots[10] | 39,813 | (MT $CO_2$e/year) |

Notes:

[1] $CO_2$e weighted intensity factor for SCE accounts for $CO_2$ and $CH_4$ emissions rates consistent with 50% Renewable Portfolio Standard.

[2] US Department of Energy, 2013. Benefits and Considerations of Electricity as a Vehicle Fuel. Available at: http://www.afdc.energy.gov/fuels/electricity_benefits.html. Accessed: September 2016.

[3] CARB, 2015. EMFAC2014, running exhaust emission rate for $CO_2$ and $CH_4$ for light duty gasoline- and diesel-powered vehicles in Los Angeles, aggregated for all models and speeds, averaged over all seasons for 2030. Emission rate includes reductions for Advanced Clean Cars (ACC) and Pavley. Available at: http://www.arb.ca.gov/emfac/. Accessed: September 2016.

[4] Annual VMT reduction estimated based on an estimate of ten hours of charge time for a Level 2 charging station that charges at a rate of 25 miles of driving range per hour.

[5] Number of charging stations based on project commitment. This assumes 2,000 parking spaces will be serviced by a charging station (equivalent to 7.5 percent of required commercial parking spaces). The off-site mitigation measure GCC-12 assumes 2,036 parking spaces will have a charging station, based on a ratio of one parking space serviced by an electric vehicle charging station per 30 residential dwelling units and one parking space serviced by an electric vehicle charging station per 7,000 commercial square feet.

[6] GHG emissions calculated using annual VMT reduction at all stations and $CO_2$ and $CH_4$ emission rate. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[7] GHG emissions calculated using annual VMT reduction at all stations, fuel economy of electric vehicles, along with SCE electricity $CO_2$e emission factor. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[8] GHG emissions reduction is a difference of GHG emissions of gasoline vehicles and GHG emissions of electric vehicles. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[9] Remaining mobile emissions after TDMs and Residential and Commercial EV Mitigation. TDM calculations are shown in Table 4-5.

[10] Reduction is the number of off-site parking spots multiplied by the GHG reduction per parking spot.

Abbreviations:

CARB - California Air Resources Board
$CH_4$ - methane
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EMFAC - California Air Resources Board Emissions Factor Model
EV - electric vehicle
GHG - greenhouse gases
gms - grams
kWh - kilowatt-hour
MT - metric tonnes
MWh - megawatt-hour
SCE - Southern California Edison
TDM - Transportation Demand Management
VMT - vehicle miles traveled

**Table 4-5. GHG Emissions Reductions due to Transportation Demand Management**
RMDP/SCP
Los Angeles County, California

| Item | Value | Units |
|---|---|---|
| Total VMT per Year[1] | 1,211,961,903 | (miles/yr) |
| Total VMT Reduction due to TDMs[2] | 14.9% | |
| Total VMT per Year after TDMs | 1,031,379,579 | (miles/yr) |
| Total Mobile GHG Emissions, 2030 Unmitigated | 410,855 | (MT $CO_2$e/yr) |
| Total GHG Reduction due to NHTSA Regulatory Compliance[3] | 7,041 | (MT $CO_2$e/yr) |
| Total Mobile GHG Emissions after NHTSA Reduction, 2030 Unmitigated | 403,814 | (MT $CO_2$e/yr) |
| Total GHG Reduction due to TDMs[4] | 14.9% | |
| Reduction in Mobile GHG Emissions due to TDMs, 2030 Unmitigated | 60,168 | (MT $CO_2$e/yr) |
| Remaining Mobile GHG Emissions after TDMs, 2030 | 343,646 | (MT $CO_2$e/yr) |

Notes:

[1] Total VMT based on the trip rates and trip lengths for Entrada South, Valencia Commerce Center, and Newhall Ranch Specific Plan areas. Trips were modeled using CalEEMod® version 2013.2.2.

[2] Reduction due to TDMs based on Fehr & Peers, *RMDP/SCP Project: Transportation Demand Management Program* (2016).

[3] Mobile GHG reductions due to Phase 2 NHTSA regulations are not incorporated into EMFAC2014. These reductions are calculated in Table 2-18b and apply to both the 2030 unmitigated and 2030 mitigated emissions inventories.

[4] GHG emissions are directly proportional to VMT using CalEEMod® methodology. The NEV measure results in a 2.54% reduction in mobile VMT, which translates to a 2.54% reduction in mobile GHGs: 403,886 MT $CO_2$e/year x 2.54% = 10,259 MT $CO_2$e/year reduction due to NEVs. Assuming that 20% of the 21,242 dwelling units use a subsidy to purchase an NEV, the number of NEVs purchased equals (21,242 x 20%) = 4,248 NEVs. The GHG reduction per subsidy equals the total GHG emissions reduction divided by the number of subsidies = 10,259 MT $CO_2$e / 4,248 NEVs = 2.4 MT $CO_2$e per year per subsidy.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
EMFAC - California Air Resources Board Emissions Factor Model
$CO_2$e - carbon dioxide equivalents
GHG - greenhouse gases
MT - metric tonnes
NEV - neigborhood electric vehicles
NHTSA - National Highway Traffic Safety Administration
TDM - Transportation Demand Management
VMT - vehicle miles traveled
yr - year

**Table 4-6. Mobile GHG Reductions due to Traffic Signal Synchronization**
RMDP/SCP
Los Angeles County, California

**I. Percent Reduction in Mobile GHG Emissions Due to Traffic Signal Synchronization**

| | | | | | |
|---|---|---|---|---|---|
| **Traffic Assumptions**[1] | | | | | |
| Total RMDP/SCP ADT | 336,051 | | | | trips/day |
| Total RMDP/SCP VMT | 3,533,618 | | | | mi/day |
| Road Segment-Specific Traffic Assumptions[2] | Commerce Center | Magic Mountain | Chiquito | SR-126 | |
| Average Running Speed | 45 | 45 | 45 | 60 | mph |
| Average Daily Trips (ADT) | 41,700 | 47,000 | 35,300 | 66,600 | trips/day |
| Road Segment Length | 2.3 | 3.8 | 4.6 | 5.6 | mi/trip |
| Road Segment-Specific Daily VMT[3] | 95,910 | 178,600 | 162,380 | 372,960 | mi/day |
| **$CO_2$ Emission Factors**[4] | | | | | |
| Congested $CO_2$ Emission Factor | 323 | 323 | 323 | 332 | g $CO_2$/mi |
| Free-flow $CO_2$ Emission Factor | 259 | 259 | 259 | 306 | g $CO_2$/mi |
| **$CO_2$ Emissions**[4] | | | | | |
| "Baseline" $CO_2$ Emissions (based on congested EF) | 30.98 | 57.69 | 52.45 | 123.82 | MT $CO_2$/day |
| Post-Synchronization $CO_2$ Emissions (based on free-flow EF) | 24.84 | 46.26 | 42.06 | 114.13 | MT $CO_2$/day |
| Road Segment-Specific Percent Reduction in Mobile GHG Emissions due to Traffic Signal Synchronization[5] | 0.54% | 1.00% | 0.91% | 0.83% | % |
| **Overall Project Percent Reduction in Mobile GHG Emissions due to Traffic Signal Synchronization**[6] | **3.28%** | | | | **%** |

**II. Mobile GHG Emissions after Traffic Signal Synchronization**

| | | |
|---|---|---|
| Total Mobile GHG Emissions, after TDMs, Residential and Commercial EV, and Electric School Bus Mitigation Measures | 250,655 | MT $CO_2$e/yr |
| Reduction in Mobile GHG Emissions due to Traffic Signal Synchronization | 8,212 | MT $CO_2$e/yr |
| **Remaining Mobile GHG Emissions after Mitigation** | **242,443** | **MT $CO_2$e/yr** |

Notes:

[1] Total RMDP/SCP ADT and VMT was based on the SCVCTM Model as provided by Stantec. This ADT and VMT is calculated in Tables 2-17a through 2-17e. This represents the VMT and trips before the weekend trip rate adjustment in CalEEMod®.

[2] This calculation was provided by Stantec as shown in Appendix I. Four road segments in RMDP/SCP are proposed for traffic signal synchronization: Commerce Center from north of Franklin to Magic Mountain, Magic Mountain from Long Canyon to I-5 northbound ramps, Chiquito Canyon/Long Canyon/Valencia, and SR-126 from County Line to I-5 northbound ramps.

[3] Average running speed was assumed. Segment VMT is the product of ADT and road segment length.

[4] Congested and Free-flow emission factors are based on the CAPCOA RPT-2 Fact Sheet, which provides $CO_2$ emissions per mile based on vehicle speed. $CO_2$ emissions were calculated by multiplying the emission factor by the respective road segment daily VMT.

[5] The reduction due to traffic synchronization for each road segment is found using the following equation:

$$\%\ CO_2\ \text{Reduction} = \left(1 - \frac{\text{Project } CO_{2(\text{free-flow})}}{\text{Project } CO_{2(\text{congested})}}\right) \times \frac{\text{Road Segment-Specific Daily VMT}}{\text{Total RMDP/SCP VMT}} \times 100$$

[6] The calculated percent reduction is normalized to the total traffic emissions to facilitate the calculation relative to the Project GHG emissions inventory. The CAPCOA RPT-2 emission factors do not account for the detail that the Project emissions inventory does. For example, the Project emissions inventory is based on EMFAC2014 and CalEEMod® accounts for weekend vs. weekday variations. By normalizing this reduction due to the traffic signal synchronization to the Project VMT using the RPT-2 emission factors, the calculation can account for the differences between the Project emissions inventory relative to the RPT-2 methodology.

Abbreviations:

ADT - Average Daily Trips
CalEEMod® - CALifornia Emissions Estimator MODel
CAPCOA - California Air Pollution Control Officers Association
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EMFAC - California Air Resources Board Emissions Factor Model
EF - emission factor
EV - electric vehicle
g - gram
GHG - greenhouse gases
I-5 - Interstate 5
mi - mile
MT - metric tonnes
mph - miles per hour
SCVCTM - Santa Clarita Valley Consolidated Traffic Model
SR-126 - State Route 126
TDM - Transportation Demand Management
VMT - vehicle miles traveled
yr - year

References:

CAPCOA, 2010. Available at: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf. Accessed: September, 2016.
Stantec, *Newhall Ranch RMDP/SCP – GHG Reductions from Traffic Signal Coordination* (2016).

**Table 4-7. GHG Emissions Reduction due to Replacement of CNG School Buses with Electric School Buses**
RMDP/SCP
Los Angeles County, California

| **Assumptions** | | |
|---|---|---|
| SCE Electricity Emission Factor[1] | 0.17 | (MT $CO_2$e/MWh) |
| Fuel Economy of Electric Bus[2] | 1.8 | (kWh/mile) |
| CNG School Bus $CO_2$e Emission while Running[3] | 938 | (gms/mile) |
| Annual Average School Bus VMT[4] | 13,780 | (VMT/year) |
| Number of Buses[5] | 18 | buses |
| **Estimated Benefit from Replacing CNG School Buses with Electric Buses** | | |
| GHG Emissions of CNG Bus[6] | 233 | (MT $CO_2$e/year) |
| GHG Emissions of Electric Bus[7] | 75 | (MT $CO_2$e/year) |
| GHG Emissions Reduction[8] | 157 | (MT $CO_2$e/year) |
| Total Project Traffic GHG Emissions, After TDMs, Residential and Commercial EV Mitigation, and Electric School Bus Program[9] | 250,655 | (MT $CO_2$e/year) |

Notes:

[1] $CO_2$e weighted intensity factor for SCE accounts for $CO_2$ and $CH_4$ emissions rates consistent with the 50% Renewable Portfolio Standard.

[2] Average of BYD and Proterra fuel economy found on their respective websites. Proterra. Available at: http://www.proterra.com/product-tech/product-portfolio/. Accessed: September 2016. BYD. Available at: http://byd.com/na/ebus/ebus.html. Accessed: September 2016.

[3] CARB, 2015. EMFAC2014 2030 running exhaust emission rate for $CO_2$e (accounts for $CO_2$ and $CH_4$) for diesel school buses in Los Angeles County (1,265 gms/mile), along with the ratio of EMFAC2014 2030 emission rates for diesel urban buses (2,603 gms/mile) to CNG urban buses (1,929 gms/mile), were used to calculate the CNG school bus emission rate. Emission rates include reductions Advanced Clean Cars (ACC) and Pavley and are aggregated for all models and speeds, averaged over all seasons for 2030. Available at: http://www.arb.ca.gov/emfac/. Accessed: September 2016.

[4] CARB, 2015. EMFAC2014 2030 annual diesel school bus VMT in Los Angeles County, aggregated for all models and speeds, averaged over all seasons for 2030. Accessed: September 2016. Assumed CNG bus VMT should be no different from diesel bus VMT.

[5] Number of buses based on Project specific estimate.

[6] GHG emissions calculated using annual VMT, number of buses, and $CO_2$ and $CH_4$ emission rate. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[7] GHG emissions calculated using annual VMT, fuel economy and number of electric buses along with SCE electricity $CO_2$e emission factor. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[8] GHG emissions reduction is a difference of GHG emissions of CNG buses and GHG emissions of electric buses. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[9] Remaining mobile emissions after TDMs, Residential and Commercial EV Mitigation, and EV school bus program.

Abbreviations:

CARB - California Air Resources Board
$CH_4$ - methane
CNG - compressed natural gas
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EMFAC - California Air Resources Board Emissions Factor Model
EV - electric vehicle
GHG - greenhouse gases
gms - grams
kWh - kilowatt-hour
MT - metric tonnes
MWh - megawatt-hour
SCE - Southern California Edison
TDM - Transportation Demand Management
VMT - vehicle miles traveled

**Table 4-8. GHG Emissions Reduction due to Replacement of CNG Transit Buses with Electric Transit Buses**
RMDP/SCP
Los Angeles County, California

| Assumptions | | |
|---|---|---|
| SCE Electricity Emission Factor[1] | 0.17 | (MT $CO_2$e/MWh) |
| Fuel Economy of Electric Bus[2] | 1.8 | (kWh/mile) |
| Urban CNG bus $CO_2$e Emission while Running[3] | 1929 | (gms/mile) |
| Annual Average Transit Bus VMT[4] | 38,089 | (VMT/year) |
| Number of Buses[5] | 10 | buses |
| **Estimated Benefit from Replacing CNG Transit Buses with Electric Buses** | | |
| GHG Emissions of 10 CNG Buses[6] | 735 | (MT $CO_2$e/year) |
| GHG Emissions of 10 Electric Buses[7] | 116 | (MT $CO_2$e/year) |
| GHG Emissions Reduction[8] | 619 | (MT $CO_2$e/year) |

Notes:

[1] $CO_2$e weighted intensity factor for SCE accounts for $CO_2$ and $CH_4$ emissions rates consistent with the 50% Renewable Portfolio Standard.

[2] Average of BYD and Proterra fuel economy found on their respective websites. Proterra. Available at: http://www.proterra.com/product-tech/product-portfolio/. Accessed September 2016. BYD. Available at: http://byd.com/na/ebus/ebus.html. Accessed September 2016.

[3] CARB, 2015. EMFAC 2014, running exhaust emission rate for $CO_2$ and $CH_4$ for CNG urban bus fleets in Los Angeles County, aggregated for all models and speeds, averaged over all seasons for 2030. Emission rate includes reductions for Advanced Clean Cars (ACC) and Pavley. Available at: http://www.arb.ca.gov/emfac/. Accessed: September 2016.

[4] CARB, 2015. EMFAC2014 2030 annual VMT for CNG urban buses in Los Angeles County, aggregated for all models and speeds, averaged over all seasons for 2030. Accessed: September 2016.

[5] Number of buses based on Project specific estimate.

[6] GHG emissions calculated using annual VMT, number of buses, and $CO_2$ and $CH_4$ emission rate. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[7] GHG emissions calculated using annual VMT, fuel economy and number of electric buses along with SCE electricity $CO_2$e emission factor. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative.

[8] GHG emissions reduction is a difference of GHG emissions of CNG buses and GHG emissions of electric buses. The emissions inventory includes a small amount of nitrous oxide, so when it is excluded from reductions benefits, it is conservative. The reduction per subsidy equals the total GHG emissions reduction divided by the number of transit bus subsidies = 619 MT $CO_2$e / 10 buses = 61.9 MT $CO_2$e per year per bus.

Abbreviations:

CARB - California Air Resources Board
$CH_4$ - methane
CNG - compressed natural gas
$CO_2$ - carbon dioxide
$CO_2$e - carbon dioxide equivalents
EMFAC - California Air Resources Board Emissions Factor Model
EV - electric vehicle
GHG - greenhouse gases
gms - grams
kWh - kilowatt-hour
MT - metric tonnes
MWh - megawatt-hour
SCE - Southern California Edison
VMT - vehicle miles traveled

**Table 4-9. GHG Emissions Reduction due to Building Retrofit Program**
RMDP/SCP
Los Angeles County, California

| Measure Concept[1] | Incremental or Full Savings Claimed[2] | Annual GHG Savings Attributed to Market Intervention (MT)[3] | Number of Residences Required to Meet 1,000 MT Reduction |
|---|---|---|---|
| HVAC Upstream Incentive (no-cost upgrade) - All Electric Heat Pump | Incremental | 1.063 | 940 |
| | Full | 1.680 | 595 |
| Water Heater Replacement No-Cost Upgrade | Incremental | 0.725 | 1,380 |
| | Full | 0.874 | 1,145 |

Notes:

[1] These are example measure concepts adapted from Appendix J. Energy savings were modeled by ConSol using 2016 CBECC-Res software.

[2] Incremental savings claimed indicates the Project funds the incremental cost of an upgrade and claims the emissions savings for this incremental gain; for example, when a homeowner goes to replace an HVAC system with the minimum Title 24-compliant unit, instead a highly efficient unit is offered with the difference in cost covered by the Project. Full savings claimed indicates a funding structure where the Project funds a large portion (50-80%) of the total measure costs and claims the entire emissions savings from the measure; for example, replacing a 1975 baseline HVAC system with a highly efficient unit. The energy savings are not directly proportional to costs in these two funding mechanisms.

[3] Annual savings attributed to market intervention is the amount of GHG savings that are claimed due to the program incentive. Electricity and natural gas savings for each measure are presented in Appendix J. The electricity emission factor assumes 50% RPS. Depending on whether the funding structure is the 'full savings claimed' or 'incremental savings claimed', this is either the full savings from a 1975 baseline unit to a highly efficient unit, or the incremental savings from a minimum Title 24-compliant unit to a highly efficient unit.

Abbreviations
GHG - greenhouse gases
HVAC - heating ventilation air conditioning
MT - metric tonnes

**Table 5-1. Summary of GHG Reductions Associated with Mitigation Measures**
RMDP/SCP
Los Angeles County, California

| Mitigation Measure | Emissions Reduction ($MT\ CO_2e$ / year) | References[1] |
|---|---|---|
| Mobile | | |
| *GCC-4 - Residential EV Chargers and Vehicle Subsidy* | 53,724 | Table ES-3 |
| *GCC-5 - Commercial Development Area EV Chargers* | 39,109 | Table ES-3 |
| *GCC-6 - Transportation Demand Management Plan* | 60,168 | Table ES-3 |
| *GCC-7 - Traffic Signal Synchronization* | 8,212 | Table ES-3 |
| *GCC-8 - Electric School Bus Program* | 157 | Table ES-3 |
| *GCC-9 - Electric Transit Bus Subsidy* | 619 | Table ES-3 |
| *GCC-12 - Off-Site EV Chargers* | 39,813 | Table ES-3 |
| Electricity[2] | | |
| *GCC-1 - Residential Zero Net Energy* | 18,930 | Table 4-1a and 4-1b |
| *GCC-2 - Commercial Zero Net Energy* | 24,843 | Table 4-2a and 4-2b |
| *GCC-11 - Building Retrofit Program* | 500 | Table ES-3 |
| Natural Gas[2] | | |
| *GCC-1 - Residential Zero Net Energy* | 11,726 | Table 4-1a and 4-1b |
| *GCC-2 - Commercial Zero Net Energy* | 612 | Table 4-2a and 4-2b |
| *GCC-3 - Swimming Pool Heating* | 22,356 | Table ES-3 |
| *GCC-11 - Building Retrofit Program* | 500 | Table ES-3 |
| Area Sources | | |
| *N/A* | -- | -- |
| Water Consumption and Wastewater Treatment | | |
| *N/A* | -- | -- |
| Solid Waste Generation | | |
| *N/A* | -- | -- |
| Vegetation Removal | | |
| *GCC-10 - Offsetting Construction and Vegetation Change Emissions* | 1,335 | Table ES-2 |
| Construction | | |
| *GCC-10 - Offsetting Construction and Vegetation Change Emissions* | 6,437 | Table ES-2 |
| **Subtotal GHG Reductions by Measures 1-12 (Mitigation)** | 289,043 | Table ES-3 |
| Offset of Remaining Emissions | | |
| *GCC-13 - Zero GHG Plan (Mobile)* | 202,011 | Table ES-2 |
| GCC-13 - Zero GHG Plan (Electricity)[3] | -4,880 | Table 2-14a and 2-14b |
| GCC-13 - Zero GHG Plan (Natural Gas)[3] | 8,192 | Table 2-14a and 2-14b |
| GCC-13 - Zero GHG Plan (Area Sources) | 367 | Table ES-2 |
| GCC-13 - Zero GHG Plan (Water Consumption and Wastewater Treatment) | 8,190 | Table ES-2 |
| *GCC-13 - Zero GHG Plan (Solid Waste Generation)* | 23,179 | Table ES-2 |
| **Subtotal GHG Reductions by Measure 13** | 237,059 | Table ES-2 |
| **Total Reductions** | 526,103 | Table ES-2 |

[1] Reference identifies where these values were first summarized. Additional background regarding these emission estimates are included in the tables within this Technical Report.

[2] The zero net energy mitigation measures are split by calculating the emissions for electricity and natural gas separately, instead of combined as shown in tables 4-1a through 4-2b consistent with actual emissions reductions. The offsite building retrofits are split assuming 50% electricity and 50% natural gas.

[3] The zero net energy mitigation measures are split based on the anticipated emissions reductions. These are calculated by summing the total energy (i.e., electricity or natural gas) related GHG emissions and subtracting the GHG reductions as summarized above. The negative value for electricity represents additional electricity generated due to solar PV.

Abbreviations:

$CO_2e$ - carbon dioxide equivalents
EV - electric vehicle
GHG - greenhouse gases
MT - metric tonnes
PV - photovoltaic

**Table 5-2. Summary of Unmitigated and Mitigated Project GHG Emissions**
RMDP/SCP
Los Angeles County, California

| Emissions / Mitigation Measure | Emissions (MT $CO_2e$ / year) | | | References[1] |
|---|---|---|---|---|
| | Unmitigated | Reduction | Post-Zero Net Mitigation | |
| Mobile | 403,814 | | | Table ES-2 |
| | | 201,803 | | Table ES-3 |
| | | | 202,011 | |
| Electricity | 39,393 | | | Tables 2-14a and 2-14b |
| | | 44,274 | | Table 5-1 |
| | | | -4,880 | |
| Natural Gas | 43,386 | | | Tables 2-14a and 2-14b |
| | | 35,194 | | Table 5-1 |
| | | | 8,192 | |
| Area Sources | 367 | | | Table ES-2 |
| | | 0 | | |
| | | | 367 | |
| Water Consumption and Wastewater Treatment | 8,190 | | | Table ES-2 |
| | | 0 | | |
| | | | 8,190 | |
| Solid Waste Generation | 23,179 | | | Table ES-2 |
| | | 0 | | |
| | | | 23,179 | |
| Vegetation Removal | 1,335 | | | Table ES-2 |
| | | 1,335 | | Table ES-2 |
| | | | 0 | |
| Construction | 6,437 | | | Table ES-2 |
| | | 6,437 | | Table ES-2 |
| | | | 0 | |
| **Sub-Total Annual Emissions** | 526,103 | 289,043 | 237,059 | Table ES-2 and ES-3 |
| **GCC-13 GHG Reductions** | | 237,059 | | |
| **Total Annual Emissions** | 526,103 | | 0 | |

[1] Reference identifies where these values were first summarized. Additional background regarding these emission estimates are included in the tables within this Technical Report.

Abbreviations:
$CO_2e$ - carbon dioxide equivalents
GHG - greenhouse gases
MT - metric tonnes

# APPENDIX C.2
# DRAFT AEA APPENDIX 1 APP. C:
# CONSOL RESIDENTIAL AND COMMERCIAL BUILDING ANALYSIS

Prepared For:
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25124 Springfield Court
Valencia, California 91355

# Newhall Land & Farming Company
# RESIDENTIAL AND COMMERCIAL BUILDING ANALYSIS
**at**
**25124 Springfield Court**
**Valencia, California 91355**

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September 2016

## Executive Summary

This report estimates and identifies energy savings related to energy efficiency and renewable energy options for new residential and commercial construction. The energy uses considered are those regulated by the California Building Energy Efficiency Standards (California Energy Code) (Title 24, Part 6 of the California Code of Regulations), as well as those that are not regulated by Title 24 but are part of the total energy profile of residential and commercial buildings. Annual site energy savings (kWh and therms) and Time Dependent Valuation (TDV) energy savings were determined using energy modeling software. The photovoltaic (PV) systems for the residential and commercial building prototypes analyzed in this report were sized to offset the electrical and natural gas consumption in accordance with the California Energy Commission's (CEC) TDV-Based Zero Net Energy (ZNE) definition.

Two **residential building prototypes** were considered in the analysis:

- 2,700 square foot, two-story single-family home
- 6,960 square foot, two-story multifamily building (8-plex)

Three **non-residential building prototypes** were considered in the analysis:

- 100,000 square foot, four-story office building
- 75,000 square foot, one-story light industrial building (20,000 square feet conditioned)
- 40,000 square foot, one-story suburban retail building

The report presents information regarding the energy use of the building prototypes relative to multiple iterations of the California Energy Code (Title 24), as well as relative to the CEC's ZNE definitional parameters. Further, while the report presents a ZNE-compliant design pathway for each of the building prototypes, it is anticipated that additional annual site energy savings will occur as the result of more advanced building energy efficiency standards that: (i) become requirements imposed in future editions of the Title 24 Standards, and/or (ii) become standard practice as residential and commercial building technologies evolve.

### Zero Net Energy Definition

This analysis used the CEC's definition of ZNE, which is based on TDV Energy.[1] TDV Energy assigns multipliers to gas and electric demand for every hour of the year. The natural gas multipliers have virtually no variation, while the electricity multipliers can vary dramatically over the course of a day, month, or year. The multipliers are designed to more accurately reflect the resource cost to the utility and society for peak electricity generation, transmission, and distribution, and are highest at periods of peak demand.

As the amount of PV energy generation has grown, the TDV peak has shifted to later in the afternoon, when PV production declines but demand for air conditioning remains high.[2] Measures that produce or reduce energy at periods of high electricity demand are rewarded by the TDV-based approach to ZNE. The units for "TDV energy," as used throughout this report, are "kTDV/sq. ft./year," which can also be written as "TDV

1 See CEC, *2015 Integrated Energy Policy Report* (2015), p. 41.

2 For more detail on TDV multipliers, please see Energy + Environmental Economics, *Time Dependent Valuation of Energy for Developing Building Efficiency Standards* (July 2014), available at: http://www.energy.ca.gov/title24/2016standards/prerulemaking/documents/2014-07-09_workshop/2017_TDV_Documents/.

kBTU/sq. ft./year." These units are used interchangeably throughout the CEC's relevant compliance tools and documentation.

## New Residential Construction

### Methods and Assumptions

All residential buildings are assumed to be in Climate Zone 9 (Santa Clarita/Los Angeles County), and the analysis focuses on feasible, cost-effective design and product selections most likely to be adopted by builders.

Energy modeling was conducted using the CEC's public domain building energy simulation and compliance software, known as "California Building Energy Code Compliance" software (CBECC-res). The single-family and multifamily building energy models used in this analysis are based on prototypical models developed by the CEC. ConSol modified the models to represent known builder preferences and practices.

For the single-family home and multifamily prototypes, ConSol determined annual site energy savings (kWh and therms) resulting from changes to the California Energy Code between 2005 and 2016. ConSol also developed a model for each residential building prototype, whereby each prototype exceeds the 2016 code by just over 10%, which serves as a proxy for the 2019 code. Building energy loads in each model are categorized as "regulated" loads, which include only the end-uses regulated by Title 24, Part 6: space heating, space cooling, and water heating. Additional data in each model is provided for "unregulated" loads, as shown in Table 1 and Table 2.

Although appliance efficiency is technically regulated by California's Title 20 Standards, as of today, it is not possible to gain compliance credit or to trade-off improved appliance efficiency with other measures. Similarly, lighting is regulated by Title 24, but it is not a presently changeable variable within the compliance software, so it presently is characterized as an unregulated load. However, recent updates to the assumptions within CBECC reflect dramatic lighting energy use savings, as well as more modest appliance energy use savings, which are shown in the "Unregulated Loads" portions of Table 1 and Table 2. When ZNE becomes a requirement for all new residential construction, both "regulated" and "unregulated" building loads will be included in the compliance calculation, and it may be possible to trade lighting and appliance efficiency with other efficiency measures and/or PV.

The most recent iteration of CBECC-res, version 2016.2.0 (857), allows users to begin balancing both regulated and unregulated loads against PV generation, in order to demonstrate that a residential building has reached ZNE on a TDV-basis. CBECC software currently uses the Energy Design Rating (EDR) to represent annual TDV energy consumption for both regulated and unregulated building loads. Likewise, CBECC-res software now enables users to model PV generation, which is also output as an EDR value.

<table>
<tr><th colspan="4">ENERGY DESIGN RATING</th></tr>
<tr><td colspan="4">Energy Design Rating (EDR) is an alternate way to express the energy performance of a building using a scoring system where 100 represents the energy performance of the Residential Energy Services (RESNET) reference home characterization of the 2006 International Energy Conservation Code (IECC). A score of zero represents the energy performance of a building that combines high levels of energy efficiency with renewable generation to "zero out" its TDV energy. Because EDR includes consideration of components not regulated by Title 24, Part 6 (such as domestic appliances and consumer electronics), it is not used to show compliance with Part 6 but may instead be used by local jurisdictions pursuing local ordinances under Title 24, Part 11 (CALGreen).<br><br>As a Standard Design building under the 2016 Building Energy Efficiency Standards is significantly more efficient than the baseline EDR building, the EDR of the Standard Design building is provided for information. Similarly, the EDR score of the Proposed Design is provided separately from the EDR value of installed PV so that the effects of efficiency and renewable energy can both be seen</td></tr>
<tr><td>EDR of Standard Design</td><td>EDR of Proposed Design</td><td>EDR Value of Proposed PV</td><td>Final EDR of Proposed Design</td></tr>
<tr><td>62.4</td><td>59.9</td><td>60.0</td><td>-0.1</td></tr>
</table>

**Figure 1: Description of EDR and Output for a ZNE Residential Building**

By sizing a PV system to generate greater annual EDR than the residential building consumes, the user can approximate a building that will meet the CEC's ZNE definition. As shown in Figure 1, the EDR of the

PV system slightly exceeds the EDR of the Proposed Design. (The CEC has not yet developed compliance software or published a method for demonstrating ZNE using EDR, so TDV values are also provided as an alternative method to demonstrate ZNE, as shown in Table 1 and Table 2.)

**Savings Resulting From Past, Present, and Projected Code Changes**

Table 1 provides estimates of annual site energy consumption for the single-family home prototype and Table 2 provides estimates for the multifamily building prototype. The first two columns in each table represent buildings designed to meet the 2005 and 2016 code, respectively. The third column represents buildings designed to exceed the 2016 code by 10% prior to the addition of solar PV necessary to reach ZNE, which serves as a proxy for 2019 code.

**Table 1**
**Site and TDV[3] Energy Use in 2005, 2016, and ZNE for a Single-Family Home in Climate Zone 9**

| Newhall Land Co. - Code Review<br>Santa Clarita<br>Climate Zone 09<br>2700 Sqft / 2-Story / 20% Glazing / 4 Occupants | 2005 Code-Compliant Building | 2016 Code-Compliant Building | 2019 Title 24 Building Features (Approximated) |
|---|---|---|---|
| Software | CBECC-RES 2013-4 (744) | CBECC-RES 2016.2.0 (857) | CBECC-RES 2016.2.0 (857) |
| **Regulated Loads from CBECC Log file (Space Heating, Cooling & Water Heating)** | | | |
| kWh | 1,850 | 879 | 1,877 |
| Therms | 377 | 205 | 74 |
| **Unregulated Loads from CBECC Log File (Inside & Exterior Lighting, Appliance & Cook, Plug Loads)** | | | |
| Interior Lighting kWh | 1,300 | 616 | 616 |
| Appliance & Cooking kWh | 2,195 | 1,873 | 1,862 |
| Plug Load kWh | 2,630 | 2,371 | 2,371 |
| Exterior Lighting kWh | 161 | 152 | 152 |
| Appliance & Cooking Therms | 20 | 15 | 15 |
| **Total Regulated and Unregulated Loads** | | | |
| Total kWh | 8,136 | 5,891 | 6,878 |
| Total Therms | 397 | 220 | 89 |
| PV Sizing to Achieve ZNE | | | 5.0 kW |
| PV Production kWH | | | 8,167 |
| Proposed Design EDR | | | 47.18 |
| PV Production EDR | | | 47.83 |
| Proposed Design TDV | | | 69.92 |
| PV Production TDV | | | 70.88 |

3 "TDV" as used in the table and elsewhere in the report represents kTDV/sq. ft./year.

**Table 2**
**Site and TDV Energy Use in 2005, 2016, and ZNE in a Multifamily 8-plex in Climate Zone 9**

| Newhall Land Co. - Code Review<br>Santa Clarita<br>Climate Zone 09<br>8-Plex (6,960 Sqft) / 2-Story / 15% Glazing / 2 Occupants | 2005 Code-Compliant Building | 2016 Code-Compliant Building | 2019 Title 24 Building Features (Approximated) |
|---|---|---|---|
| Software | CBECC-RES 2013-4 (744) | CBECC-RES 2016.2.0 (857) | CBECC-RES 2016.2.0 (857) |
| **Regulated Loads from CBECC Log file (Space Heating, Cooling & Water Heating)** | | | |
| kWh | 9,202 | 3,996 | 9,085 |
| Therms | 1,108 | 697 | 31 |
| **Unregulated Loads from CBECC Log File (Inside & Exterior Lighting, Appliance & Cook, Plug Loads)** | | | |
| Interior Lighting kWh | 4,172 | 2,034 | 2,034 |
| Appliance & Cooking kWh | 11,544 | 10,780 | 10,781 |
| Plug Load kWh | 10,701 | 12,062 | 12,062 |
| Exterior Lighting kWh | 479 | 434 | 434 |
| Appliance & Cooking Therms | 118 | 96 | 96 |
| **Total Regulated and Unregulated Loads** | | | |
| Total kWh | 36,097 | 29,305 | 34,395 |
| Total Therms | 1,226 | 792 | 127 |
| kWh per unit | 4,512 | 3,663 | 4,299 |
| Therms per unit | 153 | 99 | 16 |
| PV Sizing to Achieve ZNE | | | 21.9 kW |
| PV Production kWH | | | 35,772 |
| Proposed Design EDR | | | 59.92 |
| PV Production EDR | | | 60.05 |
| Proposed Design TDV | | | 120.19 |
| PV Production TDV | | | 120.44 |

## Meeting 2019 Residential Building Energy Standards (ZNE)

ConSol assessed how builders will meet the 2019 Building Energy Efficiency Standards[4] and sized the PV systems to reach ZNE, in accordance with the CEC's goal for residential buildings.

During the last adoption cycle for the California Energy Code (2016), the CEC made aggressive changes to the Title 24 standards and it is unlikely that there will be substantial changes to energy efficiency requirements for 2019—instead, the transition will be focused on integrating PV. ConSol assumed that the 2019 code will include a relatively modest 10% improvement to energy efficiency before allowing the addition of PV to achieve ZNE. This assumption is based on the fact that changes to Title 24 must meet cost effectiveness thresholds for adoption, and—once the 2016 code requirements are implemented—there will be very few cost-effective options for energy efficiency improvements. As a result, using PV will likely be the lowest cost pathway to achieve ZNE for residential building types.

In order to achieve the 10% efficiency improvement above 2016 code, ConSol designed the single-family home with more efficient windows (lower U-factor and lower SHGC), a more efficient gas furnace, a more efficient air conditioner, and a more efficient water heater. The water heater was switched from a 0.82 EF (Energy Factor) tankless gas unit to a 3.39 EF electric heat pump, resulting in decreased annual therm

4 The 2019 Building Energy Standards are yet to be determined; therefore, ConSol used the best available knowledge and past experience to estimate the 2019 stringency and energy features.

usage and increased kWh usage.  These design efficiencies for the single-family building prototype resulted in a net TDV energy decrease of over 10%.

ConSol designed the multifamily home with additional roof deck insulation, higher roof reflectance, more efficient windows (lower U-factor and lower SHGC), a more efficient gas furnace, a more efficient air conditioner, and a more efficient water heater.  Since the water heater was switched from a 0.82 EF tankless gas unit to a 3.39 EF electric heat pump, annual therm usage again decreased while kWh usage increased. These design efficiencies for the multifamily building prototype also resulted in a net TDV energy decrease of over 10%.

## PV Sizing to Achieve ZNE

Once the models for the residential prototypes were updated to represent the likely parameters of the 2019 code (10% better than 2016 code), PV systems were sized to reach ZNE.  The most recent version of CBECC-res includes a version of the CEC-PV calculator, which allows users to size PV systems to match annual building consumption.  There are limited variables such as “standard” versus “premium” panels and inverters.  ConSol used a standard system using California Flexible Installation (CFI)[5] to meet the ZNE requirements.

Through iterative runs, ConSol determined that the two-story, 2,700 square foot single-family home would need an approximately 5.0kW system to reach ZNE in Climate Zone 9, Santa Clarita.  The two-story, 6,960 square foot multifamily 8-plex would need an approximately 21.9kW system to reach ZNE in Climate Zone 9, Santa Clarita.

Policy documents, such as the 2015 Integrated Energy Policy Report, point to TDV as the metric that will be used to demonstrate compliance with ZNE in California.  As previously discussed, CBECC software now uses EDR as the compliance metric that is output on CF1-R Title 24 compliance forms.  The EDR value is based on TDV energy, but has additional ratios, which could cause confusion.  In order to definitively demonstrate that the single-family home and multifamily building prototypes are designed to meet ZNE, ConSol has included both the EDR and TDV energy consumption and PV generation, which were acquired from the CBECC log file that is generated with each modeling run.

The EDR value for the Proposed Design for the single-family home prototype is **47.18**, while the EDR of the 5.0 kW PV system is **47.83**, slightly in excess of the annual building energy consumption.  Similarly, the TDV energy of the Proposed Design is **69.92**, while the TDV energy of the 5.0 kW PV system is **70.88**, which is again slightly higher than the annual TDV energy consumption.

The EDR value for the Proposed Design for the multifamily building prototype is **59.90**, while the EDR of the 21.9 kW PV system is **60.05**, slightly in excess of the annual building energy consumption.  Similarly, the TDV energy of the Proposed Design is **120.19**, while the TDV energy of the 21.9 kW PV system is **120.44**, which is again slightly higher than the annual TDV energy consumption.

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5 California Flexible Installation (CFI) was developed to simplify rebate approvals within the NSHP program.  Modeling PV using CFI provides an estimate of PV system performance within a range of installation scenarios, as are often found in new subdivisions.  CFI can only be used for new construction projects, and it assumes that each PV system can be installed within all of the following criteria: 1) have an azimuth ranging from 150 to 270 degrees, 2) have a tilt corresponding to a roof pitch between 0:12 and 7:12, 3) meet the minimal shading criteria, 4) use the same make, model, and quantity of major system components, and 5) have fixed, nontracking mounting. For more information see: http://www.energy.ca.gov/2013publications/CEC-300-2013-009/CEC-300-2013-009-ED7-CMF.pdf

## New Commercial Construction

### Methods and Assumptions

All commercial buildings are assumed to be in Climate Zone 9 (Santa Clarita/Los Angeles County), and the analysis focuses on feasible, cost-effective design and product selections most likely to be adopted by builders.

Energy modeling was conducted using EnergyPro 6.8 and Energy Pro 7.1, which is CEC-approved modeling software that can be used for commercial buildings regulated by the California Energy Code. The office, light industrial, and suburban retail building energy models used in this analysis are based on prototypical models.

For the three commercial building prototypes, ConSol determined annual site energy consumption savings (kWh and therms) resulting from changes to the California Energy Code between 2008 and 2016.

### Savings Resulting From Code Changes

Table 3 identifies the annual electrical energy consumption (kWh) savings for the three commercial building prototypes resulting from changes to the California Energy Code between 2008 and 2016.

**Table 3**
**2008 to 2016 – Total Electrical Energy Savings**

| Building Type | Electrical Consumption (kWh) | | | Electrical Savings (kWh) |
|---|---|---|---|---|
| | 2008 Code-Compliant Building | 2013 Code-Compliant Building | 2016 Code-Compliant Building | 2008 Code-Compliant Building to 2016 Code-Compliant Building |
| 100,000 $ft^2$ 4-Story Office Building | 999,952 | 929,334 | 922,690 | 77,262 |
| 75,000 $ft^2$ Light Industrial Building* | 205,979 | 165,615 | 161,743 | 44,236 |
| 40,000 $ft^2$ Suburban Retail Building | 539,915 | 419,207 | 423,112 | 116,803 |

*Only 20,000 $ft^2$ is conditioned.

Table 4 identifies the annual natural gas energy consumption (therms) savings for the three building prototypes resulting from changes to the California Energy Code between 2008 and 2016. The recommended electrical energy savings measures resulted in additional natural gas usage for the light industrial building. This is indicated by the negative sign (-) in the therms savings column. The net increase for the light industrial building prototype is a result of the reduced internal heat produced by the lights, which then requires additional space heating.

**Table 4**
**2008 to 2016 – Total Natural Gas Energy Savings**

| Building Type | Natural Gas Consumption (therms) | | | Natural Gas Savings (therms) |
|---|---|---|---|---|
| | 2008 Code-Compliant Building | 2013 Code-Compliant Building | 2016 Code-Compliant Building | 2008 Code-Compliant Building to 2016 Code-Compliant Building |
| 100,000 $ft^2$ 4-Story Office Building | 5,030 | 5,169 | 4,338 | 692 |
| 75,000 $ft^2$ Light Industrial Building* | 948 | 1,167 | 971 | -23 |
| 40,000 $ft^2$ Suburban Retail Building | 4,096 | 4,271 | 3,183 | 913 |

*Only 20,000 $ft^2$ is conditioned.

## Meeting 2019 Commercial Building Energy Standards

Packages of energy efficiency improvements that would be required for the three commercial building prototypes to exceed the 2016 California Energy Code by roughly 15%[6] were created. Based on our professional judgment, it is possible that the 2019 California Energy Code requirements will be 15% above the 2016 California Energy Code requirements; however, based on the last iteration of the Code (2008 to 2013), a smaller incremental improvement was achieved (i.e., approximately 2-18% depending on building prototype).

Although the goal was to target the 15% savings number, current and proposed code constraints, cost effectiveness, and practical options limited the feasibility of the actual measures that could be proposed. The actual savings percentage for each commercial building prototype, therefore, may be less than 15% based on the available energy efficiency improvements.

### *100,000 Square Foot, Four-Story Office Building*

Table 5 shows the incremental energy savings for a package of energy efficiency recommendations for a 100,000 square foot, four-story office building.

**Table 5**
**100,000 Square Foot, Four-Story Office Building (18% above 2016)**
**Energy Conservation Measures**

| End Use | ECM | Recommendations | Annual Savings (kWh) | Annual Savings (Therms) |
|---|---|---|---|---|
| **Lighting** | **1** | Reduce Lighting Density from 0.75 Watts per Square Foot to 0.60 Watts per Square Foot | 114,661 | 2,491 |
| **HVAC** | **2** | Install Water Cooled Chilled Water System (0.5 kW/ton) and Heating Hot Water Boiler Versus Packaged Units | | |
| | | **Total** | **114,661** | **2,491** |

6 The percent energy savings includes both electricity and natural gas.

The lighting recommendation involves switching from standard fluorescent lighting fixtures to essentially 100% LED lighting fixtures.

The HVAC recommendation involves installing a high efficiency water cooled chiller, cooling tower, air handlers, piping, and distribution pumps versus standard packaged rooftop air conditioning units.

### *75,000 Square Foot Light Industrial Building*

Table 6 shows the incremental energy savings for a package of energy efficiency recommendations for the 75,000 square foot light industrial building.

The recommended electrical energy savings measures resulted in additional natural gas usage. This is indicated by the negative sign (-) in the therms savings column. The net increase for each building prototype is a result of the reduced internal heat produced by the lights, which in turn requires additional gas heating.

**Table 6**
**75,000 Square Foot Light Industrial Building (2% above 2016)**
**Energy Conservation Measures**

| End Use | ECM | Recommendations | Annual Savings (kWh) | Annual Savings (Therms) |
|---|---|---|---|---|
| **Lighting** | **1** | Reduce Office Area Lighting Density from 0.9 Watts per Square Foot to 0.72 Watts per Square Foot | 10,861 | -221 |
| | | **Total** | **10,861** | **-221** |

The lighting recommendation involves switching from standard fluorescent lighting fixtures to essentially 100% LED lighting fixtures.

### *40,000 Square Foot Suburban Retail Building*

Table 7 shows the incremental energy savings for a package of energy efficiency recommendations for the 40,000 square foot suburban retail building.

The recommended electrical energy savings measures resulted in additional natural gas usage. This is indicated by the negative sign (-) in the therms savings column. The net increase for each building prototype is a result of the reduced internal heat produced by the lights, which in turn requires additional gas heating.

**Table 7**
**40,000 Square Foot Suburban Retail Building (11% above 2016)**
**Energy Conservation Measures**

| End Use | ECM | Recommendations | Annual Savings (kWh) | Annual Savings (Therms) |
|---|---|---|---|---|
| **Lighting** | **1** | Reduce Lighting Density from 1.2 Watts per Square Foot to 0.96 Watts per Square Foot | 61,562 | -104 |
| | | **Total** | **61,562** | **-104** |

The lighting recommendation involves switching from standard fluorescent lighting fixtures to essentially 100% LED lighting fixtures.

## Achieving ZNE For Commercial Buildings Via Photovoltaic Systems

The TDV Energy generated by the EnergyPro 7.1 software for each building prototype was used as the target for PV system design. ConSol used the CECPV Calculator (Version 5.0) to generate TDV Energy output for various PV system sizes. Through iterative runs, ConSol determined the appropriate PV system sizes needed to meet the annual TDV Energy usage for each building prototype.

The panels used for the calculations were 295 watts DC each. The dimensions of each panel is 77.01 x 39.06 x 1.57 inches.

The "baseline" columns for electrical and natural gas energy consumptions shown in Tables 8 through 10 below were calculated using the EnergyPro 7.1 software. The electrical generation of the PV system is greater than the baseline electrical consumption because the PV system is sized to offset the combined TDV impact of the electrical and natural gas consumption shown in these columns. The negative value in the last column indicates that the proposed PV system is generating more TDV Energy than is required by the building.

### *100,000 Square Foot, Four-Story Office Building*

Table 8 shows the size of a PV system necessary to reach ZNE for a 2019-compliant 100,000 square foot, four-story office building. The proposed TDV with PV is not simply the baseline TDV minus the TDV generation because the TDV impacts of the building and PV were analysed hourly, which resulted in the proposed TDV values.

**Table 8**
**100,000 Square Foot, Four-Story Office Building**
**PV System**

| PV Sizing | PV Size (kW DC) | Electrical Baseline (kWh) | Natural Gas Baseline (therms) | Electrical Generation (kWh) | TDV Generation (TDV kBtu/sqft/yr) | Baseline TDV (TDV kBtu/sqft/yr) | Proposed TDV w/ Solar (TDV kBtu/sqft/yr) |
|---|---|---|---|---|---|---|---|
| Zero Net Energy | 536.9 | 808,029 | 1,847 | 902,871 | 215.8 | 212.0 | -2.5 |

### *75,000 Square Foot Light Industrial Building*

Table 9 shows the size of a PV system necessary reach ZNE for a 2019-compliant 75,000 square foot light industrial building. The proposed TDV with PV is not simply the baseline TDV minus the TDV generation because the TDV impacts of the building and PV were analysed hourly, which resulted in the proposed TDV values.

**Table 9**
**75,000 Square Foot Light Industrial Building**
**PV System**

| PV Sizing | PV Size (kW DC) | Electrical Baseline (kWh) | Natural Gas Baseline (therms) | Electrical Generation (kWh) | TDV Generation (TDV kBtu/sqft/yr) | Baseline TDV (TDV kBtu/sqft/yr) | Proposed TDV w/ Solar (TDV kBtu/sqft/yr) |
|---|---|---|---|---|---|---|---|
| Zero Net Energy | 126.6 | 150,882 | 1,192 | 199,604 | 231.1 | 228.1 | -0.3 |

### *40,000 Square Foot Suburban Retail Building*

Table 10 shows the size of a PV system necessary to reach ZNE for a 2019-compliant 40,000 square foot suburban retail building. The proposed TDV with PV is not simply the baseline TDV minus the TDV generation because the TDV impacts of the building and PV were analysed hourly, which resulted in the proposed TDV values.

**Table 10**
**40,000 Square Foot Suburban Retail Building**
**PV System**

| PV Sizing | PV Size (kW DC) | Electrical Baseline (kWh) | Natural Gas Baseline (therms) | Electrical Generation (kWh) | TDV Generation (TDV kBtu/sqft/yr) | Baseline TDV (TDV kBtu/sqft/yr) | Proposed TDV w/ Solar (TDV kBtu/sqft/yr) |
|---|---|---|---|---|---|---|---|
| Zero Net Energy | 299.1 | 361,550 | 3,287 | 486,764 | 283.7 | 273.6 | -7.4 |

# APPENDIX C.3
# DRAFT AEA APPENDIX 1 APP. H: FORECASTING ELECTRIC VEHICLE PURCHASES IN THE NEWHALL RANCH COMMUNITY

Prepared for
**The Newhall Land and Farming Company**
**Valencia, California**

Prepared by
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**San Francisco, California**

Project Number
**0534264Q**

Date
**September 2016**

# FORECASTING ELECTRIC VEHICLE PURCHASES IN THE NEWHALL RANCH COMMUNITY

RAMBOLL ENVIRON

# CONTENTS

# CONTENTS *(CONTINUED)*

## TABLES



## APPENDICES

# 1. INTRODUCTION

Research shows that a driver's decision to convert from an internal combustion engine vehicle (ICEV) to an electric vehicle (EV) is influenced by a number of factors, including – but not limited to – cost of ownership and operation, battery ranges, and concerns about access to charging infrastructure, as well as environmental awareness and social perceptions. This report describes how incentives, as defined to include financial purchase subsidies and charging infrastructure, are expected to accelerate the conversion to EVs in the vehicle fleet operated by the future residents of the Newhall Ranch planned community.

## 1.1 Background on the Newhall Ranch Community's Incentive Program

As background, Newhall Ranch is a proposed planned community located in an unincorporated portion of the Santa Clarita Valley (northern Los Angeles County, California). The community proposes to implement a number of commitments to further incentivize the use of EVs, including:

- Equipping each residence with a minimum of one single-port EV charging station that will achieve a similar or better functionality as a Level 2 charging station.
- Providing a $1,000 subsidy for 50 percent of the community's residences for the purchase of a zero emission vehicle, as defined by the California Air Resources Board.
- Equipping the community's parking areas for commercial buildings with EV charging stations that provide charging opportunities to 7.5 percent of the total number of required parking spaces. ("Commercial buildings" include retail, light industrial, office, hotel, and mixed-use buildings.) The EV charging stations will achieve a similar or better functionality as a Level 2 charging station.[1]
- Installing off-site EV charging stations in Los Angeles County that will service one parking space for every 15 on-site residential dwelling units, and one parking space for every 15,000 square feet of on-site commercial development. ("Commercial development" includes retail, light industrial, office, hotel, and mixed-use buildings.) The EV charging stations again will achieve a similar or better functionality as a Level 2 charging station.[2]

This report evaluates the effect of these commitments on the purchase of EVs by the community's residents.

## 1.2 Analysis Overview

The analysis presented in this report is based on economic principles of demand; i.e., people make purchases based on price, their income level, the price of substitutes (in this case, an

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[1] In the event that the installed charging stations utilize more superior functionality/technology than Level 2 charging stations, the parameters of the mitigation obligation (i.e., number of parking spaces served by electric vehicle charging stations) shall reflect the comparative equivalency of Level 2 charging stations to the installed charging stations on the basis of average charge rate per hour.

[2] See footnote 1; the same provision applies.

ICEV), expectations, and a variety of tastes and preferences. The approach to analyzing the impact of the incentives involves first establishing the number of EVs that might be expected to be purchased by the community's residents absent any additional incentives. The same kind of forecast is then developed for the population with the incentives in place. The difference between the two forecasts may be considered the result attributable to the incentives.

## 1.3 Terminology

There are many terms and abbreviations that researchers have used to refer to the different kinds of EVs available. For example, a hybrid electric vehicle is often referred to as a HEV, and a plug-in hybrid as a PHEV. Additionally, some researchers use the term battery electric vehicle and refer to BEVs; other researchers collectively refer to both plug-in electric vehicles and plug-in hybrid electric vehicles as PEVs. To simplify the phraseology used in this report, we will henceforth refer to any car that has a plug-in option (both fully electric and plug-in hybrids) as EVs.

## 1.4 Structure of the Report

Section 2 of this report reviews published literature on the factors that affect EV purchasing decisions, and research about how incentives have worked elsewhere to increase the rate of EV conversion. An approach to modeling the anticipated response to the Newhall Ranch community's incentives is presented in Section 3. Section 4 shows the results of the modeling analysis.

# 2. PUBLISHED RESEARCH ON ELECTRIC VEHICLE ADOPTION

This section describes relevant research on the factors that influence the decision to purchase an EV. Current market shares for EVs also are reviewed, along with discussion of published forecasts for future EV sales. Finally, the body of research that examines how government incentives have been provided to increase EV penetration is discussed. The totality of this literature and research provides an overview of how incentives function in the marketplace to increase overall EV sales.

## 2.1 Who Buys an Electric Vehicle and Why?

Existing research has identified a number of key characteristics and factors that impact if and when people purchase an EV. For example, one study revealed that, when asked about the critical factors that may influence the decision to purchase an EV, the highest percentage (63 percent) of respondents cited the ability to charge at home, with other factors including battery range, and total operating cost.[3] Other studies have identified that the decision to select EVs, as compared to ICEVs, is a function of cost, range, income of the buyer, driving habits, price of gas, recharging infrastructure, and 'greenness', including the influence of neighbors and friends. The research on the characteristics of EV drivers and the factors affecting purchasing decisions are summarized below.

### 2.1.1 Characteristics of EV Households and Drivers

Several studies analyze the characteristics of EV drivers to identify the commonalities amongst those who are likely to purchase an EV.

A 2013 study conducted by the Institute of Transportation Studies at UC Davis explored the characteristics of 1,200 households who purchased an EV in California during the 2011 and 2012 calendar years.[4] The study found that 96 percent of the EV owners lived in single-family homes, with 46 percent of the owners reporting annual incomes higher than $150,000 (which was the highest category included in the survey). The study found that purchasing an EV was linked, in most cases, with the installation of electric vehicle supply equipment (EVSE) at home, and the ability to plug the car into a unit for charging. Additionally, overall, 19 percent of the new EVs were purchased as additional vehicles, and not as replacement vehicles, in households that had more vehicles than drivers.

The UC Davis study also explored how EV owners compared to the general population, in terms of interest in reducing their contribution to global warming and other environmental issues. The study found that 60 percent of EV owners either had solar panels on their roofs, or were considering installing panels. This contrasts to a statewide average of less than 1 percent of housing units having rooftop solar panels.

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[3] Accenture. 2011. Plug In Electric Vehicles Changing Perceptions, Hedging Bets - Accenture end-consumer survey on the electrification of private transport. Available at: https://www.accenture.com/us-en/~/media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_9/Accenture-Plug-in-Electric-Vehicle-Consumer-Perceptions.pdf. Accessed: August 2016.

[4] Tal, Gil, Michael A. Nicholas, Justin Woodjack, and Daniel Scrivano. 2013. Who Is Buying Electric Cars in California? Exploring Household and Vehicle Fleet Characteristics of New Plug-In Vehicle Owners. Institute of Transportation Studies - University of California, Davis. Available at: https://merritt.cdlib.org/d/ark:%252F13030%252Fm56692z3/1/producer%252F2013-UCD-ITS-RR-13-02.pdf. Accessed: August 2016.

A 2011 study conducted by the University of Delaware, unlike the UC Davis study, did not find a correlation between income and EV purchase, but instead found that a person's propensity to buy an EV increases with youth, education, "green" life style, believing gas prices will rise significantly in the future, and living in a place where a plug is easily accessible at home.[5] The study also found that people were more motivated by expected fuel savings than by a desire to be "green" or help the environment.

### 2.1.2 Frequency of EV Use in Multi-Car Households

A 2013 survey conducted by the Union of Concerned Scientists (UCS) found that 64 percent of its respondents (all of whom were EV owners) lived in a household with 2 or more vehicles and preferentially used the EV.[6] This is consistent with a 2015 survey of EV enthusiasts, which reported that 79.4 percent of EV owners and potential owners had 2 or more vehicles in their households.[7] The same study showed that, in households with one EV and one ICEV, people favored the EV for driving, except if the trip involved: a) driving longer distances on weekends, b) hauling, or c) the needed to carry more than 5 passengers.[8]

A 2015 study from South Korea also is consistent with these findings, in that it concluded that households that had one (or more) EV and at least one ICEV all showed a decline in the daily distance driven by the ICEV, and an increase in daily distance driven by the EV (about 45 percent higher) after three months of EV ownership.[9] In addition, a 2013 survey from Norway showed that 90 percent of EV owners said that the EV car "Completely" or "To a High Degree" replaced their ICEV, and preliminary data from Ford also suggests that with time – six months – the frequency of use of the EV increases, and the ICEV use decreases. [10,11]

5 Hidrue, Michael K., George R.Parsons, Willett Kempton, and Meryl P.Gardner. 2011. Willingness to Pay for Electric Vehicles and their Attributes. Resource Energy Econ. doi:10.1016/j.reseneeco.2011.02.002. Available http://www.udel.edu/V2G/resources/HidrueEtAl-Pay-EV-Attributes-correctedProof.pdf. Accessed: August 2016.

6 Union of Concerned Scientists. 2013. Electric Vehicle Survey Methodology and Assumptions; American Driving Habits, Vehicle Needs, and Attitudes toward Electric Vehicles, December. Available at: http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_vehicles/UCS-and-CU-Electric-Vehicle-Survey-Methodology.pdf. Accessed: August 2016.

7 Shahan, Zachary. 2015. Electric Cars: What Early Adopters and First Followers Want. Important Media, available at: http://cleantechnica.us2.list-manage.com/subscribe?u=a897522b53d0853c85abbf9fa&id=a264ba3c49. Accessed: August 2016.

8 UCS, 2013.

9 Hwang, Sang-kyu, and Sang-hoon Son. 2015. Electric Vehicle User Mobility Analysis with Dashboard Camera in Jeju Island, Korea. Paper presented at Electric Vehicle Symposium, EVS28, in Kintex, Korea, May 3-6, 2015.

10 Haugneland, Petter, and Hans Havard Kvisle. 2013. Norwegian Electric Car User Experiences, paper presented at EVS27, Barcelona Spain, November.

11 Castrucci Alexandria, Mike. 2015. Good Habits Pay Dividends for Electric Car Drivers. Posted on October 7, 2013. Available at: (http://www.mikecastruccialexandria.com/blog/electric-car-driving-habits/). Based on data from MyFord Mobile app. Available at: (https://www.myfordmobile.com/content/mfm/app/site/my-car/home.html). Accessed: August 2016.

### 2.1.3 Cost

Economic models of EV purchasing behavior suggest that price is the biggest barrier to adoption of EVs, with cost defined to include the initial purchase cost of the vehicle and the subsequent operating costs.[12]

Initially, the purchase price of an EV was about $8,000 to $10,000 higher than comparable ICEVs without incentives. However, since the introduction of the Ford Focus EV, Chevrolet Volt, and Nissan Leaf in 2011, the cost of each has declined by $10,000, $7,000, and $5,000 respectively by 2015.[13] Some of this downward price pressure has occurred as the competition has increased, and as the selection of EVs and number of manufacturers has increased.[14]

The demonstrated decline in purchase costs is also influenced, in part, by the declining production costs of EV batteries. More specifically, the historical cost trends for batteries show a strong downward trend, with one study showing that batteries for EVs averaged a roughly 14 percent annual cost decrease from 2007 to 2014.[15] Furthermore, the impact of learning-by-doing cost reductions (which are attributable to a doubling in EV battery production), is between six and nine percent. This has resulted in the industry-wide average cost of a battery pack declining from $1,000/kWh to $410/kWh (2007 to 2014), and an even greater reduction among market-leading battery EV manufacturers, to around $300/kWh.

The other primary cost associated with EVs is the operating cost, which is the cost of operating the EV as compared with an ICEV. Generally speaking, EV operating costs tend to be lower than those associated with ICEVs because electricity is cheaper than gas on a cost per mile basis. For example, a study prepared by the Idaho National Laboratory shows that operating an EV costs about 3.3 cents per mile, compared with about 11 cents per mile for an ICEV getting 22 miles per gallon assuming a gas price of $2.50 per gallon.[16] The comparison will be much starker if gas prices were to increase. For example, if fuel were to increase to $4.00 per gallon, the cost of fuel for the ICEV with 22 miles per gallon goes to about 18 cents per mile, while the EV cost is expected to stay under 4 cents per mile. Therefore, the price of gas and electricity is expected to influence the decision to purchase an EV due to their role in evaluating the comparative operating costs.

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[12] See Adepetu and Keshav, 2015, and also Coffman et al., 2015 for good reviews of the economic models of consumer decision making for EV purchases.

[13] Coffman, Makena, P. Bernstein, S. Wee. 2015. Factors Affecting EV Adoption: A Literature Review and EV Forecast for Hawaii, Report Number: HNEI-04-15, Hawaii Natural Energy Institute, University of Hawaii at Manoa, April. Available at: http://www.hnei.hawaii.edu/sites/www.hnei.hawaii.edu/files/EVTC_EV%20Adoption%20and%20Forecast%20for%20HI.pdf. Accessed: August 2016.

[14] California's South Coast Air Quality Management District recently published a "Clean Car Buying Guide" that provides detailed comparisons of all EV makes and models currently available. The guide is found at: http://www.aqmd.gov/docs/default-source/publications/aqmd-advisor/2016-buyers-guide.pdf?sfvrsn=4, Accessed: August 2016.

[15] Nykvist, B. and Nilsson, M. Rapidly falling costs of battery packs for electric vehicles. *Nature: Climate Change* (2015), 5, pg. 329-332.

[16] Idaho National Laboratory, Advanced Vehicle Testing Activity. Available at: https://avt.inl.gov/sites/default/files/pdf/fsev/costs.pdf. Accessed: August 2016.

### 2.1.4 Range Anxiety

The range that an EV can travel on one charge and the associated "range anxiety" is a key topic associated with the decision to purchase an EV. "Range anxiety" is the experience that EV drivers have when they lack confidence that their vehicle will have sufficient fuel or charge to complete a trip or route.

Studies have shown that about 59 percent of US commuters drive less than 40 miles each day and, as a result, are well–suited to EV ownership.[17] One study analyzed the behavior of Toronto's drivers and identified several strategies to instill confidence in their drivers.[18] The strategies included training drivers to understand EV capacity, to know where charging infrastructure was located, to learn driving methods to extend battery life, to start the day with a full charge, and to plan their daily routes with navigation tools to reduce the risk of unexpected extra travel.

With the increase in battery charge range on the near horizon and a strong trend in the same direction for the mid-term, and with the increasing presence of publicly available charging stations, the issue of "range anxiety" is expected to diminish in importance. For example, Tesla launched a new EV model advertising over 200 miles in range on a single charge, and a price of $35,000. Tesla accepted pre-orders for the vehicle and reportedly had sold 373,000 vehicles through pre-orders by May 15, 2016.[19] The Tesla Model 3s will be available late 2017 as well as the Chevy Bolt, which will have a similar price and range. Hence, with improving EV technology, "range anxiety" is expected to reduce in the future.

### 2.1.5 EV Charging Stations – Residential and Public

Numerous studies have shown that EV charging currently occurs primarily at home. While charging stations at work places and retail stores are becoming more widespread, most EV charging has historically taken place at home, and will continue to do so.[20] An average vehicle spends 90 percent of its time at home and work, and with over 70 to 80 percent of EV charging typically occurring at home, the remaining charging primarily occurs at a workplace.[21,22] Both strategies are needed, however, to support EV adoption, and a reasonable assumption for strategic planning is that home charging will continue to be the preferred approach for future EV owners.[23]

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[17] UCS, 2013.

[18] Toronto Atmospheric Fund. 2015. Fleetwise EV300 Findings Report on EV Usage in Sixteen GTA Fleets, June. Available at: http://taf.ca/wp-content/uploads/2014/09/FleetWise-EV300-Findings-Report-16-June-2015.pdf. Accessed: August 2016.

[19] Lambert, Frank. 2016. Tesla has 373,000 Model 3 reservations as of May 15, after 8k cancellations and 4k duplicates, Electrek, May. Available at: https://electrek.co/2016/05/18/tesla-model-3-reservations-cancellations-duplicates/. Accessed: August, 2016.

[20] Holland, B. 2013. How important is charging infrastructure to EV adoption? GreenBiz. January 17. Available at: (https://www.greenbiz.com/blog/2013/01/17/how-important-charging-infrastructure-ev-adoption). Accessed: August 2016.

[21] Holland, B. 2013. How important is charging infrastructure to EV adoption? GreenBiz. January 17. Available at: (https://www.greenbiz.com/blog/2013/01/17/how-important-charging-infrastructure-ev-adoption). Accessed: August 2016.

[22] Leemput, N. et al. 2015. MV and LV Residential Grid Impact of Combined Slow and Fast Charging of Electric Vehicles. Energies (2015), 8, 1760-1783. http://www.mdpi.com/1996-1073/8/3/1760. Accessed August 2016.

[23] In a 2014 assessment of infrastructure for the California Energy Commission, the authors analyzed two charging infrastructure paths forward, both emphasizing the dominance of home charging. Melaina, Marc, Michael Helwig. (National Renewable Energy Laboratory). 2014. California Statewide Plug-In Electric Vehicle

Research also shows that access to charging infrastructure at home is an important factor in the decision to purchase an EV. Hirdue et al. (2011) found that the availability and accessibility of a plug at home increases a person's propensity to buy an EV.[24] The 2013 UC Davis study discussed above also revealed that purchasing an EV is associated, in most cases, with the installation of EVSE at home and the ability to plug the car into power for charging.[25]

Another study also identified the importance of residential parking and charging, suggesting that:

- Fleet penetration of EVs beyond 22 percent will require residential infrastructure investment to increase access to outlets near home parking;
- Fleet penetration beyond 39 percent may require significant residential infrastructure investment because many households will need to upgrade their electrical infrastructure to charge multiple vehicles;
- Fleet penetration beyond 47 percent will require residential charging to be available for renters; and
- Fleet penetration beyond 56 percent may require not only new chargers but also additional residential parking, with associated logistics, space implications, and environmental impacts.[26]

The Newhall Ranch community's proposal to install charging stations in residential areas, therefore, will address an important factor to facilitate the level of conversion to EV.[27]

Charging stations outside the home are also critical to EV conversion. In one survey, 37 percent of respondents agreed with the statement that "having access to plug-in electric vehicle charging at work would increase the likelihood of considering a plug-in electric vehicle in my next purchase."[28]

Sierzchula et al. analyzed the impact of policies on EV adoption in 30 countries and found that an increase in public charging infrastructure was the strongest indicator of an increase

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Infrastructure Assessment. California Energy Commission. Publication Number: CEC-600-2014-003.Available at: http://www.energy.ca.gov/2014_energypolicy/documents/2014-06-05_workshop/summary_pev_infrastructure_report.pdf. Accessed August 2016.

[24] Hidrue, M.K., G.R. Parsons, W. Kempton, and M.P. Gargner. 2011. Willingness to pay for electric vehicles and their attributes. Resource Energy Econ. doi:10.1016/j.reseneeco.2011.02.002. Available at: (http://www.udel.edu/V2G/resources/HidrueEtAl-Pay-EV-Attributes-correctedProof.pdf). Accessed: August 2016.

[25] Tal, G., M.A. Nicholas, J. Woodjack, and D. Scrivano. 2013. Who Is Buying Electric Cars in California? Exploring Household and Vehicle Fleet Characteristics of New Plug-In Vehicle Owners. Institute of Transportation Studies at University of California, Davis. Research Report – UCD-ITS-RR-13-02. February. Available at: https://merritt.cdlib.org/d/ark:%252F13030%252Fm56692z3/1/producer%252F2013-UCD-ITS-RR-13-02.pdf. Accessed: August 2016.

[26] Traut, E.J., T.C. Cherng, C. Hendrickson, and J.J. Michalek. 2013. US Residential Charging Potential for Electric Vehicles. Transportation Research Park D 25, 2013 139-145. Available at: http://www.cmu.edu/me/ddl/publications/2013-TRD-Traut-etal-Residential-EV-Charging.pdf. Accessed: August 2016.

[27] For a good discussion of how EV drivers can use and benefit from public charging infrastructure, see SCAG's Southern California Plug-in Electric Vehicle Readiness Plan, December, 2012. Available at: https://www.scag.ca.gov/Documents/SCAG-Southern%20CA%20PEV%20Readiness%20Plan.pdf

[28] UCS, 2013.

in EV market share.[29] Specifically, they found that each additional charging station per 100,000 residents increased EV market share by 0.12 percent, and that charging station infrastructure was as effective (if not more) than financial incentives in explaining EV market behavior and trends. Sierzchula et al. relied upon data collected in 2012. At that time, Norway had the highest intensity of charging stations (25 stations per 100,000 people), and also the highest EV adoption rate at just over three percent. The next two highest charging station intensity rates were seen in the Netherlands and Estonia, which also had two of the next three highest rates of EV adoption. The exception was Japan, which also had a high EV adoption rate, but a slightly lower intensity of charging infrastructure per 100,000 people.

### 2.1.6 Technology Diffusion Impact

The pace of diffusion of a new technology has been studied relative to EV adoption. As there is increased awareness and visibility of EVs (as more and more are driven), more people see neighbors and friends successfully adopting EVs, and fewer perceived barriers remain.[30] This phenomenon has been termed, among others, as 'social networks' or the 'neighborhood effect.'[31, 32] Also, as the number of EV models for purchase increases, Sierzchula et al. found that there is a positive correlation with the rate of EV conversion.[33] Although causation could be explained in either direction, it is not surprising that consumers are more likely to purchase an EV when there are more EV models available for purchase. Observing a wide range of EV options in the market causes EVs to be perceived as a less risky choice than if there were only one EV model available for purchase.

The diffusion of innovation concept derives from work by Everett Rogers, who described the process through which populations adopt new technology.[34] Rogers hypothesized different technological adoption phases through time, first involving the "Innovators," about 2.5 percent of the population who is interested in a new idea and want to try it. A second group of about 13.5 percent of the population make up "Early Adopters," who follow the "Innovators," bringing the total of those who will ultimately adopt to about 16 percent. The next phase is often difficult to achieve, and thus getting from the "Early Adopters" to this "Early Majority Group" is often referred to as "the chasm." The "Early Majority" typically represents the next 34 percent. This is the point where the adoption rate reaches 50 percent of the number of people who will use the new technology. After the "Early Majority" group, the "Late Majority" and the "Laggards" are the final groups of people who convert.

Following this innovation diffusion model, one researcher found that besides price, usefulness for the environment, perceived risk, difficulty of use, knowledge and information, performance, fuel cost savings, and social prestige were all factors that

[29] Sierzchula, W., Bakker, S., Maat, K., and van Wee, B. The influence of financial incentives and other socio-economic factors on electric vehicle adoption, Energy Policy (2014), 68, 183-194.

[30] Nelson-Nygaard Consulting Associates Inc. 2014. Removing Barriers to Electric Vehicle Adoption by Increasing Access to Charging Infrastructure. Seattle Office of Sustainability & Environment. Available at: http://www.seattle.gov/Documents/Departments/OSE/FINAL%20REPORT_Removing%20Barriers%20to%20EV%20Adoption_TO%20POST.pdf. Accessed: August 2016.

[31] He, L., M. Wang, W. Chen, and G. Conzelmann. 2014. Incorporating Social Impact on New Product Adoption in Choice Modeling: A Case Study in Green Vehicles. Transp. Res. Part D 32 421-434.

[32] See discussion in Coffman et al., 2015.

[33] Sierzchula et al. (2014).

[34] Rogers, Everett M. 2003. Diffusion of Innovations, fifth edition, The Free Press.

influenced the decision to purchase an EV.[35] Hence, social perceptions influencing the timing of a technology ‘catching on’ are important to consider.

Diffusion models have been widely used to capture the dynamics of automobile markets.[36] And, the recent history of EV adoption rates in Norway supports the use of the model in this context, with EV purchase rates moving from 3 to 6 to 14 to 23 percent over the course of 2012-2015.[37]

Another way to think about how and why some people wait to purchase an EV is described by Greene et al., who employ a diffusion model that captures the natural risk aversion that consumers have toward new technologies.[38] Their research explores how temporary policies that overcome transition barriers are needed in order to reduce risk aversion and induce positive feedback. Once these have been effective (they suggest after a decade or so), such policies are no longer needed. Coffman and Adepetu and Keshav also incorporate some form of technology diffusion in their research models of consumer behavior toward EV purchases.

### 2.1.7 Summary

The studies discussed above highlight the key factors that affect the transition to EVs. Demand for EVs is similar to other markets, and is a function of price, the income level of the buyer, tastes and preferences, and expectations. In addition, the published literature highlights that the ability to charge an EV at home (and away) and range anxiety are important factors influencing the decision to purchase an EV, and the pace of technology diffusion is related to social networks, neighbor effects, and visibility.

## 2.2 Market Share and Forecasts

Historical EV market shares and forecasts for future EV market shares establish important parameters in the modeling of EV adoption rates. (The rate of EV adoption is the percent of new cars purchased that are EV as a share of the total.) This section examines the recent history of EV adoption in California, and also covers a review of recent forecasts for the future.

### 2.2.1 Market Share for EVs

California is currently one of the largest markets for EVs in the United States, and has, in fact, been referred to as “America’s capital of plug-in cars.”[39] Based on sales figures tracked by the California Air Resources Board, Californians bought approximately 50

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[35] Mayshayeki, Morteza. 2012. Factors Influencing The Diffusion of Battery Electric Vehicles In Urban Areas, in Partial Fulfillment of a Master’s Thesis Presented to Ryerson University In partial fulfillment of the Requirements for the degree of Master of Management Science In the program of Management of Technology and Innovation.

[36] Coffmann et al., 2015.

[37] World’s Top 7 Electric Vehicle Adoption Countries for 2015, EV insider website, Based on data from EV Sales Blog. Available at: http://insideevs.com/worlds-top-7-electric-vehicle-adoption-countries-for-2015/. Accessed: August 2016.

[38] Reene, David L. and Liu Changzheng. 2014. Transitioning to Electric Drive Vehicles, Public Policy Implications of Uncertainty, Network Externalities, Tipping Points, and Imperfect Markets. White Paper 1:14, University of Tennessee, Baker Center for Public Policy, January.

[39] Cobb, Jeff. 2016. California Plug-in Sales Led the US Last Year with Nearly Five-Times Greater Market Share. HybridCars.com. February. Available at: http://www.hybridcars.com/california-plug-in-sales-led-us-last-year-with-nearly-five-times-greater-market-share/. Accessed: August 2016.

percent of all EVs sold in the United States in 2014, and 55 percent in 2015.[40] Table 1 presents the market share of EVs in California and the United States over the last few years. These are calculated as the share of new cars in a given year that are electric. The table shows that EV sales, as a share of all new cars, dropped slightly in 2015 both nationally and in California, which appears to be due to overall drops in fuel prices. The actual number of EVs sold nationally was over 114,000 in 2015, with over 62,000 of those being sold in California. As shown in Table 1, the 3.03 percent market share of EVs in California is approximately four times higher than that in the United States, which was about 0.66 percent in 2015.

**Table 1: Market Shares of Electric Vehicles in California and USA**

| Geography | Market Share of Electric Vehicles | | | |
|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 |
| California | 1.31% | 2.49% | 3.22% | 3.03% |
| USA | 0.37% | 0.62% | 0.72% | 0.66% |

Sources: California New Car Dealers Association (CNCDA). February 2016. California New Vehicle Registrations Expected to Remain Above 2 Million Units in 2016. Registrations through December 2015 since 2011. Revised figures for 2014. Available at: http://www.cncda.org/CMS/Pubs/Cal%20Covering%204Q%2015.pdf. Accessed: August 2016.

Electric Drive Transportation Association (EDTA). 2016. Electric Drive Sales Dashboard. Sales figures sourced from HybridCars.com and direct reports submitted by EDTA member companies. Available at http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952#sthash.5QBifqpG.EyVW8gqf.dpuf and http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952. Accessed: August 2016.

### 2.2.2 Forecasts for EV Adoption

Forecasts for the pace of EV adoption in California have historically underestimated EV sales. For example, in July 2012, a forecast for EV sales was developed for the Southern California Association of Governments by UCLA. The results optimistically stated that, "EV sales in California could exceed 50,000 per year by 2019 and 150,000 by 2022."[41] As

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40 Extrapolated from Data Provided in: California New Car Dealers Association (CNCDA). February 2016. California New Vehicle Registrations Expected to Remain Above 2 Million Units in 2016. Registrations through December 2015 since 2011. Revised figures for 2014. Available at: http://www.cncda.org/CMS/Pubs/Cal%20Covering%204Q%2015.pdf. Accessed: August 2016.

AND

Electric Drive Transportation Association (EDTA). 2016. Electric Drive Sales Dashboard. Sales figures sourced from HybridCars.com and direct reports submitted by EDTA member companies. Available at: http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952#sthash.5QBifqpG.EyVW8gqf.dpuf and http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952. Accessed: August 2016.

41 Williams, Brett, J.R. DeShazo, and Ayala Ben-Yehuda, Early Plug-in Electric Vehicle Sales: Trends, Forecasts, and Determinants. Report prepared for the Southern California Association of Governments (SCAG), but the

mentioned above, sales in California were over 62,000 in 2015, thereby exceeding UCLA's projections four years ahead of schedule.

More recent forecasts predict higher EV penetration levels, with adoption to be moving out of the "Early Adopters" phase and into the "Early Majority" phase sooner rather than later. Specifically, one forecast for global sales developed by Bloomberg New Energy Finance (BNEF) anticipates that global EV sales will be 35 percent of new car sales by 2040.[42] Another recent forecast, developed by Navigant Consultants, projects that EV sales will increase in California by just under 70 percent annually for the years 2016 through 2018, and then by about 16 percent per year from 2019 through 2022, resulting in EV sales of over 500,000 in California by 2022.[43] Both the Navigant and BNEF forecasts were produced after the news that Tesla had taken 400,000 pre-orders for their new longer battery charge Tesla Model 3s, which suggests that the rate of increase in the EV market share could be as high as these estimates in the coming years.

### 2.2.3 Summary

The understanding of the historical EV market share and forecasts for future EV market share establish important parameters in the modelling of EV adoption rates. California's historical EV market share data establishes a baseline for expectations of conversion to EV. For the purpose of this report, emphasis is placed on the forecasts for California from Navigant Consulting, which suggest that a rapid increase in EV purchases is underway in 2016, with sales increasing from just over 62,000 in 2015 to over 500,000 in 2022.

## 2.3 How Incentives Work

A variety of incentives have been developed and used by governments and other global organizations to encourage the conversion to EVs to achieve greenhouse gas emission reductions. The incentives serve to reduce the purchase price of the vehicle, reduce ongoing operation and maintenance costs, expedite the industry's technological advancement, and/or address one of the preference issues, such as range anxiety.

Multiple studies suggest that there is a positive correlation between incentives and the conversion to EV. The primary and traditional incentives mechanisms are purchase oriented, and include rebates, tax credits/incentives, and purchase subsidies.[44] In addition to these financial-based incentives associated with EV purchase, other incentives include increased access to public charging stations, free electricity while using public charging stations, and/or subsidies that make the ability to install a home charging station more affordable, all which result in positive correlation with increased conversion to EV. While

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UCLA Luskin School of Public Affairs, available at: http://luskin.ucla.edu/sites/default/files/WilliamsEtAl2012-UCLA%20Luskin%20Deliverable%204.pdf. Accessed: August 2016.

[42] Electric Vehicles to be 35 % of Global New Car Sales by 2040, press release for study developed by Bloomberg New Energy Finance study, available at: http://about.bnef.com/press-releases/electric-vehicles-to-be-35-of-global-new-car-sales-by-2040/. Accessed: August 2016.

[43] Shepard, Scott, and Lisa Jerram. 2016 Executive Summary: Electric Vehicle Geographic Forecasts; Battery and Plug-In Hybrid Electric Vehicle Sales and Populations in North America, free excerpt of the larger report. Available at: https://www.navigantresearch.com/research/electric-vehicle-geographic-forecasts. Accessed: August 2016.

[44] Clinton, Bentley, Austin Brown, Carolyn Davidson, and Daniel Steinberg. 2015. Impact of Direct Financial Incentives in the Emerging Battery Electric Vehicle Market: A Preliminary Analysis. National Renewable Energy Laboratory. Department of Economics, University of Colorado – Boulder. February.

policies differ from state to state, each state shows a strong correlation between subsidies and rebates offered and an increase in the conversion to EV.[45]

Financial incentives are generally effective because the higher initial cost of EVs is often viewed as the most prominent market barrier.[46] When the State of Georgia eliminated their state-level tax credit for EVs, sales of EVs dropped 90 percent in 2015.[47] In May 2016, the International Council on Clean Transportation (ICCT) released a study that compared EV incentive programs in European countries, and also concluded that there is a correlation between higher levels of fiscal incentives and charging infrastructure and higher adoption of EVs.[48] Although the data set of policies gathered by the ICCT is too small for statistical inference, it is clear that the combination of significant fiscal incentives as a percent of total vehicle cost and a high number of charging stations per 1,000 vehicles registered (such as five or more as are found in Oslo and Amsterdam) led to the highest rates of EV purchases as a share of all new cars. (The ICCT study found that EV purchases were approximately 20 percent and 14 percent of all vehicle sales with the incentives in Oslo and Norway, respectively.)

As previously discussed, there are many factors that affect EV adoption; however, price remains the biggest barrier, and financial incentives must be large enough to spur real adoption.

- Jenn, Azevedo, and Ferreira found that, in order for incentives to have a significant effect on the EV market, the overall incentive must be over $1,000.[49] For incentives less than this, the incentive has an insignificant effect on consumer behavior.
- Gallagher et al. found that a tax incentive equal to $1,000 brought about a five percent increase in EV sales, based on data from 2000 through 2006 comparing all states with incentive programs.[50]
- Adepetu and Keshav simulated results for adoption of EVs in Los Angeles, and found that, under a baseline scenario, the market share of EVs would increase from roughly three percent to around seven percent.[51] When offered a $2,000 rebate,

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[45] DeShazo, J.R., CC Song, Michael Sin, and Thomas Gariffo. 2015. State of the States' Plug-in Electric Vehicle Policies, UCLA Luskin School of Public Affairs, March. Available at: http://innovation.luskin.ucla.edu/sites/default/files/EV_State_Policy.pdf. Accessed: August 2016.

[46] Yang, Zifei, P. Slowik, Nic Lutsey, Stephanie Searle. 2016. Principles for Effective Electric Vehicle Incentive Design. June 2016. Available at: http://www.theicct.org/sites/default/files/publications/ICCT_IZEV-incentives-comp_201606.pdf. Accessed: August 2016.

[47] Caputo, Michael. 2016. Georgia EV Sales Sputter without Tax Credit, online article. Available at: http://www.marketplace.org/2016/01/08/world/georgia-ev-sales-sputter-without-tax-break. Accessed: August 2016.

[48] Tietge, Uwe, P. Mock, N. Lutsey, A. Campestrin. 2016. The International Council on Clean Transportation. Comparison of Leading Electric Vehicle Policy and Deployment in Europe. May 2016. Available at: http://www.theicct.org/sites/default/files/publications/ICCT_EVpolicies-Europe-201605.pdf. Accessed: August 2016.

[49] Jenn, A., Azevedo, I., and Ferreira, P. 2013. The impact of federal incentives on the adoption of hybrid electric vehicles in the United States, Energy Economics. Available at: http://dx.doi.org/10.1016/j.eneco.2013.07.025. Accessed: August 2016.

[50] Gallagher, K. and Muehlegger, E. Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology (2010), Journal of Environmental Economics and Management, 61(1), 1-15.

[51] Adepetu, Adedamola, and Srinivasan Keshav, 2015. The Relative Importance of Price and Driving Range on Electric Vehicle Adoption: Los Angeles Case Study. *Transportation,* DOI 10.1007/s11116-015-9641-y.

the EV share in 2018 of new car sales increased to 8.5 percent. This is equivalent to a 1.5 percent increase from the baseline scenario, or a 20 percent increase in EV market share. Similarly, a $4,000 rebate would increase the EV share of new car sales to ten percent in 2018 (a 40 percent increase), and a $2,000 rebate coupled with a quintupled battery size led to a 30 percent increase in adoption (or up to roughly nine percent of the new market share by 2018).

- Clinton et al. found that a tax credit of $1,000 stimulated a 2 to 10 percent increase in the rate of EV conversion.[52]

Incentives for related costs other than the EV vehicle purchase also have a positive effect to increase conversion to EVs. The Plug-in Electric Vehicle Owner Survey, managed by the Center for Sustainable Energy, highlighted the importance of subsidized or discounted chargers.[53] Of those with an installed Level 2 charger at home, 64 percent received a free or subsidized charger, and 80 percent of them found the importance of the subsidy to install a Level 2 charger influential. Another study revealed that 83.1 percent of the participants of a consumer survey on EVs stated that it would increase their comfort in purchasing or leasing a EV by “a lot” or would be “a deciding factor” if they have charging facilities at home for easy overnight charging.[54] This evidence suggests that investment in a residential charging infrastructure should result in increased conversion to EV.

Recent work from the ICCT found that there are specific principles that optimize the use of incentives for EV purchases.[55] First, incentives must be exceptionally visible and accessible to consumers, both in terms of their value and the time at which they are applied. Second, locations with a lack of infrastructure (charging stations) and unclear (poorly communicated or advertised) incentives have not seen as significant an uptake of EVs. Third, immediate rebates are the most effective at incentivizing consumers. Fourth, providing charging stations also serves as an immediate rebate and, in combination with effective notification to users, can provide another “incentive” to increase the conversion to EVs. As stated by the ICCT, “Rebates are more than twice as effective as tax credits in motivating consumers, and point-of-sale incentives can be an order of magnitude more effective.”[56]

### 2.3.1 Existing Federal Incentive Program

There have been numerous federal-level incentive programs for alternatively fueled vehicles. The Energy Improvement and Extension Act, enacted in 2008, was the first attempt by the federal government to provide incentives to stimulate the purchase of EVs.

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[52] Clinton, Bentley, Austin Brown, Carolyn Davidson, and Daniel Steinberg, 2015. Impact of Direct Financial Incentives in the Emerging Battery Electric Vehicle Market: A Preliminary Analysis. National Renewable Energy Laboratory. Department of Economics, University of Colorado – Boulder. February.

[53] California Center for Sustainable Energy (CCSE) and California Environmental Protection Agency - Air Resources Board (ARB). 2012. California Plug-in Electric Vehicle Owner Survey. Available at: https://energycenter.org/sites/default/files/docs/nav/policy/research-and-reports/California%20Plug-in%20Electric%20Vehicle%20Owner%20Survey%20Report-July%202012.pdf. Accessed: August 2016.

[54] Krupa, J.K., D.M. Rizzo, M.J. Eppstein, D.B. Lanute, D.E. Gaalema, K. Lakkaraju, and C.E. Warrender. 2014. Analysis of a Consumer Survey on Plug-in Hybrid Electric Vehicles. Volume 64 pages 14-31. Available at: http://www.sciencedirect.com/science/article/pii/S0965856414000500. Accessed: August 2016.

[55] Yang, Zifei, P. Slowik, Nic Lutsey, Stephanie Searle. 2016. Principles for Effective Electric Vehicle Incentive Design. June 2016. Available at: http://www.theicct.org/sites/default/files/publications/ICCT_IZEV-incentives-comp_201606.pdf. Accessed: August 2016.

[56] Ibid

The program was amended in 2009 with the American Recovery and Reinvestment Act, and again in 2013 as part of the American Taxpayer Relief Act.

While there are no longer any federal programs incentivizing the purchase and ownership of hybrid vehicles, there are federal incentive programs for plug-in electric and plug-in hybrid/electric vehicles. For qualified vehicles acquired after December 31, 2009, the existing federal incentive program provides a base credit of $2,500. An additional $417 credit is available for a vehicle which draws propulsion energy from a battery with at least 5 kilowatt hours of capacity, plus an additional $417 for each kilowatt hour of battery capacity in excess of 5 kilowatt hours, up to a maximum of $7,500.[57]

These programs are structured so that credits begin to phase out once a given manufacturer has sold at least 200,000 qualifying vehicles, as determined on a cumulative basis for sales after December 31, 2009.[58] There are as many as 42 different makes and models of vehicles (manufactured by Ford, BMW, Fiat, Chevrolet, Honda, Kia, Mercedes, Nissan, Porsche, Toyota, Volvo, and Volkswagen, as well as VIA, Wheego and previously, Tesla) that would qualify for a tax credit of some amount.[59] According to recent IRS data, sales have not yet approached the threshold levels for most manufacturers.[60] The federal program is a *tax credit*. As a tax credit, the approved amount is deducted from the purchaser's total tax burden. If the credit holders total tax bill is less than the amount of the credit, the "credit" is lost and the credit cannot be forwarded to future tax years.

The federal incentive program also recognizes the importance of home charging in the decision to purchase an EV. EV drivers can take a tax credit of 30 percent off the purchase of home charging equipment, up to $1,000, currently through 2016 when the tax credit will expire.[61] Home charging hardware may cost up to $1,500 (including installation), with more economical chargers available for less than $1,000.[62] The estimated benefit of this tax incentive is on the order of a few hundred dollars.

### 2.3.2 Existing State Incentive Programs

A number of states, including California, offer additional incentives and rebates to motivate the conversion to EVs. The ICCT conducted two meta-studies in 2014 and 2015 analyzing the correlation between direct and indirect incentives across 13 states[63] and in 30 major

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57 Internal Revenue Service. 2016. Plug-In Electric Drive Vehicle Credit (IRC 30D). Available at: https://www.irs.gov/Businesses/Plug-In-Electric-Vehicle-Credit-IRC-30-and-IRC-30D. Accessed: August 2016.

58 Ibid.

59 U.S. Department of Energy, Energy Efficiency & Renewable Energy and U.S. Environmental Protection Agency, Office of Transportation & Air Quality, The Official U.S. Government Source for Fuel Economy Information. Available at: http://www.fueleconomy.gov. Accessed: August 2016.

60 Internal Revenue Service. 2016. IRC 30D - Plug-In Electric Drive Motor Vehicle Credit Quarterly Sales. Available at: https://www.irs.gov/businesses/irc-30d-plug-in-electric-drive-motor-vehicle-credit-quarterly-sales. Accessed: August 2016.

61 Plugincars. 2016. Incentives for Plug-in Hybrids and Electric Cars, February 24. Available at: http://www.plugincars.com/federal-and-local-incentives-plug-hybrids-and-electric-cars.html. Accessed: August 2016.

62 Drive Clean. Charging Equipment Cost. Available at: http://driveclean.ca.gov/pev/Costs/Charging_Equipment.php. Accessed: August 2016.

63 Lingzhi Jin, Stephanie Searle, And Nic Lutsey. 2014. Evaluation Of State-Level U.S. Electric Vehicle Incentives**.** International Council on Clean Transportation 1225 Street NW, Suite 900 Washington DC 20005 USA

metropolitan areas.[64] Their analysis found that state incentives have promoted registrations of 700 to 3,500 EVs since 2011. The ICCT analysis considered incentive packages by type of incentive and by state, and compared the value of incentive(s) relative to the market share for EVs in a given state and to the national average. In the states with the three most aggressive combinations of incentive packages (CA, HI and OR, and WA and GA), the combined incentive packages resulted in EV conversion was two to four percent higher than the national average.

Within California, Governor Brown aims to encourage the deployment of 1.5 million zero emission vehicles in California by 2025.[65] The State is facilitating its achievement of this goal through a variety of financial incentives to reduce the difference in upfront cost between ICEVs and EVs. For example, the California Clean Vehicle Rebate Project (CVRP) currently provides a rebate of up to $6,500 for eligible individuals, subject to an income cap, and provides higher rebates to low and moderate-income consumers.[66]

### 2.3.3 Summary

Published literature establishes a positive correlation between incentives and conversion to EV. The primary positive effect results from reducing the cost of ownership and operation. More aggressive incentive programs have shown that greater incentives may further accelerate the conversion to EVs.

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[64] Lutsey, Nic, Stephanie Searle, Sarah Chambliss, Anup Bandivadekar. 2015. Assessment Of Leading Electric Vehicle Promotion Activities In United States Cities. International Council on Clean Transportation 1225 Street NW, Suite 900 Washington DC 20005 USA.

[65] State of California Office of Governor. Executive Order B-16-2012. Available at: https://www.gov.ca.gov/news.php?id=17472. Accessed: August 2016.

[66] California Air Resources Board. 2016. Clean Vehicle Rebate Project. April. Available at: http://www.arb.ca.gov/msprog/aqip/cvrp.htm/. Accessed: August 2016. Similarly, the draft Mobile Source Strategy prepared by the California Air Resources Board for the South Coast Air Quality Management District's 2016 Air Quality Management Plan anticipates a robust suite of incentive funding to facilitate the penetration and advancement of zero and near-zero emission technologies and vehicles. Available at: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/Draft2016AQMP. Accessed: August 2016. Additionally, as part of the June 2016 partial settlement between Volkswagen and the U.S. Environmental Protection agency, Volkswagen is required to invest $800 million in California to facilitate the installation of EV charging infrastructure and the promotion of EVs. Volkswagen's investment plans will be subject to review and approval by the California Air Resources Board. Available at: https://www.epa.gov/enforcement/volkswagen-clean-air-act-partial-settlement. Accessed: August 2016.

# 3. APPROACH

Ramboll Environ has developed a predictive model (see Appendix A) of the expected EV purchases that will occur at the Newhall Ranch community, based on the programs that the community will implement in order to promote the purchase of EVs. Please see Section 1.1, Background on the Newhall Ranch Community's Incentive Program, above for a description of those programs, which include the provision of EV purchase subsidies and a comprehensive EV charging station infrastructure network. The following is an overview of the model's development, which includes details regarding the calculations, data, and assumptions.

## 3.1 Overview of Approach

The basic development of the model includes the seven components summarized below.

1. Calculate the number of total residents that will live at the Newhall Ranch community by year.
   a. Calculations are based on the absorption schedule included in Appendix A.
2. Calculate the number of cars purchased by residents (households) each year.
   a. Calculations are based on the estimated number of drivers and the stock of cars in the Newhall Ranch community for all residents, and the percentage of drivers that purchase a car in any year.
3. Calculate the number of EVs owned by residents (households) each year.
   a. Calculations are based on data that includes EVs already-owned by residents prior to moving to the Newhall Ranch community, and data that indicates how many EVs may be purchased going forward.
   b. The number of EVs purchased is calculated as a percent of all cars purchased based on the published literature for anticipated EV sales (see Section 2.2, Market Share and Forecasts, above).
4. The percentage of all car purchases that are EVs is assumed to start at seven percent in 2020, and increase over time at a constant increase of 2.5 percent annually (see Section 2.2, Market Share and Forecasts, above).
   a. These assumptions are based on BNEF and Navigant studies, and the historical market information of EV purchases in California.
   b. The Newhall Ranch community's population is assumed to be similar to the population of California drivers in terms of distribution of income level and other preferences.
5. The EVs that would be purchased annually *without* the incentives are calculated by multiplying the total number of cars purchased in the Newhall Ranch community by the estimated EV purchase percentage for each year.
6. The total number of EVs purchased that are stimulated by the Newhall Ranch community's incentive program is estimated by three factors.

a. First, the effect of the $1,000 purchase subsidy and the installation of an in-home charging station (estimated at a value of $800) is considered.[67] Using a 10 percent increase per thousand dollars of stimulus, based on results from Adepetu and Keshay (2015), we assume a 19 percent increase in the rate of EV adoption due to these incentives. This result is also supported by research from Clinton et al. (2015).

b. Second, the effect of the additional installation of EV charging stations in the Newhall Ranch community is considered. Using results adapted from Sierzchula et al. (2014), the model assumes a 7.2 percent increase in the rate of EV adoption from the charging stations in the study area.[68] (While conservatively not considered in this analysis, the community's off-site installation of EV charging stations in the Los Angeles County area also is anticipated to beneficially improve EV adoption rates in that larger geographic area.)

c. Third, the effect of an accelerated technology diffusion path is considered, following the supportive scientific literature discussed above in Section 2.1.6, Technology Diffusion Impact, and as captured in modeling efforts by Coffmann (2015), and Adepetu and Keshav (2015). Due to the increased visibility of the Newhall Ranch community's programs, the social network and/or the neighbor effect, the pace of adoption is expected to be faster in the early years of the study (from 2020 to 2023) and then slow down. This will reflect the pace of adoption expected as the use of EVs moves from the "Early Adopters" phase into the "Early Majority" phase.

7. The total EV cars that may be purchased as a result of the Newhall Ranch community's program is calculated based on the difference between the EV cars purchased with implementation the Newhall Ranch program compared to the result without the program. The model represents the sum total effect of the program over the period of time that the Newhall Ranch community is anticipated to be built out (2030).

## 3.2 Vehicles Purchased by the Community

The vehicles purchased by the Newhall Ranch community are estimated based on a population estimate and published literature regarding vehicle purchasing trends.

Consistent with the Southern California Association of Governments data, the average household size in the Newhall Ranch community is assumed to be 3.15.[69] Factoring this into the number of households, we estimate that the Newhall Ranch community (Study Area) will have 63,000 residents (see Table 2).

Data regarding the proportion of an area's population that drives (and is assumed to own a vehicle) is based on the latest publicly available data from the Federal Highway

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[67] Estimate developed from Plug-In Hybrid website, stating that the station itself runs on average about $600-$700; and that professional installation could be as low as $200. Therefore, a value of $800 is assumed to approximate a mid-point value estimate. See: http://www.plugincars.com/quick-guide-buying-your-first-home-ev-charger-126875.html.

[68] Sierzchula et al. found that an increase of one charging station per 100,000 people increases new EV sales by 0.12 percent. Given the population of Newhall Ranch (around 60,000), and given the 2,000 new charging stations anticipated to serve approximately 4,000 parking spots, this would produce a 108 percent increase in sales of EVs. However, as the Sierzchula et al. research analyzed countries with fewer than 100 charging stations per 100,000 in population, we limited this effect to the result that could be brought about by the presence of 100 public charging stations.

[69] SCAG, 2016. Data relied upon by for the 2016 RTP/SCS for Santa Clarita (2.94) and LA County (3.36). Available at: http://scagrtpscs.net/Pages/default.aspx. Accessed: August 2016.

Administration (FHA) regarding the number of drivers per 1,000 residents in each state.[70] This data indicated that, in 2014, there were 639 drivers per 1,000 residents in California (see Table 3). Applying that to the 63,000 residents in anticipated for the Newhall Ranch community, and assuming that all drivers own vehicles, it is estimated that approximately 40,257 people are drivers in the Study Area.

| **Table 2: Data and Estimation of Drivers in the Study Area** | |
|---|---|
| No. of Households | 21,242 |
| Average Number of Persons per Household | 3.15 |
| No. of Residents | 66,912 |
| No. of Drivers per 1,000 Residents in CA in 2014 | 639 |
| No. of Drivers Among 66,912 Residents | **42,757** |

Sources: U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates. Available at https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2014/. Accessed: August 2016. And, U.S. Department of Transportation, Federal Highway Administration. 2014. Highway Statistics series of reports. Available at: www.fhwa.dot.gov/policyinformation/statistics.cfm. Accessed: August 2016.

To estimate the number of cars purchased in the Study Area each year, the analysis uses data on the number of new and used cars sold in 2014, and the total number of licensed drivers in the US in the same year. In 2014, approximately 16.17 million new cars were sold, and the number of used cars sold was just over 42 million.[71, 72] The number of licensed drivers were reported as over 214 million (see Table 3).[73] This suggests that 27 percent of licensed drivers purchase a car each year, or about one in four drivers. However, only about eight percent (one in 13 drivers) buys a new car in each year, while the rest buy used cars. Because the market for used EVs is smaller than the market for used ICEVs, we have adjusted the percent of the population that could potentially buy a new or used EV downward to 20 percent, which is considered a conservative assumption because the used EV market is expected to be more robust going into the future as the prevalence of used EVs increases. Table 3 shows that, using these assumptions, the number of drivers who purchase a car and, therefore, might purchase an EV ranges from 805 in 2020, to 8,051 in 2030, as more and more people move into the community.

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[70] U.S. Department of Transportation, Federal Highway Administration, 2014, Highway Statistics series of reports. Available at: www.fhwa.dot.gov/policyinformation/statistics.cfm. Accessed: August 2016.

[71] Davis, Stacy C., Susan W. Diegel, and Robert Boundy, 2015, Transportation Energy Data Book, Edition 34, Prepared for the Vehicle Technologies Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, August. Table 3-11. Available at: http://cta.ornl.gov/data/index.shtml. Accessed: August 2016.

[72] Webb, Tom. 2015. 2015 Used Car Market Report Year in Review and Outlook. Available at: http://www.niada.com/uploads/dynamic_areas/tRRlH6fX2WoqiCcaonlq/33/2015ManheimUsedCarMarketReport.pdf. Accessed: August 2016.

[73] U.S. Department of Transportation, Federal Highway Administration. 2014. Highway Statistics series of reports. Available at: www.fhwa.dot.gov/policyinformation/statistics.cfm. Accessed: August 2016.

| **Table 3: Estimation of Drivers and Car Buyers in the Newhall Community** | |
|---|---|
| Total Licensed Drivers in the US (2014) - USA | 214,092,472 |
| Total New Vehicles Sold in 2014 - USA | 16,171,000 |
| Total Used Vehicles Sold in 2014 - USA | 42,000,000 |
| Percentage of Drivers that Buy a Car Each Year (based on 2014 data) | 27% |
| Adjusted Percent to Account for Reduced Used Car Market for EVs | 20% |
| Number of Drivers in Newhall Ranch in 2020 | 670 |
| Number of Drivers in Newhall Ranch in 2030 | 42,757 |
| Number of Drivers Who Might Purchase an EV in Newhall Ranch in 2020 | **134** |
| Number of Drivers Who Might Purchase an EV in Newhall Ranch in 2030 | **8,551** |

Sources: U.S. Department of Transportation, Federal Highway Administration. 2014. Highway Statistics series of reports. Available at www.fhwa.dot.gov/policyinformation/statistics.cfm, and,
Davis, Stacy C., Susan W. Diegel, and Robert Boundy, 2015. Transportation Energy Data Book, Edition 34, Prepared for the Vehicle Technologies Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, August. Table 3-11, Available at: http://cta.ornl.gov/data/index.shtml. Accessed: August 2016.

# 4. RESULTS

Following the methodology outlined in Section 3, it is estimated that the Newhall Ranch community's incentive program will lead to a 48 percent increase in EV adoption. Specifically, without the incentive program, only 12,978 of the vehicles purchased and driven in the Newhall Ranch community by 2030 would be EVs. With implementation of the incentive program, 24,941 of the vehicles purchased and driven in the Newhall Ranch community by 2030 would be EVs, an increase of 11,963 vehicles. As a result, by 2030, nearly half of car purchases are expected to be EVs, and there will be an average of over one EV per household in the community.

**Table 4: Expected EVs in Newhall Ranch Community by 2030 with Incentive Program**

| Total Cars Purchased by Newhall Land Residents | EVs in Community-No Additional Incentive | Additional EVs Purchased with Incentive Program | Percent Increase due to Incentives | Total EVs at in 2030 | Average EV per Household |
|---|---|---|---|---|---|
| 52,887 | 12,978 | 11,963 | 48% | 24,941 | 1.17 |

The results in Table 4 represent the best estimate of EV adoption within the Newhall Ranch community given the incentive program, given our current understanding of EV purchases and our expectation that future events will more or less follow along with existing trends.

However, as the forecast begins in 2020, there is a possibility that unforeseen events could shift the anticipated purchasing behavior. Several alternative forecasts, therefore, have been developed to demonstrate how the results may change under different conditions. These alternative forecasts include:

1) **Greater Overall EV Conversion**: This forecast assumes a higher existing percentage of EV sales and ending percentage in 2030 compared to overall vehicle sales. Specifically, it is assumed that, in 2020, EV sales are nine percent of total car sales, and, in 2030, 34 percent of total car sales. This is an increase of two and four percent, respectively, from the base analysis;

2) **Lesser Overall EV Conversion**: This forecast assumes a lower existing percentage of EV sales and ending percentage in 2030 compared to overall vehicle sales. Specifically, it is assumed that, in 2020, EV sales are four percent of total car sales and, in 2030, 20 percent of total car sales. This is a decrease of three and ten percent, respectively, from the base analysis;

4) **Rapid Technology Diffusion**: This forecast assumes that the pace of technology diffusion is faster than the pace assumed in the base analysis, which peaks in 2024, and then begins to slow. Under the rapid technology diffusion alternative forecast, the rates are slightly higher through 2024, and continue to increase through 2025 and then begin to slow; and

3) **Delayed Technology Diffusion**: This forecast assumes that the pace of technology diffusion is slower than the pace assumed in the base analysis, which

peaks in 2024, and then begins to slow. Under the delayed technology diffusion alternative, the rate of increase is slightly lower through 2024 compared to the base analysis, and the peak does not come until 2027.

Results for these alternative forecasts are shown in Table 5. These alternatives demonstrate that the Newhall Ranch community's incentive program is likely to have a positive effect under different market conditions even if the predicted effect of the program varies. Two alternative forecasts may result in higher, or more rapid EV adoption than the current model captures, and two alternative forecasts may result in lower, or less rapid EV adoption than the current model captures.

Notably, the evaluation does not specifically factor in higher oil prices that may occur in the 2020 to 2030 time frame. If this occurs, it would be expected that this would result in more rapid adoption than what the current model anticipates. Similarly, the cost for electricity could have an effect both positive (e.g., if low cost renewable energy becomes more prevalent) or negative (e.g., if the cost of electricity increase).

Detailed annual results for the base analysis and each alternative forecast are shown in Appendix A to this report.

**Table 5 Alternative Forecast Results**

| Forecast | Total Cars Bought by Newhall Land Residents | Total EVs in Community -No Additional Incentive | Additional EVs with Incentive Program | Percent Increase due to Incentives | Total EVs in 2030 | Average EVs per Household |
|---|---|---|---|---|---|---|
| Greater EV Conversion | 52,887 | 14,841 | 12,298 | 45% | 27,138 | 1.28 |
| Lesser EV Conversion | 52,887 | 8,574 | 6,552 | 43% | 15,126 | 0.71 |
| Rapid Technology Diffusion | 52,887 | 12,978 | 8,819 | 40% | 21,797 | 1.03 |
| Delayed Technology Diffusion | 52,887 | 12,978 | 14,973 | 54% | 27,951 | 1.32 |

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# APPENDIX A
# PURCHASING FORECAST MODEL

**ASSUMPTIONS**

| Assumptions | Best Estimate | Greater EV Conversion | Lesser EV Conversion | Rapid Technology Diffusion | Delayed Technology Diffusion |
|---|---|---|---|---|---|
| New Households Annually \1 | 333-2,606 | 333-2,606 | 333-2,606 | 333-2,606 | 333-2,606 |
| Persons per household \2 | 3.15 | 3.15 | 3.15 | 3.15 | 3.15 |
| Vehicles per 1,000 people \3 | 639 | 639 | 639 | 639 | 639 |
| Percent of drivers who purchase a vehicle per year \4 | 20% | 20% | 20% | 20% | 20% |
| 2020 percent of vehicle purchases electric - trend \5 | 7% | 9% | 4% | 7% | 7% |
| 2030 percent of vehicle purchases electric - trend \5 | 32% | 34% | 20% | 32% | 32% |
| Value financial incentive \7 | $1,800 | $1,800 | $1,800 | $1,800 | $1,800 |
| Increase in purchase rate due to financial incentive \8 | 1% - 6% | 1% - 6% | 1% - 4% | 1% - 6% | 1% - 6% |
| Increase in purchase rate due to charging stations \9 | 7% - 15% | 7% - 15% | 7% - 15% | 7% - 12% | 7% - 20% |

Table Notes and References:

\1 - This range is based on the Project applicant's absorption schedule, and subject to additional calendar year specificity

\2 - SCAG, 2016. Data relied upon by for the 2016 RTP/SCS for Santa Clarita (2.94) and LA County (3.36). Available at: http://scagrtpscs.net/Pages/default.aspx. Accessed: August 2016.

\3 - Davis, Stacy C., Susan W. Diegel, and Robert Boundy, 2015, Transportation Energy Data Book, Edition 34, Prepared for the Vehicle Technologies Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, August. Table 3-11. Available at: http://cta.ornl.gov/data/index.shtml. Accessed: August 2016.

\4 - Revised downward, based on U.S. Department of Transportation, Federal Highway Administration. 2014. Highway Statistics series of reports. Available at: www.fhwa.dot.gov/policyinformation/statistics.cfm. Accessed: August 2016.

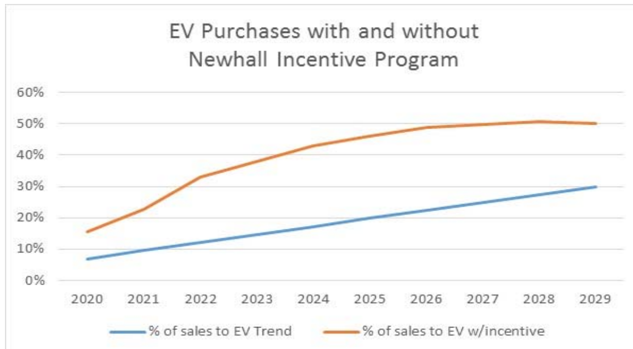
\5 - Based on BNEF and Navigant studies, and the historical market information of EV purchases in California and the population is assumed to be similar to the population of California drivers in terms of distribution of income level and other preferences;

\6 - This only reflects the benefit of the on-site residential EV chargers, and not those in the on-site commercial areas. Estimate developed from Plug-In Hybrid website, stating that the station itself runs on average about $600-$700; and that professional installation could be as low as $200. Therefore, a value of $800 is assumed to approximate a mid-point value estimate. See: http://www.plugincars.com/quick-guide-buying-your-first-home-ev-charger-126875.html.

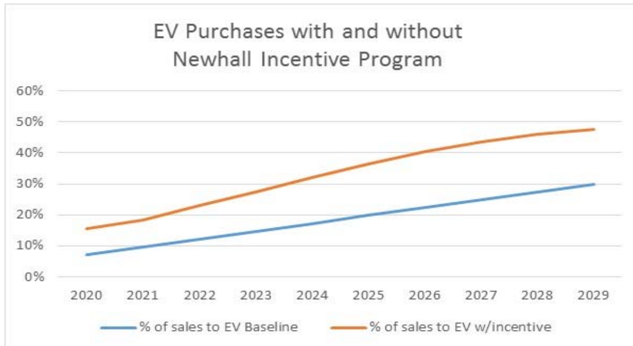
\7 - Based on relationship from Adepetu, Adedamola, and Srinivasan Keshav. 2015. The Relative Importance of Price and Driving Range on Electric Vehicle Adoption: Los Angeles Case Study. Transportation, DOI 10.1007/s11116-015-9641-y. 1-21.

\8 - Only includes the additional charging stations in the Newhall Ranch commercial areas. Based on Sierzchula, W., Bakker, S., Maat, K., and van Wee, B. 2014. The influence of financial incentives and other socio-economic factors on electric vehicle adoption, Energy Policy, 68, 183-194.

| Best Estimate | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **21,242 homes in the Development** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **Total** |
| Number of households occupied per year | 333 | 1,713 | 2,987 | 3,420 | 2,117 | 1,853 | 1,875 | 2,606 | 2,460 | 1,343 | 535 | **21,242** |
| Number of households | 333 | 2,046 | 5,033 | 8,453 | 10,570 | 12,423 | 14,298 | 16,904 | 19,364 | 20,707 | 21,242 | |
| Stock of Cars in Community | 670 | 4,118 | 10,131 | 17,015 | 21,276 | 25,006 | 28,780 | 34,025 | 38,977 | 41,680 | 42,757 | |
| Number of cars purchased each year | 134 | 824 | 2,026 | 3,403 | 4,255 | 5,001 | 5,756 | 6,805 | 7,795 | 8,336 | 8,551 | **52,887** |
| Percent of purchased cars EV Trend | 7% | 10% | 12% | 15% | 17% | 20% | 22% | 25% | 27% | 30% | 33% | |
| Percent of purchased cars EV Incentive | 15% | 23% | 33% | 38% | 43% | 46% | 49% | 50% | 51% | 50% | 50% | |
| EV Cars trend | 9 | 79 | 245 | 499 | 733 | 989 | 1,285 | 1,694 | 2,139 | 2,501 | 2,784 | 12,958 |
| Additional EVS due to Incentive Pgrms | 11 | 109 | 423 | 791 | 1,096 | 1,311 | 1,535 | 1,692 | 1,815 | 1,674 | 1,505 | 11,963 |
| Total EVS in Community Trend | 29 | 128 | 394 | 913 | 1666 | 2675 | 3981 | 5695 | 7854 | 10375 | 13179 | |
| Total EVS in Community w/Incentive | 41 | 249 | 938 | 2247 | 4096 | 6416 | 9257 | 12663 | 16638 | 20832 | 25142 | |
| | | | | | | | | Percent of  Cars EV Trend | | | | **25%** |
| | | | | | | | | Percent of Cars EV with Incentive | | | | **47%** |

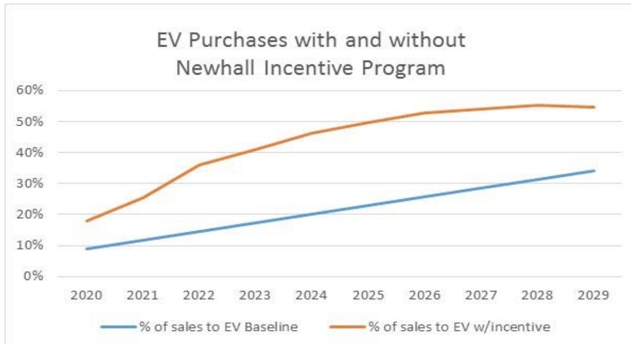


| Delayed Technology Diffusion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **21,242 homes in the Development** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **Total** |
| Number of households occupied per year | 333 | 1,713 | 2,987 | 3,420 | 2,117 | 1,853 | 1,875 | 2,606 | 2,460 | 1,343 | 535 | **21,242** |
| Number of households | 333 | 2,046 | 5,033 | 8,453 | 10,570 | 12,423 | 14,298 | 16,904 | 19,364 | 20,707 | 21,242 | |
| Stock of Cars in Community | 670 | 4,118 | 10,131 | 17,015 | 21,276 | 25,006 | 28,780 | 34,025 | 38,977 | 41,680 | 42,757 | |
| Number of cars purchased each year | 134 | 824 | 2,026 | 3,403 | 4,255 | 5,001 | 5,756 | 6,805 | 7,795 | 8,336 | 8,551 | **52,887** |
| Percent of purchased cars EV Trend | 7% | 10% | 12% | 15% | 17% | 20% | 22% | 25% | 27% | 30% | 33% | |
| Percent of purchased cars EV Incentive | 15% | 18% | 23% | 28% | 32% | 36% | 40% | 43% | 46% | 48% | 49% | |
| EV Cars trend | 9 | 79 | 245 | 499 | 733 | 989 | 1,285 | 1,694 | 2,139 | 2,501 | 2,784 | 12,958 |
| Additional EVS due to Incentive Pgrms | 11 | 73 | 219 | 437 | 635 | 835 | 1,032 | 1,261 | 1,437 | 1,474 | 1,404 | 8,819 |
| Total EVS in Community Trend | 29 | 128 | 394 | 913 | 1,666 | 2,675 | 3,981 | 5,695 | 7,854 | 10,375 | 13,179 | |
| Total EVS in Community w/Incentive | 41 | 213 | 698 | 1,654 | 3,042 | 4,886 | 7,224 | 10,199 | 13,795 | 17,790 | 21,998 | |
| | | | | | | | | Percent of New Cars EV at Baseline | | | | **25%** |
| | | | | | | | | Percent of New Cars EV with Incentive | | | | **41%** |

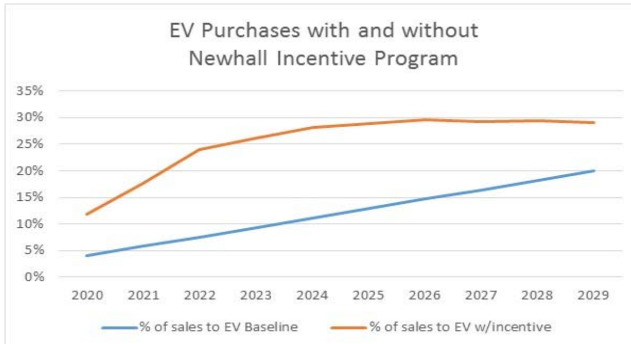


| Greater EV Conversion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **21,242 homes in the Development** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **Total** |
| Number of households occupied per year | 333 | 1,713 | 2,987 | 3,420 | 2,117 | 1,853 | 1,875 | 2,606 | 2,460 | 1,343 | 535 | **21,242** |
| Number of households | 333 | 2,046 | 5,033 | 8,453 | 10,570 | 12,423 | 14,298 | 16,904 | 19,364 | 20,707 | 21,242 | |
| Stock of Cars in Community | 670 | 4,118 | 10,131 | 17,015 | 21,276 | 25,006 | 28,780 | 34,025 | 38,977 | 41,680 | 42,757 | |
| Number of cars purchased each year | 134 | 824 | 2,026 | 3,403 | 4,255 | 5,001 | 5,756 | 6,805 | 7,795 | 8,336 | 8,551 | **52,887** |
| Percent of purchased cars EV Trend | 9% | 12% | 15% | 17% | 20% | 23% | 26% | 28% | 31% | 34% | 37% | |
| Percent of purchased cars EV Incentive | 18% | 25% | 36% | 41% | 46% | 50% | 53% | 54% | 55% | 55% | 55% | |
| EV Cars trend | 12 | 97 | 295 | 590 | 856 | 1,145 | 1,477 | 1,936 | 2,434 | 2,834 | 3,145 | 14,820 |
| Additional EVS due to Incentive Pgrms | 12 | 112 | 432 | 807 | 1,118 | 1,339 | 1,570 | 1,736 | 1,868 | 1,734 | 1,570 | 12,298 |
| Total EVS in Community Trend | 32 | 149 | 464 | 1,074 | 1,950 | 3,115 | 4,612 | 6,568 | 9,022 | 11,877 | 15,042 | |
| Total EVS in Community w/Incentive | 44 | 273 | 1,021 | 2,438 | 4,431 | 6,935 | 10,002 | 13,694 | 18,016 | 22,604 | 27,340 | |

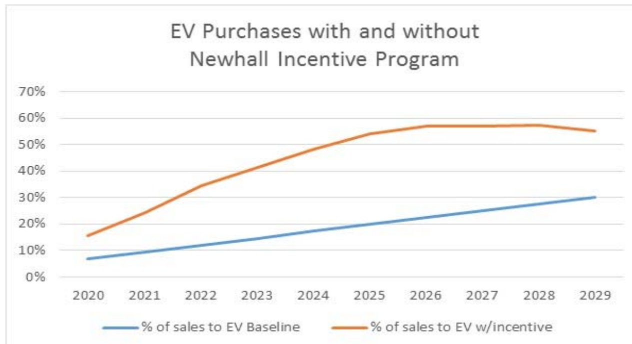
| | |
|---|---|
| Percent of New Cars EV at Baseline | **28%** |
| Percent of New Cars EV with Incentive | **51%** |



| **Lesser EV Conversion** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **21,242 homes in the Development** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **Total** |
| Number of households occupied per year | 333 | 1,713 | 2,987 | 3,420 | 2,117 | 1,853 | 1,875 | 2,606 | 2,460 | 1,343 | 535 | **21,242** |
| Number of households | 333 | 2,046 | 5,033 | 8,453 | 10,570 | 12,423 | 14,298 | 16,904 | 19,364 | 20,707 | 21,242 | |
| Stock of Cars in Community | 670 | 4,118 | 10,131 | 17,015 | 21,276 | 25,006 | 28,780 | 34,025 | 38,977 | 41,680 | 42,757 | |
| Number of cars purchased each year | 134 | 824 | 2,026 | 3,403 | 4,255 | 5,001 | 5,756 | 6,805 | 7,795 | 8,336 | 8,551 | **52,887** |
| Percent of purchased cars EV Trend | 4% | 6% | 8% | 9% | 11% | 13% | 15% | 16% | 18% | 20% | 22% | |
| Percent of purchased cars EV Incentive | 12% | 18% | 24% | 26% | 28% | 29% | 30% | 29% | 29% | 29% | 30% | |
| EV Cars trend | 5 | 48 | 153 | 318 | 473 | 645 | 844 | 1,119 | 1,420 | 1,667 | 1,862 | 8,554 |
| Additional EVS due to Incentive Pgrms | 11 | 98 | 334 | 572 | 728 | 797 | 857 | 868 | 867 | 757 | 664 | 6,552 |
| Total EVS in Community Trend | 25 | 93 | 266 | 604 | 1,097 | 1,762 | 2,626 | 3,765 | 5,206 | 6,893 | 8,775 | |
| Total EVS in Community w/Incentive | 36 | 201 | 708 | 1,618 | 2,839 | 4,300 | 6,022 | 8,029 | 10,336 | 12,781 | 15,327 | |
| | | | | | | | | Percent of New Cars EV at Baseline | | | | **16%** |
| | | | | | | | | Percent of New Cars EV with Incentive | | | | **29%** |



| Rapid Technology Diffusion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **21,242 homes in the Development** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **Total** |
| Number of households occupied per year | 333 | 1,713 | 2,987 | 3,420 | 2,117 | 1,853 | 1,875 | 2,606 | 2,460 | 1,343 | 535 | **21,242** |
| Number of households | 333 | 2,046 | 5,033 | 8,453 | 10,570 | 12,423 | 14,298 | 16,904 | 19,364 | 20,707 | 21,242 | |
| Stock of Cars in Community | 670 | 4,118 | 10,131 | 17,015 | 21,276 | 25,006 | 28,780 | 34,025 | 38,977 | 41,680 | 42,757 | |
| Number of cars purchased each year | 134 | 824 | 2,026 | 3,403 | 4,255 | 5,001 | 5,756 | 6,805 | 7,795 | 8,336 | 8,551 | **52,887** |
| Percent of purchased cars EV Trend | 7% | 10% | 12% | 15% | 17% | 20% | 22% | 25% | 27% | 30% | 33% | |
| Percent of purchased cars EV Incentive | 15% | 24% | 34% | 41% | 48% | 54% | 57% | 57% | 57% | 55% | 54% | |
| EV Cars trend | 9 | 79 | 245 | 499 | 733 | 989 | 1,285 | 1,694 | 2,139 | 2,501 | 2,784 | 12,958 |
| Additional EVS due to Incentive Pgrms | 11 | 121 | 453 | 913 | 1,316 | 1,709 | 1,993 | 2,179 | 2,317 | 2,103 | 1,858 | 14,973 |
| Total EVS in Community Trend | 29 | 128 | 394 | 913 | 1,666 | 2,675 | 3,981 | 5,695 | 7,854 | 10,375 | 13,179 | |
| Total EVS in Community w/Incentive | 41 | 261 | 979 | 2,411 | 4,480 | 7,197 | 10,496 | 14,389 | 18,866 | 23,490 | 28,152 | |
| Percent of New Cars EV at Baseline | | | | | | | | | | | | **25%** |
| Percent of New Cars EV with Incentive | | | | | | | | | | | | **53%** |



# APPENDIX B
# LIST OF PREPARERS

# GRETCHEN GREENE, PH.D.

**Senior Manager**
**Environmental Economics**

Dr. Gretchen Greene has 20 years of diverse economics experience in natural resource, agricultural, and community economics. She works on complicated problems involving society and management of the natural environment. Dr. Greene has expertise in benefit cost analysis ecosystem service valuation; regulatory analysis; recreation and tourism; sustainable economic development; public infrastructure investment; and population projections. Recent interests have focused on risk based decision making in the face of a changing climate. She also brings expertise in econometric analysis, program review, feasibility analyses, National Environmental Policy Act (NEPA), risk perception, Natural Resource Damage Assessment (NRDA), surveys, and data analysis. She has worked with numerous federal, state, tribal and municipal agencies as well as private industrial clients and law firms. Gretchen has considerable litigation support experience including serving as expert witness in forecasting water demand and other topics.

## CONTACT INFORMATION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## EDUCATION

1995-1998
**Ph.D., Food and Resource Economics**
University of Florida, Gainesville, FL, United States

1991-1995
**M.S., Food and Resource Economics**
University of Florida, Gainesville, FL, United States

1977-1982
**B.A., Religion Studies**
Wellesley College, Wellesley, MA, United States

## COURSES/CERTIFICATIONS

American Red Cross Adult CPR and First Aid Training CPR - AED Certification, 2015

## LANGUAGE SKILLS

**English** (mother tongue), Spanish, Setswana

## SELECTED PROJECT EXPERIENCE FOLLOWS

**Benefits and Costs of Nature Based Adaptation to Climate Change – Non Profit Organization**
Worked to evaluate impacts of alternative climate change adaptation strategies. Baseline conditions included an evaluation of how changing climatic conditions would affect the economic value of structures, agriculture, and ecosystem services to the year 2100. Benefits and costs of adaptation strategies were measured by evaluating the same assets under nature-based and engineering-based adaptation alternatives for Ventura County, California. The team worked closely with stakeholders representing city governments, state agencies, emergency managers, and the US Navy.

**Global Water Resources Availability – Agricultural**
Conducted an environmental scan for Driscoll's Berries, evaluating the risks associated with global access to fuel, water, land, and labor over the next 15 to 20 years. The team reviewed global forecasts for availability of these resources and analyzed how changing access might influence decisions to invest in areas throughout the world. Climate change impacts to agricultural production were analyzed in a GIS environment and overlaid with land, labor, and fuel availability.

**Trade Leakage Analysis for Cap and Trade System, California**
Analyzed trade leakage for rare earth mine in Central California for the purpose of establishing initial emission credits under the California cap and trade system designed to comply with AB 32.

**Economic Value of Environmental and Community Benefits from Stewardship Development Strategy, Venice, Florida**
Led a research team to identify and quantify environmental and community benefits associated with an environmentally friendly development design plan. The study identified benefits of the proposed project over and above those that would be realized using conventional development strategy. The proposed project produced additional environmental value through adherence to building and design standards and practices such as Florida Green Building Coalition, Smartgrowth, Low Impact Design (LID), Florida Yards and Neighborhoods, and Leadership in Energy and Environmental Design (LEED). Quantified benefits included improved water and ecological functioning, greater habitat for wildlife, reduced transportation and associated reductions in costs and pollution, improved energy conservation, and healthier lifestyles for citizens.

**Regulatory Analysis of Used Oil Processing and Re-refining in California - Industry**
ENVIRON analyzed the used oil markets in California and the impact California Senate Bill 546 (SB 546) will have on the current market structure. ENVIRON examined which elements of SB 546 would improve waste diversion, collection and ultimate end use of used oil. In addition, ENVIRON examined the environmental impact of used oil and the role re-refining serves in reducing that impact on air quality and energy consumption.

**Economic Feasibility of Camelina Production for Jet Fuel Biomass Feedstock (Altair, LLC) Seattle, Washington**
Dr. Greene evaluated the economic and environmental feasibility of camelina production in the western US for purposes of feedstock for jet fuel energy. The proposed project was submitted for the USDA Biomass Crop Assistance Program (BCAP). The analysis included an economic feasibility determination, including an assessment of location, labor, and infrastructure; a financial feasibility determination based on financial projections and assumptions and cash flows; a sensitivity analysis based on feedstock and energy prices; and an analysis stating that feedstock is the highest and best use of the land and product.

**Environmental and Social Impact Analysis, Oyu Tolgoi Mine, Mongolia**
Dr. Greene evaluated the ecosystem services provided by the Southern Gobi desert to livestock herders and people living in smaller towns (soums). Ecosystem services were evaluated through data collection, and verification through focus groups and on-site interviews with representatives from various demographic groups. Topics covered include pasture quality, water availability, use of plants and wildlife, and other traditional uses of the natural landscape.

**Fargo Moorhead Metropolitan Flood Risk Management Area Draft Feasibility Report and Environmental Impact Statement (Battelle and US Army Corps of Engineers), North Dakota**
Served as economics panel member of external panel review. Dr. Greene reviewed the flood damage assessment model and environmental mitigation for proposed flood protection alternatives for the Fargo Moorhead Metropolitan Area. Comments were reviewed and addressed by the US Army Corps of Engineers prior to publication.

**Savannah Harbor Expansion Project (Battelle and US Army Corps of Engineers), Georgia**
Economics member of external panel review. Dr. Greener reviewed the Savannah Harbor Expansion Project Economic Evaluation, General Reevaluation Report and Transportation Cost and Savings Model. Comments were reviewed and addressed by the US Army Corps of Engineers prior to publication. The review team also reviewed a Tier II EIS for the project including environmental mitigation and enhancement plans.

**Economic Analysis of the Proposed Stream Protection Rule (National Mining Association), Washington D.C.**
Dr. Greene led the ENVIRON team in evaluating the economic impacts of the Office of Surface Mining proposed stream protection rule (SPR) which affects the entire U.S. coal industry. The percent decrease in access to recoverable reserves was determined for both surface and underground mining, and for each of the three regions in the country. For each sector experiencing losses, the ENVIRON team estimated employment impacts, including direct mining jobs placed at risk as well as total jobs at risk. In addition, ENVIRON developed estimates of the overall economic impact including direct, indirect, and induced effects, and the municipal effects from loss of tax revenues.

**Regional Economic Impacts of Wind Power Development, (Palouse Economic Development council), Southeastern Washington**
For the Palouse Economic Development Council in Southeastern Washington, assisted in the analysis of the economic impact of three existing wind power projects in Columbia County. Sources of project impacts being evaluated include wind turbine operation and maintenance jobs, lease payments to landowners, increased visitation to the region, increased tax revenue, and potential effects on property values and recreation. In addition to data collection from project developers and operators, the estimation of these effects includes extensive interviews with local service and retail businesses, government officials (tax assessors, public works directors, land use planners, etc), and community organizations (chamber of commerce, economic development agencies). Based on this data, estimated the increased revenue to all economic sectors directly due to the project and how these direct economic impacts ripple through the economy and translate into total increased economic activity (direct, indirect, and induced effects) in terms of jobs and income.

**Planning Strategies for Revenue Enhancement on the Valles Caldera National Preserve (Valles Caldera Trust), New Mexico**
Managed a project to develop a business plan for the Valles Caldera National Preserve in New Mexico. A variety of ventures are being analyzed for the Preserve, including; mid level lodge with restaurant, high end lodge, campground, cabin rentals, visitor center with gift shop and café, green burial cemetery, and expanding recreational program and visitor tours. Developed an interactive financial model to be used for planning purposes. The interactive model allows board members and preserve staff to adjust model assumptions to view their impact on future cost and return projections.

**Future Water Requirements for Domestic, Commercial, Municipal, and Industrial Purposes on the Flathead Indian Reservation, Upper Columbia Area Office, Montana**
Worked in cooperation with Tribal Consultants to determine the present use and future water requirements for domestic, commercial, municipal, and industrial (DCMI) purposes on the Flathead Indian Reservation in Montana. The work included an economic assessment of future projects and development opportunities. The results will be included in an operational water model of the reservation. Results will also assist in negotiating for a water rights settlement among the tribe, the state of Montana, and the federal government.

**Present Water Use and Future Water Needs for Domestic, Commercial, and Municipal Purposes and Present and Future Comprehensive Ground Water Need by the Lummi Nation on the Lummi Peninsula**
Served as expert witness on the domestic, commercial, and municipal water needs of the Lummi Nation. The work included conducting a population projection, and estimating the future water requirements of the tribe on a per capita basis. Water demand forecasts were used in this study covering the

comprehensive ground water needs of the Lummi Nation. Contributed a socioeconomic analysis of the reservation.

**Feasibility of Marine Terminal on West Hayden Island – Municipality**
Completed an evaluation of the economic gains and losses associated with development of a marine terminal on West Hayden Island for Portland Office of Sustainability and Planning. The effort included assessments of the economic role of Portland Harbor; marine industrial trends; marine site suitability; and land demand. The analysis also informed the Economic Social, Environmental, and Energy (ISEE) analysis completed as part of the city land use plan.

**Tribal Housing and Income in the Pacific Northwest: Unmet Need for American Indians Living Outside Tribal Home States, Pierce County, Washington**
The Alesek Institute conducted a survey of Native Americans in Washington State during 2004-5. Analyzed the results of the survey, including the different types of household structures found among Native Americans. For example, multigenerational households with children, parents, siblings, and grandparents represented one household structure, while several unrelated adults living together another, and households with single parents and young children still another. The analysis compared how household incomes verified by household structure, and also how Indians from Washington State tribes compared with other Indians living in the region.

**Social and Economic Assessment Report, Grand Ronde, Oregon**
Conducted a social and economic assessment of several communities within which the Confederated Tribes of the Grand Ronde (CTGR) operate. Developed, administered, and analyzed results of a 14 page mail survey of over 1,300 Tribal members living in the immediate Grand Ronde area and throughout the nation, as well as non-Tribal members living in the local community. The survey questions were developed based on interviews with dozens of Tribal staff members. Also held a series of workshops with representatives from the Tribe to set-up and use a shared information network to house the most current community data and reports.

**Analytic Techniques for Incorporating Economics into Coastal Climate Change Adaptation**
The Nature Conservancy sought Dr. Greene to analyze existing economic tools to assist in adaptation planning for sea level rise. No single economic tool addresses all the economic impacts of sea level rise, and so it is necessary to understand the capabilities and limitations of available tools. Dr. Greene analyzed the economic metrics, technical expertise required, analytical flexibility, scale of analysis, software requirements, and budget considerations for multiple tools addressing flood damages, regional economic impacts, ecosystem services, and social and community impacts.

**Floodplain Ecosystem Services Valuation for Carson River Valley – Municipal Water District**
Estimated the value of floodplain ecosystem services provided by farmlands that flood in winter. Facing population and development pressures, the water management district was interested in exploring appropriate monetary values to pay farmers for ecosystem services provided by the undeveloped land. Based on actual flood flow data a model was designed to simulate the actual event and then the same event as it might have happened were the floodplain to have been developed. Results demonstrated changes in peak flow speed, volume, and warning time under the two scenarios.

**Economic Analysis of Modified Risk Tobacco Products– Tobacco Industry**
Created an estimate of the benefits in terms of health care cost savings that would be stimulated by the adoption of reduced harm tobacco products by smokers who would otherwise continue to smoke. The estimation process involves processing data from numerous public health sources to estimate health care cost savings by state for Medicaid recipients.

**Water Supply for Future Demand - Municipality**
Oversaw the analysis conducted to identify options to meet future demand for water in Polk County, Oregon. The effort included collection of water use data through interviews with water providers,

reservoir operators, and other stakeholder organizations within the relevant watersheds, and development of a comprehensive database of water use in the region. The information included, among others, source capacity, average daily demand, maximum daily demand, and deficit, where applicable.

**Social and Economic Assessment Report, Grand Ronde, Oregon**
Conducted a social and economic assessment of several communities within which the Confederated Tribes of the Grand Ronde (CTGR) operate. Developed, administered, and analyzed results of a 14 page mail survey of over 1,300 Tribal members living in the immediate Grand Ronde area and throughout the nation, as well as non-Tribal members living in the local community. The survey questions were developed based on interviews with dozens of Tribal staff members. Also held a series of workshops with representatives from the Tribe to set-up and use a shared information network to house the most current community data and reports.

**Comprehensive Economic Development Strategy, White River, Arizona**
Provided support to the White Mountain Apache Tribe, as the Tribe updates their Comprehensive Economic Development Strategy (CEDS). The CEDS is required by the US Economic Development Agency when pursuing grants for economic development. Supported the effort through data collection, economic development project evaluations, and overseeing the document preparations.

**Impacts of Oil and Gas Development on Tropical Colonists and Indigenous Groups**
Led a team providing litigation support to a confidential oil and gas company on potential damage to tropical rainforest land in Latin America. The project involved reviewing the history of Amazonian development in Ecuador, including the colonization effort and the interaction between the indigenous populations, the oil and gas exploration, the government of Ecuador, and the colonial farmers. Economic theory was evaluated and socioeconomic improvements were measured and analyzed using World Bank metrics and econometric tools.

## MEMBERSHIPS

American Water Research Association (AWRA)

Population Association of America (PAA)

Western International Economic Association (WIEA)

American Agricultural Economic Association (AAEA)

# JERI ANNETTE SAWYER

**Manager 8**

Jeri Sawyer is an economist with more than 25 years of experience in energy, water, health, and agricultural economic analysis, including crop, livestock, and ranching analysis, water rights analysis, regional economic and demographic forecasting, utility-level electric load forecasting, renewable energy analysis, and electric rate impact analysis. She is highly proficient in power product cost analysis, pricing and rate formulation. Jeri has proven experience in technical and economic analysis, supporting the Bureau of Indian Affairs and associated Native American Tribes for FERC hydroelectric project relicensing, including development of Section 4(e) conditions, Section 10(a) recommendations, Section 10(e) annual charges and alternative energy/power analyses. In addition, she has increasing experience with recreation demand analysis, recreational site assessments and inventories, economic impact analysis, and population forecasting, much of which has been in support of Native American Tribes. Jeri is highly skilled in health economic analysis, providing support to various clients using modeling and statistical analysis.


## CONTACT INFORMATION

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United States of America


## EDUCATION

1991-1993
**MS, Economics**
Portland State University, Portland, United States

1984-1988
**BS, Agricultural Economics**
Washington State University, Pullman, United States

## PROJECTS

*DEMAND FORECASTING*

**Water Demand/Population Forecasting for Little Colorado River Basin**

Lead economist responsible for the estimation of baseline population, and collection and assessment of additional population data to update previously developed population projection models, using 2000 and 2010 Census data, to forecast future domestic, commercial, municipal, and industrial water requirements for the Hopi Indian Reservation and the Navajo Indian Reservation within the Little Colorado River Basin, Arizona and New Mexico. This information is being used in litigation and negotiation to compare model results to the results used in the settlement agreement related to water right claims on behalf of these tribes.

**San Juan River Basin Economic/Socio Economic Analysis**

Estimated baseline population and collected additional population data to develop a population projection model for the Navajo Indian Reservation within the San Juan River Basin, Arizona and New Mexico to be used to forecast future domestic, commercial, municipal, and industrial water requirements. This information was used to compare model results to the results used in the settlement agreement related to water right claims on behalf of this tribe.

**3 Pueblos Population and Economic Analysis**
Developed, prepared and documented population projections for three Pueblos in New Mexico to support the determination of future domestic, commercial, municipal, and industrial (DCMI) water requirements for each of the pueblos.

*LARGE MODEL DEVELOPMENT*

**Economics of Tobacco Harm Reduction Strategies**
Assisting in developing estimates of health care costs and cost savings related to tobacco harm reduction strategies. This is an ongoing project where she is working on the continued development and enhancement of a model to estimate changes in life tables related to tobacco harm reduction housed within an Access database with output presented in 2-page excel reports.

**The Nature Conservancy, Benefits and Costs of Nature Based Adaptation to Climate Change Ventura, California**
All economic costs and benefits of adaptation alternatives for Ventura County were developed including changes in the ecosystem service levels. Flood and hazard damages were evaluated for over 31,000 parcels in a GIS system, including damages to public infrastructure and agriculture. The team is working closely with stakeholders representing city governments, state agencies, emergency managers, and the US Navy.

*ENERGY ECONOMIC ASSESSMENT*

**Enloe Dam FERC Hydroelectric Dam Relicensing and Energy Analysis**
Provided economic and socioeconomic analysis for the Enloe Dam FERC licensing process for the Okanogan Public Utility District. She developed the power economics and socioeconomic sections of the License Application. Specifically, she collected, compiled and analyzed power cost and revenue data, and developed a socioeconomic impact analysis to Okanogan County with the operation of the project.

**Economic and Energy Analysis for Proposed Wind Project**
Harney County 230-kV Transmission Line and Wind Farm EIS. Jeri provided economic and energy analysis for a transmission line right-of-way (ROW) that will connect a wind power project in Harney County, Oregon to the existing power grid. The co-clients are green energy development firms, Harney Electric Cooperative & Columbia Energy Partners. The preferred ROW path crosses national wildlife refuge lands under the management of the Fish & Wildlife Service and Bureau of Land Management that are under general management plan direction.

**FERC Hydroelectric Dam Relicensing - Pelton**
Serving as overall project manager and provides technical analytical support to the Department of the Interior in economics, recreation and land use, and database and document management, to ensure protection of the trust resources of the Warm Springs Indian Reservation. She oversees and coordinates staff and subcontractors performing studies for a wide variety of disciplines, including fisheries, terrestrial, power engineering, water quality and hydrology, cultural resources, and GIS. She also developed a methodology and price calculations for the sale of allotted reservation land used in the production of power to the Licensees.

**Bristol Bay Assessment**
Provided a detailed review of the socioeconomic components of an EPA draft scientific study document of the Bristol Bay watershed and its natural resources addressing likely effects of the Pebble Mine in Alaska. Specific review components included Existing Conditions and Impact Assessment of Economics of Energy Resources.

**Similkameen River Proposed Hydroelectric Project FERC Study**
Provided economic and flooding analysis for the proposed Similkameen River hydroelectric project FERC study for the Okanogan Public Utility District. Developed the power economics and flooding impact analyses. Collecting, compiling, and analyzing county tax data, and developing an impact analysis to Okanogan County with the operation of the proposed project.

**St. Lawrence River/FDR Power Project FERC Relicensing Study**
Overseeing and coordinating the work of subcontractors from a wide variety of disciplines in the FERC relicensing studies for the St. Lawrence/FDR Project in New York, for which 10(a) recommendations were submitted. Overall project management and provided technical analytical support to the BIA in economics, recreation and land use, and database and document management. Coordinated subcontractors performing studies for fisheries, terrestrial, power engineering, water quality and hydrology, and cultural resources. Deliverables were produced for the Department of the Interior/BIA, with the focus on the protection of the trust resources of the St. Regis Mohawk Tribe Reservation.

**Annual Charges Related to Wisconsin River Headwaters Hydroelectric Project FERC Application**
Developed recommendations for section 10(e) annual charges to be paid to the Lac Vieux Desert Band of the Lake Superior Chippewa Tribe. Conducted a study on the Lac Vieux Desert Indian Reservation in northern Michigan to determine the amount and value of reservation land flooded by the hydroelectric project. Presented recommendations to the Bureau of Indian Affairs, Minneapolis Area Office in 1997.

**Friant Power Authority Impacts**
Provided technical support in the development of analysis of the impact to the Friant Power Authority from various alternative flow regimes of the San Joaquin river. The Friant Project consists of three generators, one on each of the Madera Canal, Friant-Kern Canal, and the San Joaquin river outlet of the Friant Dam. Analyzed the proposed reductions in flow through the two canals as it applies to the Friant Power Authority as a whole as well as to its member districts. Analysis included impacts to power generation at the three power facilities, financial impacts to the Friant Power Authority and its eight member water, irrigation, and municipal utility districts, and the final consumers within the region.

**Licensing Conditions and Annual Charges Related to Cushman Hydroelectric Project FERC Application**
Overseeing and coordinating the work of subcontractors from a wide variety of disciplines and providing economic analysis for the Cushman Hydroelectric Project FERC relicensing project, for the Bureau of Indian Affairs, Northwest Regional Office, ongoing since 1995. Coordinated the development of section 4(e) conditions and developed the recommended 10(e) annual charges for the relicensing of the Cushman Hydroelectric Project, which impacts the Skokomish Indian Reservation in western Washington. Coordinated the work of six subconsultant firms, including experts in fisheries, hydrology, power engineering, geology, sediment transport, wetlands, wildlife, and cultural resources, to address project impacts, including loss of fish habitat and fish passage, flooding, changes in groundwater, changes in wetland and wetland habitat, and impacts on cultural resources.

**West Enfield Hydroelectric Project Operations Modification Assessment**
Responsible for overseeing and coordinating the work of subcontractors from several disciplines. Evaluated the potential impacts of a proposal to raise the dam at the West Enfield Project (FERC Project No. 2600) in Maine, which could cause further flooding of lands of the Penobscot Indian Nation. Based on information provided by GIS analysts, which included the identification and quantification of additional lands and habitat that could potentially be flooded with raising the pool level by one foot or two feet, developed an annual charge for the flooded lands to be paid to the Penobscot Indian Nation and made recommendations to BIA based on this analysis.

### *OTHER RELATED ECONOMIC ANALYSIS*

**Review of Regulatory Impact Assessment of Proposed Air Rule**

Part of a team conducting a review of a Regulatory Impact Assessment (RIA) prepared by the Bureau of Ocean Energy Management (BOEM) for a proposed rule regarding air quality near offshore oil and natural gas production in the Gulf of Mexico. Developed cost calculations for various elements of the Proposed Rule, and critiqued the RIA prepared by BOEM in regards to its estimation of cost and benefit impacts of the proposed Rule. Key Deliverables included Economic Assessment within Specific Sector, Geography, & State, Evaluation of Market Mechanisms, Cost Benefit Analysis, Survey Design, Review of Regulatory Impact Assessment

**Economic Impact Analysis for Colorado Recycling**

Providing economic impact analysis for the Recycling Industry in the State of Colorado. This is an ongoing project which includes gathering data, developing an on-line survey to gather additional non-publicly available data, and using IMPLAN software to analyze the direct, indirect, and induced economic impacts within each county and state-wide. She is responsible for compiling data, using IMPAN software and analyzing the results to develop economic impacts for each county and for the state as a whole.

**Coexistence White Paper**

Assisting in developing research and a resulting white paper regarding the coexistence of various corn types, including the use of, markets for, prices of, regulations of, and stewardship practices for various types of corn such as conventional, organic, and biotechnology (BT) corn.

**Human Use Services Information System**

Assisting in the development of a web-based information management system that compiles, evaluates, and facilitates access to publicly available data, reports, articles, and geospatial information related to baseline ecological and human use services provided within a large water body.

### OTHER ACTIVITIES

**Portland, Oregon – April 2014**

Metro Compost Use: Economic Analysis of Supply, Demand, and Utilization
BioCycle West Conference

**Denver, Colorado – October 2014**

Economic Impacts of Recycling in Colorado
Colorado Association for Recycling Annual Meeting

**Tacoma, Washington – May 2004**

The Importance of Detailed Small Area Population Projections in Local Planning Efforts,
Pacific Northwest Regional Economic Conference

**Boston, Massachusetts – April 2004**

Estimating AIAN Migration on Indian Reservations in the Western United States,
Population Association of America Annual Meeting

**Minneapolis, Minnesota – May 2003**

Projecting Indian Populations for the Purpose of Determining Water Requirements: Methodological Issues
Population Association of America Annual Meeting

# APPENDIX C.4
# FINAL AEA:
# ERRATA TO MITIGATION MONITORING AND REPORTING PLAN

# I. INTRODUCTION

This Errata to the Mitigation Monitoring and Reporting Plan (MMRP) for the Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP Project), previously adopted by the California Department of Fish and Wildlife (CDFW) in December 2010, identifies those changes to the previously adopted MMRP that are necessary to respond to the California Supreme Court's decision in *Center for Biological Diversity v. Cal. Dept. of Fish and Wildlife* (2015) 62 Cal.4th 204.

The MMRP (as revised by this Errata) is required by CDFW as lead agency under CEQA (Pub. Resources Code, Sections 21000 et seq.) for the Project as analyzed in the previously certified 2010 Final EIR (State Clearinghouse No. 2000011025) and this Additional Environmental Analysis (AEA). Specifically, this Errata has been adopted to ensure that the avoidance or mitigation of significant effects as described in the Project's AEA are enforceable. As to global climate change, Mitigation Measures 2-1 through 2-13 contained herein replace and supersede (in full) Mitigation Measures GCC-1 through GCC-7 in the previously adopted MMRP (December 2010). Additionally, the Project Applicant's commitment to the installation of additional electric vehicle charging stations is reflected in this Errata. This Errata also reflects the elimination of BIO-44 and BIO-46 and the addition of new Project Design Features (PDF-3-1 through PDF-3-12) and mitigation measures (3-1a through 3-3f), in light of the Supreme Court's *CBD* decision and Section 2.2 of this document. The new PDFs and mitigation measures ensure that there is no "take" of unarmored threespine stickleback.

As to the greenhouse gas (GHG) emissions-reducing measures, because the Project will facilitate the phased development of a planned community, and because the regulatory and technological frameworks for GHG emissions are rapidly evolving and are expected to continue to do so for decades to come, minor modifications to the mitigation measures presented in this Errata are permitted, but can be made by the applicant or its designee only with the approval of CDFW and the County of Los Angeles Department of Regional Planning (DRP) staff. Following consultation with any other appropriate agencies or departments, CDFW and County DRP staff may determine the adequacy of any minor modifications by evaluating whether the proposal of the applicant or its designee results in equivalent or more beneficial environmental effects, as compared to the original mitigation measures. The minor modifications cannot result in the creation of new or substantially more severe environmental effects; instead, at a minimum, the modifications must achieve equivalent environmental benefits. CDFW and County DRP must render their determination based on the evidentiary record before them, including supporting materials and analyses prepared at the request of the applicant or its designee. The minor modifications procedure, described above, is generally applicable to the Project Design Features and mitigation measures set forth in this Errata and the MMRP adopted by CDFW in 2010.

As required by Public Resource Code section 21081.6(a)(2), the custodian and location of the documents constituting the record of proceedings for the Project are the California Department of Fish and Wildlife, South Coast Region, located at 3883 Ruffin Road, San Diego, California 92123. All inquiries relating to the record should be directed to the South Coast Region at (858) 467-4201.

## ERRATA TO MITIGATION MONITORING AND REPORTING PLAN

| Mitigation Measure | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
|---|---|---|---|
| **The following mitigation measures have been added or deleted, since CDFW's issuance of the original MMRP (December 2010) to address potential impacts to unarmored threespine stickleback, and to comply with the Supreme Court's *CBD* opinion.** | | | |
| **PDF-3-1:** To avoid impacts on the unarmored threespine stickleback, as well as other sensitive fish in the Santa Clara River, no construction activities shall take place in the wetted channel of the Santa Clara River. | CDFW; LA County Dept. of Public Works | **Sub-Notification review by CDFW:** Review of bridge construction plans and pre-construction site conditions.<br>**Field Verification:** Qualified biologists shall be present during any construction activity that takes place in the dry riverbed of the River to ensure that such construction activity does not make contact with or disturb the wetted channel of the River.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County identifying where construction activities in the Santa Clara River have occurred and demonstrating that such activities have not taken place in the wetted channel of the River. | |
| **PDF-3-2:** The construction methods for the two permanent bridges at Commerce Center Drive and Long Canyon Road shall be modified to: (i) reduce the number of bridge piers and include a span between columns supported by piles that accommodates the maximum dry season flow within the Santa Clara River; and (ii) relocate bridge piers to | CDFW; LA County Dept. of Public Works | **Bridge Plan Check.**<br>**Sub-Notification review by CDFW:** Review of bridge construction plans and pre-construction site conditions.<br>**Field Verification:** Prior to construction of bridge piles, the qualified biologist shall confirm the "no water contact construction | |

| Mitigation Measure | | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
|---|---|---|---|---|
| | span the bridge deck across the entirety of the wetted portion of the Santa Clara River channel to allow for a "no water contact construction zone" within the wetted channel and avoid the need for stream diversion or dewatering during construction. | | zone" to ensure that such construction activity does not make contact with or disturb the wetted channel of the River.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County identifying where construction activities in the Santa Clara River have occurred and demonstrating that such activities have not taken place in the wetted channel of the River. | |
| **PDF-3-3:** | To avoid contact with the wetted channels of the Santa Clara River during construction, the span between permanent bridge piers shall increase from the 100-foot span analyzed in the 2010 Final EIR to a minimum of a 165-foot span over the wetted channel. | CDFW; LA County Dept. of Public Works | **Bridge Plan Check**<br>**Sub-Notification review by CDFW:** Review of bridge construction plans. | |
| **PDF-3-4:** | The 165-foot span over the wetted channel shall conform to Caltrans Bridge Design Standards, the County of Los Angeles Department of Public Works geotechnical review requirements, and applicable seismic stability and operational safety standards. | CDFW; LA County Dept. of Public Works | **Bridge Plan Check** | |
| **PDF-3-5:** | The project shall use the full-depth casing method for constructing CIDH shafts for the permanent bridges. | CDFW; LA County Dept. of Regional Planning | **Sub-Notification review by CDFW:** Review of bridge construction plans.<br>**Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction activities adhere to this Project Design Feature. | |

| Mitigation Measure | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
|---|---|---|---|
| | | **Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-6:** All permanent bridge pier and structure construction from within the riverbed ~~and bank stabilization construction work~~ shall be completed during the dry season (defined as June 1 through September 30), and may require multiple construction seasons. | CDFW; LA County Dept. of Regional Planning | **Sub-Notification review by CDFW:** Review of construction schedule.<br>**Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction activities adhere to this Project Design Feature.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-7:** All construction of the permanent bridge decks and subsequent deck work shall occur from the top of the superstructure and no access to the wetted channel of the Santa Clara River shall be allowed for this work to be completed. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction activities adhere to this Project Design Feature.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-8:** With respect to the temporary haul route bridges, all steel pile supports shall be installed and removed when the column and | CDFW; LA County Dept. of | **Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction | |

| Mitigation Measure | | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
|---|---|---|---|---|
| | pile locations are outside of the wetted portion of the Santa Clara River and when there is a clear weather window as predicted by NOAA weather data. A clear weather forecast is defined for this project as a 40 percent or less chance of a 0.1 inch or greater precipitation event within the next 48 hours. Modular bridge decks, and all travel surface materials above the deck, shall be removed from the river prior to November 30 and shall not be installed until after May 1 of each year they are in use, consistent with NOAA weather data. | Regional Planning | activities adhere to this Project Design Feature.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-9:** | Bank stabilization construction at the San Jose Flats area of Mission Village is restricted to June 1 through September 30, because this area is closer to the Santa Clara River wetted channel and to preclude the construction work zone from being inundated by seasonal flood flows. Bank stabilization in locations susceptible to winter flood flows shall be conducted from May 1 through November 30, when winter flood flows typically do not occur on the Santa Clara River. Other bank stabilization areas not at-risk of winter flood flows may be constructed year-round. | CDFW; LA County Dept. of Regional Planning | **Sub-Notification review by CDFW:** Review of construction schedule.<br>**Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction activities adhere to this Project Design Feature.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-10:** | During the concrete pour of the permanent bridge piles, displaced groundwater shall be contained within portable tanks located in the work zone for disposal at a legal disposal site in an upland area. No continuous dewatering or drawdown within the shaft shall occur. Casing water, if any, | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction activities adhere to this Project Design Feature. | |

| Mitigation Measure | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
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| shall be extracted and disposed at a legal disposal site in an upland location. No other construction dewatering associated with installation of the bridges, including temporary haul route bridges, shall occur within the project site. | | **Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-11:** All construction dewatering of seepage water, associated with bank stabilization shall be conducted in a manner that does not create a risk of fish stranding, either through draw down (zone of influence) or by flow discharge creating temporary habitat suitable for unarmored threespine stickleback. | CDFW; LA County Dept. of Regional Planning | **Sub-Notification review by CDFW:** Review of Construction Groundwater Dewatering Plan.<br>**Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure that such construction activities adhere to this Project Design Feature.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such bridge construction activities adhere to this Project Design Feature. | |
| **PDF-3-12:** All long-term maintenance of project facilities on the Santa Clara River shall adhere to timing and work zone restrictions, specifically: (1) maintenance activities shall not take place in the wetted channel of the Santa Clara River; (2) maintenance, repair or replacement of bridge structures requiring access to the riverbed shall be restricted to the period from June 1 to September 30; (3) any dewatering necessary during any maintenance activities shall not create a risk of fish stranding, either through draw | CDFW; LA County Dept. of Public Works | **Field Verification:** Qualified biologist(s) shall be present during bridge maintenance activities to ensure that such maintenance activities adhere to this Project Design Feature.<br>**Reporting:** Applicant/LA County Dept. of Public Works shall prepare and submit maintenance activity reports to CDFW confirming that such bridge maintenance activities adhere to this Project Design Feature. | |

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| | down (zone of influence) or by flow discharge creating temporary habitat suitable for unarmored threespine stickleback, nor shall it involve direct removal of surface water from, or discharge to, the wetted channel of the Santa Clara River. | | | |
| **3-1:**<br><br>3-1a: | The project applicant, or its designated general contractor, shall implement the following measures to avoid contact with the wetted channel, which would avoid affecting unarmored threespine stickleback.<br><br>The project applicant, or its designated general contractor, shall implement the PDFs and regulatory measures as incorporated into the project's bridge and bank stabilization designs. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge and bank stabilization construction activities to ensure that the PDFs and regulatory measures have been implemented as incorporated into the project's bridge and bank stabilization designs.<br><br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that the bridge and bank stabilization PDFs have been implemented per the proposed designs. | |
| 3-1b: | The mandated Worker Environmental Awareness Program (Mitigation Measure BIO-52 from the 2010 Final EIR) shall include a discussion regarding restriction of access to the wetted channel of the Santa Clara River and repercussions if encroachment occurs. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge and bank stabilization construction activities to ensure that all workers receive instruction regarding restricted access to the wetted channel of the Santa Clara River and the repercussions if encroachment occurs. | |

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| | | | **Reporting:** Applicant shall prepare and submit reports to the County demonstrating that all workers involved in bridge construction and/or bank stabilization installation have received instruction and warnings as required by this mitigation measure. | |
| 3-1c: | Prior to the commencement of construction activities, a qualified biologist shall survey the proposed work locations to confirm that the construction zone is outside the wetted channel of the river and that no work takes place where fish may be affected. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present at bridge and bank stabilization construction zones to ensure that such zones are outside the wetted channel of the River and that no work takes place where fish may be affected. **Reporting:** Applicant shall prepare and submit reports to CDFW and the County demonstrating that all conditions of this mitigation measure have been met satisfactorily. | |
| 3-1d: | During permanent bridge construction, a qualified biologist shall monitor all activities that are a threat to adjacent natural habitats or nearby species and prevent equipment, personnel, or debris from entering or making contact with the wetted channel of the river. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present at bridge construction zones to ensure no equipment, personnel or debris enter or makes contact with the wetted channel of the River. **Reporting:** Applicant shall prepare and submit reports to CDFW and the County demonstrating that all conditions of this mitigation measure have been met satisfactorily. | |
| 3-1e: | A clear weather window, defined for this project as a ~~less than~~ 40 percent chance or | CDFW; LA County | **Field Verification:** Qualified biologist(s) shall obtain and consult daily weather | |

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| | <u>less</u> of 0.10 inches or greater of precipitation in the next 48 hours as forecasted by NOAA, shall be required for the scheduling of any bridge or bank stabilization-related concrete pours. If a bridge or bank stabilization-related concrete pour is in progress, and an un-forecasted rain event occurs, bridge or bank stabilization-related concrete pours shall be suspended. | Dept. of Regional Planning | forecasts and verify a 72-hour clear weather window for all construction activities. During a defined storm event, the qualified biologist shall confirm that no bridge or bank stabilization-related concrete pours are being installed.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County demonstrating that no bridge pier installation took place during defined storm events. | |
| 3-1f: | During all storm events (including summer rains), a monitor shall inspect work sites to make sure that site is secure and that flooding does not cause tarps to break or diversion drains to become plugged, potentially allowing construction materials and debris to flow into the river. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** During all storm events, a monitor shall inspect work sites to ensure flooding does not cause tarps to break or diversion drains to become plugged, potentially allowing construction materials and debris to flow into the River.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that such site inspections took place during storm events and that no construction material or debris entered the River. | |
| 3-1g: | Precautionary spill containment devices shall be deployed and maintained during any pouring of concrete related to the bridge structure where released materials or storm water runoff that may have come in contact with uncured concrete could be released to the wetted channel of the Santa Clara River. Containment may be integrated into | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during any construction activity that takes place in the dry riverbed of the River to ensure that spill containment devices have been deployed and that no uncured concrete or other | |

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| | the K-rail barrier along the perimeter of the Work Zone or may be underslung or integrated into the bridge structure itself (such as storm drain system for the roadway that is directed to a water quality treatment facility within the development areas north or south of the bridge crossing). | | materials are discharged or released into the wetted channel of the River.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County demonstrating that spill containment devices have been deployed and that no uncured concrete or other materials have been discharged or released to the wetted channel of the River. | |
| 3-1h: | A K-rail construction barrier shall be deployed between the bridge construction work zone and the wetted channel of the Santa Clara River. A discussion of access restrictions shall be included in the required Worker Environmental Awareness Program training (Mitigation Measure BIO-52 from the 2010 Final EIR). | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge construction activity to ensure that K-rail construction barrier is deployed as required by this mitigation measure.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County demonstrating that K-rail barriers have been deployed as required by this mitigation measure. | |
| 3-1i: | Spill containment shall be deployed and maintained during CIDH pile construction, bridge column construction, cast-in-place girder construction, bridge deck pours, and any other pouring of concrete related to the bridge structure where released materials or storm water runoff that may have come in contact with uncured concrete could be released to the wetted channel of the Santa Clara River. Containment shall be integrated into the K-rail barrier along the | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure spill containment as required in this mitigation measure.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that during bridge construction activities the spill containment requirements set forth in this mitigation measure have been fulfilled. | |

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| | perimeter of the work zone or underslung tarp or integrated into the bridge structure itself (such as storm drain system for the roadway that is directed to a water quality treatment facility within the development areas north or south of the bridge crossing). | | | |
| 3-1j: | To prevent construction debris from falling into the Santa Clara River during installation of bridge decks, the deck areas shall be fitted with an under-slung debris tarp, debris platform, or equivalent protection, extending at least 50 feet beyond the width of the wetted channel. The project applicant or its designee shall perform periodic maintenance and inspection to confirm that the debris catchment system is performing correctly. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bridge construction activities to ensure construction debris prevention has been implemented as required by this mitigation measure.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that during bridge construction activities the construction debris prevention requirements of this mitigation measure have been fulfilled. | |
| 3-1k: | To ascertain that water quality is not being affected by bridge and bank stabilization-related concrete pouring activities, the project applicant or its designee shall monitor the water quality at points, upstream, downstream, and immediately adjacent to the ~~bridge~~ construction work zone daily during concrete pouring operations and report the results monthly, or | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified water quality technician(s) shall be present during bridge construction activities to ensure water quality monitoring as required by this mitigation measure. In addition, if the monitoring data show that pH levels have changed more than 0.5 units from the naturally occurring variation or have fallen outside the range of 6.5 to 8.5,[1] the applicant shall immediately cease | |

1 These thresholds are derived from the Los Angeles Regional Water Quality Control Board's Basin Plan.

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| | as directed, to CDFW. Key parameters to be monitored include pH and turbidity. | | concrete-related construction work on the proposed bridge and within 24 hours inform CDFW and the County. Concrete-related construction work shall not resume until conditions return to the ranges indicated above or until CDFW determines such work may recommence without adversely affecting fish or other biological resources.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that during bridge construction activities the water quality monitoring requirements of this mitigation measure have been fulfilled. | |
| 3-1I: | All bridge maintenance and repair activities, as described in the RMDP Maintenance Manual, that have the potential to affect the wetted channel of the Santa Clara River shall adhere to the dry season window, as defined for this project, as June 1 through September 30, and shall completely avoid the Santa Clara River wetted channel when performing maintenance activities. All measures implemented during original bridge construction shall also be implemented to avoid accidental contact, spills, or falling debris into the wetted channel. In the future, if the wetted portion of the Santa Clara River shifts in location (for example, in response to a flood event | CDFW; LA County Dept. of Public Works | **Field Verification:** Qualified biologist(s) shall be present during bridge maintenance and repair activities to ensure that (i) such activities take place only during the dry season window as defined in this mitigation measure, and (ii) all required measures to prevent accidental contact, spills or falling debris into the wetted channel have been implemented.<br>**Reporting:** Applicant/LA County Dept. of Public Works shall prepare and submit maintenance activity reports to CDFW confirming bridge maintenance and repair | |

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| | that alters the ~~geomorphology of the channel~~ wetted channel alignment), all maintenance and repair activities shall also be required occur outside of the wetted channel. | | activities comply with the conditions of the mitigation measure. | |
| **3-2:** | The project applicant, or its designated general contractor, shall implement the following measures to avoid unarmored threespine stickleback. | See above. | See respective entries above for enumerated mitigation measures. | |
| 3-2a: | Implement Mitigation Measure 3-1a, 3-1b, ~~3-1e,~~ and 3-1f. | | | |
| 3-2b: | Prior to the commencement of construction activities, a qualified biologist shall survey the proposed work locations to confirm that the construction zone is outside the wetted channel of the river, that the proposed vibratory pile installation locations are at least 10 feet away from the wetted channel, and that no work takes place where unarmored threespine stickleback may be affected. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during temporary bridge construction to ensure that proposed work locations are outside the wetted channel of the River, that the proposed vibratory pile installation locations are at least 10 feet from the wetted channel, and that no work takes where unarmored threespine stickleback may be affected.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that temporary bridge construction activities comply with the conditions of the mitigation measure. | |
| 3-2c: | Vibratory piles for the temporary haul route bridges shall be installed no closer than 10 feet to the wetted channel of the Santa Clara River, as determined by survey at the | CDFW; LA County Dept. of | **Field Verification:** Qualified biologist(s) shall be present during temporary bridge construction to ensure that the proposed vibratory piles are installed and removed | |

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| | time piles are to be installed, and shall only be removed by vibratory methods if the wetted channel is at least 10 feet away. | Regional Planning | only during times when the wetted channel is at least 10 feet away.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that temporary bridge construction activities comply with the conditions of the mitigation measure. | |
| 3-2d: | No construction activities or personnel shall occur near the edge of the wetted channel that would have potential to destabilize low flow channel bank. A set-back from the edge of the top of bank for a horizontal distance that is twice the bank height (2 horizontal: 1 vertical) shall be maintained to prevent collapsing the bank of the low flow channel. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during temporary bridge construction activities to ensure that such activities do not destabilize the low flow channel bank and that the setback required by this mitigation measure is maintained.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that temporary bridge construction activities comply with the conditions of the mitigation measure. | |

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| 3-2e: During temporary haul route bridge construction and demobilization, a qualified biologist shall monitor all activities that are a threat to adjacent natural habitats or nearby species and prevent equipment, personnel, or debris from entering or making contact with the wetted channel of the river. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during temporary bridge construction activities to ensure that no equipment, personnel or debris enter or makes contact with the wetted channel of the River.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that temporary bridge construction activities comply with the conditions of the mitigation measure. | |
| **3-3**: The project applicant or its designated contractor shall implement the following measures:<br>3-3a: Implement Mitigation Measure 3-1a, 3-1b, 3-1e, ~~and~~ 3-1f, and 3-1k. | See above. | See respective entries above for enumerated mitigation measures. | |
| 3-3b: Prior to the commencement of bank stabilization construction activities, a qualified biologist shall survey the proposed work locations to confirm that the construction zone is outside the wetted channel of the river, that construction BMPs are installed prior to construction, and that no work takes place where fish may be affected. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bank stabilization construction activities to ensure that (i) the construction zones are outside the wetted channel of the River, (ii) construction BMPs have been installed prior to construction, and (iii) no work takes place where fish may be affected.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that bank stabilization construction activities | |

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| | | | comply with the conditions of this mitigation measure. | |
| 3-3c: | Bank stabilization construction at the San Jose Flats area of Mission Village is restricted to the dry season, as defined as between June 1 and September 30 to preclude the construction work zone from being inundated by seasonal flood flows. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bank stabilization construction activities at the San Jose Flats area to ensure that such activities take place only during the dry season as defined in this mitigation measure.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that bank stabilization construction activities comply with the conditions of this mitigation measure. | |
| 3-3d: | Bank stabilization construction locations susceptible to winter flood flows shall be conducted from May 1 through November 30, when winter flood flows do not occur on the Santa Clara River. Other bank stabilization areas not at risk of flood flows shall be constructed year-round. | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bank stabilization construction activities to ensure that such activities take place only during the period set forth in this mitigation measure.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that bank stabilization construction activities comply with the conditions of this mitigation measure. | |
| 3-3e: | Although a late-spring or early fall flood event is not expected to occur, the project applicant or its designated contractor shall implement Perimeter Best Management Practices, as required under the Environmental Protection Agency's | CDFW; LA County Dept. of Regional Planning | **Field Verification:** Qualified biologist(s) shall be present during bank stabilization construction activities to ensure that the applicant or its designee implements the Perimeter Best Management Practices as described in this mitigation measure. | |

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| | Construction National Pollutant Discharge Elimination System permit, which would deflect minor flows (less than 12 inches deep, and less than ~~15~~ 8 fps velocities) from entering bank protection construction work zones. | | **Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that the applicant or its designee implements the Perimeter Best Management Practices as described in this mitigation measure. | |
| 3-3f: | The project applicant or its designee shall develop a Construction Groundwater Dewatering Plan for those areas (i.e., bank stabilization areas) in close proximity to stream flow and submit to CDFW for approval. The plan shall include the following measures and be conducted during construction groundwater dewatering activities:<br>◢ Operational restriction on dewatering addressed in the 2010 Final EIR require that any dewatering be conducted in a manner that does not affect river flow, and these same restrictions shall be observed going forward. Bank stabilization dewatering shall be implemented in a manner that (1) does not create temporary wetted channel habitat suitable for stickleback; (2) does not diminish existing river flow, and therefore does not result in stranding of unarmored threespine stickleback or other fish; and (3) does not introduce pollutants to surface waters.<br>◢ Dewatering activities shall not involve direct removal of surface water from, or discharge to the Santa Clara River. Nor shall such | CDFW; LA County Dept. of Regional Planning | **Sub-Notification review by CDFW:** Review of Construction Groundwater Dewatering Plan.<br>**Field Verification:** Qualified biologist(s) shall monitor the construction dewatering requirements of this mitigation measure.<br>**Reporting:** Applicant shall prepare and submit mitigation monitoring reports to CDFW and the County confirming that the construction dewatering requirements of this mitigation measure have been fulfilled. | |

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| activities result in any draw-down of the river's flow such that fish may become stranded. Any groundwater discharges shall be directed to an appropriate and legal disposal site in an upland area that will not affect the surface elevation of the wetted channel of the Santa Clara River.<br>◢ The project applicant or its designee shall assess local stream and groundwater conditions, including flow depths, groundwater elevations, and anticipated dewatering cone of influence (radius of draw down).<br>◢ The project applicant or its designee shall monitor daily surface water elevations upstream, adjacent to, and downstream of the extraction points, to assess any critical flow regimes susceptible to excessive draw down before, during, and after groundwater dewatering activities. The designated monitor shall have the authority to halt dewatering activities if water levels decrease in the wetted portion of the Santa Clara River where unarmored threespine stickleback are present. <u>In the event the designated monitor observes an effect on the wetted channel that necessitates halting of dewatering operations, the applicant will be required to consult with CDFW, revise the Construction Groundwater Dewatering Plan as appropriate, and implement whatever additional restrictions may be</u> | | | |

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| necessary to preclude impact to the wetted channel (such as limiting the extent of excavation dewatering, implementing other construction methods acceptable to the Los Angeles County Department of Public Works such as launch stone, or suspending construction until such time as regional groundwater conditions are more favorable for the construction to proceed).<br>◢ The project applicant or its designee shall monitor surface water elevations downstream of the project location to assess any flow regimes and overbank areas that may be susceptible to flooding.<br>◢ The project applicant or its designee shall monitor upland discharge locations for potential channel erosion from dewatering discharge, and appropriate BMPs must be implemented to prevent excessive erosion or turbidity in the discharge.<br>◢ Monitoring reports shall be summarized and provided to CDFW upon completion of construction activities that required dewatering. | | | |
| ~~**BIO-44:** Temporary bridges, culvert crossings, or other feasible methods of providing access across the river shall be constructed outside of the winter season and not during periods when spawning is occurring. Prior to the construction of any temporary or permanent crossing of the Santa Clara~~ | ~~CDFW~~ | ~~**Plan Requirements:** A Stream Crossing and Diversion Plan that complies with requirements specified by this measure shall be prepared and submitted to USFWS and CDFG. Required follow-up procedures to be conducted prior to construction period.~~ | |

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| ~~River, the applicant shall develop a Stream Crossing and Diversion Plan. The plan shall include the following elements: the timing and methods for pre-construction aquatic species surveys; a detailed description of the diversion methods (*e.g.*, berms shall be constructed of on-site alluvium materials of low silt content, inflatable dams, sand bags, or other approved materials); special-status species relocation; fish exclusion techniques, including the use of block netting and fish relocation; methods to maintain fish passage during construction; channel habitat enhancement, including the placement of vegetation, rocks, and boulders to produce riffle habitat; fish stranding surveys; and the techniques for the removal of crossings prior to winter storm flows. The Plan shall be submitted to the USFWS and CDFG for approval at least 30 days prior to implementation.~~<br><br>~~If adult special-status fishes are present and spawning has not occurred, they shall be relocated prior to the diversion or crossing. Block nets of 1/8-inch woven mesh will be set upstream and downstream. On days with possible high temperature or low humidity (temperatures in excess of 80° F), work will be done in the early morning hours, as soon as sufficient light is available, to avoid~~ | | ~~**Reporting:** Submit Stream Crossing and Diversion Plan to CDFG at least 30 days prior to implementation.~~ | |

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| | ~~exposing fishes to high temperatures and/or low humidity. If high temperatures are present, the fishes will be herded to downstream areas past the block net. Once the fishes have been excluded by herding, a USFWS staff member or his or her agents shall inspect the site for remaining or stranded fish. A USFWS staff member or his or her agents shall relocate the fish to suitable habitat outside the Project area (including those areas potentially subject to high turbidity). During the diversion/relocation of fishes, the USFWS or his or her agents shall be present at all times.~~ | | | |
| **~~BIO-46:~~** | ~~During any stream diversion or culvert installation activity, a qualified biologist(s) shall be present and shall patrol the areas within, upstream, and downstream of the work area. The biologists shall inspect the diversion and inspect for stranded fish or other aquatic organisms. Under no circumstances shall the unarmored threespine stickleback be collected or relocated, unless USFWS personnel or their agents implement this measure. Any event involving stranded fish shall be recorded and reported to CDFG and USFWS within 24 hours.~~ | ~~CDFG~~ | **~~Measure Implementation:~~** ~~Specified monitoring activities to be conducted during stream diversion and culvert installation. Required follow-up procedures to be conducted throughout construction period.~~<br>**~~Reporting:~~** ~~Submit reports annually (by April 1) to CDFG until success criteria are met. Report to CDFG within 24 hours of finding stranded fish.~~ | |

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| **The following mitigation measures replace and supersede in full mitigation measures GCC-1 through GCC-7 located on pages 134 through 136 of the December 2010 MMRP, and are consistent with the South Coast Air Quality Management District's locational preferences for GHG mitigation by securing emissions reductions on the Project site, within the Santa Clarita Valley and County of Los Angeles, and within and outside of the State of California.** | | | |
| **2-1:** Prior to the issuance of residential building permits for the project or a portion of the project, the project applicant or its designee shall submit one or more ~~a~~ Zero Net Energy Confirmation (ZNE) Reports (ZNE Report) prepared by a qualified building energy efficiency and design consultant to Los Angeles County for review and ~~approval~~ confirmation that the residential development covered by the ZNE Report achieves the ZNE standard specified in this mitigation measure. Specifically, a ~~The~~ ZNE Report shall demonstrate that the residential development within the RMDP/SCP project site subject to application of Title 24, Part 6, of the California Code of Regulations has been designed and shall be constructed to achieve ZNE, as defined by CEC in its 2015 Integrated Energy Policy Report, which requires the value of the net energy produced by project renewable energy resources to equal the value of the energy consumed annually by the project using the CEC's Time Dependent Valuation metric ~~or otherwise achieve an equivalent level of energy efficiency, renewable energy generation, or greenhouse gas emissions savings~~.<br><br>A ZNE Report shall provide, at a minimum, the following information ~~may, but is not required to~~: | LA County Dept. of Public Works and Dept. of Regional Planning | **Measure Implementation:** Submit ZNE Report for County review and confirmation prior to issuance of residential building permits.<br><br>An energy efficiency and design consultant is qualified to prepare a ZNE Report if the consultant is a Certified Energy Analyst, as established by the California Association of Building Energy Consultants, or, alternatively, has similar qualifications as confirmed by staff for the County of Los Angeles. | |

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| ◢ Confirmation that the residential development shall comply with Title 24, Part 6 building standards that are operative at the time of building permit application.<br><br>◢ Identification of additional measures or building performance standards that shall be relied upon to achieve the ZNE standard (as defined above), assuming ZNE is not already achieved by meeting the operative Title 24, Part 6 building standards.<br><br>In demonstrating that the residential development achieves the ZNE standard, the ZNE Report may:<br><br>◢ Evaluate multiple buildings and/or land use types. For example, a ZNE Report may cover all of the residential and ~~commercial~~ non-residential buildings within a neighborhood/community, or a subset thereof, including an individual building.<br><br>◢ Rely upon aggregated or community-based strategies to support its determination that the subject buildings are designed to achieve ZNE. For example, shortfalls in renewable energy generation for one or more buildings may be offset with excess renewable generation from one or more other buildings~~, or off-site renewable energy generation~~. As such, a ZNE Report could determine a building is designed to achieve ZNE based on aggregated or community- | | | |

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| based strategies even if the building on its own may not be designed to achieve ZNE.<br>◢ Make reasonable assumptions about the estimated electricity and natural gas loads and energy efficiencies of the subject buildings.<br>◢ If interconnection of the project's renewable generation is not sufficient to allow compliance with the ZNE standard for the project, or a portion of the project, then Los Angeles County shall allow the project applicant or its designee to achieve an equivalent level of GHG emissions reductions to mitigate such shortfall by providing 5.1 MT $CO_2e$ of GHG reductions for every megawatt-hour of renewable energy generation that would have been needed to achieve the ZNE standard for the project, or a portion of the project, as demonstrated in the ZNE Report. | | | |
| **2-2:** Prior to the issuance of building permits for commercial development and private recreation centers, and prior to the commencement of construction for the public facilities, respectively, for the project or a portion of the project the project applicant or its designee shall submit one or more ~~a~~ Zero Net Energy Confirmation Reports (ZNE Report) prepared by a qualified building energy efficiency and design consultant to Los Angeles County for review and confirmation that the commercial development, private recreation centers, and/or | LA County Dept. of Public Works and Dept. of Regional Planning | **Measure Implementation:** Submit ZNE Report for County review and confirmation prior to issuance of building permits for commercial development and private recreation centers, and prior to the commencement of construction for the public facilities.<br>An energy efficiency and design consultant is qualified to prepare a ZNE Report if the consultant is a Certified | |

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| public facilities covered by the ZNE Report achieve the ZNE standard specified in this mitigation measure ~~approval~~. Specifically, a ~~The~~ ZNE Report shall demonstrate that the commercial development, private recreation centers, and public facilities within the RMDP/SCP project site subject to application of Title 24, Part 6, of the California Code of Regulations have been designed and shall be constructed to achieve ZNE, as defined by CEC in its 2015 Integrated Energy Policy Report, which requires the value of the net energy produced by project renewable energy resources to equal the value of the energy consumed annually by the project using the CEC's Time Dependent Valuation metric ~~or otherwise achieve an equivalent level of energy efficiency, renewable energy generation, or GHG gas emissions savings~~.<br><br>("Commercial development" includes retail, light industrial, office, hotel, and mixed-use buildings. "Public facilities" are fire stations, libraries, and elementary, middle/junior high and high schools.)<br><br>A ZNE Report shall provide, at a minimum, the following information ~~may, but is not required to~~:<br><br>◢ Confirmation that the commercial development, private recreation centers, and/or public facilities shall comply with Title 24, Part 6 building standards that are | | Energy Analyst, as established by the California Association of Building Energy Consultants, or, alternatively, has similar qualifications as confirmed by staff for the County of Los Angeles. | |

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| operative at the time of building permit application.<br><br>◢ Identification of additional measures or building performance standards that shall be relied upon to achieve the ZNE standard (as defined above), assuming ZNE is not already achieved by meeting the operative Title 24, Part 6 building standards.<br><br>In demonstrating that the commercial development, private recreation centers, and/or public facilities achieves the ZNE standard, the ZNE Report may:<br><br>◢ Evaluate multiple buildings and/or land use types. For example, a ZNE Report may cover all of the residential and non-residential buildings within a neighborhood/community, or a subset thereof, including an individual building.<br><br>◢ Rely upon aggregated or community-based strategies to support its determination that the subject buildings are designed to achieve ZNE. For example, short falls in renewable energy generation for one or more buildings may be offset with excess renewable generation from one or more other buildings~~, or off-site renewable energy generation~~. As such, a ZNE Report could determine a building is designed to achieve ZNE based on aggregated or community- | | | |

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| based strategies even if the building on its own may not be designed to achieve ZNE.<br>◢ Make reasonable assumptions about the estimated electricity and natural gas loads and energy efficiencies of the subject buildings.<br>◢ <u>If interconnection of the project's renewable generation is not sufficient to allow compliance with the ZNE standard for the project, or a portion of the project, then Los Angeles County shall allow the project applicant or its designee to achieve an equivalent level of GHG emissions reductions to mitigate such shortfall by providing 5.1 MT $CO_2$e of GHG reductions for every megawatt-hour of renewable energy generation that would have been needed to achieve the ZNE standard for the project, or a portion of the project, as demonstrated in the ZNE Report.</u> | | | |
| **2-3:** Prior to the issuance of private recreation center building permits, the project applicant or its designee shall submit swimming pool heating design plans to Los Angeles County for review and approval. The design plans shall demonstrate that all swimming pools located at private recreation centers on the RMDP/SCP project site have been designed and shall be constructed to use solar water heating or other technology with an equivalent level of energy efficiency. | LA County Dept. of Public Works | **Measure Implementation:** Submit swimming pool heating design plans for County review and approval prior to issuance of building permit for private recreation center. | |

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| **2-4:** Prior to the issuance of residential building permits, the project applicant or its designee shall submit building design plans, to Los Angeles County for review and approval, which demonstrate that each residence within the RMDP/SCP project site subject to application of Title 24, Part 6, of the California Code of Regulations shall be equipped with a minimum of one single-port electric vehicle (EV) charging station. Each charging station shall achieve a similar or better functionality as a Level 2 charging station.<br><br>Additionally, prior to the issuance of the first building permit for the RMDP/SCP project site, the project applicant or its designee shall establish and fund a dedicated account for the provision of subsidies for the purchase of ZEVs, as defined by ARB. The project applicant or its designee shall provide proof of the account's establishment and funding to Los Angeles County.<br><br>The dedicated account shall be incrementally funded, for each village-level project, in an amount that equals the provision of a $1,000 subsidy per residence – on a first-come, first-served basis – for <u>65</u> ~~50~~ percent of the village's total residences subject to application of Title 24, Part 6, of the California Code of Regulations. | LA County Dept. of Public Works and Dept. of Regional Planning | **Measure Implementation:** As to the charging stations, submit building design plan for review and approval prior to issuance of residential building permits.<br><br>As to the subsidies, the Project applicant or its designee shall submit proof of the establishment and funding of a dedicated account for the administration of the subsidies to the County prior to the issuance of the first building permit for the RMDP/SCP Project site. The dedicated account shall be funded incrementally, prior to the issuance of residential building permits for each village-level project in an amount that equals the provision of subsidies for 65 percent of the village's total residences; e.g., for a village with 1,444 residential dwelling units, the Project applicant or its designee would have a $938,600 funding obligation [(1,444 units x 0.65) x ($1,000)], which equates to a $650 per dwelling unit funding obligation. Specifically, prior to the issuance of residential building permits, the Project applicant or its designee shall provide proof of payment in an amount that directly relates to the number of residential units being permitted at that time.<br><br>The dedicated account shall be administered by the Project's | |

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| | | Transportation Management Organization (see Mitigation Measure 2-6), which shall be responsible for marketing and promoting the availability of the purchase subsidies to each village's residences, and tracking the uptake (i.e., utilization) of the subsidies.<br><br>In the event that the account is not depleted after occupancy of the final residential dwelling unit, the Project applicant or its designee, which may include the Transportation Management Organization or its equivalent management entity, shall coordinate with the Los Angeles County Planning Director and secure the Planning Director's approval of one or more strategies that secure an equivalent level of GHG emissions reductions. For purposes of calculating the greenhouse gas emissions reductions required to demonstrate equivalency, each un-used subsidy shall equal 3.89 MT $CO_2e$ reductions per year. The Project applicant or its designee shall be permitted to utilize any unused subsidy funding for purposes of achieving this equivalency requirement. | |
| **2-5:** Prior to the issuance of commercial building permits, the project applicant or its designee shall submit building design plans, to Los Angeles County, which demonstrate that the parking areas for commercial buildings on the RMDP/SCP project site shall be equipped with | LA County Dept. of Public Works and Dept. of | **Measure Implementation:** Submit building design plan for County review and approval prior to issuance of commercial building permits. | |

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| | EV charging stations that provide charging opportunities to 7.5 percent of the total number of required parking spaces. ("Commercial buildings" include retail, light industrial, office, hotel, and mixed-use buildings.)<br><br>The EV charging stations shall achieve a similar or better functionality as a Level 2 charging station. In the event that the installed charging stations use ~~more superior~~ functionality/technology other than Level 2 charging stations, the parameters of the mitigation obligation (i.e., number of parking spaces served by EV charging stations) shall reflect the comparative equivalency of Level 2 charging stations to the installed charging stations on the basis of average charge rate per hour. For purposes of this equivalency demonstration, Level 2 charging stations shall be assumed to provide charging capabilities of 25 range miles per hour. | Regional Planning | | |
| **2-6:** | The project applicant-submitted Newhall Ranch Transportation Demand Management Plan (TDM Plan), located in ~~Technical Report~~ Final AEA Appendix 7 ~~contained in AEA Appendix 1~~, shall be implemented to reduce VMT resulting from project build out with oversight from Los Angeles County. The TDM Plan is designed to influence the transportation choices of residents, students, employees, and visitors, and serves to enhance the use of alternative | LA County Dept. of Public Works and Dept. of Regional Planning | **Measure Implementation:** A copy of the Newhall Ranch TDM Plan is contained within Final AEA Appendices 7 and 8. Implementation of the TDM Plan shall proceed in accordance with the provisions outlined in the plan, and shall be required by the County's condition of approval that itself requires implementation of this MMRP. Additionally, monitoring and | |

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| transportation modes both on and off the project site through the provision of incentives and subsidies, expanded transit opportunities, bikeshare and carshare programs, technology-based programs, and other innovative means. Village-level implementation ~~Implementation~~ of relevant elements of the TDM Plan ~~will be included as a condition of approval~~ shall proceed in accordance with village-level applicability supplements prepared by a qualified transportation engineer that are reviewed and considered by Los Angeles County when approving tentative subdivision maps for land developments that are part of the project.<br><br>Accordingly, the TDM Plan identifies key implementation actions that are critical to the effectiveness of the VMT-reducing strategies, as well as timeline and phasing requirements, monitoring standards, and performance metrics and targets tailored to each of the strategies.<br><br>In accordance with the TDM Plan, a non-profit Transportation Management Organization (TMO) or equivalent management entity shall be established to provide the services required, as applicable. | | implementation of the Newhall Ranch TDM Plan shall proceed in accordance with village-level applicability supplements to the TDM Plan, which shall be prepared and presented to the County in conjunction with the development of village-level CEQA documentation.<br><br>The Newhall Ranch TDM Plan includes the provision of subsidies for the purchase of neighborhood electric vehicles (NEVs) and electric bikes (E-Bikes). The Newhall Ranch Transportation Management Organization or equivalent management entity shall be responsible for marketing and promoting the availability of the NEV and E-Bike purchase subsidies to each village's residences, and tracking the uptake (i.e., utilization) of the subsidies.<br>In the event that the NEV and E-Bike subsidies are not fully utilized after occupancy of the final residential dwelling unit, the Project applicant or its designee, which may include the Transportation Management Organization or its equivalent entity, shall coordinate with the Los Angeles County Planning Director and secure the Planning Director's approval of one or more strategies that secure an equivalent level of GHG emission reductions. For purposes of calculating the greenhouse gas emissions reductions required to demonstrate equivalency, each | |

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| | | un-used NEV purchase subsidy shall equal 2.7 MT $CO_2$e reductions per year and each un-used E-Bike purchase subsidy shall equal 0.9 MT $CO_2$e reductions per year. The Project applicant or its designee shall be permitted to utilize any unused subsidy funding for purposes of achieving this equivalency requirement. | |
| **2-7:** Prior to the issuance of traffic signal permits, the project applicant or its designee shall work with Los Angeles County and the California Department of Transportation (Caltrans), as applicable, to facilitate traffic signal coordination along:<br>◢ State Route 126 from the Los Angeles County line to the Interstate 5 north-bound ramps;<br>◢ Chiquito Canyon Road, Long Canyon Road, and Valencia Boulevard within the RMDP/SCP project site;<br>◢ Magic Mountain Parkway from Long Canyon Road to the Interstate 5 north-bound ramps; and<br>◢ Commerce Center Drive from Franklin Parkway to Magic Mountain Parkway.<br>To effectuate the signal synchronization and specifically the operational and timing adjustments needed at affected traffic signals, the project applicant or its designee shall submit | LA County Dept. of Public Works/Cal. Dept. of Trans. | **Measure Implementation:** The Project applicant or its designee shall submit traffic signal plan(s) for County or Caltrans review and approval, as applicable, and/or pay applicable fees as needed for signal operations and timing adjustments to affected traffic signals prior to traffic signal permit issuance. | |

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| traffic signal plans for review and approval, and/or pay needed fees as determined by Los Angeles County or Caltrans, as applicable.<br><br>A majority of the signals that will be synchronized will be new signals constructed/installed by the project. Thus, for these signals, the project will provide the necessary equipment at the signal controller cabinet, as well as within the new roadways themselves, to enable and facilitate synchronization. The project is responsible for paying 100 percent of the applicable fee amount for the signal synchronization work, with assurance that the necessary funding will be available to fully implement this measure. | | | |
| **2-8:** Consistent with the parameters of the Newhall Ranch TDM Plan, the project applicant or its designee shall provide Los Angeles County with proof that funding has been provided for the purchase, operation and maintenance of ~~electric~~ <u>zero emission</u> school buses in furtherance of the school bus program identified in the project's TDM Plan. The proof of funding shall be demonstrated incrementally as the school bus program is paced to village-level occupancy and student enrollment levels. | LA County Dept. of Regional Planning | **Measure Implementation:** See Mitigation Measure 2-6, above.<br><br>Provide the County with proof of payment per the standards established in the TDM Plan for the administration of the school bus program; the funding shall be made available incrementally as the school bus program is paced to village-level occupancy and student enrollment levels. | |
| **2-9:** Prior to the issuance of the first 2,000th residential building permit within the RMDP/SCP project site and every 2,000th residential building permit thereafter, the project | LA County Dept. of Regional Planning | **Measure Implementation:** Prior to the issuance of the first 2,000$^{th}$ residential building permit within the RMDP/SCP project site and every 2,000th residential | |

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| applicant or its designee shall provide Los Angeles County with proof that it has provided a subsidy of $100,000 per bus for the replacement of up to 10 diesel or compressed natural gas transit buses with ~~electric~~ zero emission buses to the identified transit provider(s). | | building permit thereafter, provide the County with proof of establishment of an escrow account in the amount of $100,000, representing a subsidy for one zero emission transit bus for the benefit of the identified transit provider(s). The escrow instructions shall document that the subsidies only can be used by the transit provider(s) exclusively for the purpose specified herein (i.e., the purchase of zero emission transit buses).<br>The Project applicant or its designee, which may include the Transportation Management Organization or its equivalent management entity, shall monitor the transit provider(s)'s utilization of the subsidies.<br>In the event that one or more subsidies are not utilized for the purchase of any zero emission transit bus after occupancy of the final residential dwelling unit within the RMDP/SCP project area, the Project applicant or its designee, which may include the Transportation Management Organization or its equivalent management entity, shall coordinate with the Los Angeles County Planning Director and secure the Planning Director's approval of one or more strategies that secure an equivalent level of GHG emissions reductions. For purposes of calculating the greenhouse gas emissions reductions required to demonstrate | |

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| | | equivalency, each un-used zero emission transit bus subsidy shall equal 61.9 MT $CO_2$e reductions per year. The Project applicant or its designee shall be permitted to utilize any unused subsidy funding for purposes of achieving this equivalency requirement. | |
| **2-10:** Prior to issuing grading permits for village-level development within the RMDP/SCP project site, Los Angeles County shall confirm that the project applicant or its designee shall fully mitigate the ~~related~~ construction and vegetation change GHG emissions associated with each such grading permit (the "Incremental Construction GHG Emissions") by relying upon one of the following compliance options, or a combination thereof, in accordance with the project applicant-submitted Newhall Ranch GHG Reduction Plan (GHG Reduction Plan; see ~~Technical Report~~ Final AEA Appendix 6 ~~F contained in AEA Appendix 1~~):<br><br>◢ Directly undertake or fund activities that reduce or sequester GHG emissions ("Direct Reduction Activities") and retire the associated "GHG Mitigation ~~reduction~~ Credits ~~credits~~" in a quantity equal to the Incremental Construction GHG Emissions. A "GHG Mitigation Credit" shall mean an instrument issued by an Approved Registry that satisfies the performance standards set forth in the GHG Reduction Plan and shall represent the estimated reduction or sequestration of one metric tonne of carbon | LA County Dept. of Regional Planning | **Measure Implementation:** A copy of the Newhall Ranch GHG Reduction Plan is located within Final AEA Appendix 6.<br><br>Prior to obtaining grading permits for development within the Project site, the incremental GHG emissions associated with such construction and vegetation change-related activities shall be offset.<br><br>Compliance with this measure shall be demonstrated as provided for in Section VIII of the GHG Reduction Plan.<br><br>In the event that multiple village-level projects have shared improvements, as defined to include any type of utility, roadway and/or infrastructure improvement identified for the implementation of each project, the construction-related emissions for the shared improvements only shall be offset once and shall be the responsibility of the village-level project that occurs first in time from a grading permit issuance perspective. | |

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| dioxide equivalent that will be achieved by a Direct Reduction Activity that is not otherwise required (CEQA Guidelines Section 15126.4(c)(3)). An "Approved Registry" is an accredited carbon registry as defined by the GHG Reduction Plan; or<br><br>◢ Obtain and retire "Carbon Offsets" ~~carbon credits that have been issued by a recognized and reputable carbon registry, as described in the GHG Reduction Plan,~~ in a quantity equal to the Incremental Construction GHG Emissions. "Carbon Offset" shall mean an instrument issued by an Approved Registry that satisfies the performance standards set forth in the GHG Reduction Plan and shall represent the past reduction or sequestration of one metric tonne of carbon dioxide equivalent achieved by a Direct Reduction Activity or any other GHG emission reduction project or activity that is not otherwise required (CEQA Guidelines Section 15126.4(c)(3)). | | | |
| **2-11:** Prior to the issuance of building permits for ~~every 100 residential units or 100,000 square feet of commercial development for each village-level project~~ development within the RMDP/SCP project site, the project applicant or its designee shall ~~provide proof of funding of~~ undertake or fund Direct Reduction Activities pursuant to the Building Retrofit Program ("Retrofit Program"), as included in Final AEA Appendix 13, to improve the energy efficiency of existing buildings located primarily in | LA County Dept. of Regional Planning | **Measure Implementation:** A copy of the Newhall Ranch Building Retrofit Program is located within Final AEA Appendix 13.<br><br>Prior to the issuance of building permits for development within the RMDP/SCP project site, the Project Applicant or its designee shall provide the County with an attestation from an Approved Registry that the Project Applicant has retired a sufficient quantity of GHG Mitigation | |

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| disadvantaged communities (as defined in the Retrofit Program). The project applicant or its designee shall retire GHG Mitigation Credits or Carbon Offsets issued by an Approved Registry based on such Direct Reduction Activities in a quantity equal to the ~~proportional percentage~~ sum of the ~~Building Retrofit Program (Retrofit Program),~~ following (together, the “Retrofit Reduction Requirement”) as included in ~~Technical Report~~ Final AEA Appendix 13 ~~G contained in Appendix 1, to Los Angeles County~~:~~.~~<br><br>• For the residential portion of a building permit application, the product of the planned number of residential units for the village-level project multiplied by 0.0377 $MTCO_2e$;<br><br>• For the commercial portion of a building permit application, the product of the planned commercial development per thousand commercial square feet multiplied by 0.0215 MTCO2e. ~~(~~“Commercial development” includes retail, light industrial, office, hotel and mixed-use buildings.~~)~~<br><br>Building retrofits covered by the Retrofit Program can include, but are not limited to: cool roofs, solar panels, solar water heaters, smart meters, energy efficient lighting (including, but not limited to, light bulb replacement), energy efficient appliances, energy efficient windows, | | Credits or Carbon Offsets associated with Direct Reduction Activities to undertake or fund Building Retrofits in a quantity equal to the Retrofit Reduction Requirement. | |

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| | pool covers, insulation, and water conservation measures.<br><br>The Retrofit Program shall be implemented within the geographic area defined to include Los Angeles County and primarily within disadvantaged communities, as defined by the Retrofit Program, or in other areas accepted by the Los Angeles County Planning Director.<br><br>~~Funding shall be applied to implement retrofits strategies identified in the Retrofit Program or other comparable strategies accepted by the Los Angeles County Planning Director.~~ | | | |
| **2-12:** | Prior to the issuance of the first building permit for the RMDP/SCP project site, the project applicant or its designee shall provide Los Angeles County with proof of installation of EV charging stations capable of serving 20 off-site parking spaces. Thereafter, the project applicant or its designee shall provide Los Angeles County proof of installation of EV charging stations prior to the issuance of residential and commercial building permits per the following ratios: one (1) off-site parking space shall be served by an electric vehicle charging station for every 30 dwelling units, and one (1) off-site parking space shall be served by an electric vehicle charging station for every 7,000 square feet of commercial development. (“Commercial development” includes retail, light industrial, office, hotel and mixed-use buildings.) Off-site EV charging stations capable of servicing 2,036 parking spaces would be | LA County Dept. of Regional Planning | **Measure Implementation:** Provide the County with proof (e.g., illustrative photos) of installation of electric vehicle charging stations capable of servicing 20 off-site parking spaces prior to the issuance of the first building permit for the RMDP/SCP project site.<br><br>Prior to issuance of the 30th residential building permit and each 30th residential building permit thereafter, provide evidence (e.g., illustrative photos) of installation of one off-site parking space being equipped with an electric vehicle charging station.<br><br>Prior to the issuance of a commercial building permit for 7,000 square feet and each additional 7,000 square feet thereafter, provide evidence (e.g., | |

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| required if the maximum allowable development facilitated by the RMDP/SCP project occurs; fewer EV charging stations would be required if maximum build-out under the RMDP/SCP project does not occur.<br><br>The EV charging stations shall achieve a similar or better functionality as a Level 2 charging station and may service one or more parking spaces. In the event that the installed charging stations use ~~more superior~~ functionality/technology other than Level 2 charging stations, the parameters of the mitigation obligation (i.e., number of parking spaces served by EV charging stations) shall reflect the comparative equivalency of Level 2 charging stations to the installed charging stations on the basis of average charge rate per hour. For purposes of this equivalency demonstration, Level 2 charging stations shall be assumed to provide charging capabilities of 25 range miles per hour.<br><br>The EV charging stations shall be located within the geographic area defined to include Los Angeles County.~~,~~ ~~and~~ The EV charging stations shall be in areas that are generally accessible to the public,~~.~~ ~~For example, the charging stations may be located in~~ such as areas that include, but are not limited to, retail centers, employment centers and office complexes, recreational facilities, schools, and other categories of public facilities. | | illustrative photos) of installation of one off-site parking space being equipped with an electric vehicle charging station. | |

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| **2-13:** In addition to Mitigation Measures 2-1 through 2-12, the project applicant or its designee shall offset GHG emissions to zero by funding or undertaking Direct Reduction Activities ~~activities that directly reduce or sequester GHG emissions~~ or, if necessary, obtaining Carbon Offsets ~~carbon credits~~ through the Newhall Ranch GHG Reduction Plan. The project applicant-submitted Newhall Ranch GHG Reduction Plan focuses on achieving GHG reductions or sequestration through the Direct Reduction Activities ~~direct investment in specific programs or projects~~ in coordination with an Approved Registry ~~accredited carbon registry~~, such as the Climate Action Reserve. If these Direct Reduction Activities ~~direct investment efforts~~ do not achieve the necessary ~~an adequate~~ amount of GHG reductions, the project applicant or its designee can obtain Carbon Offsets issued by an Approved Registry ~~carbon credits from accredited carbon registries~~.<br><br>~~The South Coast Air Quality Management District recommends that mitigation be considered in the following prioritized manner: (1) project design feature/on-site reduction measures; (2) off-site within neighborhood; (3) off-site within district; (4) off-site within state; and (5) off-site out of state.~~ Prior to issuing building permits for development within the RMDP/SCP project site, Los Angeles County shall confirm that the project applicant or its designee shall fully offset the project's remaining (i.e., post implementation of | LA County Dept. of Regional Planning | **Measure Implementation:** A copy of the Newhall Ranch GHG Reduction Plan is located within Final AEA Appendix 6.<br><br>Prior to obtaining building permits for an incremental level of development within the RMDP/SCP project site, the incremental operational GHG emissions over the 30-year Project life associated with such building permits that must be offset (the "Incremental Operational GHG Emissions") will be equal to the sum of: (1) the number of proposed residential units covered by the applicable building permit multiplied by 108.89 MT $CO_2e$; and (2) every thousand square feet (TSF) of proposed commercial development covered by the applicable building permit multiplied by 506.86 MT $CO_2e$.<br><br>For example, to obtain a building permit for 75 residential units and 40,000 square feet of commercial development, the Incremental Operational GHG Emissions would be: 75 units x 108.89 MT $CO_2e$/unit + 40 TSF x 506.86 MT $CO_2e$/sq. ft. = 28,441 MT $CO_2e$.<br><br>(Note that the multiplier for residential or commercial development may vary for a village-level project, as estimated in the CEQA document for the village-level project, provided that, in all cases, the | |

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| Mitigation Measures 2-1 through 2-12) operational GHG emissions over the 30-year project life associated with each such building permit ~~permits~~ (the "Incremental Operational GHG Emissions") by relying upon one of the following compliance options, or a combination thereof, in accordance with the Newhall Ranch GHG Reduction Plan:<br><br>◢ Undertake or fund Direct Reduction Activities ~~Demonstrate that the project applicant has directly undertaken or funded activities that reduce or sequester GHG emissions ("Direct Reduction Activities")~~ that are estimated to result in GHG Mitigation Credits ~~reduction credits~~, as described in the GHG Reduction Plan, and retire such GHG Mitigation Credits ~~reduction credits~~ in a quantity equal to the Incremental Operational GHG Emissions ~~emissions~~;<br><br>~~◢ Provide a guarantee that it shall retire carbon credits issued in connection with Direct Reduction Activities in a quantity equal to the Incremental Operational GHG emissions;~~<br><br>◢ Undertake or fund Direct Reduction Activities and retire the associated Carbon Offsets ~~carbon credits~~ in a quantity equal to the Incremental Operational GHG Emissions; or<br><br>◢ If necessary, as determined by the Los Angeles County Planning Director in | | remaining GHG emissions will be offset fully.)<br><br>Compliance with this measure shall be demonstrated as provided for in Section VIII of the GHG Reduction Plan. | |

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| accordance with the GHG Reduction Plan, ~~it is impracticable~~ to fully offset Incremental Operational GHG Emissions ~~through the Direct Reduction Activities~~, the project applicant or its designee may purchase and retire Carbon Offsets ~~carbon credits~~ that have been issued by an Approved Registry ~~a recognized and reputable, accredited carbon registry~~ in a quantity equal to the Incremental Operational GHG Emissions.<br><br>Compliance with MM 2-13 shall be demonstrated incrementally prior to obtaining building permits~~, and shall follow the preferred geographic hierarchy recommended by SCAQMD, discussed above~~.<br><br>The Incremental Operational GHG Emissions ~~emissions~~ shall be equal to the sum of (1) the number of proposed residential units covered by the applicable building permit multiplied by a "GHG Residential Ratio" ~~108.89 MT $CO_2$e~~ and (2) every thousand square feet of proposed commercial development covered by the applicable building permit multiplied by a "GHG Commercial Ratio." ("Commercial development" includes retail, light industrial, office, hotel, and mixed-use buildings.) GHG Residential Ratio and GHG Commercial Ratio shall mean the emissions ratios in MT$CO_2$e set forth in the applicable CEQA analysis completed by the County of Los Angeles for a specific village-level project to ensure that the | | | |

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| related GHG emissions are reduced to zero ~~506.86 MT $CO_2$e~~. | | | |
| **Project Applicant-Proposed Supplemental Commitment**<br>In addition to the installation of EV charging stations required by Mitigation Measures 2-5 and 2-12, and although not required for the project to achieve net zero GHG emissions, the project applicant or its designee shall provide Los Angeles County with proof of installation of EV charging stations prior to the issuance of residential and commercial building permits per the following ratios: one (1) parking space shall be served by an electric vehicle charging station for every 50 dwelling units, and one (1) parking space shall be served by an electric vehicle charging station for every 15,900 square feet of commercial development. ("Commercial development" includes retail, light industrial, office, hotel and mixed-use buildings.) EV charging stations capable of servicing 1,010 parking spaces would be required if the maximum allowable development facilitated by the RMDP/SCP project occurs; fewer EV charging stations would be required if maximum build-out under the RMDP/SCP project does not occur.<br>The EV charging stations shall achieve a similar or better functionality as a Level 2 charging station and may service one or more parking spaces. In the event that the installed charging stations use functionality/technology | LA County Dept. of Regional Planning | **Measure Implementation:**<br>Prior to issuance of the 50th residential building permit and each 50th residential building permit thereafter, provide evidence (e.g., illustrative photos) of installation of one on- or off-site parking space being equipped with an electric vehicle charging station.<br>Prior to the issuance of a commercial building permit for 15,900 square feet and each additional 15,900 square feet thereafter, provide evidence (e.g., illustrative photos) of installation of one on- or off-site parking space being equipped with an electric vehicle charging station.<br>If installed on the RMDP/SCP project site, the parking spaces equipped with an electric vehicle charging station must be in addition to the parking spaces otherwise required to have such infrastructure by Mitigation Measure 2-5.<br>If installed off of the RMDP/SCP project site, the parking spaces equipped with an electric vehicle charging station must be in addition to the parking spaces otherwise | |

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| other than Level 2 charging stations, the parameters of the mitigation obligation (i.e., number of parking spaces served by EV charging stations) shall reflect the comparative equivalency of Level 2 charging stations to the installed charging stations on the basis of average charge rate per hour. For purposes of this equivalency demonstration, Level 2 charging stations shall be assumed to provide charging capabilities of 25 range miles per hour.<br>The EV charging stations shall be located either on the project site or within the jurisdictional area of the Southern California Association of Governments. The EV charging stations shall be in areas that are generally accessible to the public, such as areas that include, but are not limited to, retail centers, employment centers and office complexes, recreational facilities, schools, and other categories of public facilities. | | required to have such infrastructure by Mitigation Measure 2-12.<br><br>Because the parking spaces serviced by the electric vehicle charging stations provided by this measure are in addition to those required by Mitigation Measures 2-5 and 2-12, a tracking matrix shall be maintained to ensure that this measure's benefits are additive and that the requirements of each measure are independently satisfied. | |
| ~~**GCC-1.** All residential buildings on the Project applicant's land holdings that are facilitated by approval of the proposed Project shall be designed to provide improved insulation and ducting, low E glass, high efficiency air conditioning units, and radiant barriers in attic spaces, as needed, or equivalent to ensure that all residential buildings operate at levels fifteen percent (15%) better than the standards required by the 2008 version Title 24. Notwithstanding this measure, all residential buildings shall be designed to comply with the then-operative Title 24 standards applicable at~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Comply with specified requirements prior to issuance of building permits.~~ | |

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| ~~the time building permit applications are filed. For example, if new standards are adopted that supersede the 2008 Title 24 standards, the residential buildings shall be designed to comply with those newer standards and, if necessary, exceed those standards by an increment that is equivalent to a 15 percent exceedance of the 2008 Title 24 standards.~~ | | | |
| ~~**GCC-2.** All commercial and public buildings on the Proposed applicant's land holdings that are facilitated by approval of the proposed Project shall be designed to provide improved insulation and ducting, low E glass, high efficiency HVAC equipment, and energy efficient lighting design with occupancy sensors or equivalent to ensure that all commercial and public buildings operate at levels fifteen percent (15%) better than the standards required by the 2008 version of Title 24. Notwithstanding this measure, all nonesidential buildings shall be designed to comply with the then-operative Title 24 standards applicable at the time building permit applications are tiled. For example, if new standards are adopted that supersede the 2008 Title 24 standards the nonresidential buildings shall be designed to comply with those newer standards and, if necessary, exceed those standards by an increment that is equivalent to a 15 percent exceedance of the 2008 Title 24 standards.~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Comply with specified requirements prior to issuance of building permits.~~ | |

| Mitigation Measure | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
|---|---|---|---|
| ~~**GCC-3.** The Project applicant or designee shall produce or cause to be produced renewable electricity, or secure greenhouse gas offsets or credits from a public agency (e.g., CARB; SCAQMD) endorsed market equivalent to the installation of one photovoltaic *(i.e.,* solar) power system no smaller than 2.0 kilowatts, when undertaking the design and construction of each single-family detached residential unit on the Project site.~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Demonstrate compliance with specified requirements prior to issuance of building permits.~~ | |
| ~~**GCC-4.** The Project applicant or designee shall produce or cause to be produced renewable electricity, or secure greenhouse gas offsets or credits from a public agency (e.g., CARB; SCAQMD) endorsed market equivalent to the installation of one photovoltaic system no smaller than 2.0 kilowatts, on each 1,600 square feet of nonresidential roof area provided on the Project site.~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Demonstrate compliance with specified requirements prior to issuance of building permits.~~ | |
| ~~**GCC-5.** Consistent with the Governor's Million Solar Roofs Plan, the Project applicant or designee, acting as the seller of any single-family residence constructed as part of the development of at least 50 homes that are intended or offered for sale, shall offer a solar energy system option to all customers that enter negotiations to purchase a new production home constructed on land for which an application for a tentative subdivision map has been deemed complete. The seller shall disclose the total installed cost of the solar~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Demonstrate methods to be implemented to comply with specified requirements prior to issuance of building permits.~~ | |

| Mitigation Measure | Monitoring Agency | Mitigation Measure Monitoring Requirements | Approval/ Acceptance Dates |
|---|---|---|---|
| ~~energy system option, and the estimated cost savings.~~ | | | |
| ~~**GCC-6.** The Project applicant or designee shall use solar water heating for each of the pools located at the recreation centers that would by facilitated by approval of the proposed Project *(i.e.,* the pools that would be located at the forty recreation centers within the Specific Plan area, and the two recreation centers within the Entrada planning area).~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Demonstrate compliance with specified requirements prior to Issuance of building permits.~~ | |
| ~~**GCC-7.** The Project applicant or designee, in accordance with Los Angeles County requirements, will design and construct all municipal facilities *(i.e.,* fire stations) facilitated by approval of the proposed Project so as to achieve LEED silver certification.~~ | ~~LA County Dept. of Regional Planning~~ | ~~**Measure Implementation:** Demonstrate methods to be implemented to comply with specified requirements prior to issuance of building permits.~~ | |

**Note:** A "village-level project" as described in this MMRP is a project within the RMDP/SCP project site that is associated with a specific tract map; for example, the Mission Village and Landmark Village projects are each a "village-level project."

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# APPENDIX C.5
# FINAL AEA APPENDIX 1:
# CARB LETTER

# Air Resources Board

**Mary D. Nichols, Chairman**
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

**Matthew Rodriquez**
*Secretary for Environmental Protection*

**Edmund G. Brown Jr.**
*Governor*


November 3, 2016

Chuck Bonham, Director
California Department of Fish and Wildlife
1416 9th Street, 12th Floor
Sacramento, California 95814

Dear Mr. Bonham:

As you requested, California Air Resources Board (ARB) staff reviewed the technical basis for the net zero greenhouse gas (GHG) determination in the Additional Environmental Analysis prepared for the Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan.

ARB staff consulted with Department of Fish and Wildlife staff and technical experts at Ascent Environmental, the principal consultant assisting the Department. In doing so, ARB staff reviewed the technical documentation provided for the evaluation of the project's total estimated GHG emissions and the reductions in emissions to be achieved through the mitigation measures. Based on staff's review, ARB finds the documentation provides an adequate technical basis to determine that the project would not result in any net additional GHG emissions after the mitigation measures are fully implemented.

If you have any questions regarding staff's analysis, please contact Mr. Kurt Karperos by email at kurt.karperos@arb.ca.gov or by phone at (916) 322-2739.

Sincerely,

Richard W. Corey
Executive Officer

cc: Kurt Karperos
Deputy Executive Officer

# APPENDIX C.6
# FINAL AEA APPENDIX 8:
# TRANSPORTATION DEMAND MANAGEMENT PLAN

# Appendix 8

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## RMDP/SCP Project: Transportation Demand Management Plan Evaluation, Fehr & Peers, September 7, 2016

FEHR & PEERS

# TECHNICAL MEMORANDUM

Date: September 7, 2016

To: Eric Lu, Ramboll Environ

From: Tom Gaul & Chelsea Richer, Fehr & Peers

***Subject: RMDP/SCP Project: Transportation Demand Management Plan Evaluation***

*Ref: LA16-2810*

This technical memorandum presents an evaluation of the recommended Transportation Demand Management (TDM) Plan for the Resource Management & Development Plan and Spineflower Conservation Plan (RMDP/SCP) Project, which would facilitate development within three planning areas (i.e., Newhall Ranch Specific Plan, Entrada, and Valencia Commerce Center planning areas). The recommended TDM Plan is included in the attachment to this document.

## 1. INTRODUCTION

The recommended TDM Plan contains a set of strategies designed to maximize vehicle miles traveled (VMT) reduction opportunities within the facilitated development areas of the RMDP/SCP Project, taking into account the Project location and the types of land uses that would be facilitated by the Project. The estimated VMT reductions for each strategy presented in the TDM Plan are based on research presented in the California Air Pollution Control Officers Association's (CAPCOA) 2010 report.[1] For certain strategies, reference also is made to research conducted by Fehr & Peers beyond the estimates provided by the CAPCOA report. The remainder of this technical memorandum is organized as follows:

- Section 2 provides an overview of the recommended TDM Plan, including a list of the strategies contained in the recommended TDM Plan.
- Section 3 provides information about the overall methodology used to estimate the VMT reduction potential associated with each strategy.
- Section 4 provides a detailed description of and estimated VMT reductions for each of the strategies contained within the recommended TDM Plan.

[1]California Air Pollution Control Officers Association. *Quantifying Greenhouse Gas Mitigation Measures-A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures*, 2010. The CAPCOA report is herein incorporated by reference pursuant to CEQA Guidelines, section 15150.

- Section 5 provides a summary of the overall estimated VMT reduction associated with the strategies contained within the recommended TDM Plan.
- Appendix: TDM Strategy Examples provides a listing of examples of TDM strategies implemented in other areas of the state, with applicable internet source references.
- Attachments includes the following documents: Newhall Ranch Transportation Demand Management Plan (September 2016); Exhibit 1, CAPCOA Chart 6-2, Transportation Strategies Organization; Exhibit 2, Conceptual Transit Plan; Exhibit 3, Conceptual Large Mobility Hub Plan; Exhibit 4, Conceptual Small Mobility Hub Plan; Table 1, Strategies in the Recommended TDM Plan for the RMDP/SCP Project; and Table 2, Calculations to Support the Strategies in the Recommended TDM Plan for the RMDP/SCP Project.

## 2. OVERVIEW OF THE RECOMMENDED TDM PLAN

The following strategies are included in the recommended TDM Plan:

1. Integrate Affordable and Below Market Rate Housing
2. Pedestrian Network
3. Traffic Calming
4. Transit Network Expansion
5. Alternative Work Schedules and Telecommute Program (Residential End)
6. Required Commute Trip Reduction Program
7. Alternative Work Schedules and Telecommute Program (Work End)
8. School Bus Program
9. Transit Fare Subsidy for Employees
10. Carshare Program
11. Neighborhood Electric Vehicle (NEV) & Electric Bicycle (E-Bike) Strategy
12. Mobility Hubs
13. Tech-Enabled Mobility
14. Bikeshare Program
15. Transit Fare Subsidy for Below Market Rate Housing Residents

The implementation of the TDM Plan would be, in part, accomplished through the creation of a Transportation Management Organization (TMO) or equivalent management entity, the formation of which is a pre-requisite to achievement of some of the VMT reduction estimates identified herein.

## 3. METHODOLOGY

The 2010 CAPCOA report, titled *Quantifying Greenhouse Gas Mitigation Measures*, is a primary resource to the assessment of quantifiable greenhouse gas emission reduction benefits. CAPCOA's research focuses on strategies to reduce greenhouse gas emissions at the project level, primarily in terms of land use, transportation, and energy use. The transportation component bases the emission reduction benefits on estimated reductions in VMT. These strategy-specific VMT reduction estimates were applied to the TDM strategies included in Section 4 below.

For each strategy, the CAPCOA report provides a discussion of the relevant literature, as well as a guideline for estimating the VMT reduction resulting from each individual strategy. The recommended guidelines for estimating VMT reduction were developed from relevant research and case studies. Section 4 below summarizes the particular methodology used to estimate the specific VMT reduction for each of the strategies included in the recommended TDM Plan.

For three strategies (Strategies 12, 13 and 14 below), there was no methodology available for estimating VMT reduction using the CAPCOA report, due to research limitations at the time the CAPCOA report was published. Therefore, VMT reduction estimates were derived from research conducted by Fehr & Peers, using professional engineering judgement and based on experience working on other TDM projects in California. These three instances are indicated in their respective sections in Section 4. In addition, while the effectiveness of the NEV component of Strategy 11 is based on CAPCOA research, the effectiveness of the e-bike component of the strategy is based on transportation technology trends and studies that post-date the CAPCOA report.

In addition, each strategy is considered by CAPCOA as part of a larger category group: Land Use/Location, Neighborhood/Site Enhancement, Parking Policy/Pricing, Transit System Improvements, Commute Trip Reduction, and Road Pricing Management. The CAPCOA report provides certain maximum reductions in VMT for each individual strategy, as well as for each category of strategies. The maximum reductions serve as caps for each category to prevent the double counting of reductions resulting from a combination of related strategies, similar in concept to the dampening adjustment discussed above.

Similarly, the CAPCOA report sets overall maximum caps based on context, with a 20% maximum reduction cap set for "Suburban Center," the context most appropriate to the RMDP/SCP Project, based on the balance of jobs and housing facilitated by the RMDP/SCP Project and the availability of transit service throughout the Project site. This maximum cap recognizes that each set of strategies is somewhat bounded by the overall land use beyond a project site, opportunities to connect to other suburban and urban environments, and the set of already existing mobility and access tools. Exhibit 1 duplicates Chart 6-2 from the CAPCOA report, identifying the category and overall maximum VMT reduction caps, as well as the individual strategies included in each category.

## 4. EVALUATION OF RECOMMENDED TDM STRATEGIES

This section provides a detailed evaluation of each TDM strategy listed in Section 2: Overview of the Recommended TDM Plan, above. For each strategy that is based on the CAPCOA report, the related CAPCOA strategy code (for example, CAPCOA TRT-6 or SDT-3) is provided.

### *1. Integrate Affordable and Below Market Rate Housing*

According to CAPCOA, a VMT reduction of 0.04% - 1.20% would be expected based on the inclusion of below market rate housing into residential and mixed-use development projects with more than 5 dwelling units (CAPCOA LUT-6). Below market rate housing provides greater opportunity for lower income families to live closer to job centers and achieve jobs/housing match near transit. Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. According to the research underlying the CAPCOA range of effectiveness, housing that is affordable to an average income of 75% below the area median income produces the expected VMT reduction. At Newhall Ranch, 10% of the total housing would be deemed affordable, below market rate, while 6% would be affordable to those with an average income of 75% below the area median income. As such, the more conservative 6% rate was utilized to calculate the VMT reduction attributable to this strategy.

The reduction rate is based on the amount of below market rate housing provided and calculated according to the following formula:

> % VMT Reduction = 4% times, or multiplied by (*) Percentage of units in the project that are below market rate

Approximately 10% of the housing facilitated by the RMDP/SCP Project would be below market rate housing, with 6% affordable to an average of 75% below the area median income. This type housing is therefore expected to result in a 0.2% decrease in total VMT (4% * 6% = 0.2%).

### *2. Pedestrian Network*

According to CAPCOA, enhancing pedestrian infrastructure can reduce VMT for residential, retail, office, industrial, and mixed-use projects (CAPCOA SDT-1). A high quality pedestrian network within an urban or suburban project site would be expected to result in an estimated 1% VMT reduction. With the expansion of the pedestrian network to include connections to the off-site network, a project can achieve an estimated VMT reduction of up to 2%.

In order for the pedestrian network to facilitate a reduction in VMT, the pedestrian network must directly connect to all existing and planned pedestrian facilities both within and adjacent to the project site, while minimizing any barriers to pedestrian access. According to CAPCOA, pedestrian network improvements are those that eliminate physical barriers to pedestrian access, such as walls, landscaping, and slopes/steep inclines that prevent easy access.

The RMDP/SCP Project would facilitate development that would incorporate a high-quality pedestrian network to enhance pedestrian access both on- and off-site, thereby encouraging a mode shift from driving to walking. The pedestrian network would be built into the design of the street network throughout the Project site, and would connect to existing development surrounding the Project site and to a network of off-street trails that will link areas of residential development with areas of commercial development, schools, and open space. Moreover, higher capacity streets throughout the Project site would have sidewalks and generally avoid barriers to pedestrian travel such as walls, landscaping, and steep slopes/inclines that otherwise would impede pedestrian travel. As a result, this high quality network is expected to directly result in a 2% reduction in total VMT, and indirectly would combine with other TDM strategies to further reduce VMT.

### 3. *Traffic Calming*

According to CAPCOA, traffic calming strategies include design elements intended to reduce motor vehicle speeds and improve pedestrian and bicyclist safety, creating an environment that encourages people to walk or bike instead of driving (CAPCOA SDT-2). Design elements could include, but are not limited to, count-down signal timers, marked crosswalks, raised crosswalks, raised intersections, speed tables, median islands, planter strips with trees, curb extensions, on-street parking, tight corner radii, roundabouts or mini-circles, and chicanes/chokers.

CAPCOA's estimation of VMT reduction for traffic calming measures is based on the percentage of streets and intersections within the project receiving traffic calming improvements. When 100% of streets and intersections within the project receive such improvements, there is an estimated 1% reduction in VMT. This estimated reduction in VMT applies to both urban and suburban projects, although the underlying literature relied upon by CAPCOA includes differences in reductions between the two. The VMT reductions were generally higher for traffic calming improvements in suburban environments (1.5%-2.0%) than urban environments (0.5%-0.6%). According to CAPCOA, "[t]hough the literature provides some difference between a suburban and urban context, the difference is small and thus a conservative estimate was used to be applied to all contexts" (CAPCOA, 192). Thus, CAPCOA's estimate ranges from 0.25%-1%, based on the percentage of streets and intersections incorporating traffic calming design elements.

Traffic calming improvements interact with other TDM strategies that encourage a mode shift from driving to walking and/or biking. The VMT reductions estimated by CAPCOA take this interaction into account and the estimated VMT reduction for traffic calming is specific to the traffic calming improvements and is separate from any other interacting measures.

For purposes of the RMDP/SCP Project, and based on the CAPCOA report, it is estimated that the traffic calming improvements would result in a 1% reduction in total VMT. This percentage is based on the fact that 100% of the streets and intersections will include one or more of the design elements listed in CAPCOA's description of traffic calming improvements, as detailed above, or other features such as streetscaping, NEV lanes, or bike lanes.

### *4. Transit Network Expansion*

According to CAPCOA, transit network expansion includes the extension of local transit service (CAPCOA TST-3), shuttles to major rail transit centers and other areas within a project site (CAPCOA TST-6), and improved pedestrian access to transit facilities (CAPCOA TST-2; e.g., sidewalk/crosswalk safety enhancements and/or bus shelter improvements).

The CAPCOA report provides the following formula for calculating the percent VMT reduction associated with transit network expansion:

> % VMT Reduction = (% increase in transit network coverage) * (elasticity of transit) * (existing transit mode share) * (adj. factor = 0.67)

According to the CAPCOA report, transit network expansion results in VMT reductions ranging from 0.1-8.2%.

With respect to the RMDP/SCP Project, Santa Clarita Transit plans to extend existing bus routes into the planning areas where the RMDP/SCP Project would facilitate development, thereby connecting the RMDP/SCP Project's planning areas to major transit centers such as the Santa Clarita or Newhall Metrolink Stations.[2] Based on the CAPCOA formula, these planned transit enhancements were estimated to increase the existing transit system network coverage by 80%, a conservative estimate given the current lack of any transit presently serving the Project site. Given these coverage improvements (i.e., 80%), in combination with a transit elasticity of 1.01 based on CAPCOA documentation, and an existing 2.3% transit mode share as reported by the City of Santa Clarita,[3] the estimated reduction in total VMT attributable to the transit network expansion would be approximately 1.3% (80% * 1.01 * 2.3% * 0.67 = 1.3%).[4]

### *5. Alternative Work Schedules and Telecommute Program (Residential End)*

This strategy captures commuters who live within the RMDP/SCS Project area and commute elsewhere, while Strategy 7 presented later captures commuters who live outside the RMDP/SCS Project area and work within the RMDP/SCS Project area.

According to CAPCOA, participation in an alternative work week or telecommute program results in fewer commute trips, which then reduces commute and overall VMT (CAPCOA TRT-6). The degree to which these programs reduce VMT is a direct result of the extent of the program and the number of people participating. Depending on the participation rate and the program type, the range in reduction of commute trip VMT is estimated by CAPCOA to be between 0.07% and 5.5%.

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[2] City of Santa Clarita. *Transportation Development Plan*, May 2013.
[3] 2.3% transit mode share based on the 2014 Census Journey to Work data for the City of Santa Clarita.
[4] Transit elasticity of 1.01 for suburban transit routes based on CAPCOA documentation.

The program participation rate is approximated according to the methodology presented by CAPCOA, which itself is based on a Cambridge Systematics/Fehr & Peers study.[5] Based on this methodology, a maximum of 50% of the typical workforce would have the potential to participate in an alternative work schedule, and 50% of those people actually would chose to participate; i.e., 25% of the total workforce would chose to participate. CAPCOA conservatively suggests that this rate be adjusted down further, in order to take into consideration possible rebound effects (i.e., travel for other purposes during the day while working at home), to a 10% participation rate.

As to program type, telecommute program types based on alternative work schedules range from one to several telecommute days per week; that is, employees participating in the program would be expected to telecommute anywhere from 1 to 3 days. Based on the range of telecommute days, in combination with the marketing support of the Transportation Management Organization noted in Section 2, a telecommute program would be expected to result in an average of 1.5 days of telecommuting per week.

Given a participation rate of 10% in a program expected to result in an average of 1.5 days of telecommuting/week, CAPCOA estimates the commute VMT reduction as 2.2% (CAPCOA page 237). To extrapolate this reduction in commute VMT to a reduction in overall VMT, the commute VMT reduction rate of 2.2% was applied to the commute VMT, which is 11% of the total VMT attributable to home-based (production end) work trips.[6] Additionally, since any work trips that start and end within Newhall Ranch (internal trips) would be captured by the reduction for Strategy 7: Alternative Work Schedules and Telecommute Program (Work End), the results are multiplied by the percentage of home-to-work production-end trips, which are external, or 78%.[7] This results in an overall VMT reduction of 0.2% (2.2% * 11% * 78% = 0.2%).

### *6. Required Commute Trip Reduction Program*

According to CAPCOA, a required commute trip reduction program (CAPCOA TRT-2) is a multi-strategy program that encompasses a combination of individual VMT reduction measures such as ride-sharing, marketing and promotions, preferential parking, transit subsidies, and bicycle end-of-trip facilities. Commute trip programs are typically operated by Transportation Management Organizations that manage and promote the program, collect data and monitor effectiveness. In some cases, some strategies, such as ride-sharing or providing preferential parking for carpool participants, may be implemented and operated by individual employers who monitor and report progress regularly to the TMO. The critical components of a required commute trip program (TRT-2) compared to a voluntary commute trip program (TRT-1) is that the required commute trip program has established performance standards, required implementation, and regular monitoring and reporting. Participation in required commute trip reduction programs is typically

[5] Cambridge Systematics and Fehr & Peers. *Moving Cooler: An analysis of transportation strategies for reducing greenhouse gas emissions.* Urban Land Institute, 2009.
[6] Percent of VMT attributable to home-based (production end) work trips calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010).
[7] Percent of work trips that are external are 78%, calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010).

required of employers above a certain size threshold, exempting small businesses and non-traditional employers from the requirement to participate.

Based on the diversity of types of jobs that would exist as part of the development facilitated by the RMDP/SCP Project (i.e., large and small businesses, schools, community facilities), it is conservatively estimated that 50% of the employees would be employees of larger businesses eligible to access the services and benefits provided by the required commute trip program as a result of their employer's required participation. This estimate is at the low end of CAPCOA's expected participation range for this strategy, between 20% and 100%. According to CAPCOA, required commute trip reduction programs would result in a 21% decrease in vehicle mode share for commute trips for those employees who are eligible to participate in the program (CAPCOA page 224). Therefore, the following formula is used to estimate the commute-trip-related VMT reduction attributable to a required commute trip program:

> % VMT Reduction = (% employees eligible) * (21% reduction in vehicle mode share) * (% share of all trips attributable to home-based commute trips)

For the RMDP/SCP Project, it is estimated that a 1.5% VMT reduction would result from implementation of a required commute trip program based on a 50% employee eligibility rate, and a 21% reduction in the percentage share of all trips attributable to home-based work trips, which is 14% (50% * 21% * 14% = 1.5%).[8]

### 7. *Alternative Work Schedules and Telecommute Program (Work End)*

Related to alternative work schedules and telecommute programs from the residential perspective (Strategy 5) are similar programs viewed from the work, or employer, perspective. This strategy captures commuters who live outside the RMDP/SCS Project area and work within the RMDP/SCS Project area, while Strategy 5 captures commuters who live within the RMDP/SCS Project area and commute elsewhere. Therefore, the participation of an employee in an alternative work week or telecommute program is analogous to that of a project site resident (see Strategy 5, above): the higher the participation rate and the more extensive the program, the larger the reduction in VMT.

Determining the participation rate and program type for the telecommute program on the work end utilizes the same CAPCOA methodology as on the residential end: while 50% of a typical work force would have the potential to participate in the alternative work schedule, only a 10% participation rate is utilized. As to program type, commercial businesses that locate in the RMDP/SCP Project's planning areas would be encouraged to implement alternative work schedules and telecommuting options for their employees. Using the reference table provided on page 237 of the CAPCOA report, a 4/40 alternative work schedule (4 days per week, 10 hours a day) and a 10% participation rate would yield a 1.5% reduction in commute VMT.

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[8] Percent VMT attributable to home-based (attraction end) work trips calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010).

To extrapolate the reduction in commute VMT to a reduction in overall VMT, the commute reduction rate of 1.5% is applied to the 14% of total VMT that is attributed to home-based (attraction end) work trips, thereby resulting in an overall VMT reduction of 0.2% (1.5% * 14% = 0.2%).

### *8. School Bus Program*

According to CAPCOA, the implementation of a school bus program involves coordinating with local school districts to provide school bus service in the project area and local community (CAPCOA TRT-13). The degree to which the school bus program would reduce school VMT (i.e., those vehicle miles generated by student travel to and from a school) ranges from 38% to 63% dependent upon the number of families participating in the program.

Based on the methodology provided by CAPCOA, the reduction in school VMT is calculated as follows:

> % Reduction in School VMT = Participation rate of Families * (39 school weeks / 52 weeks)

CAPCOA research identified an 84% participation rate based on a study conducted in connection with the Lamorinda School Bus Program serving Lafayette, Orinda, and Moraga, California. The Lamorinda study, which contains the only empirical data provided by CAPCOA supporting participation rates, determined that 84% of the families within the boundaries of the School Bus Program participated in the program. CAPCOA also includes a low end participation rate of 50%, which is not supported by quantitative study and is based on an assumption of a "minimum participation goal." Because the communities of Lafayette, Orinda, and Moraga are suburban communities similar to the type of communities that would be built as part of the Project, and because the proposed School Bus Program would have as its goal a maximum, rather than minimum, participation rate, based on the professional judgment of the engineers preparing this analysis, a participation rate of 84% was used as a starting point for the analysis. As a conservative estimate, the participation rate was reduced by 10% to 76%.

Based on the methodology provided by CAPCOA, the proposed School Bus Program would result in an annual reduction in school-trip VMT of 57.0% (76% of families participating * 75% (39 weeks of school / 52 weeks in a year) = 57.0% of annual school-trip VMT reduced). This percent reduction is then applied to the total VMT that would be generated by the Project's school-based trips, or 5.9% of total annual VMT, resulting in an overall VMT reduction of 3.4% (57.0% * 5.9% =3.4%).[9]

### *9. Transit Fare Subsidy for Employees*

CAPCOA associates certain levels of transit fare subsidy with corresponding levels of commuter participation in transit based on locational context (CAPCOA TRT-4). For the Suburban Center

[9] CAPCOA estimates that 9.8% of total trips (5.9% of total VMT) are related to school trips based on 2000-2001 California Statewide Travel Survey and 2001 NHTS Summary of Travel Trends.

context, a subsidy of $2.98 per person per day incentivizes a 16.4% reduction in commute VMT when employees are given a subsidy at their place of employment (CAPCOA page 231). The 16.4% reduction provided by CAPCOA is then multiplied by the percent of employees eligible to receive this subsidy to arrive at the final percent VMT reduction for this category of trips.

For subsidies of $2.98 per person per day, the CAPCOA report provides the following formula for calculating the percent VMT reduction associated with employee transit fare subsidies:

> % VMT Reduction = (% employees eligible to participate) * (16.4% reduction in commute VMT) * (% share of all trips attributable to home-based commute trips)

The transit fare subsidy will be offered through the TMO. Because an estimated 50% of Newhall Ranch employees would be eligible to access the services and benefits provided by the required commute trip program (Strategy 6) as a result of their employer's required participation, the remaining 50% of employees who commute to jobs located within the RMDP/SCP Project's planning areas will be eligible to access transit fare subsidies directly through the TMO. As noted above, at the level of $2.98 per day, which equates to between 25% and 100% of an existing round-trip Santa Clarita Transit fare, depending on service class, CAPCOA estimates that 16.4% of commuters would switch, resulting in a reduction of 8.2% of commute-based VMT (50% * 16.4%). Overall, the commute-based VMT for employees accounts for 14% of the overall VMT.[10] Therefore, an 8.2% reduction in commute-based VMT equates to a 1.1% reduction in overall VMT (14% * 8.2% = 1.1%).

### *10. Carshare Program*

Carshare programs are membership-based programs that provide members access to a shared fleet of vehicles (CAPCOA TRT-9). Cost is generally based on a per mile or hourly basis. There are three common categories of carshare programs: transit station based, employer based, or residential based/citywide. Each of these programs has slightly different uses. Transit station-based carshare generally is intended to close the "last mile" gap by allowing users to drive from the transit station to their final destination. Employer-based carshare programs can provide transit/bike/walk commuters with an opportunity to conduct business/day trips while also providing a guaranteed ride home. Residential based/citywide carshare programs generally replace entire home-based trips.

The CAPCOA methodology calculates the reduction in overall VMT attributable to carshare programs as follows:

> % VMT Reduction = (37% reduction in carshare member VMT) * (20 carshare members per shared car) * (1 car / 2,000 suburban residents)

For purposes of the RMDP/SCP Project, the CAPCOA reduction in carshare member VMT for suburban areas is estimated as 0.4% (37% * 20/2,000 = 0.4%).

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[10] Percent VMT attributable to home-based (attraction end) work trips calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010).

To incentivize participation, the recommended TDM Plan includes partial subsidization of the annual membership fee (50% subsidy) for up to 50% of the households that would elect to participate in the carshare program (i.e., a 50% subsidy for all households that elect to participate in the program, capped at 50% of the total Project households), and 100% subsidization of the annual fee for up to 100% of the below market rate households. The incentive program is entirely additive and does not factor in to the VMT reduction calculations.

### *11. Neighborhood Electric Vehicle (NEV) & Electric Bicycle (E-Bike) Strategy*

CAPCOA associates a VMT reduction with neighborhood electric vehicle (NEV) participation and ownership, along with a travel network that accommodates NEV use, including features such as charging facilities, striping, signage, and educational tools (CAPCOA SDT-3). The VMT reductions are associated with market penetration levels (i.e., percent of households owning a NEV) and an average reduction in total VMT per NEV household of 12.7% (Percent Market Penetration * 12.7%), as follows:

- 1 out of 10 Households purchase an NEV (10%) * 12.7% = 1.3% reduction in total VMT
- 1 out of 5 Households purchase an NEV (20%) * 12.7% = 2.5% reduction in total VMT
- 1 out of 3 Households purchase an NEV (33%) * 12.7% = 4.2% reduction in total VMT

While the methodology of how to estimate market penetration is not well documented in CAPCOA, a case study undertaken for a community in Los Angeles County provides a method to estimate market penetration levels given certain subsidy levels.

The South Bay region in Los Angeles County conducted a pilot demonstration project for NEVs, which surveyed participants after the study on price-point and willingness to buy an NEV.[11] Based on this survey, 83% of respondents said they would consider purchasing an NEV at the $6,000 price point (or a 54% subsidy based on an average purchase price of $13,000), and 69% said they would consider purchasing an NEV at the $8,000 price point (or a 38% subsidy). However, these survey respondents are not reflective of the general public because they already expressed interest in NEVs by signing up to participate in the pilot study, and already had been given an NEV to drive, free of charge. At the end of the study, two out of 51 participating households purchased an NEV without any subsidy, or about 4%.

Assuming the above survey data for the South Bay region of L.A. County overstates NEV interest relative to an average resident who has not participated in a pilot study nor expressed a pre-existing interest in NEVs, based on our professional judgment it was estimated that the general population’s willingness to purchase an NEV at each price point would be one-half that of the South Bay study participants’ willingness. Using this approach and interpolating from the survey results, it is estimated that about 1 in 10 residents (12%) would consider purchasing an NEV with

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[11] Siembab, W. and Magarian, D. *Zero Emission Local Use Vehicles: The Neglected Sustainable Transportation Mode.* Published June 30, 2013 for the South Bay Cities Council of Governments.

a 10% subsidy; about 1 in 5 (20%) would consider purchasing with a 25% subsidy; and about 1 in 3 (35%) would consider purchasing with a 50% subsidy.

The recommended TDM Plan includes a 25% NEV purchase subsidy, to be promoted and marketed through the Transportation Management Organization, for single-family residences. At this price point, in combination with a supportive travel network that accommodates NEVs, it is estimated that 1 out of 5 single-family residences would purchase and use NEVs, resulting in a VMT reduction for single-family residences of 2.5% (12.7% * 20% = 2.5%).

With respect to multi-family residences, such residences may not have access to the facilities needed to store and charge an NEV as readily as single-family residences, primarily due to the potential lack of available driveway and garage space. However, electric bikes (e-bikes), which have a lower price point than NEVs but can serve similar travel objective purposes, can be stored and charged inside the home or smaller spaces in the garage. Therefore, the recommended TDM Plan includes a 50% e-bike purchase subsidy, to be promoted and marketed through the Transportation Management Organization, for multi-family residences.

Although the CAPCOA report does not address e-bikes as a strategy to reduce VMT, several recent studies have evaluated the travel behavior of individuals who have access to an e-bike.[12] Two key elements from these studies indicate how much VMT reduction can be anticipated from an e-bike subsidy: uptake rates (i.e., acquisition participation rates) and mode-shift tendencies (i.e., likelihood of use over alternative forms of transportation).

In the most recent study, *Evaluation of an Electric Bike Pilot Project at Three Employment Campuses in Portland, Oregon* (2017), 26% more study participants reported using the e-bike for trips at least one day per week and up to three days per week, compared to bicycle usage before the study began (i.e., a 26% uptake rate and a 14%-43% mode-shift tendency). Similarly, 4% more study participants reported using the e-bike for trips at least 4 days per week and up to seven days per week, compared to bicycle usage before the study began (i.e., a 4% uptake rate and a 57%-100% mode-shift tendency). Therefore, these study results indicate that between 6% and 15% of participant VMT could be reduced as a result of e-bike usage.

Some important differences exist between the Portland study and Newhall Ranch. In the Portland study, e-bikes were given to participants, while at Newhall Ranch, up to 50% of multi-family residences will be provided a 50% e-bike subsidy. In the Portland study, participants self-selected into the study, while Newhall Ranch will include the entire population of multi-family residences. In the Portland study, three employment centers were used as the basis for selecting participants, ranging from very suburban to urban contexts with varying levels of bicycle culture and

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[12] Hiselius, L.W. and Svenssona, A. (2014) Could the increased use of e-bikes (pedelecs) in Sweden contribute to a more sustainable transport system? *9th International Conference "Environmental Engineering".*
Lienhop, M. et al. (2015) PEDELECTION: Verlagerungs- und Klimaeffekte durch Pedelec-Nutzung im Individualverkehr. *Institut fur Transportation Design* & *Institut fur Energie- und Emweltforschung Heidelberg GmbH.*
MacArthur, J. et al. (2017) Evaluation of an Electric Bike Pilot Project at Three Employment Campuses in Portland, OR. *National Institute for Transportation and Communities.*

supportive facilities, while Newhall Ranch exhibits a suburban center context in the Santa Clarita Valley, with substantial existing bicycle culture and planned supportive facilities throughout the region. Given these differences and the range of potential VMT reduction demonstrated by the Portland study, a VMT reduction of at least 2.5% is a reasonable estimate for the e-bike component of this strategy, and falls below the low end of the range generated by the Portland study.

Therefore, with a 25% NEV purchase subsidy for single-family residences and a 50% e-bike purchase subsidy for multi-family residences, an overall 2.5% VMT reduction is estimated for this combined/hybrid NEV & e-bike strategy. At Newhall Ranch, the proportion of total VMT attributable to single family residences is 46%, and the proportion of total VMT attributable to multi-family residences is 54%.[13] Based on this proportion, the NEV component of this strategy is estimated to comprise 1.2% VMT reduction, and the e-bike component of this strategy is estimated to comprise 1.3% VMT reduction, for a total of 2.5% VMT reduction.[14]

### *12. Mobility Hubs*

Mobility hubs are one-stop centers for transit, rideshare meeting, car share, bicycle repairs, bicycle share, end-of-trip facilities, and other commuter amenities. These sites are conveniently located within each neighborhood and employment center in order to attract the most use and provide the most benefit.

Mobility hubs within the RMDP/SCP Project site would tie together the other mobility options available within the three planning areas, and are expected to enhance the effectiveness of other strategies contained within the recommended TDM Plan by providing a centralized location to access mobility services and by exposing users of one type of service to the other options available on site. The Mobility Hub results in its own VMT reductions because it improves the usability of the other strategies available at the hub by making transfers easier, providing information about the full suite of transportation options to users who may start out using only one type of transportation service, and providing a location for promotional events, in this case those related to transportation within Newhall Ranch.

Four small mobility hubs and two large mobility hubs would be established within the RMDP/SCP Project's three planning areas; potential locations of these mobility hubs are shown in Exhibit 2. Exhibit 3 shows a representative example of a large mobility hub, and Exhibit 4 shows a representative example of a small mobility hub. The following amenities are typical amenities that may be included at each mobility hub, based on size:

- Small Mobility Hub:

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[13] Percent VMT attributable to single family residences and multi-family residences was calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010).
[14] These numbers have been rounded to one decimal place for consistency with other strategies in the TDM Plan. The CAPCOA equation produces a more precise reduction of 2.54% for this strategy, of which 1.17% can be attributed to single-family residences purchasing NEVs and 1.37% can therefore be attributed to multi-family residences purchasing an e-bike.

  - Info kiosks
  - Transit arrival information
  - Bike lockers and bike parking
  - Enhanced pedestrian amenities
  - Branding/signage
  - Co-location of carshare and bikeshare
- Large Mobility Hub:
  - Info kiosks
  - Transit arrival information
  - Bike lockers and bike parking
  - Enhanced pedestrian amenities
  - Branding/signage
  - Co-location of carshare and bikeshare
  - Designated park–and-ride spaces

The Mobility Hub strategy is a relatively new innovation, and research documenting the effectiveness of this strategy was not available at the time the CAPCOA report was published. However, based on research conducted by Fehr & Peers for other California projects, and the CAPCOA 0.1-0.5% percent reduction attributable to park-and-ride lots as a stand-alone facility (CAPCOA page 298), mobility hubs can contribute up to an additional 0.5% VMT reduction when used in conjunction with a suite of other TDM strategies. Based on this information and Fehr & Peers' professional engineering judgment, in combination with the inclusion of six mobility hubs and the related synergy with the Project site, a 0.3% overall VMT reduction was utilized for the RMDP/SCP Project.

### *13. Tech-Enabled Mobility*

"Tech-enabled mobility" describes the development and provision of a one-stop website for transportation information, as well as complementary apps for mobile devices and computers. This website/app would provide comprehensive commute planning, on-demand rideshare matching, real-time transit arrivals, bicycle route mapping, shared ride reservations (carshare, bikeshare), and traffic information for the development facilitated by the RMDP/SCP Project. This strategy brings together elements of and enhances the effectiveness of the other strategies included in the TDM Plan. By digitally assembling resources and information about transportation options and TDM services in one place, users are enabled to make different choices based on their needs for a particular trip. It also serves as an educational tool to expose users to the full range of transportation choices.

Additional capabilities of tech-enabled mobility include:

- It allows for two-way communication once the user has registered and downloaded the app. This can enable the TMO to remind users of transportation choices or alert users about promotions through push notifications, emails, or alerts.

- The website and app can be developed in a way that moves beyond simply assembling information in one place; it has the potential to "gamify" participation on the go, allowing users to set goals, track progress, provide rewards, and compare their activity to other users. Health/habit/lifestyle tracking apps are pervasive and popular, and the website/app format can engage users even when a trip is not being made.

One example of a mobile application that brings transportation services together in one digital space is GoLA (http://golaapp.com/), produced in partnership between the City of Los Angeles and Xerox. This app allows the user to see the full range of available choices, set mode-based preferences, compare trips across a variety of metrics (total travel time, monetary cost, and environmental cost), and select an itinerary that meets the needs of that trip. Another example of a more "gamified" version of a transportation website/app is the Denver Regional Council of Government's Clear the Air Challenge (http://cleartheairchallenge.org/). Arlington County, Virginia's comprehensive TDM program also includes several tech-enabled components that bring together the program's transportation options in a digital space (www.commuterpage.com).

This strategy is a relatively new innovation, and research documenting the effectiveness of this strategy was not available at the time the CAPCOA report was published. However, based on research conducted by Fehr & Peers at large employers in the Silicon Valley, and documentation from mobility-app developers on the effectiveness of their products, mobility websites and apps can contribute up to an additional 1%-2.5% VMT reduction when used in conjunction with a suite of other TDM strategies. Based on this research and professional engineering judgment, a conservative 1.5% overall VMT reduction was estimated for the RMDP/SCP Project based on the development of a website and mobile device application specific to Newhall Ranch and the mobility options available on-site and nearby and the potential to reach many more users with information, promotions, and service options with a faster and less costly frequency.

### *14. Bikeshare Program*

According to CAPCOA, bikeshare has a minimal impact on VMT when implemented alone, but in conjunction with other strategies, can further enhance VMT reduction. Though CAPCOA lists bikeshare as a strategy, it does not provide associated estimates of VMT reduction.

In membership surveys of an established urban bikeshare system, a self-reported VMT reduction of 5.5% per year was observed.[15] Based on additional investigation done by Fehr & Peers into the effectiveness of this strategy, in combination with our professional judgment, it is estimated that the availability of bikeshare bicycles throughout the project site, in conjunction with subsidized membership, can reduce overall VMT by between 0.2%-0.5%.

Based on the conservative professional judgment of transportation engineers and planners, and in recognition of the differences between an established urban bikeshare system and the Suburban Center context of the RMDP/SCP Project's planning areas, a 0.3% VMT reduction was estimated, based on inclusion of an on-site bikeshare system with up to 15 stations. To provide additional

[15] Capital Bikeshare membership survey, 2014.

incentive to participate in the bikeshare system, the TDM Plan will subsidize 50% of the annual cost for up to 1.5% of Project residents who live in market rate housing, and 100% of the annual household membership cost for below market rate housing. The incentive program is entirely additive and does not factor in to the VMT reduction calculations.

### *15. Transit Fare Subsidy for Below Market Rate Housing Residents*

In addition to the transit fare subsidy for employees discussed above in Strategies 6 and 9, additional subsidies would be offered to residents living in below market rate households. This is a separate strategy, with an analogous methodology to Strategies 6 and 9.

For subsidies of $2.98 per person per day, the CAPCOA report provides the following formula for calculating the percent VMT reduction associated with employee transit fare subsidies, which is applied only to the external work trips, and to the 10% of households that would be affordable, below-market-rate:

> % VMT Reduction = (% employees eligible to participate) * (16.4% reduction in commute VMT) * (% share of all trips attributable to home-based commute trips) * (% external work trips) * (% below market rate households)

The same level of subsidy would be offered, the same level of eligibility is utilized, and the same information relative to the Santa Clarita Transit fare would apply as for the employee transit fare subsidy: 50% * 16.4% = 8.2%.[16] As previously described, the home-based (production end) work VMT accounts for 11% of the overall VMT, and 78% of those trips are external and would not be captured by the CTR program or transit fare subsidies for employees offered in Strategies 6 or 9. Because the subsidy would be offered to all 10% of the households identified as affordable, below market rate, the 10% rate was utilized for the calculations. Therefore, an 8.2% reduction in commute-based VMT would equate to a 0.1% reduction in overall VMT (11% * 8.2% * 78% * 10% = 0.1%).

It should also be noted that subsidizing transit passes for below market rate housing residents would be expected to increase transit usage for non-commute (i.e., non-work-related) trips, further reducing VMT from the reduction estimate provided herein.

## 5. OVERALL VMT REDUCTION EFFECTIVENESS

Based on the methodology outlined in the CAPCOA report, when determining the overall VMT reduction, the VMT reduction separately calculated for each of the individual strategies should be dampened, or diminished, according to a multiplicative formula to account for the fact that some of the strategies may be redundant or applicable to the same populations. The multiplicative equation to accomplish this adjustment is as follows:

> Overall % VMT Reduction = 1-(1-A)*(1-B)*(1-C)*(1-D) …

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[16] Based on this level of subsidy and the associated CAPCOA utilization rates, the TDM Plan is structured to provide subsidized passes to up to 300 individuals living in below market rate housing.

where A, B, C, D ... = individual mitigation strategy reduction percentages

For example, if two strategies were proposed with corresponding VMT reductions of 20% and 10%, the equation would be [1-(1-20%)*(1-10%)] or [1-(80%*90%)], which equates to a 28% reduction rather than the 30% reduction that would otherwise be seen with a direct sum. Therefore, the overall VMT reduction was calculated as a dampened, or diminished, total according to the equation above, which produces a conservative overall estimate.

Table 1, Strategies in the Recommended TDM Plan for the RMDP/SCP Project, identifies the strategies discussed above. The overall estimated VMT reduction, after accounting for the dampening effect previously described, is 14.9%. This total VMT reduction level is consistent with CAPCOA's global maximum reduction cap for projects, like the RMDP/SCP Project, located within a Suburban Center context. Additionally, Table 2, Calculations to Support the Strategies in the Recommended TDM Plan for the RMDP/SCP Project, provides a tabular overview of the mathematical inputs informing the VMT reduction effectiveness calculations for each of the strategies.

Given the ongoing evolution of transportation technologies and advancements, alternative TDM strategies with equal or enhanced effectiveness may prove to be better suited to the development facilitated by the RMDP/SCP Project. As additional TDM strategies become available, the TDM Plan would have the flexibility to implement these alternative TDM strategies of equal or enhanced effectiveness.

## APPENDIX: TDM STRATEGY EXAMPLES

### *Alternative Work Schedules and Telecommute Programs*

Telecommute programs have been implemented as a TDM strategy in Menlo Park, Alameda County, and San Mateo.[17]

### *Carshare Programs*

Carshare programs have been implemented as a TDM strategy in Menlo Park and Alameda County, and are under development in Santa Monica.[18]

### *NEV Networks*

Areas that have implemented NEV networks include Rancho Mission Viejo, a master planned community in Orange County, and the City of Lincoln, California.[19,20]

### *Mobility Hubs*

Mobility Hubs have been used to bolster the use of mobility options in Broward County (Florida), Toronto, and Milton (Ontario), and are under development in the City of Los Angeles.[21]

### *Tech-Enabled Mobility*

In June 2013, Rancho Mission Viejo and Ladera Ranch, master planned communities in Orange County, launched a comprehensive online mobility hub website to provide bus and train schedules, traffic information, and rideshare requests to users who then accumulate reward points based on commute decisions.[22] The goal of these sites was to enroll 500 residents of these communities (or 2% of all residents) in the program, further enabling easy access to the available transportation choices and encouraging participation in the suite of options.[23] Examples of

[17] http://www.menlopark.org/DocumentCenter/View/2634; http://www.greatcommunities.org/wp-content/uploads/pdf/2007%2011%20Parking%20TDM%20Policy%20Fact%20Sheet.pdf; http://www.alamedactc.org/files/managed/Document/2414/TDM_and_Parking_Management.pdf

[18] http://www.menlopark.org/DocumentCenter/View/2634; http://www.alamedactc.org/files/managed/Document/2414/TDM_and_Parking_Management.pdf

[19] Knight Shine, N. *Golf cart-like vehicles part of the plan at Rancho Mission Viejo*. OC Register. September 15, 2015. http://www.ocregister.com/articles/rancho-683758-mission-viejo.html

[20] MHM Engineers & Surveyors. *NEV Transportation Plan for the City of Lincoln*. August 2006. http://lincolnca.gov/home/showdocument?id=16

[21] http://www.browardmpo.org/projects-studies/mobility-hubs; https://crcresearch.org/case-studies/case-studies-sustainable-infrastructure/transportation/mobility-hubs-toronto-ontario; http://www.miltontransit.ca/en/transit-programs/resources/AppendixC-MiltonMobilityHubWorkingPaper.pdf; additional information provided by LADOT via email on 2/16/16.

[22] RideAmigos. *Rancho Mission Viejo Case Study*. http://rideamigos.com/wp-content/uploads/2014/11/2.1.8-Case-Study-iGoLadera.pdf

[23] Ekberg, Marie. *Five things you need to know about iGoLadera* The Orange County Register. March 27, 2013. http://www.ocregister.com/articles/community-501573-program-traffic.html

potential commercial providers of tech-enabled services include RideAmigos, Luum, Ridescout, Xerox, and Metropia.

### *Bikeshare Programs*

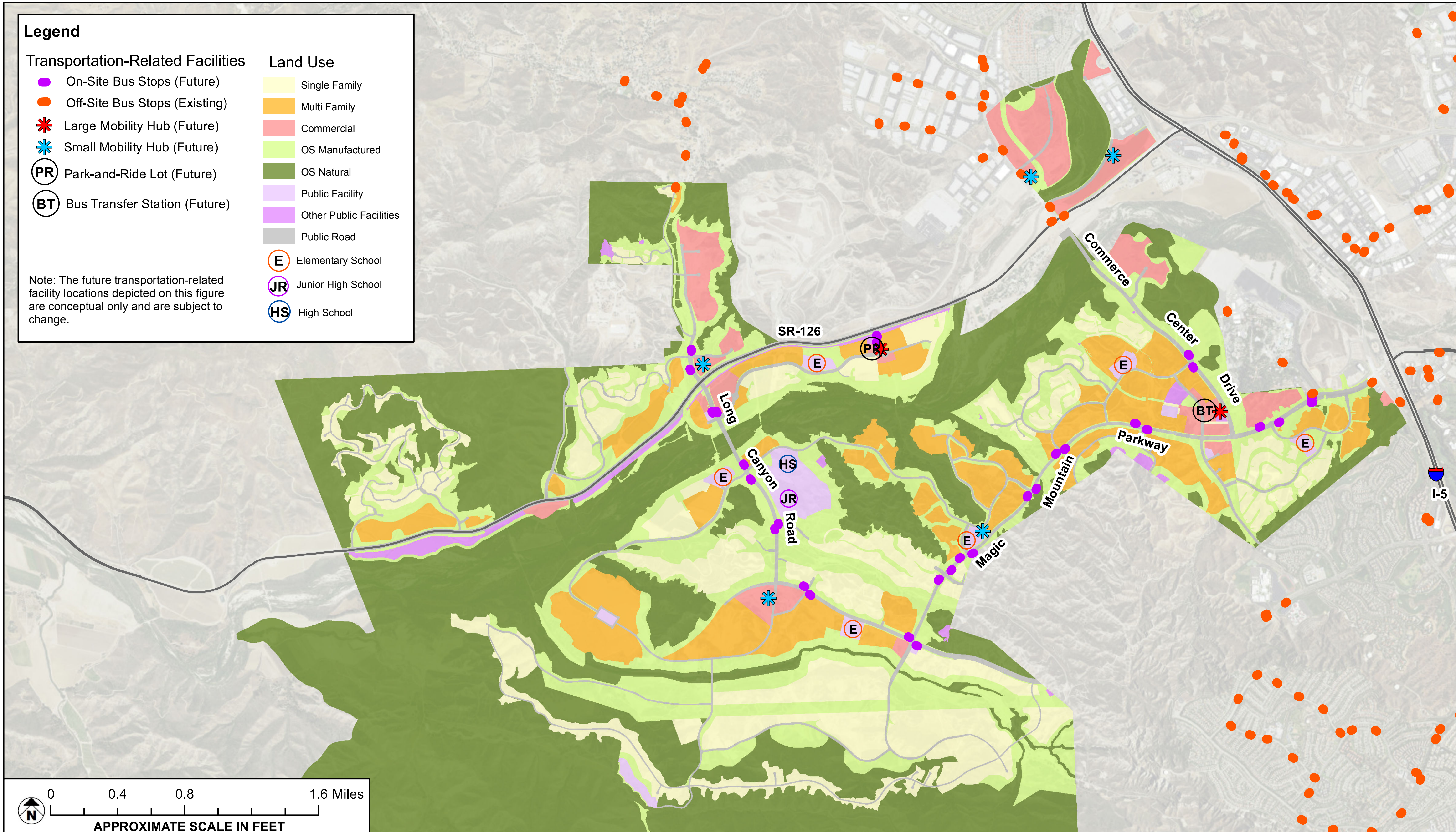
Bikesharing has been implemented as a TDM strategy in Menlo Park and Berkeley, was implemented recently in the City of Santa Monica and the City of San Diego as an additional transportation option, and is under development in Downtown Los Angeles.[24]

[24] http://www.smgov.net/Departments/PCD/Programs/Santa-Monica-Bike-Share/;
http://thesource.metro.net/2015/06/25/metro-board-approves-bikeshare-vendor-for-los-angeles-county/

# Chart 6-2: Transportation Strategies Organization

| Transportation Measures (Five Subcategories) Global Maximum Reduction (all VMT): urban = 75%; compact infill = 40%; suburban center or suburban with NEV = 20%; suburban = 15% | | | | | Global Cap for Road Pricing needs further study | |
|---|---|---|---|---|---|---|
| Transportation Measures (Four Categories) Cross-Category Max Reduction (all VMT): urban = 70%; compact infill = 35%; suburban center or suburban with NEV = 15%; suburban = 10% | | | | Max Reduction = 15% overall; work VMT = 25%; school VMT = 65%; | Max Reduction = 25% (all VMT) | |
| Land Use / Location<br>Max Reduction: urban = 65%; compact infill = 30%; suburban center = 10%; suburban = 5% | Neighborhood / Site Enhancement<br>Max Reduction: without NEV = 5%; with NEV = 15% | Parking Policy / Pricing<br>Max Reduction = 20% | Transit System Improvements<br>Max Reduction = 10% | Commute Trip Reduction (assumes mixed use)<br>Max Reduction = 25% (work VMT) | Road Pricing Management<br>Max Reduction = 25% | Vehicles |
| Density (30%) | Pedestrian Network (2%) | Parking Supply Limits (12.5%) | Network Expansion (8.2%) | CTR Program<br>Required = 21% work VMT<br>Voluntary = 6.2% work VMT | Cordon Pricing (22%) | Electrify Loading Docks |
| Design (21.3%) | Traffic Calming (1%) | Unbundled Parking Costs (13%) | Service Frequency / Speed (2.5%) | Transit Fare Subsidy (20% work VMT) | Traffic Flow Improvements (45% CO2) | Utilize Alternative Fueled Vehicles |
| Location Efficiency (65%) | NEV Network (14.4) <NEV Parking> | On-Street Market Pricing (5.5%) | Bus Rapid Transit (3.2%) | Employee Parking Cash-out (7.7% work VMT) | Required Contributions by Project | Utilize Electric or Hybrid Vehicles |
| Diversity (30%) | Car Share Program (0.7%) | Residential Area Parking Permits | Access Improvements | Workplace Parking Pricing (19.7% work VMT) | | |
| Destination Accessibility (20%) | Bicycle Network <Lanes> <Parking> <Land Dedication for Trails> | | Station Bike Parking | Alternative Work Schedules & Telecommute (5.5% work VMT) | | |
| Transit Accessibility (25%) | Urban Non-Motorized Zones | | Local Shuttles | CTR Marketing (5.5% work VMT) | | |
| BMR Housing (1.2%) | | | Park & Ride Lots* | Employer-Sponsored Vanpool/Shuttle (13.4% work VMT) | | |
| Orientation Toward Non-Auto Corridor | | | | Ride Share Program (15% work VMT) | | |
| Proximity to Bike Path | | | | Bike Share Program | | |
| | | | | End of Trip Facilities | | |
| | | | | Preferential Parking Permit | | |
| | | | | School Pool (15.8% school VMT) | | |
| | | | | School Bus (6.3% school VMT) | | |

*Note: Strategies in bold text are primary strategies with reported VMT reductions; non-bolded strategies are support or grouped strategies.*




SOURCE: Hunsaker & Associates - 2016; Santa Clarita Transit - 2016; Meridian Consultants - 2016

Exhibit 2

Meridian Consultants

Conceptual Transit Plan

080-001-15

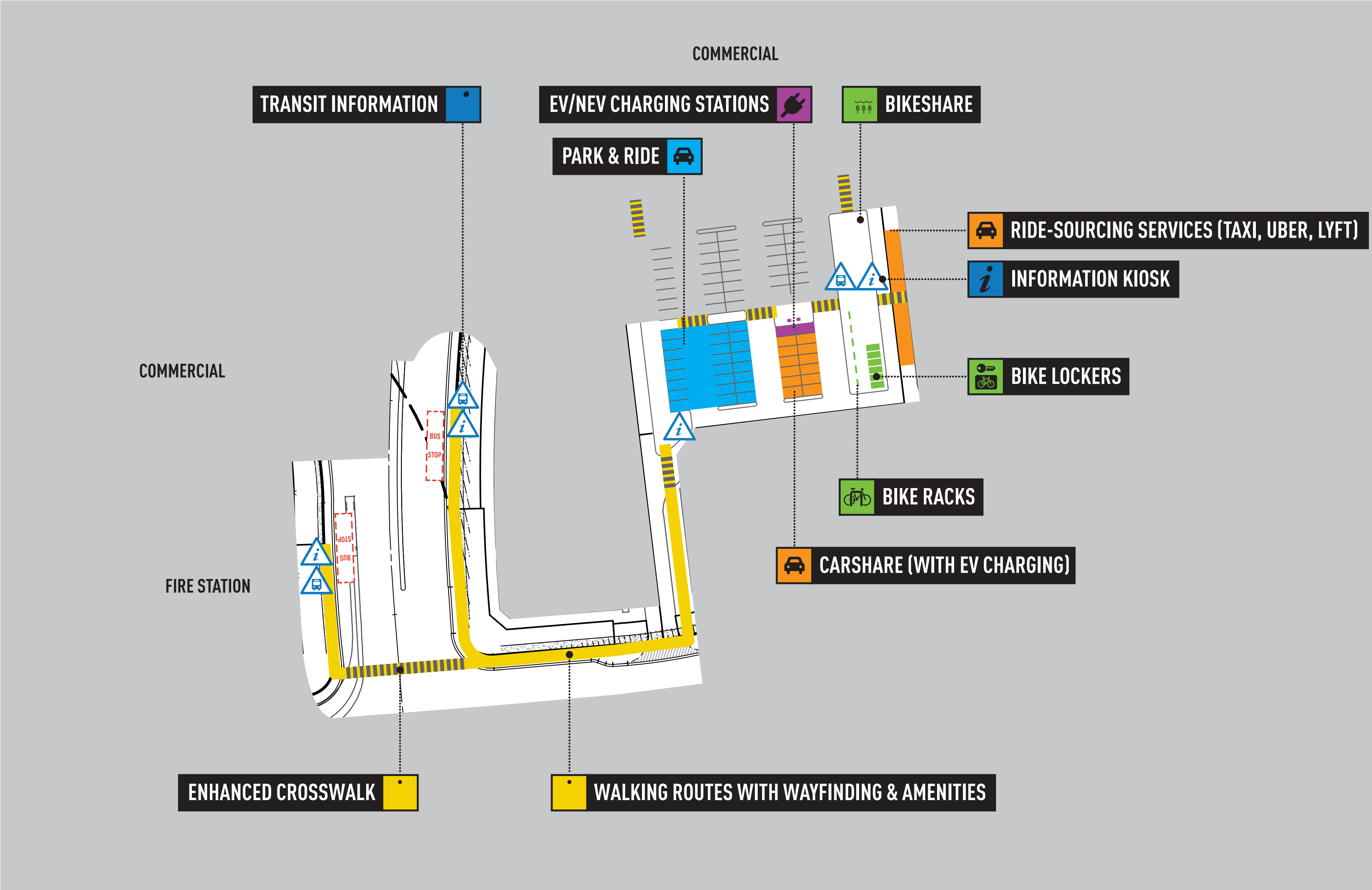



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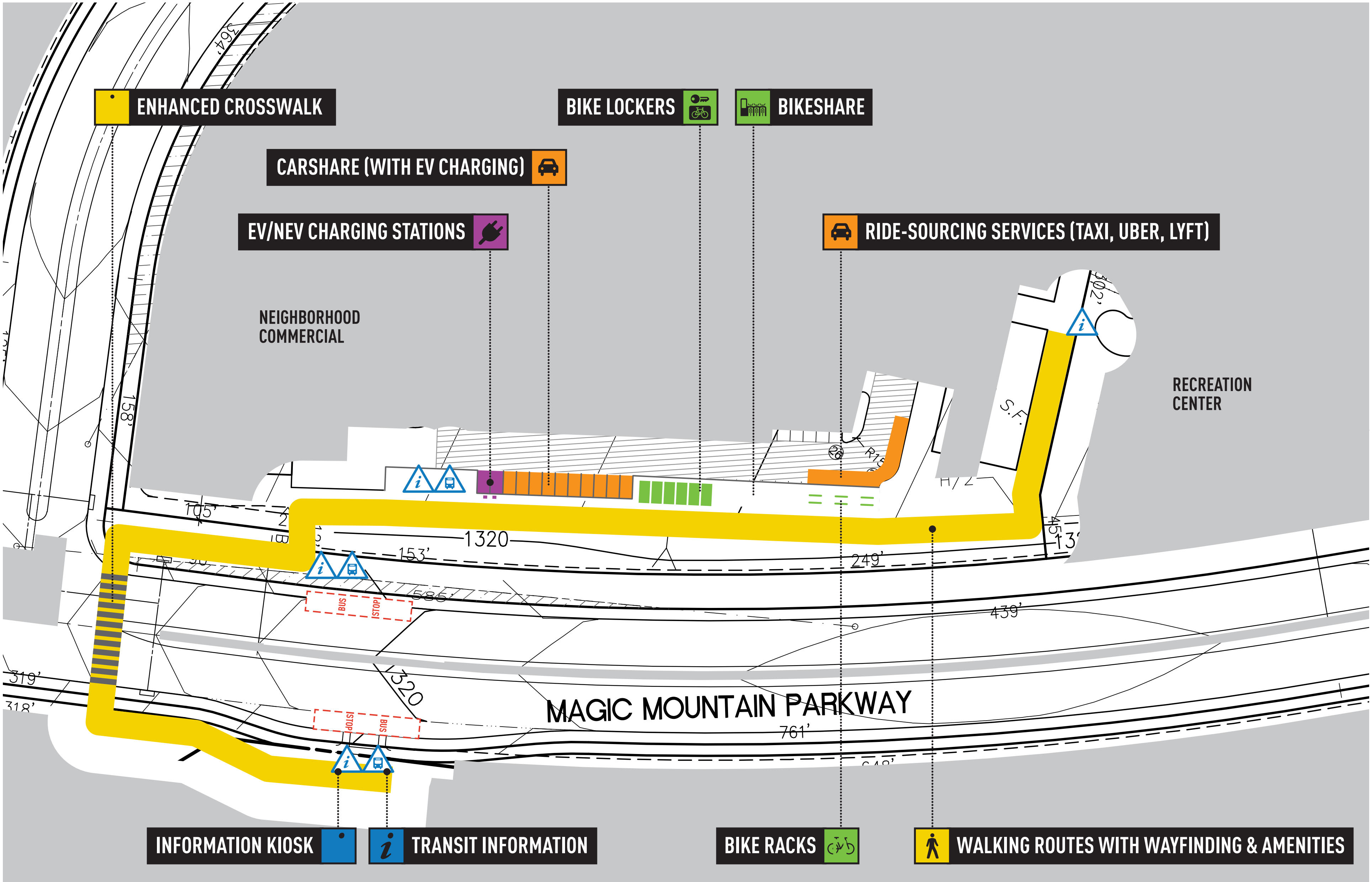
Exhibit 3

# Conceptual Large Mobility Hub Plan

The facilities and related locations depicted on this plan are conceptual only and are subject to change.




\\fpla03\data\Jobs\Active\2800s\2810_Newhall Ranch\Graphics\AI

Exhibit 4

## Conceptual Small Mobility Hub Plan

The facilities and related locations depicted on this plan are conceptual only and are subject to change.

**Table 1**
**Strategies in the Recommended TDM Plan for the RMDP/SCP Project [1,2]**

| Strategy Number | Strategy | Description | Relevant Data | CAPCOA Reference | CAPCOA Reduction Range | CAPCOA VMT Reduction for Trip Type | Reduction to Overall VMT [3] |
|---|---|---|---|---|---|---|---|
| 1 | Integrate Affordable and Below Market Rate Housing | Below market rate housing provides greater opportunity for lower income families to live closer to job centers and achieve jobs/housing match near transit. Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. | 6% of units are below market rate and affordable to an average income of 75% below area median income | LUT-6 | 0.04%-1.2% | 0.2% | 0.2% |
| 2 | Pedestrian Network | Pedestrian facilities such as sidewalks, paseos, and regional trails. | Within project and connecting off-site | SDT-1 | 0%-2% | 2.0% | 2.0% |
| 3 | Traffic Calming | One or more traffic calming measures for all on-site roadways and intersections. | 100% of streets within project; 100% of intersections within project | SDT-2 | 0.25%-1% | 1.0% | 1.0% |
| 4 | Transit Network Expansion | Extension of Santa Clarita Transit routes within the RMDP/SCP project area. | 80% increase of transit network coverage; 2.3% transit mode share as a % of total daily trips; includes TST-2 [4] | TST-3 | 0.1%-8.2% | 1.3% | 1.3% |
| 5 | Alternative Work Schedules and Telecommute Program (Residential End) | Highest internet speed available to residents and marketing efforts by the Transportation Management Organization. | 10% of employees participating; 1.5 days of telecommuting to jobs outside Newhall Ranch | TRT-6 | 0.07%-5.5% (commute trips only) | 2.2% | 0.2% |
| 6 | Required Commute Trip Reduction Program | Multi-strategy required program that encompasses a combination of individual VMT reduction measures such as ride-sharing, marketing, preferential parking, and end-of-trip facilities. Targets for the program are set and subject to regular performance monitoring and reporting. | 50% of employees eligible (participating); includes TRT-3, TRT-5, TRT-7, TRT-8 | TRT-2 | 4.2%-21% (commute trips only) | 10.5% | 1.5% |
| 7 | Alternative Work Schedules and Telecommute Program (Work End) | Encouraging telecommuting and alternative work schedules (e.g., 4/40, 9/80). | 10% of employees participating; 4/40 plan | TRT-6 | 0.07%-5.5% (commute trips | 1.5% | 0.2% |
| 8 | School Bus Program | Implement school bus service. | 76% of families using school bus program (electric bus) | TRT-13 | 38%-63% (school trips only) | 57.0% | 3.4% |
| 9 | Transit Fare Subsidy for Employees | Discounted daily or monthly public transit passes for employees. | 50% of employees eligible at $2.98/day subsidy | TRT-4 | 0.3%-20% (commute trips | 8.2% | 1.1% |
| 10 | Carshare Program | On-site availability of car-share vehicles throughout the project site, such as Zipcar or a Newhall Ranch-specific fleet. | Suburban setting | TRT-9 | 0.4%-0.7% | 0.4% | 0.4% |
| 11 | NEV & Electric Bicycle (E-Bike) Strategy | Travel network that accommodates use of NEVs and e-bikes, including features such as charging facilities, striping, signage, and educational tools. Initial financial incentive in the form of subsidies are included in this strategy. | 1 NEV per 5 single-family residences; 1 e-bike per 2 multi-family residences. | SDT-3 (NEVs only) | 0.5%-12.7% | 2.5% | 2.5% |
| 12 | Mobility Hubs | One-stop centers for transit, rideshare meeting, car share, bicycle repairs, bicycle share, end-of-trip facilities, commuter amenities. Centrally-located within each neighborhood and employment center. | Contributes to increased uptake of all strategies; co-located with electric vehicle charging stations | N/A | 0%-0.5%[5] | 0.3% | 0.3% |

**Table 1**
**Strategies in the Recommended TDM Plan for the RMDP/SCP Project [1,2]**

| Strategy Number | Strategy | Description | Relevant Data | CAPCOA Reference | CAPCOA Reduction Range | CAPCOA VMT Reduction for Trip Type | Reduction to Overall VMT [3] |
|---|---|---|---|---|---|---|---|
| 13 | Tech-Enabled Mobility | One-stop website for Newhall Ranch transportation information. Comprehensive commute planning, on-demand rideshare matching, real-time transit arrivals, bicycle route mapping, shared ride reservations (shuttle, car share), traffic information, etc. All-in-one Newhall Ranch specific transportation app or suite of apps. Similar information and services as on website. | Smart-phone apps and online resource centers contribute to increased uptake of all strategies | N/A | 1%-2.5%[5] | 1.5% | 1.5% |
| 14 | Bikeshare | On-site availability of bikeshare bicycles throughout the project site. | Minimal impact when implemented alone, but with other strategies can further enhance VMT reduction | TRT-12 | 0.2%-0.5%[5] | 0.3% | 0.3% |
| 15 | Transit Fare Subsidy - Below Market Rate Households | Discounted public transit passes to below market rate households. | Increases transit mode share for external home-work productions. | N/A | N/A | 8.2% | 0.1% |
| **Overall Global VMT Reduction** | | | | | | | **14.9%[6]** |

Notes
1. Based on the CAPCOA report, the land use type is Suburban Center.
2. The TDM Plan would include establishment of a transportation management organization (TMO) to implement and manage strategies.
3. 14% of total VMT is home-to-work attractions, 11% of total VMT is home-to-work productions, and 78% of home-to-work productions are external to Newhall Ranch calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010). 5.9% of total VMT is school trips based on CAPCOA.
4. 2.3% transit mode share based on 2014 Census Journey to Work data for Santa Clarita City.
5. Estimated VMT reduction associated with these strategies based on Fehr & Peers research.
6. Individual rows' VMT reductions do not sum to overall total since effect of individual strategy reductions are multiplicative (not additive).

**Table 2**
**Calculations to Support the Strategies in the Recommended TDM Plan for the RMDP/SCP Project [1,2]**

| Strategy Number | Strategy | CAPCOA Reference | CAPCOA Final Reduction Range | Strategy Calculations (A) | (B) | (C) | (D) | (E) | Reduction to Overall RMDP/SCP VMT [3] (F)=(A)*(B)*(C)*(D)*(E) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Integrate Below Market Rate Housing Affordable to an Average Income of 75% Below Area Median Income | LUT-6 | 0.04%-1.2% | 4% Initial CAPCOA Reduction | 6% BMR & Low-Income Housing | - | - | - | 0.2% |
| 2 | Pedestrian Network | SDT-1 | 0%-2% | | | (Calculation N/A) | | | 2.0% |
| 3 | Traffic Calming | SDT-2 | 0.25%-1% | | | (Calculation N/A) | | | 1.0% |
| 4 | Transit Network Expansion | TST-3 | 0.1%-8.2% | 80% Coverage | 1.01 Elasticity of Transit (CAPCOA) | 2.3% Transit Modeshare[4] | 0.67 Adjustment Factor (CAPCOA) | - | 1.3% |
| 5 | Alternative Work Schedules and Telecommute Program (Residential End) | TRT-6 | 0.07%-5.5% (commute trips only) | 2.2% CAPCOA Reduction (given 10% participation; 1.5 days tele-commuting) | 11% of VMT (home-based work productions) | 78% of work trips external to Newhall Ranch | - | - | 0.2% |
| 6 | Required Commute Trip Reduction Program (includes creation of TMO) | TRT-2 | 4.2%-21% (commute trips only) | 50% Employees eligible | 21% reduction in vehicle mode share (CAPCOA) | 14% of VMT (home-based work attractions) | - | - | 1.5% |
| 7 | Alternative Work Schedules and Telecommute Program (Work End) | TRT-6 | 0.07%-5.5% (commute trips only) | 1.5% CAPCOA Reduction (given 10% participation; 4/40 alternative work schedule) | 14% of VMT (home-based work attractions) | - | - | - | 0.2% |
| 8 | School Bus Program | TRT-13 | 38%-63% (school trips only) | 76% participation rate | 75% (39 weeks of school/52 weeks in a year) | 5.9% of VMT (school-based trips) | - | - | 3.4% |
| 9 | Transit Fare Subsidy for Employees | TRT-4 | 0.3%-20% (commute trips only) | 50% Employees eligible | 16.4% reduction in commute VMT (CAPCOA) | 14% of VMT (home-based work attractions) | - | - | 1.1% |
| 10 | Carshare Program | TRT-9 | 0.4%-0.7% | 37% reduction in carshare member VMT (CAPCOA) | 20 carshare members/shared car | 1 shared car/2000 suburban residents | 90% Market rate households; 10% Below Market Rate Households | - | 0.4% |

**Table 2**

**Calculations to Support the Strategies in the Recommended TDM Plan for the RMDP/SCP Project [1,2]**

| Strategy Number | Strategy | CAPCOA Reference | CAPCOA Final Reduction Range | Strategy Calculations | | | | | Reduction to Overall RMDP/SCP VMT [3] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (A) | (B) | (C) | (D) | (E) | (F)=(A)*(B)*(C)*(D)*(E) |
| 11 | NEV Strategy for Single-Family Residences | SDT-3 | 0.5%-12.7% | 1 / 5 Single-Family HH with an NEV | 12.7% VMT reduction (CAPCOA) | - | - | - | 2.5%[5] |
| | E-Bike Strategy for Multi-Family Residences | N/A | 6%-15%[6] | | | (Calculation N/A) | | | |
| 12 | Mobility Hubs | N/A | 0%-0.5%[6] | | | (Calculation N/A) | | | 0.3% |
| 13 | Tech-Enabled Mobility | N/A | 1%-2.5%[6] | | | (Calculation N/A) | | | 1.5% |
| 14 | Bikeshare | TRT-12 | 0.2%-0.5%[6] | | | (Calculation N/A) | | | 0.3% |
| 15 | Transit Fare Subsidy - Below Market Rate Households | N/A | N/A | 50% Participation | 16.4% reduction in commute VMT (CAPCOA) | 11% of VMT (home-based productions) | 78% of work trips external to Newhall Ranch | 10% Below Market Rate households | 0.1% |
| **Overall Global VMT Reduction** | | | | | | | | | **14.9%[7]** |

Notes
1. Based on the CAPCOA report, the land use type is Suburban Center.
2. The TDM Plan would include establishment of a transportation management organization (TMO) to implement and manage strategies.
3. 14% of total VMT is home-to-work attractions, 11% of total VMT is home-to-work productions, and 78% of home-to-work productions are external to Newhall Ranch calculated based on traffic modeling conducted for the RMDP/SCP EIS/EIR (December 2010). 5.9% of total VMT is school trips based on CAPCOA.
4. 2.3% transit mode share based on 2014 Census Journey to Work data for Santa Clarita City.
5. This reflects the combined effectiveness of the NEV component for single-family residences and the e-bike component for multi-family residences.
6. Estimated VMT reduction associated with these strategies based on Fehr & Peers research.
7. Individual rows' VMT reductions do not sum to overall total since effect of individual strategy reductions are multiplicative (not additive).

# APPENDIX D
# DUST CONTROL MITIGATION PLAN

Prepared for
**Entrada South and Valencia Commerce**
**Los Angeles County, California**

Prepared by
**Ramboll US Corporation**
**Irvine, California**

Project Number
**169011750-007**

Date
**June 2022**

# FUGITIVE DUST CONTROL PLAN OUTLINE

## ENTRADA SOUTH AND VALENCIA COMMERCE CENTER
## LOS ANGELES COUNTY, CALIFORNIA

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**5 Park Plaza**
**Suite 500**
**Irvine, California 92614**
**(949) 261-5151**
**(949) 261-6202**

RAMBOLL

## CONTENTS



## TABLES

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ES/VCC | Entrada and Valencia Commerce Center |
| RMDP/SCP | Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan |
| SCAMQD | South Coast Air Quality Management District |
| SEIR | Supplemental Environmental Impact Report |

# 1. INTRODUCTION

## 1.1 Introduction

This plan has been prepared to demonstrate the dust control measures that will be implemented during construction of the Entrada South and Valencia Commerce Center Project (hereinafter referred to as the Modified Project). For reference, this analysis refers to the approved Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan (RMDP/SCP; hereinafter referred to as the 2017 Approved Project) studied in the State-certified Environmental Impact Report (EIR; SCH No. 2000011025). A Supplemental Environmental Impact Report (SEIR) analyzed the Modified Project's potential impacts on air quality resulting from the development of the Entrada and Valencia Commerce Center (ES/VCC) Planning Areas.

This ES/VCC Dust Control Compliance Program Documentation sets forth the on-going procedures and practices that will be in place from the commencement of construction to monitor and document compliance with regulatory requirements that address fugitive dust emissions during Modified Project construction.

## 1.2 Rule 403 Requirements and Applicability to the Modified Project

The South Coast Air Quality Management District (SCAQMD) Rule 403 requires the implementation of fugitive dust control measures during active construction periods capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads. The Project is required to comply with Rule 403, and the ES/VCC Dust Control Compliance Program Documentation highlights selected fugitive dust control measures as required by Rule 403.

# 2. DUST CONTROL COMPLIANCE PROGRAM DOCUMENTATION PROCEDURES AND PRACTICES

## 2.1 Dust Control Measures to be Implemented

This section describes compliance documentation procedures and practices that will be implemented during Modified Project construction when there is a potential for fugitive dust emissions to occur. The dust control measures target the following dust control issues:

- Handling grading soil
- Importing/exporting materials
- Controlling wind-blown dust
- Controlling fugitive dust from high wind events
- Controlling fugitive dust from unpaved roads

## 2.2 Table 1: Documentation of Compliance

Table 1 provides the full text of each applicable dust control measure applicable to the Modified Project along with the procedures and practices for monitoring and documenting compliance for each measure. Each Target Issue may include more than one dust control measure that may be used to satisfy Rule 403 compliance. Additionally, some measures may be alternatives to other methods used to reduce fugitive dust, as specified in the table.

**Table 1: Dust Control Measures**

| | Target Issue | Dust Control Measure | Implementation Procedures of Dust Control Measure Consistent with SCAQMD Rule 403 | Documentation and Compliance Monitoring |
|---|---|---|---|---|
| 1 | Handling grading soil | Apply approved nontoxic chemical soil stabilizers according to manufacturer specifications to all inactive construction areas (previously graded areas inactive for ten days or more). | Consistent with Table 2 in Rule 403, this control action applies to disturbed surface areas where grading has been completed | Observe and monitor the application of soil stabilizers at all previously graded construction areas that are inactive for a period of ten days or more. Document the day and locations when the soil stabilizer was applied. |
| 2 | | Replace ground cover in disturbed areas. | Consistent with Table 2 in Rule 403, this is an alternative method to applying soil stabilizers (item 1) to control potential emissions from disturbed surface areas. Per Rule 403, this measure applies within 21 days after active operations have ceased if soil stabilizers have not been applied. | Document compliance with records of when mulch or binder cover is replaced after active operations have ceased. Maintain records of active operations. |
| 3 | Importing/ Exporting Materials | All trucks hauling dirt, sand, soil, or other loose materials are to be covered and/or maintain at least six inches of freeboard (i.e., minimum vertical distance between top of the load and the top of the trailer), in accordance with Sections 23114 of the California Vehicle Code. | Consistent with Table 1 in Rule 403, this control measure applies for importing and/or exporting of bulk materials. The measure states to either cover the truck or maintain at least six inches of freeboard on haul vehicles. | Field monitoring personnel will be present for documenting haul truck compliance. Maintain daily logs for all trucks exiting the site. |
| 4 | | To limit track out when other dust control measures can not be applied, one or more of the following Rule 403 fugitive dust control measures shall be applied: Pave unpaved roads, install gravel surfaces on unpaved roads, utilize wheel shaker/wheel spreading device, | Consistent with Rule 403(d)(5), one or more of the measures shall be applied to limit the tracking out of soil material from the construction site. | Document which control measure(s) were applied. |

| Table 1: Dust Control Measures | | | | |
|---|---|---|---|---|
| | **Target Issue** | **Dust Control Measure** | **Implementation Procedures of Dust Control Measure Consistent with SCAQMD Rule 403** | **Documentation and Compliance Monitoring** |
| | | install wheel shakers, rumble plats, and/or 3/4" gravel.[1] | | |
| 5 | Importing/ Exporting Materials | Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads. | n/a | Observe and monitor sweeping of paved roads before the end of the construction workday. Field monitoring personnel will be present during the soil important/export on the site.<br><br>Demonstrate compliance with a log of sweeping operations. |
| 6 | Controlling wind blown dust | For cleared or graded areas where other control measures are unable to be implemented, provide temporary wind fencing with 50 percent or less porosity along the perimeter of these areas. | Consistent with Table 1 in Rule 403, this requirement applies to active open storage pile areas if necessary. Thus, the temporary fencing is required for areas that have just been cleared or graded and are unable to be controlled by other means (e.g., item 1 soil stabilization or replaced ground cover). | Maintain a log of when fencing was provided. |

**Table 1: Dust Control Measures**

| | Target Issue | Dust Control Measure | Implementation Procedures of Dust Control Measure Consistent with SCAQMD Rule 403 | Documentation and Compliance Monitoring |
|---|---|---|---|---|
| 7 | Controlling fugitive dust from high wind events | In accordance with Rule 403, suspend excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph. | Install an on-site anemometer to measure wind speed. Anemometers are devices used to measure wind speed and direction in accordance with the performance standards, and maintenance and calibration in the most recent Rule 403 implementation handbook. If instantaneous wind speed (maximum wind gusts) exceeds 25 mph three times over a 30 minute period, alert excavating and grading operators that work shall be stopped for no less than 30 minutes. Work may resume if wind speed remains below 25 mph for at least 30 minutes. | Document compliance by maintaining the meteorological data and records showing that work was stopped based on wind gust exceedances. |
| 8 | Controlling fugitive dust from unpaved roads | Enclose, cover, and water active grading sites, or apply non-toxic soil binders to exposed piles, unpaved parking, staging areas, and/or unpaved road surfaces (i.e., gravel, sand, dirt) according to manufacturer's specifications. Contracted water trucks will apply water to these areas noted above during working hours. Stand by or extra water truck work will be planned for on an as needed basis. | Consistent with Table 2 in Rule 403, compliance with this measure is demonstrated by conducting watering at least twice daily to prevent visible emissions from extending more than 100 feet beyond the active area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors. | Document compliance includes maintaining a log of watering operations that indicate watering of active grading sites occurred. |

| Table 1: Dust Control Measures | | | | |
|---|---|---|---|---|
| | **Target Issue** | **Dust Control Measure** | **Implementation Procedures of Dust Control Measure Consistent with SCAQMD Rule 403** | **Documentation and Compliance Monitoring** |
| 9 | | Reduce and enforce maximum travel speed limit of 15 mph or less on all unpaved roads. | Consistent with Table 2 in Rule 403, compliance with this measure is demonstrated by restricting vehicle speeds to 15 miles per hour for unpaved roads. | Observe and monitor posted speed limit signs along unpaved roads. Document compliance with a photo of the speed limit signs. |
| | Notes:<br>[1] Wheel washing and other measures that use water have the potential to use additional water and generate the runoff that the rule is intended to prevent. While Rule 403(d)(5) lists wheel washing as one option to limit the track out of soil from the Modified Project site, due to the impacts of water usage, the Modified Project will not prefer wheel washing or other measures that use water because these have the potential to generate additional wastewater or runoff. | | | |

# 3. RECORDING DOCUMENTATION COMPLIANCE

## 3.1 Table 2: Fugitive Dust Control Log

As stated above, Newhall will implement the dust control measures described in this plan for the Modified Project in satisfaction of Rule 403. Table 2 provides a fugitive dust documentation compliance table for each dust control measure, organized monthly.

| Table 2: Fugitive Dust Control Log | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Month:** | | **Fugitive Dust Source Category/Control Measures** | | | | | | | | | |
| | | | **Day of Month** | | | | | | | | |
| **Target Issue** | **Dust Control Measure** | **Documentation Requirement** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **Ongoing Compliance Documentation** | | | | | | | | | | | |
| Handling Grading Soil | Apply non-toxic chemical soil stabilizers to inactive construction areas | Document the days and locations when the soil stabilizer was applied | | | | | | | | | |
| | Replace Ground Cover in disturbed areas | Document when mulch or binder cover is replaced | | | | | | | | | |
| | | Record Active Operational Days | | | | | | | | | |
| Importing/Exporting Materials | All hauling trucks are to be covered and/or maintain at least six inches of freeboard | Daily logs for all trucks exiting the site | | | | | | | | | |
| | Limit track out with dust control measures such as:<br>- Paving unpaved roads<br>- Installing gravel surface on unpaved roads<br>- Utilizing wheel shaker/wheel spreading device<br>- Installing wheel shakers, rumble plats, and/or 3/4" gravel | Document which control measure(s) were applied | | | | | | | | | |
| | Sweep streets at end of day if visible soil material is carried onto adjacent public paved roads | Observe and monitor sweeping of paved roads before the end of the construction workday and log daily sweeping operations | | | | | | | | | |
| Controlling fugitive dust from high wind events | Suspend operations when wind speeds exceed 25 mph | Maintain meteorological data | | | | | | | | | |
| | | Record when work was stopped based on wind gust exceedances | | | | | | | | | |
| Controlling fugitive dust from unpaved roads | Enclose, cover, and water active grading sites or apply non-toxic soil binders to exposed piles, unpaved parking, staging areas, and/or unpaved road surfaces | Log watering operations that indicate watering of active grading sites occurred | | | | | | | | | |
| **One-Time Compliance Documentation** | | | | | | | | | | | |
| Controlling wind blown dust | Provide temporary wind fencing for cleared or graded areas where other control measures are unable to be implemented | Log when fencing was provided | | | | | | | | | |
| Controlling fugitive dust from unpaved roads | Reduce and enforce maximum travel speed of 15 mph or less on all unpaved roads | Photograph speed limit sign when posted | | | | | | | | | |

| **Table 2: Fugitive Dust Control Log** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Month:** | | **Fugitive Dust Source Category/Control Measures** | | | | | | | | | |
| | | | **Day of Month** | | | | | | | | |
| **Target Issue** | **Dust Control Measure** | **Documentation Requirement** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| **Ongoing Compliance Documentation** | | | | | | | | | | | |
| Handling Grading Soil | Apply non-toxic chemical soil stabilizers to inactive construction areas | Document the days and locations when the soil stabilizer was applied | | | | | | | | | |
| | Replace Ground Cover in disturbed areas | Document when mulch or binder cover is replaced | | | | | | | | | |
| | | Record Active Operational Days | | | | | | | | | |
| Importing/Exporting Materials | All hauling trucks are to be covered and/or maintain at least six inches of freeboard | Daily logs for all trucks exiting the site | | | | | | | | | |
| | Limit track out with dust control measures such as:<br>- Paving unpaved roads<br>- Installing gravel surface on unpaved roads<br>- Utilizing wheel shaker/wheel spreading device<br>- Installing wheel shakers, rumble plats, and/or 3/4" gravel | Document which control measure(s) were applied | | | | | | | | | |
| | Sweep streets at end of day if visible soil material is carried onto adjacent public paved roads | Observe and monitor sweeping of paved roads before the end of the construction workday and log daily sweeping operations | | | | | | | | | |
| Controlling fugitive dust from high wind events | Suspend operations when wind speeds exceed 25 mph | Maintain meteorological data | | | | | | | | | |
| | | Record when work was stopped based on wind gust exceedances | | | | | | | | | |
| Controlling fugitive dust from unpaved roads | Enclose, cover, and water active grading sites or apply non-toxic soil binders to exposed piles, unpaved parking, staging areas, and/or unpaved road surfaces | Log watering operations that indicate watering of active grading sites occurred | | | | | | | | | |
| **One-Time Compliance Documentation** | | | | | | | | | | | |
| Controlling wind blown dust | Provide temporary wind fencing for cleared or graded areas where other control measures are unable to be implemented | Log when fencing was provided | | | | | | | | | |
| Controlling fugitive dust from unpaved roads | Reduce and enforce maximum travel speed of 15 mph or less on all unpaved roads | Photograph speed limit sign when posted | | | | | | | | | |

**Table 2: Fugitive Dust Control Log**

| Month: | | Fugitive Dust Source Category/Control Measures | Day of Month | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Target Issue** | **Dust Control Measure** | **Documentation Requirement** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** |
| **Ongoing Compliance Documentation** | | | | | | | | | | | |
| Handling Grading Soil | Apply non-toxic chemical soil stabilizers to inactive construction areas | Document the days and locations when the soil stabilizer was applied | | | | | | | | | |
| | Replace Ground Cover in disturbed areas | Document when mulch or binder cover is replaced | | | | | | | | | |
| | | Record Active Operational Days | | | | | | | | | |
| Importing/Exporting Materials | All hauling trucks are to be covered and/or maintain at least six inches of freeboard | Daily logs for all trucks exiting the site | | | | | | | | | |
| | Limit track out with dust control measures such as:<br>- Paving unpaved roads<br>- Installing gravel surface on unpaved roads<br>- Utilizing wheel shaker/wheel spreading device<br>- Installing wheel shakers, rumble plats, and/or 3/4" gravel | Document which control measure(s) were applied | | | | | | | | | |
| | Sweep streets at end of day if visible soil material is carried onto adjacent public paved roads | Observe and monitor sweeping of paved roads before the end of the construction workday and log daily sweeping operations | | | | | | | | | |
| Controlling fugitive dust from high wind events | Suspend operations when wind speeds exceed 25 mph | Maintain meteorological data | | | | | | | | | |
| | | Record when work was stopped based on wind gust exceedances | | | | | | | | | |
| Controlling fugitive dust from unpaved roads | Enclose, cover, and water active grading sites or apply non-toxic soil binders to exposed piles, unpaved parking, staging areas, and/or unpaved road surfaces | Log watering operations that indicate watering of active grading sites occurred | | | | | | | | | |
| **One-Time Compliance Documentation** | | | | | | | | | | | |
| Controlling wind blown dust | Provide temporary wind fencing for cleared or graded areas where other control measures are unable to be implemented | Log when fencing was provided | | | | | | | | | |
| Controlling fugitive dust from unpaved roads | Reduce and enforce maximum travel speed of 15 mph or less on all unpaved roads | Photograph speed limit sign when posted | | | | | | | | | |

| Table 2: Fugitive Dust Control Log | | | | | | |
|---|---|---|---|---|---|---|
| **Month:** | | **Fugitive Dust Source Category/Control Measures** | | | | |
| | | | **Day of Month** | | | |
| **Target Issue** | **Dust Control Measure** | **Documentation Requirement** | **28** | **29** | **30** | **31** |
| **Ongoing Compliance Documentation** | | | | | | |
| Handling Grading Soil | Apply non-toxic chemical soil stabilizers to inactive construction areas | Document the days and locations when the soil stabilizer was applied | | | | |
| | Replace Ground Cover in disturbed areas | Document when mulch or binder cover is replaced | | | | |
| | | Record Active Operational Days | | | | |
| Importing/Exporting Materials | All hauling trucks are to be covered and/or maintain at least six inches of freeboard | Daily logs for all trucks exiting the site | | | | |
| | Limit track out with dust control measures such as:<br>- Paving unpaved roads<br>- Installing gravel surface on unpaved roads<br>- Utilizing wheel shaker/wheel spreading device<br>- Installing wheel shakers, rumble plats, and/or 3/4" gravel | Document which control measure(s) were applied | | | | |
| | Sweep streets at end of day if visible soil material is carried onto adjacent public paved roads | Observe and monitor sweeping of paved roads before the end of the construction workday and log daily sweeping operations | | | | |
| Controlling fugitive dust from high wind events | Suspend operations when wind speeds exceed 25 mph | Maintain meteorological data | | | | |
| | | Record when work was stopped based on wind gust exceedances | | | | |
| Controlling fugitive dust from unpaved roads | Enclose, cover, and water active grading sites or apply non-toxic soil binders to exposed piles, unpaved parking, staging areas, and/or unpaved road surfaces | Log watering operations that indicate watering of active grading sites occurred | | | | |
| **One-Time Compliance Documentation** | | | | | | |
| Controlling wind blown dust | Provide temporary wind fencing for cleared or graded areas where other control measures are unable to be implemented | Log when fencing was provided | | | | |
| Controlling fugitive dust from unpaved roads | Reduce and enforce maximum travel speed of 15 mph or less on all unpaved roads | Photograph speed limit sign when posted | | | | |