World Logistics Center

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Draft Recirculated Revised Sections of the
Final Environmental Impact Report
Appendix

Moreno Valley, California

State Clearinghouse No. 2012021045

Prepared for:

City of Moreno Valley

December 2019

Appendix A

Air Quality, Greenhouse Gas, and Health Risk Analyses

ESA

Appendix A.1

Air Quality/Greenhouse Gas/Health Risk Assessment Technical Report

ESA

WORLD LOGISTICS CENTER

Air Quality, Greenhouse Gas Emissions, and Health Risk Assessment Report

Prepared for

City of Moreno Valley
14177 Frederick Street
Moreno Valley, California 92552

November 2019

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Acronyms and Abbreviations

AB 32	California Global Warming Solutions Act of 2006
AQMP	Air Quality Management Plan
ATCM	Air Toxics Control Measure
BACT	Best Available Control Technology
Basin	South Coast Air Basin
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BAU	Business as Usual
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen Code	California Green Building Standards Code
CAFE	Corporate Average Fuel Economy
CAPCOA	California Air Pollution Control Officer's Association
CARB	California Air Resources Board
CBSC	California Building Standards Commission
CCAT	California Climate Action Team
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEUS	Commercial End-Use Survey
CH_4	Methane
City	City of Los Angeles
CO	carbon monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
CPUC	California Public Utilities Commission
DPM	Diesel Particulate Matter
EMFAC	on-road vehicle emissions factor model
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
hp	horsepower
HVAC	Heating, Ventilating and Air Conditioning
IPCC	Intergovernmental Panel on Climate Change
LADWP	Los Angeles Department of Water and Power
LAGBC	Los Angeles Green Building Code

LCFS	Low Carbon Fuel Standard
LOS	Level of Service
LST	localized significance threshold
MATES IV	Multiple Air Toxics Exposure Study, May 2015
MPO	Metropolitan Planning Organization
$MTCO_2e$	Metric ton of carbon dioxide equivalent
$MMTCO_2e$	Million metric tons of carbon dioxide equivalent
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
N_2O	Nitrous Oxide
OPR	California Office of Planning and Research
Pb	lead
$PM_{2.5}$	fine particulate matter
PM_{10}	respirable particulate matter
ppm	parts per million
PFCs	Perfluorocarbons
RTIP	Regional Transportation Improvement Program
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
RPS	Renewable Portfolio Standard
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plan
SO_2	sulfur dioxide
SF_6	Sulfur Hexafluoride
TAC	toxic air contaminant
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USGBC	United States Green Building Code
VDECS	Verified Diesel Emission Control Strategies
VMT	Vehicle miles travelled
VOC	volatile organic compounds
WLCSP	World Logistics Center Specific Plan
$\mu g/m^3$	micrograms per cubic meter
µm	micrometers

EXECUTIVE SUMMARY

The World Logistics Center Specific Plan (project) proposes 40.6 million square feet of logistics warehouse uses. These uses comprise a maximum of 40.4 million square feet of "high-cube logistics" warehouse distribution uses classified as "Logistics Development" (LD) and 200,000 square feet (approximately 0.5%) of warehousing-related uses classified as "Light Logistics" (LL). In addition, the LD designation includes land for two special use areas; a fire station and a "logistics support" facility for vehicle fueling and sale of convenience goods (3,000 square feet is assumed for planning purposes for the "logistics support").

In accordance with the requirements under the California Environmental Quality Act (CEQA), this Technical Report provides an estimate of air quality and GHG emissions for the project and predicts the potential impacts from construction and operation activities. The report includes the categories and types of emission sources resulting from the Project, the calculation procedures used in the analysis, and any assumptions or limitations.

This report summarizes the potential for the project to conflict with an applicable air quality plan, to violate an air quality standard or threshold, to result in a cumulatively net increase of criteria pollutant emissions, or to expose sensitive receptors to substantial pollutant concentrations, and to generate GHG emissions that may have a significant impact on the environment and its potential to conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs. The findings of the analyses are as follows:

- The incremental increase in emissions from construction and operation of the project would exceed the regional daily emission thresholds set forth by the South Coast Air Quality Management District (SCAQMD) for VOC, NO_X, CO, PM_{10}, and $PM_{2.5}$ even with the implementation of mitigation.

- The incremental increase in onsite emissions from construction and operation of the project would exceed the localized significance thresholds for PM_{10} set forth by the SCAQMD even with implementation of mitigation.

- Emissions from the increase in traffic due to operation of the project would not have a significant impact upon 1-hour or 8-hour local carbon monoxide (CO) concentrations due to mobile source emissions.

- Project construction and operations would not expose off- or on-site receptors to significant levels of toxic air contaminants causing significant health risk with implementation of mitigation.

- The project would result in significant cumulative air quality impacts during construction and operations of the Project even with implementation of mitigation.
- Greenhouse gas emissions associated with the project would not exceed applicable thresholds and the project would be consistent with greenhouse gas reduction plans, policies, and regulations.

SECTION 1
Introduction

1.1 Existing Conditions

The project area is largely vacant undeveloped marginal agricultural land, with six occupied single-family homes and associated ranch/farm buildings in various locations on the property. In the 1920s, several farm buildings and related houses were constructed on the property and, in the 1940s, a stock farm operated on a portion of the site that was later expanded into a commercial horse farm and training facility that operated until the mid-1990s. The overall project site has been farmed by a variety of owners since the early 1900s and has supported dry (non-irrigated) farming, livestock grazing, and limited citrus groves. Much of the site continues to be used for dry farming today.

San Diego Gas & Electric (SDG&E) operates a natural gas compressor plant, known as the Moreno Compressor Station, on 19 acres south of the site. The Southern California Gas Company (SCGC) operates a metering and pipe cleaning station on two separate parcels (totaling 1.5 acres) south of the site south of Alessandro Boulevard along existing Virginia Street. The site contains a variety of overhead and underground utility lines associated with oil, natural gas, and electrical service.

Metropolitan Water District owns property and owns and operates facilities within the World Logistics Center Specific Plan (WLCSP) area. As shown on the attached map, Metropolitan's irregularly shaped fee-owned property (APN 422-040-009 and 422-040-015), Inland Feeder Tunnel, and appurtenant tunnel access structure are located within the WLCSP area. In addition, Metropolitan's Inland Feeder pipeline and appurtenant structures extend through the specific plan area in the street rights-of-way for Eucalyptus Avenue, World Logistics Center Parkway, and Davis Road. Metropolitan also has a 110-foot-wide easement along Davis Road.

At present, the project site contains a number of unimproved drainage features, but it does not contain any improved flood control facilities. The project area is largely vacant marginal agricultural land with six rural residential properties.

1.2 Project Description

The project proposes a maximum of 40.4 million square feet of "high-cube logistics" warehouse distribution uses classified as "Logistics Development" (LD) and 200,000 square feet (approximately 0.5%) of warehousing-related uses classified as "Light Logistics" (LL). In addition, the LD designation includes land for two special use areas; a fire station and a "logistics support" facility for vehicle fueling and sale of convenience goods (3,000 square feet is assumed for planning purposes for the "logistics support").

1.3 Project Location

The project is located in "Rancho Belago," the eastern portion of the City of Moreno Valley, in northwestern Riverside County. The project site is immediately south of SR-60, between Redlands Boulevard and Gilman Springs Road (the easterly city limit), extending to the southerly city limit. **Figure 1** depicts the location of the project within the region and the City of Moreno Valley. The major roads that currently provide access to the project site are Redlands Boulevard, Theodore Street, World Logistics Center Parkway, Alessandro Boulevard, and Gilman Springs Road.

The World Logistics Center (WLC) project area is located in portions of Sections 1, 12, and 13 of Township 3 South, Range 3 West; and portions of Sections 6, 7, 8, 9, 16, 17, 18, 19, 20, and 21 of Township 3 South, Range 2 West, as depicted on the U.S. Geological Survey (USGS) 7.5-minute series Sunnymead and El Casco, California quadrangles.

SOURCE: ESRI

World Logistics Center

Figure 1
Regional Location

ESA

1.4 Existing Air Quality Conditions

Existing Setting

The project site is located in the South Coast Air Basin (Basin), a geographic area that encompasses the coastal plain and connecting broad inland valleys and low hills. The Pacific Ocean forms the southwestern border of the Basin, with mountain ranges forming the remainder of the border. The Basin includes Orange County and the non-desert portions of Los Angeles County, Riverside County, and San Bernardino County. The Basin is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD).

The air quality in the air basin has been steadily improving over the last couple of decades as measured in air pollutant concentrations by the SCAQMD. A concentration of a pollutant is a measure of the amount of a pollutant in the air. Some pollutants are measured in parts per million (ppm) and some are measured in micrograms per cubic meter ($\mu g/m^3$).

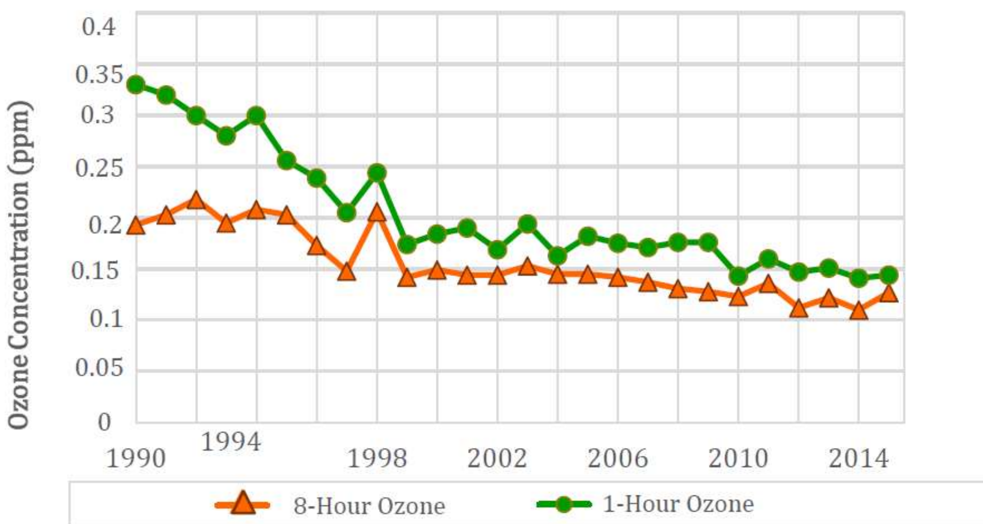
When sensitive people, such as children, pregnant women, and the elderly, breathe in air pollutants, they can experience health effects. These health effects differ based on the type of pollutant, the length of time someone is exposed, pre-existing health conditions, and the concentration of the pollutant. In general, health effects can include coughing, sore throat, chest pain, difficulty breathing, eye irritation, reduced lung function, asthma aggravation, chronic lung diseases, cancer, and lung damage.

Federal, state, and local agencies enact rules and regulations to reduce air pollutant emissions to protect the health of sensitive individuals. The EPA sets federal ambient air quality standards and the CARB sets state ambient air quality standards. When concentrations of pollutants exceed the standards, sensitive individuals may experience health effects.

Ozone is a pollutant formed in the air when emissions of volatile organic compounds (VOC) and nitrogen oxides (NO_x) combine in the presence of sunlight. Ozone is a pollutant of concern in the Basin because ozone levels exceed the ozone standards.

As shown in **Figure 2**, *Ozone Concentration Trends in the South Coast Air Basin,* ozone concentrations in the basin have generally decreased over the past twenty years for 1-hour and 8-hour averaging time periods as defined by the State and/or federal ambient air quality standards. The 1-hour and 8-hour concentration refers to the average of the concentration over a 1-hour and 8-hour time period, respectively.

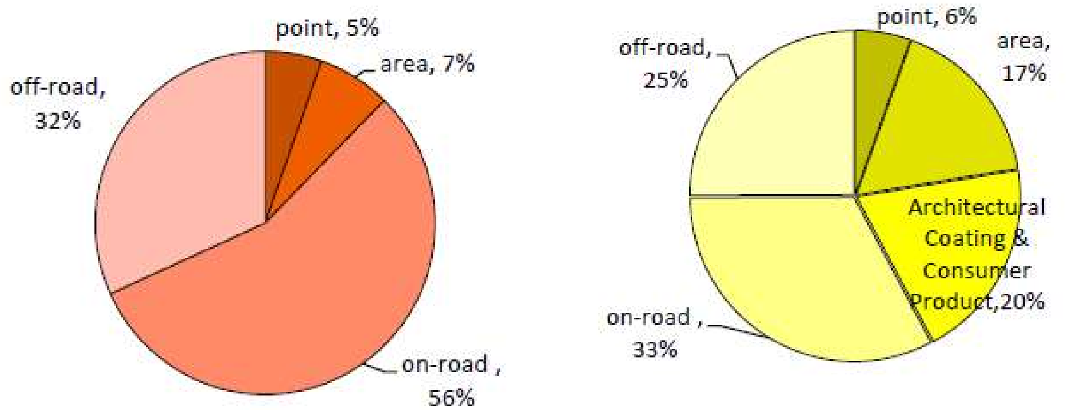
Figure 2: Ozone Concentration Trends in the South Coast Air Basin



Sources of air pollution are typically categorized into one of three groups: area, mobile, or point. Area sources include small pollution sources like dry cleaners, gas stations, commercial buildings (heating and cooling units; surface coatings), and residential buildings (fire places; surface coatings). Mobile sources include both on-road vehicles (such as cars, trucks and buses) and off-road equipment (such as ships, airplanes, agricultural and construction equipment). Point sources include major industrial facilities like chemical plants, steel mills, oil refineries, power plants, and hazardous waste incinerators. As shown in **Figure 3**, *Ozone Precursor Emissions (VOC and NO_X) in the South Coast Air Basin,* the main source of NO_x and VOC emissions in the basin are from on-road motor vehicles, not from the operation of buildings. Although vehicle miles traveled in the basin continue to increase, ozone concentrations are decreasing because of the mandated controls on motor vehicles and the replacement of older polluting vehicles with cleaner and lower-emitting vehicles. VOC and NO_x are ozone precursors; therefore, if those emissions decrease, it follows that ozone concentrations would also decrease.

Emissions of NO_x in the air basin are expected to decrease in the future despite future growth in population, and vehicle miles traveled, as shown in **Figure 4**, *NO_X Emissions Forecast in the South Coast Air Basin*.

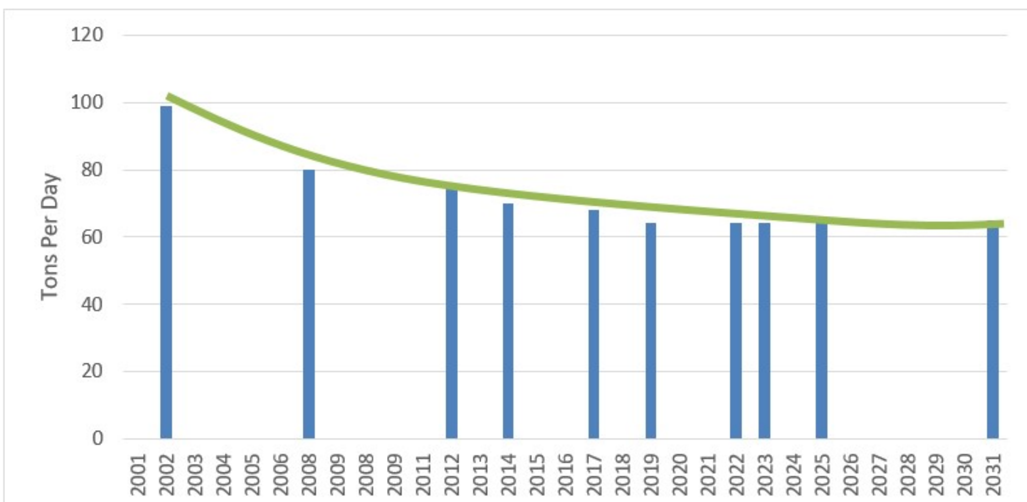
Figure 3: Ozone Precursor Emissions (VOC and NO_x) in the South Coast Air Basin



NO_X Emissions Sources in South Coast Air Basin

VOC Emissions Sources in South Coast Air Basin

Figure 4: NO_x Emissions Forecast in the South Coast Air Basin



Another pollutant of concern is particulate matter (PM). PM is a mixture of small particles and liquid droplets suspended in the air. It is made up of components such as chemicals, metals, soil, or dust particles. The size of these particulates is linked to their potential for causing health problems. Ultrafine particles are less than 0.1 in micron in diameter, fine particles are less than 2.5 microns in diameter ($PM_{2.5}$), and coarse particles are larger than 2.5 microns and smaller than 10 microns in diameter (PM_{10}). The CARB and EPA have established standards for $PM_{2.5}$ and PM_{10} but not for ultrafine particles. $PM_{2.5}$ and PM_{10} are a concern in the air basin because sometimes the concentrations exceed the standards. $PM_{2.5}$ is often used as a marker for toxic air pollutants such as diesel PM.

As shown in **Figure 5**, *$PM_{2.5}$ Emissions Forecast in the South Coast Air Basin*, $PM_{2.5}$ emissions are expected to decrease in the Basin and then level out after the year 2014.

As shown in **Figure 6**, *Particulate Matter Concentration Trends in the South Coast Air Basin,* PM_{10} and $PM_{2.5}$ annual concentrations have continued to decrease since 1990 within the air basin as a whole.

Figure 7, *$PM_{2.5}$ Concentration Trends in the Inland Empire,* provides an additional view of $PM_{2.5}$ trends specifically in the Inland Empire. As shown, there is a marked decreasing trend in $PM_{2.5}$ concentrations in Riverside-Rubidoux, Fontana, and San Bernardino from 2001 to 2016 and at Mira Loma from 2006 to 2016. This decreasing trend in the Inland Empire PM_{10} concentration continues despite simultaneous increases in urban development including the development of large warehouse complexes since 2001.

Figure 5: $PM_{2.5}$ Emissions Forecast in the South Coast Air Basin

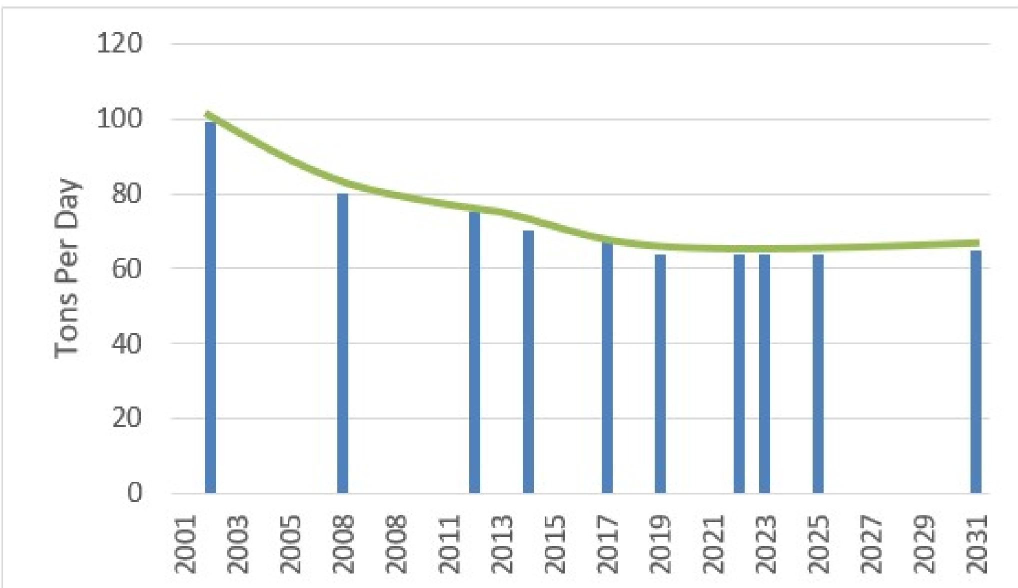


Figure 6: Particulate Matter Concentration Trends in the South Coast Air Basin

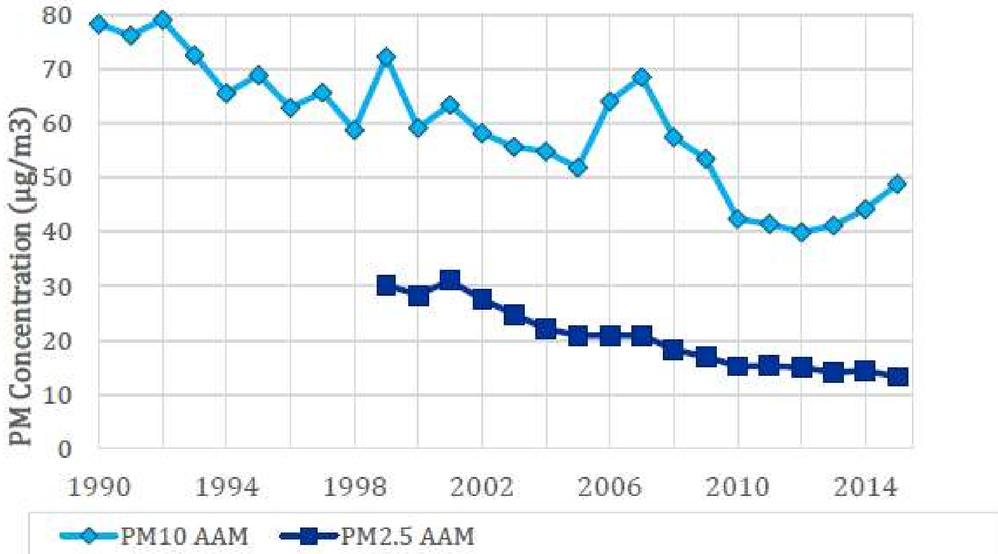
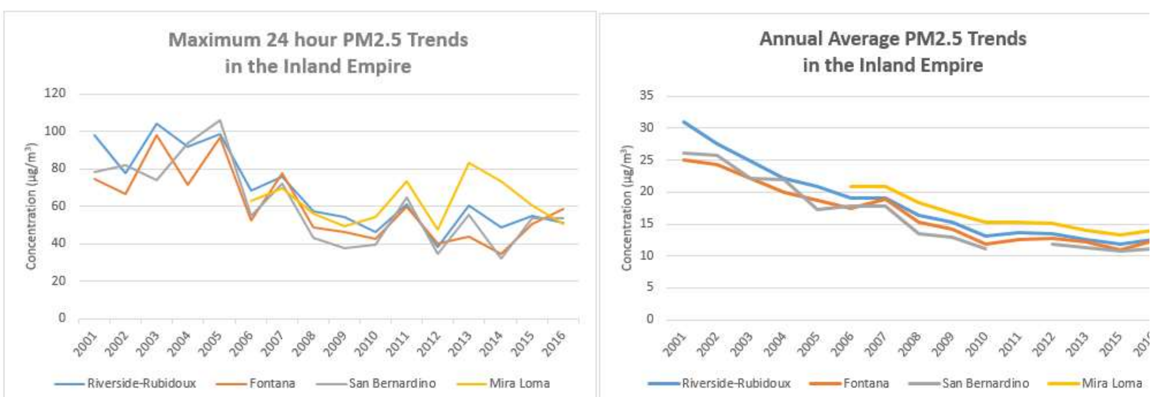
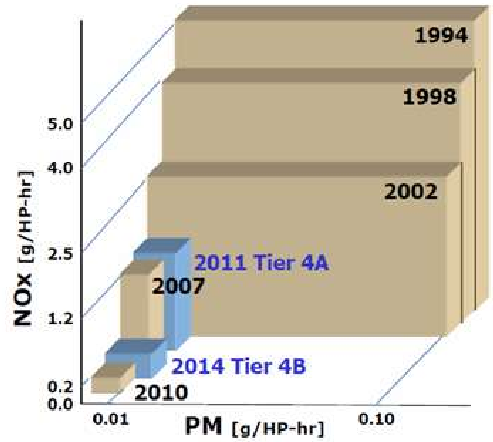


Figure 7: PM$_{2.5}$ Concentration Trends in the Inland Empire



Part of the success in the decreasing NO_x and PM emissions are increasingly stringent standards placed on motor vehicles. **Figure 8**, *Changes in U.S. Heavy-Duty Diesel NO_X and PM Emission Standards Over Time,* demonstrates the changes in U.S. heavy duty diesel emission standards for NO_x and PM over the last twenty-five years. The project would incorporate mitigation that would require that all diesel trucks accessing the project be model 2010 or younger. As shown below, emissions from 2010 trucks are only a fraction of emissions from an older vehicle, at 0.2 grams per horsepower hour (g/HP-hr) of NO_x and 0.01 g/HP-hr of PM. The text in blue represents the off-road construction standards; 2011 model vehicles incorporate Tier 4 Interim standards and 2014 models incorporate Tier 4 Final standards. The project will incorporate mitigation that requires use of only Tier 4 models of equipment.

Figure 8: Changes in U.S. Heavy-Duty Diesel NO_x and PM Emission Standards Over Time



Climate and Meteorology

Air quality in the project area is not only affected by various emission sources (mobile, industry, etc.), but also by atmospheric conditions such as wind speed, wind direction, temperature, rainfall, and amount of sunshine. The combination of topography, low atmospheric mixing height, abundant sunshine, and emissions from the second largest urban area in the United States combine to give the Basin one of the worst air pollution problems in the nation.

Winds in the Basin are predominantly of relatively low velocities, averaging about 4.0 miles per hour (mph). These low average wind speeds, together with a persistent temperature inversion, limit the vertical dispersion of air pollutants throughout the Basin. Strong, dry, north or northeasterly winds, known as Santa Ana winds, occur during the fall and winter months, dispersing air contaminants. These conditions tend to last for several days at a time.

During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas of Los Angeles County are transported predominantly inland into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are increased concentrations of carbon monoxide (CO) and oxides of nitrogen (NO_X), due to extremely low inversions and air stagnation during the night and early morning hours that trap emissions principally from mobile sources at ground level. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

Regional Air Quality

Both the State of California and the Federal government have established health-based ambient air quality standards (AAQS) for six air pollutants. These pollutants are known as “criteria pollutants.”

- Carbon monoxide (CO)
- Lead (Pb)
- Ozone (O3)

- Nitrogen Dioxide (NO2)
- Particulate matter with a diameter of 10 microns or less (PM_{10})
- Sulfur dioxide (SO_2)

Federal standards for 8-hour ozone and for fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) have also been adopted. In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety and are listed in **Table 1**, *Ambient Air Quality Standards*. **Table 2**, *Summary of Health Effects of the Major Criteria Air Pollutants,* lists the health effects of these criteria pollutants and their potential sources.

The Air Quality Index is metric index developed by the United States EPA for reporting daily air quality. It indicates how clean or polluted the air is and what associated health effects might be a concern. The Air Quality Index focuses on health effects that may be experienced within a few hours or days after breathing polluted air. Descriptions for the various pollutant levels in the Air Quality Index are shown in **Table 3**, *Air Quality Index Descriptions*.

The federal and California 8-hour ambient air quality standard for ozone is 70 ppb. The California 1-hour standard for ozone is 90 ppb (there is no federal 1-hour standard). As shown in the table, in order to achieve the federal ambient air quality standard for ozone, the Air Quality Index would need to be below 101. In order to achieve the state 8-hour ambient air quality standard for ozone, the Air Quality Index would need to be below 84.

In the Moreno Valley area during 2016 and 2017, the air quality index was greater than 150 one day each year. That means the air was unhealthy for one day in 2016 and one day in 2017. Although the main source of NO_X and VOC emissions are from on-road motor vehicles, NO_X and VOC emissions during project construction could contribute to unhealthy air days. Therefore, the project will incorporate mitigation that prohibits grading on days when an Air Quality Index is greater than 150 for particulates or ozone. If future years follow that trend, there would one day during each of the construction years when construction activities would need to be suspended.

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1] Concentration[3]	California Standards[1] Method[4]	Federal Standards[2] Primary[3,5]	Federal Standards[2] Secondary[3,6]	Federal Standards[2] Method[7]
Ozone (O_3)[8]	1-Hour	0.09 ppm (180 μg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm (137 μg/m^3)		0.070 ppm (137 μg/m^3)		
Respirable Particulate Matter (PM_{10})[9]	24-Hour	50 μg/m^3	Gravimetric or Beta Attenuation	150 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m^3		—		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	No Separate State Standard		35 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m^3	Gravimetric or Beta Attenuation	12.0 μg/m^3	15.0 μg/m^3	
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m^3)		35 ppm(40 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)[10]	Annual Arithmetic Mean	0.030 ppm (57 μg/m^3)	Gas Phase Chemiluminescence	53 ppb (100 μg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1-Hour	0.18 ppm (339 μg/m^3)		100 ppb (188 μg/m^3)	None	
Sulfur Dioxide (SO_2)[11]	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (for certain areas)[11]	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	24-Hour	0.04 ppm (105 μg/m^3)		0.14 ppm (for certain areas)[11]	—	
	3-Hour	—		—	0.5 ppm (1300 μg/m^3)	
	1-Hour	0.25 ppm (655 μg/m^3)		75 ppb (196 μg/m^3)	—	
Lead[12, 13]	30 Day Average	1.5 μg/m^3	Atomic Absorption	—	—	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 μg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average[11]	—		0.15 μg/m^3		

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Visibility-Reducing Particles[14]	8-Hour	Extinction coefficient of 0.23 per kilometer - visibility of ten miles or more (0.07-30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.	Beta Attenuation and Transmittance through Filter Tape	**No Federal Standards**		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]

[1] California standards for ozone; carbon monoxide (except 8-hour Lake Tahoe); sulfur dioxide (1- and 24-hour); nitrogen dioxide; particulate matter (PM_{10} and $PM_{2.5}$ and visibility-reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest eight-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current federal policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method which can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8] On October 1, 2015, the natural eight-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM_{10} standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the 98th percentile of the daily maximum concentrations at each site must not exceed 0.100 ppm. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 0.75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm).

[12] The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

°C = degrees Celsius
EPA = United States Environmental Protection Agency
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
ppm = parts per million
ppb = parts per billion

Source: California Air Resources Board, 2016 (https://www.arb.ca.gov/research/aaqs/aaqs2.pdf).

Table 2
Summary of Health Effects of the Major Criteria Air Pollutants

Pollutants	Sources	Primary Effects
Ozone (O_3)	▪ Atmospheric reaction of organic gases (ROG or VOC) with nitrogen oxides in the presence of sunlight.	▪ Breathing difficulty. ▪ Lung tissue damage. ▪ Damage to rubber and some plastics.
Nitrogen Dioxide (NO_2)	▪ Motor vehicle exhaust. ▪ Heavy construction equipment exhaust. ▪ Farming equipment exhaust. ▪ Residential heating.	▪ Lung irritation and damage. ▪ Formation of acid rain.
Carbon Monoxide (CO)	▪ Motor vehicle exhaust. ▪ Heavy construction equipment exhaust. ▪ Farming equipment exhaust. ▪ Residential heating.	▪ Reduced tolerance for exercise. ▪ Impairment of mental function. ▪ Impairment of fetal development. ▪ Death at high levels of exposure. ▪ Aggravation of some heart diseases (angina).
Suspended Particulate Matter ($PM_{2.5}$ and PM_{10})	▪ Motor vehicle exhaust ($PM_{2.5}$). ▪ Equipment and industrial sources ($PM_{2.5}$). ▪ Residential and agricultural burning ($PM_{2.5}$ and PM_{10}). ▪ Atmospheric chemical reactions ($PM_{2.5}$ and PM_{10}). ▪ Road dust (PM_{10}). ▪ Windblown dust (Agriculture [PM_{10}]) ▪ Construction (Fireplaces [PM_{10}])	▪ Reduced lung function. ▪ Aggravation of the effects of gaseous pollutants. ▪ Aggravation of respiratory and cardiorespiratory diseases. ▪ Increased cough and chest discomfort. ▪ Soiling. ▪ Reduced visibility.
Sulfur Dioxide (SO_2)	▪ Coal/oil- burning power plants. ▪ Industries, refineries, and diesel engines.	▪ Increased lung disease. ▪ Breathing problems for asthmatics. ▪ Formation of acid rain.
Lead (Pb)	▪ Metal smelters. ▪ Resource recovery. ▪ Leaded gasoline. ▪ Deterioration of lead paint.	▪ Learning disabilities. ▪ Brain and kidney damage.

Source: California Air Resources Board 2009 (http://www.arb.ca.gov/research/health/fs/fs2/fs2.htm).

Table 3
Air Quality Index Descriptions

Air Quality Index Levels of Health Concern	Air Quality Index Numerical Range	Ozone Concentration for Air Quality Index (ppb)		Meaning
		8-Hour	1-Hour	
Good	Low: 0 High: 50	—	—	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	Low: 51 Std: 84* High: 100	Low: 59 Std: 70*	Low: 85	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	Low: 101 High: 150	Low: 75 (also the federal standard)	Low: 125	Members of sensitive groups may experience health effects. The general public is not likely to be affected. People with heart or lung disease, children, and older adults are considered sensitive and are at greater risk. For ozone, people who are active outdoors are also considered sensitive.
Unhealthy	Low: 151 High: 200	Low: 95	Low: 165	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	Low: 201 High: 300	Low: 115	Low: 205	Health alert: everyone may experience more serious health effects
Hazardous	Low: 301 High: 500	Low: 374	Low: 405	Health warnings of emergency conditions. The entire population is more likely to be affected.

ppb = parts per billion (a measure of concentration) * Std = 8-hour California ozone ambient air quality standard

Source: Environmental Protection Agency (https://airnow.gov/index.cfm?action=aqibasics.aqi); MBA-FCS 2015

Indirect sources of pollution are generated when minor sources collectively emit a substantial amount of pollution. An example of indirect source contribution would be the motor vehicles at intersections, malls, and on highways. The California Clean Air Act (CCAA) provides the SCAQMD with the authority to manage transportation activities at indirect sources. The SCAQMD also regulates stationary sources of pollution throughout its jurisdictional area. Direct emissions from motor vehicles are regulated by the CARB.

The narrative below describes the pollutant characteristics, mechanisms of pollutant origination, and health effects each of the criteria pollutants (i.e., pollutants specifically regulated under the Federal Clean Air Act [CAA] and/or the California Clean Air Act [CCAA]) and other pollutants of concern. Because the concentration levels of the AAQS were set with an adequate margin to protect public health and safety, these health effects will not occur unless the standards are exceeded by a large margin or for a prolonged period of time. State AAQS are more stringent than Federal AAQS.

- *Carbon Monoxide*
    - Description and Properties: CO is colorless, odorless toxic gas produce by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and

biomass). CO is a primary pollutant, meaning it is emitted directly into the air (unlike secondary pollutants such as ozone that are formed by the reactions of other pollutants). CO levels tend to be highest during the winter months when the meteorological conditions support the accumulation of the pollutants. This occurs when relatively low inversion levels trap pollutants near the ground and concentrated the CO. Because CO is somewhat soluble in water, normal winter conditions of rainfall and fog can suppress CO conditions.

- Health Effects: CO is essentially inert to plants and materials but can have significant effects on human health. CO gas enters the body through the lungs, dissolves in the blood, and replaces oxygen as an attached hemoglobin. This binding reduces available oxygen in the blood and; therefore, reduces oxygen delivery to the body's organs and tissues. Effects on humans range from slight headaches to nausea to death. Elevated levels of CO can also cause visual impairments, reduced manual dexterity, poor learning ability, reduced work capacity, and trouble performing complex tasks.

- Sources: The major sources of CO are on-road vehicles, aircraft, and off-road equipment, or any source that burns fuel including residential heaters and stoves. Since most of the CO sources are the indirect result of urban development, most emissions and unhealthy CO levels occur in major urban areas.

- *Ozone*

  - Description and Physical Properties: O_3 is known as a photochemical pollutant. Ozone is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between reactive organic gases (ROG) or volatile organic compounds (VOC), NO_X, and sunlight. ROG and NO_X are emitted from automobiles, solvents and fuel combustion, the sources of which are widespread throughout the SCAQMD. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. The conditions conducive to the formation of ozone include extended periods of daylight (solar radiation) and hot temperatures. These conditions are prevalent during the summer when thermal inversions are most likely to occur. As a result, summertime conditions of long periods of daylight and hot temperatures form ozone in the greatest qualities. During the summer, thermal inversions trap ozone from dispersing vertically, high concentrations of this pollutant are prevalent.

  - Health Effects: Health effects of ozone can include respiratory system irritation, reduction of lung capacity, asthma aggravation, inflammation and damage to lung cells, aggravated cardiovascular disease, and permanent lung damage. The greatest health risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Ozone also damages natural ecosystems such as forests, foothill communities, and damages agricultural crops and some man-made materials such as rubber, paint, and plastics.

- Sources: Ozone is a secondary pollutant, thus is not emitted directly in the lower level of the atmosphere. The sources of ozone precursors (ROG and NO_X) are discussed above in the description of ozone.

- *Oxides of Nitrogen*

  - Description and Physical Properties: During combustion of fossil fuels, oxygen reacts with nitrogen to produce NO_X (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, and N_2O_5). Atmospheric deposition of NO_X occurs when atmospheric or airborne nitrogen is transferred to water, vegetation, soil, or other materials. Acid deposition involves the deposition of nitrogen and/or sulfur acidic compounds that can harm natural resources and materials. NO_X is also an ozone precursor. When NO_X and ROG are released in the atmosphere, they can also be a precursor to PM_{10} and $PM_{2.5}$.

  - Health Effects: The EPA has concluded that the only form of NO_X that exists at a level high enough to cause public health concerns is nitrogen dioxide (NO_2). Nitrogen dioxide is a brown gas with a strong odor. NO_X can react with moisture, ammonia, and other compounds to form nitric acid and related particles. The main human health concerns of nitrogen dioxide include lung damage, increased incidence of chronic bronchitis, eye and mucus membrane damage, negative effects on the respiratory system, pulmonary dysfunction, and premature death. Small particles can penetrate deeply into the sensitive tissue of the lungs and can cause or worsen respiratory disease such as emphysema, asthma, and bronchitis, and can also aggravate existing heart disease. Because NO_X is an ozone precursor, the health effects associated with ozone are also indirect health effects associated with unhealthful levels of NO_X emissions.

  - Sources: A major source of NO_X includes stationary source fuel combustion (i.e. manufacturing and industrial, food and agricultural processing, and service commercial uses). Additionally, NO_X emission sources include motor vehicles internal combustion engines and electric utility and industrial boilers powered by fossil fuel combustion. Natural sources of NO_X include lightning, soils, wildfires, stratospheric intrusion, and the oceans. Natural sources accounted for approximately seven percent of 1990 emissions of NO_X for the United States. On-road vehicles also contribute to NO_X emissions.

- *Sulfur Dioxide*

  - Description and Physical Properties: Sulfur dioxide (SO_2) is a colorless, pungent gas. At levels greater than 0.5 ppm, the gas has a strong odor, similar to rotten eggs. Sulfuric acid is formed from sulfur dioxide, which is an aerosol particle component that affects acid deposition. Sulfur oxides (SO_X) include sulfur dioxide and sulfur trioxide (SO_3). The gas can also be produced in the air by dimethylsulfide and hydrogen sulfide. Sulfur dioxide is removed from the air by dissolution in water, chemical reactions, and transfer to soils and ice caps. Historically, sulfur dioxide was a pollutant of concern. However, with the successful application of regulations at the State and local level, the levels of sulfur dioxide have been reduced dramatically in the past several decades. The CARB, the State regulatory agency charged with regulating air pollution in the State, demonstrates that sulfur dioxide levels in the State are well below the maximum standards. Although sulfur dioxide concentrations have been reduced to levels well below State and Federal standards, further reductions are desirable because sulfur dioxide is a precursor to sulfate and PM_{10}. Sulfates are a particulate formed through the photochemical oxidation of sulfur dioxide.

- Health Effects: Sulfur dioxide is a soluble gas; therefore, it can be absorbed in the mucous membranes of the respiratory tract and nose. Long-term exposure of high levels of sulfur dioxide can cause irritation of existing cardiovascular disease, respiratory illness, and changes in the defenses in the lungs. When people with asthma are exposed to high levels of sulfur dioxide for short periods of time during moderate activity, effects may include wheezing, chest tightness, or shortness of breath.

- Sources: Anthropogenic, or human caused, sources include fossil-fuel combustion, mineral ore processing, and chemical manufacturing. Volcanic emissions are a natural source of sulfur dioxide.

- *Lead*

  - Description and Physical Properties: Lead (Pb) is a solid heavy metal that can exist in air pollution as an aerosol particle component. An aerosol is a collection of solid, liquid, or mixed-phase particles suspended in the air. Lead was first regulated as an air pollutant in 1976. Leaded gasoline was first marketed in 1923 and was used in motor vehicles until around 1970. The exclusion of lead from gasoline helped to decrease emissions of lead in the United States from 219,000 to 4,000 short tons per year between 1970 and 1997. Even though leaded gasoline has been phased out in most countries, some still use leaded gasoline. The mechanisms by which lead can be removed from the atmosphere (sinks) include deposition to soils, ice caps, and oceans, and inhalation.

  - Health Effects: Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. The more serious effects of lead poisoning include behavior disorders, mental retardation, and neurological impairment. Low levels of lead in fetuses and young children can result in nervous system damage, which can cause learning deficiencies and low IQs. Lead may also contribute to high blood pressure and heart disease.

- Sources: Lead-ore crushing, lead-ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, soil waste disposal, and crustal physical weathering.

- *Particulate Matter (PM_{10} and $PM_{2.5}$)*
  - Description and Physical Properties: Particulate matter is a generic term that defines a broad group of chemically and physically different particles (either liquid droplets or solids) that can exist over a wide range of sizes. Examples of atmosphere particles include those produced from combustion (diesel soot or fly ash), light produced (urban haze), sea spray produced (salt particles), and soil-like particles from re-suspended dust. In discussions of air pollution, particulate matter is typically divided up into two size categories: PM_{10} and $PM_{2.5}$ because of the adverse health effects associated with the smaller-sized particles. PM_{10} refers to particulate matter that is 10 microns or less in diameter (1 micron is one-millionth of a meter, also known as a micrometer [µm]). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in a diameter. Soil dust consists of the minerals and organic material found in soil being lifted up into the air by winds (e.g., fugitive dust).
  - Health Effects: Particulate matter can be inhaled directly into the lungs where it can be absorbed into the bloodstream. It is a respiratory irritant and can cause direct pulmonary effects such as coughing, bronchitis, lung disease, respiratory illnesses, increased airway reactivity, and exacerbation of asthma. Relatively recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. Non-health related effects include reduced visibility and soiling of property.
  - Sources: Particulate matter originates from a variety of stationary and mobile sources. Stationary sources include fuel combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal and recycling. Mobile or transportation-related sources include particulate matter from highway vehicles and non-road vehicles and fugitive dust from paved and unpaved roads. Secondary particulate matter is formed in the atmosphere through chemical reactions that can involve ROG, SO_X, NO_X, and ammonia.

- *Diesel Particulate Matter*
  - Description and Physical Properties: Diesel particulate matter (DPM) is a source of $PM_{2.5}$ as the size of diesel particles are typically 2.5 microns and smaller. In 1998, DPM made up about 6 percent of the total $PM_{2.5}$ inventory nationwide. Diesel exhaust is a complex mixture of thousands of particles and gases that is produced when an engine burns diesel fuel. DPM includes the particles-phase

constituents in diesel exhaust. Organic compounds account for 80 percent of the total particulate matter mass, which is composed of compounds such as hydrocarbons and their derivatives, and polycyclic aromatic hydrocarbons (PAHs) and their derivatives. Fifteen PAHs have been confirmed for carcinogenicity, a number of which are found in diesel exhaust. The chemical composition and particle sizes of diesel PM vary between different engine types (heavy-duty, light-duty), engine operating conditions (idle, accelerate, decelerate), expected load, engine emission controls, fuel formulations (high/low sulfur fuel), and the year of the engine.

- Cancer Health Effects: Human studies on the carcinogenicity of diesel particulate matter demonstrate an increased risk of lung cancer, although the increased risk cannot be clearly attributed to diesel exhaust exposure. Several occupational and ambient studies have documented the health effects due to exposure to diesel PM. The California Office of Environmental Health Hazards Assessment (OEHHA), in its role in assessing risk from environmental factors reviews such studies and makes recommendations on how environmental risk should be evaluated through programs like the AB2588 Hot Spots Program. In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, 1950's era railroad workers, and equipment operators. The studies showed these workers were more likely to develop lung cancer than workers who were not exposed to diesel emissions. These studies provided strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. However, all of these studies were based on exposure to exhaust from traditional diesel engines and prior to the advent of highly efficient emissions controls like the diesel particulate filter. Based on these studies, CARB identified diesel exhaust a toxic air contaminant in 1998.

- Non-Cancer Health Effects: Some short-term (acute) effects of diesel exhaust include eye, nose, throat, and lung irritation, and can cause coughs, headaches, light-headedness, and nausea. Diesel exhaust is a major source of ambient particulate matter pollution as well, and numerous studies have linked elevated particle levels in the air to increase hospital admission, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems.

- Sources: Diesel exhaust.

- *Visibility-Reducing Particles*

  - Description and Physical Properties: Visibility-reducing particles (VRP) are suspended particulate matter that reduces visibility. Visibility is the distance through the air that can be seen without the use of instrumental assistance. The distance that can be seen is limited by the amount of gases and aerosol particles in the way. The EPA implemented a Regional Haze Rule in 1999 to attempt to protect visibility in 156 national parks and wilderness areas in the United States. The regulation requires states to establish goals for improving their areas and to work together with other states as the pollution is often transported over long distances.

- Health Effects: The human health effects of VRP are those of pollution (particulate matter, oxides of nitrogen, and sulfur dioxide) discussed above.
- Sources: The sources are other pollutants (particulate matter, oxides of nitrogen, and sulfur dioxide) as discussed above.

- *Vinyl Chloride*
  - Description and Physical Properties: Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products, including pipes, wire and cable coatings, and packaging materials. Vinyl chloride is formed when other substances such as trichloroethylene and tetrachloroethylene are broken down. This can occur when plastics containing these substances are left to decompose in solid waste landfills. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites due to microbial breakdown of chlorinated solvents. In 1978, the CARB established a State ambient air quality standard for vinyl chloride. The standard was set at 0.01 ppm for a 24-hour duration because that was the lowest level that could be detected at that time. In 1990, the CARB identified vinyl chloride as a toxic air contaminant and estimated a cancer unit risk factor.
  - Health Effects: Short-term exposure to high levels of vinyl chloride in air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.
  - Sources: Manufacturing of PVC plastic and vinyl products.

- *Hydrogen Sulfide*
  - Description and Physical Properties: Hydrogen sulfide (H_2S) is a flammable, colorless, poisonous gas that smells like rotten eggs.
  - Health Effects: High levels of hydrogen sulfide can cause immediate respiratory arrest. It can irritate the eyes and respiratory tract and cause symptoms like headache, nausea, vomiting, and cough. Long exposure to hydrogen sulfide can cause pulmonary edema.

- Sources: Hydrogen sulfide and other reduced sulfur compounds form by the anaerobic decomposition of manure some types of bacteria found in animal and human by-products produce hydrogen sulfide during reduction of sulfur-containing compounds, such as proteins. Manure, storage tanks, ponds, anaerobic lagoons, and land application sites are the primary sources of hydrogen sulfide emissions. Anthropogenic sources include the combustion of sulfur containing fuels (oil and coal) and organic matter that undergoes putrefaction. It is used in the production of heavy water for nuclear reactors, the manufacture of chemicals, in metallurgy, and as an analytical reagent.

- *Reactive Organic Gases and Volatile Organic Compounds*

    - Description and Physical Properties: Reactive organic gases (ROG), or volatile organic compounds (VOC), are defined as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. ROG consist of nonmethane hydrocarbons and oxygenated hydrocarbons. Hydrocarbons are organic compounds that contain only hydrogen and carbon atoms. Nonmethane hydrocarbons are hydrocarbons that do not contain the unreactive hydrocarbon, methane. Oxygenated hydrocarbons are hydrocarbons with oxygenated functional groups attached.

    - It should be noted that there are no State or Federal ambient air quality standard for ROG because they are not classified as criteria pollutants. They are regulated, however, because a reduction in ROG emissions reduces certain chemicals reactions that contribute to the formulation of ozone. ROG are also transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.

    - Health Effects: Although health-based standards have not been established for ROG, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of ROG are suspected to cause eye, nose, and throat irritation; headaches, loss of coordination, nausea, damage to liver, kidney, and the central nervous system. There are many ROG that have been classified as toxic air contaminates. A particular ROG of concern is benzene, which is described in more detail below. The EPA maintains a list of all air substances that have been classified as hazardous to humans and/or animals, and includes ROG, pesticides, herbicides, and radionuclides.

    - Sources: The major sources of ROG are on-road motor vehicles and solvent evaporation.

- *Benzene*

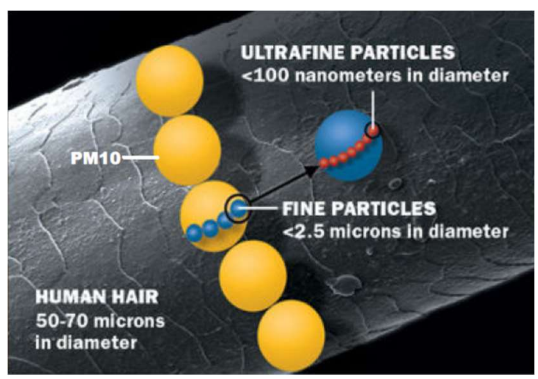
- Description and Physical Properties: Benzene is an ROG. It is a clear or colorless light-yellow, volatile, highly flammable liquid with a gasoline-like odor. The EPA has classified benzene as a "Group A" (human) carcinogen.

- Health Effects: Short-term (acute) exposure of high doses from inhalation of benzene may cause dizziness, drowsiness, headaches, eye irritation, skin irritation, and respiratory tract irritation, and at higher levels, unconsciousness can occur. Long-term (chronic) occupational exposure of high dose by inhalation has caused blood disorders, including aplastic anemia and lower levels or red blood cells. Occupational exposure to benzene has been shown to cause leukemia (mainly acute myelogenous leukemia). Studies have also found that benzene exposure increased the risks of lymphatic and hematopoietic cancer (cancers of lymphatic system and of organs and tissues involved in the production of blood), total leukemia, and specific histologic types of leukemia.

- Sources: Benzene is emitted into the air from gasoline services station (fuel evaporation), motor vehicle exhaust, tobacco smoke, and from burning oil and coal. Benzene is also used as a solvent for paints, inks, oils, waxes, plastic, and rubber. It is used in the extraction of oils from seeds and nuts. It is also used in manufacturing detergents, explosives, dyestuffs, and pharmaceuticals.

Ultrafine Particles. Ultrafine particles are particulate matter (PM) that exists in the ambient air and are less than 0.1 micrometer (µm or microns) in diameter. Ultrafine particles (UFP or PM0.1) are included in the group called $PM_{2.5}$, particulate matter less than 2.5 micrometers in diameter.

The picture to the right displays the relative size of the particles compared with a human hair, with PM_{10} (particulate matter less than 10 micrometers in diameter) indicated as yellow circles, $PM_{2.5}$ shown as blue circles, and ultrafine particles shown as red circles.



The CARB or the EPA have not set an ambient air quality standard for ultrafine particles because health effect evidence and measurements are currently limited. In its recent revisions to the national ambient air quality standards for particulate matter, the EPA states, "In considering both the currently available health effects evidence and the air quality data, the Policy Assessment concluded that this information was still too limited to provide support for consideration of a distinct PM standard for ultrafine particles".[1]

The EPA indicates that evidence and research regarding health effects from short-term and long-term exposure to ultrafine particles are still too limited to establish a standard for ultrafine particles. In addition, the EPA reports that the studies that do exist have reported inconsistent and mixed results. The following is an excerpt from the Federal Register illustrating this point:

1 U.S. Environmental Protection Agency. 2013. Federal Register. National Ambient Air Quality Standards for Particulate Matter. Website: http://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf. Accessed May 2018.

> *"New evidence, primarily from controlled human exposure and toxicological studies, expands our understanding of cardiovascular and respiratory effects related to short-term ultrafine particle exposures. However, the Policy Assessment concluded that this evidence was still very limited and largely focused on exposure to diesel exhaust, for which the Integrated Science Assessment concluded it was unclear whether the effects observed are due to ultrafine particles, larger particles within the $PM_{2.5}$ mixture, or the gaseous components of diesel exhaust. In addition, the Integrated Science Assessment noted uncertainties associated with the controlled human exposure studies using concentrated ambient particle systems, which have been shown to modify the composition of ultrafine particles.*
>
> *The Policy Assessment recognized that there are relatively few epidemiological studies that have examined potential cardiovascular and respiratory effects associated with short-term exposures to ultrafine particles. These studies have reported inconsistent and mixed results.*
>
> *Collectively, in considering the body of scientific evidence available in this review, the Integrated Science Assessment concluded that the currently available evidence was suggestive of a causal relationship between short-term exposures to ultrafine particles and cardiovascular and respiratory effects. Furthermore, the Integrated Science Assessment concluded that evidence was inadequate to infer a causal relationship between short-term exposure to ultrafine particles and mortality as well as long-term exposure to ultrafine particles and all outcomes evaluated".* [2]

The Integrated Science Assessment for Particulate Matter concluded that evidence is inadequate to determine a causal relationship between short-term exposures of ultrafine particles to mortality or central nervous system effects, but that the evidence suggests short-term (24-hour) exposures cause cardiovascular and respiratory effects. The assessment also concluded that there is inadequate evidence linking long-term exposure (typically measured in terms of an annual concentration) of ultrafine particles to health effects, including respiratory, developmental, cancer, and mortality. Overall, epidemiological studies of atmospheric PM suggest that cardiovascular effects are associated with smaller particles, but there are few reports that make a clear link between ultrafine particle exposures and increased mortality. In January 2015, a new study[3] on the relationship of mortality to long-term exposure to fine and ultra-fine particles was released. The study found there was a relationship between mortality and both fine and ultra-fine particles exposure.

In its Quantitative Health Risk Assessment for Particulate Matter, the EPA did not assess ultrafine particles, stating "that there was insufficient data to support a quantitative risk assessment for other size fractions (e.g., ultrafine particles)."[4]

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2 U.S. Environmental Protection Agency. 2013. Federal Register. National Ambient Air Quality Standards for Particulate Matter. Website: http://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf. Accessed May 2018.

3 Environmental Health Perspectives, January 2015. Associations of Mortality with Long-Term Exposures to Fine and Ultrafine Particles, Species and Sources: Results from the California Teachers Study Cohort

4 U.S. Environmental Protection Agency. 2010. Quantitative Health Risk Assessment for Particulate Matter. EPA-452/R-10-005. Website: http://www.epa.gov/nscep/index.html. (Search for the document.)

The availability of measurements of ultrafine particles to support health studies is also limited:

> *With respect to our understanding of ambient ultrafine particle concentrations, at present, there is no national network of ultrafine particle samplers; thus, only episodic and/or site-specific data sets exist. Therefore, the Policy Assessment recognized a national characterization of concentrations, temporal and spatial patterns, and trends was not possible at this time, and the availability of ambient ultrafine measurements to support health studies was extremely limited. In general, measurements of ultrafine particles are highly dependent on monitor location and, therefore, more subject to exposure error than accumulation mode particles. Furthermore, the number of ultrafine particles generally decreases sharply downwind from sources, as ultrafine particles may grow into the accumulation mode by coagulation or condensation. Limited studies of ambient ultrafine particle measurements have suggested that these particles exhibit a high degree of spatial and temporal heterogeneity driven primarily by differences in nearby source characteristics. Internal combustion engines and, therefore, roadways are a notable source of ultrafine particles, so concentrations of these particles near roadways are generally expected to be elevated. Concentrations of ultrafine particles have been reported to drop off much more quickly with distance from roadways than fine particles.* [5]

In addition, it was hypothesized that chemical composition of PM may be a better predictor of health effects than particle size:

> *In addressing the issue of particle composition, the Integrated Science Assessment concluded that, '[f]rom a mechanistic perspective, it is highly plausible that the chemical composition of PM would be a better predictor of health effects than particle size.' Heterogeneity of ambient concentrations of* $PM_{2.5}$ *constituents (e.g., elemental carbon, organic carbon, sulfates, nitrates) observed in different geographical regions as well as regional heterogeneity in* $PM_{2.5}$*-related health effects reported in a number of epidemiological studies are consistent with this hypothesis.* [6]

The SCAQMD's Multiple Air Toxics Exposure Study (MATES-IV) states, "the health impact caused by exposure to UFPs [ultrafine particles] is still not well-understood." MATES-IV presents measurements of black carbon and ultrafine particles at 10 fixed sites within the Basin. The results indicate that the highest black carbon levels were at more urban sites located near major roadways. Black carbon was not measured in the previous MATES-III; however, elemental carbon levels decreased about 35 percent during from 2005 to 2012. Black carbon is a term used for elemental and graphitic components of soot.

The SCAQMD's 2016 Air Quality Management Plan (AQMP), discusses its progress in implementing the 2012 AQMP which contains a detailed chapter on near roadway exposure and ultrafine particles. The 2012 AQMP summarizes current health effect research on ultrafine particles. The potential health effects from ultrafine particle exposure are similar to those of $PM_{2.5}$

5 U.S. Environmental Protection Agency. 2013. Federal Register. National Ambient Air Quality Standards for Particulate Matter. Website: http://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf. Accessed May 2018.

6 U.S. Environmental Protection Agency. 2013. Federal Register. National Ambient Air Quality Standards for Particulate Matter. Website: http://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf. Accessed May 2018.

and PM_{10}: such as adverse cardio-respiratory responses including elevated blood pressure, and mild inflammatory and prothrombotic (obstruction of circulation) responses. The AQMP indicated that future research and assessment is needed in the following areas:

- Chemical Composition. Chemical composition of ultrafine particles depends on many factors, including vehicle technology, fuel, and atmospheric chemical reactions after being emitted. Particle composition may be a factor determining particle toxicity; therefore, knowledge regarding the chemistry is important.
- Formation. More research is needed regarding the processes leading to ultrafine particle formation.
- Standardized Measurement Methods and Procedures. Currently, there is no standard method for conducting size-classified or particle-number measurements. Characteristics measured in ambient and emission-testing studies are highly dependent on the measurement instrument/protocol used and its setting.
- Measurements at Hot Spot Locations. More measurements should be taken at “hot spots” where large numbers of vehicles are operated.
- Emissions Inventories. Vehicle emission factors for different particle size ranges and for particle numbers are highly uncertain, and there are no emission inventories for ultrafine particles from motor vehicles. New estimations of ultrafine particle levels should not be derived solely from vehicle emission factors (i.e., EMFAC), but have to include predictions for formation near the tailpipe and in the atmosphere.
- Air Quality Modeling. Modeling tools will need to be developed to simulate the formation and transport over a wide range of atmospheric conditions and emissions scenarios. The dispersion near the first few hundred meters of the roadway needs to be better understood.
- Health Effects. New toxicological and epidemiological studies targeting exposure to controlled and uncontrolled emissions from gasoline and diesel vehicles are needed to better characterize the exposure-response relationships to ultrafine particles and to help develop health guidelines and potential regulations. The health effects of inorganic ultrafine particle emissions from vehicles are only now starting to receive significant attention.
- Other Sources. More work is needed to better understand size, composition, and health impact of particles near stationary sources and other processes (rather than just motor vehicles).

Children and Air Pollution. Numerous studies have shown strong links between air pollution exposures and a range of health outcomes. One particular study was carried out over a 10-year experimental time period by the University of Southern California, the Children’s Health Study.[7] The Children's Health Study, which began in 1992, is a large, long-term, study of the effects of chronic air pollution exposures on the health of children living in Southern California. Children

7 Gauderman, W, et. al. Peters: Association between Air Pollution and Lung Function Growth in Southern California Children. American Journal of Respiratory and Critical Medicine. Vol 162. Page 1383. 2000.

may be more strongly affected by air pollution because their lungs and their bodies are still developing. Children are also exposed to more air pollution than adults since they breathe faster and spend more time outdoors in strenuous activities. About 5,500 children in twelve communities were enrolled in the study; two-thirds of them were enrolled as fourth-graders. Data on the children's health, their exposures to air pollution, and many factors that affected their responses to air pollution were gathered annually until they graduated from high school. The major conclusions reached in the University of Southern California's Children's Health Study are shown below. Note however, that the conclusions provided below were developed based on measurements made in the 1990's when levels of air pollution in the Basin were substantially higher than current levels.

- Children exposed to higher levels of particulate matter, nitrogen dioxide, acid vapor and elemental carbon, had significantly lower lung function at age 18, an age when the lungs are nearly mature and lung function deficits are unlikely to be reversed.

- Children who were exposed to current levels of air pollution had significantly reduced lung growth and development when exposed to higher levels of acid vapor, ozone, nitrogen dioxide, and particulate matter, which is made up of very small particles that can be breathed deeply into the lungs.

- Children living in communities with higher concentrations of nitrogen dioxide, particulate matter, and acid vapor had lungs that both developed and grew more slowly and were less able to move air through them. This decreased lung development may have permanent adverse effects in adulthood.

- Children who moved away from study communities had increased lung development if the new communities had lower particulate matter levels, and had decreased lung development if the new communities had higher particulate matter levels.

- Days with higher ozone levels resulted in significantly higher school absences due to respiratory illness. Children with asthma who were exposed to higher concentrations of particulate matter were much more likely to develop bronchitis.

- In the most recent update to the Children's Health Study, researchers discovered that improvements in regional air quality contributed to improved children's lung function. Specifically, combined exposure to two harmful pollutants, nitrogen dioxide (NO_2) and fine particulate matter, fell approximately 40 percent for children in the third study group (2007-2011) compared to the first study group (1994-98). The study followed children from Long Beach, Mira Loma, Riverside, San Dimas and Upland.

- Children's lungs grew faster as air quality improved. Lung growth from age 11 to 15 was more than 10 percent greater for children breathing the lower levels of NO_2 from 2007 to 2011 compared to those breathing higher levels from 1994 to 1998.

- The percentage of children in the study with abnormally low lung function at age 15 dropped from nearly 8 percent for the 1994-98 group, to 6.3 percent in 1997-2001, to just 3.6 percent for children followed between 2007 and 2011.

Air Pollution Constituents and Attainment Status

The CARB has many responsibilities with respect to air quality, including the following:

- Coordination and oversight of State and Federal air pollution control programs in California;
- Oversight activities of local air quality management agencies (e.g., the SCAQMD);
- Responsibility for incorporating air quality management plans for local air basins into a State Implementation Plan (SIP) for EPA approval; and
- Maintaining air quality monitoring stations throughout the State in conjunction with local air districts.

The CARB has divided the State into 15 air basins based on meteorological and topographical factors that affect air pollution. An air basin generally has similar meteorological and geographic conditions throughout. The CARB and EPA use the data collected at monitoring stations to classify air basins as attainment, nonattainment, nonattainment transitional, or unclassified, based on air quality data for the most recent three calendar years compared with the AAQS. Nonattainment areas are imposed with additional restrictions, as required by the EPA to attain and maintain air quality standards. The air quality data are also used to monitor progress in attaining and maintaining air quality standards.

Significant authority for air quality control within the various air basins has been given to local air districts that regulate stationary source emissions and develop local nonattainment plans. **Table 4,** *Attainment Status of Criteria Pollutants in the South Coast Air Basin,* identifies the attainment status for the criteria pollutants in the Basin. The State AAQS are more stringent than the Federal AAQS.

Table 4
Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
O_3 1-hour	Nonattainment	N/A
O_3 8-hour	Nonattainment	Extreme Nonattainment
PM_{10}	Nonattainment	Maintenance – serious (San Bernardino County is in nonattainment)
$PM_{2.5}$	Nonattainment	Moderate Nonattainment
CO	Attainment	Serious Maintenance
NO_2	Attainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Pb	Attainment	Attainment
All others	Attainment/Unclassified	Attainment/Unclassified

Unclassified designation: a pollutant that is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment designation: a pollutant is designated attainment if the State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment: a pollutant is designated nonattainment if there was at least one violation at any site in the area during a 3-year period.
Source: California Air Resources Board (https://www.arb.ca.gov/desig/adm/adm.htm), 2018; Environmental Protection Agency (https://www.epa.gov/green-book), 2018

Regional Air Quality Improvements

The SCAQMD website (aqmd.gov) contains historical air quality data dating back to 1994; the year after air pollution emissions thresholds were established. As described on the SCAQMD website,[8] in 1994 pollutant concentrations in the Basin exceeded three of the six Federal ambient air quality standards. The state sulfate standard was exceeded in some Basin areas. The state lead standard was exceeded in one localized area immediately adjacent to a source of lead emissions. No areas of the Basin exceeded standards for nitrogen dioxide or sulfur dioxide. The Los Angeles and Riverside County areas of the Southeast Desert Air Basin (SEDAB) served by the District exceeded standards for ozone and PM_{10}. No other standards were exceeded in the District SEDAB areas. The Federal standards were exceeded at one or more locations in the Basin during 142 days in 1994.

The American Lung Association website (lung.org) includes data collected from State air quality monitors that are used to compile an annual *State of the Air* report. These reports have been published over the last 13 years. The latest *State of the Air Report* compiled for the Basin was in 2017.[9] As noted in this report, air quality in the Basin has significantly improved in terms of both pollution levels and high pollution days over the past three decades. Riverside County's average number of unhealthy ozone days dropped from 203 days per year in the initial 2000 State of the Air report to 122 in 2017 report and San Bernardino County's number of unhealthy ozone days dropped from 230 in 2000 to 142 in 2017. Both Counties has seen dramatic reduction in particle pollution since the initial State of the Air report (2000). While the 2017 *State of the Air Report* shows a slight uptick in the number of days of unhealthy particle pollution for both counties since

8 Historical Air Quality, Summary of 1994 Air Quality, http://aqmd.gov/smog/AirQualityStandardsComplianceReport/AirQualitySummary94.html, website accessed December 17, 2012.

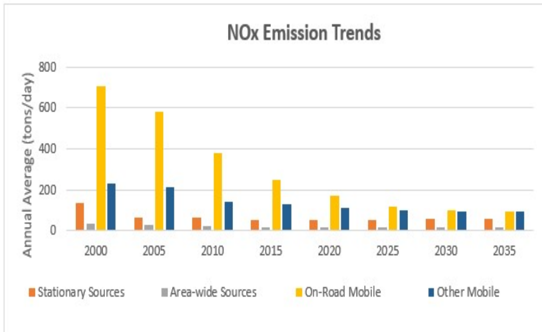
9 *State of the Air 2017,* American Lung Association, *http://www.lung.org/associations/states/california/assets/pdfs/sota/south-coast-fact-sheet.pdf,* website accessed April 2018.

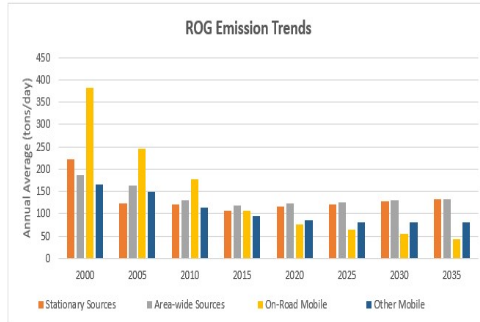
the 2016 report, it is important to note that pollution levels measured in this latter report were affected by fluctuations in weather conditions.

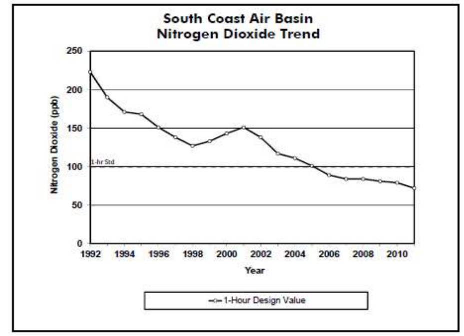
The 2016 Air Quality Management Plan 2016 AQMP outlines a comprehensive control strategy that meets the requirement for expeditious progress towards an attainment date for the five National Ambient Air Quality Standards (NAAQS) being analyzed. As stated in the 2016 AQMP, "The ozone and PM levels continue to trend downward as the economy and population increase, demonstrating that it is possible to maintain a healthy economy while improving public health through air quality improvements" (South Coast Air Quality Management District 2016). As shown in **Figure 9**, *NO_X, VOC, CO, and Ozone Trends in the South Coast Air Basin*, NO_X, VOC, PM, NH_3, have been decreasing in the Basin since 2000 and are projected to continue to decrease through 2035.[10] These decreases result primarily from motor vehicle controls and reductions in evaporative emissions. Although vehicle miles traveled in the Basin continue to increase, NO_X and VOC levels are decreasing because of the mandated controls on motor vehicles and the replacement of older polluting vehicles with lower-emitting vehicles. NO_X emissions from electric utilities have also decreased due to use of cleaner fuels and renewable energy.

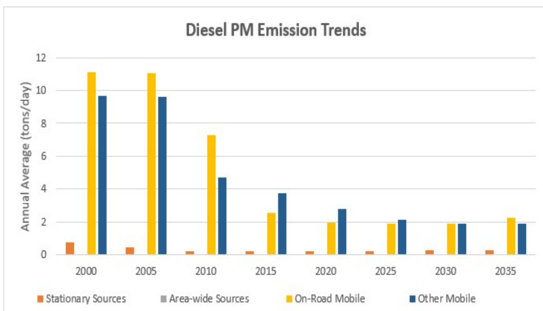
[10] CARB, California Almanac of Emissions and Air Quality, 2013 Edition

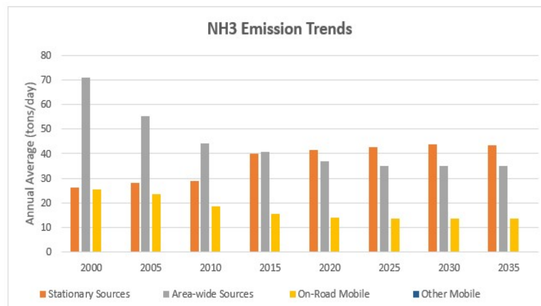
Figure 9: NOx, VOC, CO, and Ozone Trends in the South Coast Air Basin

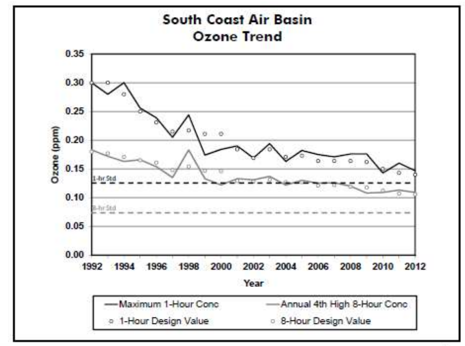


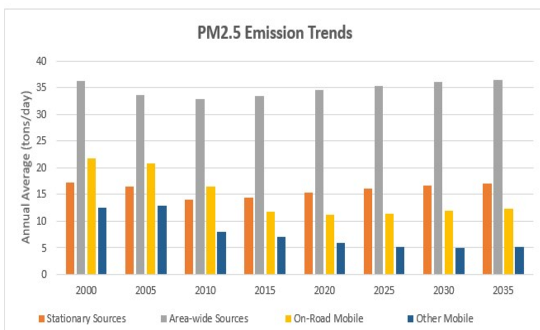




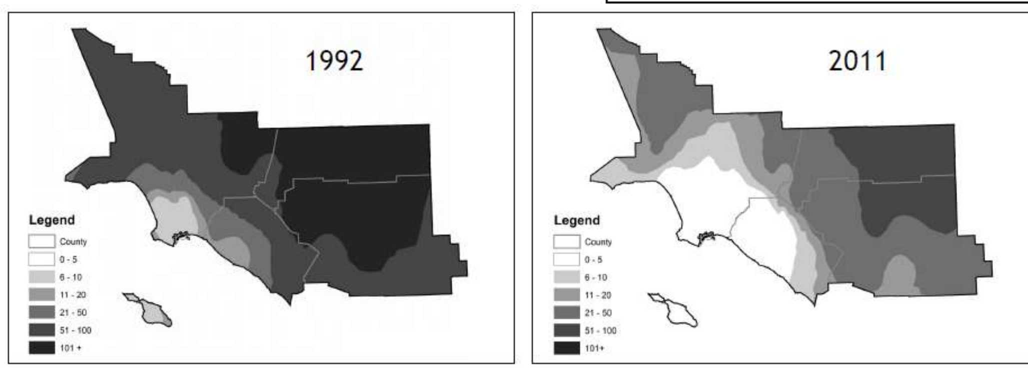








Source: CARB, California Almanac of Emissions and Air Quality, 2013 Edition.

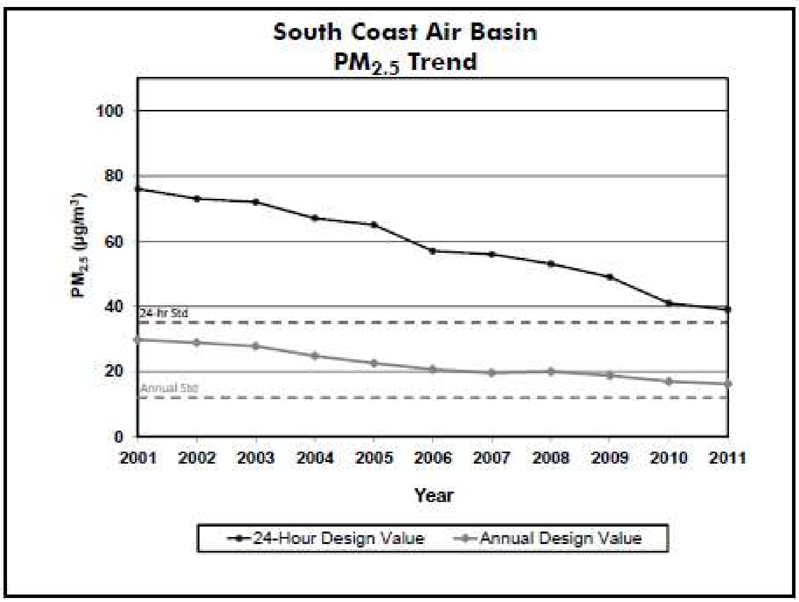


Ozone Contour Maps – 3 year Average of National 8-hour Exceedance Days

Figure 9 also displays ozone contour maps, which show that the number of days exceeding the national 8-hour standard has decreased between 1992 and 2011. During the 1992 time period, nearly all of the South Coast had more than 50 exceedance days, with more than 100 days in nearly one-third of the Basin. This is equivalent to more than three months during a year with ozone concentrations above the level of the standard. The 2011 map now shows a large area with less than ten exceedance days. Much of this area currently meets the national standard, including about two-thirds of Orange County and one-third of Los Angeles County, where the majority of the Basin population lives and works.[11]

As shown in the top portion of **Figure 10**, *Particulate Matter Trends in the South Coast Air Basin*, the overall trends of $PM_{2.5}$ in the air (not emissions) show an overall improvement since 2001. Area-wide sources (fugitive dust from roads, dust from construction and demolition, and other sources) contribute the greatest amount of direct particulate matter emissions.

Figure 10: Particulate Matter Trends in the South Coast Air Basin



Source: CARB, California Almanac of Emissions and Air Quality, 2013 Edition.

The reduction in air pollution levels experienced in the Basin is attributable to multiple factors. First, Federal and State regulatory strategies requiring the use of cleaner fuels and use of emissions control technology in the transportation and energy production industries have proven to greatly reduce the amount of tailpipe emission (vehicles) and point source (power plants) pollutants (e.g., NO_X and ROG). Second, the SCAQMD's rules and regulatory programs have proven to be instrumental in improving the air quality in the Basin. As an example, the SCAQMD has adopted multiple rules regarding fugitive dust (PM_{10} and $PM_{2.5}$) and construction emissions that have resulted in reduced emission levels. Third, the SCAQMD's creation of the 1993 CEQA review handbook has resulted in lead agencies throughout the air basin employing uniform

[11] CARB. The California Almanac of Emissions and Air Quality, 2013 Edition. https://www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm. Accessed April 2018

CEQA analyses and methodologies. The use of uniform CEQA review has allowed the SCAQMD and lead agencies that rely on the 1993 SCAQMD Air Quality Handbook to perform CEQA analysis to better track progress and to employ uniform mitigation and design feature strategies. Fourth, the use of the SCAQMD thresholds of significance to determine a project's direct and cumulative impact has allowed the SCAQMD to make tremendous progress toward achieving air quality attainment. The discussion above (pertaining to the air quality improvements achieved over the past 20 years) demonstrates that the SCAQMD's rules and procedures, including the uniform utilization of the thresholds of significance recommended in the SCAQMD *CEQA Air Quality Handbook* are contributing toward the achievement of improved air quality in the Basin.

It is for this reason the City have chosen to rely on the thresholds of significance established by the SCAQMD in its 1993 CEQA Handbook and subsequent additions to the Handbook. These thresholds of significance (which serve as both direct and cumulative thresholds) have been uniformly utilized by lead agencies throughout the Basin for the past 20 years and the improvement of air quality within the Basin throughout this time period has demonstrated the efficacy of these thresholds, along with the other regional and statewide regional programs discussed above, in improving air quality throughout the Basin.

Local Air Quality

The SCAQMD, together with the CARB, maintains ambient air quality monitoring stations in the Basin. The air quality monitoring station most representative of the project site is the Riverside-Rubidoux station. This station monitors CO, SO_2, NO_2, O_3, PM_{10}, and $PM_{2.5}$. Some monitoring data for SO_2 has been omitted as attainment is regularly met for this pollutant within the Basin. This station characterizes the air quality representative of the ambient air quality in the project area. The ambient air quality data in **Table 5**, *Ambient Air Quality Monitored in the Project Vicinity,* identify that CO and NO_2 levels are consistently below the relevant State and Federal standards in the project vicinity. O_3, PM_{10}, and $PM_{2.5}$ levels all exceed State and/or Federal standards regularly. **Figure 11**, *Air Quality Monitoring Station,* identifies the location of the monitoring station relative to the project site.

Sensitive Land Uses in the Project Vicinity

Sensitive receptors include residences, schools, medical offices, convalescent facilities, and similar uses where people sensitive to air pollutants may be located (i.e., the ill, elderly, pregnant women, and children). There are currently six occupied single-family homes and associated ranch/farm buildings in various locations on the project site. These residences are existing on-site sensitive receptors. The nearest off-site existing sensitive receptors in the vicinity of the project site are the residences located along Bay Avenue, Merwin Street, west of Redlands Boulevard, and scattered residences along Gilman Springs Road north of Alessandro Boulevard. Nearby sensitive land uses are depicted in **Figure 12,** *Existing Sensitive Receptors*.

Existing Project Area Emissions

The project area is largely vacant undeveloped marginal agricultural land, with six occupied single-family homes and associated ranch/farm buildings in various locations on the property.

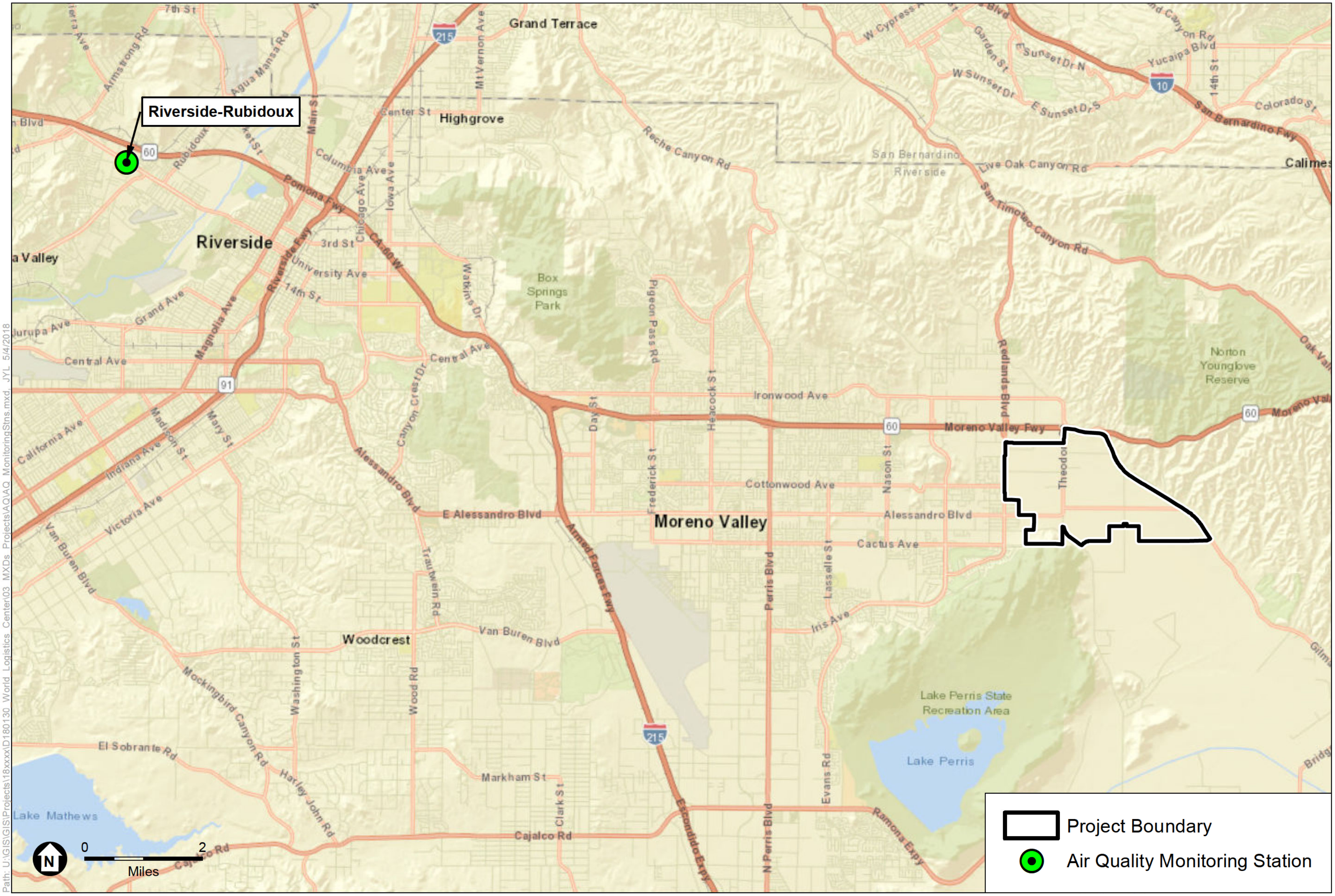
Much of the site is currently used for dry farming generating criteria pollutant and dust emissions. San Diego Gas & Electric (SDG&E) operates a natural gas compressor plant, known as the Moreno Compressor Station, on 19 acres south of the site. The Southern California Gas Company (SCGC) also operates a metering and pipe cleaning station on two separate parcels (totaling 1.5 acres) south of the site south of Alessandro Boulevard along existing Virginia Street. Existing air quality conditions at the project site reflect ambient[12] monitored conditions as presented in **Table 5**.

[12] Ambient: of or related to the immediate surroundings of something; in this context it means "in the air"

Table 5
Ambient Air Quality Monitored in the Project Vicinity

Pollutant	Standard	2014	2015	2016	2017
Carbon Monoxide (CO)					
Maximum 1-hr concentration (ppm)		2.4	2.5	1.6	2.4
Number of days exceeded:	State: > 20 ppm	0	0	0	0
	Federal: > 35 ppm	0	0	0	0
Maximum 8-hr concentration (ppm)		1.9	1.7	1.3	1.8
Number of days exceeded:	State: ≥ 9.0 ppm	0	0	0	0
	Federal: ≥ 9 ppm	0	0	0	0
Ozone (O_3)					
Maximum 1-hr concentration (ppm)		0.141	0.132	0.142	0.145
Number of days exceeded:	State: > 0.09 ppm	29	31	33	ND
Maximum 8-hr concentration (ppm)		0.105	0.106	0.105	0.118
Number of days exceeded:	State: > 0.070 ppm	69	59	71	ND
	Federal: > 0.075 ppm	41	39	47	84
Coarse Particulates (PM_{10})					
Maximum 24-hr concentration (μg/m^3)		100	69	84	92
Number of days exceeded:	State: > 50 μg/m^3	125	92	ND	ND
	Federal: > 150 μg/m^3	0	0	0	0
Annual arithmetic mean concentration (μg/m^3)		44.8	40.0	ND	ND
Exceeded for the year	State: > 20 μg/m^3	Yes	Yes	ND	ND
Fine Particulates ($PM_{2.5}$)					
Maximum 24-hr concentration (μg/m^3)		50.6	61.1	60.8	50.3
Number of days exceeded:	Federal: > 35 μg/m^3	ND	10	5	ND
Annual arithmetic mean (μg/m^3)		16.8	15.3	12.6	12.2
	State: > 12 μg/m^3	Yes	Yes	Yes	Yes
Exceeded for the year	Federal: > 12.0 μg/m^3	Yes	Yes	Yes	Yes
Nitrogen Dioxide (NO_2)					
Maximum 1-hr concentration (ppm)		0.0600	0.057	0.073	0.063
Number of days exceeded:	State: > 0.18 ppm	0	0	0	0
Annual arithmetic mean concentration (ppm)		0.015	0.0144	0.015	0.015
Exceeded for the year	State: > 0.030 ppm Federal: > 0.053 ppm	No No	No No	ND	ND
Sulfur Dioxide (SO_2)					
Maximum 24-hr concentration (ppm)		1.3	1.0	1.2	1.2
Number of days exceeded:	State: > 0.04 ppm	ND	ND	ND	ND
Annual arithmetic average concentration (ppm)		0.26	0.27	0.23	0.29
Exceeded for the year:	Federal: > 0.030 ppm	No	No	No	No

μg/m^3 = micrograms per cubic meter
EPA = United States Environmental Protection Agency
ID = Insufficient data
ND = No data
ppm = parts per million
Source: CARB, iADAM: Air Quality Data Statistics. Available at https://www.arb.ca.gov/adam for the SCAQMD Riverside-Rubidoux air monitoring station.

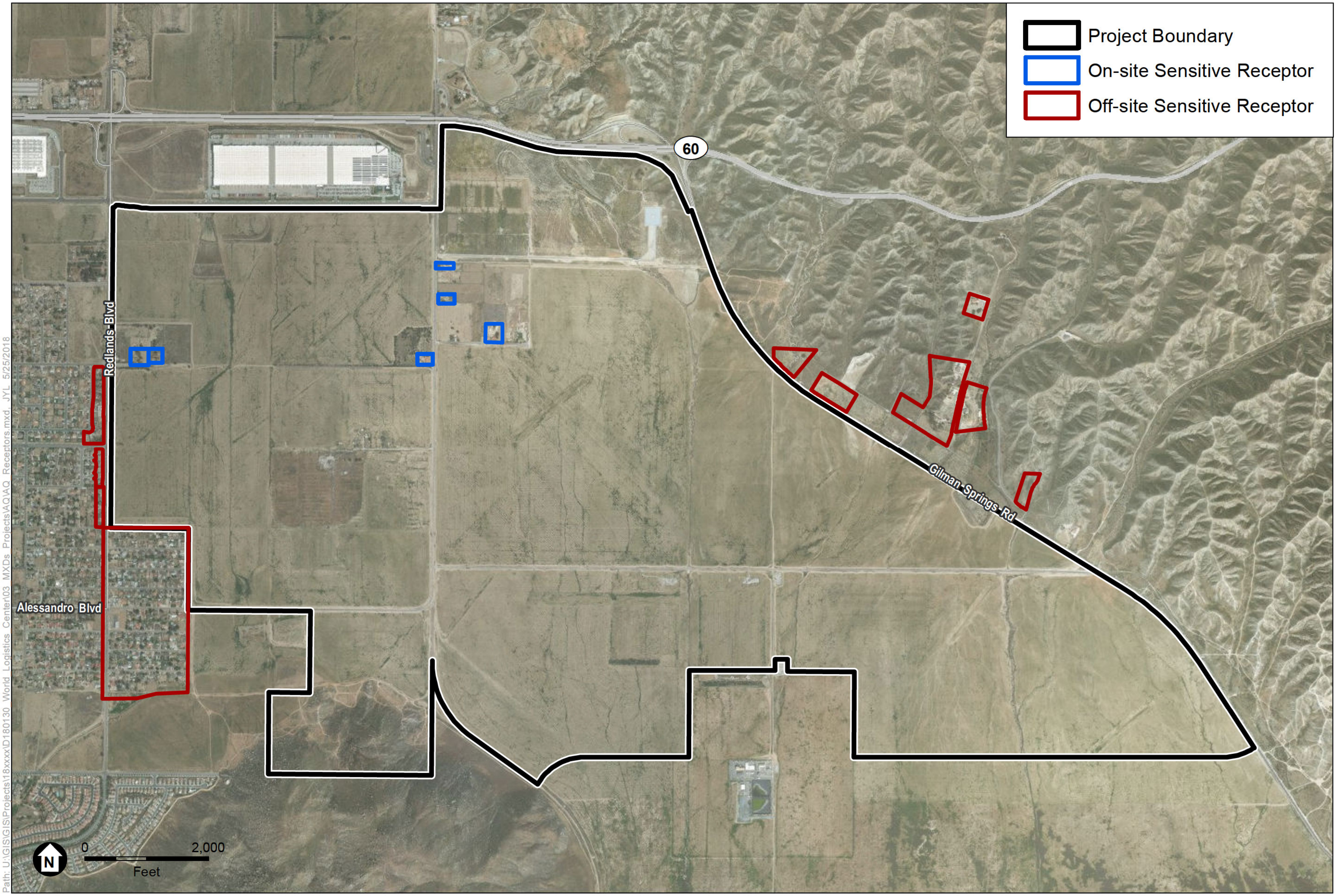


SOURCE: ESRI

World Logistics Center

Figure 11
Air Quality Monitoring Station

ESA



SOURCE: ESRI 2016; County of Riverside 2017

World Logistics Center

Figure 12
Existing Sensitive Receptors

ESA

1.5 Existing Greenhouse Gas Environment

Global Climate Change

Global climate change is the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred by some scientists and policy makers to "global warming" because it helps convey the notion that there are other changes in addition to rising temperatures.

Climate change refers to any significant change in measures of climate such as temperature, precipitation, or wind, lasting for decades or longer. Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system (e.g., changes in ocean circulation); and/or
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, and desertification).

The primary observed effect of global climate change has been a rise in the average global tropospheric[13] temperature of 0.36 degrees Fahrenheit (°F) per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling shows that further warming could occur, which would induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of California could include higher sea levels, drier or wetter weather, changes in ocean salinity, changes in wind patterns or more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold and increased intensity of tropical cyclones (hurricanes). Specific effects in California might include a decline in the Sierra Nevada snowpack, erosion of California's coastline, and seawater intrusion in the Delta.

Human activities, such as fossil fuel combustion and land use changes release carbon dioxide (CO_2) and other compounds, cumulatively termed greenhouse gases (GHGs). GHGs are effective in trapping infrared radiation that otherwise would have escaped the atmosphere, thereby warming the atmosphere, the oceans, and earth's surface.[14] Many scientists believe that "most of the warming observed over the last 50 years is attributable to human activities."[15] The increased amounts of CO_2 and other GHGs are alleged to be the primary causes of the human-induced component of warming.

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13 The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

14 U.S. Environmental Protection Agency (EPA). *Climate Change: Basic Information*. Available at https://archive.epa.gov/epa/climatechange/climate-change-basic-information.html. Website accessed June 2018.

15 Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007: The Physical Science Basis*, http://www.ipcc.ch.

GHGs are present in the atmosphere naturally, released by natural sources, or formed from secondary reactions taking place in the atmosphere. They include CO_2, methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). In the last 200 years, substantial quantities of GHGs have been released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere, enhancing the natural greenhouse effect, which is believed to be causing global climate change. While human-made GHGs include CO_2, CH_4, and N_2O, some (like chlorofluorocarbons [CFCs]) are completely new to the atmosphere.

GHGs vary considerably in terms of Global Warming Potential (GWP), which is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The global warming potential is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of metric tons of "CO_2 equivalents" (mt CO_2e or $MTCO_2e$).

Methane is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, termites, and oceans. Human-made sources include the mining and burning of fossil fuels; digestive processes in ruminant animals such as cattle; rice paddies; and the burying of waste in landfills. As for CO_2, the major removal process of atmospheric CH_4—chemical breakdown in the atmosphere—cannot keep pace with source emissions, and CH_4 concentrations in the atmosphere are increasing.

Worldwide emissions of GHGs in 2010 were approximately 47,351 million mt CO_2e[16] Emissions from the top five countries and the European Union accounted for approximately 57 percent of the total global GHG emissions, according to the most recently available data. The United States was the number two producer of GHG emissions, contributing 13 percent of the emissions. The primary GHG emitted by human activities in the United States was CO_2, representing approximately 82 percent of total GHG emissions. CO_2 from fossil fuel combustion, the largest source of GHG emissions, accounted for approximately 85 percent of the GHG emissions.[17]

In 2016, the United States emitted approximately 5.3 billion mt CO_2e or approximately 16.5 tons per year (tpy) per person. Of the six major sectors nationwide (electric power industry, transportation, industry, agriculture, commercial, and residential), the electric power industry and transportation sectors combined account for approximately 72 percent of the GHG emissions; the majority of the electrical power industry and all of the transportation emissions are generated

16 World Resources Institute, CAIT. 2018. Climate Analysis Indicators Tool: WRI's Climate Data Explorer. Washington, DC. Available at: http://cait2.wri.org. Accessed April 6, 2018.

17 Ibid.

from direct fossil fuel combustion. Between 1990 and 2016, total United States GHG emissions rose approximately 2.8 percent.[18]

World carbon dioxide emissions[19] are expected to increase by 1.9 percent annually between 2001 and 2025. Much of the increase in these emissions is expected to occur in the developing world where emerging economies, such as China and India, fuel economic development with fossil energy. Developing countries' emissions are expected to grow above the world average at 2.7 percent annually between 2001 and 2025; and surpass emissions of industrialized countries near 2018.

The California Air Resources Board (CARB) is responsible for developing the California Greenhouse Gas Emission Inventory. This inventory estimates the amount of GHGs emitted into and removed from the atmosphere by human activities within the State of California and supports the Assembly Bill (AB) 32 Climate Change Program. The most recent inventory of GHG emissions in California estimated 440.4 million mt CO_2e in 2015.[20] This is a 2.2 percent increase in GHG emissions from 1990. The top contributor of emissions in 2015 was transportation, which contributed 37 percent of the emissions. The second highest sector was industrial (21 percent), which includes sources from refineries, general fuel use, oil and gas extraction, and cement plants. According to CARB, California is on track to meet the 2020 GHG reduction target codified in California Health and Safety Code (HSC), Division 25.5, also known as The Global Warming Solutions Act of 2006 (AB 32).[21]

Effects of Global Climate Change

Climate change is a change in the average weather of the earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use these data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The International Panel on Climate Change (IPCC) constructed several emission trajectories of greenhouse gases needed to stabilize global temperatures and climate change impacts. In its Fourth Assessment Report, the IPCC predicted that the global mean surface temperature change for 2081-2100 relative to the period from 1986 to 2005, given six scenarios, could range from 0.3 degrees Celsius (°C) to 4.8 °C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios (IPCC 2014). The IPCC concluded that global climate change was largely the result of human activity, mainly the burning

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18 U.S. Environmental Protection Agency (EPA). 2018. *Inventory of U.S. Greenhouse Gas Emissions And Sinks: 1990 – 2016*. http://www.epa.gov/climatechange/emissions/usinventoryreport.html. Accessed April 6, 2018.

19 http://www.eia.gov/oiaf/1605/ggccebro/chapter1.html.

20 California Air Resources Board. California Greenhouse Gas Inventory: 2000-2015. 2017 edition. http://www.arb.ca.gov/cc/inventory/data/data.htm

21 California Air Resources Board, Frequently Asked Questions for the 2016 Edition California Greenhouse Gas Emission Inventory, (2016). Available at: https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2014/ghg_inventory_faq_20160617.pdf. Accessed April 2018.

of fossil fuels. However, the scientific literature is not consistent regarding many of the aspects of global warming or climate change, including actual temperature changes during the 20th century, the accuracy of the IPCC report, and contributions of human versus non-human activities.

Effects from global climate change may arise from temperature increases, climate-sensitive diseases, extreme weather events, and degradation of air quality. There may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells. Those living in warmer climates are likely to experience more stress and heat-related problems. Heat-related problems include heat rash and heat stroke. In addition, climate-sensitive diseases may increase, such as those spread by mosquitoes and other disease-carrying insects. Such diseases include malaria, dengue fever, yellow fever, and encephalitis. Extreme events such as flooding and hurricanes can displace people and agriculture. Global warming may also contribute to air quality problems from increased frequency of smog and particulate air pollution.

Additionally, the following climate change effects, which are based on trends established by the IPCC, can be expected in California over the course of the next century:

- A diminishing Sierra snowpack declining by 70 percent to 90 percent, threatening the State’s water supply. If GHG emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier.

- A rise in sea levels resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California’s coast have risen about seven inches. If emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. (Note: This condition would not affect the project area as it is a significant distance away from coastal areas.)

- An increase in temperature and extreme weather events. Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in California. More heat waves can exacerbate chronic disease or heat-related illness.

- Increased risk of large wildfires if rain increases as temperatures rise. Precipitation, winds, temperature, and vegetation influence wildfire risk; therefore, wildfire risk is not uniform throughout the state. Changes in current precipitation patterns could influence that risk. As an example, wildfires in the grasslands and chaparral ecosystems of southern California are estimated to increase by approximately 30 percent toward the end of the 21st century because more winter rain will stimulate the growth of more plant fuel available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.

- Increasing temperatures from 8 to 10.4°F under the higher emission scenarios, leading to a 25 percent to 35 percent increase in the number of days ozone pollution levels are exceeded in most urban areas (see below).

- Increased vulnerability of forests due to forest fires, pest infestation, and increased temperatures.
- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range. This increase in air quality problems could result in an increase in asthma and other health-related problems.
- A decrease in the health and productivity of California's forests. Climate change can cause an increase in wildfires, an enhanced insect population, and establishment of non-native species.
- Increased electricity demand, particularly in the hot summer months.
- Increased ground-level ozone formation due to higher reaction rates of ozone precursors.

Consequences of Climate Change in Moreno Valley

Figure 13, *Observed and Projected Temperatures,* below, displays a chart of measured historical and projected annual average temperatures in the Moreno Valley area. As shown in Figure 13, temperatures are expected to rise in the low and high GHG emissions scenarios.

Water for the project would be provided by the Eastern Municipal Water Department (EMWD). The EMWD 2015 Urban Water Management Plan considered the impact of climate change on water supplies as part of its long-term strategic planning. One of the outcomes of climate change could be more frequent limitations on imported supplies. To limit the impact of climate change, EMWD's long-term planning focuses on the development of reliable local resources and the implementation of water use efficiency. This includes the full utilization of recycled water and the recharge of local groundwater basins to increase supply reliability during periods of water shortage. EMWD is also focused on reducing demand for water supplies, especially outdoors. Increasing the use of local resource and reducing the need for imported water has the dual benefit of not only improving water quality reliability, but reducing the energy required to import water to EMWD's service area.

Figure 13: Observed and Projected Temperatures

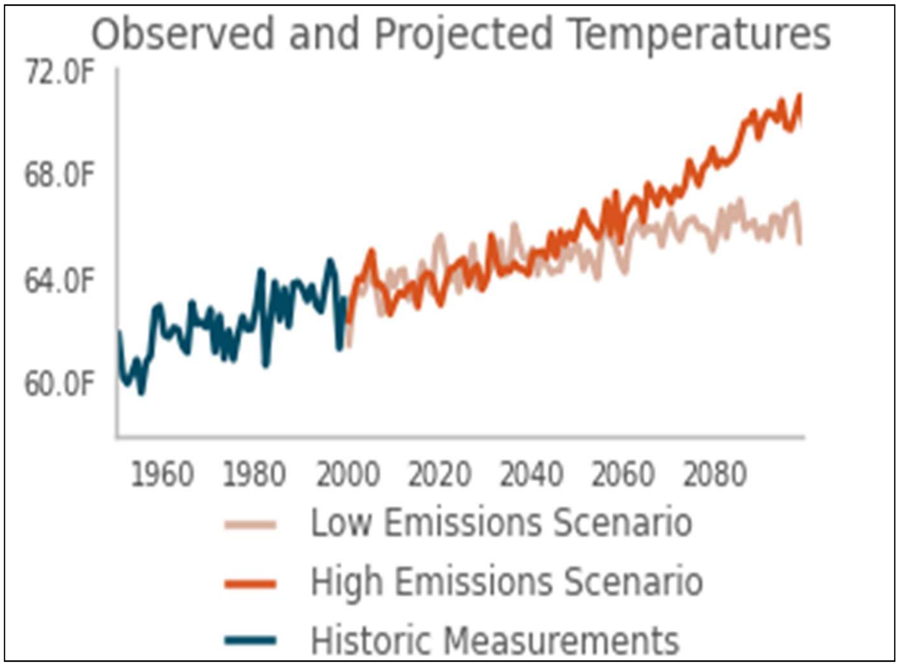
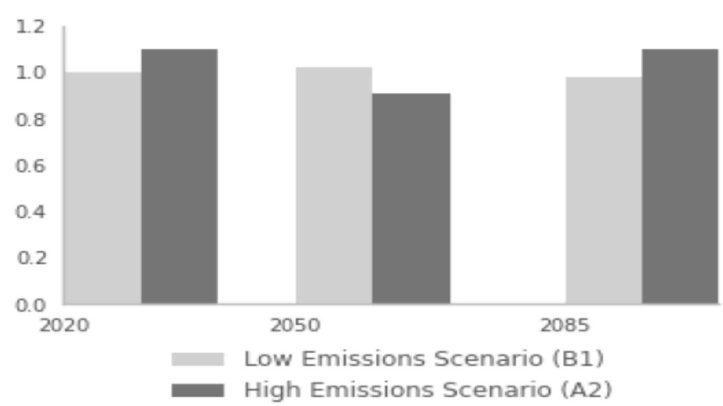


Figure 14, *Wildfire Risk in Moreno Valley,* displays the fire risk in Moreno Valley relative to 2010 levels. Figure 14 displays the projected increase in potential area burned given three different 30-year averaging periods ending in 2020, 2050, and 2085 and two different scenarios (A2, B1). The data are modeled solely on climate projections and do not take landscape and fuel sources into account (there is very little combustible material in the project area). The data modeled the ratio of additional fire risk for an area as compared to the expected burned area. The data are shown in Figure 14 and indicate that under the low-emissions scenario, the additional wildfire risk is about 1, which means that wildfire risk is expected to remain about the same. Under the high-emission scenario, additional risk is variable with a slight increase.

Figure 14: Wildfire Risk in Moreno Valley



1.6 Greenhouse Gases

The most common greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Greenhouse gases defined by AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Natural processes and human activities emit greenhouse gases. The presence of greenhouse gases in the atmosphere affects the earth's temperature. Many scientists believe that emissions from human activities, such as electricity production and vehicle use, have led to elevated concentrations of these gases in the atmosphere beyond the level of naturally occurring concentrations. Greenhouse gases, the effects of each greenhouse gas, and some of the sources for each of the greenhouse gases are listed below.

- *Water Vapor*
    - Description and Physical Properties: Water vapor (H_2O) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization.
    - Health Effects: There are no health effects from water vapor. When some pollutants come in contact with water vapor, they can dissolve and then the water vapor can be a transport mechanism to enter the human body.
    - Source: The main source of water vapor is evaporation from the oceans (approximately 85%). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.
- *Carbon Dioxide*
    - Description and Physical Properties: Carbon dioxide (CO_2) is an odorless, colorless natural greenhouse gas.
    - Health Effects: Outdoor levels of carbon dioxide are not high enough to result in negative health effects.
    - Sources: Carbon dioxide is emitted from natural and anthropocentric (human) sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic out gassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.

- *Methane*
    - Description and Physical Properties: Methane (CH_4) is an extremely effective GHG with a global warming potential of 21, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10–12 years) compared to other greenhouse gases.
    - Health Effects: There are no health effects from methane.
    - Sources: Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.
- *Nitrous Oxide*
    - Description and Physical Properties: Nitrous oxide (N_2O), also known as laughing gas, is a colorless greenhouse gas. It has a lifetime of 114 years. Its global warming potential is 310.
    - Health Effects: Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses it is harmless. In some cases, heavy and extended use can cause Olney's Lesions (brain damage).
    - Sources: Concentrations of nitrous oxide also began to rise at the beginning of the Industrial Revolution. In 1998, the global concentration was 314 ppb. Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, e.g., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars.
- *Chlorofluorocarbons*
    - Description and Physical Properties: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C_2H_6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). Global warming potentials range from 3,800 to 8,100.

  - Health Effects: In confirmed indoor locations, working with CFC-113 or other CFCs is thought to have resulted in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

  - Sources: CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants, and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining level or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

- *Hydrofluorocarbons*

  - Description and Physical Properties: Hydrofluorocarbons (HFCs) are synthetic man-made chemicals that are used as a substitute for CFCs. Out of all the greenhouse gases, they are one of three groups with the highest global warming potential (depending on the gas, ranges from 140 to 11,700). Prior to 1990, the only significant emissions were HFC-23. HFC-134a use is increasing due to its use as a refrigerant.

  - Health Effects: There are no health effects from HFCs.

  - Sources: HFCs are man-made for applications such as automobile air conditioners and refrigerants.

- *Perfluorocarbons*

  - Description and Physical Properties: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6). Global warming potentials range from 6,500 to 9,200.

  - Health Effects: There are no health effects from PFCs.

  - Sources: The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

- *Sulfur Hexafluoride*

  - Description and Physical Properties: Sulfur hexafluoride (SF_6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated, 23,900. Concentrations in the 1990s were about 4 ppt. It has a lifetime of 3,200 years.

- Health Effects: In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.
- Sources: Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

- *Aerosols*
  - Description and Physical Properties: Aerosols are particles emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light. Cloud formation can also be affected by aerosols.
  - Health Effects: See health effects associated with particulate matter, above.
  - Sources: Sulfate aerosols are emitted when fuel containing sulfur is burned. Another source of aerosols (in the form of black carbon or soot) is the result of incomplete combustion or the incomplete burning of fossil fuels. Although particulate matter regulation has been lowering aerosol concentrations in the United States, global concentrations are likely increasing as a result of other sources around the world.
  - *Black Carbon.* A specific aerosol of concern is black carbon. Black carbon is a light absorbing component of particulate matter and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass. The following is additional information on black carbon:
    - Black carbon is emitted directly into the atmosphere in the form of fine particles ($PM_{2.5}$).
    - Black carbon contributes to the adverse impacts on human health, ecosystems, and visibility associated with $PM_{2.5}$.
    - Black carbon influences climate by: 1) directly absorbing light, 2) reducing the reflectivity ("albedo") of snow and ice through deposition, and 3) interacting with clouds.

    The direct and snow/ice albedo effects of black carbon are widely understood to lead to climate warming. However, the globally averaged net climate effect of black carbon also includes the effects associated with cloud interactions, which are not well quantified and may cause either warming or cooling. Therefore, though most estimates indicate that black carbon has a net warming influence, a net cooling effect cannot be ruled out.

    - Sensitive regions such as the Arctic and the Himalayas are particularly vulnerable to the warming and melting effects of black carbon.

- Black carbon is emitted with other particles and gases, many of which exert a cooling influence on climate. Therefore, estimates of the net effect of black carbon emissions sources on climate should include the offsetting effects of these co-emitted pollutants. This is particularly important for evaluating mitigation options.

- Black carbon's short atmospheric lifetime (days to weeks), combined with its strong warming potential, means that targeted strategies to reduce black carbon emissions can be expected to provide climate benefits within the next several decades.

- The different climate attributes of black carbon and long-lived GHGs make it difficult to interpret comparisons of their relative climate impacts based on common metrics.

- Based on recent emissions inventories, the majority of global black carbon emissions come from Asia, Latin America, and Africa. Emissions patterns and trends across regions, countries and sources vary significantly.

- Control technologies are available to reduce black carbon emissions from a number of source categories.

- Black carbon mitigation strategies, which lead to reductions in $PM_{2.5}$, can provide substantial public health and environmental benefits.

Climate change is driven by radiative forcings and feedbacks. Radiative forcing is the difference between the incoming energy and outgoing energy in the climate system. In other terms, radiative forcing is the energy absorbed by the greenhouse gas that would otherwise be lost to space. Positive forcing tends to warm the surface while negative forcing tends to cool it. A feedback is a climate process that can strengthen or weaken a forcing. For example, when ice or snow melts, it reveals darker land underneath, which absorbs more radiation and causes more warming.

In order to attempt to quantify the impact of greenhouse gases, the gases are assigned global warming potentials. Individual greenhouse gas compounds have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of one. The global warming potential of a greenhouse gas is a potential of a gas or aerosol to trap heat in the atmosphere compared to the reference gas, carbon dioxide, and is a measurement of the radiative forcing of a gas. There are positive (warming) and negative (cooling) forcings. To describe how much global warming a given type and amount of greenhouse gas may cause, the carbon dioxide equivalent is used. The calculation of the carbon dioxide equivalent is a consistent methodology for comparing greenhouse gas emissions since it normalizes various greenhouse gas emissions to a consistent reference gas, carbon dioxide. Carbon dioxide as a molecule has a certain potential for warming; other molecules have a different potential. For example, methane's warming potential of 21 indicates that methane has 21 times greater warming effect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential.

SECTION 2
Regulatory Setting

2.1 International Regulation of Climate Change

Intergovernmental Panel on Climate Change

In 1988, the United Nations created the IPCC to provide independent scientific information regarding climate change to policymakers. The IPCC does not conduct research itself, but rather compiles information from a variety of sources into reports regarding climate change and its impacts. The IPCC has thereafter periodically released reports on climate change, and in 2007 released its Fourth Assessment Report which concluded most global climate change was the result of human activity, mainly the burning of fossil fuels.

United Nations Framework Convention on Climate Change

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change (Convention). Under the Convention, governments gather and share information on greenhouse gas emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

Kyoto Protocol

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas emissions at average of five percent against 1990 levels over the five-year period 2008-2012. The Convention (discussed above) encouraged industrialized countries to stabilize emissions; however, the Protocol commits them to do so. Developed countries have contributed more emissions over the last 150 years; therefore, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities." The United States has not entered into force of the Kyoto Protocol.

Moreover, since the United States declined to ratify the Kyoto Protocol in 1995, it has become increasingly clear that global climate change cannot be addressed without limiting GHG emissions from developing, as well as developed, countries. According to many sources, China has already surpassed the United States as the world's largest GHG emitter and is building new coal-fired power plants at a rate of approximately one per week. A recent study conducted by economists at the UC Berkeley and UC San Diego estimated that China's CO_2 emissions are growing by as much as 11 percent annually. In 2007, China released its first national plan on climate change, which includes goals related to increasing energy efficiency and increasing use of renewable resources. The plan, however, makes no commitments regarding reduction of GHG emissions.

Like China, India is already one of the top emitters of GHGs and continues to grow rapidly. India has recently pledged to take more action to fight global warming, for example, by pursuing solar energy, urging energy efficiency, and conservation, but it has not set any concrete goals in these areas, let alone pledged to reduce its carbon emissions. To the contrary, India's emissions are projected to increase fourfold by 2030 (see "Melting Asia," The Economist, June 5, 2008). Similarly, Brazil, the largest economy in South America, and another rapidly developing country, has no national policy requiring it to reduce carbon emissions. Brazil's carbon emissions increased by more than 60 percent between 1990 and 2004, and are projected to continue to rise at a similar pace (see International Energy Agency, World Energy Outlook 2006).

The Kyoto Protocol expired in 2012. Formal negotiations to replace the protocol officially began in December 2007 at the UNFCCC Climate Change Conference in Bali, Indonesia (http://unfccc.int/.php). Whether a workable agreement can be reached, however, remains to be seen, as the United States continues to press for an agreement that requires firm commitments from developing nations, and countries like China and India continue to oppose binding targets (see http://news.bbc.co.uk/////.stm).

In addition, it should be noted that most mitigation measures that address greenhouse gas reduction typically parallel those that reduce the consumption of energy (i.e., electricity and natural gas). Reducing energy use in a market economy typically reduces the cost of energy. However, a reduced cost of energy can release pent-up demand (latent demand) for energy use, particularly in less developed portions of the world, such as Africa and Asia. As such, it is not clear how much energy use reduction in California or the U.S. would actually reduce worldwide energy use. The same would apply to measures to reduce greenhouse gas emissions.

2.2 Federal

Federal Clean Air Act

Pursuant to the Federal Clean Air Act (CAA) of 1970, the EPA established national ambient air quality standards (NAAQS). The NAAQS were established for six major pollutants, termed "criteria" pollutants. Criteria pollutants are defined as those pollutants for which the Federal and State governments have established ambient air quality standards, or criteria, for outdoor concentrations in order to protect public health.

The EPA established national air quality standards for ground-level O_3 and $PM_{2.5}$ in 1997. On May 14, 1999, the Court of Appeals for the District of Columbia Circuit issued a decision ruling that the CAA, as applied in setting the new public health standards for O_3 and particulate matter, was unconstitutional as an improper delegation of legislative authority to the EPA. On February 27, 2001, the U.S. Supreme Court upheld the way that the government sets air quality standards under the CAA. The Court unanimously rejected industry arguments that the EPA must consider financial cost as well as health benefits in writing standards. The Justices also rejected arguments that the EPA took too much lawmaking power from Congress when it set tougher standards for O_3 and soot in 1997. Nevertheless, the Court threw out the EPA's policy for implementing new O_3 rules, stating that the EPA ignored a section of the law that restricts its authority to enforce such rules.

In April 2003, the EPA was cleared by the White House Office of Management and Budget (OMB) to implement the eight-hour ground-level O_3 standard. The EPA issued the proposed rule implementing the eight-hour O_3 standard in April 2003. The EPA completed final eight-hour nonattainment status on April 15, 2004. The EPA issued the final $PM_{2.5}$ implementation rule in fall 2004. The EPA issued final designations on December 14, 2004.

Effective January 22, 2010, the EPA strengthened the standard for NO_2 by setting a new 1-hour standard at the level of 100 parts per billion (ppb). This standard defines the maximum allowable concentration anywhere in an area and will protect against adverse health effects associated with short-term exposure to NO_2. To attain this standard, the 3-year average of the 98^{th} percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb. On January 25, 2010, the EPA issued the final rule setting the one-hour maximum standard for NO_2 at 100 ppb. The agency retained the annual standard of 53 ppb.

Effective June 2, 2010, the EPA revised the primary standard for SO_2 by establishing a new 1-hour standard at a level of 75 ppb. The EPA revoked the two existing primary standards of 140 ppb evaluated over 24 hours and 30 ppb evaluated over an entire year as they would not provide additional public health protection given a 1-hour standard at 75 ppb. To attain this standard, the 3-year average of the 99^{th} percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Effective December 14, 2012, the national annual $PM_{2.5}$ standard was lowered from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ but the existing 24-hour and annual secondary standards were retained.

On October 1, 2015, the national eight-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm, respectively.

Greenhouse Gas Endangerment

Massachusetts v. EPA (Supreme Court Case 05-1120) was argued before the United States Supreme Court on November 29, 2006, in which it was petitioned that the EPA regulate four greenhouse gases, including carbon dioxide, under Section 202(a)(1) of the Clean Air Act. A decision was made on April 2, 2007, in which the Supreme Court found that greenhouse gases are air pollutants covered by the Clean Air Act. The Court held that the EPA Administrator must determine whether emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- *Endangerment Finding:* The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases—carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.

- *Cause or Contribution Finding:* The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing greenhouse gas emissions standards for vehicles, as discussed in the section "Clean Vehicles" below.

In September 2011, the EPA Office of Inspector General evaluated the EPA's compliance with established policy and procedures in the development of the endangerment finding, including processes for ensuring information quality. The evaluation concluded that the technical support document should have had more rigorous EPA peer review.

In June 2012, a Federal appeals court rejected a lawsuit against the EPA. The suit alleged that the EPA violated the law by relying almost exclusively on data from the United Nations IPCC rather than doing its own research or testing data according to Federal standards. The U.S. Chamber of Commerce and the National Association of Manufacturers (with others) filed petitions to the U.S. Court of Appeals – D.C. Circuit to rehear the case. The EPA and Department of Justice provided a response on October 12, 2012.

Clean Vehicles

Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the Department of Transportation's Highway Traffic and Safety Administration (NHTSA) announced a joint final rule establishing a national program that would reduce greenhouse gas emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program applied to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The vehicles had to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards were designed to cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012–2016). In August 2012, standards were adopted for model year 2017 through 2025 for passenger cars and light-duty trucks. By 2025, vehicles are required to achieve 54.5 mpg (if GHG reductions are achieved exclusively through fuel economy improvements) and 163 grams of CO_2 per mile. According to the USEPA, a model year 2025 vehicle would emit one-half of the GHG emissions from a model year 2010 vehicle.[22]

On October 25, 2010, the EPA and the U.S. Department of Transportation proposed the first national standards to reduce greenhouse gas emissions and improve fuel efficiency of heavy-duty trucks and buses (also known as “Phase 1”). For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to a 20 percent reduction in carbon dioxide emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles and up to a 15 percent reduction for diesel vehicles by 2018 model year (12% and 17% respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles (includes other vehicles like buses, refuse trucks, concrete mixers; everything except for combination tractors and heavy-duty pickups and vans), the agencies are proposing engine and vehicle standards starting in the 2014 model year, which would achieve up to a 10 percent reduction in fuel consumption and carbon dioxide emissions by the 2018 model year. Building on the success of the standards, the EPA and U.S. Department of Transportation jointly finalized additional standards (called “Phase 2”) for medium- and heavy-duty vehicles through model year 2027 that will improve fuel efficiency and cut carbon pollution. The final standards are expected to lower CO_2 emissions by approximately 1.1 billion metric tons.

Mandatory Reporting of GHG

The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases rule. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions, are required to submit annual reports to the EPA.

This rule does not apply to high cube logistics developers within the WLC Project because, although the project would emit more than 25,000 mt CO_2e per year of GHGs, the rule only applies to the following categories: fossil fuel suppliers and industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and engines. The EPA’s Applicability Tool was used to determine if the project developer would need to report the GHG emissions. The source categories that are required to report GHG emissions (i.e., production, manufacturing, electricity generation, and industrial waste landfills) did not apply to the project.

[22] United States Environmental Protection Agency, EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks, (August 2012). Available at: http://www.epa.gov/oms/climate/documents/420f12051.pdf. Accessed March 2017.

New Source Review Prevention of Significant Deterioration (GHG Tailoring Rule)

The EPA issued a final rule on May 13, 2010, that establishes thresholds for greenhouse gases that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. Operating permits are legally enforceable documents that permitting authorities issue to air pollution sources after the source has begun to operate. Title V Operating Permits are required from Title V of the Clean Air Act. This final rule "tailors" the requirements of these Clean Air Act permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the Federal Code of Regulations, the EPA states:

> *This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the Clean Air Act, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to greenhouse gas sources, starting with the largest greenhouse gas emitters. This rule establishes two initial steps of the phase-in. The rule also commits the agency to take certain actions on future steps addressing smaller sources, but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for greenhouse gas emissions until at least April 30, 2016.*

EPA estimates that facilities responsible for nearly 70 percent of the national greenhouse gas emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest greenhouse gas emitters—power plants, refineries, and cement production facilities.

On December 23, 2010, the EPA issued a series of rules that put the necessary regulatory framework in place to ensure that 1) industrial facilities can get Clean Air Act permits covering their GHG emissions when needed and 2) facilities emitting GHGs at levels below those established in the Tailoring Rule do not need to obtain Clean Air Act permits.

Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units.

As required by a settlement agreement, the EPA proposed new performance standards for emissions of carbon dioxide for new affected fossil fuel-fired electric utility generating units on March 27, 2012. New sources greater than 25 megawatt would be required to meet an output based standard of 1,000 pounds of carbon dioxide per megawatt-hour.

Cap and Trade

Cap and trade refers to a policy tool where emissions are limited to a certain amount and can be traded, or provides flexibility on how the emitter can comply. Successful examples in the United States include the Acid Rain Program and the NO_X Budget Trading Program in the northeast. There is no Federal cap and trade program currently and no pending legislation exists to establish a national cap and trade program.

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration (NHTSA), which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon (mpg). Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. The Corporate Average Fuel Economy (CAFE) program, administered by the EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. The EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance. Please also refer to the subsection, "Clean Vehicles," above.

Energy Policy Act of 1992

The Energy Policy Act (EPAct) of 1992 was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain Federal, State, and local governments and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the Act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 includes provisions for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a Federal purchase requirement for renewable energy.

2.3 State of California

Mulford-Carrell Act

The State began to set California Ambient Air Quality Standards (CAAQS) in 1969 under the mandate of the Mulford-Carrell Act. The CAAQS are generally more stringent than the NAAQS. In addition to the six criteria pollutants covered by the NAAQS, there are CAAQS for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

Originally, there were no attainment deadlines for CAAQS; however, the CCAA of 1988 provided a time frame and a planning structure to promote their attainment. The CCAA required nonattainment areas in the State to prepare attainment plans and proposed to classify each such area on the basis of the submitted plan, as follows: moderate, if CAAQS attainment could not occur before December 31, 1994; serious, if CAAQS attainment could not occur before December 31, 1997; and severe, if CAAQS attainment could not be conclusively demonstrated at all. The attainment plans are required to achieve a minimum 5 percent annual reduction in the emissions of nonattainment pollutants unless all feasible measures have been implemented. The EPA has designated the Southern California Association of Governments (SCAG) as the Metropolitan Planning Organization (MPO) responsible for ensuring compliance with the requirements of the CAA for the Basin.

California Clean Air Act

The CCAA was passed into law in 1988. The CCAA provides the basis for air quality planning and regulation independent of federal regulations. A major element of the CCAA is the requirement that local air districts in violation of the CAAQS must prepare attainment plans that identify air quality problems, causes, trends and actions to be taken to attain and maintain California's air quality standards by the earliest practicable date. The CCAA provides air districts with the authority to manage transportation activities at indirect sources that individually are minor but collectively emit a substantial amount of pollution such as motor vehicles at intersections, malls, and on highways. The SCAQMD also regulates stationary sources of pollution throughout its jurisdictional area. Direct emissions from motor vehicles are regulated by the CARB.

CARB Airborne Toxic Control Measure/Asbestos

Asbestos is listed as a toxic air contaminant by CARB and as a Hazardous Air Pollutant by the EPA. Asbestos occurs naturally in surface deposits of several types of rock formations. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Crushing or breaking these rocks, through construction or other means, can release asbestoform fibers into the air. Asbestos emissions can result from the sale or use of asbestos-containing materials, road surfacing with such materials, grading activities, and surface mining. The risk of disease is dependent upon the intensity and duration of exposure. When inhaled, asbestos fibers may remain in the lungs and with time may be linked to such diseases as asbestosis, lung cancer, and mesothelioma. In July 2001, the CARB approved an Air Toxic Control Measure for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos. The regulation requires application of best management practices (BMPs) to control fugitive dust in areas known to have naturally occurring asbestos and requires notification to the local air district prior to commencement of ground-disturbing activities. The measure establishes specific testing, notification and engineering controls prior to grading, quarrying or surface mining in construction zones where naturally occurring asbestos is located on projects of any size. There are additional notification and engineering controls at work sites larger than one acre in size. These projects require the submittal of a "Dust Mitigation Plan" and approval by the air district prior to the start of a project. There is no asbestos in the project area.[23]

California Code of Regulations Title 24, Part 6

The California Energy Code (Title 24, Section 6) was created as part of the California Building Standards Code (Title 24 of the California Code of Regulations) by the California Building Standards Commission in 1978 to establish statewide building energy efficiency standards to reduce California's energy consumption. These standards include provisions applicable to all buildings, residential and nonresidential, which describe requirements for documentation and certificates that the building meets the standards. These provisions include mandatory requirements for efficiency and design of energy systems, including space conditioning (cooling and heating), water heating, and indoor and outdoor lighting systems and equipment, and appliances. California's Building Energy Efficiency Standards are updated on an approximately three-year cycle as technology and methods have evolved. The 2016 Standards, effective January 1, 2017, focus on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings, and include requirements that will enable both demand reductions during critical peak periods and future solar electric and thermal system installations.

California Code of Regulations Title 24, Part 11

The California Green Building Standards Code (California Code of Regulations, Title 24, Part 11), commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Building Standards Commission and the California Department of Housing and Community Development in 2008. CALGreen standards require new residential and commercial buildings to comply with mandatory measures under five topical areas: planning and design; energy efficiency; water efficiency and conservation; material conservation and resource efficiency; and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt which encourage or require additional measures in the five green building topics. The most recent update to the CALGreen Code went into effect January 1, 2017.

The CALGreen Code is not intended to substitute for or be identified as meeting the certification requirements of any green building program that is not established and adopted by the California

[23] U.S. Geological Survey. 2011. Van Gosen, B.S., and Clinken beard, J.P. California Geological Survey Map Sheet 59. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California. Open-File Report 2011-1188

Building Standards Commission (CBSC). Key provisions of the CALGreen Code that apply to the type of new non-residential development proposed for the project site are as follows:

Division 5.1—Planning and Design

Section 5.106 Site Development

5.106.4 Bicycle Parking and Changing Rooms:

Short-term bicycle parking. If the new project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack (5.106.4.1).

Long-term bicycle parking. For buildings with over 10 tenant-occupants or alterations that add 10 or more tenant vehicular parking spaces, provide secure bicycle parking for 5 percent of tenant vehicular parking spaces being added, with a minimum of one space. Acceptable parking facilities shall be convenient from the street and shall meet the following: 1. Covered, lockable enclosures with permanently anchored racks for bicycles; 2. Lockable bicycle rooms with permanently anchored racks; or 3. Lockable, permanently anchored bicycle lockers (5.106.4.2).

5.106.5 Clean Air Vehicle Parking: For new projects or additions or alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles [201 spaces and over require at least 8 percent] (5.106.5.2).

5.106.8 Light Pollution Reduction (specific backlight, uplight, and glare ratings)

5.106.10 Grading and Paving: Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings.

Division 5.2—Energy Efficiency

Section 5.201.1 Energy Efficiency (Mandatory energy efficiency standards through California Code of Regulations, Title 24, Part 6)

Division 5.3—Water Efficiency and Conservation

Section 5.303 Indoor Water Use

5.303.1 Meters: Separate water meters for buildings in excess of 50,000 sq. ft or buildings projected to consume more than 1,000 gallons per day.

5.303.2 Twenty Percent Savings: Use of plumbing fixtures and fittings that will reduce the overall use of potable water within the building by 20 percent, based on the maximum allowable water use per fixture and fitting as required by the California Building Code (California Code of Regulations, Title 24, Part 2)

5.304.3 Irrigation design: Automatic irrigation system controllers installed at the time of final inspection shall be weather- or soil moisture-based controllers that adjust irrigation in response to changes in plant needs; weather-based controllers.

5.303.4 Wastewater Reduction: Each building shall reduce by 20 percent wastewater by one of the following methods: 1. The installation of water-conserving fixtures or 2. Use of non-potable water systems (5.303.4).

5.303.6 Plumbing Fixtures and Fittings

Section 5.304 Outdoor Water Use

5.304.1 Water Budget: A water budget shall be developed for landscape irrigation use that conforms to the local water efficient landscape ordinance or to the California Department of Water Resources Model Water Efficient Landscape Ordinance where no local ordinance is applicable.

5.304.2 Outdoor Water Use (separate submeters or metering devices)

5.304.3 Irrigation Design (irrigation controllers and sensors)

Division 5.4—Material Conservation and Resource Efficiency

Section 5.407 Water Resistance and Moisture Management

Section 5.408 Construction Waste Reduction, Disposal and Recycling

5.408.1 and 5.408.3 Construction Waste Diversion: Recycle and/or salvage for reuse a minimum 50 percent of the nonhazardous construction and demolition waste. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled.

5.408.2 Construction Waste Management Plan

Section 5.410 Building Maintenance and Operation

5.410.1 and 5.713.10 Recycling by Occupants: Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling.

Division 5.5—Environmental Quality

Section 5.504 Pollutant Control

5.504.3 Covering of Duct Openings and Protection of Mechanical Equipment During Construction

5.504.4 Finish Material Pollutant Control: Low-pollutant emitting interior finish materials such as adhesives, paints, carpet, and flooring

5.404.5.3 Filters: Minimum Efficiency Reporting Value (MERV) of 8 or higher in mechanically ventilated buildings.

California Code of Regulations Titles 14 and 27

These parts of the California Code require energy-efficient practices as part of solid and hazardous waste handling and disposal.

Pavley Regulations and Fuel Efficiency Standards

California AB 1493, enacted on July 22, 2002, required the CARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. The regulation was stalled by automaker lawsuits and by the EPA's denial of an implementation waiver. On January 21, 2009, the CARB requested that the EPA reconsider its previous waiver denial. On January 26, 2009, President Obama directed that the EPA assess whether the denial of the waiver was appropriate. On June 30, 2009, the EPA granted the waiver request. On September 8, 2009, the U.S. Chamber of Commerce and the National Automobile Dealers Association sued the EPA to challenge its granting of the waiver to California for its standards. California assisted the EPA in defending the waiver decision. The U.S. District Court for the District of Columbia denied the Chamber's petition on April 29, 2011.

The standards phased in during the 2009 through 2016 model years. The near term (2009–2012) standards were expected to result in about a 22 percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards were expected to result in about a 30 percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.

In January 2012, CARB approved the Advanced Clean Cars program, a new emissions-control program for model years 2015 through 2025. The program includes components to reduce smog-forming pollution, reduce GHG emissions, promote clean cars, and provide the fuels for clean cars. The zero emissions vehicle (ZEV) program will act as the focused technology of the

Advanced Clean Cars program by requiring manufacturers to produce increasing numbers of ZEVs and plug-in hybrid electric vehicles (PHEV) in the 2018 to 2025 model years.[24]

In May 2016, CARB released the updated Mobile Source Strategy that demonstrates how the State can simultaneously meet air quality standards, achieve GHG emission reduction targets, decrease health risk from transportation emissions, and reduce petroleum consumption over the next fifteen years, through a transition to zero-emission vehicles (ZEVs), cleaner transit systems and reduction of vehicle miles traveled. The Mobile Source Strategy calls for 1.5 million ZEVs (including plug-in hybrid electric, battery-electric, and hydrogen fuel cell vehicles) by 2025 and 4.2 million ZEVs by 2030. It also calls for more stringent GHG requirements for light-duty vehicles beyond 2025 as well as GHG reductions from medium-duty and heavy-duty vehicles and increased deployment of zero-emission trucks primarily for class 3 – 7 “last mile” delivery trucks in California. Statewide, the Mobile Source Strategy would result in a 45 percent reduction in GHG emissions, and a 50 percent reduction in the consumption of petroleum-based fuels.[25]

Low Carbon Fuel Standard, Executive Order S-01-07

The Governor signed Executive Order S-01-07 on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California’s transportation fuels by at least 10 percent by 2020. In particular, the executive order established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission (CEC), the CARB, the University of California, and other agencies to develop and propose protocols for measuring the “life-cycle carbon intensity” of transportation fuels. The CARB adopted the Low Carbon Fuel Standard on April 23, 2009. The Low Carbon Fuel Standard requires producers of petroleum based fuels to reduce the carbon intensity of their products, beginning with a quarter of a percent in 2011, ending in a 10 percent total reduction in 2020. Petroleum importers, refiners and wholesalers can either develop their own low carbon fuel products, or buy LCFS Credits from other companies that develop and sell low carbon alternative fuels, such as biofuels, electricity, natural gas or hydrogen. The Low Carbon Fuel Standard was challenged in the United States District Court in Fresno in 2011. The court’s ruling issued on December 29, 2011, included a preliminary injunction against the CARB’s implementation of the rule. The Ninth Circuit Court of Appeals stayed the injunction on April 23, 2012 pending final ruling on appeal, allowing the CARB to continue to implement and enforce the regulation and vacated the injunction on September 18, 2013, and remanded the case to the district court for further consideration.

Senate Bill 1383

This bill creates goals for short-lived climate pollutant (SLCP) reductions in various industry sectors. The SLCPs included under this bill – including methane, fluorinated gases, and black carbon – are GHGs that are much more potent than carbon dioxide and can have detrimental effects on human health and climate change. SB 1383 requires the CARB to adopt a strategy to

[24] California Air Resources Board (CARB). *The Advanced Clean Cars Program,* 2017. Available at https://www.arb.ca.gov/msprog/acc/acc.htm. Website accessed June 2018

[25] California Air Resources Board (CARB). *Mobile Source Strategy*, 2016. Available at https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.htm. Website accessed June 2018

reduce methane by 40%, hydrofluorocarbon gases by 40%, and anthropogenic black carbon by 50% below 2013 levels by 2030. The methane emission reduction goals include a 75% reduction in the level of statewide disposal of organic waste from 2014 levels by 2025.

Senate Bill 1368

In 2006, the State Legislature adopted SB 1368, which was subsequently signed into law by the Governor. SB 1368 directs the California Public Utilities Commission (CPUC) to adopt a performance standard for greenhouse gas emissions for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than 5 years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Because of the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as combined cycle natural gas power plants. Accordingly, the new law will effectively prevent California's utilities from investing in, financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 will lead to dramatically lower greenhouse gas emissions associated with California's energy demand, as SB 1368 will effectively prohibit California utilities from purchasing power from out-of-state producers that cannot satisfy the performance standard for greenhouse gas emissions required by SB 1368. The CPUC adopted the regulations required by SB 1368 on August 29, 2007.

Senate Bill 97 and the CEQA Guidelines Update

Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the California Governor's Office of Planning and Research (OPR) pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. It provided CEQA protection until January 1, 2010, for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of greenhouse gases would not violate CEQA.

On April 13, 2009, the OPR submitted to the Secretary for Natural Resources its recommended amendments to the CEQA Guidelines for addressing greenhouse gas emissions. On July 3, 2009, the Natural Resources Agency commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05. Following a 55-day public comment period and two public hearings, the Natural Resources Agency proposed revisions to the text of the CEQA Guidelines amendments. The Natural Resources Agency transmitted the adopted amendments and the entire rulemaking file to the Office of Administrative Law on December 31, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of greenhouse gas emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

A new section, CEQA Guidelines Section 15064.4, was added to assist agencies in determining the significance of GHG emissions. The new section allows agencies the discretion to determine whether a quantitative or qualitative analysis is best for a particular project. However, the CEQA Guidelines offer little guidance on the crucial next step in this assessment process—how to determine whether the project's estimated greenhouse gas emissions are significant or cumulatively considerable.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts respectively. Greenhouse gas mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze greenhouse gas emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable; however, it does not answer the question of how to determine whether emissions are cumulatively considerable.

Section 15183.5 permits programmatic greenhouse gas analysis and later project-specific tiering. A tiered project is a project that was addressed in a certified program document, such as an EIR or Mitigated Negative Declaration. The CEQA Guidelines state the following:

> *Lead agencies may analyze and mitigate the significant effects of greenhouse gas emissions at a programmatic level, such as in a general plan, a long range development plan, or a separate plan to reduce greenhouse gas emissions. Later project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review. Project-specific environmental documents may rely on an EIR containing a programmatic analysis of greenhouse gas emissions (Section 15183.5(a)).*

Compliance with plans for the reduction of GHG emissions can support a determination that a project's cumulative effect is not cumulatively considerable, according to proposed Section 15183.5(b).

In addition, the amendments revised Appendix F of the CEQA Guidelines, which focuses on energy conservation. The sample environmental checklist in the CEQA Guidelines' Appendix G was amended to include greenhouse gas impact questions, which are used in this analysis.

Executive Order S-3-05

Executive Order S-3-05 was signed by Governor Schwarzenegger in 2005 proclaiming California is vulnerable to the impacts of climate change. It states that increased temperatures could reduce the Sierra Nevada's snowpack, worsen California's air quality problems, and potentially cause a rise in sea levels. The Executive Order establishes total GHG emission targets including emissions reductions to the 2000 level by 2010, and the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The 2050 reduction goal represents what scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be an aggressive, but achievable, mid-term target.

Assembly Bill 32

California's major initiative for reducing GHG emissions is outlined in AB 32, the "Global Warming Solutions Act," passed by the California State legislature on August 31, 2006. This effort aims at reducing GHG emissions to 1990 levels by 2020. The original 2020 GHG emissions limit was 427 million mt CO_2e. The current 2020 GHG emissions limit is 431 million mt CO_2e. AB 32 requires the CARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce GHGs that contribute to global climate change.

The Scoping Plan was approved by the CARB on December 11, 2008, and includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures.[26] The Scoping Plan includes a range of GHG reduction actions that may include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. The Scoping Plan, even after Board approval, remains a recommendation. The measures in the Scoping Plan will not be binding until after they are adopted through the normal rulemaking process. The CARB rule-making process includes preparation and release of each of the draft measures, public input through workshops and a public comment period, followed by a CARB hearing and rule adoption.

Pursuant to AB 32, the CARB and the Climate Action Team (CAT)[27] did the following:

- Adopted a list of discrete early action measures;
- Established a statewide GHG emissions cap for 2020 based on 1990 emissions and adopted mandatory reporting rules for significant sources of GHG;
- Indicated how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms and other actions; and
- Adopted regulations to achieve the maximum technologically feasible and cost-effective reductions in GHG, including provisions for using both market mechanisms and alternative compliance mechanisms.

In June 2007, the CARB approved a list of 37 early action measures, including three discrete early action measures (Low Carbon Fuel Standard, Restrictions on High Global Warming

26 CARB, *Climate Change Proposed Scoping Plan: a Framework for Change,* October 2008.

27 CAT is a consortium of representatives from State agencies who have been charged with coordinating and implementing GHG emission reduction programs that fall outside of CARB's jurisdiction.

Potential Refrigerants, and Landfill Methane Capture). Discrete early action measures are measures that were required to be adopted as regulations and made effective no later than January 1, 2010, the date established by Health and Safety Code (HSC) Section 38560.5. The CARB adopted additional early action measures in October 2007[28] that tripled the number of discrete early action measures. These measures relate to truck efficiency, port electrification, reduction of perfluorocarbons from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and sulfur hexafluoride (SF_6) reductions from the non-electricity sector. The combination of early action measures was estimated to reduce statewide GHG emissions by nearly 16 million mt CO_2e.[29]

AB 32 codifies Executive Order S-3-05's[30] year 2020 goal by requiring that statewide GHG emissions be reduced to 1990 levels by the year 2020.

The first AB 32 Scoping Plan, published in 2008, identified a future cap-and-trade program covering refineries, power plants, industrial facilities, and transportation fuels as a central element of California's overall strategy to reduce GHG emissions to 1990 levels. More information on the Scoping Plan and California's Cap and Trade program is provided below.

Amendments to California Global Warming Solutions Act of 2006: Emission Limit (SB 32)

Signed into law on September 8, 2016, Senate Bill (SB) 32 (Amendments to California Global Warming Solutions Act of 2006: Emission Limit) amends HSC Division 25.5 and codifies the 2030 target in the recent Executive Order B-30-15 (40 percent below 1990 levels by 2030). The 2030 target is intended to ensure that California remains on track to achieve the goal set forth by Executive Order B-30-15 to reduce statewide GHG emissions by 2050 to 80 percent below 1990 levels. SB 32 states the intent of the legislature to continue to reduce GHGs for the protection of all areas of the state and especially the state's most disadvantaged communities, which are disproportionately impacted by the deleterious effects of climate change on public health (California Legislative Information Website 2017). SB 32 was passed with companion legislation AB 197, which provides additional direction for developing the Scoping Plan. In 2016, the California State Legislature adopted SB 32 and its companion bill AB 197, and both were signed by Governor Brown. SB 32 amends HSC Division 25.5 and establishes a new climate pollution reduction target of 40 percent below 1990 levels by 2030, while AB 197 includes provisions to ensure the benefits of state climate policies reach into disadvantaged communities.

California Cap and Trade Program

Authorized by the California Global Warming Solutions Act of 2006 (AB 32), the cap-and-trade program is a core strategy that California is using to meet its statewide GHG reduction targets for 2020 and 2030, and ultimately achieve an 80 percent reduction from 1990 levels by 2050.

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[28] CARB. 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. October.

[29] CARB. 2007. "ARB approves tripling of early action measures required under AB 32." News Release 07-46. http://www.arb.ca.gov/newsrel/nr102507.htm. October 25.

[30] Executive Order S-3-05 establishes greenhouse gas emission reduction targets for California.

Pursuant to its authority under AB 32, CARB has designed and adopted a California Cap-and-Trade Program to reduce GHG emissions from major sources (deemed "covered entities") by setting a firm cap on statewide GHG emissions and employing market mechanisms to achieve AB 32's emission-reduction mandate of returning to 1990 levels of emissions by 2020.[31] Under the Cap-and-Trade program, an overall limit is established for GHG emissions from capped sectors (e.g., electricity generation, petroleum refining, cement production, fuel suppliers, and large industrial facilities that emit more than 25,000 metric tons CO_2e per year) and declines over time, and facilities subject to the cap can trade permits to emit GHGs. The statewide cap for GHG emissions from the capped sectors commenced in 2013 and declines over time, achieving GHG emission reductions throughout the Program's duration.[32] On July 17, 2017 the California legislature passed Assembly Bill 398, extending the Cap-and-Trade program through 2030.

The Cap-and-Trade Regulation provides a firm cap, ensuring that the 2020 and 2030 statewide emission limits will not be exceeded. An inherent feature of the Cap-and-Trade Program is that it does not direct GHG emissions reductions in any discrete location or by any particular source. Rather, GHG emissions reductions are assured on a State-wide basis.

Since 2015, fuels, such as gasoline, diesel, and natural gas, have been covered under the Cap-and-Trade Program. Fuel suppliers are required to reduce GHG emissions by supplying low carbon fuels or purchasing pollution permits, called "allowances," to cover the GHGs produced when the conventional petroleum-based fuel they supply is combusted.

2008 Scoping Plan

The California State Legislature adopted AB 32 in 2006 which focuses on reducing greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) to 1990 levels by the year 2020. Pursuant to the requirements in AB 32, the CARB adopted the Climate Change Scoping Plan (Scoping Plan) in 2008, which outlines actions recommended to obtain that goal. The Scoping Plan calls for an "ambitious but achievable" reduction in California's greenhouse gas emissions, cutting approximately 30 percent from BAU emission levels projected for 2020, or about 10 percent from today's levels. On a per-capita basis, that means reducing annual emissions of 14 tons of carbon dioxide for every man, woman, and child in California down to about 10 tons per person by 2020.

The Scoping Plan[33] contains the following 18 strategies to reduce the State's emissions:

1. California Cap-and-Trade Program Linked to Western Climate Initiative. Implement a broad-based California Cap-and-Trade program to provide a firm limit on emissions. Link the California cap-and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.

[31] 17 CCR §§ 95800 to 96023.

[32] See generally 17 CCR §§ 95811, 95812.

[33] Scoping Plan Reduction Measures from California Air Resources Board 2008.

2. California Light-Duty Vehicle Greenhouse Gas Standards. Implement adopted standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.
3. Energy Efficiency. Maximize energy efficiency building and appliance standards; pursue additional efficiency including new technologies, policy, and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California.
4. Renewable Portfolio Standard. Achieve 33 percent renewable energy mix statewide. Renewable energy sources include (but are not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.
5. Low Carbon Fuel Standard. Develop and adopt the Low Carbon Fuel Standard.
6. Regional Transportation-Related Greenhouse Gas Targets. Develop regional greenhouse gas emissions reduction targets for passenger vehicles. This measure refers to SB 375.
7. Vehicle Efficiency Measures. Implement light-duty vehicle efficiency measures.
8. Goods Movement. Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.
9. Million Solar Roofs Program. Install 3,000 MW of solar-electric capacity under California's existing solar programs.
10. Medium/Heavy-Duty Vehicles. Adopt medium and heavy-duty vehicle efficiency measures.
11. Industrial Emissions. Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce greenhouse gas emissions and provide other pollution reduction co-benefits. Reduce greenhouse gas emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.
12. High Speed Rail. Support implementation of a high-speed rail system.
13. Green Building Strategy. Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.
14. High Global Warming Potential Gases. Adopt measures to reduce high global warming potential gases.
15. Recycling and Waste. Reduce methane emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.
16. Sustainable Forests. Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation.
17. Water. Continue efficiency programs and use cleaner energy sources to move and treat water.

18. Agriculture. In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020.

2014 Scoping Plan Update

This First Update to California's Climate Change Scoping Plan (2014 Scoping Plan Update) was developed by the CARB in collaboration with the Climate Action Team and reflects the input and expertise of a range of state and local government agencies. The Update reflects public input and recommendations from business, environmental, environmental justice, utilities and community-based organizations provided in response to the release of prior drafts of the Update, a Discussion Draft in October 2013, and a draft Proposed Update in February 2014.

This report highlights California's success to date in reducing its GHG emissions and lays the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The First Update includes recommendations for establishing a mid-term emissions limit that aligns with the State's long-term goal of an emissions limit 80 percent below 1990 levels by 2050 and sector-specific discussions covering issues, technologies, needs, and ongoing State activities to significantly reduce emissions throughout California's economy through 2050. The focus areas include energy, transportation, agriculture, water, waste management, and natural and working lands.[34] With respect to the transportation sector, California has outlined several steps in the State's zero emission vehicle (ZEV) Action Plan to further support the market and accelerate its growth. Committed implementation of the actions described in the plan will help meet Governor Brown's 2012 Executive Order (EO) B-16-2012, which—in addition to establishing a more specific 2050 GHG target for the transportation sector of 80 percent from 1990 levels—called for 1.5 million ZEVs on California's roadways by 2025.

Achieving such an aggressive 2050 target will require innovation and unprecedented advancements in energy demand and supply.[35] Emissions from 2020 to 2050 will have to decline at more than twice the rate of that which is needed to reach the 2020 statewide emissions limit. In addition to our climate objectives, California also must meet federal clean air standards. Emissions of criteria air pollutants, including ozone precursors (primarily oxides of nitrogen, or NO_X) and particulate matter, must be reduced by an estimated 90 percent by 2032 to comply with federal air quality standards. The scope and scale of emission reductions necessary to improve air quality is similar to that needed to meet long-term climate targets. Achieving both objectives will align programs and investments to leverage limited resources for maximum benefit.

2017 Scoping Plan Update

On December 14, 2017, CARB approved the final version of California's 2017 Climate Change Scoping Plan (2017 Scoping Plan Update), which outlines the proposed framework of action for achieving the 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990

34 California Air Resources Board, *First Update to the Climate Change Scoping Plan,* http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf, May 2014, Accessed September 12, 2016.

35 Ibid.

levels.[36] The 2017 Scoping Plan Update identifies key sectors of the implementation strategy, which includes improvements in low carbon energy, industry, transportation sustainability, natural and working lands, waste management, and water. Through a combination of data synthesis and modeling, CARB determined that the target Statewide 2030 emissions limit is 260 $MMTCO_2e$, and that further commitments will need to be made to achieve an additional reduction of 50 $MMTCO_2e$ beyond current policies and programs. The cornerstone of the 2017 Scoping Plan Update is an expansion of the Cap-and-Trade program to meet the aggressive 2030 GHG emissions goal and ensure achievement of the 2050 limit set forth by E.O. B-30-15.

The 2017 Scoping Plan Update's strategy for meeting the 2030 GHG target incorporates the full range of legislative actions and state-developed plans that have relevance to the year 2030. These include:

- Extending the low carbon fuel standard (LCFS) beyond 2020 and increasing the carbon intensity reduction requirement to 18 percent by 2030;
- SB 350, which increase renewables portfolio standard (RPS) to 50 percent and requires a doubling of energy efficiency for existing buildings by 2030;
- The 2016 Mobile Source Strategy is estimated to reduce emissions from mobile sources including an 80 percent reduction in smog-forming emissions and a 45 percent reduction in diesel particulate matter from 2016 level in the South Coast Air Basin, a 45 percent reduction in GHG emissions, and a 50 percent reduction in the consumption of petroleum-based fuels;
- The Sustainable Freight Action Plan to improve freight efficiency and transition to zero emission freight handling technologies (described in more detail below);
- SB 1383, which requires a 50 percent reduction in anthropogenic black carbon and a 40 percent reduction in hydrofluorocarbon and methane emissions below 2013 levels by 2030; and
- Assembly Bill 398, which extends the state Cap-and-Trade Program through 2030.

With respect to project-level GHG reduction actions and thresholds for individual development projects, the 2017 Scoping Plan Update Indicates,

> *Beyond plan-level goals and actions, local governments can also support climate action when considering discretionary approvals and entitlements of individual projects through CEQA. Absent conformity with an adequate geographically-specific GHG reduction plan as described in the preceding section above, CARB recommends that projects incorporate design features and GHG reduction measures, to the degree feasible, to minimize GHG emissions. Achieving no net*

[36] CARB, *California's 2017 Climate Change Scoping Plan: The strategy for achieving California's 2030 greenhouse gas target*, November, 2017, https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf; accessed December 18, 2017.

> *additional increase in GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development.*[37]

Mobile Source Strategy

Implementing CARB's Mobile Source Strategy includes measures to reduce total light-duty VMT by 15 percent from the business-as-usual in 2050. The Mobile Source Strategy includes an expansion of the Advanced Clean Cars program (which further increases the stringency of GHG emissions for all light-duty vehicles, and 4.2 million zero-emission and plug-in hybrid light-duty vehicles by 2030). It also calls for more stringent GHG requirements for light-duty vehicles beyond 2025 as well as GHG reductions from medium-duty and heavy-duty vehicles and increased deployment of zero-emission trucks primarily for class 3 – 7 "last mile" delivery trucks in California. Statewide, the Mobile Source Strategy would result in a 45 percent reduction in GHG emissions, and a 50 percent reduction in the consumption of petroleum-based fuels.[38]

Sustainable Freight Action Plan

Executive Order B-32-15 directed the State to establish targets to improve freight efficiency, transition to zero emission technologies, and increase the competitiveness of California's freight transport system. The targets are not mandates, but rather aspirational measures of progress towards sustainability for the State to meet and try to exceed. The targets include:

- System Efficiency Target: Improve freight system efficiency by 25 percent by increasing the value of goods and services produced from the freight sector, relative to the amount of carbon that it produces by 2030.
- Transition to Zero Emission Technology Target: Deploy over 100,000 freight vehicles and equipment capable of zero emission operation and maximize near-zero emission freight vehicles and equipment powered by renewable energy by 2030.
- Increased Competitiveness and Economic Growth Targets: Establish a target or targets for increased State competitiveness and future economic growth within the freight and goods movement industry based on a suite of common-sense economic competitiveness and growth metrics and models developed by a working group comprised of economists, experts, and industry. These targets and tools will support flexibility, efficiency, investment, and best business practices through State policies and programs that create a positive environment for growing freight volumes and jobs, while working with industry to mitigate potential negative economic impacts. The targets and tools will also help evaluate the strategies proposed under the Action Plan to ensure consideration of the impacts of actions on economic growth and competitiveness throughout the development and implementation process.

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37 *Id.* at 101.

38 California Air Resources Board (CARB). *Mobile Source Strategy*, 2016. Available at https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.htm. Website accessed June 2018.

California Transportation Plan 2040

The California Transportation Plan (CTP) 2040 provides a long-range policy framework to meet future mobility needs and reduce GHG emissions. The CTP defines goals, performance-based policies, and strategies to achieve maximum feasible emission reductions in order to attain a statewide reduction in GHG emissions.

The CTP 2040 recognizes that the Governor is committed to reduce by one-half current petroleum use in cars and trucks; increase from one-third to one-half the electricity derived from renewable sources; double the efficiency savings of existing buildings and make heating fuels cleaner; reduce the release of methane, black carbon, and other short-lived climate pollutants; and manage farm and rangelands, forests, and wetlands to store more carbon.

Transportation GHG reduction strategies within the CTP 2040 include demand management (including telecommuting/working at home, increased carpoolers, and increase car sharing), mode shift (including transit service improvements, high-speed rail, bus rapid transit, expanded bike and pedestrian facilities, carpool land occupancy requirements, and increased HOV lanes), travel cost (implement expanded pricing policies), and operational efficiency (incident/emergency management, Caltrans' Master Plan, ITS/TSM, and eco-driving).

Executive Order B-16-2012 (Zero-Emission Vehicles)

This executive order indicates that all State entities under the Governor's control support and facilitate the rapid commercialization of zero-emission vehicles. The order contains a target similar to Executive Order S-3-05, but for the transportation sector instead of all sectors: that California target for 2050 a reduction of GHG emissions from the transportation sector equaling 80 percent less than 1990 levels. Executive order B-16-2012 also indicates that the CARB, the California Energy Commission, the Public Utilities Commission and other relevant agencies are ordered to work with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks to help achieve the following:

- By 2015: The State's major metropolitan areas able to accommodate zero-emission vehicles, each with infrastructure plans and streamlined permitting; the State's manufacturing sector expend zero-emission vehicle and component manufacturing; an increase in the private sector's investment in zero-emission vehicle infrastructure; and the State's academic and research institutions contributing to zero-emission vehicle research, innovation and education.

- By 2020: The State's zero-emission vehicle infrastructure ability to support up to one million vehicles; the costs of zero-emission vehicles competitive with conventional combustion vehicles; zero-emission vehicles accessible to mainstream consumers; widespread use of zero-emission vehicles for public transportation and freight transport; and a decrease in transportation sector GHG emissions as a result of the switch to zero-emission vehicles; electric vehicle charging integrated into the electricity grid.

- By 2025: over 1.5 million zero-emission vehicles on California roads; easy access to zero-emission vehicle infrastructure in California; the zero-emission vehicle industry strong and sustainable part of California's economy; and California's vehicles displace at least 1.5 billion gallons of petroleum fuels per year.

Greenhouse Gas Emissions Performance Standard for Power Plants

On January 25, 2007, the CPUC adopted an interim GHG emissions performance standard. This standard is a facility-based emissions standard requiring all new long-term commitments for baseload generation to serve California consumers with power plants that have emissions no greater than a combined cycle gas turbine plant. The established level is 1,100 pounds of CO_2 per megawatt-hour.

Senate Bill 375

SB 375 was signed into law on October 1, 2008. SB 375 provides emissions-reduction goals around which regions can plan, integrates disjointed planning activities, and provides incentives for local governments and developers to implement "smart growth" planning and development strategies, including reducing the average VMT to reduce commuting distances and reduce criteria and greenhouse gas air pollutant emissions. SB 375 has three major components:

- Using the regional transportation planning process to achieve reductions in GHG emissions consistent with AB 32's goals;
- Offering CEQA incentives to encourage projects that are consistent with a regional plan that achieves GHG emission reductions; and
- Coordinating the regional housing needs allocation process with the regional transportation process while maintaining local authority over land use decisions.

SB 375 requires each Metropolitan Planning Organization (MPO) to include a Sustainable Communities Strategy (SCS) in the regional transportation plan that demonstrates how the region will meet the greenhouse gas emission targets and creates CEQA streamlining incentives for projects that are consistent with the regional SCS. The focus of SB 375 is on placement of new residential projects and coordinated transportation planning.

Renewable Electricity Standards

There have been several renewable electricity senate bills in California. On September 12, 2002, Governor Gray Davis signed SB 1078 requiring California to generate 20 percent of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a Renewables Portfolio Standard (RPS) target for California requiring that all retail sellers of electricity serve 33 percent of their load with renewable energy by 2020. Governor Schwarzenegger also directed the CARB (Executive Order S-21-09) to adopt a regulation by July 31, 2010, requiring the state's load serving entities to meet a 33 percent renewable energy target by 2020. The CARB approved the Renewable Electricity Standard on September 23, 2010, by Resolution 10-23. Senate Bill X1-2 (2011) codifies the Renewable Electricity Standard into law.

Senate Bill 350

The Clean Energy and Pollution Reduction Act of 2015 (Chapter 547, Statutes of 2015) was approved by Governor Brown on October 7, 2015. SB 350 (1) increases the standards of the California RPS program by requiring that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030; (2) requires the State Energy Resources Conservation and Development Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030; (3) provides for the evolution of the Independent System Operator (ISO) into a regional organization; and (4) requires the state to reimburse local agencies and school districts for certain costs mandated by the state through procedures established by statutory provisions. Among other objectives, the Legislature intends to double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation.

Senate Bill 100

On September 10, 2018, Governor Brown signed SB 100, establishing that 100 percent of all electricity in California must be obtained from renewable and zero-carbon energy resources by December 31, 2045. SB 100 also creates new standards for the RPS, increasing required energy from renewable sources for both investor-owned utilities and publicly owned utilities from 50 percent to 60 percent by December 31, 2030. Incrementally, these energy providers must also have a renewable energy supply of 44 percent by December 31, 2024, and 52 percent by December 31, 2027. The updated RPS goals are considered achievable, since many California energy providers are already meeting or exceeding the RPS goals established by SB 350.

SmartWay Partners

SmartWay effectively refers to aerodynamic and rolling resistance requirements geared toward reducing fuel consumption. Most large trucking fleets driving newer vehicles are compliant with SmartWay design requirements. CARB’s Tractor-Trailer Greenhouse Gas Regulation requires that all 2010 and older model year tractors that pull 53-foot or longer box type trailers must use SmartWay verified low rolling resistance tires beginning January 1, 2013.

The EPA has evaluated the fuel saving benefits of various devices through emissions and fuel economy testing, demonstration projects and technical literature review. As a result, EPA has determined the following types of technologies provide fuel saving and/or emission reducing benefits when used properly in their designed applications:

- **Idle Reduction Technologies** allow engine operators to refrain from long-duration idling of the main propulsion engine by using an alternative technology. An idle reduction technology is generally defined as the installation of a technology or device that:
    - Reduces unnecessary main engine idling of the vehicle or equipment; and/or

  - Is designed to provide services (e.g., heat, air conditioning, and/or electricity) to the vehicle or equipment that would otherwise require the operation of the main drive engine while the vehicle or equipment is temporarily parked or remains stationary.

- **Aerodynamic Technologies** minimize drag and improve airflow over the entire tractor-trailer vehicle. Aerodynamic technologies include gap fairings that reduce turbulence between the tractor and trailer, side skirts that minimize wind under the trailer, and rear fairings that reduce turbulence and pressure drop at the rear of the trailer.

- **Low Rolling Resistance Tires:** Certain tire models can reduce NO_X emissions and fuel use by 3 percent or more, relative to the best-selling new tires for line haul class 8 tractor trailers. These improvements are achieved under the following conditions:

  - Tires are used on the axle positions stated on the list below.

  - Verified low rolling resistance tires are installed on all of the axle positions of the tractor and trailer.

  - All tires must be properly inflated according to the manufacturer's specifications.

- **Retrofit Technologies:** Diesel retrofit technologies that the EPA has approved or conditionally approved, such as:

  - Diesel Particulate Filter (DPF);

  - CMX Catalyst Muffler;

  - Selective Catalytic Reduction (SCR) System;

  - Diesel Oxidation Catalyst (DOC); and

  - Diesel Oxidation Catalyst (DOC) plus CDTi Closed Crankcase Ventilation (CCV) System.

Within each of these categories, the EPA has verified specific products and continues to evaluate and verify new products. Although the EPA has verified the fuel saving and/or emission reducing benefits of the listed products, it does not endorse the purchase of products or services from any specific vendor.

2.4 Regional

Lewis Air Quality Management Act

The 1976 Lewis Air Quality Management Act established the SCAQMD and other air districts throughout the State. The Federal CAA Amendments of 1977 required that each state adopt an implementation plan outlining pollution control measures to attain the Federal standards in nonattainment areas of the State.

The CARB is responsible for incorporating air quality management plans for local air basins into an SIP for EPA approval. Significant authority for air quality control within them has been given to local air districts that regulate stationary source emissions and develop local nonattainment plans.

Carl Moyer Memorial Air Quality Standards Attainment Program

Since 1998, the Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) has provided funding to encourage the voluntary purchase of cleaner engines, equipment, and emission reduction technologies. The Carl Moyer Program plays a complementary role to California's regulatory program by funding emission reductions that are surplus, i.e., early and/or in excess of what is required by regulation. The Carl Moyer Program accelerates the turnover of old highly-polluting engines, speeds the commercialization of advanced emission controls, and reduces air pollution impacts on environmental justice communities. Emission reductions achieved through the Carl Moyer Program are an important component of the California State Implementation Plan.

Regional Air Quality Management Plan

The SCAQMD and the SCAG are responsible for formulating and implementing the Air Quality Management Plan (AQMP), which has a 20-year horizon for the Basin. An AQMP is a plan prepared and implemented by an air pollution district for a county or region designated as nonattainment of the Federal and/or California ambient air quality standards. The SCAQMD and SCAG must update the AQMP every three years.

2012 AQMP

The 2012 AQMP was adopted December 7, 2012.[39] The purpose of the 2012 AQMP for the Basin was to set forth a program that would lead the Basin into compliance with the Federal 24-hour $PM_{2.5}$ air quality standard, and to provide an update of the Basin's projections in meeting the Federal 8-hour ozone standards. The AQMP was adopted by the SCAQMD Board; therefore, it was submitted to the EPA as the State Implementation Plan (SIP). Specifically, the AQMP served as the official SIP submittal for the Federal 2006 24-hour $PM_{2.5}$ standard. In addition, the AQMP updated specific elements of the previously approved 8-hour ozone SIP: 1) an updated emissions inventory, and 2) new control measures and commitments for emissions reductions to help fulfill the Section 182(e)(5) portion of the 8-hour ozone SIP.

[39] South Coast Air Quality Management District. *2012 Air Quality Management Plan*, February 2013. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(february-2013)/main-document-final-2012.pdf

The 2012 AQMP states, "The remarkable historical improvement in air quality since the 1970's is the direct result of Southern California's comprehensive, multiyear strategy of reducing air pollution from all sources as outlined in its AQMPs."

The 2012 AQMP proposed Basin-wide $PM_{2.5}$ measures that would be implemented by the 2014 attainment date, episodic control measures to achieve air quality improvements (would only apply during high $PM_{2.5}$ days), Section 182(e)(5) implementation measures (to maintain progress toward meeting the 2023 8-hour ozone national standard), and transportation control measures. Most of the control measures focused on incentives, outreach, and education.

Proposed $PM_{2.5}$ reduction measures in the 2012 AQMP included the following:

- Further NO_X reductions from the SCAQMD's Regional Clean Air Incentives Market (RECLAIM) program. The RECLAIM program was adopted by the SCAQMD in October 1993 and set an emissions cap and declining balance for many of the largest facilities emitting NO_x and SO_x in the South Coast Air Basin. RECLAIM includes over 350 participants in its NO_x market and about 40 participants in its SO_x market. RECLAIM has the longest history and practical experience of any locally designed and implemented air emissions cap and trade program. RECLAIM allows participating facilities to trade air pollution while meeting clean air goals.
- Further reductions from residential wood-burning devices.
- Further reductions from open burning.
- Emission reductions from under-fired char broilers.
- Further ammonia reductions from livestock waste.
- Backstop measures for indirect sources of emissions from ports and port-related sources.
- Further criteria pollutant reductions from education, outreach, and incentives.

There were multiple VOC and NO_X reductions in the 2012 AQMP to attempt to reduce ozone formation, including further VOC reductions from architectural coatings, miscellaneous coatings, adhesives, solvents, lubricants, and mold release products.

The 2012 AQMP also contained proposed mobile source implementation measures for the deployment of zero and near-zero emission on-road heavy-duty vehicles, locomotives, and cargo handling equipment. There were measures for the deployment of cleaner commercial harbor craft, cleaner ocean-going marine vessels, cleaner off-road equipment, and cleaner aircraft engines.

The 2012 AQMP proposed the following mobile source implementation measures:

- On-road mobile sources:
    - Accelerated penetration of partial zero-emission and zero-emission vehicles. This measure proposed to continue incentives for the purchase of zero-emission

vehicles and hybrid vehicles with a portion of their operation in an all-electric range mode. The state Clean Vehicle Rebate Pilot program was proposed to continue from 2015 to 2023 with a proposed funding for up to $5,000 per vehicle. The measure seeks to provide funding assistance for up to 1,000 zero-emission or partial-zero emission vehicles per year.

- o Accelerated penetration of partial zero-emission and zero-emission light-heavy and medium-heavy duty vehicles through funding assistance for purchasing the vehicles. The objective of the proposed action was to accelerate the introduction of advanced hybrid and zero-emission technologies for Class 4 through 6 heavy-duty vehicles. The state is currently implementing a Hybrid Vehicle Incentives Project program to promote zero-emission and hybrid heavy-duty vehicles. The proposed measure aimed to continue the program from 2015 to 2023 to deploy up to 1,000 zero- and partial-zero emission vehicles per year with up to $25,000 funding assistance per vehicle. Zero-emission vehicles and hybrid vehicles with a portion of their operation in an all-electric range mode would be given the highest priority.

- o Accelerated retirement of older light-, medium-, and heavy-duty vehicles through funding incentives.

- o Further emission reductions from heavy-duty vehicles serving near-dock rail yards This proposed control measure called for a requirement that any cargo container moved between the ports of Los Angeles and Long Beach to the nearby rail yards be with zero-emission technologies. The measure would be fully implemented by 2020 through the deployment of zero-emission trucks or any alternative zero-emission container movement system such as a fixed guideway system. The measure called for the CARB to either adopt a new regulation or amend an existing regulation to require such deployment by 2020.

- Off-road mobile sources:

  - o Extension of the Surplus Off-Road Opt-In for NO_x (SOON) provision for construction/industrial equipment, which provides funding to repower or replace older Tier 0 and Tier 1 equipment.

  - o Further emission reductions from freight and passenger locomotives called for an accelerated use of Tier 4 locomotives in the Basin.

  - o Further emission reductions from ocean-going marine vessels while at berth.

  - o Emission reductions from ocean-going marine vessels.

The 2012 AQMP also relied upon the SCAG regional transportation strategy, which is in its adopted 2012–2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and 2011 Federal Transportation Improvement Program, which contains the following sections:

1. Linking regional transportation planning to air quality planning and making sure that the regional transportation plan supports the goals and objectives of the AQMP/SIP.
2. Regional transportation strategy and transportation control measures: The RTP/SCS contains improvements to the regional multimodal transportation system including the following: active transportation (non-motorized transportation, e.g., biking and walking); transportation demand management; transportation system management; transit; passenger and high-speed rail; goods movement; aviation and airport ground access; highways; arterials; and operations and maintenance.
3. Reasonably available control measure analysis.

2016 AQMP

On March 3, 2017, SCAQMD approved the Final 2016 Air Quality Management Plan (AQMP) that demonstrates attainment of the 1-hr and 8-hr ozone NAAQS as well as the latest 24-hr and annual $PM_{2.5}$ standards. Currently, the 2016 AQMP is being reviewed by the U.S. EPA and CARB. Until the approval of the EPA and CARB, the current regional air quality plan is the Final 2012 Air Quality Management Plan (AQMP) adopted by the SCAQMD on December 7, 2012.The Final 2016 AQMP includes the integrated strategies and measures needed to meet the NAAQS.

The 2016 AQMP seeks to achieve multiple goals in partnership with other entities promoting reductions in criteria pollutant, greenhouse gases, and toxic risk, as well as efficiencies in energy use, transportation, and goods movement. The most effective way to reduce air pollution impacts on the health of our nearly 17 million residents, including those in disproportionally impacted and environmental justice communities that are concentrated along our transportation corridors and goods movement facilities, is to reduce emissions from mobile sources, the principal contributor to our air quality challenges. For that reason, the SCAQMD worked closely with CARB and the U.S. EPA who have primary responsibility for these sources. The Plan recognized the critical importance of working with other agencies to develop new regulations, as well as secure funding and other incentives that encourage the accelerated transition of vehicles, buildings, and industrial facilities to cleaner technologies in a manner that benefits not only air quality, but also local businesses and the regional economy. These “win-win” scenarios will be key to implementation of this Plan with broad support from a wide range of stakeholders. The 2016 AQMP also includes transportation control measures (TCMs) developed by SCAG from the 2016 RTP/SCS.

The RTP/SCS and Federal Transportation Improvement Program (FTIP) were developed in consultation with federal, state and local transportation and air quality planning agencies and other stakeholders. The four County Transportation Commissions (CTCs) in the South Coast Air Basin, namely Los Angeles County Metropolitan Transportation Authority, Riverside County Transportation Commission, Orange County Transportation Authority and the San Bernardino Associated Governments, were actively involved in the development of the regional transportation measures. In the South Coast Air Basin, TCMs include the following three main categories of transportation improvement projects and programs that have funding programmed for right-of-way and/or construction in the first two years of the 2015 FTIP:

- Transit, Intermodal Transfer, and Active Transportation Measures;
- High Occupancy Vehicle (HOV) Lanes, High Occupancy Toll (HOT) Lanes, and their pricing alternatives; and
- Information-based Transportation Strategies.

South Coast Air Quality Management District Proposed Indirect Sources Rules for Warehouse

In order to obtain the 80 ppb and 75 ppb 8-hour ozone standards by the 2023 and 2031 attainment dates, respectively, and in support of the 2016 AQMP, the SCAQMD is formulating Facility Based Mobile Sources Rules to reduce NO_X emissions from indirect sources (e.g., mobile sources generated by, or attracted to facilities). This proposed rule or set of rules would reduce emissions associated with emissions sources operating in and out of warehouse and distribution centers, consistent with Control Measures MOB 03 from the 2016 AQMP, and is anticipated to be brought before the Board for consideration in the second quarter of 2020 (SCAQMD, 2019a).[40] The SCAQMD is looking at a variety of options which could include voluntary reduction strategies, as well as, regulations to limit emissions. The voluntary emission reduction strategies for warehouses and distribution centers could include: (1) development of a SCAQMD administered CEQA air quality mitigation fund, for warehouse projects to opt into, which would be used to reduce project emissions by funding financial incentives for fleet owners to purchase cleaner trucks; (2) development of updated guidance for warehouse siting and operations; (3) development of the necessary fueling/charging infrastructure by working with utilities and regulatory agencies; and (4) development of "green delivery options" which could involve a small, voluntary, opt-in surcharge for consumers when purchasing goods online with the funds generated used towards reducing truck fleet emissions (SCAQMD, 2018).[41] A regulatory approach is being proposed as well, since the recommended voluntary measures would only result in limited emissions reductions. The proposed Warehouse Indirect Source Rule is aimed at reducing trucking emissions and could provide several compliance options that facilities could choose including: (1) requirements for warehouses to ensure that construction fleets and truck fleets that serve their facility during operations are cleaner than required by CARB regulations (verified through a voluntary fleet certification program); (2) facility emission caps that would require warehouses to directly control the emissions associated with trucks visiting the facility; (3) mitigation fees if the facilities emissions exceed cap levels set in the Indirect Source Rule, (4) crediting options for other activities like installation of charging/fueling infrastructure for cleaner trucks and transportation refrigeration units, conversion of cargo handling equipment to zero emission technologies, etc.; (5) requiring facilities to utilize zero emission trucks and build the infrastructure to support them; and (6) a points based system for the warehouse Indirect

[40] South Coast Air Quality Management District, 2019a. General Board Meeting November 1, 2019 Agenda No. 1. Attached Minutes of the October 4 2019 Meeting. Available online: http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2019/2019-nov1-001.pdf?sfvrsn=6 Accessed November 6, 2015.

[41] South Coast Air Quality Management District, 2018. Board Meeting, March 2, 2018. Agenda No. 32. Available online: http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2018/2018-mar2-032.pdf?sfvrsn=7. Accessed November 3, 2019.

Source Rule (SCAQMD, 2019a, SCAQMD, 2019b,[42] SJVAPCD, 2017[43]). This proposed rule would further reduce air quality emissions, beyond those calculated in this analysis, as future operations of the WLC would be subject to this rule once it is proposed and approved.

Greenhouse Gases

In April 2008, the SCAQMD, in order to provide guidance to local lead agencies on determining the significance of GHG emissions identified in CEQA documents, convened a "GHG CEQA Significance Threshold Working Group."[44] The goal of the working group is to develop and reach consensus on an acceptable CEQA significance threshold for GHG emissions that would be utilized on an interim basis until the CARB (or some other State agency) develops statewide guidance on assessing the significance of GHG emissions under CEQA.

Initially, SCAQMD staff presented the working group with a significance threshold that could be applied to various types of projects—residential, non-residential, industrial, etc. However, the threshold is still under development. In December 2008, staff presented the SCAQMD Governing Board with a significance threshold for stationary source projects in which it is the lead agency. This threshold uses a tiered approach to determine a project's significance, with 10,000 metric tons (mt) of carbon dioxide equivalent (CO_2e) as a screening numerical threshold.

In September 2010, the Working Group released additional revisions, which recommended a project-level efficiency target of 4.8 mt CO_2e per service population (SP) as a 2020 target and 3.0 mt CO_2e, per SP as a 2035 target. The recommended plan-level target for 2020 was 6.6 mt CO_2e and the plan level target for 2035 was 4.1 mt CO_2e. The SCAQMD has not announced when staff is expecting to present a finalized version of these thresholds to the Governing Board.

The SCAQMD has also adopted Rules 2700, 2701, and 2702 to establish a voluntary program to encourage, quantify, and certify voluntary GHG emission reductions in the SCAQMD's jurisdiction. The CARB adopted a resolution regarding the adoption of GHG accounting protocols that distinguishes between the offset certification programs that were developed for the voluntary market, and the program that must be developed to certify offsets to be used under CARB's cap-and-trade rule. This resolution withdrew CARB approval of voluntary protocols but would not impact the use of these protocols for voluntary purposes. Protocols in Rules 2701 and 2702 are voluntary protocols, which no longer have CARB's approval.

Diesel Regulations

The Ports of Long Beach and Los Angeles and the CARB have adopted regulations aimed at reducing the amount of diesel particulate. These programs are the Ports of Los Angeles and Long

[42] South Coast Air Quality Management District General Board Meeting March 1, 2019 Agenda No. 25. Mobile Source Committee Meeting February 15, 2019. Available online: http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2019/2019-mar1-025.pdf?sfvrsn=6. Accessed November 6, 2019.

[43] San Joaquin Valley Air Pollution Control District, 2017. Rule 9510 Indirect Source Review (ISR) (Adopted December 15, 2005, Amended December 21, 2017, but not in effect until March 21, 2018). Available online: http://www.valleyair.org/rules/currntrules/r9510-a.pdf. Accessed November 6, 2015.

[44] For more information see: http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html.

Beach "Clean Truck Program,[45] the CARB Drayage Truck Regulation,[46] and the CARB statewide On-road Truck and Bus Regulation.[47] Each of these regulatory programs will require an accelerated introduction of "clean trucks" into the statewide truck fleet that will result in substantially lower diesel emissions during the 2008 to 2020 timeframe. Additionally, the Ports of Long Beach and Los Angeles updated the Clean Air Action Plan in 2017, providing new strategies and emission targets supporting zero-emissions and freight efficiency targets.[48]

- Airborne Toxic Control Measure for Diesel Particulate Matter from Portable Engines Rated at 50 horsepower and Greater. Effective February 19, 2011, each fleet shall comply with weighted reduced particulate matter emission fleet averages by compliance dates listed in the regulation.

- CARB Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling adopts new Section 2485 within Chapter 10, Article 1, Division 3, Title 13 in the California Code of Regulations. The measure limits the idling of diesel vehicles (i.e., commercial trucks over 10,000 pounds) to reduce emissions of toxics and criteria pollutants. The driver of any vehicle subject to this section: (1) shall not idle the vehicle's primary diesel engine for greater than five minutes at any location; and (2) shall not idle a diesel-fueled auxiliary power system for more than five minutes to power a heater, air conditioner, or any ancillary equipment on the vehicle if it has a sleeper berth and the truck is located within 100 feet of a restricted area (homes and schools).

- CARB Final Regulation Order, Requirements to Reduce Idling Emissions from New and In-Use Trucks, requires that new 2008 and subsequent model-year heavy-duty diesel engines be equipped with an engine shutdown system that automatically shuts down the engine after 300 seconds of continuous idling operation once the vehicle is stopped, the transmission is set to 'neutral' or 'park,' and the parking brake is engaged. If the parking brake is not engaged, then the engine shutdown system shall shut down the engine after 900 seconds of continuous idling operation once the vehicle is stopped and the transmission is set to neutral or park." There are a few conditions where the engine shutdown system can be overridden to prevent engine damage. Any project trucks manufactured after 2008 would be consistent with this rule, which would ultimately reduce air emissions.

- CARB Regulation for In-Use Off-Road Diesel Vehicles. On July 26, 2007, the CARB adopted a regulation to reduce diesel particulate matter and NO_X emissions from in-use (existing) off-road heavy-duty diesel vehicles in California. All self-propelled off-road diesel vehicles over 25 horsepower (hp) used in California and most two-engine vehicles (except on-road two-engine sweepers) are subject to this regulation. This includes vehicles that are rented or leased (rental or leased fleets). Such vehicles are used in construction, mining, and industrial operations. The regulation:

    - imposes limits on idling to no more than five consecutive minutes,

45 http://www.portoflosangeles.org/ctp/idx_ctp.asp.
46 http://www.arb.ca.gov/msprog/onroad/porttruck/porttruck.htm.
47 http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm.
48 http://www.cleanairactionplan.org/2017-clean-air-action-plan-update/

- restricts adding of older equipment (such as Tier 0 and Tier 1) into fleets,
- requires reporting and labeling, and
- requires disclosure of the regulation upon vehicle sale.

The CARB is enforcing that with fines up to $10,000 per day for each vehicle in violation. Performance requirements of the rule are based on a fleet's average NO_X emissions, which can be met by replacing older vehicles with newer, cleaner vehicles or by applying exhaust retrofits. The regulation was amended in 2010 to delay the original timeline of the performance requirements making the first compliance deadline January 1, 2014 for large fleets (over 5,000 horsepower), 2017 for medium fleets (2,501-5,000 horsepower), and 2019 for small fleets (2,500 horsepower or less).

Toxic Air Contaminants

A toxic air contaminant (TAC) is defined as an air pollutant that may cause or contribute to an increase in mortality (death) or serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. Hazardous Air Pollutants (HAPs) and TACs are used interchangeably in this discussion. HAPs are regulated by the EPA under the Federal Clean Air Act. TAC is the term used under the California Clean Air Act to regulate the same hazardous pollutants. These contaminants tend to be localized and are found in relatively low concentrations in ambient air. However, they can result in adverse chronic health effects if exposure to low concentrations occurs for periods of several years. Many of these contaminants originate from human activities, such as fuel combustion and solvent use.

In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts are not expected to occur. This contrasts with the criteria pollutants carbon dioxide, nitrogen dioxide, particulate matter, and ozone for which acceptable levels of exposure can be determined and for which the State and federal governments have set ambient air quality standards. For this reason, thresholds for TAC impacts for regulatory purposes and for CEQA thresholds have been set based on the increase in risk of cancer of a specific amount at sensitive receptors located near the source of TAC emissions.

The California Almanac of Emissions and Air Quality presents the relevant concentration and cancer risk data for the ten TACs that pose the most substantial health risk in California based on available data. These TACs are as follows: acetaldehyde, benzene, 1.3-butadiene, carbon tetrachloride, hexavalent chromium, paradichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and diesel particulate matter (diesel PM).

TAC measurements, available at the SCAQMD Riverside Rubidoux monitoring station (14 miles northwest of the project site) can be used to characterize the "background" health risks from regional TAC emission sources. **Table 6,** *Toxic Air Contaminant Concentration Levels and Associated Health Effects,* provides this summary of TAC levels in the project area and health risk information. This table lists the air concentration levels and associated health cancer risks for eight of the nine TACs reported by the CARB in its Almanac as measured at the Riverside-Rubidoux air monitoring station. Note that since diesel PM cannot be measured directly, the table does not provide estimates of either measured diesel PM or the cancer risk associated with diesel PM.

Past studies have indicated that diesel PM poses the greatest health risk among the TACs listed in Table 6. The principal concern regarding exposures to diesel PM lies in its small size and thus its ability to penetrate deep into lung tissues when inhaled. Diesel exhaust has been found to cause health effects from short-term or acute exposures and from long-term chronic exposures, such as repeated occupational exposures. The type and severity of health effects depends upon several factors including the amount of chemical you are exposed to and the length of time you are exposed. Individuals also react differently to different levels of exposure. There is limited information on exposure to just diesel PM but there is enough evidence to indicate that inhalation exposure to diesel exhaust causes acute and chronic health effects.

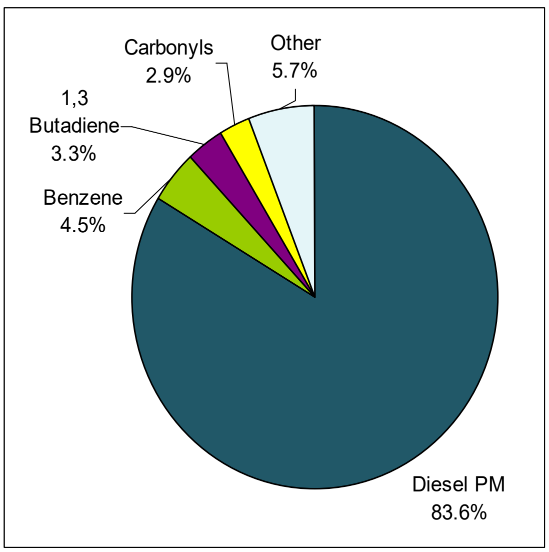
Long-term (chronic) exposure to diesel exhaust is likely to occur when a person works in a field where diesel is used regularly or experiences repeated exposure to diesel fumes over a long period of time. Human health studies demonstrate a correlation between exposure to diesel exhaust and increased lung cancer rates in occupational settings. Experimental animal inhalation studies of chronic exposure to diesel exhaust have shown that a range of doses causes varying levels of inflammation and cellular changes in the lungs. Human and laboratory studies have also provided considerable evidence that diesel exhaust is a likely carcinogen.

Several occupational and ambient studies have documented the health effects due to exposure to diesel PM. The California Office of Environmental Health Hazards Assessment (OEHHA), in its role in assessing risk from environmental factors reviews such studies and makes recommendations on the way environmental risk should be evaluated through programs like the AB2588 Hot Spot Program. In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, 1950's era railroad workers, and equipment operators. The studies showed these workers were more likely to develop lung cancer than workers who were not exposed to diesel emissions. These studies provide strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. However, all of these studies were based on exposure to exhaust from traditional diesel engines and prior to the advent of highly efficient emissions controls like the diesel particulate filter. Based on these studies, CARB identified diesel exhaust a toxic air contaminant in 1998.

In 2008, the SCAQMD released the third iteration of the Multiple Air Toxics Exposure Study (MATES-III). The MATES-III report includes monitoring of various air toxic compounds in the Basin, establishes and updates existing baseline toxic air contaminants, and simulates cancer risk in the Basin. The study focuses on the carcinogenic risk from exposure to air toxics. It does not estimate mortality or other health effects from particulate exposures. The SCAQMD MATES-III report indicates that overall in the Basin, diesel PM contributes 83.6 percent of the risk.

In 2014, the SCAQMD released the fourth iteration of the Multiple Air Toxics Exposure Study (MATES-IV). The MATES-IV is a follow up to the previous MATES studies and included an updated toxics air emission inventory, new air toxics air dispersion modeling, and enhanced air toxics monitoring. A key conclusion reached in the MATES-IV study was that the population weighted cancer risk in the Basin decreased by 57 percent from the MATES-III period in 2005 to the MATES-IV period in 2012 indicating that overall, cancer risks are declining in the Basin as a result of the implementation of emission controls principally on large diesel trucks. The MATES-IV study also concluded that diesel PM contributed 68 percent to the total cancer risk in the Basin with benzene and 1.3 Butadiene also making important contributions to cancer risk. **Figure 15,** *Summary of MATES IV Cancer risks,* summarizes the basin-wide cancer risks as derived from the MATES-IV study.

Figure 15: Summary of MATES IV Cancer Risks



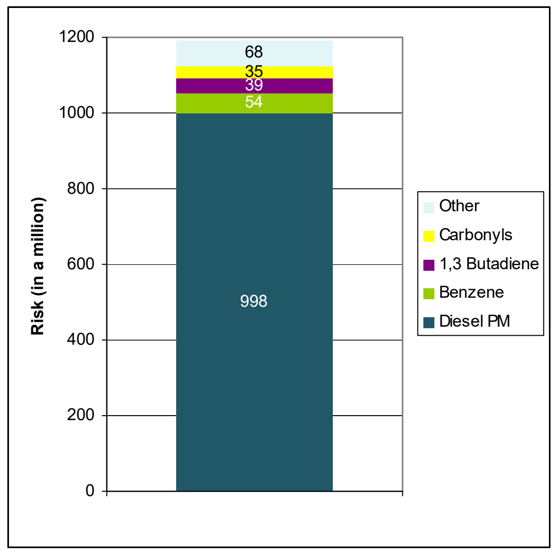


Table 6
Toxic Air Contaminant Concentration Levels and Associated Health Effects (Riverside, California)

TAC	Concentration[A] / Health Risk[B]	2015	2016	2017	Health Effects
Acetaldehyde	Mean	1.48	1.44	1.08	Acetaldehyde is a carcinogen that also causes chronic non-cancer toxicity in the respiratory system. Symptoms of chronic intoxication of acetaldehyde in humans resemble those of alcoholism. The primary acute effect of inhalation exposure to acetaldehyde is irritation of the eyes, skin, and respiratory tract in humans. At higher exposure levels, erythema, coughing, pulmonary edema, and necrosis may also occur. Acute inhalation of acetaldehyde resulted in a depressed respiratory rate and elevated blood pressure in experimental animals.
	Health Risk	22	21	16	

Table 6
Toxic Air Contaminant Concentration Levels and Associated Health Effects (Riverside, California)

TAC	Concentration[A] / Health Risk[B]	2015	2016	2017	Health Effects
Benzene	Mean	ID	0.27	0.271	Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer health effects. Brief inhalation exposure to high concentrations can cause central nervous system depression. Acute effects include central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness. Neurological symptoms of inhalation exposure to benzene include drowsiness, dizziness, headaches, and unconsciousness in humans. Ingestion of large amounts of benzene may result in vomiting, dizziness, and convulsions in humans. Exposure to liquid and vapor may irritate the skin, eyes, and upper respiratory tract in humans. Redness and blisters may result from dermal exposure to benzene. Chronic inhalation of certain levels of benzene causes disorders in the blood in humans. Benzene specifically affects bone marrow (the tissues that produce blood cells). Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in humans occupationally exposed to benzene.
	Health Risk	ID	85	70	
Chromium Hex	Mean	0.083	0.045	ID	In California, hexavalent chromium has been identified as a carcinogen. There is epidemiological evidence that exposure to inhaled hexavalent chromium may result in lung cancer. The principal acute effects are renal toxicity, gastrointestinal hemorrhage, and intravascular hemolysis. The respiratory tract is the major target organ for chromium (VI) following inhalation exposure in humans. Other effects noted from acute inhalation exposure to very high concentrations of chromium (VI) include gastrointestinal and neurological effects, while dermal exposure causes skin burns in humans. Chronic inhalation exposure to chromium (VI) in humans results in effects on the respiratory tract, with perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, asthma, and nasal itching and soreness reported. Chronic human exposure to high levels of chromium (VI) by inhalation or oral exposure may produce effects on the liver, kidneys, gastrointestinal and immune systems, and possibly the blood.
	Health Risk	34	19	ID	
Para-Dichlorobenzene	Mean	ID	ID	ID	In California, para-dichlorobenzene has been identified as a carcinogen. Acute exposure to 1,4-dichlorobenzene via inhalation results in irritation to the eyes, skin, and throat in humans. In addition, long-term inhalation exposure may affect the liver, skin, and central nervous system in humans (e.g., cerebellar ataxia, dysarthria, weakness in limbs, and hyporeflexia).
	Health Risk	ID	ID	ID	
Formaldehyde	Mean	3.52	3.64	3.35	The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects seen from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. Chronic exposure to formaldehyde by inhalation in humans has been associated with
	Health Risk	70	76	70	

Table 6
Toxic Air Contaminant Concentration Levels and Associated Health Effects (Riverside, California)

TAC	Concentration[A] / Health Risk[B]	2015	2016	2017	Health Effects
					respiratory symptoms and eye, nose, and throat irritation. Animal studies have reported effects on the nasal respiratory epithelium and lesions in the respiratory system from chronic inhalation exposure to formaldehyde. Occupational studies have noted statistically significant associations between exposure to formaldehyde and increased incidence of lung and nasopharyngeal cancer. This evidence is considered “limited” rather than “sufficient” due to possible exposure to other agents that may have contributed to the excess cancers. EPA considers formaldehyde to be a probable human carcinogen (cancer-causing agent) and has ranked it in EPA’s Group B1. In California, formaldehyde has been identified as a carcinogen.
Methylene Chloride	Mean	ID	48.2	12.3	Case studies of methylene chloride poisoning during paint-stripping operations have demonstrated that inhalation exposure to extremely high levels can be fatal to humans. Acute inhalation exposure to high levels of methylene chloride in humans has resulted in effects on the central nervous system, including decreased visual, auditory, and psychomotor functions, but these effects are reversible once exposure ceases. Methylene chloride also irritates the nose and throat at high concentrations. The major effects from chronic inhalation exposure to methylene chloride in humans are effects on the central nervous system, such as headaches, dizziness, nausea, and memory loss. In addition, chronic exposure can lead to bone marrow, hepatic, and renal toxicity. EPA considers methylene chloride to be a probable human carcinogen and has ranked it in EPA’s Group B2. California considers methylene chloride to be carcinogenic.
	Health Risk	ID	477	122	
Perchloroethylene	Mean	ID	0.018	0.013	In California, perchloroethylene has been identified as a carcinogen. Perchloroethylene vapors are irritating to the eyes and respiratory tract. Following chronic exposure, workers have shown signs of liver toxicity, as well as kidney dysfunction and neurological disorders.
	Health Risk	ID	2	2	
Diesel PM	Mean	No Monitoring Data Available			In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, railroad workers, and equipment operators. The studies showed these workers were more likely to develop lung cancer than workers who were not exposed to diesel emissions. These studies provided strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. Exposure to diesel exhaust can have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks. This research was based on studies prior to the advent of modern diesel engines with high efficiency emissions controls.
	Health Risk				

ID = Insufficient data

Table 6
Toxic Air Contaminant Concentration Levels and Associated Health Effects (Riverside, California)

TAC	Concentration[A] / Health Risk[B]	2015	2016	2017	Health Effects

A = Concentrations for Hexavalent Chromium are expressed as µg/m^3, and concentrations for Diesel PM are expressed as µg/m^3. Concentrations for all other TACs are expressed as ppb.
B = Health Risk represents the number of excess cancer cases per million people based on a lifetime (70-year) exposure to the annual average concentration. Total Health Risk represents only those compounds listed in this table and only those with data for the year. There may be other significant compounds for which monitoring and/or health risk information are not available
Source: CARB 2018 for the SCAQMD Riverside-Rubidoux air monitoring station.

The basin-wide population weighted cancer risk is 367 per million based on averages at fixed monitoring sites estimated during the MATES-IV study. This level of risk means that on average an estimated 367 individuals in the basin could contract cancer out of a population of one million individuals exposed to all sources of toxic air contaminants over a lifetime of 70 years. A comprehensive air dispersion model and a detailed air toxics emission inventory were then used to estimate cancer risks at other locations where no monitoring sites were deployed. A 10-year research program[49] demonstrated that diesel PM from diesel-fueled engines is a human carcinogen and that chronic (long-term) inhalation exposure to diesel PM poses a chronic health risk.

In addition to increasing the risk of lung cancer, exposure to diesel exhaust can have other health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. Diesel exhaust has been a major source of fine particulate pollution as well, and studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems.

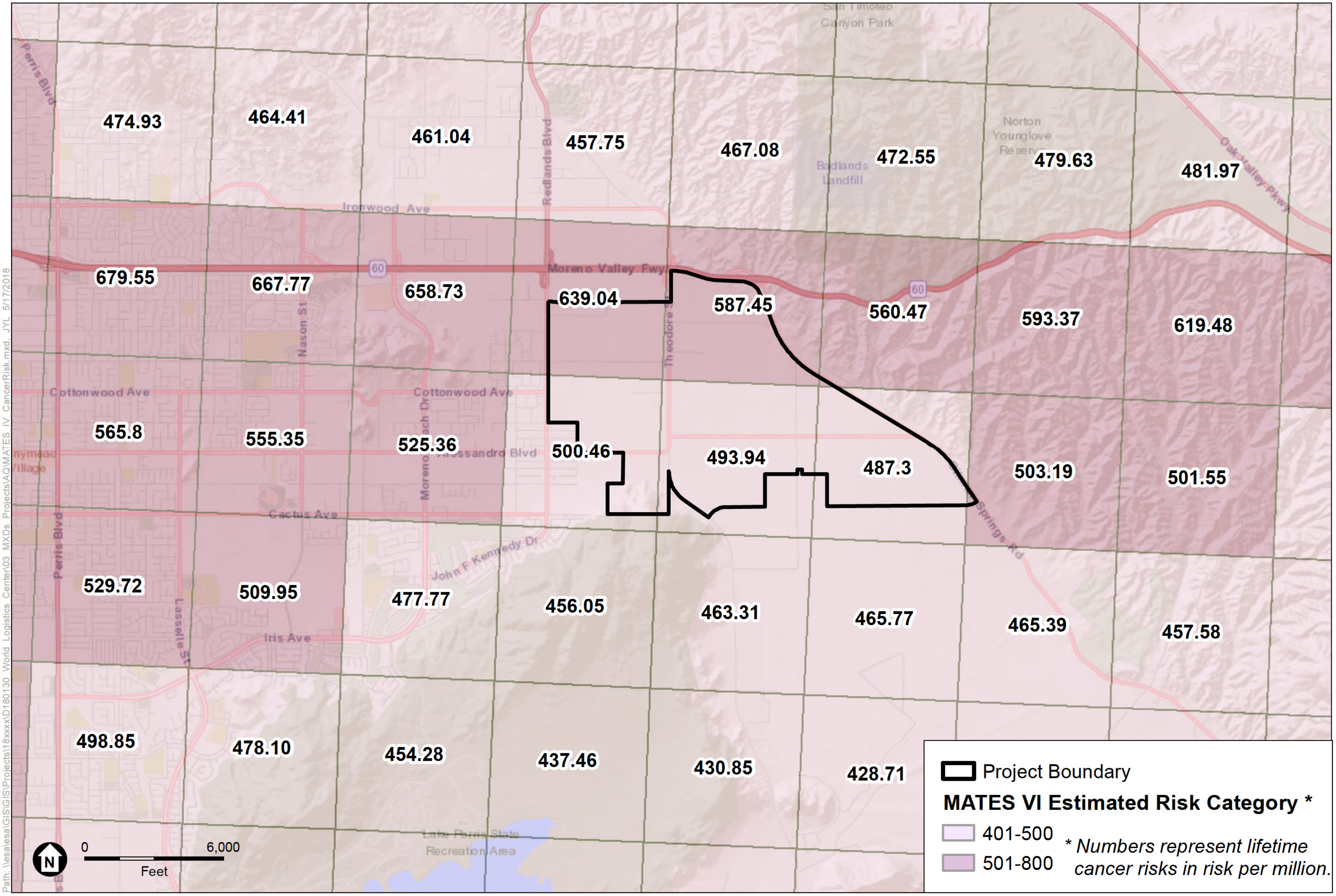
Diesel PM differs from other TACs in that it is not a single substance but a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled, internal combustion engines, the composition of the emissions varies, depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. Unlike the other TACs, however, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. The CARB has made preliminary concentration estimates based on a diesel PM exposure method. This method uses the CARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of diesel PM. Within the Basin, in addition to diesel PM, there are emissions of benzene, formaldehyde, acetaldehyde, naphthalene, ethylbenzene, acrolein, toluene, hexane, propylene, and xylene from a variety of sources located within the Basin that contribute to health risks.

Figure 16, *MATES IV Cancer Risk in Area*, shoes the average cancer risk in the project area. As shown in **Figure 17**, *Change in Air Toxics Simulated Risk from 2005 to 2012*, nearly all areas of the Basin experienced decreases in cancer risk during the time period from MATES–III time

49 CARB. 1998. The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines

period of 2005 to the MATES-IV time period of 2012. The project area also experienced a decrease in cancer risk of between 100 and 400 in one million from the years 2005 to 2012.

Figure 20 depicts the cancer risk estimates as a “snapshot in time.” That is, the cancer risks are derived from air dispersion models and are based on the emissions of various TACs during the years 2005 and 2012. The basic tenet used to estimate cancer risk assumes that the public will be exposed to these TAC emissions during an entire 70-year lifetime of continuous exposure. However, the SCAQMD, CARB, and the EPA have adopted numerous regulations that have



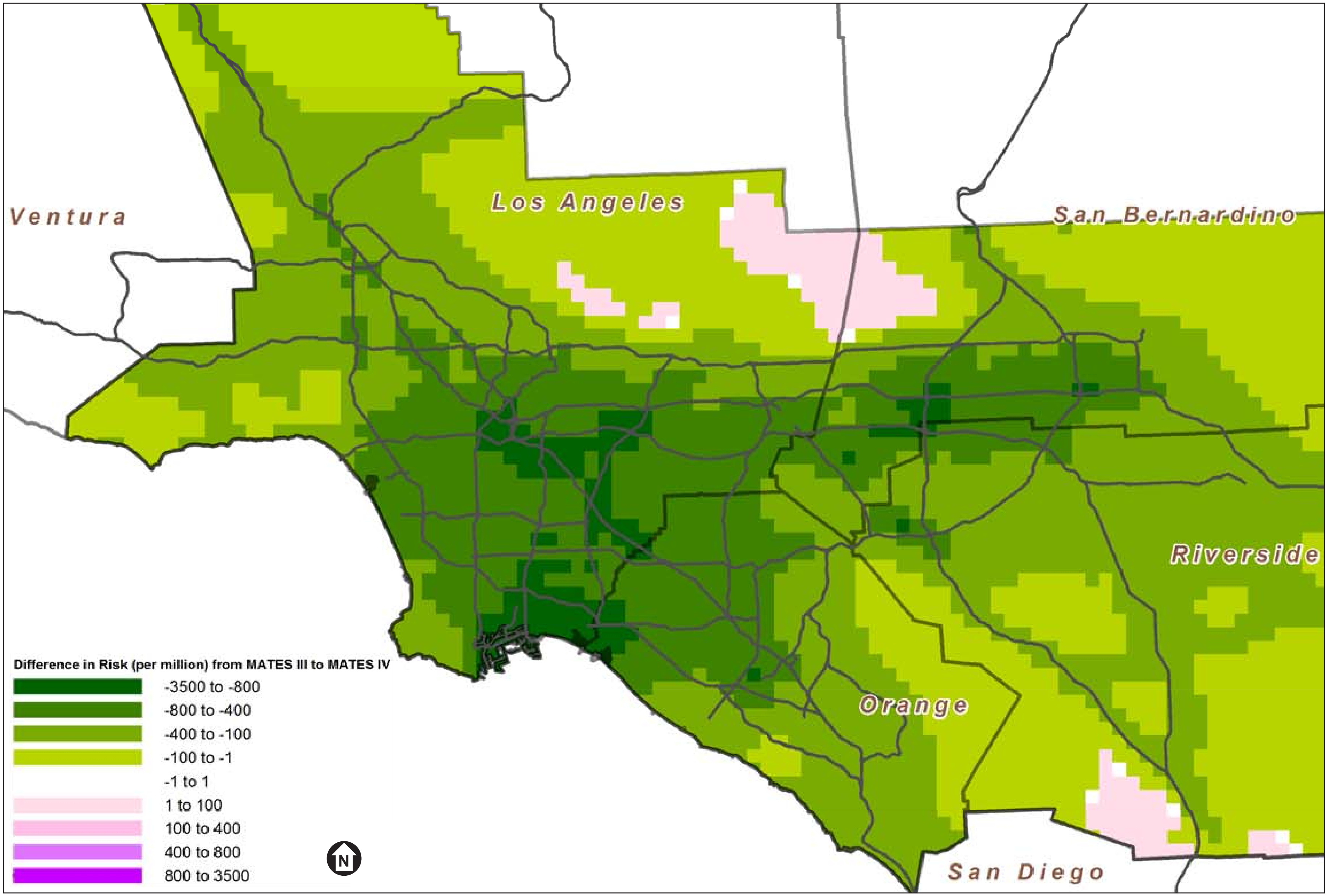
SOURCE: ESRI 2016; South Coast Air Quality Management District 2018

World Logistics Center

Figure 16

MATES IV Cancer Risk in Area

ESA



SOURCE: SCAQMD, MATES IV Final Report, May 2015

Figure 17
Change in Air Toxics Simulated Risk from 2005 to 2012

resulted in significant reductions in pollutant emissions with the attendant reductions in prevailing air quality levels since 2012 as noted earlier. The benefits of substantial additional emission reductions derived from the adoption and application of SCAQMD, CARB, and EPA regulations are not reflected in the estimate of 70-year lifetime cancer risks referred to in Figure 17.

Conservative Nature of Health Risk Assessments

Moreover, the current methodological protocols required by the SCAQMD and CARB when studying the health risk posed by diesel PM assume the following (from the California Air Pollution Control Officers Association 2009): (1) 24-hour constant exposure; (2) 350 days a year; (3) for a continuous period lasting 70 years. These are overly conservative assumptions that are not replicated in reality. Most people are indoors for 18–20 hours a day (at their place of employment or home) and most people do not live in the same location for a 70-year period. In fact, less than 10 percent of the population has a continuous residency at the same location of greater than 30 years (American Community Survey 2011). Thus, the health risk assessments prepared pursuant to the current protocols overestimate the risk of cancer associated with diesel PM exposure.

Alternative Views on Diesel PM Risk

Some researchers, such as Dr. James E. Enstrom (2008), believe that the risk from diesel PM is exaggerated. Enstrom calls into question some of the basic research on the declaration of diesel exhaust as a toxic air contaminant. In particular, the article states the following:

> *There is substantial new epidemiologic evidence relevant to the health effects of diesel exhaust that was not considered when the 1998 toxic air contaminant declaration was made. For instance, the 2007 paper by Francine Laden et al. measured death rates during 1985–2000 among 54,000 members of the unionized U.S. trucking industry. ... This cohort, which included 36,000 diesel truck drivers, had death rates from all causes and all cancer that were substantially below the rates among US males. Furthermore, unlike earlier evidence that was used in the TAC declaration, this cohort did not have a substantially elevated lung cancer death rate.*

Dr. Enstrom also indicates that the premature mortality calculation in the report, "Quantification of the Health Impacts and Economic Valuation of Air Pollution from Ports and Goods Movement in California," is exaggerated. Dr. Enstrom's analysis "found no relationship between $PM_{2.5}$ and mortality in elderly Californians during 1983–2002."

Southern California Association of Governments

Southern California Association of Governments (SCAG) Sustainable Communities Strategy (SCS) within Regional Transportation Plan (RTP) demonstrates the region's ability to attain and exceed the GHG emission reduction targets set by the CARB. The SCS outlines the plan for integrating the transportation network and related strategies with an overall land use pattern that responds to projected growth, housing needs, changing demographics, and transportation demands. The regional vision of the SCS maximizes current voluntary local efforts that support the goals of SB 375, as evidenced by several Compass Blueprint Demonstration Projects and various county transportation improvements. The SCS focuses the majority of new housing and job growth in high-quality transit areas and other opportunity areas in existing main streets, downtowns, and commercial corridors, resulting in an improved jobs-housing balance and more opportunity for transit-oriented development. This overall land use development pattern supports and complements the proposed transportation network, which emphasizes system preservation, active transportation, and transportation demand management measures.

The RTP/SCS exceeds its greenhouse gas emission-reduction targets set by the CARB by achieving an 8 percent reduction by 2020, an 18 percent reduction by 2035, and a 21 percent reduction by 2040 compared to the 2005 level on a per capita basis. **Table 7**, *SCAG Assumptions for Moreno Valley,* shows the assumptions regarding Moreno Valley that SCAG used in its 2016 analysis.

Table 7
SCAG Assumptions for Moreno Valley

Year	Population	Households	Employment
2012	197,600	51,800	31,400
2040	256,600	73,000	83,200

Source: Southern California Association of Governments 2016 (http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS_DemographicsGrowthForecast.pdf)

The RTP also includes an appendix on Goods Movement, which provides an overview of the regional goods movement and initiatives to facilitate it. The 2016 RTP does not include a list of proposed or recommend strategies. Proposed Strategies in the 2012 RTP (that are still relevant in the 2016 RTP) that include the Local Jurisdiction as a responsible party, that could be applicable to the project, and that pertain to air quality or greenhouse gases are shown in **Table 8**, *Select 2012 Regional Transportation Plan Strategies*. Many of the strategies are similar to the project's mitigation measures and project design features.

Table 8
Select 2012 Regional Transportation Plan Strategies

Strategy	Responsible Party*	Project Consistency
Encourage the use of range-limited battery electric and other alternative fueled vehicles through policies and programs, such as, but not limited to, neighborhood oriented development, complete streets, and electric (and other alternative fuel) vehicle supply equipment in public parking lots.	Local Jurisdictions, COGs, SCAG, CTCs	Consistent with **Mitigation Measures AIR-7** (non-diesel yard trucks), **AIR-8** (alternative fuel station), and **AIR-11** (electric vehicle charging stations).
Support projects, programs, and policies that support active and healthy community environments that encourage safe walking, bicycling, and physical activity by children, including, but not limited to development of complete streets, school siting policies, joint use agreements, and bicycle and pedestrian safety education.	Local Jurisdictions and CTCs	Consistent with **Mitigation Measure AIR-11** (bicycle lanes, storage lockers, and pedestrian connections/pathways).

Table 8
Select 2012 Regional Transportation Plan Strategies

Strategy	Responsible Party*	Project Consistency
Engage in a strategic planning process to determine the critical components and implementation steps for identifying and addressing open space resources, including increasing and preserving park space, specifically in park-poor communities.	Local Jurisdictions and CTCs	The project is consistent with City's goal of conserving open space. As compared to the Moreno Highlands Specific Plan, theproject would change the zoning on 910 acres from residential to open space. In addition, the project preserves the zoning of 74 acres of open space in the southwest corner of the project site for passive open space and recreation uses. Finally, a network of trails has been proposed within the project site to provide public trail access to the Lake Perris Recreational Area and the San Jacinto Wildlife Area.
Develop first-mile/last-mile strategies on a local level to provide an incentive for making trips by transit, bicycling, walking, or neighborhood electric vehicle or other zero emission vehicle options.	Local Jurisdictions and CTCs	Consistent with **Mitigation Measure AIR-11** (Riverside County's Rideshare Program), bicycle lanes, and pedestrian access.
Encourage transit fare discounts and local vendor product and service discounts for residents and employees of transit oriented development/high quality transit areas or for a jurisdiction's local residents in general who have fare media	Local Jurisdictions	Not applicable. This measure is for areas in transit-oriented development.
Encourage the implementation of a Complete Streets policy that meets the needs of all users of the streets, roads and highways—including bicyclists, children, persons with disabilities, motorists, neighborhood electric vehicle (NEVs) users, movers of commercial goods, pedestrians, users of public transportation and seniors—for safe and convenient travel in a manner that is suitable to the suburban and urban contexts within the region.	Local Jurisdictions, COGs, SCAG, CTCs	Although the project is not implementing what is labeled as a "Complete Streets" policy, the project would include bicycle lanes and pedestrian access (**Mitigation Measure AIR-11**) and would implement handicapped access pursuant to current regulations.
Support work-based programs that encourage emission reduction strategies and incentivize active transportation commuting or ride-share modes.	SCAG, Local Jurisdictions	Consistent through **Mitigation Measure AIR-11** (Riverside County's Rideshare Program; designated parking for carpool/van pools).
Develop infrastructure plans and educational programs to promote active transportation options and other alternative fueled vehicles, such as neighborhood electric vehicles, and consider collaboration with local public health departments, walking/biking coalitions, and/or Safe Routes to School initiatives, which may already have components of such educational programs in place.	Local Jurisdictions	Consistent with **Mitigation Measures AIR-11** (bicycle lanes, pedestrian access, electric vehicle charging) and **AIR-8** (alternative fueling infrastructure).
Encourage the development of telecommuting programs by employers through review and revision of policies that may discourage alternative work options.	Local Jurisdictions and CTCs	Not applicable. Tenants may choose to implement telecommuting if feasible.
Emphasize active transportation and alternative fueled vehicle projects as part of complying with the Complete Streets Act (AB 1358).	State, SCAG, Local Jurisdictions	Consistent with **Mitigation Measure AIR-8** (alternative fueling station) and **Mitigation Measure AIR-11** (electric vehicle charging stations)

* Abbreviations:
SCAG = Southern California Association of Governments

Table 8
Select 2012 Regional Transportation Plan Strategies

Strategy	Responsible Party*	Project Consistency

CTCs = county transportation commissions
COGs = subregional councils of governments
Source: Southern California Association of Governments 2012

The Goods Movement appendix of the 2016 RTP/SCS describes a process to develop and deploy needed technologies, along with key action steps for public sector agencies to help move the region to that objective. The 2016 RTP/SCS reaffirms zero- and near zero-emission technologies as a priority, and establishes the regional path forward to such as goods movement system.

SB 375 took effect in 2009 and required regional municipal planning organizations to develop regional land use plans that demonstrate how the regions will achieve compliance with the GHG reduction goals of AB 32. Cities located within these regions are then required, in turn, to update their General Plans in accordance with the regional plans. Non-compliance with SB 375 will result in transportation funds being withheld from the regional and/or local agency. To date, the regional municipal planning organization for Riverside County (the Western Riverside Council of Governments, or WRCOG) has not adopted a regional plan that is in compliance with SB 375.

2.5 Local

City of Moreno Valley

General Plan

Chapter 9 of the City's General Plan defines goals and policies related to air quality within the City of Moreno Valley. The specific policies of the General Plan that are relevant to theproject are as follows:

Objective 6.6 Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.

Objective 6.7 Reduce mobile and stationary source air pollutant emissions.

Policy 6.7.1 Cooperate with regional efforts to establish and implement regional air quality strategies and tactics.

Policy 6.7.2 Encourage the financing and construction of park and ride facilities.

Policy 6.7.3 Encourage express transit service from Moreno Valley to the greater metropolitan areas of Riverside, San Bernardino, Orange, and Los Angeles Counties.

Policy 6.7.4 Locate heavy industrial and extraction facilities away from residential areas and sensitive receptors.

Policy 6.7.5 Require grading activities to comply with South Coast Air Quality Management District's Rule 403 regarding the control of fugitive dust.

Policy 6.7.6 Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code.

Climate Action Strategy

The City of Moreno Valley approved the Energy Efficiency and Climate Action Strategy (Strategy) in October 2012. The Strategy identifies ways that the City can reduce energy and water consumption and greenhouse gas emissions as an organization (its employees and the operation of its facilities) and outlines the actions that the City can encourage and community members can employ to reduce their own energy and water consumption and greenhouse gas emissions. The Strategy contains the following policies to reduce greenhouse gas emissions in 2010 by 15 percent by 2020:

R2-T1 Land Use Based Trips and VMT Reduction Policies. Encourage the development of Transit Priority Projects along High Quality Transit Corridors identified in the SCAG Sustainable Communities Plan, to allow a reduction in vehicle miles traveled.

R2-T3 Employment-Based Trip Reductions. Require a Transportation Demand Management (TDM) program for new development to reduce automobile travel by encouraging ride-sharing, carpooling, and alternative modes of transportation.

R2-E1 New Construction Residential Energy Efficiency Requirements. Require energy efficient design for all new residential buildings to be 10 percent beyond the current Title 24 standards.

R2-E2 New Construction Residential Renewable Energy. Facilitate the use of renewable energy (such as solar [photovoltaic] panels or small wind turbines) for new residential developments. Alternative approach would be the purchase of renewable energy resources off site.

R2-E5 New Construction Commercial Energy Efficiency Requirements. Require energy efficient design for all new commercial buildings to be 10 percent beyond the current Title 24 standards.

R3-E1 Energy Efficient Development, and Renewable Energy Deployment Facilitation and Streamlining. Updating of codes and zoning requirements and guidelines to further implement green building practices. This could include incentives for energy-efficient projects.

R3-L2 Heat Island Plan. Develop measures that address "heat islands." Potential measures include using strategically placed shade trees, using paving materials with a Solar Reflective Index of at least 29, an open grid pavement system, or covered parking.

R2-W1 Water Use Reduction Initiative. Consider adopting a per capita water use reduction goal which mandates the reduction of water use of 20 percent per capita with requirements applicable to new development and with cooperative support of the water agencies.

R3-W1 Water Efficiency Training and Education. Work with EMWD and local water companies to implement a public information and education program that promotes water conservation.

R2-S1 City Diversion Program. For solid waste, consider a target of increasing the waste diverted from the landfill to a total of 75 percent by 2020.

SECTION 3
Significance Thresholds

3.1 State CEQA Guidelines, Appendix G

Based on Appendix G of the CEQA Guidelines, air quality impacts would occur if the project would:

AIR-1: Conflict with or obstruct implementation of the applicable air quality plan;

AIR-2: Violate any air quality standard or contribute substantially to an existing or projected air quality violation;

AIR-3: Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

AIR-4: Expose sensitive receptors to substantial pollutant concentrations; and/or

AIR-5: Create objectionable odors affecting a substantial number of people.

GHG-1: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, or

GHG-2: Conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

In addition to the Federal and State AAQS, there are daily emissions thresholds for construction and operation of a project in the Basin. The Basin is administered by the SCAQMD, and guidelines and emissions thresholds established by the SCAQMD in its CEQA Air Quality Handbook[50] and subsequent additions to the Handbook were used in this analysis. It should be noted that the emissions thresholds were established based on the attainment status of the air basin with regard to air quality standards for specific criteria pollutants. Because the concentration standards were set at a level that protects public health with an adequate margin of safety, these emissions thresholds are regarded as conservative and would overstate an individual project's contribution related to air quality and health risks.

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50 *CEQA Air Quality Handbook*, April 1993.

Air Quality Thresholds

Construction Emissions

The following CEQA significance thresholds for regional construction emissions have been established by the SCAQMD for the Basin:

- 75 pounds per day of VOC, also known as reactive organic compounds (ROC).
- 100 pounds per day of NO_X.
- 550 pounds per day of CO.
- 150 pounds per day of PM_{10}.
- 150 pounds per day of SO_X.
- 55 pounds per day of $PM_{2.5}$.

Projects in the Basin with construction-related emissions that exceed any of the emission thresholds are considered to be significant under CEQA.

Operational Emissions

Projects with regional operation-related emissions that exceed any of the regional emission thresholds listed below are considered significant under the SCAQMD guidelines.

- 55 pounds per day of VOC, also known as ROC.
- 55 pounds per day of NO_X.
- 550 pounds per day of CO.
- 150 pounds per day of PM_{10}.
- 150 pounds per day of SO_X.
- 55 pounds per day of $PM_{2.5}$.

Carbon Monoxide Hotspots

The significance of localized project impacts under CEQA depends on whether ambient CO levels in the vicinity of the project are above or below State and Federal CO standards. If ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a State or Federal standard, project emissions are considered significant if they increase one-hour CO concentrations by 1.0 ppm or more or eight-hour CO concentrations by 0.45 ppm or more. The Basin meets State and Federal attainment standards for CO; therefore, the project would have a significant CO impact if project emissions result in an exceedance of State or

Federal one-hour or eight-hour standard. The following emission concentration standards for CO, based on the SCAQMD CEQA Air Quality Handbook (1993), apply to the project:

- California State one-hour CO standard of 20.0 ppm.
- California State eight-hour CO standard of 9.0 ppm.

Localized Significance Thresholds

The SCAQMD published its Final Localized Significance Threshold Methodology in June 2003, revised July 2008) and Final Methodology to Calculate Particulate Matter (PM) 2.5 and $PM_{2.5}$ Significance Thresholds (October 2006), recommending that all air quality analyses include a localized assessment of both construction and operational impacts on the air quality of nearby sensitive receptors. Localized Significant Thresholds (LSTs) represent the maximum emissions from a project site that are not expected to result in an exceedance of Federal or State AAQS. LSTs are based on the ambient concentrations of that pollutant within the Source Receptor Area (SRA) where a project is located and the distance to the nearest sensitive receptor. The project site is located in the northern portions of SRAs 24 (Moreno Valley) and 28 (San Jacinto).

In the case of CO and NO_2, if ambient levels are below the air standards for these pollutants, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a State or Federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM_{10} and $PM_{2.5}$, both of which are nonattainment pollutants in the Basin. For these latter two pollutants, the significance criteria are the pollutant concentration thresholds presented in SCAQMD Rules 403 and 1301. The Rule 403 threshold of 10.4 $\mu g/m^3$ applies to construction emissions (and may apply to operational emissions at aggregate handling facilities). The Rule 1301 threshold of 2.5 $\mu g/m^3$ applies to non-aggregate handling operational activities.

Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to adverse air quality. There are currently six occupied single-family homes and associated ranch/farm buildings in various locations on the project site. These residences are existing on-site sensitive receptors. The nearest off-site existing sensitive receptors in the vicinity of the project site are the residences located along Bay Avenue, Merwin Street, and west of Redlands Boulevard, and scattered residences along Gilman Springs Road.

Following the SCAQMD LST methodology, for sites larger than 5 acres, air dispersion modeling needs to be conducted. Because the project site greatly exceeds 5 acres, the localized significance for project air pollutant emissions was determined by performing dispersion modeling to determine if the pollutant concentrations would exceed relevant significance thresholds established by the SCAQMD.

The following LSTs were applied to the construction and operation of the project:

- 0.18 ppm (State 1-hour); 0.100 ppm (Federal 1-hour); and 0.03 ppm (Annual) of NO_2 for construction or operations.

- 20 ppm (1-hour) and 9.0 ppm (8-hour) of CO for construction or operation.
- 10.4 µg/m^3 (24-hour) and 1 µg/m^3 of PM_{10} (Annual) for construction.
- 2.5 µg/m^3 (24-hour) and 1.0 ppm (Annual) of PM_{10} for operations.
- 10.4 µg/m^3 (24-hour) of $PM_{2.5}$ for construction.
- 2.5 µg/m^3 (24-hour) of $PM_{2.5}$ for operation.
- Note that when construction and operational activities occur at the same time, the SCAQMD recommends application of the significance thresholds for operation apply in determining emission significance

Health Risk Significance Thresholds

For pollutants without defined significance standards or air contaminants not covered by the standard criteria cited above, the definition of substantial pollutant concentrations varies. For toxic air contaminants (TAC), "substantial" is taken to mean that the individual cancer risk exceeds a threshold considered to be a prudent risk management level.

The SCAQMD has defined several health risk significance thresholds that it recommends to Lead Agencies in assessing a project's health risk impacts. The City of Moreno Valley has not adopted its own set of thresholds. Therefore, the following SCAQMD thresholds were adopted for the project.

- **Maximum Individual Cancer Risk (MICR) and Cancer Burden.** The MICR is the estimated increase in lifetime probability of the maximally exposed individual contracting cancer as a result of exposure of TACs over the applicable exposure period. Cancer burden multiples the cancer risk by the exposed population to estimate the number of individuals that would be expected to contract cancer from the project.

  A significant impact would occur for:

  A. An increased MICR greater than 10 in 1 million at any receptor location; or

  B. A cancer burden greater than 0.5.

- **Chronic Hazard Index (HI).** This is the ratio of the estimated long-term level of exposure to a TAC for a potential maximally exposed individual to its chronic reference exposure level. A reference exposure level is the exposure level below which an adverse health effect will not occur as determined by health professionals The chronic HI calculations include multi-pathway consideration, when applicable.

  A significant impact would occur if the increase in total chronic HI for any target organ system due to exposures to total TAC emissions from the project exceeds 1.0 at any receptor location.

- **Acute Hazard Index (HI).** This is the ratio of the estimated maximum one-hour concentration of a TAC for a potential maximally exposed individual to its acute reference exposure level, the exposure level below which an adverse health effect will not occur as determined by health professionals.

  A significant impact would occur if the increase in total acute HI for any target organ system due to exposure to total TAC emissions from the project exceeds 1.0 at any receptor location.

Greenhouse Gas Thresholds

On December 5, 2008, the SCAQMD Governing Board adopted an interim greenhouse gas significance threshold for stationary sources, rules, and plans where the SCAQMD is the lead agency (SCAQMD permit threshold). Tier 3 of the threshold is recommended by the SCAQMD for industrial projects.[51] The threshold consists of five tiers, as follows:

- Tier 1 consists of evaluating whether or not a project qualifies for any applicable exemption under CEQA. The project is not exempt under CEQA; therefore, go to Tier 2.
- Tier 2 consists of determining whether or not the project is consistent with a greenhouse gas reduction plan. If a project is consistent with a qualifying local greenhouse gas reduction plan, it does not have significant greenhouse gas emissions. There is no greenhouse gas reduction plan that could be used for CEQA purposes for this project; go to Tier 3.
- Tier 3 is a screening threshold level to determine significance using a 90 percent emission capture rate approach and is 10,000 $MTCO_2e$ per year (with construction emissions amortized/averaged over 30 years and added to operational emissions). Project greenhouse gas emissions are compared with the threshold, 10,000 $MTCO_2e$ per year (see analysis below).
- Tier 4 was not approved in the interim greenhouse gas threshold.
- Tier 5 would allow the project proponent to purchase offsite mitigation to reduce greenhouse gas emissions to less than the screening level (in Tier 3).

Section 15064.4(b) of the CEQA Guideline amendments for greenhouse gas emissions state that a lead agency may take into account the following three considerations in assessing the significance of impacts from greenhouse gas emissions.

Consideration #1: The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting.

Consideration #2: Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.

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[51] SCAQMD. 2015. Air Quality Significance Thresholds. Revised March 2015. http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2

Consideration #3: The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

AB 32 Capped and Uncapped Emissions

The ARB has designed a California cap-and-trade program that is enforceable and meets the requirements of AB 32. The program began on January 1, 2012, with an enforceable compliance obligation beginning with its 2013 greenhouse gas emissions inventory. Some of the project's greenhouse gas emissions are subject to the requirements of the AB 32 Cap and Trade Program and will have a greenhouse gas allocation based on current emissions levels. The AB 32 Cap-and-Trade Program has divided allocations into sectors. The transportation and electricity sectors would be covered by the cap-and-trade program.

The SCAQMD has recognized that the greenhouse gas emissions associated with capped sources should not be counted for the purpose of determining what the greenhouse gas emissions are for facilities that will use electricity generated elsewhere. In September 2013, the SCAQMD adopted the following two Negative Declarations last year stating that greenhouse gas emissions subject to the ARB Cap-and-Trade Program do not count against the 10,000 $MTCO_2e$ significance threshold the SCAQMD applies when acting as a lead agency:

- Ultramar Inc. Wilmington Refinery Proposed Cogeneration Project[52]
- Phillips 66 Los Angeles Refinery Carson Plant - Crude Oil Storage Capacity Project[53]

In addition, the San Joaquin Valley Air Pollution Control District (SJVAPCD) has recently taken this issue one step further and adopted a policy: "CEQA Determinations of Significance for Projects Subject to ARB's GHG Cap-and-Trade Regulation".[54] This policy applies when the SJVAPCD is the lead agency and when it is a responsible agency. In short, the SJVAPCD "has determined that GHG emissions increases that are covered under ARB's Cap-and-Trade regulation cannot constitute significant increases under CEQA . . ." The SJVAPCD classifies ARB's Cap-and- Trade Program as an approved greenhouse gas emission reduction plan or

52 SCAQMD. Final Negative Declaration for: Ultramar Inc. Wilmington Refinery Cogeneration Project. October 2014. https://planning.lacity.org/eir/CrossroadsHwd/deir/files/references/C38.pdf

53 SCAQMD. Final Negative Declaration for: Phillips 66 Los Angeles Refinery Carson Plant - Crude Oil Storage Capacity Project. December 2014. http://www.aqmd.gov/docs/default-source/ceqa/documents/permit-projects/2014/phillips-66-fnd.pdf

54 San Joaquin Valley Air Pollution Control District (SJVAPCD). 2014. CEQA Determinations of Significance for Projects Subject to ARB's GHG Cap-and-Trade Regulation. https://www.valleyair.org/policies_per/Policies/APR-2025.pdf

greenhouse gas mitigation program under CEQA Guidelines Section 15064(h) (3). Here are some other pertinent excerpts from that policy:

- Consistent with CCR §15064(h)(3), the District finds that compliance with ARB's Cap-and-Trade regulation would avoid or substantially lessen the impact of project-specific GHG emissions on global climate change.

- The District therefore concludes that GHG emissions increases subject to ARB's Cap-and-Trade regulation would have a less than significant individual and cumulative impact on global climate change.

- [I]t is reasonable to conclude that implementation of the Cap-and-Trade program will and must fully mitigate project-specific GHG emissions for emissions that are covered by the Cap-and-Trade regulation.

- [T]he District finds that, through compliance with the Cap-and-Trade regulation, project-specific GHG emissions that are covered by the regulation will be fully mitigated.

The policy acknowledges that "combustion of fossil fuels including transportation fuels used in California (on and off road including locomotives), not directly covered at large sources, are subject to Cap-and-Trade requirements, with compliance obligations starting in 2015." As such, the SJVAPCD concludes that greenhouse gas emissions associated with vehicle miles traveled cannot constitute significant increases under CEQA. This regulatory conclusion is therefore directly applicable to the project because vehicle miles traveled is by far the largest source of project greenhouse gas emissions.

Therefore, only the uncapped project emissions are compared with the SCAQMD significance threshold (see Tier 3 above).

SECTION 4
Methodology

The evaluation of potential impacts to air quality and GHG emissions that may result from the construction and long-term operations of the Project is conducted as follows:

4.1 Construction

Construction-related emissions are expected from various activities associated with the construction of the project such as rough grading, infrastructure construction, asphalt paving, building construction, architectural coatings, and construction workers commuting. Construction emissions for construction worker vehicles traveling to and from the project site, in addition to vendor trips (construction materials delivered to the project site) and haul trips (dump trucks and concrete trucks) were also accounted for in the analysis. Localized air quality in the project area would be affected by both heavy-duty construction equipment usage on site as well as local traffic due to the equipment delivery and construction worker commuting. The SCAQMD CEQA methodology was used to analyze the criteria pollutant emissions from these activities.

The assumptions that follow in this section are for the criteria pollutant analysis and the greenhouse gas analysis. This section describes the assumptions used to estimate the emissions using the California Emissions Estimator Model (CalEEMod) (Version 2016.3.2). The criteria pollutants estimated by CalEEMod for construction are as follows: VOC, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$. In addition, CalEEMod also estimated construction emissions for methane, nitrous oxide, carbon dioxide, and $MTCO_2e$ for use in the greenhouse gas impact assessment.

Construction was assumed to occur over 15 years. Although buildout of the project would depend on market conditions, the project could be built out and operational as early as 2035.[55] Therefore, to provide a conservative air quality analysis, construction was assumed to be completed over a 15-year period that provides for phase overlap and the use of older construction equipment.

The various activities during construction are described as follows:

- Mass excavation: Approximately 42 million cubic yards (cy) of cut and fill will be required to rough/mass grade the entire project site, including remedial grading and over-

[55] *Full build out of the Project is expected to take 15 to 20 years, dependent on market forces. The TIA analyzes full project buildout in 2040, which is worst case for traffic analysis purposes as it accounts for greater regional growth in non-project traffic. However, for purposes of a conservative construction impact analysis, the fifteen-year buildout (construction ending in 2034 and full operations in 2035) is analyzed. An accelerated construction schedule occurring in earlier years would account for greater overlap of construction activity and the use of dirtier construction equipment (i.e. subject to less stringent emission standards).*

excavation. Earthwork will balance on site within the Specific Plan, eliminating the need to import or export dirt for the project.

- Finish grading: This activity is to fine tune the drainage patterns on the site and achieve the finish tolerance of the grading activity.
- Building: This activity involves construction of the buildings on the project site. The sub-activities include bringing concrete to the site, tilting up the concrete walls, constructing the wet utilities, installing the electrical, and installing the landscaping around the buildings.
- Concrete: Concrete pouring would likely occur during nighttime hours due to limitations high temperatures pose for concrete work during the day. On-site equipment used during concrete pouring would involve daytime prep with actual concrete pouring occurring during the nighttime hours. On average, the total hours of operation for each piece of equipment during the concrete phase would be approximately 10 hours. Therefore, the analysis assumes a realistic average use of construction equipment by assuming that the maximum equipment would be used for five days per week occurring for 10 hours per day (including the concrete pouring phase).
- Utilities: Grading and trenching for electrical, natural gas, etc.
- Interchange: Construction related to the State Route 60 (SR-60) interchange improvements.
- Curbing/driving approaches: Constructing curbs and driveways.
- Coatings: The exterior of the buildings and the interior of the office space would be painted. CalEEMod assumes that a high quantity of painting would occur, even though the project consists of warehouses and would require minimal painting. VOC from painting is estimated outside of CalEEMod.
- Paving: The acreage to be paved in unknown at this time; it was assumed for worst-case purposes that one-third of each planning area would be paved. The VOC emissions from paving were estimated manually using the calculations presented in the CalEEMod User's Guide and the acreage of the planning area.
- Landscaping: This involves landscaping the area outside the immediate proximity of the buildings.

Off-road Equipment

The off-road equipment refers to the equipment that would operate onsite (and in the adjacent offsite areas, for offsite improvements) to move dirt and materials around, and include equipment such as scrapers, graders, loaders, pavers, excavators, and dozers. This equipment operates during all subphases of construction of the project.

The emission levels for off-road equipment are based on the emission factors, horsepower, load factor, and activity level of the equipment. The emission factors are generally described as an emission rate per horsepower and time of operation and depend on the type of equipment, horsepower, and model year of the equipment. In general, the horsepower is the power of an engine – the greater the horsepower, the greater the power to be able to move dirt and materials around. In general, a greater horsepower also results in greater emissions. The load factor is the average power of a given piece of equipment while in operation compared with its maximum rated horsepower. A load factor of 1.0 indicates that a piece of equipment continually operated at its maximum operating capacity. The activity level is generally represented by the number of hours the equipment is in operation during a time period such as a day. An air emissions model, such as CalEEMod, combines the emission factors, horsepower, load factor, and activity level and outputs the emissions for the various pieces of equipment and air pollutants.

The onsite construction equipment assumptions, including the horsepower, load factor, and number, are included in Appendix A of this report and are used in the emission model to estimate construction emissions.

Equipment *tiers* refers to the adoption of emission standards established by the EPA and ARB that apply to diesel engines in off-road equipment. The "tier" of an engine depends on the model year and horsepower rating; generally, the newer a piece of equipment is, the greater the tier it is likely to have. Beginning in year 2011, new off-road mobile engines sold that are equal to or greater than 175 horsepower (hp) and non-emergency stationary engines less than 10 liters per cylinder and equal to or greater than 175 hp are required to meet Tier 4 Interim standards (40 Code of Federal Regulations, part 1039). Tier 4 Final for engines greater than 130 hp are required as of 2014.

CalEEMod contains a default inventory of construction equipment for various land uses that incorporates estimates of the number of equipment, their age, their hp, and equipment tier from which rates of emissions are developed. For the unmitigated emissions estimates, all equipment is assumed to be the CalEEMod defaults. For the mitigated emissions estimates, the off-road equipment (those over 50 hp) are assumed to be Tier 4.

The analysis assumes that the onsite equipment are in the on position for 10 hours per day as a project design feature. This is a conservative scenario as the CalEEMod default assumes construction equipment would be on for 6 to 8 hours per day. This is used to calculate maximum daily emissions which are required for the regional analysis, because project emissions can occur on any day of the week.

Onsite equipment used during concrete pouring, which would most likely occur during the night, was assumed to occur over 24 hours to calculate the regional emissions for a worst-case 24-hour construction day. Concrete pouring phases that would include nighttime activity would occur for a maximum of one or two days for each planning area and not throughout the entire concrete pouring phase. It is assumed that during 24-hour concrete pour days, no other construction would occur on the project site. Therefore, in order to calculate annual average emissions, it is necessary to base emissions upon a realistic work schedule. The analysis assumes a more realistic annual average use of construction equipment by assuming that the maximum equipment would occur for five days per week occurring for 10 hours per day (including the concrete pouring phase). In this way, an annual average and daily emission inventories were estimated.

Construction Trips

Construction trips refer to the number of trips to the project site from offsite locations and include the following groups:

- Workers: These are trips from construction workers from their residence to the project site. The CalEEMod default worker trip length of 14.7 miles was increased to 25 miles, to account for a potentially longer commute distance for construction workers. The CalEEMod default vehicle fleet mix was used for employee trips.

- Vendors: These trips include water trucks and service/support trucks bringing smaller materials to the project site. The vendor trip length was increased from the default of 6.9 miles to 25 miles, to account for any additional trips and to account for deliveries from the greater Los Angeles area. The CalEEMod default vehicle fleet was used for vendor trips.

- Haul Trucks: Dump truck trips, support haul trucks, concrete trucks, and material delivery trips were represented as haul trips, with a mileage of 25 miles per trip (increased from the default of 20 miles). The CalEEMod default vehicle type was used for haul trips.

CalEEMod utilizes EMFAC2014 emissions factors for on-road sources. Therefore, construction trips emissions were calculated outside of CalEEMod using updated EMFAC2017 emissions factors. Calculations are included as Appendix A of this report. The vendor and haul trips for onsite travel (assuming trip length of 0.5 miles) and idling were also calculated using EMFAC2017 emissions factors. The CalEEMod default hp and load factors for water trucks, concrete trucks, and off-highway trucks were included in the onsite construction equipment by assigning hours per day to account for onsite travel and idling. The hp and load factors were used for each equipment as specified below:

- Water trucks and service support trucks: other material handling equipment, 1 hour per day per trip

- Concrete trucks: cement and mortar mixers, 1 hour per day per trip

- Delivery trucks, dump trucks, and support haul trucks: off-highway trucks, 0.3 hours per day per trip

Fugitive Dust Estimates

Off-Road Equipment

Approximately 42 million CY of cut and fill will be required to rough/mass grade the entire project site, including remedial grading and over-excavation. Grading is required to make the land level before the building foundations are laid. Earthwork will balance on-site within the Specific Plan, eliminating the need to import or export dirt for the project.

During grading activities, fugitive dust can be generated from the movement of dirt on the project site. CalEEMod estimates dust from dozers moving dirt around, dust from graders or scrapers leveling the land, and loading or unloading dirt into haul trucks. Each of those activities is calculated differently in CalEEMod based on the number of acres traversed by the grading equipment.

Only some pieces of equipment generate fugitive dust within CalEEMod during grading activities. However, there could be construction emissions occurring over the entire planning area because some equipment does not generate fugitive dust. As an example, the building forklifts lifting materials up would not generate fugitive dust. In addition, there could be groups of graders and scrapers working at different ends of the planning area. The dispersion modeling assessment assumes that emissions would occur over the entire planning area.

According to CalEEMod, only several types of onsite off-road construction equipment generate fugitive dust. These include scrapers, crawler tractors, graders, and rubber tired dozers. For a conservative approach, for this assessment, it was assumed that compactors, excavators, and backhoes also generated fugitive dust. The scrapers are assumed to impact 1 acre over an 8-hour day and the other equipment mentioned above would impact ½ acre over an 8-hour day.

SCAQMD Rule 403 requires fugitive dust generating activities to follow best available control measures to reduce emissions of fugitive dust. In particular, the project would need to comply with the requirements of a “large operation,” which requires more dust suppressant methods. Rule 403 states that for large operations, during earth moving, the soil moisture content must be at least 12 percent or water to prevent visible dust emissions from exceeding 100 feet in any direction. According to the SCAQMD’s Mitigation Measure Examples: Fugitive Dust from Construction & Demolition,[56] maintaining a 12 percent soil moisture would reduce fugitive dust by 69 percent. Therefore, for the unmitigated and mitigated emissions estimates, dust emissions from earth moving are reduced by 69 percent. These measures from Rule 403 are accounted for in CalEEMod as “mitigation” because they reduce emissions, even though they are technically not mitigation, but requirements. Rule 403 is accounted for in CalEEMod by watering three times per day, which would result in a 61 percent reduction in fugitive dust.

Unpaved Road Dust

There could be fugitive dust generated on unpaved roads from the employee vehicles, vendor vehicles, and haul trucks during construction. The emissions estimates for this dust were estimated using assumptions consistent with CalEEMod defaults. The mean vehicle speed was reduced from 40 miles per hour to 20 miles per hour. The percent paved was changed to zero percent. Construction parking would likely be near the paved roads; therefore, the onsite distance

[56] SCAQMD. 2007. Fugitive Dust Mitigation Measures. http://www.aqmd.gov/docs/default-source/ceqa/handbook/mitigation-measures-and-control-efficiencies/fugitive-dust/fugitive-dust-overview.pdf

is an average of 0.5 mile per trip on unpaved roads. The average vehicle weight was increased from the CalEEMod default of 2.4 tons to 5 tons. All other CalEEMod defaults were used.

SCAQMD Rule 403 requires dust control measures on unpaved roads. Best available control measure 15-1 requires that all off-road traffic and parking areas be stabilized (gravel/paving). Best available control measure 15-2 requires that all haul routes be stabilized gravel/paving) and measure 15-3 requires that construction traffic be directed over established haul routes. In addition, large operations must choose one of the following to reduce dust from unpaved roads:

(4a): Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8-hour work day]; or

(4b): Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; or

(4c): Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.

The fugitive dust reductions from the above control measures is quantified as follows; the smallest percent reduction is used in this analysis, which is from control measure 4a (60 percent reduction):

(4a): According to the SCAQMD mitigation measure examples for Fugitive Dust from Construction and Demolition,[57] applying water every three hours results in a 61 percent decrease in PM_{10}. Applying a 50 percent moisture content for unpaved roads in CalEEMod's "mitigation" module results in a 60 percent reduction in fugitive dust.

(4b): CalEEMod's watering twice per day would result in a 55 percent reduction in fugitive dust. A 55 percent reduction in unpaved road dust occurs when the soil moisture level is 34 percent. Applying a speed limit reduction of 15 miles per hour and watering twice per day reduces fugitive dust by 64.7 percent reduction, according to CalEEMod calculations.

(4c): According to the SCAQMD mitigation measure examples for Fugitive Dust from Unpaved Roads,[58] applying chemical dust suppressants results in an 84 percent reduction.

Water Usage

There would be water used during construction to be compliant with SCAQMD Rule 403. Approximately 30 to 50 gallons of water are needed to compact each cubic yard of soil. If there would be 42 million cy of cut and fill, a total of 6,445 acre feet (2,100 million gallons) of water

57 SCAQMD. 2007. Fugitive Dust Mitigation Measures. http://www.aqmd.gov/docs/default-source/ceqa/handbook/mitigation-measures-and-control-efficiencies/fugitive-dust/fugitive-dust-overview.pdf

58 SCAQMD. 2007. Fugitive Dust Mitigation Measures. http://www.aqmd.gov/docs/default-source/ceqa/handbook/mitigation-measures-and-control-efficiencies/fugitive-dust/fugitive-dust-overview.pdf

would be required. The greenhouse gas emissions associated with water transport are calculated using CalEEMod in its operation module.

Construction Waste

Greenhouse gas emissions associated with construction waste were estimated using the EPA's waste Reduction Model (WARM). The quantity of waste was estimated based on one construction waste case study and the 2008 California waste characterization study.

4.2 Operation

Operational emissions occur once the project commences operation. For purposes of this analysis, project buildout will occur in two phases. Therefore, operational emissions are analyzed for the Phase 1 buildout year and the full buildout year. The major sources of these emissions are summarized below.

To estimate some of the emissions on a year-by-year basis, the conceptual occupancy schedule for purposes of this analysis is shown in **Table 9**, *Conceptual Operational Occupancy Schedule,* based on the best current information. This schedule assumes that the square footage being constructed within each Plot will be occupied the following year and may vary in the future based on market demand factors associated with regional goods movement.

Table 9
Conceptual Operational Occupancy Schedule

Year	Annual Addition (Millions of Square Feet)	Cumulative Total (Millions of Square Feet)
2020	0.00	0.00
2021	4.60	4.60
2022	4.60	9.20
2023	4.60	13.80
2024	4.60	18.40
2025	4.55	22.95
2026	1.80	24.75
2027	1.80	26.55
2028	1.85	28.40
2029	1.80	30.20
2030	1.80	32.00
2031	1.80	33.80
2032	1.80	35.60
2033	1.80	37.40
2034	1.80	39.20
2035	1.40	40.60

Note: The square footage includes logistics development and light logistics square footage and does not include fueling station, fire station, and convenience store.

Motor Vehicle Emissions

Motor vehicle emissions refer to exhaust and road dust emissions from the automobiles and delivery trucks that would travel to and from the project site each day. The following procedures were used to estimate the mobile source criteria regional operational emissions, localized onsite emissions, and greenhouse gas emissions based on emission factors from the CARB EMFAC2017 mobile source emission model and emission information from the EPA dealing with paved road dust.

To quantify mobile source operational emissions, the following information is required:

- Trip generation – the number of vehicles that are expected to move to and from the project site each day.
- Vehicle fleet mix – the mix of vehicle types (i.e., automobiles, trucks, gasoline or diesel-fueled, etc.).
- Trip lengths – the distance each vehicle travels during each trips.
- Emission factors – the amount of emissions generated as a function of vehicle type, vehicle speed, calendar year, and vehicle model year for a given amount of vehicle idling time or distance traveled.

Trip Generation Rates

Trip generation quantifies the number of trips that a project generates each day during all facets of its operations. The trip generation is determined by multiplying an appropriate trip generation rate for a particular land use descriptive of the project by the quantity of that land use. Trip generation rates are determined for daily traffic, morning peak hour inbound and outbound traffic, and the evening peak hour inbound and outbound traffic for the proposed land use. The trip generation rates use for this project were derived from the project traffic impact analysis (TIA) prepared by WSP USA.[59] The trip generation rates applied in this assessment are shown in **Table 10**, *Trip Generation Rates*.

Table 10
Trip Generation Rates

Land Use	Units	Daily Trip Rate
High Cube Logistics Center	KSF	1.40
Light Logistics	KSF	1.74
Existing Utilities Servicing Station	KSF	13.24
Gas Station with Convenience Store	Fuel Pumps	31.61
Convenience Store	KSF	321.87
Fire Station	Number	137

KSF = thousands of square feet
Source: WSP USA Inc. Traffic Impact Analysis Report for The World Logistics Center. June 2018

59 WSP USA, Inc. Traffic Impact Analysis Report for The World Logistics Center. June 2018

Working jointly with the National Association of Industrial and Office Properties (NAIOP), the SCAQMD conducted a trip generation study for high-cube warehouses, the predominant form of land use for the project, High-Cube Warehouse Vehicle Trip Generation Analysis (October 2016). The study replaces the earlier, smaller studies that produced conflicting results and created uncertainty regarding the amount of traffic generated by the newer, more automated type of high-cube warehouse proposed for the project. The results of the study for high-cube warehouse trip generation has been incorporated into the 10^{th} edition of the Institute of Traffic Engineers (ITE) Trip Generation Manual. The trip generation rates included in this study for high-cube warehouse uses and trip rates from the 10^{th} edition of the ITE Trip Generation Manual have been used for other proposed land uses.

Vehicle Fleet Mix

The vehicle fleet mix is defined as the mix of motor vehicle classes active during the operation of the project. Emission factors are assigned to the expected vehicle mix as a function of calendar year, vehicle class, speed, and fuel use (gasoline and diesel-powered vehicles). The vehicle fleet mix for the project is based on the assumptions contained in the TIA. The TIA provided a vehicle fleet mix for passenger cars, light duty trucks, medium duty trucks, and heavy duty trucks. For purposes of this assessment, the EMFAC2017 mobile source model was used to derive a complete mix of vehicles consisting of the following vehicle classes (some vehicle classes have been separated into subclasses based on vehicle weight):

- Passenger Car: light duty automobiles (LDA), and light duty trucks (LDT1 and LDT2) – identified as passenger cars in the TIA.
- Light Trucks: medium duty trucks (MDT) – identified as Light Trucks in the TIA.
- Medium Trucks: light-heavy duty trucks (LHDT1 and LHDT2) with a gross weight of between 8,501 pounds and 14,000 pounds – identified as Medium Trucks in the TIA.
- Heavy Trucks: medium-heavy duty trucks (MHDT) and heavy-heavy duty trucks (HHDT) with gross weight of 14,001 to 33,000 pound and 33,000-plus pounds, respectively – identified as Heavy Trucks in the TIA.

The EMFAC2017 model was also used to subdivide each vehicle class by electric, gasoline, diesel, and natural gas vehicles for each analysis year.

Two types of trip generation data were estimated for this assessment:

- Daily average: The daily average trip generation and VMT is representative of daily operations and is characterized by the total amount of vehicle trips and their travel distance during an operational day. The daily vehicle trips, VMT, and fleet mix were provided by the TIA and used to estimate the daily regional emissions from the operation of the project as a project's vehicles travel to and from the project site through the South Coast Air Basin. The daily vehicle trips and fleet mix were also used to estimate local daily and annual air quality impacts to the areas surrounding the project site.

- Peak hour: The peak hour vehicle fleet mix represents the number and mix of vehicles that would access the project during the peak hour of traffic. The peak hour information was provided by the TIA and used to estimate 1-hour and 8-hour local air pollutant impacts as well as for the estimation of acute non-cancer hazards.

Forecasted trip generation and vehicle miles traveled (VMT) contained in the TIA were used to estimate the project's motor vehicle emissions. The traffic model provided estimates of project traffic volumes segregated by vehicle class as passenger cars, light heavy duty trucks, medium heavy duty trucks, and heavy-heavy duty trucks. The TIA provides VMT attributable to the project based on the net effect the project has on regional travel as well as project VMT without consideration of a net effect. The net effect includes consideration that creation of a job center (the project) would redistribute existing regional travel and result in shorter employee trips. Freeway and non-freeway VMT and speed data, as provided by WSP, were utilized to determine the appropriate emission factors to apply to project trips from the EMFAC2017 model. In calculating the operational traffic emissions, the VMT per speed was based on daily speed data provided by WSP. Emissions factors vary by speed bin. Therefore, accounting for variations in speed attributable to slow downs occurring during peak hours provides a realistic representation of project mobile emissions.

For purposes of the health risk assessment, peak hour intersection turning movement volumes provided by the TIA for the project area were utilized in order to assign emissions to specific roadway and freeway segments to determine risk. The traffic model is composed of a series of traffic segments that represent the flow of traffic from one geographic point to another. The project's motor vehicle traffic volumes were estimated using the number of peak hour vehicles forecasted by the regional traffic model. The output of the traffic model is in the form of two-way traffic flows for each traffic segment. For each roadway segment, the total number of vehicles was forecasted. The number of vehicles was then broken down into several vehicle types, as described above. Motor vehicle emissions were then estimated for each roadway segment by using the traffic volumes extracted from the traffic model forecasts, the length of the roadway segment, and the emission factors from EMFAC2017.

Mobile emissions utilize EMFAC2017's projected vehicle fuel mix for Project milestone years 2025 and 2035, which are associated with Phase 1 buildout and project full occupancy, respectively. EMFAC2017 does not include population assumptions for electric trucks. The potential penetration of electric trucks and potential use in association with the project has been analyzed by ESA.[60] Although the State has set targets for zero-emission vehicles, it would be speculative to assume that any EV Penetration scenarios would be practicable or feasible. Therefore, as a worst-case analysis, the greenhouse gas analysis included herein does not factor in any potential emissions reductions provided by electric or natural gas-fueled trucks. For informational purposes only, emissions associated with a Medium EV Penetration Scenario has been taken into account to show further emissions reduction potential.

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60 ESA. World Logistics Center Transportation Energy Technical Study. June 2018

Local Travel

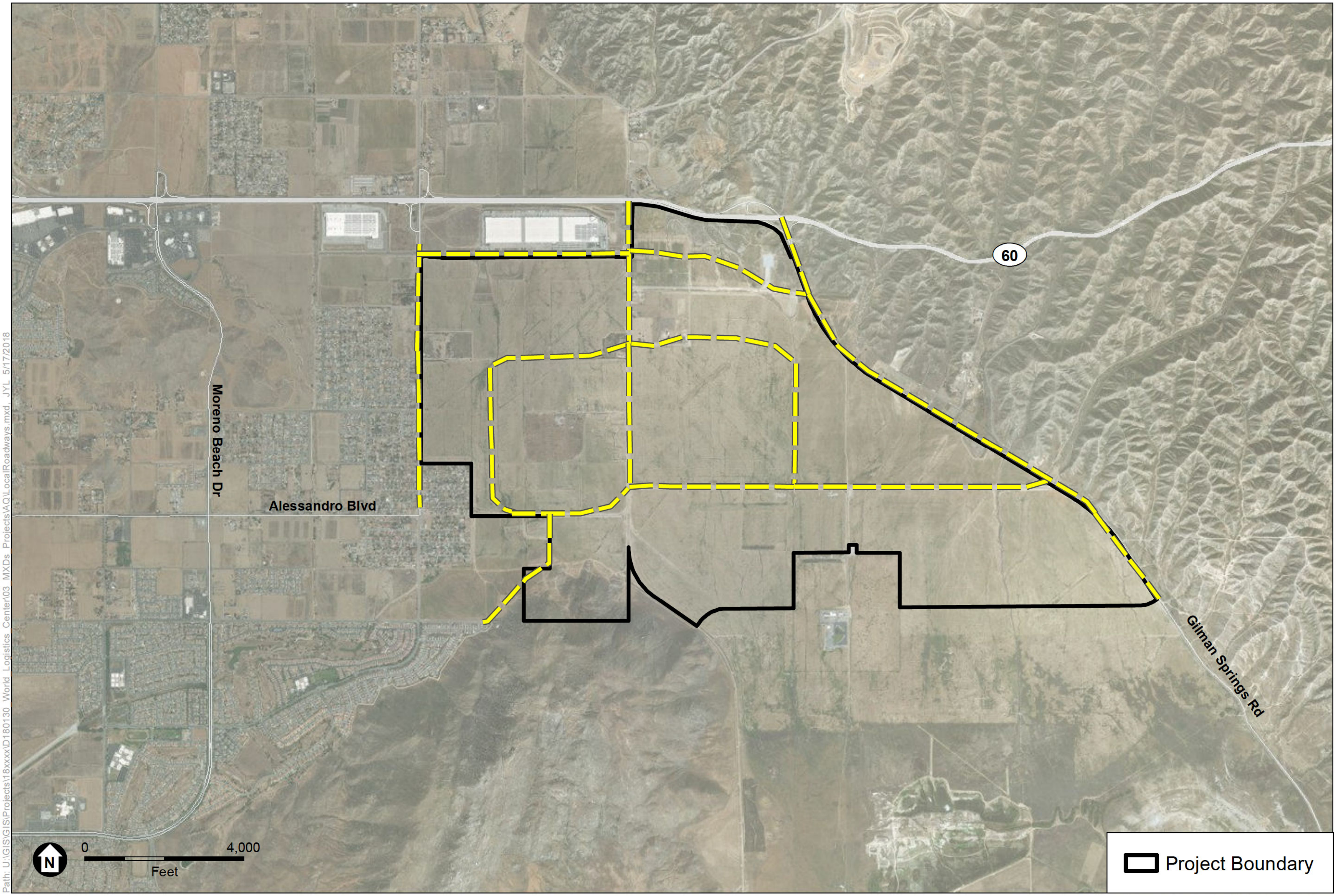
The automobile and truck traffic generated by the project would travel along several local roadways within and bordering the area of the project including Redlands Boulevard, World Logistics Center Parkway, Gilman Springs Road, Alessandro Boulevard, and Eucalyptus Avenue. As the project traffic travels along the roadway network, this traffic would generate air emissions. To examine the local air quality impacts from the project vehicles during operation along the local roadway network, a number of roadway segments were identified for analysis as described in the TIA.

The local roadway segments analyzed in this assessment are identified in Figure 18. The TIA only provided peak hour turning movement volumes along each of the roadway segments for passenger cars, and light, medium, and heavy trucks during the existing, Phase 1 interim year, and buildout year. For purposes of the health risk assessment, the average of the AM and PM peak hour volumes were multiplied by 10 to estimate daily traffic volumes along each of the studied roadway segments.

The localized air quality analysis also addressed vehicle travel and idling within the truck yards of each phase of the project site. The exact physical locations and sizes of the various buildings that would comprise the project are unknown at this time. However, average trip lengths within the truck yards for the project's two phases and individual land uses was estimated based on a review of the location of transportation analysis zones located within the project boundaries and the placement of the existing and planned local roadway network that would comprise the project. For this purpose, an average truck trip length of 1,080 feet was assigned to the high cube development truck yard areas, 574 feet for the light logistics land uses truck yards, 330 feet for the gas utility land use, and 160 feet for the fueling station/convenience store and fire station land uses.

Regional Travel

The project's motor vehicles would also travel along numerous regional roadways outside of the project boundaries including local surface street and freeways. Figure 19 shows the local surface street roadway network analyzed and Figure 20 shows the freeway segments analyzed.



SOURCE: ESRI 2016; ESA 2018

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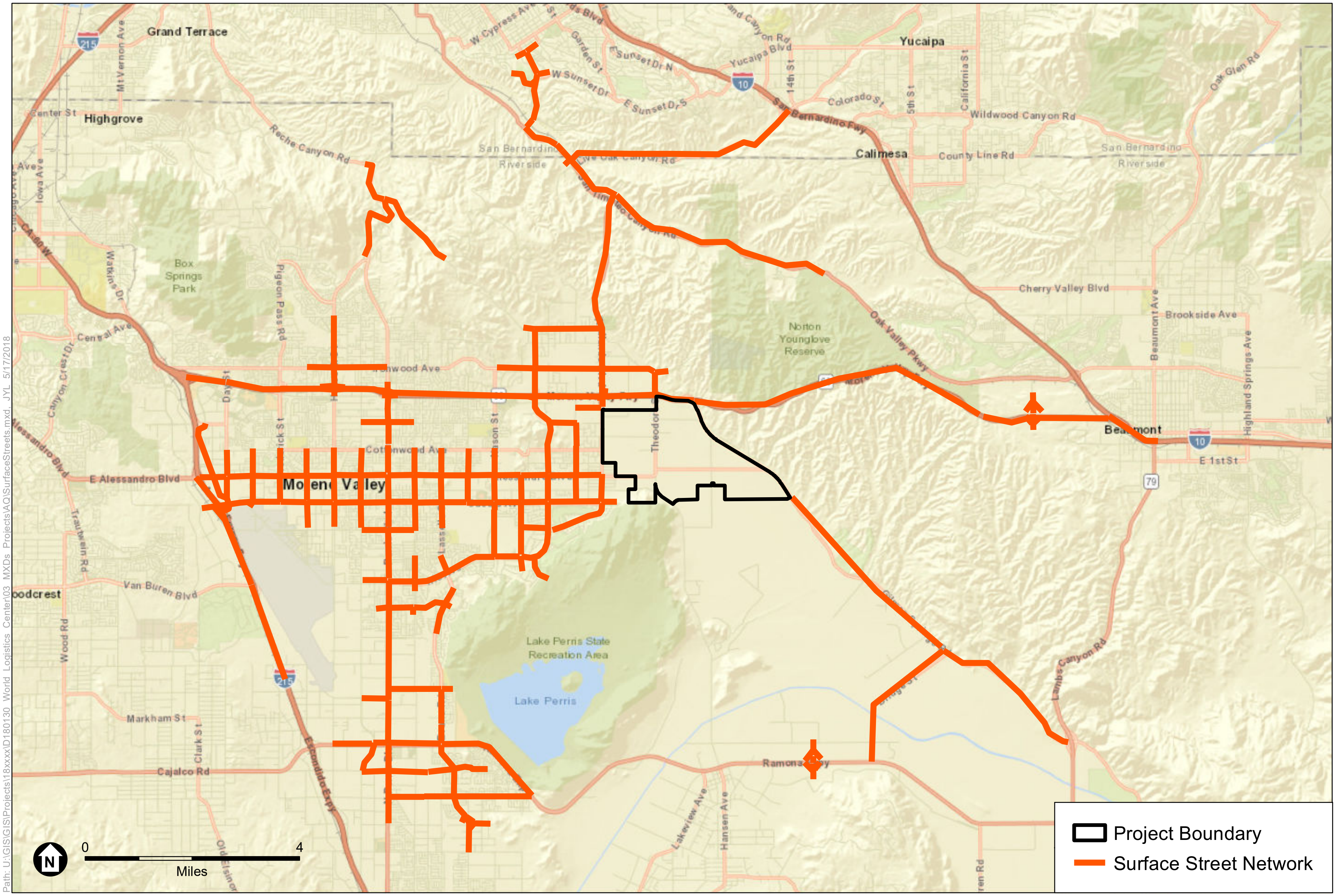
Figure 18
Local Roadway Network Analyzed in the
Local Air Quality and Health Risk Assessment

ESA



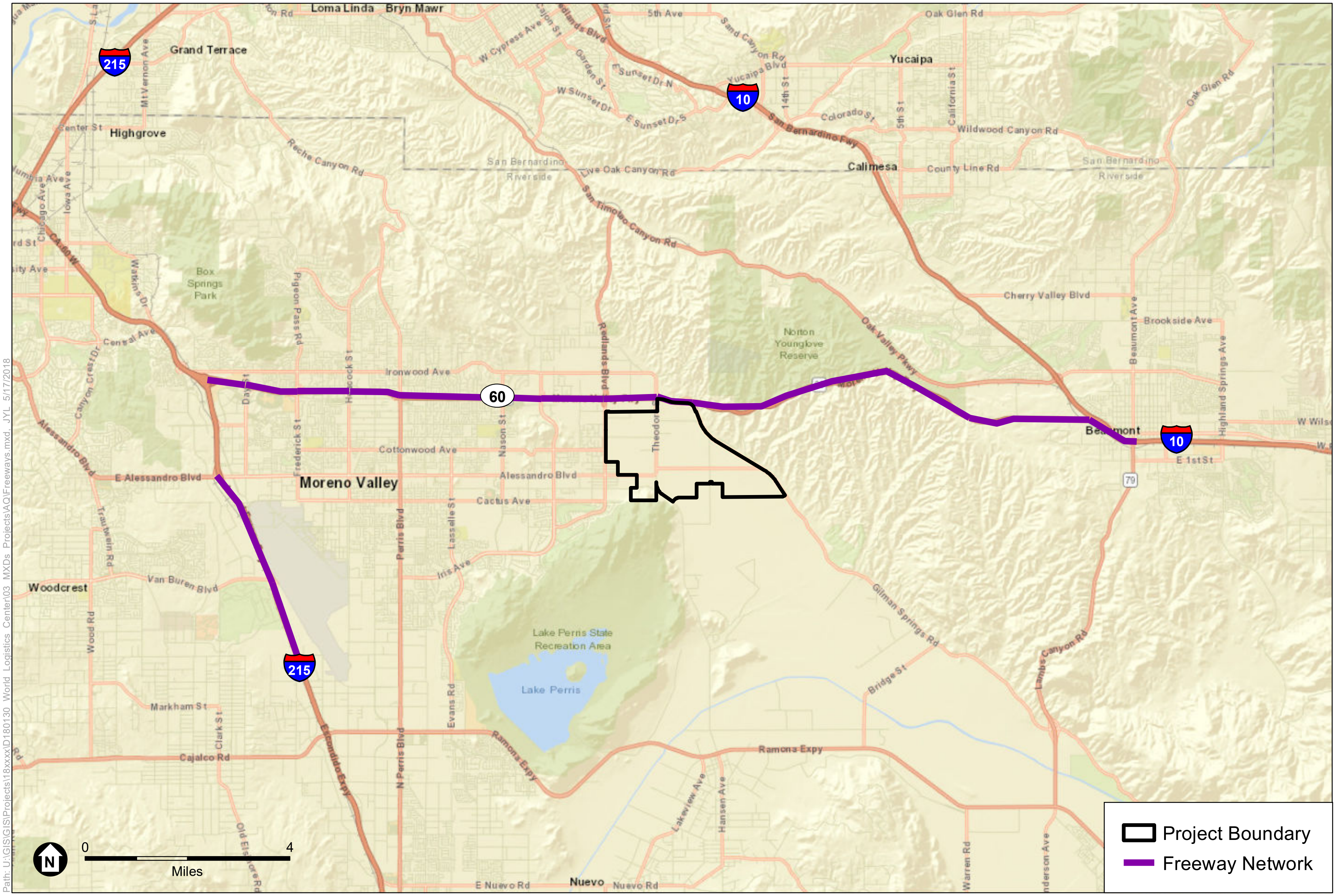
SOURCE: ESRI 2016; ESA 2018

Path: U:\GIS\GIS\Projects\18xxxx\D180130 World Logistics Center\03 MXDs Projects\AQ\SurfaceStreets.mxd, JYL 5/17/2018

World Logistics Center

Figure 19
Surface Street Network Analyzed in the Health Risk Assessment

ESA



SOURCE: ESRI 2016; ESA 2018

World Logistics Center

Figure 20
Freeway Network Analyzed in the Health Risk Assessment

ESA

Emission Factors

There are emission factors available through EMFAC for VOC, NO_X, CO, SO_X, PM_{10}, $PM_{2.5}$, CO_2, N_2O, and CH_4. There are no emission factors available for black carbon or ultrafine particles. Emissions from motor vehicles can be characterized as follows:

- Combustion Emissions (grams/mile traveled or grams/hour for idling): Combustion emissions (i.e., exhaust emissions) result from the combustion of fuel and are the main source of emissions for all pollutants for the project. EMFAC2017 has the capability to provide emission rates for user defined user speeds, fuel type, vehicle class, and model year.

- Running Loss (grams/mile): Running loss emissions are defined as evaporative hydrocarbons that are emitted from hoses, fittings or canisters, while the vehicle is in operation. This occurs either because fuel heating as caused the vapor generation rate to exceed the vehicle's capacity to control the vapors, or through permeation and leakage (VOC only).

- Diurnal and Resting Loss (grams/vehicle): Diurnal and resting loss emissions are evaporative hydrocarbons. Diurnal emissions result from a sitting vehicle as the ambient temperature rises. Resting loss emissions result from a sitting vehicle as the ambient temperature declines or remains constant.

- Tire wear (grams/mile): and Brake Wear (grams/mile): EMFAC has the capability to provide particulate emissions from tires and brakes that occur from operational wear (PM_{10} and $PM_{2.5}$ only).

- Road Dust (grams/mile) is generated from re-suspension of loose particulate material from the surface of the road as a result of movement of vehicles and wind flow. Road dust emissions are primarily a factor of the amount of re-suspendable particulate matter available on the road surface and the traffic flow volume on the road. The estimation of road dust emissions was based on the methodology presented by the EPA in its assessment of road dust emissions from paved roads (PM_{10} and $PM_{2.5}$ only).

The EMFAC2017 emission factors were developed for the South Coast Air Basin on an annual basis. To derive the basin-wide emission factors, the emission factors were developed as a weighted average of the county emission factors from the four counties that comprise the South Coast Air Basin, weighted by the vehicle miles traveled in each county.

Motor vehicle emissions for each category of emissions were estimated for vehicle travel within the project's truck yards, along adjacent and internal roadways, and truck idling within the project's truck yards.

Truck idling emissions assumed that each heavy duty truck would idle 5 minutes per day prior to mitigation, pursuant to the ARB Air Toxic Control Measure limiting the idling time for heavy duty diesel trucks and the World Logistics Center Specific Plan.

Emission factors for the year 2020 are used for the “worst-case” scenario. Phase 1 of the project used emission factors from the year 2025, and Phase 2 of the project used emission factors for the year 2035. For the mitigated version, the emission factors were modified to reflect the mitigation measure that requires the use of model year 2010 or newer trucks for all medium-heavy duty (MHDT) and heavy-heavy duty diesel (MHDT) trucks associated with the project.

Emission factors for the year 2020 were used for the “worst-case” scenario. Interim year 2025 (Phase 1 buildout) of the project used emission factors from the year 2025, and horizon year 2035 (Phase 2 buildout) of the project used emission factors for the year 2035. For years 2021 through 2024 and years 2026 through 2034, emissions factors and the Project’s net effect on VMT were interpolated and scaled using data from 2025 and 2035 in order to provide an estimate of emissions and potential overlap of construction and operational emissions. For the mitigated scenario, the emission factors were modified to reflect the mitigation measure that requires the use of model year 2010 or newer trucks for all heavy-duty diesel trucks associated with the project. Note that emissions from the existing on-site residence and fugitive dust that would be removed were not included in this analysis as a worst-case scenario.

A Note About Operational Heavy-Duty Truck Emissions

The majority of the project’s operational emissions are from on-road mobile sources, more particularly, heavy-duty trucks that contribute a disproportionate amount of emissions compared to passenger vehicles. Emissions from on-road mobile sources are regulated at the state and federal levels, and therefore, are outside of the control of local agencies such as the City and the SCAQMD. For example, the EPA is working closely with the EPA, engine, and vehicle manufacturers, and other interested parties to identify programs that will reduce emissions from heavy-duty diesel vehicles in California. In its “Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles,” the ARB presented a blueprint for achieving a 75 percent reduction in diesel particulates by 2010 and an 85 percent reduction by 2020 from the 2000 baseline.[61] The emission reductions would arise from a combination of measures including the use of ultra-low sulfur diesel fuel, new emission standards for large diesel engines, restrictions on diesel engine idling, addition of post-combustion filter and catalyst equipment, and retrofits for business and government diesel truck fleets. The implementation of these emission reductions will also result in reductions of other pollutants such as NO_X, VOC, and CO. As these emission reduction programs are implemented and there is a turnover in the use of older vehicles with newer and cleaner vehicles, the project’s operational emissions are expected to decline significantly in the future.

Emission controls on mobile source vehicles already adopted by the ARB particularly dealing with NO_X and PM_{10} controls on heavy duty trucks will reduce truck emissions significantly over the next 10 years. Today’s vehicle fleet (assumed to be 2020) is comprised of vehicles as old as 25 years and generates substantially more emissions than the vehicles that would replace them in the future.

61 CARB. 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles. https://www.arb.ca.gov/diesel/documents/rrpfinal.pdf

Greenhouse Gases

EMFAC2017 has emission factors for the greenhouse gases carbon dioxide and methane. Greenhouse gas emissions from mobile vehicles were estimated using the same procedures as shown above for carbon dioxide, nitrous oxide, and methane.[62] The emissions were estimated in tons per year and were converted to $MTCO_2e$ by multiplying the greenhouse gas by its global warming potential (1 for carbon dioxide and 21 for methane) and then multiplying it by 0.9072 (a conversion from tons to metric tons). The emissions factors from EMFAC2017 include reductions from the following regulations:

- Regulation – Pavley (AB 1493): Clean car standards to reduce greenhouse gas emissions from new passenger vehicles (LDA-MDV) from 2009 to 2016.

- Regulation – Low Carbon Fuel Standard (Executive Order S-01-07): The low carbon fuel standard would reduce carbon intensity in fuels. Carbon intensity is a measure of the greenhouse gas emissions associated with production and use of a fuel. Fuels like natural gas from landfills, dairy biogas, and biodiesel have lower carbon intensity than gasoline or diesel.

Black carbon emissions were estimated based on the diesel $PM_{2.5}$ emissions discussed below.

Other Emission Sources

There are other emission sources besides mobile vehicles during operation of the project. VOC emissions would be emitted during the occasional repainting of buildings and from consumer products. Criteria pollutants and greenhouse gases would be emitted from landscaping, natural gas usage, onsite yard trucks, onsite forklifts, and onsite emergency generators. Greenhouse gases would be emitted from electricity, water and wastewater, refrigerants, and solid waste generation. There would also be some sequestration from the onsite trees that would be planted on the project site as a result of the project. These emission sources are discussed below.

Architectural Coatings (Painting)

Paints release VOC emissions. The buildings in the project would be repainted on occasion. Painting emissions were estimated by CalEEMod using default assumptions for buildout and estimated for the previous years based on square footage shown in Table 9.

Consumer Products

Consumer products are various solvents used in non-industrial applications that emit VOCs during their product use. “Consumer Product” means a chemically formulated product 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

[62] Running emissions for N2O are from EMFAC 2017 and Idling emissions are from the EPA. U.S. EPA. 2014. Emission Factors for Greenhouse Gas Inventories. https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

products; disinfectants; sanitizers; aerosol paints; and automotive specialty products; but does not include other paint products, furniture coatings, or architectural coatings.[63]

The default emission factor developed for CalEEMod is based on a statewide factor and is not applicable to the project. The entire project would not use consumer products as specified above. The warehouses may have small kitchen areas and bathrooms that would use cleaning products. The majority of the square footage for the project would be used for warehousing/distribution. Negligible quantities of personal care products, home, lawn, and garden products, disinfectants, sanitizers, polishes, cosmetics, and floor finishes would be used. In addition, the buildings in the project would be LEED certified; LEED has a variety of credits available for use of low emitting materials. Therefore, to estimate VOC emissions from the project, the emission factor is reduced to 25 percent of its original value, to 5.1E-6 pounds VOC per day per square foot.

Landscape Equipment

Landscape maintenance includes fuel combustion emissions from equipment such as lawn mowers, rototillers, shredders/grinders, blowers, trimmers, chain saws, and hedge trimmers. CalEEMod estimated the landscaping equipment using the default assumptions in the model. Emissions were estimated for buildout and interpolated for the previous years based on square footage in Table 9.

Electricity

There would be emissions from the power plants that would generate electricity to be used by the project (for lighting, etc.). Emissions were estimated using electricity generation numbers provided by WSP for 2025 and buildout and interpolated for the previous years based on square footage in Table 9.

The Moreno Valley Electric Utility (MVU) would provide electricity for the project, however Southern California Edison (SCE) annual emission factors from 2020 through 2064 were used as a proxy for calculating GHG emissions. As described in Section 4.7.2.2, SB 100 increased California's Renewables Portfolio Standard and requires retail sellers and local publicly owned electric utilities to procure eligible renewable electricity for 60 percent of retail sales by December 31, 2030, and that CARB should plan for 100 percent eligible renewable energy resources and zero-carbon resources by December 31, 2045. SB 100 also mandated interim RPS milestones of 44 percent of retail sales by December 31, 2024, and 52 percent by December 31, 2027. To achieve the RPS mandate, utilities such as MVU and SCE are expected to steadily increase their renewable resources for energy production. This assumption is appropriate because utilities have steadily increased the percentage of energy obtained from renewable resources in response to existing mandates. Therefore, all electricity consumption would decrease in GHG intensity (i.e., emissions generated per kilowatt-hour) as the RPS milestones are met.

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63 CARB. 2011. Regulation for Reducing Emissions from Consumer Products. https://www.arb.ca.gov/consprod/regs/fro%20consumer%20products%20regulation.pdf

For estimating electricity emissions for the Proposed Project through the expected life of the project, CO_2e intensity factors were projected for each operational year through 2064, based on RPS compliance.

Building annual electricity for the project would consume approximately 174,423 MWh per year in 2025 and 298,084 MWh per year in 2035. EV charging annual electricity under the Medium EV Penetration scenario would consume 9,157 MWh per year in 2025 and 127,132 MWh per year in 2035.

Natural Gas

There would be emissions from the combustion of natural gas for the project (heat and the CNG/LNG fueling station). The Project is not expected to generate demand for natural gas. The Project would mostly comprise high-cube warehouses that do not require heating from natural gas. The spaces that do require heating are ancillary office spaces. Because all heating and cooling is provided via direct evaporative cooling and heat pumps, natural gas is not required. This allows the Project to reduce on-site fossil fuel combustion that would normally be associated with service water and space heating. The Title 24 Baseline scenario assumes compliance but not exceedance of energy standards and includes annual natural gas use equating to 51,274 MMBtu in 2025 and 84,771 MMBtu at buildout. As such, the Project would result in a 100 percent decrease in consumption of natural gas from the Title 24 Baseline scenario for both Phase 1 and Full Buildout.

Wastewater

Depending on the type of wastewater treatment plant, there could be emissions from treatment of wastewater. However, the project's wastewater would be transferred to the Eastern Municipal Water District's Moreno Valley Regional Water Reclamation Facility. The facility was upgraded with fuel cell cogeneration. A digester gas-fueled fuel cell system provides power and heat to the plant while using all available digester gas.[64] CalEEMod was used to determine emissions from wastewater.

Water

There would be greenhouse gas emissions from the use of electricity to pump water to the project. The applicant conducted a water usage analysis; therefore, CalEEMod default water usage is not used. Emissions for buildout are estimated and calculated for prior years based on the square footage anticipated in those years. Emissions from years occurring after buildout are assumed to be affected by SB 100 and would gradually decrease to zero once 100 percent renewable electricity is reached in 2045.

64 Carollo Engineers. Moreno Valley Regional Water Reclamation Facility Fuel Cell Cogeneration Design and Construction. https://www.carollo.com/projects/moreno-valley-regional-wrf-fuel-cell-cogeneration-design-and-construction. Accessed May 2018.

Refrigerants

Refrigerants may be used in air conditioning for the office component of the warehouses. Refrigerants are hydrofluorocarbons and have a relatively high global warming potential around the range 1,000 to 3,000. The emissions take into account reductions from SCAQMD's Rule 1415, which require registration, refrigerant leak inspections, and refrigerant leak repairs. Procedures and assumptions for estimating the emissions are shown in Appendix F. The emissions are estimated in tons of hydrofluorocarbons and are converted to $MTCO_2e$.

Solid Waste: Operation

Greenhouse gas emissions would be generated from the decomposition of solid waste generated by the project. Operational waste from the project would initially be delivered to the Badlands Sanitary Landfill, which installed a landfill gas energy capture recovery system in 2011. The project is estimated to generated approximately 38,165 tons of solid waste per year. Emissions at buildout are estimated by CalEEMod and are applied to earlier years based on a percentage of the square footage assumed to be operational.

Yard Trucks

According to a project design feature, the yard trucks could be powered by natural gas, propane, or electricity. Therefore, diesel is not assumed for the yard trucks. For the Port of Los Angeles activities, the most common fuel for yard trucks besides diesel is propane.[65] Therefore, emissions are based on assuming that the yard trucks are powered by propane. It is assumed for purposes of this analysis that there would be two yard trucks at each facility in the on position for seven hours per day.

Emergency Generators

Emissions from emergency generators would result during testing and maintenance. It is assumed that there would be one generator per 1.5 million square feet based on the current equipment in operation at the adjacent Skechers warehouse north of the project. The generators were assumed to operate for a total 50 hours per year per generator for routine testing and maintenance purposes, with all generators operating for one hour on the same day to estimate the maximum daily emissions. For the unmitigated emissions, the generator is assumed to be Tier 4 diesel. For the mitigated emissions, it is assumed that the generators would be fueled by natural gas.

Forklifts

It is assumed that there would be five natural gas forklifts per light logistics planning area, and assuming three light logistics areas, there would be a total of 15 natural gas forklifts. It is assumed that the warehouses would have electric forklifts, as they would primarily operate inside.

[65] Port of Los Angeles. 2012. Port of Los Angeles Inventory of Air Emissions – 2012. https://www.portoflosangeles.org/pdf/2012_Air_Emissions_Inventory.pdf

Land Use Change

The project would change the land use from pervious surfaces to impervious (buildings, asphalt, concrete) thereby reducing potential carbon sequestration from the existing farmland. CalEEMod has default accumulation for "cropland" of 6.2 tons CO_2/acre/year. However, since the project site is dry farmed and therefore would have less carbon accumulation, a different method was chosen to estimate these emissions. These emissions are included in the operational greenhouse gas emissions. The assumptions are shown in **Table 11**, *Land Use Change*.

Table 11
Land Use Change

Vegetation Land Use Type	Vegetation Land Use Subtype	Initial Acres	Final Acres	Carbon Sequestration ($MTCO_2e$/acre/year)
Cropland	Cropland	2,610	45	0.45

Source of acres: Project description
Source of carbon sequestration: Brown and Huggins 2010; Table 1 in the article presents a range of carbon sequestration for dryland agriculture; the highest of the range was selected (0.90 Mg C ha^{-1} yr^{-1}) and was converted by multiplying by 1.24 (the conversion of Mg to $MTCO_2e$) and dividing by 2.47 (conversion of ha to acres).

Carbon Sequestration (New Trees)

The project would plant trees and integrate landscape into the project design, thereby increasing carbon sequestration. Carbon sequestration is the process of capture and storage of carbon dioxide; trees and vegetation store carbon in their tissues and wood. There is no estimate of the number of trees to be planted in the Specific Plan. The Specific Plan indicates the following regarding trees:

- Streetscapes: The Specific Plan (Section 4.2.3) indicates that trees are required along all street frontages.
- Parking area: Specific Plan measure 5.4.3 requires that landscaping in parking areas comply with the standards contained in the Municipal Code.
- Tree size: Specific Plan measure 5.3.4 specifies that all trees are to be a minimum of 15 gallons.
- Building perimeters: Specific Plan measure 5.3.5 indicates that trees along building and site perimeters are required at a minimum average spacing of 1 tree per 30 linear feet of perimeter.

The number of trees is estimated as shown in **Table 12**, *Estimated Tree Inventory*. This inventory does not represent actual future plantings, which would be refined later during individual building plans. There would also be trees in the project entryways, the roundabouts, the open space areas, and the detention areas; however, those were not included to be conservative.

Table 12
Estimated Tree Inventory

Project Location	Tree Inventory Calculation Details[4]	Tree Species[3]	Trees
Automobile parking	1 tree/6 stalls x 10,981 stalls [1]	Average [2]	1,830
Building perimeters	Assuming an average of 1,500,000 sf per building; taking the square root and multiplying by 4 yields the building perimeter (4,900 ft x 27.8 buildings – 136,220 ft); 1 tree per 60 ft	Average [2]	2,270
Redlands Boulevard, Bay Street	Length = 6,642 ft/40 ft (1 side of road)	Pine	55
		Blue Palo Verde	55
		Sweet Acacia	55
Gilman Springs Road	Length = 12,257 ft/40 ft (1 side only)	Afghan Pine	59
		Date Palm (25' trunk height)	59
Street A	Length = 8,656 ft/40 ft x 2 sides of street	Chilean Mesquite/ Algarrobo	216
		Mexican Fan Palm (30' trunk height)	216
Eucalyptus Street	Length = 5,350 feet/ 40 ft (1 side of road)	Brisbane Box	45
		Afghan Pine	45
		Date Palm (30' trunk height)	45
Street B	Length = 4,418 ft / 40 ft x 3 (two sides of street and median)	Brisbane Box	330
Streets C, D, E, F, G, H	Length = 38,363 ft/ 40 ft x 2 sides of street	Chilean Mesquite/ Algarrobo	1,918
Total			**7,504**

Notes:
1 Table 9.11.040C-12 in Moreno Valley Code states that warehouse and distribution uses are required to have 1/1000 sf of gross floor area for the first 20,000 sf; 1/2000 sf of gross floor area for the second 20,000 sf; 1/4000 sf of gross floor area for areas in excess of the initial 40,000 sf. Assuming 27.8 buildings each 1,500,000 sf in size yields 10,981 stalls.
2 The tree types are not specified in the Specific Plan; therefore, the carbon sequestration rate for the average was used.
3 If more than one species is listed for a project location, the species are distributed evenly.
4 Calculations assume one tree per 40 feet of distances listed, as an average.
Source: World Logistics Center Specific Plan

Although CalEEMod does have calculations to estimate carbon sequestration from new trees, the carbon sequestration rates from the Center for Urban Forest Research (CUFR) Tree Carbon Calculator provide specific species information. As a comparison, CalEEMod has a sequestration rate of 0.0354 metric tons per miscellaneous tree per year. **Table 13**, *Tree Carbon Sequestration Rates (Age of Tree),* displays the carbon dioxide sequestration rates per tree from the CUFR Tree Carbon Calculator for tree species at 5 years and 10 years old. As shown in the table, generally, the older the tree is, the higher the sequestration rate. Therefore, for purposes of this analysis, the rate at five years is used because it assumes less carbon sequestration.

Table 13
Tree Carbon Sequestration Rates (Age of Tree)

Tree Species	Code	CO_2 Sequestration (lb/tree/year)	
		5 years	10 years
Afghan pine	PIBR2	47.3	161.0
Blue palo verde	CEFL	14.6	53.3
Brisbane box	TRCO	40.1	36.8
Chilean mesquite/ Algarrobo	PRCH	36.1	100.3
Crape myrtle sp.	LAIN	2.0	3.6
Desert willow	CHLI	4.9	15.1
Sweet acacia	ACFA	17.0	38.0
Sycamore	PLRA	41.7	109.5
Average	--	24.0	55.4

Note:
The rate at 5 years is used in this analysis; 10 years is shown for informational purposes, to demonstrate that the tree will increase sequestration rates overtime. The Codes for the trees are listed in the event that the reader wants to duplicate the modeling; the code makes it easier to conduct the modeling.
Source: CUFR Tree Carbon Calculator (2012) – the model does not provide model output

Table 14, *Tree Carbon Sequestration Rates (Height of Tree),* displays the carbon sequestration rates for the height of the tree, which is used as surrogate for two tree types that do not have data for the age of the tree. The lower tree height (25 feet) is used in this analysis.

Table 14
Tree Carbon Sequestration Rates (Height of Tree)

Tree Species	Code	CO_2 Sequestration (lb/tree/year)	
		5 years	10 years
Date Palm	PHDA4	14.8	15.0
Mexican Fan Palm	WARO	26.9	26.4

Source: CUFR Tree Carbon Calculator (2012) – the model does not provide model output

Table 15, *Tree Carbon Sequestration Estimates,* displays the carbon sequestration estimates for the new trees that would be planted on the project site. As shown in the table, the trees would absorb 111 tons per year.

Table 15
Tree Carbon Sequestration Estimates

Type of Tree	Trees	CO_2 Sequestration (lb/tree/year)	CO_2 Sequestration (tons/year)
Average	4,100	24.0	49
Afghan pine	465	47.3	11
Blue Palo Verde	55	14.6	<1
Sweet Acacia	55	17,0	<1
Date Palm	104	14.8	1
Chilean Mesquite/ Algarrobo	2,134	36.1	39
Mexican Fan Palm (30' trunk height)	216	26.4	3
Brisbane Box	375	40.1	8
Total	**7,504**	**--**	**111**

Source: Calculated using the data in prior tables.

Black Carbon

As discussed above, there is substantial uncertainty in estimating greenhouse gas impacts from black carbon emissions at this time. In addition, black carbon is not considered a "greenhouse gas" according to AB32. Nevertheless, black carbon emissions from construction and operation are estimated.

Emissions Methodology

The methodology used in estimating black carbon emissions is from EPA's Report to Congress on Black Carbon (EPA 2012). Essentially, $PM_{2.5}$ emissions are converted to black carbon emissions by application of speciation factors. The equation:

> $PM_{2.5}$ Emissions (in tons) x fraction of $PM_{2.5}$ that is black carbon = black carbon emissions

The speciation factors of black carbon as a percentage of $PM_{2.5}$ are from Table A1-5 and associated text in the EPA's Report to Congress on Black Carbon (EPA 2012). The only sources in this greenhouse gas analysis that assume a portion of black carbon emissions are as follows:

- **Construction.** 77 percent of the $PM_{2.5}$ exhaust emitted during construction is assumed to be black carbon.[66] $PM_{2.5}$ exhaust was estimated using CalEEMod, which is converted to black carbon emissions.
- **Operational mobile – heavy duty.** The EPA's report identifies diesel heavy-heavy duty trucks (HHDT) may have 77 percent black carbon out of the $PM_{2.5}$ exhaust emissions. Therefore, this percentage is applied to the following vehicle classes: diesel light-heavy duty trucks (LHDT1 and LHDT2), diesel medium-heavy duty trucks (MHDT), and HHDT. The black carbon emissions are estimated in the $PM_{2.5}$ spreadsheets in Appendix B.
- **Operational mobile** – **light duty.** The EPA report indicates that 64 percent of $PM_{2.5}$ exhaust emissions for light duty diesel vehicles may be black carbon.[67] Therefore, this percentage is applied to the following vehicle classes: diesel light duty trucks (LDT1 and LDT2) and medium duty trucks (MDT).
- **Natural gas**. 38 percent of the $PM_{2.5}$ emissions from natural gas usage is assumed to be black carbon.

This is a conservative estimate of black carbon, as discussed in the following excerpt from the EPA's report:

[66] For construction equipment equipped with diesel particulate matter filters, the BC component is 10 percent of PM2.5; however, this percentage is not applied. The construction equipment will be Tier 3 or higher; however, the BC component of Tier 3 equipment is currently not available so a worst-case assessment is provided.

[67] The percentage of BC for the light duty diesel vehicle group varies from 31% to 64%; therefore, the worst-case scenario is used in this analysis.

For the 2007 vehicle (engine) model year, stringent [EPA] emission standards of 0.01 g/BHP-hr (grams per break horsepower/hour – a standard unit for emissions from heavy-duty mobile source engines) became effective for heavy-duty diesel engines, which represents over 99% control [or reduction] from a pre=control diesel engine in the 1970 time frame. As a result of these standards, BC [black carbon] emissions have been dramatically or even preferentially reduced as the major PM constituent. To meet these stringent PM standards, virtually all new on-highway diesel trucks in the United States, beginning with the 2007 model year, have been equipped with diesel particular filters (DPFs). DPFs typically eliminate more than 90% of diesel PM and can reduce BC by as much as 99%.[68]

Global Warming Potential

In the EPA's "Report to Congress on Black Carbon," black carbon emissions are estimated for the United States and globally but are not converted to a metric (such as $MTCO_2e$) using a global warming potential. The report discusses the global warming potential of BC:

[Black carbon] BC influences the climate differently than the warming effects of GHGs. These differences have important implications for identifying appropriate metrics to compare climate impacts (and reductions thereof) … While a GWP can be calculated for BC, there are reasons that GWPs may be less applicable for this purpose due to the different nature of BC compared to GHGs, in terms of various physical properties and the fact that unlike GHGs, BC is not well mixed in the atmosphere. However, because GWPs are the most commonly used, and only official, metric in climate policy discussions, many studies have calculated GWPs for BC. One-hundred-year GWPs for BC in the literature range from 330- to 2,240. That is to say, 330 to 2,240 tons of CO_2 would be required to produce the same integrated radiative effect over 100 years as one ton of BC. Some of the factors that account for the range in these estimates include the use of different and uncertain indirect and snow/ice albedo effects[69]*estimates, use of a different CO_2 lifetime for the baseline, and recognition of the dependence of a GWP for BC on emissions location…*

… There is currently no single metric widely accepted by the research and policy community for comparing BC and long-lived GHGs. In fact, some question whether and when such comparisons are useful. For example, there are concerns that some such comparisons may not capture the different weights placed on near-term and long-term climate change.[70]

4.3 Localized Significance Threshold Analysis

Localized Analysis Methodology

SCAQMD has developed the Localized Significance Threshold (also known as "LST") methodology and recommends that this methodology be used in determining whether a project

[68] U.S. EPA. 2012. Report to Congress on Black Carbon, March 2012.
[69] The albedo is the reflecting power of a surface.
[70] U.S. EPA. 2012. Report to Congress on Black Carbon, March 2012.

may generate significant adverse localized air quality impacts and substantially affect sensitive receptors. The evaluation of localized air quality impacts determines the potential of the project to violate any air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations.

According to the SCAQMD LST assessment methodology, the assessment of localized impacts addresses only those emissions that are generated "onsite," that is for the purposes of this project, emissions generated from within or along the boundaries of the project. Therefore, for this localized analysis, only the onsite emissions are examined. Freeway trips as well as trips along the surface street network away from the project were only included in the health risk assessment prepared for this project.

To evaluate localized impacts for construction and operation, an air dispersion model (EPA model, AERMOD) was used to simulate the movement of project related air pollutants through the air and output air concentrations of those pollutants at numerous receptor locations surrounding the project. The estimated concentrations provide conservative estimates (in terms of likely over-predictions) and may not represent actual occurrences. The methodology follows SCAQMD modeling guidance for AERMOD, where applicable.[71]

Table 16, *General Air Dispersion Modeling Assumptions – Localized Air Quality Assessment,* lists the general model assumptions used in the localized significance threshold assessment.

71 SCAQMD. AB 2588 & Rule 1402 Supplement Guidelines, 2016. Available at http://www.aqmd.gov/docs/default-source/planning/risk-assessment/ab2588-supplemental-guidelines.pdf?sfvrsn=9

Table 16
General Air Dispersion Modeling Assumptions – Localized Air Quality Assessment

Feature	Assumption
Terrain processing	Complex terrain; elevations were obtained for the project site using the EPA AERMAP terrain data pre-processor
Emission source configuration	See Table 17 and 18
Land Use	Urban: County of Riverside population provided by the SCAQMD
Coordinate System	Universal Transverse Mercator
Meteorological Data	SCAQMD Riverside Meteorological Data for 2012-2016
NO2 Assessment Methodology	Ozone Limiting using ozone data from the SCAQMD Riverside-Rubidoux air monitoring station for 2012-2016
Receptor Height	0 meters, as recommended by SCAQMD LST methodology
Receptor Location	Receptor locations were defined both within and outside of the project boundaries.

Each of the emission sources that are included in the AERMOD air dispersion model consist of a particular emission source representation. The following definitions are used in defining the emission source representations referred to in **Table 17**, *Project Localized Analysis Construction Emission Source Assumptions*, and **Table 18**, *Project Localized Analysis Operational Emission Source Assumptions*.

- Point source: a single identifiable local source of emissions; it is approximated in the AERMOD air dispersion model as a mathematical point in the modeling region with a location and emission characteristics such as height of release, temperature, etc. (example: a stack from a standby generator or a stack from a motor vehicle such as a truck);

- Volume source: a three dimensional source of pollutants release (example: exhaust emissions from construction equipment);

- Line source: a series of volume sources along a path (example: vehicular traffic along a street or freeway); and

- Area source: a large area where emissions are assumed to be uniformly distributed in the horizontal and vertical directions (example: parking lot).

Construction Modeling Assumptions – Local Air Quality Assessment

Table 17 summarizes the emission source characteristics during construction. For the unmitigated scenario, it is assumed that construction equipment would be in the on position for 10 hours per day for all construction activities. In addition, during building construction, additional hours from midnight to 6 AM were also included to account for the concrete pouring of the tilt-up building walls that would most likely take place at night. The construction was assumed to take place five days per week.

Table 17
Project Localized Analysis Construction Emission Source Assumptions

Emission Source Type	Air Dispersion Model Emission Source Description	Relevant Assumptions
Onsite: Off-road Construction Equipment	Volume Source	• Stack release height: 16.4 feet • Emissions derived from the CalEEMod land use emission model • Volume sources were used to characterize the construction equipment with a volume source dimension of 270 meters on a side to cover the construction area; the number of volume sources used is dependent on the size of the construction area.
Onsite: Fugitive Dust	Area Source	• Release height: 0.0 feet in accordance with LST guidance • Emissions derived from the CalEEMod land use emission model • Area sources were used to characterize the fugitive dust generated from the construction equipment.

Operational Model Assumptions – Local Air Quality Assessment

The characterization of the project's operational emission sources as required by AERMOD air dispersion model is provided in Table 18. It is assumed for this analysis that facility operations would occur for 24 hours per day, 7 days per week, 365 days per year.

A graphical representation of the AERMOD air dispersion model local operational sources is shown in **Figure 21**. The AERMOD model also requires the placement of a network of receptors which represent the geographic locations where the impacts from the project's emissions are calculated.

Figure 22 shows the receptor network used in the localized significance threshold analysis. Receptors were located within and outside of the project's boundaries. A dense receptor grid was used in order to adequately characterize the project's offsite impacts. Of particular importance is the location of receptors in the residential areas adjacent and to the west of the project across Redlands Boulevard and scattered residences across Gilman Springs Road as well as locations of other sensitive receptors such as schools.

Table 18
Project Localized Analysis Operational Emission Source Assumptions

Emission Source Type	Air Dispersion Model Emission Source Description	Relevant Assumptions
Onsite vehicle traffic within the truck yards	Area Source	• Stack release height: 6 feet for all vehicles • Vehicle speed: 15 mph • Vehicle trip length based on a review of the layout of the project development phases in relation to the local roadway network. - High cube warehouse: 1,080 feet - Light logistics: 570 feet - Gas compressor utility: 330 feet - All other land uses: 160 feet • Vehicle types: passenger cars and heavy duty delivery trucks • Emission factor: ARB EMFAC2017 model
Onsite diesel truck idling within the truck yards	Area source	• State release height: 6 feet • Idle time: 5 minutes per truck per day (unmitigated) • Vehicle type: heavy duty delivery trucks • Emission factor: ARB EMFAC2017 model
Local Roadway Vehicle Travel	Line sources	• Line source width equal to the width of the roadway plus 3 meters on both sides. • Vehicle speeds: - Heavy duty trucks: 25 mph on local roadways - All other vehicles: 35 mph on local roadways
Standby Diesel Electric Generators	Point sources	• The project was assumed to contain 27 emergency standby diesel generators distributed within the project boundary at full build out (1 generator per 1.5 million square feet of space) • Rated at 315 kilowatts electrical output • Projected testing and maintenance assumed to be 1 hour per day and 50 hours per year • Height of emission release assumed to be 9 feet based on estimates of the generator's temperature, gas flow rate, and influence of building downwash on plume rise • Emissions based on EPA Tier 3 emission standards for diesel generators
Support Equipment	Area sources	• Forklifts using natural gas as fuel • Yard trucks using liquid petroleum gas as fuel

Localized Significance Threshold Analysis

The localized significance threshold analysis evaluated four conditions:

- Project Build Out (2020): this condition assumes that Phase 1 and Phase 2 of the project are fully built out in 2020 as a worst-case scenario.

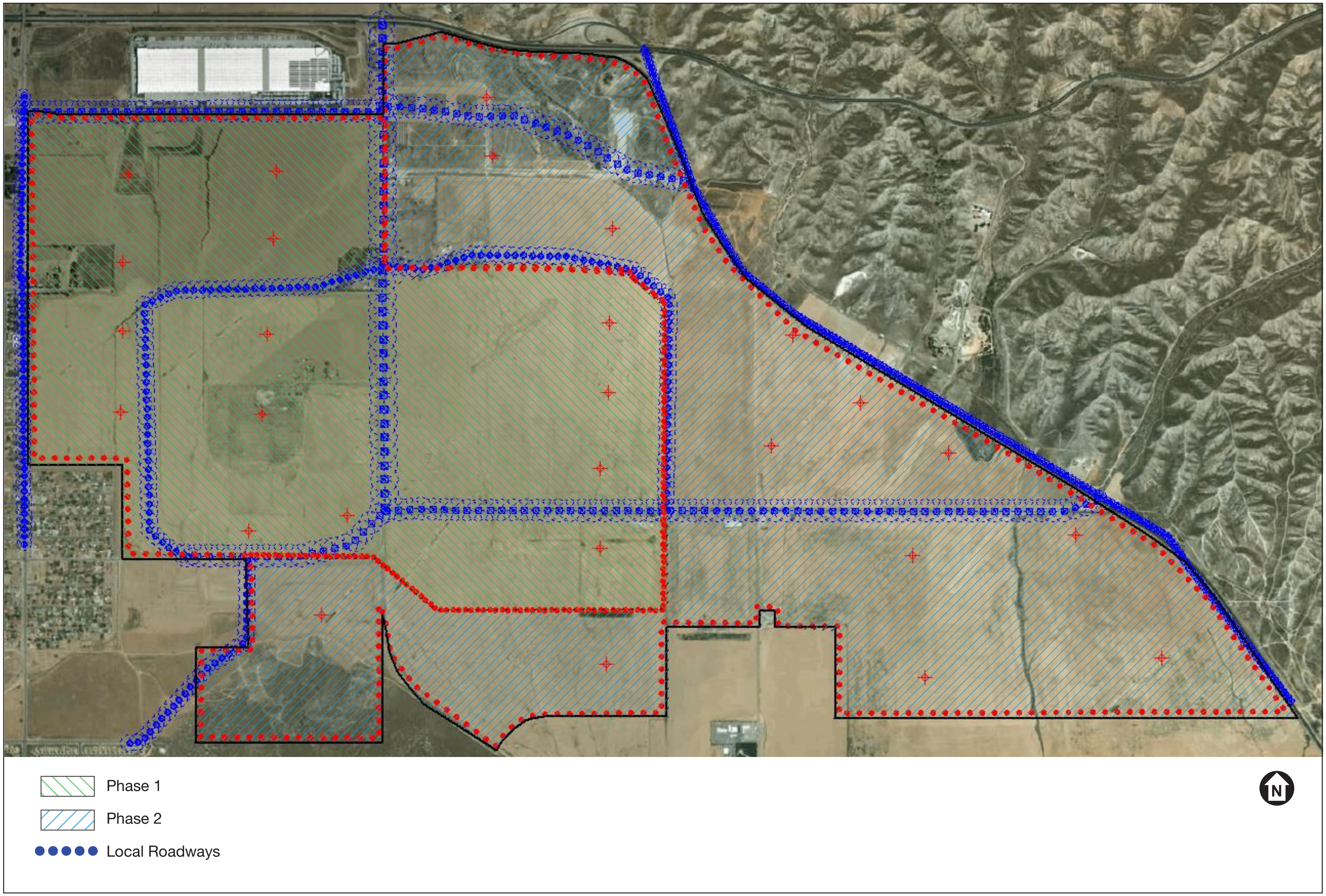
- 2022, the year when the project emissions from both project construction and operation are at their highest combined levels for several pollutants; and when construction activities would occur near the existing residences west of the project boundary along Merwin Street;

- 2025, the earliest year Phase 1 is assumed to be fully operational. When the projected construction schedule would result in construction activities in the southern portion of the project adjacent to Alessandro Boulevard and east of the existing residential areas along

Merwin Street, and when all of Phase I operations would occur (approximately 57 percent of entire project floor space); and

- 2035 when Phase 1 and Phase 2 of the project are fully operational.

Project Full Build Out 2020 represents a worst-case scenario since the project could not be physically built out in its entirety in a single year and does not reflect the fact that the project would be developed over a time period of 15 years depending on market demands for warehouse space. This assumption also does not account for the fact that emissions from mobile sources, prior to mitigation, particularly from heavy duty diesel trucks are expected to decline significantly over time as emissions control technologies continue to improve. This assessment also provided consistency with the TIA and noise reports which examines Project Build Out under existing conditions. The project impact results were added to the existing background concentrations and then compared to the localized threshold for the appropriate pollutant. Background concentration data was obtained from the SCAQMD's Rubidoux monitoring station for years 2016-2018, the most recent data available. Background concentrations of CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3-year average of the 98th percentile of the daily maximum 1-hour average. The 2022, 2025, and 2035 conditions represent the project development including the localized impacts during construction and operation over the time period of 2020 to 2035.

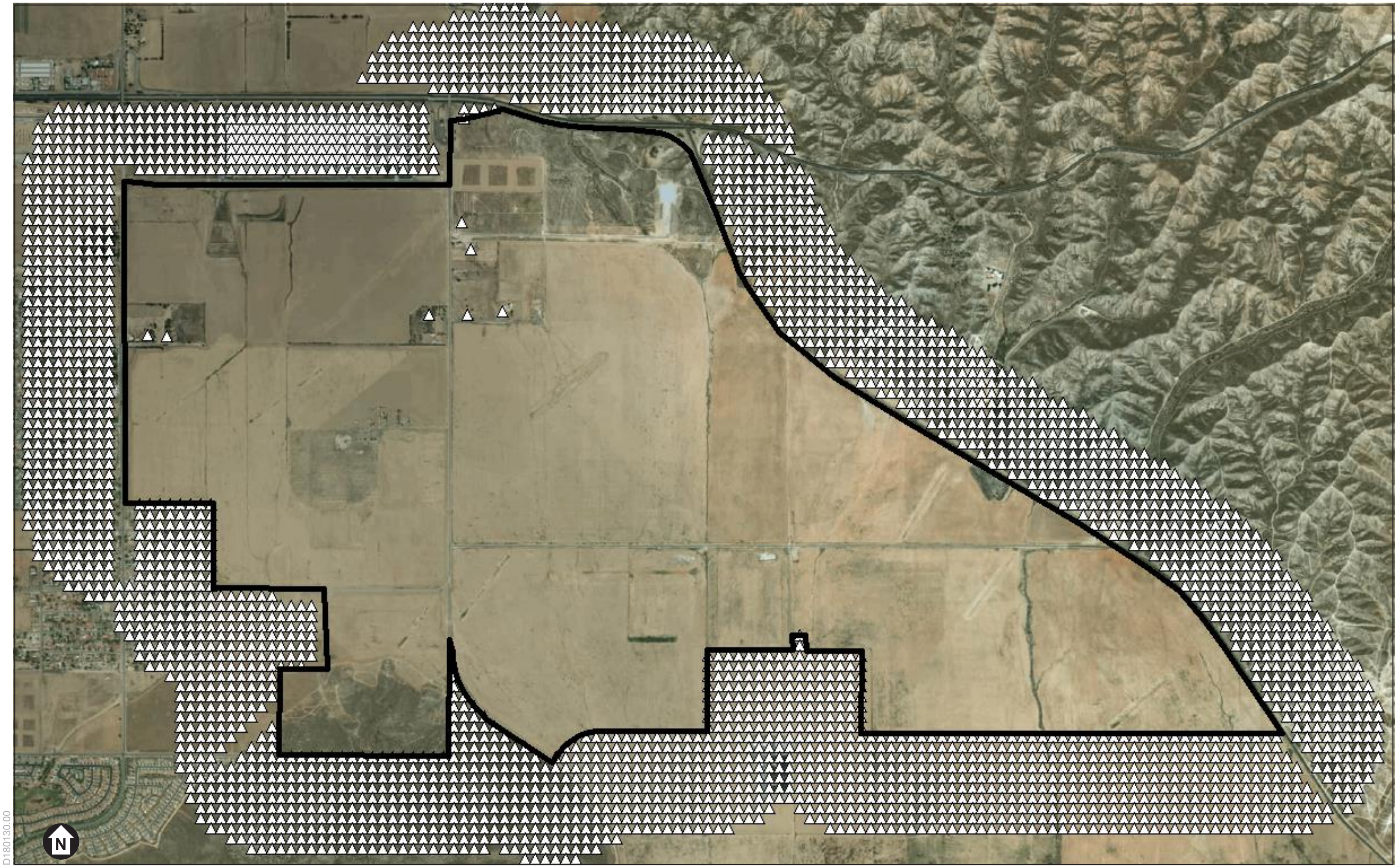


SOURCE: ESA

World Logistics Center

Figure 21
Localized Analysis Operational Emission Sources

ESA



SOURCE: ESA

World Logistics Center

Figure 22
Air Dispersion Model Receptors for the Localized Analysis

ESA

4.4 Health Risk Assessment

About Health Risk Assessments

A Health Risk Assessment (HRA) is a guide that helps to determine whether current or future exposures to a chemical or substance in the environment could affect the health of a population. In general, risk depends on the following factors:

- How much of a chemical is present in an environmental medium (e.g., air);
- How much contact (exposure) a person has with the contaminated environmental medium; and
- The inherent toxicity of the chemical.

This HRA builds and expands upon the methodology described above in the localized air quality assessment by examining the regional effects of the project's potential health risk impacts. The HRA methodology applies a risk characterization model to the results from the air dispersion model to estimate potential health risks at each sensitive receptor location. However, unlike the localized assessment of the criteria pollutants (e.g., carbon monoxide, oxides of nitrogen, and particulate matter), which looks at impacts from exposure times of one hour to a year within a specific year, the HRA examines the impacts over an exposure time period from one hour to an extended exposure time period of many years.

Health Risk Impacts Assessed

The health risk assessment estimated the incremental health impacts attributable to the project's construction and operations for the following condition:

- Proposed Project Development condition which examines the effect of project-related construction and operational traffic emissions as if the project were built out in accordance with its proposed phased construction and operational buildout schedule commencing with the construction of Phase 1 in 2020 and the final full build out in 2035. This condition forms the basis for quantifying the incremental impacts from the project.

A multi-pollutant health risk assessment was conducted for the Proposed Project. The health risk assessment evaluated toxic emissions from a variety of sources. These included exhaust emissions of particulate matter (PM) and total organic gases (TOG) from diesel and gasoline combustion, as well as toxics associated with fugitive PM from tire wear and brake wear of mobile sources. Annual average emissions and impacts were calculated for each year starting from 2020 when construction of the Project would commence. Specifically, annual average concentrations of toxics were estimated from the construction emissions for each year of construction from 2020 to 2034 according to the construction schedule and equipment usage projected for each year of construction. Proposed Project Development examines project impacts resulting from the proposed construction and operation of the project from the commencement of construction in 2020 for a 30-year duration for sensitive/residential receptors, 25-year for worker receptors, and 9-year exposure time periods for school-site student receptors. Annual average emissions and impacts during operation were estimated for the Phase 1 build out year and the final full build out year, years for which detailed traffic information was available from the TIA. The annual average operational emissions were then scaled among operational years between 2021 and 2035 based on the Phase 1 build out year and final full build out year's emissions, using scaling factors that reflecting changes in EMFAC-based emission factors from 2025 or 2035 and the project occupancy schedule for each specific year. See Appendix B.9 for detail on the scaling factor development and how the in-between years' emissions were calculated.

During years when both construction and operations occur simultaneously (2021 to 2034), the annual concentrations at the sensitive receptors from construction were added to the annual concentrations from operations to provide a total impact assessment of all emissions from the project during each year. The resulting total annual average concentrations calculated each year for the exposure time period (individual annual averages) multiplied by the requisite daily breathing rates, age sensitivity factors, and time-at-home factors for each year of exposure. The HRA studied two scenarios for the 30-year exposure cancer risk calculation for sensitive/residential receptors. Scenario 1 assumes that a fetus in the 3rd trimester (within the mother's womb) commences its 30-year exposure starting in year 2020 (construction start year), covering the entire 15 years of construction and progressive project occupancy (operations are not assumed to commence until the year 2021, the first year of operational occupancy) between 2020 and 2035 and another 15 years after project full buildout between 2035 and 2050 (construction + operation scenario); Scenario 2 assumes that a fetus in the 3rd trimester commences its 30-year exposure starting in the 1st year of full buildout in 2035 and last until 2064 (full operation scenario).

The mitigation conditions require all construction equipment that are greater than 50 horsepower to be Tier 4, all medium-heavy-duty and heavy-heavy-duty diesel trucks accessing the project during operation be model year 2010 or newer and that all on-site equipment be Tier 4.

Risk Assessment Methodology

The HRA process involves four main steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization.

Hazard Identification

Hazard identification is the process by which contaminants of concern are selected for investigation in the risk assessment, and includes a review of the chemicals that are potentially released to the atmosphere from the equipment of concern. This assessment is responsive to the emissions of various toxic air contaminants from the construction and operation of the project. The main toxic air contaminants associated with the project include PM and (TOG)[72] from diesel and gasoline combustion, as well as toxics associated with fugitive PM from tire wear and brake

[72] Total Organic Gases (TOG) means compounds of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid; metallic carbides or carbonares, and ammonium carbonate; also includes all organic gas compounds emitted to the atmosphere including low reactivity or exempt compounds such as methane, ethane, etc.

wear of mobile sources. An abbreviated list of common toxicity values for chemicals evaluated in this analysis and target organs[73] that each contaminant affects in a toxic exposure are summarized in **Table 19**, *Toxicity Values*. Please refer to Appendix E for a more detailed list of the TACs analyzed in this study.

The ARB has simplified the process for estimating cancer and chronic non-cancer impacts of air toxics by specifying cancer potency values and reference exposure levels (RELs). For diesel PM, which is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions (ARB 2005b) and provides a hazard level that is greater than would occur when estimating the cancer and chronic non-cancer risk by specifying the individual TOG compounds. However, no acute non-cancer REL has been defined for diesel PM, therefore emissions of the speciated toxic air contaminants in diesel exhaust were evaluated in estimating acute non-cancer hazards.

No such surrogate values exist for gasoline, tire wear or break wear emissions, so the speciated toxic air contaminants were determined as well as their corresponding cancer potency values and RELs.

Table 19
Toxicity Values

Toxic Air Contaminant	CAS Number	Inhalation Cancer Potency Factor $[mg/kg\text{-}day]^{-1}$	Chronic Reference Exposure Level $\mu g/m^3$	Target Organ for Chronic Exposure	Acute Reference Exposure Level $\mu g/m^3$	Target Organ for Acute Exposure
Diesel PM*	9901	1.1	5	I	ND	ND
Acetaldehyde	75070	*	*	*	470	D,I
Acrolein	107028	*	*	*	2.5	D,I
Benzene	71432	*	*	*	27	C,E,F
Formaldehyde	50000	*	*	*	55	D
Methanol	67561	*	*	*	28,000	G
MEK	78933	*	*	*	13,000	D,I
Styrene	100425	*	*	*	21,000	H,D,I
Toluene	108883	*	*	*	37,000	D,G,H,I
M-Xylene	108383	*	*	*	22,000	D,G,I
O-Xylene	95476	*	*	*	22,000	D,G,I
P-Xylene	106423	*	*	*	22,000	D,G,I
1-3 Butadiene	106990	*	*	*	660	H
Copper	7440508	*	*	*	100	I
Chlorine	7782505	*	*	*	210	D,I
Nickel	7440020	*	*	*	0.2	F
Sulfates	9960	*	*	*	120	I
Arsenic	7440382	*	*	*	0.2	I,G,
Vanadium (fume or dust)	7440622	*	*	*	30	D,I

Notes:
* Only diesel PM emissions were evaluated for cancer risk and chronic hazard indices because diesel PM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions (ARB 2005b). For the acute hazard indices, diesel PM was not evaluated since no acute non-cancer REL has been defined for diesel PM; rather, emissions of the other toxic air contaminants were evaluated for all emission sources in

[73] A target organ is an organ or bodily system that is most affected by exposure to a specific toxic air contaminant.

estimating acute non-cancer hazards.
Key to non-cancer and chronic exposure target organs:
C. Cardiovascular; D. Eye; E. Hematologic System; F. Immune System; G. Nervous System
H. Reproductive System; I. Respiratory System
ND = not defined as the California Office of Environmental Health Hazard Assessments has not defined an acute reference exposure level for diesel PM.
Source: California Air Resources Board 2015

Dose-Response

The dose-response assessment develops relationships between exposures to a given chemical and the corresponding potential health effects associated with exposure to that chemical. In general, data are limited regarding adverse effects associated with direct exposure to humans to a particular chemical. Therefore, animal experiments have often been performed to assess a chemical's toxicity. These experiments are conducted to determine the organs that are adversely affected by a toxic chemical and the amount of the chemical needed to produce an adverse effect on the organ.

Two types of adverse health effects are generally considered in health risk assessments: carcinogenic and non-carcinogenic. Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk. Chemicals that potentially produce carcinogenic effects have been shown or are suspected to produce tumors in animals or humans.

Non-carcinogenic effects, such as liver or kidney damage, may be either reversible or permanent. In these situations, it is assumed that there is a level of exposure at which these chemicals produce no adverse effects in the human body. In other words, exposure to these chemicals in amounts less than a threshold level will result in no adverse health effects. The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure.

Exposure Assessment

Exposure assessment identifies potential exposure pathways, estimates chemical concentrations at potential exposure points, and calculates expected doses of emitted substances. An exposure pathway is defined as the means by which an individual or a population is exposed to contaminants that originate from a source. Each pathway represents a different mechanism for exposure.

Four elements must be present in order for a potential human exposure pathway to exist;

1. A source and mechanism of substance release to the environment;
2. An environmental transport medium (e.g., air, water, soil);
3. An exposure point, or point of potential contact with the contaminated medium; and

4. A receiver (i.e., human) with a route of entry (e.g., inhaling air, drinking water) at the point of contact.

The current risk assessment only considers toxic air contaminants that are released into the air and inhaled. The levels of atmospheric contaminants resulting from emissions of toxic air contaminants are calculated using mathematical air dispersion models, which use emission rates and exposure duration, design features specific to the emissions sources, and meteorological data. The air modeling results include annual average and maximum hourly ambient air concentrations of the modeled substances at various receptor locations. In order to evaluate human exposure, a human receiver with a route of exposure to the affected medium is required, such as a person inhaling air in a potentially affected area. Therefore, potential health risks are only evaluated for developed areas where humans typically are present. A quantitative estimate of potential human exposure is developed for the inhalation pathway in this study.

The cancer risk and chronic non-cancer hazard indices are based on concentrations from sources of exhaust PM and TOG, and fugitive PM. These sources include off-road construction equipment, heavy duty trucks, gasoline vehicles, onsite equipment and emergency generators. A majority of the toxic emissions are related to diesel exhaust. Diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State of California as a known carcinogen. Under California regulatory guidelines,[74] diesel PM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole. The California Environmental Protection Agency and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to use of a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole mixture because the identity of all chemicals in the mixture may not be known, and/or exposure and health effect information for all chemicals identified within the mixture may not be available.

Gasoline combustion can also release chemicals that are carcinogenic, and are included in this study. A preliminary comparison of the relative toxicity of gasoline-borne toxics compared to diesel PM concluded that the potential cancer risks associated with the TACs from gasoline combustion emissions from the project's gasoline vehicles are substantially less than the potential cancer risks from the project's diesel PM emissions. Less than 2 percent of the total cancer risk from the project's vehicles can be attributed to the gasoline TACs with the remaining 98 percent attributable to toxics from diesel PM. Furthermore, toxics associated with fugitive PM from tire wear and brake wear contribute substantially less than the potential cancer risks from the project's diesel PM emissions.

[74] CARB. 2005. HARP User Guide, Appendix K, Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines. https://www.arb.ca.gov/toxics/harp/docs/userguide/appendixK.pdf

The acute non-cancer indices are based on toxic concentrations from both diesel and gasoline vehicles. To estimate acute non-cancer hazard indices, specific chemical concentrations that comprise the PM and TOG emissions must be calculated in a process called speciation.[75]

Risk Characterization

Risk characterization is the process of combining dose-response information with the estimates of human exposure in order to derive a quantitative estimate of the likelihood that humans will experience any adverse health effects for the given exposure assumptions. Two general types of health effects are generally considered: potential carcinogenic risks after chronic (long-term) exposure and potential non-carcinogenic health impacts following chronic (long-term) and acute (short-term) exposure. Each of these health effects was evaluated in this report.

Estimation of Cancer Risks

Excess cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens over a specified exposure duration. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF). A risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of toxic air contaminants over a specified duration of time. This risk would be an excess cancer risk that is in addition to any cancer risk borne by a person not exposed to these air toxics.

As noted above, diesel PM is used as a surrogate measure of carcinogenic exposure for the mixture of chemicals that make up diesel exhaust as a whole. Cancer risks were estimated in accordance with the “Current OEHHA Guidance”.[76] The “Current OEHHA Guidance” assumes a lifetime exposure of 30 years with the inclusion of early-in-life sensitivity factors for sensitive receptors, a 25-year exposure for worker receptors, and a 9-year exposure duration for school-site student receptors.

The cancer risk from toxics is calculated by multiplying an average toxics concentration calculated using the AERMOD air dispersion model and an inhalation exposure factor as shown in Equation 1 below.

Cancer Risk = Inhalation cancer potency factor (CPF) x Dose-inhalation (EQ-1)

Where:

[75] Total organic compounds are comprised of many types of individual chemical compounds. Speciation is the process of breaking a total organic compound into its individual compounds. From this information, speciation profiles are devised for many emission sources to provide the makeup of that sources total organic emissions. Speciation profiles are used to estimate emissions of the individual compounds from the emission source which, in turn, are used to estimate the health effects of the emission sources and their total organic compound emissions.

[76] Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015. http://www.oehha.ca.gov/air/hot_spots/2015/2015GuidanceManual.pdf

Cancer Risk = Total individual lifetime excess cancer risk defined as the cancer risk a hypothetical individual faces if exposed to carcinogenic emissions from a particular facility; this risk is defined as an excess risk because it is the risk above and beyond the background cancer risk to the population contributed by causes not related to the project; cancer risk is expressed in terms of risk per million exposed individuals.

Inhalation cancer potency factor (CPF) = 1.1 (milligrams per kilogram per day)$^{-1}$ for diesel PM;

Dose-inhalation = C_{air} x (EF x ED x 10^{-6} ÷ AT x AAF) **(EQ-2)**

Where:

C_{air} is the average diesel PM concentrations calculated from the AERMOD model in μg/m^3;

EF is the exposure frequency (days per week);

ED is the exposure duration (years); and

AT is the time period over which the exposure is calculated (days)

AAF are a set of age-specific adjustment factors that include age sensitivity factors (ASF), daily breathing rates (DBR), and time at home factors (TAH).

Cancer Risk Exposure Assumptions

The principal focus of this HRA is on the potential health impacts to sensitive/residential receptors located within and surrounding the project site. Sensitive receptors include hospitals, schools, daycare facilities, elderly housing and convalescent facilities. Residences are also considered sensitive receptors. An important parameter necessary to estimate cancer risk is the duration of exposure of an individual to toxic air contaminants. An assessment of population mobility can assist in determining the length of time a residential receptor is exposed in a particular location. For example, the duration of exposure to a source of toxic air contaminants will be directly related to the period of time residents live near the source of the emissions.

Table 20, *Exposure Assumptions for Cancer Risk,* summarizes the primary exposure assumptions used in this HRA to calculate individual cancer risk by receptor type, which is based on the SCAQMD HRA Guidance and the "Current OEHHA Guidance".

Table 20
Exposure Assumptions for Cancer Risk

Type of Guidance	Receptor Type	Exposure Frequency Hours/ day	Exposure Frequency Days/ year	Exposure Duration (years)	Age Sensitivity Factors	Time at Home Factor (%)	Daily Breathing Rate (L/kg-day)
Current OEHHA Guidance	Sensitive/Residential:						
	3rd Trimester	24	350	0.25	10	100	361
	0-2 years	24	350	2	10	100	1090
	2-16 years	24	350	14	3	100	572
	Older than 16 years	24	350	13.75	1	73	261
	Student	8	180	9	3	NA	640
	Worker	8	250	25	1	NA	230

Table 20
Exposure Assumptions for Cancer Risk

Type of Guidance	Receptor Type	Exposure Frequency Hours/ day	Days/ year	Exposure Duration (years)	Age Sensitivity Factors	Time at Home Factor (%)	Daily Breathing Rate (L/kg-day)

Time at home factor is 1 if there is a school receptor within the 1 in a million (or greater) cancer risk isopleth, which was the case for this project's unmitigated scenario for the Construction + Operation HRA.
(L/kg-day) = liters per kilogram body weight per day; NA = not applicable.
The daily breathing rates shown are RMP using the Derived Method for residential as recommended by the SCAQMD and the 95th percentile rate for other receptors as recommended by the OEHHA.
Source: OEHHA 2015; SCAQMD, 2016

The underlying factors used in the analysis exemplify the conservative nature of utilizing the exposure scenarios and the underlying assumptions:

- The residential cancer risk calculation assumes that each resident will be exposed to particulate matter and organic gases for 24 hours a day for 350 days a year at the location of his or her home throughout the entire 30-year residential exposure period.
- The worker and student cancer risk calculations assume that workers or students are exposed to diesel PM for 8 hours a day, next to, but outside of the buildings in which they work or study.
- The atmospheric dispersion model and traffic model that are used to estimate risks generally provide impact estimates that are over-estimated based on the use of conservative model assumptions.

Other Factors that Influence Health Risk Estimates: Conservative Trip Estimates

It should also be noted that the TIA used a conservative estimate of the number of truck trips after the project begins operation. The number of truck trips is important because diesel PM emissions are directly related to both the number of trucks and the vehicle miles traveled.

As mentioned above, the TIA uses the traffic generation rate for high-cube warehouses from the 10^{th} edition of the Institute of Traffic Engineers Trip Generation Manual which is based on the High-Cube Warehouse Vehicle Trip Generation Analysis prepared jointly by SCAQMD and National Association of Industrial and Office Properties (NAOIP).

Cancer Burden

Whereas cancer risk represents the probability that an individual will develop cancer, cancer burden multiplies the cancer risk by the exposed population to estimate the number of individuals that would be expected to contract cancer from the project. The exposed population is defined as the number of persons within a facility's zone of impact, which is typically the area exposed to an incremental cancer risk of one in a million from the project. Consistent with this definition, cancer burden was calculated by first identifying all population census tracts[77] located within the project's zone of impact, multiplying the estimated incremental project cancer risk impact in the census tract by the population of the census tract and then summing all of products of population times estimated cancer risk in the zone of impact. Note that each census tract contributes to the cancer burden in proportion to its population and risk. For example, if a census tract has a relatively high estimated cancer risk, but no people living there, it will not contribute to the estimation of the cancer burden. As provided in the "Current OEHHA Guidance", the cancer burden is calculated assuming a 70-year exposure duration along with the appropriate exposure frequency, daily breathing rates, age sensitivity factors, and time at home factors appropriate to each age group.[78] A cancer burden greater than 0.5 is considered a significant cancer burden.

Non-cancer Hazards

An evaluation of the potential non-cancer effects of chronic (long-term) and acute (short-term) chemical exposures was also conducted. For chemicals that cause non-cancer health effects, risks are typically characterized using a measure called the hazard index (HI). Adverse non-cancer health effects are evaluated by comparing the concentration of each TAC with the reference concentration level below which an adverse health effect will not occur as determined by health professionals. This reference concentration level is referred to as the Reference Exposure Level (REL). The State of California has published a database of RELs for numerous toxic air contaminants. Toxic air contaminants may have a unique chronic and/or acute REL. A significant risk is defined by the SCAQMD as an HI of 1 or greater, and indicates that the source of TAC emissions has a potential to cause adverse non-cancer health effects.

Chronic Non-cancer Impacts

Exposures to TACs such as diesel PM can cause chronic non-cancer illnesses such as reproductive effects, respiratory effects, eye sensitivity, immune effects, kidney effects, blood effects, central nervous system, birth defects, or other adverse environmental effects. Risk characterization for chronic non-cancer health risks from diesel PM is expressed as a HI. The HI is a ratio of the predicted concentration of a project's emissions to its REL.

When evaluating chronic non-cancer effects due to TAC exposures, a hazard quotient (HQ) is established for each individual TAC as follows and for each target organ[31] affected by the individual TAC:

$$\mathbf{HQ_i = C_{air}/REL_i} \qquad \textbf{(EQ-3)}$$

Where:

[77] A census tract is a geographic region defined for the purpose of taking a census. Usually these regions coincide with the limits of cities, towns, or other administrative areas. Each tract has a unique numeric code and averages about 4,000 inhabitants. The census tract centroid is the geographic center of the tract based on a weighted distribution of the population within the tract using the census blocks that comprise the tract. A census block is the smallest geographic unit used to tabulate population and each tract can be comprised of several blocks.

[78] Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015, Section 8.1. http://www.oehha.ca.gov/air/hot_spots/2015/2015GuidanceManual.pdf

HQi = chronic hazard quotient for each TAC, i

Cair = Annual average concentration of each TAC, i (< g/m3)

RELi = Chronic Reference Exposure Level for TAC, i (< g/m3)

i = toxic air contaminant of interest

To evaluate the potential for adverse non-cancer health effects from simultaneous exposure to multiple TACs, the HQs for all TACs that affect the same target organ are summed yielding a HI as follows:

$$\mathbf{HI_{to} = \Sigma HQ_{tac}} \qquad \textbf{(EQ-4)}$$

Where:

HI_{to} = sum of the hazard quotients for all TACs affecting the same target organ

HQ_{tac} = hazard quotient for TAC and target organ

Chronic health effects were calculated based on maximum annual average of toxic concentrations from the construction and operation of the project.

Acute Non-cancer Impacts

The OEHHA has not defined an acute non-cancer REL for diesel PM. This HRA calculated the potential acute non-cancer hazards associated with the various toxic air contaminant components of PM and organic gas exhaust emissions from diesel and gasoline vehicles that have been found to cause acute non-cancer hazards.

The ARB maintains and updates estimates of the chemical composition and hazard levels of TOGs for a variety of emission source categories. These estimates are contained in what are referred to as speciation profiles. Speciation profiles provide estimates of the toxic air contaminant composition of TOG emissions, and are used in the development of emission inventories and air quality models.

Speciation profiles based on those developed by the ARB were used in this study[79] to derive estimates of the pollutant levels of the PM and TOG components and their acute non-cancer hazards from both gasoline exhaust and diesel exhaust.

Table 21, *Speciation Profiles for Diesel and Gas Fuel Combustion Sources,* presents the speciation profiles that were used to convert PM and organic gas emissions into individual TAC emissions. Only chemicals that have a defined acute non- cancer reference exposure level (RELs) were included. The estimated total PM and organic gas emissions are multiplied by the profile percentage for a particular TAC to obtain the emissions of that particular TAC.

79 CARB. 2013. Speciation Profiles Used in ARB Modeling. https://www.arb.ca.gov/ei/speciate/speciate.htm

Table 21
Speciation Profiles for Diesel and Gas Fuel Combustion Sources

Sources	Emission Type	TAC Speciation Profile
Off-road diesel construction equipment	Exhaust TOG	ARB TOG profile #818
	Exhaust PM	ARB PM Profile #425
	Evaporative TOG	Assume negligible
	Brake/Tire PM	N/A
On-road diesel vehicles	Exhaust TOG	ARB TOG profile #818
	Exhaust PM	ARB PM profile #425
	Evaporative TOG	Assume negligible
	Brake PM	ARB PM profile #472
	Tire PM	ARB PM profile #473
On-road gasoline vehicles	Exhaust TOG	ARB TOG profile #2118
	Exhaust PM	ARB PM profile #400
	Evaporative TOG	ARB TOG profile #660
	Brake PM	ARB PM profile #472
	Tire PM	ARB PM profile #473
Off-road natural gas-fired internal combustion engine	Exhaust TOG	ARB TOG Profile #719

Notes:
(1) TOG speciation profile 2108 is from the ARB SPECIATE database; this profile is used to characterize TOG emissions from gasoline-fueled vehicles
(2) TOG speciation profile 818 is from the ARB SPECIATE database; this profile was used to characterize TOG emissions from diesel-fueled vehicles Source:
California Air Resources Board 2013.

The methodology used to estimate acute non-cancer hazards follows a similar basic methodology used to estimate chronic non-cancer hazards with two important differences: the toxic air contaminant concentration, C_{air} in Equation 3 is based on the predicted maximum one-hour concentration of the toxic air contaminant, and the REL used is specific to the acute impacts from the contaminant.

Geographic Scope of the Health Risk Assessment

The HRA is characterized by two important differences from the localized significance threshold assessment for criteria pollutants. According to the SCAQMD localized significance threshold assessment methodology, the assessment of localized impacts addresses only those emissions that are generated “onsite”, that is for the purposes of this project, emissions generated from within or along the boundaries of the Specific Plan. However, for the HRA, both the universe of the project’s emission sources and air dispersion model receptors were expanded to assess the off-site impact of the project’s emissions of toxics. Besides onsite emission sources and receptors, the

HRA also included a receptor grid that extends from the project boundary to 5 kilometers (km) away and roadway network that ends 10 km from the project boundary (e.g., including approximately 18 miles of SR-60, surface roadway networks that are extending from the project boundary to 7.6 miles west and 6.9 miles east). The study area reasonably captures the most extensive emissions from project-generated vehicles on the roadway network since all trips to and from the project would travel on the roadway segments and freeway segments (SR-60) nearest the project site regardless of origin or destination. Since project activity is highest on-site, the project's emissions and associated health impact decreases with distance from the project site. Thus, the selected study area is capable of capturing the project's maximum impact. If the maximum risk from the study area is less than significant, project health risk impacts will be less than significant for receptors further away.

The generation of emissions from traffic traveling along the various arterial and freeway mainline roadway segments requires information on traffic volumes, length of segment, and emission factors. The emission factors, in turn, depend on vehicle type, speed, calendar year, and fuel type. Estimates of peak hour vehicle volumes and types (passenger cars, light heavy duty trucks, medium heavy duty trucks, and heavy-heavy duty trucks) were provided by the traffic consultant for each roadway segment analyzed. The TIA provided peak hourly volumes of cars and trucks traveling on freeways. Based on the distribution of traffic of cars and trucks, an hourly emissions profile for cars and trucks was applied to the mobile source segments in the HRA dispersion modeling to best represent daily traffic conditions. The TIA also provided daily vehicle volumes for freeway segments, but not for non-freeway segments. For use in the cancer risk and chronic non-cancer hazard calculations, the daily vehicle volumes for non-freeway segments were assumed to be 10 times that of the peak hour vehicle volumes. The physical length and width of each roadway segment were estimated using the segment location as provided by the traffic consultant and aerial photographs available from Google Earth. Vehicle speeds for each roadway segment and vehicle type were based on the speed groups provided by the traffic consultant. Vehicles traveling on freeways were assumed to be traveling 55 miles per hour.

SECTION 5
Environmental Impacts

5.1 Compliance with Air Quality Plan

Conflict with or obstruct the implementation of the applicable air quality plan (AIR-1)

According to the 1993 SCAQMD Handbook, there are two key indicators of consistency with the AQMP:

1. Indicator: Whether the project would not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP.

2. Indicator: A project would conflict with the AQMP if it would exceed the assumptions in the AQMP in 2012 or increments based on the year of project buildout and phase. The Handbook indicates that key assumptions to use in this analysis are population number and location and a regional housing needs assessment. The parcel-based land use and growth assumptions and inputs used in the Regional Transportation Model run by the Southern California Association of Governments that generated the mobile inventory used by the SCAQMD for AQMP are not available and assumed not to include the project; therefore, the SCAQMD's significance thresholds are used to determine if the project exceeds the assumptions in the AQMP.

Considering the recommended criteria in the SCAQMD's 1993 Handbook, this analysis utilizes the following criteria to address this potential impact:

Project's Contribution to Air Quality Violations and Assumptions in AQMP

According to the SCAQMD, the project is consistent with the AQMP if the project would not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP.[80] As shown in analyses in Impact AIR-2, the project could violate an air quality standard and therefore could contribute substantially to an existing or projected air quality violation.

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[80] SCAQMD. 1993. South Coast Air Quality Management District. CEQA Air Quality Handbook, 1993.

If a project's emissions exceed the SCAQMD regional thresholds for NO_X, VOC, PM_{10}, or $PM_{2.5}$, it follows that the emissions could cumulatively contribute to an exceedance of a pollutant for which the Basin is in nonattainment (ozone, PM_{10}, and $PM_{2.5}$) at a monitoring station in the Basin.

The thresholds are criteria for determining environmental significance and are discussed in the SCAQMD's 1993 Handbook for Air Quality Analysis and are updated in the SCAQMD's most recent thresholds published online in 2012. An exceedance of a nonattainment pollutant at a monitoring station would not be consistent with the goals of the AQMP to achieve attainment of pollutants.

As discussed in the analyses below (AIR-2), the project would exceed the regional emission significance thresholds for VOC, NO_X, CO, PM_{10}, and/or $PM_{2.5}$ prior to the application of mitigation. (Refer specifically to Table 22 for construction emissions and Table 25 for operational emissions.) This means that project emissions could combine with other sources and could result in an ozone, PM_{10}, or $PM_{2.5}$ exceedance at a nearby monitoring station. The Basin in which the project is located is in nonattainment for these pollutants; therefore, according to this criterion, the project would not be consistent with the AQMP. The regional emissions assume a zero baseline for existing emissions on the project site and therefore assumes that the AQMP had no emissions for the project site. The regional significance thresholds can be interpreted to mean that if project emissions exceed the thresholds, then the project would also not be consistent with the assumptions in the AQMP. Therefore, based on this criterion, the project could contribute to air quality violations and would not be consistent with the AQMP.

Compliance with Emission Control Measures

The second indicator of whether the project could conflict with or obstruct implementation of the AQMP is by assessing the project's compliance with the control measures in the AQMPs and the State Implementation Plan (SIP).

2012 AQMP

The project would comply with all applicable rules and regulations enacted as part of the AQMP. In addition, the AQMP relies upon the SCAG regional transportation strategy, which is in its adopted 2012–2035 RTP/SCS and 2011 FTIP. Included in the RTP/SCS are transportation control measures including active transportation (non-motorized transportation, e.g., biking and walking); transportation demand management; transportation system management; transit; passenger and high-speed rail; goods movement; aviation and airport ground access; highways; arterials; and operations and maintenance.

2016 AQMP

As stated previously, the SCAQMD recently approved on March 3, 2017 the Final 2016 AQMP. Currently, the 2016 AQMP is being reviewed by the U.S. EPA and CARB. Until the approval of the EPA and CARB, the current regional air quality plan is the Final 2012 AQMP adopted by the SCAQMD on December 7, 2012. Therefore, consistency analysis with the 2016 AQMP has not been included. Nonetheless, the project would comply with all applicable rules and regulations enacted as part of the 2016 AQMP, including transportation control measures from the 2016 RTC/SCS.

State Implementation Plans

Geographical areas in the State that exceed the Federal air quality standards are called nonattainment areas. The project area is in nonattainment for ozone, PM_{10}, and $PM_{2.5}$. SIPs show how each area will attain the Federal standards. To do this, the SIPs identify the amount of pollutant emissions that must be reduced in each area to meet the standard and the emission controls needed to reduce the necessary emissions. On September 27, 2007, the CARB adopted its State Strategy for the 2007 SIP. In 2009, the SIP was revised to account for emissions reductions from regulations adopted in 2007 and 2008 and clarifies CARB's legal commitment. Additional recent revisions to the SIP are as follows:

- In 2008, the EPA revised the lead[81] national ambient air quality standard by reducing it to 0.15 $\mu g/m^3$. On December 31, 2010, the Los Angeles County portion of the Basin was designated as nonattainment for the 2008 lead national standard as a result of exceedances measured near a large lead-acid battery recycling facility. The 2012 Lead SIP for Los Angeles County was prepared by the SCAQMD and addresses the recent revision to the lead national standard, and outlines the strategy and pollution control activities that demonstrate attainment of the lead national standard before December 31, 2015. The 2012 Lead SIP was approved May 4, 2012.

- A SIP revision for the federal nitrogen dioxide standard was prepared in 2012, to address the new 1-hour federal ambient air quality standard for nitrogen dioxide.

- The proposed California Infrastructure SIP revision was considered by the CARB on January 23, 2014. The proposed Infrastructure SIP revision is administrative in nature and covers the National Ambient Air Quality Standards (federal standards) for ozone (1997 and 2008), fine particulate matter ($PM_{2.5}$; 1997, 2006, and 2012), lead (2008), nitrogen dioxide (2010), and sulfur dioxide (2010). The proposed revision describes the infrastructure (authorities, resources, and programs) California has in place to implement, maintain, and enforce these federal standards. It does not contain any proposals for emission control measures.

The SIP takes into account CARB rules and regulations. The project will comply with applicable rules and regulations as identified in the AQMPs and SIPs and therefore, complies with this criterion.

Summary

Although the project would be consistent with the policies, rules, and regulations in the AQMP and SIPs, the project must meet all the criteria listed above to be consistent with the AQMP. The project could impede AQMP attainment because its construction and operation emissions exceed

81 Lead referred to here is a chemical element; a heavy metal.

the SCAQMD regional significance thresholds, so the project is considered to be inconsistent with the AQMP.

5.2 Regional Emissions

Violate any air quality standard or contribute substantially to an existing or projected air quality violation (AIR-2)

Regional Construction Emissions

Grading and other construction activities produce combustion emissions from various sources such as site grading, utility engines, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, asphalt paving, and motor vehicles transporting the construction crew. Exhaust emissions during these construction activities will vary daily as construction activity levels change. The use of construction equipment on site would result in localized exhaust emissions. Activity during peak grading days typically generates a greater amount of air pollutants than other project construction activities.

While the actual details of the future construction schedule are not known, it is expected that project construction would occur in two phases with the construction of Phase 1 occurring over five years and the construction of Phase 2 occurring over ten years. Appendix A includes details of the emission factors and other assumptions.

Table 22, *Short-Term Regional Construction Emissions – Without Mitigation,* identifies projected emissions resulting from grading and construction activities for the project and shows the estimated maximum daily construction emissions over the course of project construction prior to the application of mitigation.

The construction emissions estimates summarized in Table 22 are based on an assumed construction scenario. Using emission factors from the CalEEMod model for off-road sources and EMFAC2017 emission factors for on-road sources, Table 22 indicates that construction emissions of criteria pollutants would exceed the SCAQMD daily emission thresholds for all criteria pollutants (VOC, NO_x, CO, PM_{10}, and $PM_{2.5}$), with the exception of SO_X.[82] This is a significant impact requiring mitigation.

Fugitive dust emissions are generally associated with land clearing and exposure of soils to the air and wind, and cut-and-fill grading operations. Dust generated during construction varies substantially by project, depending on the level of activity, the specific operations and equipment, local soils, and weather conditions at the time of construction. The project will be required to comply with SCAQMD Rules 402 and 403 to control fugitive dust. There are a number of feasible control measures that can be reasonably implemented to significantly reduce PM_{10} emissions from construction.

82 The project would emit SO_X from construction equipment exhaust; however, the maximum emissions (2 pounds per day) are less than significant as they are far below the threshold of 150 pounds per day.

As identified in Table 22, fugitive dust and exhaust emissions during the anticipated peak construction day for the project would exceed SCAQMD daily construction thresholds. The percentage of dust and exhaust varies by year but for PM_{10} is an average of 85 percent dust and 15 percent exhaust. $PM_{2.5}$ has an average of 54 percent dust and 46 percent exhaust.

Table 22
Short-Term Regional Construction Emissions–Without Mitigation

	Maximum Daily Pollutant Emissions (lbs/day)									
Year	VOC	NO_X	CO	SO_2	PM_{10} dust	PM_{10} exhaust	PM_{10} Total	$PM_{2.5}$ dust	$PM_{2.5}$ exhaust	$PM_{2.5}$ Total
2020	319	989	701	2	127	42	168	27	38	66
2021	333	1124	832	2	126	47	172	26	43	69
2022	333	1103	865	2	154	45	199	37	41	78
2023	328	1010	858	2	170	41	211	40	37	77
2024	312	811	771	2	151	32	184	31	30	61
2025	285	529	576	1	124	20	144	27	19	46
2026	270	405	401	1	91	16	107	18	14	33
2027	267	380	376	1	40	15	55	10	14	24
2028	272	423	400	1	172	16	188	24	14	39
2029	268	390	378	1	114	15	129	18	14	32
2030	272	206	324	1	114	6	120	18	6	24
2031	263	163	292	1	108	5	113	15	5	20
2032	261	151	267	1	103	4	107	14	4	19
2033	251	110	226	1	81	3	84	11	3	14
2034	250	111	221	1	99	3	102	13	3	15
SCAQMD Threshold	**75**	**100**	**550**	**150**	**NA**	**NA**	**150**	**NA**	**NA**	**55**
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**NA**	**NA**	**Yes**	**NA**	**NA**	**Yes**

Notes:
- The emissions assume all construction activities (mass grading, fine grading, building, utilities, curbing, landscaping, painting, paving, and/or interchange) occur on the same day, depending on the year in which the activity occurs.
- Emissions assume compliance with SCAQMD Rule 403.

* PM totals may not add up due to rounding.
VOC = volatile organic compounds; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} and $PM_{2.5}$ = particulate matter; NA = not applicable as there is no separate threshold for dust/exhaust

Concrete pouring would likely occur during nighttime hours due to limitations high temperatures pose for concrete work during the day. On-site equipment used during concrete pouring would involve daytime prep with actual concrete pouring occurring during the nighttime hours. On average, the total hours of operation for each piece of equipment during the concrete phase would be approximately 10 hours. Therefore, maximum daily emissions presented in Table 22 represent the maximum daily emissions including the average concrete pour day. However, under rare occurences, extended concrete pour days may be required. **Table 23**, *Short-Term Regional 24-Hour Concrete Pour Emissions – Without Mitigation* summarizes daily maximum emissions for each year of construction associated with 24-hour operation of on-site building concrete equipment. As shown in Table 23, maximum 24-hour concrete pour days would exceed SCAQMD thresholds for NO_X. However, all maximum daily emissions are less than those for the worst-case construction day as summarized in Table 22. Therefore, rare 24-hour concrete pour days would be within the estimated worst-case construction day assumptions. No further analysis of 24-hour concrete pour days is required.

Table 23
Short-Term Regional 24-Hour Concrete Pour Emissions–Without Mitigation

Year	Maximum Daily Pollutant Emissions (lbs/day)									
	VOC	NO_X	CO	SO_2	PM_{10} dust	PM_{10} exhaust	PM_{10} Total	$PM_{2.5}$ dust	$PM_{2.5}$ exhaust	$PM_{2.5}$ Total
2020	18	155	165	0	12	9	20	1	8	9
2021	17	144	164	0	12	8	19	1	7	8
2022	15	131	163	0	12	7	18	1	6	7
2023	15	123	163	0	12	6	17	1	6	7
2024	14	117	163	0	12	5	17	1	5	6
2025	13	110	163	0	12	4	16	1	4	5
2026	13	110	163	0	12	4	16	1	4	5
2027	13	110	163	0	12	4	16	1	4	5
2028	13	110	163	0	12	4	16	1	4	5
2029	13	110	163	0	12	4	16	1	4	5
2030	14	87	167	0	12	2	14	1	2	3
2031	14	87	167	0	12	2	14	1	2	3
2032	14	87	167	0	12	2	14	1	2	3
2033	14	87	167	0	12	2	14	1	2	3
2034	14	87	167	0	12	2	14	1	2	3
SCAQMD Threshold	**75**	**100**	**550**	**150**	**NA**	**NA**	**150**	**NA**	**NA**	**55**
Exceeds Threshold?	**No**	**No**	**No**	**No**	**NA**	**NA**	**No**	**NA**	**NA**	**No**

* PM totals may not add up due to rounding.
VOC = volatile organic compounds NO_X = nitrogen oxides CO = carbon monoxide PM_{10} and $PM_{2.5}$ = particulate matter
NA = not applicable as there is no separate threshold for dust/exhaust

Similar to extended concrete pouring days, other phases of construction such as utility installation and building construction may require an occasional extended construction day based on the task at hand and schedule goals. Occasional extended construction hours would occur for specific tasks within specific planning areas as needed (determined on a day-to-day basis) and would not occur site-wide throughout the 15-year construction period. Therefore, it is anticipated that estimated yearly maximum construction day emissions, as summarized in Table 22, represent the realistic worst-case regional construction emissions for the 15-year construction duration. Therefore, no further analysis of potential extended construction days is required.

The project is required to comply with regional rules that assist in reducing short-term air pollutant emissions. SCAQMD Rule 402 requires implementation of dust-suppression techniques to prevent fugitive dust from creating a nuisance off site. SCAQMD Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, SCAQMD Rule 403 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Applicable dust suppression techniques from Rule 403 are summarized below. Implementation of these dust suppression techniques can reduce the fugitive dust generation (and thus the PM_{10} component). Compliance with these rules would reduce impacts on nearby sensitive receptors. The applicable Rule 403 measures are as follows:

- All clearing, grading, earthmoving, or excavation activities shall cease when winds exceed 25 miles per hour per SCAQMD guidelines in order to limit fugitive dust emissions.

- The contractor shall ensure that all disturbed unpaved roads and disturbed areas within the project are watered at least three times daily during dry weather. Watering, with complete coverage of disturbed areas, shall occur at least three times a day, preferably in the mid-morning, afternoon, and after work is done for the day.

- Cover all trucks hauling dirt, sand, soil, or other loose materials, or maintain at least 0.6 meter (2 feet) of freeboard (vertical space between the top of the load and top of the trailer) in accordance with the requirements of California Vehicular Code Section 23114.

- The contractor shall ensure that traffic speeds on unpaved roads and project site areas are 15 miles per hour or less to reduce fugitive dust haul road emissions.

As previously discussed, SCAQMD Rule 1113 regulates the sale and application of architectural coatings. Rule 1113 is applicable to any person who applies or solicits the application of any architectural coating within the Basin. Rule 1113 sets limits on the amount of ROG or VOC emissions allowed for all types of architectural coatings. Compliance with Rule 1113 means that architectural coatings used during construction would have ROG or VOC emissions that comply with these limits.

Operational Emissions

Long-term air pollutant emission impacts that would result from the project are those associated with stationary sources (generators, forklifts, etc.), area sources (landscaping and maintenance activities), and mobile sources (e.g., emissions from the use of motor vehicles by project-generated traffic).

As discussed above in Section 4, the TIA provides VMT attributable to the project based on the net effect the project would have on regional travel as well as project VMT without consideration of a net effect. The emissions from the net effect on VMT, in conjunction with the proposed stationary and area sources, are shown in **Table 24**, *Operational Regional Air Pollutant Emissions (Worst-Case Scenario)***, Table 25**, *Operational Regional Air Pollutant Emissions (Detail, Unmitigated)*, **Table 26**, *Operational Regional Air Pollutant Emissions (Year by Year,* *Pounds per Day, Unmitigated)*, and **Table 27**, *Combined Construction and Operational Regional Air Pollutant Emissions (Year by Year, Pounds per Day, Unmitigated)*, below for determination of significance. For informational purposes only **Table 28**, *Operational Regional Air Pollutant Emissions (Detail, Unmitigated) – No Net Effect (For Informational Purposes Only)* includes operational mobile emissions without consideration of a net effect in regional traffic volumes.

Worst-case Scenario

Projected emissions resulting from operational activities of the project under the worst-case scenario are identified in Table 24.

There may be minor emissions of VOC from the fueling station, depending on what type of fuel is used. However, details regarding the fueling station are currently unknown so the emission source is not estimated. This is a worst-case analysis because it assumes that the entire project would be built-out in 2020. The motor vehicle and truck emission factors are from 2020, which assumes a "dirtier" fleet than would be the case in later years. In addition, no reductions are taken for mitigation measures.

As identified in Table 24, operational emissions for the project would exceed SCAQMD daily operational thresholds for all criteria pollutants with the exception of SO_X for the "worst-case" 2020 scenario.

Table 24
Operational Regional Air Pollutant Emissions (Worst-Case Scenario)

Scenario	Source	Emissions (pounds per day)					
		VOC	NO_X	CO	SO_x	PM_{10}	$PM_{2.5}$
Buildout 2020 emission factors	Mobile	161	3,500	1,377	14	260	131
	Area	311	<1	4	0	<1	<1
	Onsite equipment	9	245	89	0	2	2
	Total	**481**	**3,745**	**1,470**	**14**	**263**	**134**
Significance Threshold		55	55	550	150	150	55
Significant Impact?		**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**

Notes: VOC = volatile organic compounds; NOx = nitrogen oxides; CO = carbon monoxide
PM_{10} and $PM_{2.5}$ = particulate matter <1 = less than one

Operational Regional Emissions

Table 25 shows the detailed operational emission sources generated both on site and off site for Phase 1 and buildout. The table shows particulate matter (PM_{10} and $PM_{2.5}$) divided into dust (roadway and tire and brake wear) and exhaust sources. As shown in the table, emissions of VOC, NO_x, CO, PM_{10}, and $PM_{2.5}$ are significant after completion of Phase 1 and after full buildout.

Table 26 shows the operational emissions year by year using emission factors interpolated from 2025 and 2035 emission factors. The VOC, NO_x, CO, PM_{10}, and $PM_{2.5}$ emissions would be over the SCAQMD's significance thresholds for most years. The emissions demonstrate that although the number of vehicles and trucks would increase year by year, the emissions do not increase dramatically because the per-vehicle emission factors decrease over time as cleaner vehicles enter the fleet over time.

Combined Construction and Operation

There would be overlapping of construction and operational emissions with project implementation. The maximum daily operational emissions as shown in Table 26 were added to the maximum daily construction emissions and are shown in Table 27, which shows all pollutants for all years exceed the SCAQMD thresholds, with the exception of SO_X emissions.

As identified in the preceding tables, project-related air quality impacts for all criteria pollutants, with the exception of SO_X, would be significant and mitigation measures are required.

Table 25
Operational Regional Air Pollutant Emissions (Detail, Unmitigated)

Phase	Source	Emissions (pounds/day)									
		VOC	NO_X	CO	SO_X	PM_{10} Dust	PM_{10} Exh.	PM_{10} Total	$PM_{2.5}$ Dust	$PM_{2.5}$ Exh.	$PM_{2.5}$ Total
Phase 1	Mobile	24	849	277	5	129	13	141	40	7	47
	Area	203	0	3	0	0	0	0	0	0	0
	On-site Equipment	5	138	51	0	0	1	1	0	1	1
	Total	**232**	**988**	**331**	**5**	**129**	**14**	**143**	**40**	**9**	**48**
Buildout	Mobile	45	1,361	867	10	375	13	388	113	12	125
	Area	311	0	4	0	0	0	0	0	0	0
	On-site Equipment	9	245	89	0	0	2	2	0	2	2
	Total	**364**	**1,606**	**961**	**10**	**375**	**15**	**390**	**113**	**15**	**127**
Significance Threshold		**55**	**55**	**550**	**150**	**None**	**None**	**150**	**None**	**None**	**55**
Significant Impact?		**Yes**	**Yes**	**Yes**	**No**	**--**	**--**	**Yes**	**--**	**--**	**Yes**

Notes: VOC = volatile organic compounds NO_X = nitrogen oxides   CO = carbon monoxide PM_{10} and $PM_{2.5}$ = particulate matter   Exh. = exhaust
<1 = less than 1
On-site equipment emissions include emissions from yard trucks, forklifts, and stationary generators.

Table 26
Operational Regional Air Pollutant Emissions (Year by Year, pounds per day, unmitigated)

Year	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
2020	0	0	0	0	0	0
2021	51	338	111	1	34	14
2022	97	608	200	2	67	27
2023	138	808	269	3	97	37
2024	174	941	315	4	125	45
2025	205	988	330	5	138	48
2026	221	1,033	417	6	169	57
2027	238	1,109	494	6	195	65
2028	255	1,184	570	7	220	73
2029	272	1,255	639	7	245	81
2030	289	1,323	705	8	271	89
2031	305	1,388	766	8	296	97
2032	321	1,451	825	9	321	105
2033	337	1,511	879	9	346	113
2034	353	1,568	930	9	371	121
2035	364	1,606	961	10	390	127
SCAQMD Threshold	**55**	**55**	**550**	**150**	**150**	**55**
Significant?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

- Emissions are from local vehicles, trucks, natural gas, emergency generators, forklifts, yard trucks, painting, and consumer products. There is no reduction from existing onsite emissions.
- Operational emissions are assumed to be zero in 2020 when project construction commences.
- PM_{10} and $PM_{2.5}$ emissions include exhaust and road dust.
- Landscaping emissions are negligible.

VOC = volatile organic compounds; NO_X = nitrogen oxides; SO_2 = sulfur dioxide; CO = carbon monoxide; PM_{10} and $PM_{2.5}$ = particulate matter

Table 27
Combined Construction and Operational Regional Air Pollutant Emissions (Year by Year, Pounds per Day, Unmitigated)

Year	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
2020 (construction only)	319	989	701	2	168	66
2021	384	1,463	943	3	207	83
2022	429	1,710	1,066	4	266	105
2023	465	1,818	1,127	5	308	114
2024	486	1,751	1,086	6	309	106
2025	490	1,517	906	7	282	94
2026	491	1,438	817	7	276	90
2027	505	1,489	870	7	250	89
2028	528	1,607	970	8	408	112
2029	540	1,645	1,017	8	374	113
2030	560	1,529	1,029	9	391	114
2031	568	1,551	1,058	9	408	117
2032	582	1,602	1,092	9	428	124
2033	588	1,620	1,105	10	429	127
2034	603	1,679	1,150	10	473	137
2035	364	1,606	961	10	390	127
Max Daily Emissions	**603**	**1,818**	**1,150**	**10**	**473**	**137**
SCAQMD Threshold	**55**	**55**	**550**	**150**	**150**	**55**
Significant?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

- Year 2020 contains construction emissions only; buildout contains operational emissions only
- Sulfur oxide (SOx) emissions are substantially under the threshold of 150 pounds per day
- Reduction from existing onsite emissions are not included.

VOC = volatile organic compounds; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} and $PM_{2.5}$ = particulate matter

Table 28
Operational Regional Air Pollutant Emissions (Detail, Unmitigated) – No Net Effect (For Informational Purposes Only)

Phase	Source	Emissions (pounds/day)									
		VOC	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Total PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	Total $PM_{2.5}$
Phase 1	Mobile	80	1,353	1,211	11	435	19	454	128	12	140
	Area	203	0	3	0	-	0	0	-	0	0
	On-site Equipment	5	138	51	-	-	1	1	-	1	1
	Total	**288**	**1,491**	**1,265**	**11**	**435**	**20**	**455**	**128**	**14**	**141**
Buildout	Mobile	106	1,994	1,711	16	852	19	872	246	18	264
	Area	311	0	4	0	-	0	0	-	0	0
	On-site Equipment	9	245	89	-	-	2	2	-	2	2
	Total	**426**	**2,239**	**1,804**	**16**	**852**	**21**	**874**	**246**	**21**	**266**

Notes: VOC = volatile organic compounds NO_X = nitrogen oxides CO = carbon monoxide PM_{10} and $PM_{2.5}$ = particulate matter Exh. = exhaust <1 = less than 1

5.3 Cumulatively Considerable Air Quality Impacts

Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors) (AIR-3)

The project would result in the emission criteria pollutants for which the project area is in non-attainment during both construction and operation. A significant impact may occur if a project would add a cumulatively considerable contribution of a federal or state non-attainment pollutant. The Basin is currently in non-attainment for ozone, PM_{10}, and $PM_{2.5}$.

Construction Emissions

The emissions from construction of the project would exceed applicable SCAQMD regional and local impact thresholds. Therefore, the project would result in a cumulatively considerable net increase for non-attainment pollutants or ozone precursors.

Operational Emissions

Future operations would exceed applicable SCAQMD regional thresholds. Therefore, the project would result in a cumulative considerable net increase for non-attainment of criteria pollutants or ozone precursors.

5.4 Substantial Pollutant Concentrations

Expose Sensitive Receptors to Substantial Pollutant Concentrations (AIR-4)

Localized Construction and Operational Emissions

The localized significance threshold analysis evaluated four conditions:

1. Project Build Out (2020), which assumes that Phase 1 and Phase 2 of the Project are fully built out in 2020 as a worst-case scenario;

2. 2022, the year when the Project emissions from both Project construction and operation are at their highest combined levels for several pollutants; and when construction activities would occur near the existing residences west of the Project boundary along Merwin Street;

3. 2025, the earliest year Phase 1 is assumed to be fully operational. When the projected construction schedule would result in construction activities in the southern portion of the Project adjacent to Alessandro Boulevard and east of the existing residential areas along Merwin Street, and when all of Phase 1 operations would occur (approximately 57 percent of entire project floor space); and

4. 2035, when Phase 1 and Phase 2 of the Project are fully operational.

Project Full Build Out under 2020 conditions represents hypothetical worst-case conditions in that the project physically could not be built-out in 2020 or, in fact, in any single year due to the size of the project. These conditions have been included in this assessment to correspond to the analysis scenarios examined in the project TIA. These conditions also do not account for the fact that vehicle emissions are expected to decline over time as vehicle emission control technologies improve. Thus, consideration of these conditions will significantly overestimate the project's potential air quality impacts. The 2022, 2025, and 2035 conditions represent the logical and realistic development of the project over a period of 15 years as represented by the project applicant. The LST analysis is presented for each condition below.

Pursuant to the SCAQMD's LST methodology, only emissions generated from emission sources located within and along the project boundaries are included in the LST assessment. These emission sources include vehicle travel on the roadway network within and along the borders of the project and emissions from support equipment including forklifts, yard/hostler trucks, and emergency standby electric generators.

Project Full Build Out (2020) LST Assessment

The localized assessment results for the Project Phase 1 and Phase 2 Full Build Out (2020) condition are provided in **Table 29**, *Localized Assessment of Project Phase 1 and Phase 2 Full Build Out (2018) Emissions Maximum Impacts Within the Project Boundaries (Without Mitigation),* for receptors located within the project boundaries and in **Table 30**, *Localized Assessment of Project Phase 1 and Phase 2 Full Build Out (2018) Emissions Maximum Impacts Outside the Project Boundaries (Without Mitigation),* for receptors located outside the project's boundaries along with a comparison to the SCAQMD's localized significance thresholds. The significance thresholds for CO and nitrogen dioxide are derived from the measured ambient air quality data from the SCAQMD Riverside air monitoring station and serve as the measure of existing air quality.

Table 29
Localized Assessment of Project Phase 1 and Phase 2 Full Build Out (2018) Emissions Maximum Impacts Within the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration[2]		Standard/ Threshold	Total Impact Exceeds Threshold
			Project Local Increase	Total (Background + Project)		
Carbon Monoxide	1 hour, ppm	2.2	0.05	2.2	20.0	**No**
	8 hour, ppm	2.0	0.03	2.0	9.0	**No**
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.019	0.092	0.180	**No**
	National 1 hour, ppm	0.058	0.018	0.076	0.100	**No**
	Annual, ppm	0.015	0.004	0.019	0.030	**No**
PM_{10}	24 hour, µg/m^3	NA	7.2	7.2	2.5	**Yes**

Table 29
Localized Assessment of Project Phase 1 and Phase 2 Full Build Out (2018) Emissions Maximum Impacts Within the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration[2] Project Local Increase	Air Concentration[2] Total (Background + Project)	Standard/ Threshold	Total Impact Exceeds Threshold
	Annual, μg/m^3	NA	4.0	4.0	1.0	**Yes**
$PM_{2.5}$	24 hour, μg/m^3	NA	2.0	2.0	2.5	**No**

μg/m^3 = micrograms per cubic meter (a concentration unit)
NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$
1 Background data for CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3 year average of the 98th percentile of the daily maximum 1-hour average.
2 Highest impacts generally occur at the existing residences within the project boundaries.

Table 30
Localized Assessment of Project Phase 1 and Phase 2 Full Build Out (2018) Emissions Maximum Impacts Outside the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration[2] Project Local Increase	Air Concentration[2] Total (Background + Project)	Standard/ Threshold	Total Impact Exceeds Threshold
Carbon Monoxide	1 hour, ppm	2.2	0.03	2.2	20.0	**No**
	8 hour, ppm	2.0	0.02	2.0	9.0	**No**
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.015	0.088	0.180	**No**
	National 1 hour, ppm	0.058	0.015	0.073	0.100	**No**
	Annual, ppm	0.015	0.001	0.016	0.030	**No**
PM_{10}	24 hour, μg/m^3	NA	2.9	2.9	2.5	**No**
	Annual, μg/m^3	NA	1.8	1.8	1.0	**No**
$PM_{2.5}$	24 hour, μg/m^3	NA	0.8	0.8	2.5	**No**

Notes:
μg/m^3 = micrograms per cubic meter (a concentration unit); NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$
1 Background data for CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3 year average of the 98th percentile of the daily maximum 1-hour average.
2 Highest impacts generally occur at the existing residences along Gilman Springs Road to the east of the project.

As noted from Table 29, the project would exceed the SCAQMD's significance thresholds for the annual PM_{10} threshold for receptors located within the project's boundaries. As shown in table 30, the significance thresholds would not be exceeded at any sensitive receptor located outside of the project boundaries.

It is important to note the Project Phase 1 and Phase 2 Full Build Out (2020) condition~~s~~ assumes that the project's emissions are at the levels that would occur in 2020. The majority of the project's operational emissions are from on-road mobile sources, more particularly, heavy-duty trucks that contribute a disproportionate amount of emissions compared to passenger vehicles. Emissions from on-road mobile sources are regulated at the State and Federal levels and, therefore, are outside of the control of local agencies such as the City and the SCAQMD. For example, the CARB is working closely with the USEPA, engine and vehicle manufacturers, and other interested parties to identify programs that will reduce emissions from heavy-duty diesel vehicles in California. Emission reductions arise from a combination of measures including the use of ultra-low sulfur diesel fuel, new emission standards for large diesel engines, restrictions on diesel engine idling, addition of post-combustion filter and catalyst equipment, and retrofits for business and government diesel truck fleets. The implementation of these emission reductions will also result in reductions of other pollutants such as NO_X, VOC, and CO. As these emission reduction programs are implemented and there is a turnover in the use of older vehicles with newer and cleaner vehicles, the project's operational emissions are expected to decline significantly in the future. Emission controls on mobile source vehicles already adopted by the CARB particularly dealing with NO_X and PM_{10} controls on heavy duty trucks will reduce truck emissions significantly over time. Thus, two Project (2020) conditions represent highly conservative estimates, in terms of overestimating of the project's operational impacts.

Proposed Project Development Schedule LST Assessment

The final localized threshold assessment condition examined potential local project impacts considering the proposed construction and build out schedule of the project over a time period of 15 years from the commencement of construction in 2020 to the final build out and operation in 2035. This condition examined three specific time periods:

- The project's onsite maximum daily and annual construction emissions were estimated using the CalEEMod land use emission model and the construction equipment inventory and activities provided by the applicant. The project's onsite operational emissions, principally from the project's mobile sources, were derived from detailed traffic volume data provided by the project's TIA that reflects a completely operational Phase 1. The TIA applied a comprehensive regional transportation model to develop daily and peak hour traffic volumes for 2025 and buildout from the project's mobile sources. Peak hour and daily project traffic volumes were developed for each year from 2020 to buildout for roadway segments within and along the boundaries of the project using the following assumptions:

    – Project operational traffic volumes were assumed to be zero in 2020, the year that project construction would commence.

    – Traffic volumes for the years 2021 to 2024 (the completion year for Phase 1 operations) were interpolated from 2025 volumes provided in the TIA by applying the annual project occupancy schedule to the 2025 traffic volumes.

    – Traffic volumes for the years 2026 to 2034 were interpolated from the provided traffic volumes at buildout by applying the annual project occupancy schedule.

Year 2025

The localized impacts for the short-term construction and operational activities were analyzed using an air dispersion model (EPA AERMOD Model) to simulate the transport and dispersion of project-related emissions through the air. These impacts were then compared to the applicable SCAQMD localized concentration thresholds.

The estimated maximum localized air quality impacts from the construction and operation of the project at Phase 1 buildout are summarized in **Table 31**, *Localized Assessment – Construction and Operation, Year 2025 Maximum Impacts within the Project Boundaries (Without Mitigation),* for locations within the project's boundaries. These maximum impacts were found at the locations of the existing residences within the project boundaries. **Table 32**, *Localized Assessment – Construction and Operation, Year 2025 Maximum Impacts Outside the Project Boundaries (Without Mitigation),* summarizes the highest air quality impacts for sensitive receptors located outside of the project boundaries. These maximum impacts were found at the locations of the existing residences outside of the project boundary located west of the project boundary along Merwin Street. As noted from these two tables, project impacts would exceed the significance thresholds for PM_{10} for locations within the project boundaries, and thus represents a significant impact without mitigation.

Table 31
Localized Assessment – Construction and Operation, Year 2025 Maximum Impacts Within the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background [1]	Air Concentration: Project Local Increase	Air Concentration: Total (Background + Project)	Standard/ Threshold	Total Impact Exceeds Threshold?
Carbon Monoxide	1 hour, ppm	2.2	0.09	2.3	20.0	No
	8 hour, ppm	2.0	0.03	2.0	9.0	No
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.030	0.104	0.180	No
	National 1 hour, ppm	0.058	0.021	0.079	0.100	No
	Annual, ppm	0.015	0.002	0.017	0.030	No
PM_{10}	24 hour, μg/m^3	NA	5.7	5.7	2.5[2]	**Yes**
	Annual, μg/m^3	NA	2.6	2.6	1.0	**Yes**
$PM_{2.5}$	24 hour, μg/m^3	NA	1.5	1.5	2.5[2]	No

Notes:
μg/m^3 = micrograms per cubic meter (a concentration unit), ppm = parts per million (a concentration unit); NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$

1 Background data for CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3 year average of the 98th percentile of the daily maximum 1-hour average.

2 During periods when both construction and operation overlap the SCAQMD recommends the operational significance thresholds for PM_{10} and $PM_{2.5}$ as opposed to the construction thresholds which are 10.4 ug/m^3 for PM_{10} and $PM_{2.5}$. This provides a very conservative threshold for determining the significance of project impacts.

Table 32
Localized Assessment – Construction and Operation, Year 2025 Maximum Impacts Outside the Project Boundaries (without Mitigation)

Pollutant	Averaging Time, Units	Existing Background [1]	Air Concentration: Project Local Increase	Air Concentration: Total (Background + Project)	Standard/ Threshold	Total Impact Exceeds Threshold?
Carbon Monoxide	1 hour, ppm	2.2	0.11	2.3	20.0	No
	8 hour, ppm	2.0	0.03	2.0	9.0	No
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.037	0.110	0.180	No
	National 1 hour, ppm	0.058	0.024	0.082	0.100	No
	Annual, ppm	0.015	0.001	0.016	0.030	No
PM_{10}	24 hour, $\mu g/m^3$	NA	5.4	5.4	2.5[2]	**Yes**
	Annual, $\mu g/m^3$	NA	0.6	0.6	1.0	No
$PM_{2.5}$	24 hour, $\mu g/m^3$	NA	1.3	1.3	2.5[2]	No

Notes:
$\mu g/m^3$ = micrograms per cubic meter (a concentration unit), ppm = parts per million (a concentration unit); NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$

1 Background data for CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3 year average of the 98th percentile of the daily maximum 1-hour average.

2 During periods when both construction and operation overlap the SCAQMD recommends the operational significance thresholds for PM_{10} and $PM_{2.5}$ as opposed to the construction thresholds which are 10.4 ug/m^3 for PM_{10} and $PM_{2.5}$. This provides a very conservative threshold for determining the significance of project impacts.

Year 2022

The year 2022 was selected for the LST Analysis for two principal reasons: 1) the year 2022 corresponds to the year with the highest combined total onsite construction and operational emissions for NO_x and $PM_{2.5}$, the second highest onsite emissions for CO, and the fourth highest onsite emissions of PM_{10}; and 2) the location of the building construction in 2022 places the construction emissions nearest to the existing residences located west of the project boundary along Merwin Street.

The project's maximum combined impacts from construction and operations during 2022 are shown in **Table 33**, *Localized Assessment – Construction and Operation, Year 2032 Maximum Impacts Within the Project Boundaries (Without Mitigation),* for the existing sensitive receptors located within the project boundaries along with the SCAQMD-recommended significance thresholds. **Table 34**, *Localized Assessment – Construction and Operation, Year 2032 Maximum Impacts Outside the Project Boundaries (Without Mitigation),* shows the maximum combined impacts for sensitive receptors located outside of the project boundaries. Maximum impacts outside of the project boundary were found within the residential areas located to the west of the project boundary. As shown in these tables, the project would exceed the SCAQMD's significance thresholds for PM_{10} at locations within the project boundary and outside of the project boundary and NO_X within the project boundary.

Table 33
Localized Assessment – Construction and Operation, Year 2032 Maximum Impacts Within the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration[2]		Standard/ Threshold	Total Impact Exceeds Threshold?
			Project Local Increase	Total (Background + Project)		
Carbon Monoxide	1 hour, ppm	2.2	0.13	2.3	20.0	No
	8 hour, ppm	2.0	0.04	2.0	9.0	No
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.056	0.129	0.180	No
	National 1 hour, ppm	0.058	0.048	0.106	0.100	**Yes**
	Annual, ppm	0.015	0.002	0.017	0.030	No
PM_{10}	24 hour, $\mu g/m^3$	NA	5.2	5.2	2.5[3]	**Yes**
	Annual, $\mu g/m^3$	NA	1.4	1.4	1.0	**Yes**
$PM_{2.5}$	24 hour, $\mu g/m^3$	NA	1.6	1.6	2.5[3]	No

$\mu g/m^3$ = micrograms per cubic meter (a concentration unit)
NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$

1 Background data for CO and $NO_2$for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3 year average of the 98th percentile of the daily maximum 1-hour average.

2 Highest impacts at any receptor located outside of the boundaries of the project generally occur in the residential areas to the west of the project.

3 During periods when both construction and operation overlap the SCAQMD recommends the operational significance thresholds for PM_{10} and $PM_{2.5}$ as opposed to the construction thresholds which are 10.4 ug/m^3 for PM_{10} and $PM_{2.5}$. This provides a very conservative threshold for determining the significance of project impacts.

Table 34
Localized Assessment – Construction and Operation, Year 2032 Maximum Impacts Outside the Project Boundaries (without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration[2]		Standard/ Threshold	Total Impact Exceeds Threshold?
			Project Local Increase	Total (Background + Project)		
Carbon Monoxide	1 hour, ppm	2.2	0.11	2.3	20.0	No
	8 hour, ppm	2.0	0.03	2.0	9.0	No
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.041	0.115	0.180	No
	National 1 hour, ppm	0.058	0.036	0.094	0.100	No
	Annual, ppm	0.015	0.001	0.016	0.030	No
PM_{10}	24 hour, $\mu g/m^3$	NA	4.0	4.0	2.5[3]	**Yes**
	Annual, $\mu g/m^3$	NA	0.8	0.8	1.0	No
$PM_{2.5}$	24 hour, $\mu g/m^3$	NA	1.3	1.3	2.5[3]	No

$\mu g/m^3$ = micrograms per cubic meter (a concentration unit)
NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$
1 Background data for CO and nitrogen dioxide derived as the highest air quality measured data over a 3-year rolling average from 2014-2017.
2 Highest impacts at any receptor located outside of the boundaries of the project generally occur in the residential areas to the east of the project across Gilman Springs Road
3 During periods when both construction and operation overlap the SCAQMD recommends the operational significance thresholds for PM_{10} and $PM_{2.5}$ as opposed to the construction thresholds which are 10.4 ug/m^3 for PM_{10} and $PM_{2.5}$. This provides a very conservative threshold for determining the significance of project impacts.

Year 2035

The year 2035 represents a long-term planning year when both phases of the project would be fully in operation. Operational emissions during 2035 were estimated based on the project's trip generation and project-related travel along the local roadway network within and along the project boundaries. **Table 35**, *Localized Assessment – Project Operation Full Build Out, Year 2035 Maximum Impacts Within the Project Boundaries (Without Mitigation),* shows the maximum localized air quality impacts for 2035 relative to the background air quality levels at the existing sensitive receptors located within the project boundaries. **Table 36**, *Localized Assessment – Project Operation, Year 2035 Maximum Impacts Outside of the Project Boundaries (Without Mitigation),* identifies the highest localized impacts for sensitive receptors located outside of the project boundaries. As shown in Table 35 and Table 36, the project would exceed PM_{10} LSTs for receptors within and outside the project boundary and would, therefore, represent a significant impact without mitigation.

Table 35
Localized Assessment – Project Operation Full Build Out, Year 2035 Maximum Impacts Within the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration		Standard/ Threshold	Total Impact Exceeds Threshold?
			Project Local Increase	Total (Background + Project)		
Carbon Monoxide	1 hour, ppm	2.2	0.04	2.2	20	No
	8 hour, ppm	2.0	0.02	2.0	9.0	No
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.018	0.091	0.180	No
	National 1 hour, ppm	0.058	0.016	0.074	0.100	No
	Annual, ppm	0.015	0.003	0.018	0.030	No
PM_{10}	24 hour, $\mu g/m^3$	NA	8.3	8.3	2.5	**Yes**
	Annual, $\mu g/m^3$	NA	4.6	4.6	1.0	**Yes**
$PM_{2.5}$	24 hour, $\mu g/m^3$	NA	2.1	2.1	2.5	No

(1) Background data for CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO2 is the 3-year average of the 98th percentile of the daily maximum 1-hour average.
$\mu g/m^3$ = micrograms per cubic meter (a concentration unit)
NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$

Table 36
Localized Assessment – Project Operation, Year 2035 Maximum Impacts Outside of the Project Boundaries (Without Mitigation)

Pollutant	Averaging Time, Units	Existing Background[1]	Air Concentration		Standard/ Threshold	Total Impact Exceeds Threshold?
			Project Local Increase	Total (Background + Project)		
Carbon Monoxide	1 hour, ppm	2.2	0.03	2.2	20	No
	8 hour, ppm	2.0	0.01	2.0	9.0	No
Nitrogen Dioxide	State 1 hour, ppm	0.073	0.013	0.086	0.180	No
	National 1 hour, ppm	0.058	0.012	0.070	0.100	No
	Annual, ppm	0.015	0.001	0.016	0.030	No
PM_{10}	24 hour, $\mu g/m^3$	NA	2.50	2.50	2.5	**Yes**
	Annual, $\mu g/m^3$	NA	0.95	0.95	1.0	No
$PM_{2.5}$	24 hour, $\mu g/m^3$	NA	0.66	0.66	2.5	No

$\mu g/m^3$ = micrograms per cubic meter (a concentration unit); NA = Not Applicable, the SCAQMD threshold methodology does not require a background for PM_{10} or $PM_{2.5}$
1 Background data for CO and NO_2 for State standards were derived as the highest air quality measured data over the most recent 3 years of meteorological data 2016-2018. Background concentrations for the National 1-hour NO_2 is the 3-year average of the 98th percentile of the daily maximum 1-hour average.

Summary

The localized significance analysis demonstrates that without mitigation, the project would exceed the localized significance thresholds for NO_X and PM_{10} for one or more of the LST assessment years (2022, 2025, or 2035) analyzed. Therefore, according to this criterion, the air pollutant emissions would result in a significant impact and could exceed or contribute to an exceedance of the national 1-hour NO_2 annual, as well as the 24-hour and annual PM_{10} ambient air quality standards.

Toxic Air Contaminants

Acute and Chronic Health Risk Impacts

Acute and chronic health risk impact analyses examine the increased risk for non-cancer health outcomes associated with project-related air pollutant emissions. Since these are non-cancer health impacts, as described below, the impacts are analyzed separately from increased cancer risk associated with air pollution.

The construction and operation of the project would not emit any toxic chemicals in any significant quantity other than vehicle exhaust. While there may be other toxic substances in use on site, risk would be negligible due to intermittent use (i.e., chemicals from periodic maintenance), dispersion of chemicals throughout the project site, and compliance with State and Federal handling regulations.

Exposure to diesel exhaust can have immediate (acute) health effects, such as irritation of the eyes, nose, throat, and lungs, and can cause coughs, headaches, light headedness, and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks. However, according to the rulemaking on Identifying Particulate Emissions from Diesel-Fueled Engines as a Toxic Air Contaminant[83], the available data from studies of humans exposed to diesel exhaust are not sufficient for deriving an acute non-cancer REL.

The analysis, however, does derive an estimate of acute non-cancer risks by examining the acute health effects of the various toxic components that comprise diesel and gasoline emissions. There is specific guidance for estimating the acute non-cancer hazards from these toxic components based on chemical profiles established by the CARB which was used in the analysis to determine the project's acute non-cancer hazards.

To determine the project's *chronic* non-cancer hazard impact, the highest emissions concentrations was determined covering the years 2020 (the commencement of project construction) to 2035 (the full build out of the project). In this regard, the highest annual average concentrations prior to mitigation determined through air dispersion modeling occurred at an existing residence located within the project boundaries. This concentration was due to the impacts of emissions from the off-road construction equipment and operation equipment. This level of impact results in a chronic

83 CARB. 1998. The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines. https://www.arb.ca.gov/toxics/dieseltac/factsht1.pdf

non-cancer HI of 0.04. This HI is less than the SCAQMD's significance level of 1.0, and is, therefore, less than significant.

The estimation of the acute non-cancer HI requires the estimation of the maximum 1-hour impacts of toxic air contaminant (TAC) components in organic gases and PM emissions. For project construction, estimates of the maximum 1-hour ROG and PM exhaust emissions were derived from the project's peak daily construction equipment emissions; for project operation, estimates of the project's maximum 1-hour TOG and PM emissions were derived from the project's peak hour traffic data along the nearly 230 roadway segments contained within the study area and then speciated or broken down into the various TAC components by fuel type, gasoline and diesel, and emission type (i.e., exhaust, evaporative, brake wear and tire wear). The acute non-cancer HI was determined for a worst-case condition that assumed the project would be constructed between 2020 and 2034 and full operation starts in 2035. Based on this information, the maximum acute non-cancer HI found at any receptor within the model domain prior to mitigation was 0.07 during any year of project construction and operation, which is less than the SCAQMD's non-cancer HI of 1.0, and, therefore, is less than significant without mitigation.

Therefore, the potential for short-term acute and chronic exposure from TAC emissions are considered to be less than significant and no mitigation is required.

Cancer Risks

As noted in Section 4, Methodology, the project health risk assessment examined the following condition for impacts to both sensitive/residential and worker receptors:

- Proposed Project Development condition which evaluates the impacts of project-related construction and operational traffic diesel PM emissions as if the project were built out in accordance with its proposed phased construction and operational buildout schedule commencing with the construction of Phase 1 in 2020 and the full build out in 2035.

The mitigation conditions require that all diesel-fueled haul trucks during construction be 2010 or newer, diesel trucks accessing the project during operation be model year 2010 or newer, and that all on-site equipment be Tier 4.

To be conservative, the HRA relied on EMFAC2017 to determine the breakdown of vehicle types and fuel types and did not consider the potential reductions in TACs emissions and health risks from increased penetration of zero emission vehicles (ZEVs). The increased penetration of ZEVs is speculative, but likely given rapid technology advancement and more stringent legislation. For example, this HRA assumed that the 2035 heavy duty truck fleet would be made up of 89 percent diesel, 9 percent gasoline, 3 percent natural gas, and 0 percent electric. According to the WLC Transportation Energy Technical Report (ESA, 2019), a High EV Penetration scenario projects that the heavy duty truck fleet would consist 30 percent electric by 2035. Therefore, accounting for the High EV Penetration scenario would result in a greatly reduced health risk impact than what has been calculated in this analysis.

Localized Risk

Cancer Risk for Sensitive/Residential Receptors. For reference, a risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the specific concentration of TAC emissions over the duration of the exposure. This risk would be an excess cancer risk that is in addition to any cancer risk borne by a person not exposed to these air toxics.[84]

Table 37, *Estimated Cancer Risks, 30-Year Exposure for Sensitive/Residential Receptors Starting from Beginning of Project Construction (Construction and Operation HRA), Without Mitigation,* presents the estimated cancer risks for the 30-year exposure scenario that starts from the beginning of project construction (Construction + Operation HRA), which uses updated construction and operational emissions values. The results are provided separately for project construction emissions, operational emissions, and the total project emissions prior to the application of emission mitigation. **Table 38**, *Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Full Operation in 2035, Without Mitigation,* shows the estimated cancer risk for the 30-year exposure scenario that starts from the beginning of project full operation in 2035 (Operational HRA), which used the 2035 emission levels to represent the emissions for 2035 to 2064.

On the basis of the results shown in Table 37, the project would exceed the SCAQMD's cancer risk significance threshold of 10 in a million prior to the application of mitigation and would represent a significant impact. Table 38 shows that during full project operation, the estimated maximum cancer risk would exceed the 10 in a million threshold within and outside of the Project boundary and would represent a significant impact. Overall, without mitigation, the Project is expected to have a significant impact mainly due to diesel PM emissions from construction and heavy-duty diesel truck activities.

Figure 23, *Incremental Project Cancer Risk – No Mitigation (Construction and Operation),* and **Figure 24,** *Incremental Project Cancer Risk – No Mitigation (30 Years of Full Operation),* show the incremental cancer risks for the project location. The figures show the results prior to the application of mitigation.

Estimates of Cancer Risk for School Site Receptors. Cancer risk estimates at school sites in the area were prepared assuming a 9-year exposure during construction and operation as well as operation at full buildout. Prior to the application of the mitigation, the maximum cancer risk is at Ridgecrest Elementary School for the construction + operational scenario and would be approximately 12.6 in a million. Similarly, the maximum cancer risk for the full operational scenario is 3.54 in one million is at Bear Valley Elementary School. Therefore, maximum impacts at schools are greater than the 10 in one million significance threshold prior to mitigation and are potentially significant without mitigation.

Estimates of Cancer Risk for Worker Receptors. Estimates of worker exposures were prepared based on the assumption of a 25-year exposure duration for 250 days per year and 8 hours per day

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[84] Definition of a 1 in a million cancer risk from the US EPA, Technology Transfer Network Air Toxics, Glossary of Key Terms, Website: www.epa.gov/ttn/atw/natamain/gloss1.html.

as described in the methodology section above. Note that the OEHHA early-in-life age factors do not apply to worker receptors. The highest worker cancer risk estimates prior to the application of mitigation is approximately 10.9 in one million for the construction + operational scenario and 3.8 in one million for the full operational scenario, both at one onsite location. Therefore, cancer risk for worker receptors anywhere in the revised HRA's study area is greater than the 10 in one million significance threshold. Projected impacts are potentially significant without mitigation.

Estimates of Cancer Burden. The cancer burden calculation provides an estimate of the increased number of cancer cases as a result of exposures to TAC emissions. The total cancer burden is the product of the number of persons in a population area (such as a census tract) and the estimated individual risk from TACs in that population area and then summed over all of the population areas. The SCAQMD indicates that the burden calculation includes those population units having an incremental cancer risk of 1 in a million or greater.

Cancer risks were estimated at the geographical center (centroid) of census tracts that are within the study area of the HRA. For the 30-year exposure duration in accordance with "Current OEHHA Guidance", the cancer burden is estimated to be 0.64 out of a population of about 176,824 individuals that were estimated to have a cancer risk of 1 in a million or more prior to mitigation. The SCAQMD has established a threshold for cancer burden of 0.5. Therefore, the project would potentially exceed the SCAQMD's cancer burden significance threshold prior to the application of mitigation.

These analyses are based on the assumption that new technology diesel exhaust cause cancer, contrary to what was found by the HEI study and discussed in more detail below.

Table 37
Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Construction (Construction and Operation HRA), Without Mitigation

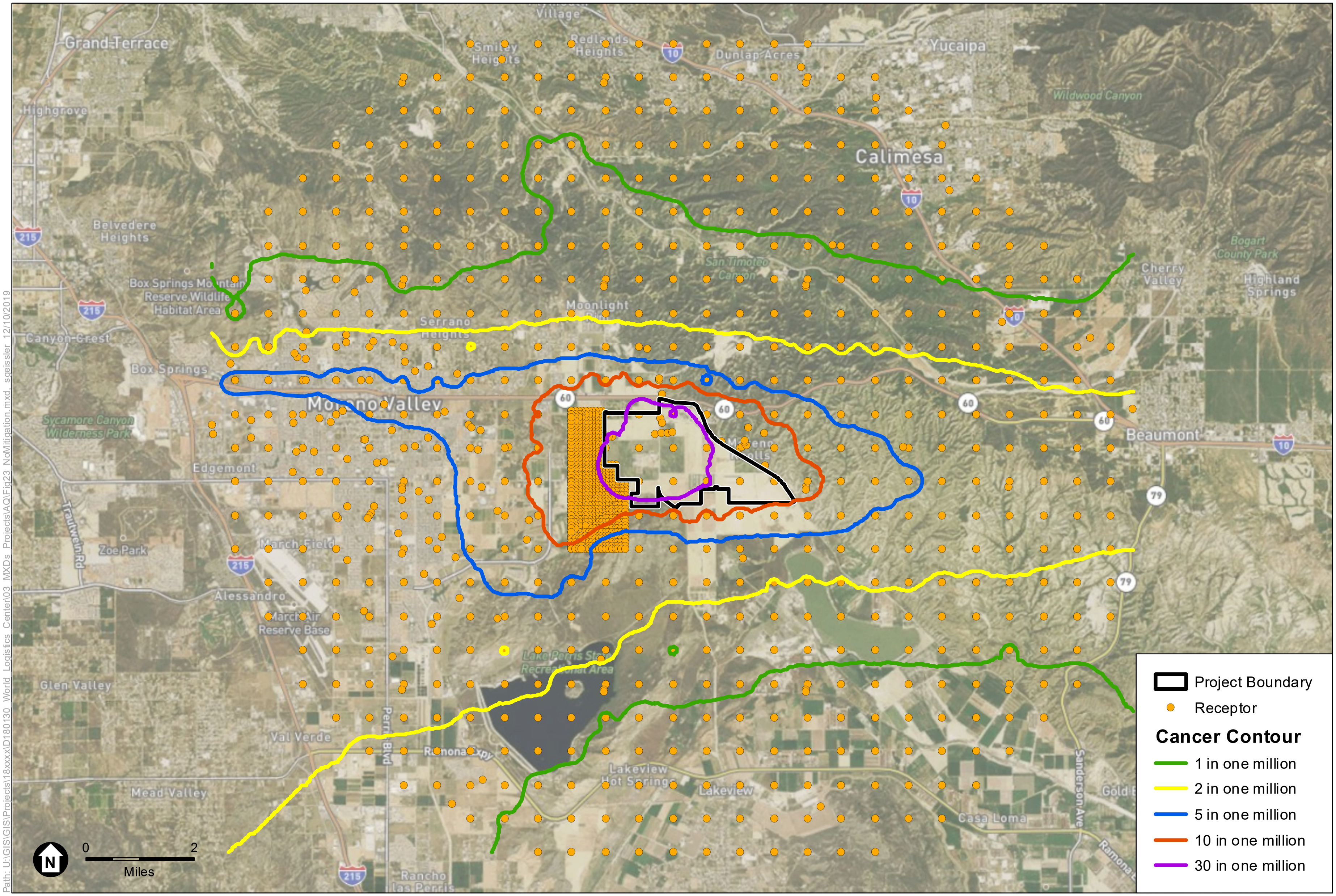
Receptor Location	Incremental Increase in Cancer Risk During Project Construction (risk/million)	Incremental Increase in Cancer Risk During Project Operation (risk/million)	Total Incremental Increase in Cancer Risk[1] (risk/million)	SCAQMD Cancer Risk Significance Threshold (risk/million)	Exceeds Threshold?
Maximum risk anywhere in the modeling domain[2]	49.5	17.3	66.8	10	Yes
Maximum risk within the project boundaries[3]	49.5	17.3	66.8	10	Yes
Maximum risk at any area outside of the project boundaries[4]	46.46	8.76	55.22	10	Yes

Notes:
1 Conservatively assumed all receptors in the studied domain are residential receptors and will have 30-year average exposures from 2020 to 2049 (includes diesel PM emissions from construction and operation); cancer risk estimates derived from the updated construction emission estimate, TIA, EMFAC2017 emission model, SCAQMD HRA guidance and "Current OEHHA Guidance" for estimating cancer risks.
2 Location is at the existing residences within the boundaries of the project, located at the 13241 World Logistic Parkway (formerly Theodore Street).
3 Location is at the existing residences within the boundaries of the project, located at the 13241 World Logistic Parkway (formerly Theodore Street).
4 Location is adjacent to the southwestern boundary of the project.

Table 38
Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Full Operation in 2035, Without Mitigation

Receptor Location	Total Incremental Increase in Cancer Risk[1] (risk/million)	SCAQMD Cancer Risk Significance Threshold (risk/million)	Exceeds Threshold?
Maximum risk anywhere in the modeling domain[2]	34.0	10	Yes
Maximum risk within the project boundaries[3]	34.0	10	Yes
Maximum risk at any area outside of the project boundaries[4]	29.9	10	Yes
Maximum risk along SR 60 freeway[5]	34.0	10	No

Notes:
1 Conservatively assumed all receptors in the studied domain are residential receptors and will have 30-year average exposures from 2035 to 2064 (includes diesel PM emissions from full project operation); cancer risk estimates derived from the TIA, EMFAC2017 emission model, SCAQMD HRA guidance and "Current OEHHA Guidance" for estimating cancer risks.
2 Location is at the existing residence immediately to the north of the project boundary at 13241 World Logistics Center Parkway (formerly Theodore Avenue).
3 Location is at the existing residence located at 30220 Dracaea Avenue.
4 Location is to the northwest of the project boundary, on the west side of Redlands Boulevard and south of Eucalyptus Avenue.
5 Location is south of SR 60 freeway, same as the location in footnote (2).

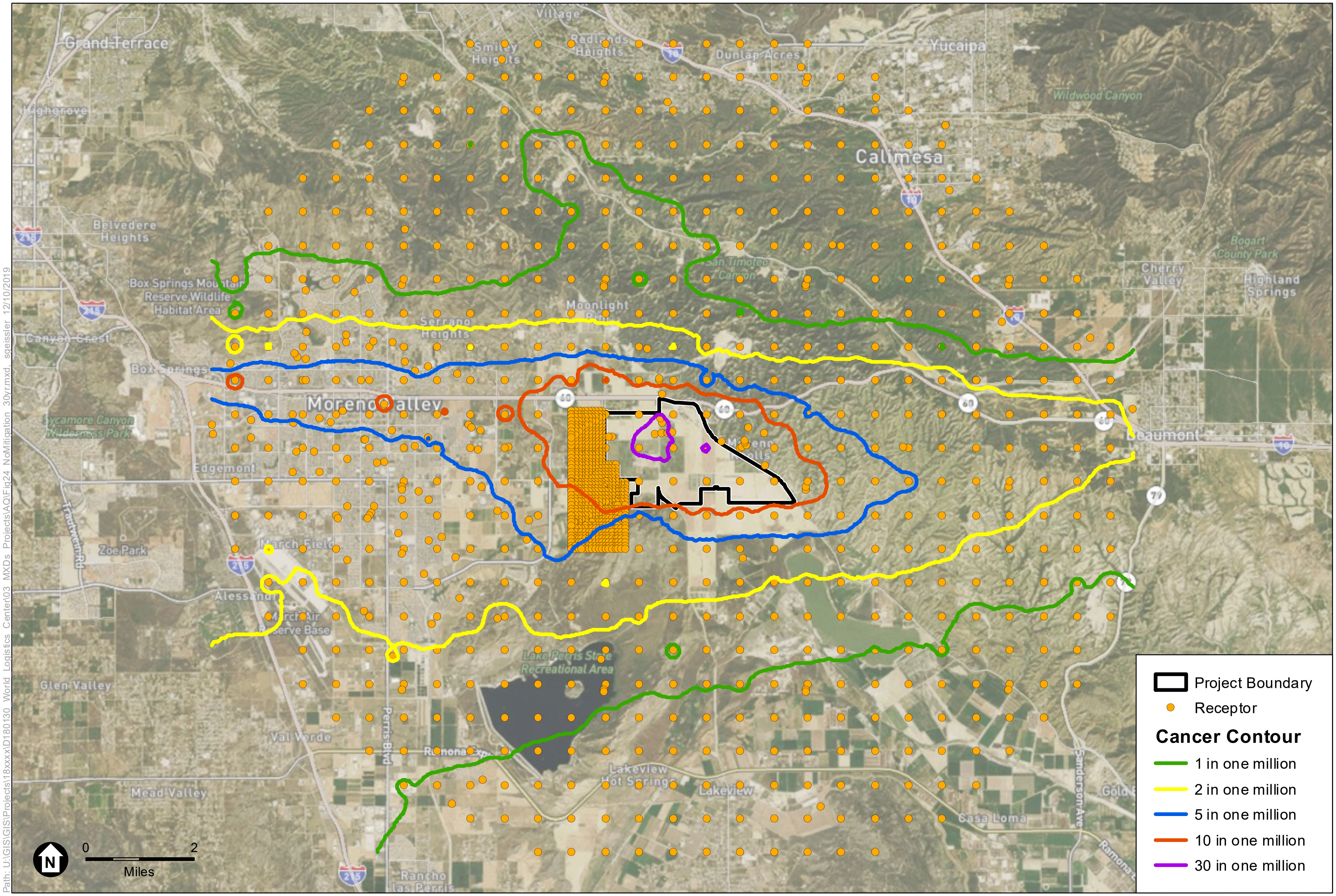


SOURCE: ESRI 2019; ESA 2019

World Logistics Center

Figure 23
Incremental Project Cancer Risk – No Mitigation
(Construction and Operation)

ESA



SOURCE: ESRI 2019; ESA 2019.

Path: U:\GIS\GIS\Projects\18xxxx\D180130 World Logistics Center\03 MXDs Projects\AQ\Fig24 NoMitigation 30yr.mxd, sgeissler 12/10/2019

World Logistics Center

Figure 24
Incremental Project Cancer Risk – No Mitigation
(30 Years of Full Operation)

ESA

Regional Freeway Network Risk

As mentioned in the methodology section, the HRA study area was focused on the most extensive emissions from project related activities. Because project activity is highest on-site and surrounding the Project boundary, the Project's emissions and associated health impact decreases with an increase in distance from the project site. This is demonstrated by the cancer risk contours in Figures 23 and 24. The HRA study area includes approximately 18 miles of freeway segments along SR-60 that extend from north of the project boundary 8.6 miles toward the west (toward Port of Long Beach) and 9 miles toward east (toward Palm Springs), and the HRA receptor grids include receptors along the SR-60 freeway. Based on the results shown in Figure 23 for the construction plus operation scenario, without mitigation, a segment surrounding the project boundary will potentially have an incremental cancer risk exceeding the SCAQMD 10 in one million threshold; at an approximate distance of 2.5 miles away from the project boundary. Based on results shown in Figure 24 for 30 years of the full project operation, without mitigation, a similar section surrounding the Project boundary out to an approximate distance of 2.5 miles will potentially have an incremental cancer risk exceeding 10 in one million. Some receptors near the SR-60 could also exceed the 10 in one million cancer risk threshold.

The Project's mitigation conditions require that all construction equipment over 50 horsepower would be Tier 4, all diesel trucks accessing the project during operation be model year 2010 or newer, that all on-site equipment be Tier 4. Also, air filtration system meeting ASHRAE Standard 52.2 MERV-13 standards will be offered to the owners of the houses located at 13100 World Logistics Center Parkway (formerly Theodore Street) and 12400 World Logistics Center Parkway (formerly Theodore Street).

Because Project-generated vehicle trips and associated impacts decrease with an increase in distance from the project site, the project impact along the regional freeway network outside the HRA's study area will be less than those presented in Figures 23 and 24. Therefore, the project's impact to the regional freeway network will be the greatest during Project full operation, as shown in Tables 54 and 55, and will be less than significant with mitigation.

Of note, results in Figure24 is based on project construction overlapping with project operations (partial project operation since project is not built out yet) while Figure 24 is based on full project operation. The difference between the two sets of results indicate that the incremental cancer risk in Figure 23 is mainly driven by the DPM emissions from onsite construction equipment. Therefore, the impact would be localized near the project site and will disappear once construction completes.

Carbon Monoxide Hotspots

Vehicular trips associated with the development of the project could contribute to congestion at intersections and along roadway segments in the project vicinity resulting in potential local CO "hotspot" impacts. The primary mobile source pollutant of local concern is CO, which is a direct function of vehicle travel speeds and idling time and, thus, traffic flow conditions. CO transport is extremely limited; it disperses rapidly with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations proximate to a congested roadway or intersection may reach unhealthful levels affecting local sensitive receptors (residents, school children, etc.). High CO concentrations are typically associated with roadways or intersections operating at unacceptable levels of service or with very high traffic volumes. In areas with high ambient background CO concentrations, modeling is recommended to determine a project's effect on local CO levels.

Carbon monoxide (CO) "hotspot" thresholds ensure that emissions of CO associated with traffic impacts from a project in combination with CO emissions from existing and forecast regional traffic do not exceed State or Federal standards for CO at any traffic intersection affected by the project. Project concentrations may be considered significant if a CO hot spot intersection analysis determines that project-generated CO concentrations cause a localized violation of the State CO 1-hour standard of 20 ppm, State CO 8-hour standard of 9 ppm, Federal CO 1-hour standard of 35 ppm, or Federal CO 8-hour standard of 9 ppm.

A CO hotspot is a localized concentration of CO that is above the State or Federal 1-hour or 8-hour CO ambient air standards. Localized high levels of CO are associated with traffic congestion and idling or slow-moving vehicles. To provide a worst-case scenario, CO concentrations are estimated at project-impacted intersections where the concentrations would be the greatest.

This analysis follows guidelines recommended by the CO Protocol[85] and the SCAQMD. According to the CO Protocol, intersections with Level of Service (LOS) E or F require detailed analysis. In addition, intersections that operate under LOS D conditions in areas that experience meteorological conditions favorable to CO accumulation require a detailed analysis. The LOS for intersections is determined in the TIA. The SCAQMD recommends that a local CO hot spot analysis be conducted if the intersection meets one of the following criteria: (1) the intersection is at LOS D or worse and where the project increases the volume to capacity ratio by 2 percent, or (2) the project decreases LOS at an intersection from C to D. A decrease in LOS, i.e., from C to D, means that there is more traffic and more delay at the intersection.

For this project analysis, the intersections with the highest traffic volumes and the LOS E or F before mitigation were identified for 2025 using information from the table in the TIA "Intersection LOS under 2025 Plus Phase 1 Conditions." The intersections with the greatest LOS before mitigation were also identified for buildout using information from the table in the TIA "Intersection LOS under 2040 Plus Build-out Conditions."

The CO concentrations were estimated using the CALINE4 model using 2025 and 2035 emission factors. The emission factors are for "all" vehicle classes and are not adjusted for a project-specific fleet to provide a worst-case scenario. In addition, the emission factors do not take into account the project mitigation reductions from requiring that all diesel trucks are model year 2010 or newer. Results of the CO hotspot modeling are provided in Appendix C.

Table 39, *Carbon Monoxide Concentrations at Intersections, 2025,* shows estimated CO concentrations at year 2025 plus project traffic conditions. The estimated CO concentrations at year buildout are shown in **Table 40**, *Carbon Monoxide Concentrations at Intersections, 2035*.

85 University of California, Davis. 1997. Prepared for California Department of Transportation. 1996. Transportation Project-Level Carbon Monoxide Protocol. http://www.dot.ca.gov/env/air/co-protocol.html

As shown in the tables, the estimated 1-hour and 8-hour average CO concentrations from project-generated and cumulative traffic plus the background concentrations are below the State and Federal standards. No CO hotspots are anticipated because of traffic-generated emissions by the project in combination with other anticipated development in the area. Therefore, the mobile emissions of CO from the project are not anticipated to contribute substantially to an existing or projected air quality violation of CO. Therefore, according to this criterion, air pollutant emissions during operation would result in a less than significant impact. No mitigation is required.

Table 39
Carbon Monoxide Concentrations at Intersections, 2025

Intersection	Peak Hour	CO Concentration (ppm)		Significan t Impact?
		1 Hour	8 Hour	
Alessandro Boulevard and Chicago Avenue	PM	2.0	1.3	No
Alessandro Boulevard and Canyon Crest Drive	PM	1.6	1.1	No
Alessandro Boulevard and Mission Grove Parkway	PM	1.4	0.9	No
Arlington Avenue and Victoria Avenue	PM	1.1	0.7	No
Alessandro Boulevard and Sycamore Canyon Boulevard	AM	1.1	0.7	No

- ppm = parts per million
- A significant impact would occur if the estimated CO concentration is over the 1-hour State standard of 20 ppm or the 8-hour State/Federal standard of 9 ppm.

Table 40
Carbon Monoxide Concentrations at Intersections, 2035

Intersection	Peak Hour	CO Concentration (ppm)		Significant Impact?
		1 Hour	8 Hour	
Alessandro Boulevard and Chicago Avenue	PM	1.9	1.3	No
Alessandro Boulevard and Canyon Crest Drive	PM	1.8	1.2	No
Alessandro Boulevard and Sycamore Canyon Boulevard	PM	1.6	1.1	No
Ramona Expressway and Sanderson Avenue	PM	2.2	1.5	No
Alessandro Boulevard and Mission Grove Parkway	PM	1.5	1.0	No

- ppm = parts per million
- A significant impact would occur if the estimated CO concentration is over the 1-hour State standard of 20 ppm or the 8-hour State/Federal standard of 9 ppm.

5.5 Odors

Create objectionable odors affecting a substantial number of people (AIR-5)

The SCAQMD recommends that odor impacts be addressed in a qualitative manner. Such an analysis shall determine whether the project would result in excessive nuisance odors, as defined under the California Code of Regulations and Section 41700 of the California Health and Safety Code, and thus would constitute a public nuisance related to air quality.

Land uses typically considered associated with odors include wastewater treatment facilities, waste-disposal facilities, or agricultural operations. The project does not contain land uses typically associated with emitting objectionable odors.

SCAQMD Rule 402 dictates that air pollutants discharged from any source shall not cause injury, nuisance, or annoyance to the health, safety, or comfort of the public. With the exception of short-term construction-related odors (e.g., equipment exhaust, paint, and asphalt odors), the proposed uses that would be developed on the proposed site do not include uses that are generally considered to generate offensive odors (e.g., agricultural uses, wastewater treatment plants, or landfills). While the application of architectural coatings and installation of asphalt may generate odors, these odors are temporary and not likely to be noticeable beyond the project boundaries. SCAQMD Rules 1108 and 1113 identify standards regarding the application of asphalt and architectural coatings, respectively.

SCAQMD Rule 1108 sets limitations on ROG (reactive organic gases), which are similar to and for the purposes of this EIR equivalent to and therefore interchangeable with volatile organic compounds (VOC) content in asphalt. This rule is applicable to any person who supplies, sells, offers for sale, or manufactures any asphalt materials for use in the Basin. Rule 1113 of the SCAQMD deals with the selling and application of architectural coatings. Rule 1113 is applicable to any person who supplies, sells, offers for sale, or manufactures any architectural coating for use in the Basin that is intended to be applied to buildings, pavements, or curbs. This rule is also applicable to any person who applies or solicits the application of any architectural coating within the Basin. Rule 1113 sets limits on the amount of VOC emissions allowed for all types of architectural coatings, along with a time table for tightening the emissions standards in the future. Compliance with Rule 1113 means that architectural coatings used during construction would have VOC emissions that comply with these limits.

The SCAQMD indicates that the number of overall complaints has been declining. Between 2003 and 2007, odor complaints made up 50 to 55 percent of the total nuisance complaints. Over the past decade, odor complaints from paint and coating operations have decreased from 27 to 7 percent and odor complaints from refuse collection stations have increased from 9 to 34 percent.

Diesel exhaust and VOCs would be emitted during construction of the project, which are objectionable to some; however, emissions would disperse rapidly from the project site and therefore should not reach an objectionable level at the nearest sensitive receptors. Diesel exhaust would also be emitted during operation of the project from the long-haul trucks that would visit the project site. However, the concentrations would not be at a level to result in a negative odor response at nearby sensitive or worker receptors. In addition, modern emission control systems on diesel vehicles since 2007 virtually eliminate diesel’s characteristic odor.

During blow-down maintenance activities, natural gas odors will be present around the SDG&E Compressor Plant located on the project site. When this portion of the WLC Specific Plan is developed, these odors will occasionally be detectable from the industrial warehouse properties adjacent to the SDG&E facility. These odors will be infrequent and odorized natural gas will not be present in high concentrations. Therefore, potential odor impacts from on-site natural gas operations are considered to be less than significant and do not require mitigation.

Adherence to applicable provisions of these rules is standard for all development within the Basin. In addition, conditions for the design of waste storage areas on the proposed site would be established through the permit process to ensure enclosures are appropriately designed and maintained to prevent the proliferation of odors. Solid waste generated by the proposed on-site uses will be collected by a contracted waste hauler, ensuring that any odors resulting from on-site uses would be adequately managed. Therefore, impacts associated with this issue would be less than significant and no mitigation is required.

5.6 Greenhouse Gas Emissions

Generate GHG Emissions, either directly or indirectly, that may have a significant impact on the environment (GHG-1)

Future development that could occur within the project site could generate GHG emissions during both construction and operation activities. The following activities are associated with the project and could directly or indirectly contribute to the generation of GHG emissions:

- **Removal of Vegetation (Land Use Change) and Sequestration**: Carbon sequestration is the process of capture and storage of carbon dioxide; trees, vegetation, and soil store carbon in their tissues and wood. The net removal of vegetation for construction from land use change results in a loss of the carbon sequestration in plants. However, planting additional vegetation (sequestration) would result in additional carbon sequestration and would lower the carbon footprint of the project.

- **Construction Activities**: During construction of the project, GHGs would be emitted through the operation of construction equipment and from worker and builder supply vendor vehicles, each of which typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as CO_2, CH_4, and N_2O. Leaks from installation of refrigeration equipment for air conditioning may occur.

- **Gas, Electric, and Water Use**: Natural gas use results in the emissions of CH_4 (the major component of natural gas) and CO_2 from the combustion of natural gas. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. Conveying water to the project and treating wastewater also uses electricity.

- **Solid Waste Disposal**: Solid waste generated by the project could contribute to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the waste, and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is approximately 21 times more potent than CO_2. Landfill CH_4 can also be a source of energy. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere.

- **Motor Vehicle Use**: Transportation associated with the project would result in GHG emissions from the combustion of fossil fuels and the use of electricity in daily automobile and truck trips.

- **On-site Equipment**: During operation of the project, there would be on-site equipment operating, including yard trucks, emergency generators, and forklifts.

Construction Emissions

The project would emit GHGs mainly from direct sources such as combustion of fuels from worker vehicles and construction equipment, as shown in **Table 41**, *Construction Greenhouse Gas Emissions (Without Mitigation)*. The GHG emissions are from all phases of construction. The SCAQMD recommends that construction emissions be averaged over a 30-year period.

Table 41
Construction Greenhouse Gas Emissions (Without Mitigation)

Year	Annual Emissions ($mt\ CO_2e$)
2020	18,770
2021	22,198
2022	23,363
2023	23,511
2024	22,113
2025	16,408
2026	12,424
2027	11,692
2028	12,000
2029	11,452
2030	12,311
2031	10,610
2032	9,993
2033	7,451
2034	7,430
Total	**221,727**
Averaged over 30 years	**7,391**

mt CO_2e = metric tons of carbon dioxide equivalents.
Note: The SCAQMD recommends that construction emissions be averaged over a 30-year period.
Sources include onsite construction equipment, worker trips, haul trips, vendor trips, refrigerant installation for the air conditioning in the offices, construction waste, and water use. Values presented in the table may not equal the sum due to rounding.

Operational Emissions

Total Emissions, Worst-case Scenario

Operational or long-term emissions occur over the life of the project. Operational emissions for a worst-case buildout condition are shown in **Table 42**, *Project Operational GHG Emissions (Worst-Case 2020 Analysis at Buildout)*. This is a worst-case analysis because it assumes that the entire project would be build-out in 2020. The emissions are presented by greenhouse gas (in tons per year), which was also converted to metric tons of carbon dioxide equivalents (mt CO_2e). The vehicle emissions in the table represent travel within the South Coast Air Basin. The emissions do not take into account mitigation measures to reduce emissions, such as the use of model year 2010 and later diesel trucks on the project site. As shown in the table, the project's uncapped emissions are over the SCAQMD's significance threshold of 10,000 mt CO_2e per year. Therefore, emissions are potentially significant.

The analysis presented in Table 42*,* also represents a worst-case analysis because the emission factors do not take into account implementation of California's Mobile Source Strategy and the full reductions expected from newer trucks and cars as a result of the Pavley regulations, the Low Carbon Fuel Standard, and California's Advanced Clean Car program. The emissions are estimated using emission factors from EMFAC2017, CARB's emission factor model, for the year 2020.

Table 42
Project Operational GHG Emissions (Worst-Case 2020 Analysis at Buildout)

Source	Emissions (metric tons per year)					GHG Emissions (mt CO_2e)[1]
	Carbon Dioxide	Methane	Nitrous Oxide	HFCs	Black Carbon	
Capped Emissions						
Construction	7,382	0.00	0.00	0.00	0.01	7,391
Net Mobile	245,516	6.84	31.06	0.00	8.10	261,099
Yard trucks	7,172	0.00	0.00	0.00	0.00	7,172
Generator	242	0.01	0.00	0.00	0.03	267
Forklifts	250	0.00	0.00	0.00	0.01	257
Electricity [2]	34,147	-	-	-	-	34,147
Water	2,548	-	-	-	-	2,548
Natural gas [2]	4,483	2.15	24.49	-	0.00	4,689
Total Capped	**300,931**	**44.13**	**144.66**	**0.00**	**8.16**	**317,570**
Uncapped Emissions						
Construction Refrigerants and Waste	104	0.00	0.00	0.05	0.00	166
Waste	7,747	457.83	0.00	-	-	19,193
Refrigerants	0	0.00	0.00	1.71	0.00	2,572
Land use change	1,154	0.00	0.00	0.00	0.00	1,154
Sequestration	-111	0.00	0.00	0.00	0.00	-111
Total Uncapped	**8,894**	**457.83**	**0.00**	**1.77**	**0.00**	**22,974**
Threshold	--	--	--	--	--	10,000
Significant impact?	--	--	--	--	--	Yes

[1] mt CO_2e is calculated from the emissions (tons/year) by multiplying by the individual global warming potential (carbon dioxide – 1, methane – 21, nitrous oxide – 310, hydrofluorocarbons [HFC] – 1500, black carbon 760) and converted to metric tons by multiplying by 0.9072. <0.01 = less than 0.01.
[2] – Electricity and natural gas emissions estimates are based on minimum compliance with 2019 Title 24 building standards and compliance with RPS.

Total Project Emissions

Table 43, *Project GHG Emissions at Buildout by GHG (Unmitigated),* shows the unmitigated capped and uncapped project emissions at buildout, including estimates of the project's mobile emissions estimates for future years based on EMFAC2017 emission factors for the actual year assessed, which take into account the Pavley regulations, the LCFS, and California's Advanced Clean Car Program. Emissions are shown by individual GHG (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, and black carbon) and totaled using the common unit of metric tons CO_2e based on the globalwarming potential of each gas. Emissions estimates for electricity and natural gas do not account for Project Design Features that improve building energy efficiency and maximize the use of on-site renewable energy.

Table 43
Project GHG Emissions at Buildout by GHG (Unmitigated)

Source	Emissions (metric tons per year)					GHG Emissions (mt CO_2e)[1]
	Carbon Dioxide	Methane	Nitrous Oxide	HFCs	Black Carbon	
Capped Emissions						
Construction	7,382	0.00	0.00	0.00	0.02	7,391
Net Mobile	172,164	7.23	19.61	0.00	1.53	179,355
Yard trucks	7,172	0.00	0.00	0.00	0.00	7,172
Generator	242	0.01	0.00	0.00	0.03	267
Forklifts	250	0.00	0.00	0.00	0.01	257
Electricity [2]	34,147	-	-	-	-	34,147
Water	2,548	-	-	-	-	2,548
Natural gas [2]	4,483	2.15	24.49	-	0.00	4,689
Total Capped	**227,579**	**44.53**	**133.21**	**0.00**	**9.64**	**235,826**
Uncapped Emissions						
Construction Refrigerants and Waste	104	0.00	0.00	0.05	0.00	166
Waste	7,747	457.83	0.00	-	-	19,193
Refrigerants	0	0.00	0.00	1.71	0.00	2,572
Land use change	1,154	0.00	0.00	0.00	0.00	1,154
Sequestration	-111	0.00	0.00	0.00	0.00	-111
Total Uncapped	**8,894**	**457.83**	**0.00**	**1.77**	**0.00**	**22,974**
Threshold	--	--	--	--	--	10,000
Significant impact?	--	--	--	--	--	Yes

[1] mt CO_2e is calculated from the emissions (tons/year) by multiplying by the individual global warming potential (carbon dioxide – 1, methane – 21, nitrous oxide – 310, hydrofluorocarbons [HFC] – 1500, black carbon 760)
[2] – Electricity and natural gas emissions estimates are based on minimum compliance with 2019 Title 24 building standards and compliance with RPS.

The total emissions estimate for the project, summarized in **Table 44**, *Project GHG Emissions (Year by Year Without Mitigation),* include both construction and operations emissions, and do not account for Project Design Features that improve building energy efficiency and maximize the use of on-site renewable energy; nor do they account for the project's mitigation measures.

Table 44 shows a summary of project emissions (unmitigated) for each year between 2020 and 2064. The analysis assumes the gradual phasing in of structures until buildout (2035) and the gradual phasing out of structures as they reach their presumed lifetime of 30 years. Therefore, the lifetime of the Project extends until 2064 when the final structures are presumed to have reached their 30-year lifetime. As shown in the table, the annual uncapped emissions are over the SCAQMD's significance threshold of 10,000 mt CO_2e per year for a majority of the years presented. Therefore, emissions are potentially significant, and mitigation is required.

Table 44a
Project GHG Emissions (Year by Year without Mitigation)

Source	GHG Unmitigated Emissions (mt CO_2e/year)														
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Capped Emissions															
Construction	18,770	22,198	23,363	23,511	22,113	16,408	12,424	11,692	12,000	11,452	12,311	10,610	9,993	7,451	7,430
Net Mobile	0	22,089	42,984	62,716	81,169	97,097	103,414	113,746	123,988	133,464	142,515	151,159	159,397	167,226	174,639
Yard trucks	0	813	1,625	2,438	3,250	4,053	4,371	4,689	5,016	5,334	5,652	5,970	6,288	6,606	6,924
Generator	0	30	61	91	121	151	163	175	187	199	211	222	234	246	258
Forklifts	0	29	58	87	117	145	157	168	180	191	203	214	226	237	248
Electricity	0	6,097	11,672	18,583	24,799	36,149	40,666	41,689	41,168	40,436	40,169	39,884	39,257	38,288	36,329
Water	0	133	267	445	623	953	1,283	1,458	1,562	1,667	1,817	1,986	2,156	2,326	2,437
Natural gas	0	0	545	1,089	1,634	2,723	3,080	3,259	3,438	3,617	3,795	3,974	4,153	4,331	4,510
Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Capped	**18,770**	**51,390**	**80,574**	**108,959**	**133,825**	**157,680**	**165,558**	**176,875**	**187,539**	**196,360**	**206,672**	**214,020**	**221,703**	**226,711**	**232,775**
Uncapped Emissions															
Construction Refrigerants and Waste	209	209	209	209	206	102	141	144	141	141	141	141	141	141	118
Waste	0	2,175	4,349	6,524	8,698	10,847	11,698	12,549	13,423	14,274	15,125	15,976	16,827	17,678	18,529
Refrigerants	0	291	583	874	1,166	1,454	1,568	1,682	1,799	1,913	2,027	2,141	2,255	2,369	2,483
Land use change	0	131	262	392	523	652	704	755	807	858	910	961	1,012	1,063	1,114
Sequestration	0	-13	-25	-38	-50	-63	-68	-72	-77	-82	-87	-92	-97	-102	-107
Total Uncapped	**209**	**2,793**	**5,377**	**7,961**	**10,543**	**12,992**	**14,043**	**15,057**	**16,093**	**17,104**	**18,116**	**19,127**	**20,138**	**21,149**	**22,137**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Significant impact?	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 44b
Project GHG Emissions (Year by Year without Mitigation)

Source	GHG Unmitigated Emissions (mt CO_2e/year)														
	2035 (Buildout)	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**
Capped Emissions															
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Mobile	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355	179,355
Yard trucks	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172
Generator	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267
Forklifts	257	257	257	257	257	257	257	257	257	257	257	257	257	257	257
Electricity	34,147	29,379	26,115	22,850	19,586	16,322	13,057	9,793	6,529	3,264	0	0	0	0	0
Water	2,548	2,580	2,580	2,580	2,580	2,580	2,580	2,580	2,580	2,580	0	0	0	0	0
Natural gas	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689	4,689
Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Capped	**228,435**	**223,699**	**220,435**	**217,170**	**213,906**	**210,642**	**207,377**	**204,113**	**200,849**	**197,584**	**191,740**	**191,740**	**191,740**	**191,740**	**191,740**
Uncapped Emissions															
Construction Refrigerants and Waste	166	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193	19,193
Refrigerants	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572
Land use change	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154
Sequestration	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111
Total Uncapped	**22,974**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**	**22,808**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Significant impact?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 44c
Project GHG Emissions (Year by Year without Mitigation)

Source	GHG Unmitigated Emissions (mt CO_2e/year)															
	2050	**2051**	**2052**	**2053**	**2054**	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**	**2061**	**2062**	**2063**	**2064**	**Total (2020-2064)**
Capped Emissions																
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	221,727
Net Mobile	154,246	132,651	107,890	87,750	57,330	45,453	40,481	37,820	35,334	32,020	28,614	25,570	22,850	21,257	19,775	5,114,971
Yard trucks	6,168	5,304	4,314	3,509	2,293	1,818	1,619	1,512	1,413	1,280	1,144	1,022	914	850	791	204,561
Generator	230	198	161	131	85	68	60	56	53	48	43	38	34	32	29	7,620
Forklifts	221	190	155	126	82	65	58	54	51	46	41	37	33	30	28	7,340
Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	636,226
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44,876
Natural gas	4,032	3,468	2,820	2,294	1,499	1,188	1,058	989	924	837	748	668	597	556	517	132,674
Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Capped	**164,897**	**141,811**	**115,340**	**93,810**	**61,289**	**48,592**	**43,277**	**40,432**	**37,774**	**34,231**	**30,590**	**27,336**	**24,428**	**22,725**	**21,141**	**6,369,995**
Uncapped Emissions																
Construction Refrigerants and Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,559
Waste	16,506	14,195	11,545	9,390	6,135	4,864	4,332	4,047	3,781	3,426	3,062	2,736	2,445	2,275	2,116	547,418
Refrigerants	2,212	1,902	1,547	1,258	822	652	580	542	507	459	410	367	328	305	284	73,356
Land use change	993	854	694	565	369	293	261	243	227	206	184	165	147	137	127	32,922
Sequestration	-95	-82	-67	-54	-35	-28	-25	-23	-22	-20	-18	-16	-14	-13	-12	-3,159
Total Uncapped	**19,615**	**16,869**	**13,720**	**11,159**	**7,291**	**5,780**	**5,148**	**4,809**	**4,493**	**4,072**	**3,639**	**3,252**	**2,906**	**2,703**	**2,515**	**653,096**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	**450,000**
Significant impact?	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes

mt CO_2e = metric tons of carbon dioxide equivalents, which is calculated from the emissions (tons/year) by multiplying by the individual global warming potential (carbon dioxide – 1, methane – 21, nitrous oxide – 310, hydrofluorocarbons – 1500, black carbon 760) and converted to metric tons by multiplying by 0.9072.

1 - Electricity and natural gas emissions estimates account for PDFs that improve energy efficiency and eliminate the use of building natural gas; includes electricity use by on-site EV chargers.

2 - Estimated construction emissions are included prior to buildout.

3 – 2036 is the first full year that the Project would be built out. Years from buildout until 2049 are conservatively estimated to be equivalent to buildout year emissions and exclude construction emissions since construction activity would cease after buildout. Years post-2049 take into account the phasing out of structures as they reach their presumed 30-year lifetime.

4 – Electricity emissions decrease to zero in 2045 after RPS has reached 100% renewable electricity

5.7 Greenhouse Gas Plan, Policy, Regulation Consistency

Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs (GHG-2)

Federal and State Reduction Strategies

Table 45, *Project Compliance with Federal/State Greenhouse Gas Reduction Strategies,* evaluates the consistency of the project with the various Federal and State energy conservation strategies and other regulations related to GHG emissions.

Table 45
Project Compliance with Federal/State Greenhouse Gas Reduction Strategies

Strategy	Project Consistency
Mandatory Codes	
California Green Building Code. The Cal Green Code (Title 24, Part 11) prescribes a wide array of measures that would directly and indirectly result in reduction of GHG emissions from the Business as Usual Scenario (California Building Code). The mandatory measures that are applicable to nonresidential projects include site selection, energy efficiency, water efficiency, materials conservation and resource efficiency, and environmental quality measures.	**Consistent.** The project will be required to adhere to the non-residential mandatory measures as required by the Cal Green Code.
Energy Efficiency Measures	
Energy Efficiency. Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts including new technologies, and new policy and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California (including both investor-owned and publicly owned utilities).	**Consistent with Mitigation Incorporated.** The project will comply with current California Building Code (CBC) requirements for building construction. **Mitigation Measures MM-GHG-5** and **MM-GHG-6** would increase energy efficiency. **Mitigation Measure MM-GHG-7** would require that the project exceed Title 24 (2008 version) by 10 percent or comply with the current version. The WLC PDFs go further by committing the project to energy conservation measures that will enable the project to exceed the more rigorous 2016 Title 24 requirements.
Renewables Portfolio Standard. Achieve a 50 percent renewable energy mix statewide by 2050. Qualifying renewable energy sources under the RPS include (but are not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.	**Not Applicable.** The project is not part of the State's power generation grid, but would install solar photovoltaic panels on project roofs pursuant to **Mitigation Measure MM-GHG-7**. The solar would reduce the project's electricity related emissions by approximately 5.0 percent. In addition, Moreno Valley Electric Utility is subject to the Renewable Portfolio Standard.

Table 45
Project Compliance with Federal/State Greenhouse Gas Reduction Strategies

Strategy	Project Consistency
Water Conservation and Efficiency Measures	
Water Use Efficiency. Increasing the efficiency of water transport and reducing water use would reduce GHG emissions. The CalGreen Code, including the California Plumbing Code (Part 5), promotes water conservation. Title 20 includes appliance and fixture efficiency standards that promote water conservation.	**Consistent with Mitigation Incorporated.** The project will be required to adhere to the non-residential mandatory measures as required by the CalGreen Code. The Specific Plan outlines a number of water conservation measures, and **Mitigation Measures MM-GHG-2** through **MM-GHG-4** will help reduce potential water use even further.
Solid Waste Reduction Measures	
Increase Waste Diversion, Composting, and Commercial Recycling, and Move Toward Zero-Waste. AB 341 mandates commercial recycling and sets a goal that 75 percent of the state's solid waste generated be reduced, recycled, or composted by 2020. AB 1826 adds requirements regarding mandatory commercial organics recycling. SB 1383 requires methane emissions reduction from landfills and sets statewide disposal targets to reduce landfilling of organic waste by 50 percent from the 2014 level by 2020, and 75 percent from the 2014 level by 2025.	**Consistent with Mitigation Incorporated.** Data available from the California Integrated Waste Management Board (CIWMB) indicate that the City of Moreno Valley has not achieved the 50 percent diversion rate. The project will comply with **MM-GHG-1** to help increase solid waste diversion, composting, and recycling. The measure would also require 50 percent diversion of construction waste prior to 2020 and 75 percent diversion starting in 2020.
Transportation and Motor Vehicle Measures	
Pavley Regulations and Vehicle Fuel Efficiency Standards. AB 1493 (Pavley) and the Advanced Clean Car (ACC) program required the State to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles and light-duty trucks. Regulations were adopted by the CARB in September 2004 and expanded with the ACC program in 2012.	**Consistent.** The project does not involve the manufacture of vehicles or production of vehicle fuels. However, vehicles that are purchased and used within the project site would comply with any vehicle and fuel standards that the CARB adopts or has adopted. In addition, the project would require that all diesel trucks be 2010 or newer (**Mitigation Measure MM-AQ-6**) and would be built to support the charging of future electric-powered vehicles anticipated by the Mobile Source Strategy. The Project design also includes supporting infrastructure to accommodate future EV populations consistent with targets in the Mobile Source Strategy.
Light-Duty Vehicle Efficiency Measures. Implement additional measures that could reduce light-duty vehicle GHG emissions. For example, measures to ensure that tires are properly inflated can both reduce GHG emissions and improve fuel efficiency.	
Heavy- and Medium-Duty Fuel and Engine Efficiency Measures. Regulations to require retrofits to improve the fuel efficiency of heavy-duty trucks that could include devices that reduce aerodynamic drag and rolling resistance. This measure could also include hybridization of and increased engine efficiency of vehicles.	
Mobile Source Strategy. This 2016 plan includes a target of 4.2 million zero emission vehicles (ZEVs) by 2030, and GHG reductions from medium-duty and heavy-duty vehicles, and transit. It also includes reductions in GHGs from medium-duty and heavy-duty vehicles via the Phase 2 Medium and Heavy-Duty GHG Standards.	

Table 45
Project Compliance with Federal/State Greenhouse Gas Reduction Strategies

Strategy	Project Consistency
Low Carbon Fuel Standard. The CARB identified this measure as a Discrete Early Action Measure in the 2008 Scoping Plan. As included in the Mobile Source Strategy, this measure would reduce the carbon intensity of California's transportation fuels by at least 18 percent by 2030.	
Sustainable Freight Action Plan. The 2016 plan directs the State to establish targets to improve freight efficiency, transition to zero emission technologies, and increase the competitiveness of California's freight transport system.	
Regional Transportation-Related Greenhouse Gas Targets. Develop regional GHG emissions reduction targets for passenger vehicles, as required by SB 375. Local governments will play a significant role in the regional planning process to reach passenger vehicle GHG emissions reduction targets. Local governments have the ability to directly influence both the siting and design of new residential and commercial developments in a way that reduces GHGs associated with vehicle travel.	**Not Applicable.** Specific regional emission targets for transportation emissions do not directly apply to the project; regional GHG reduction target development is outside the scope of this project. The project will comply with any plans developed by the City of Moreno Valley.
Measures to Reduce High Global Warming Potential (GWP) Gases	
Short-lived Climate Pollutant Strategy. SB 1383 (2016) requires the CARB to approve and implement Short-Lived Climate Pollutant strategy to reduce high GWP GHGs to achieve a statewide reduction in methane by 40%, hydrofluorocarbon gases by 40%, and anthropogenic black carbon by 50% below 2013 levels by 2030.	**Not Applicable.** New products used or serviced on the project site (after implementation of the reduction of GHG gases) would comply with future CARB rules and regulations, as would vehicles (with their refrigerants used in air conditioning systems) visiting the site.

AB = Assembly Bill CARB = California Air Resources Board GHG = greenhouse gas

With implementation of applicable strategies/measures project design features, and mitigation measures, the project's contribution to cumulative GHG emissions would be reduced. In order to ensure that the project complies with and would not conflict with or impede the implementation of reduction goals identified in AB 32 and SB 32, the Mitigation Measures listed in the above table shall be implemented.

The project will comply with existing State and Federal regulations regarding the energy efficiency of buildings, appliances, and lighting. The warehouse buildings will be built in compliance with the California Building Code to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices. In addition, Mitigation Measure MM-GHG-5 requires that the project will exceed the Title 24 energy conservation standards (2008 version) by 10 percent or comply with the current version, while the WLC Sustainability Plan goes even further by committing the project to energy conservation measures that will enable the project to exceed the more rigorous 2019 Title 24 requirements.[86]

CARB Scoping Plan

AB 32 focuses on reducing GHG emissions to 1990 levels by the year 2020, while SB 32 has a target of 40 percent below 1990 levels by 2030. Pursuant to the requirements in AB 32, the CARB adopted the Climate Change Scoping Plan (Scoping Plan) in 2008, which contains a variety of strategies to reduce the State's emissions. The First Update to the Scoping Plan was approved in 2014 and the Second Update was approved in 2017 following the passage of SB 32. The 2017 Scoping Plan Update incorporates all of the state's GHG reduction strategies included in Table 45. **Table 46**, *Analysis of Additional Measures in the 2017 Scoping Plan Update*, considers the strategies in the 2017 Scoping Plan Update that are not included in Table 52, indicating that all are either consistent with or not applicable to the project; therefore, the project does not conflict with the Scoping Plan.

Table 46
Analysis of Additional Measures in the 2017 Scoping Plan Update

Scoping Plan Reduction Measure	Consistency Analysis
16. **Carbon Sequestration in Natural and Working Lands**. Natural and working lands – including forests and agricultural lands – are a key sector in the State's climate change strategy. Storing carbon in trees, other vegetation, soils, and aquatic sediment is an effective way to remove carbon dioxide from the atmosphere. The 2017 Scoping Plan Update describes policies and programs that prioritize protection and enhancement of California's landscapes, and commits the State to finalizing a carbon sequestration and GHG emissions reduction goal for natural and working lands by September 2018	**Not Applicable.** No forested lands exist on site. As reported in the Agriculture and Forestry Resources section 4.2.1, approximately 2,200 acres of the 2,610-acre Specific Plan area is currently dry farmed, mainly with winter wheat. However, the state's Natural and Working Lands Climate Change Implementation Plan has not been adopted, and there is no protection currently in place to preserve the site for agriculture. Further, as described in the Agriculture and Forestry Resources section, the conversion of the existing agricultural lands to urban uses is supported by the City's General Plan policies, and the entire project site and adjacent lands have been designated for urban uses for nearly 20 years by the City. The Agriculture and Forestry Resources section concludes that project implementation will result in less than significant impacts to conversion of Farmland of Local Importance.

Source: CARB, 2017e

Moreno Valley General Plan Policies

The project must also be evaluated against the City's General Plan policies that relate to greenhouse gas emissions, as shown in **Table 47**, *Consistency with City General Plan Air Quality Policies*. This analysis shows that the project is consistent with the applicable General Plan objectives and policies, or the particular objective or policy is not applicable to the proposed WLC project.

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Table 47
Consistency with City General Plan Air Quality Policies

Objective or Policy	Project Consistency
Objective 6.6. Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.	**Consistent.** The project is providing employment opportunities to Moreno Valley and the surrounding area.
Policy 6.6.1. Provide sites for new neighborhood commercial facilities within close proximity to the residential areas they serve.	**Not Applicable.** The project does not propose the development of neighborhood commercial facilities or residential dwellings.
Policy 6.6.2. Provide multifamily residential development sites in close proximity to neighborhood commercial centers in order to encourage pedestrian instead of vehicular travel.	**Not Applicable.** The project is industrial and does not propose the development of residential uses.
Policy 6.6.3. Locate neighborhood parks in close proximity to the appropriate concentration of residents in order to encourage pedestrian and bicycle travel to local recreation areas.	**Not Applicable.** The project is industrial and does not propose the development of residential uses.
Objective 6.7. Reduce mobile and stationary source air pollutant emissions.	**Consistent.** The project would be implementing feasible Mitigation Measures to reduce mobile and stationary emissions (**Mitigation Measures MM-AQ-6, MM-AQ-7, MM-AQ-8,** and **MM-AQ-10**).
Policy 6.7.1. Cooperate with regional efforts to establish and implement regional air quality strategies and tactics.	**Not Applicable.** This measure is beyond the scope of the project; the City will continue to work with the SCAQMD in regional planning efforts.
Policy 6.7.2. Encourage the financing and construction of park-and-ride facilities.	**Not Applicable.** The project consists of industrial uses; a park and ride on the project would not be feasible.
Policy 6.7.3. Encourage express transit service from Moreno Valley to the greater metropolitan areas of Riverside, San Bernardino, Orange and Los Angeles Counties.	**Not Applicable.** No express mass transit facilities are designated on the project site or planned on the project site; therefore, this measure is beyond the scope of the project.
Policy 6.7.6. Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code.	**Consistent.** The project will comply with Title 24 requirements.

Source of objective and policy: Moreno Valley General Plan (2006).

Moreno Valley Climate Action Strategy

Table 48, *Consistency with City Climate Action Strategy,* evaluates the consistency of the project with the policies of the City's Climate Action Strategy approved in October 2012. As shown below, the project is consistent with the requirements of the Strategy for non-residential development with implementation of project design features and mitigation measures.

Table 48
Consistency with City Climate Action Strategy

Strategy Items	Project Consistency
R2-T1: Land Use Based Trips and VMT Reduction Policies. Encourage the development of Transit Priority Projects along High Quality Transit Corridors identified in the SCAG Sustainable Communities Plan, to allow a reduction in vehicle miles traveled.	**Not Applicable.** A Transit Priority Project is one that has at least 50 percent residential use based on area, at least 20 units per acre and is within a ½ mile of a major transit stop or High Quality Transit Corridor. A High Quality Transit Corridor is defined as one with 15-minute frequencies during peak commute hours. The project does not include a residential component and is not along a High Quality Transit Corridor nor are there any High Quality Transit Corridors or major transit stops in the vicinity of the project area. As a result, the strategy is not applicable.
R2-T3: Employment-Based Trip Reductions. Require a Transportation Demand Management (TDM) program for new development to reduce automobile travel by encouraging ride-sharing, carpooling, and alternative modes of transportation.	**Consistent** with implementation of **Mitigation Measure MM-AQ-10.**
R2-E1: New Construction Residential Energy Efficiency Requirements. Require energy efficient design for all new residential buildings to be 10 percent beyond the current Title 24 standards.	**Not Applicable.** This measure applies to residential projects.
R2-E2: New Construction Residential Renewable Energy. Facilitate the use of renewable energy (such as solar (photovoltaic) panels or small wind turbines) for new residential developments. Alternative approach would be the purchase of renewable energy resources offsite.	**Not Applicable.** This measure applies to residential projects.
R2-E5: New Construction Commercial Energy Efficiency Requirements. Require energy efficient design for all new commercial buildings to be 10% beyond the current Title 24 standards.	**Consistent** with **Mitigation Measure MM-GHG-7.**
R3-E1: Energy Efficient Development, and Renewable Energy Deployment Facilitation and Streamlining. Updating of codes and zoning requirements and guidelines to further implement green building practices. This could include incentives for energy efficient projects.	**Not Applicable.** This refers to updating building and zoning codes and does not apply to this warehousing development plan.
R3-L2: Heat Island Plan. Develop measures that address “heat islands.” Potential measures include using strategically placed shade trees, using paving materials with a Solar Reflective Index of at least 29, an open grid pavement system, or covered parking.	**Consistent.** The Specific Plan indicates that vehicle parking areas are to be landscaped to provide a shade canopy (50 percent coverage at maturity).
R2-W1: Water Use Reduction Initiative. Consider adopting a per capita water use reduction goal which mandates the reduction of water use of 20 percent per capita with requirements applicable to new development and with cooperative support of the water agencies.	**Consistent.** California Green Building Standards Code, Chapter 5, Division 5.3, Section 5.303.2 requires that indoor water use be reduced by 20 percent. Section 5.304.3 requires irrigation controllers and sensors. The Specific Plan also contains a variety of water conservation features. **Mitigation Measures MM-GHG-2, MM-GHG-3,** and **MM-GHG-4** also provide water reduction measures.
R3-W1: Water Efficiency Training and Education. Work with EMWD and local water companies to implement a public information and education program that promotes water conservation.	**Consistent.** Tenants and owners within the WLC site will provide water conservation information from EMWD and other sources to workers on a regular basis.

Table 48
Consistency with City Climate Action Strategy

Strategy Items	Project Consistency
R2-S1: City Diversion Program. For Solid Waste, consider a target of increasing the waste diverted from the landfill to a total of 75 percent by 2020.	**Consistent.** The project would incorporate standard City waste reduction features and **Mitigation Measure MM-GHG1** (has a target to reduce waste by 75 percent by 2020).
C11: Require that developer recycle existing street material for use as base for new streets.	**Consistent.** Project will implement **Mitigation Measure MM-GHG-1** where feasible.

Executive Order S-3-05

The SCAQMD developed its thresholds based on consistency with California Executive Order S-3-05. As shown in Section 5.6 (GHG-1), the project's uncapped GHG emissions would not exceed the SCAQMD's industrial threshold. However, with mitigation implemented, the Project would be reduced to levels less than 10,000 $MTCO_2e$ and, therefore, the project would not conflict with Executive Order S-3-05. This impact is less than significant with mitigation.

SECTION 6
Mitigation Measures

6.1 Air Quality

Compliance with AQMP

Applicable SCAQMD regulatory requirements are restated in the mitigation measures identified below. These measures shall be incorporated in all project plans, specifications, and contract documents. Implementation of the project would exceed applicable thresholds for all criteria pollutants, with the exception of SO_X. Despite the implementation of mitigation measures, emissions associated with the project cannot be reduced below the applicable thresholds. Construction and operational emissions would be reduced to the extent feasible through implementation of mitigation measures described below. Construction emissions would be reduced through implementation of mitigation measures that require the use of Tier 4 construction equipment, reduced idling time, use of non-diesel equipment where feasible, low-VOC paints and cleaning solvents, and dust suppression measures. Operational emissions would be reduced through implementation of mitigation measures that require reduced vehicle idling, use of non-diesel on-site equipment, meeting or exceeding 2010 engine emission standards for all diesel trucks entering the site, electric vehicle charging stations, and prohibition of refrigerated warehouses. In the absence of further feasible mitigation to reduce the project's emission of criteria pollutants to below SCAQMD thresholds, potential air quality impacts resulting from exhaust from construction equipment will remain significant and unavoidable.

Regional Emissions

Construction

The following measures are recommended to reduce the level of emissions of criteria pollutants:

MM-AIR-1 Construction equipment maintenance records (including the emission control tier of the equipment) shall be kept on site during construction and shall be available for inspection by the City of Moreno Valley.

a) Off-road diesel-powered construction equipment greater than 50 horsepower shall meet United States Environmental Protection Agency Tier 4 off-road emissions standards. A copy of each unit's certified tier specification shall be available for inspection by the City at the time of mobilization of each applicable unit of equipment.

b) During all construction activities, off-road diesel-powered equipment may be in the "on" position not more than 10 hours per day.

c) Construction equipment shall be properly maintained according to manufacturer specifications.

d) All diesel powered construction equipment, delivery vehicles, and delivery trucks shall be turned off when not in use. On-site idling shall be limited to three minutes in any one hour.

e) Electrical hook ups to the power grid shall be provided for electric construction tools including saws, drills and compressors, where feasible, to reduce the need for diesel-powered electric generators. Where feasible and available, electric tools shall be used

f) The project shall demonstrate compliance with South Coast Air Quality Management District Rule 403 concerning fugitive dust and provide appropriate documentation to the City of Moreno Valley.

g) All construction contractors shall be provided information on the South Coast Air Quality Management District Surplus Off-road Opt-In "SOON" funds which provides funds to accelerate cleanup of off-road diesel vehicles.

h) Construction on-road haul trucks shall be model year 2010 or newer if diesel-fueled.

i) Information on ridesharing programs shall be made available to construction employees.

j) During construction, lunch options shall be provided onsite.

k) A publicly visible sign shall be posted with the telephone number and person to contact regarding dust complaints per AQMD Standards.

l) Off-site construction shall be limited to the hours between 6 a.m. to 8 p.m. on weekdays only. Construction during City holidays shall not be permitted.

MM-AIR-2 Prior to issuance of any grading permits, a Construction Staging Plan shall be submitted to and approved by the City of Moreno Valley that describes in detail the location of equipment staging areas, stockpiling/storage areas, construction parking areas, safe detours around the project construction site, as well as provide temporary traffic control (e.g., flag person) during construction-related truck hauling activities. Construction trucks shall be rerouted away from sensitive receptor areas. Trucks shall use State Route 60 using World Logistics Center Parkway (formerly Theodore Street), Redlands Boulevard (north of Eucalyptus Avenue), and Gilman Springs Road. In addition to its traffic safety purpose, the traffic control plan can minimize traffic congestion and delays that increase idling emissions. A copy of the approved Construction Staging Plan shall be retained on site in the construction trailer.

MM-AIR-3 The following measures shall be applied during construction of the project to reduce volatile organic compounds (VOC):

a) Non-VOC containing paints, sealants, adhesives, solvents, asphalt primer, and architectural coatings (where used), or pre-fabricated architectural panels shall be used in the construction of the project to the maximum extent practicable. If such products are not commercially available, products with a VOC content of 100 grams per liter or lower for both interior and exterior surfaces shall be used.

b) Leftover paint shall be taken to a designated hazardous waste center.

c) Paint containers shall be closed when not in use

d) Low VOC cleaning solvents shall be used to clean paint application equipment.

e) Paint and solvent-laden rags shall be kept in sealed containers.

MM-AIR-4 No grading shall occur on days with an Air Quality Index forecast greater than 150 for particulates or ozone as forecasted for the project area (Source Receptor Area 24).

MM-AIR-5 The project shall comply with the SCAQMD proposed Indirect Source Rule for any warehouse that are constructed after the rule goes into effect. This rule is expected to reduce NO_X and PM_{10} emissions during construction and operation. Emission reductions resulting from this rule were not included in the project analysis.

As shown in **Table 49,** *Mitigated Short-Term Regional Construction Emissions*, construction emissions are still significant after mitigation, with the exception of $PM_{2.5}$ and SO_2. The reduction in $PM_{2.5}$ emissions is by a reduction in exhaust from the application of Tier 4 off-road equipment. PM_{10} emissions are still significant because emissions in 2022, 2023, 2024, and 2028 exceed the threshold; however, emissions of PM_{10} during all other years of construction are less than significant. Although mitigation reduces emissions of all pollutants (with the exception of CO due to how CalEEMod calculates Tier 4 emissions) during construction, potential air quality impacts resulting from exhaust from construction equipment and fugitive dust will remain significant and unavoidable.

Table 49
Mitigated Short-Term Regional Construction Emissions

Year	Maximum Daily Pollutant Emissions (lbs/day)					
	VOC	NO_X	CO[1]	SO_2	PM_{10} Total[2]	$PM_{2.5}$ Total[2]
2020	160	148	789	2	130	31
2021	163	172	943	2	130	30
2022	166	191	995	2	159	42
2023	164	172	996	2	174	44
2024	162	165	939	2	155	35
2025	155	126	709	1	126	30
2026	149	87	493	1	93	20
2027	147	71	454	1	42	12
2028	151	103	476	1	174	26
2029	148	87	451	1	116	20
2030	148	82	430	1	116	20
2031	147	77	375	1	109	16
2032	145	72	348	1	104	16
2033	143	61	270	1	82	12
2034	143	64	263	1	100	14
SCAQMD Threshold	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	No	**Yes**	No

Notes:
- Mitigation Measure AIR-1 was estimated by CalEEMod using its mitigation module by assuming Tier 4 off-road equipment for equipment greater than 50 horsepower.
- Mitigation Measure AIR-1(b) restricts equipment from operating more than 10 hours per day in the on position, which is estimated in CalEEMod in both the unmitigated and mitigated estimates.
- Mitigation Measures AIR-1(c) through (e), AIR-1(g) through (m), AIR-2, and AIR-4 are not quantified.
- Mitigation Measure AIR-1 is assumed in the unmitigated and mitigated estimates (Rule 403).
- Mitigation Measure AIR-1(i) requires that construction haul trucks be 2010 model year or greater. Mitigated model years are reflected in EMFAC2017 emission factors.
- Mitigation Measure AIR-3 reduces VOC emissions during painting and is calculated as demonstrated in Appendix A.3.

[1] There is an error in the way CalEEMod estimates the effect of a higher tier (such as Tier 3 or 4) on mitigated CO; therefore, the mitigated CO values are greater than unmitigated values.
[2] PM totals may not add up due to rounding.
VOC = volatile organic compounds NO_X = nitrogen oxides CO = carbon monoxide PM_{10} and $PM_{2.5}$ = particulate matter

Operations

The following mitigation measures are required to reduce emissions of criteria pollutants during project operations.

MM-AIR-6 Prior to issuance of occupancy permits for each warehouse building within the WLCSP, the developer shall demonstrate to the City that vehicles can access the building using paved roads and parking lots.

MM-AIR-7 The following shall be implemented as indicated:

Prior to Issuance of a Certificate of Occupancy

a) Signs shall be prominently displayed informing truck drivers about the California Air Resources Board diesel idling regulations, and the prohibition of parking in residential areas.

b) Signs shall be prominently displayed in all dock and delivery areas advising of the following: engines shall be turned off when not in use; trucks shall not idle for more than three consecutive minutes; telephone numbers of the building facilities manager and the California Air Resources Board to report air quality violations.

c) Signs shall be installed at each exit driveway providing directional information to the City's truck route. Text on the sign shall read "To Truck Route" with a directional arrow. Truck routes shall be clearly marked per the City Municipal Code.

On an Ongoing Basis

d) Tenants shall maintain records on fleet equipment and vehicle engine maintenance to ensure that equipment and vehicles are maintained pursuant to manufacturer's specifications. The records shall be maintained on site and be made available for inspection by the City.

e) Tenant's staff in charge of keeping vehicle records shall be trained/certified in diesel technologies, by attending California Air Resources Board approved courses (such as the free, one-day Course #512). Documentation of said training shall be maintained on-site and be available for inspection by the City.

f) Tenants shall be encouraged to become a SmartWay Partner.

g) Tenants shall be encouraged to utilize SmartWay 1.0 or greater carriers.

h) Tenants' fleets shall be in compliance with all current air quality regulations for on-road trucks including but not limited to California Air Resources Board's Heavy-Duty Greenhouse Gas Regulation and Truck and Bus Regulation.

i) Information shall be posted in a prominent location available to truck drivers regarding alternative fueling technologies and the availability of such fuels in the immediate area of the World Logistics Center.

j) Tenants shall be encouraged to apply for incentive funding (such as the Voucher Incentive Program [VIP], Carl Moyer, etc.) to upgrade their fleet.

k) All yard trucks (yard dogs/yard goats/yard jockeys/yard hostlers) shall be powered by electricity, natural gas, propane, or an equivalent non-diesel fuel.

Any off-road engines in the yard trucks shall have emissions standards equal to Tier 4 Interim or greater. Any on-road engines in the yard trucks shall have emissions standards that meet or exceed 2010 engine emission standards specified in California Code of Regulations Title 13, Article 4.5, Chapter 1, Section 2025.

l) All diesel trucks entering logistics sites shall meet or exceed 2010 engine emission standards specified in California Code of Regulations Title 13, Article 4.5, Chapter 1, Section 2025 or be powered by natural gas, electricity, or other diesel alternative. Facility operators shall maintain a log of all trucks entering the facility to document that the truck usage meets these emission standards. This log shall be available for inspection by City staff at any time.

m) All standby emergency generators shall be fueled by natural gas, propane, or any non-diesel fuel.

n) Truck and vehicle idling shall be limited to three (3) minutes.

MM-AIR-8 Prior to the issuance of building permits for more than 25 million square feet of logistics warehousing within the Specific Plan area, a publically-accessible fueling station shall be operational within the Specific Plan area offering alternative fuels (natural gas, electricity, etc.) for purchase by the motoring public. Any fueling station shall be placed a minimum of 1,000 feet from any off-site sensitive receptors or off-site zoned sensitive uses. This facility may be established in connection with the convenience store required in Mitigation Measure MM-AIR-8.

MM-AIR-9 Prior to the issuance of building permits for more than 25 million square feet of logistics warehousing within the Specific Plan area a site shall be operational within the Specific Plan area offering food and convenience items for purchase by the motoring public. This facility may be established in connection with the fueling station required in Mitigation Measure MM-AIR-7.

MM-AIR-10 Refrigerated warehouse space is prohibited unless it can be demonstrated that the environmental impacts resulting from the inclusion of refrigerated space and its associated facilities, including, but not limited to, refrigeration units in vehicles serving the logistics warehouse, do not exceed any environmental impact for the entire World Logistics Center identified in the Revised Sections of the FEIR. Such environmental analysis shall be provided with any warehouse plot plan proposing refrigerated space. Any such proposal shall include electrical hookups at dock doors to provide power for vehicles equipped with Transportation Refrigeration Units (TRUs).

MM-AIR-11 The following measures shall be incorporated as conditions to any Plot Plan approval within the Specific Plan:

a) All tenants shall be required to participate in Riverside County's Rideshare Program.

b) Storage lockers shall be provided in each building for a minimum of three percent of the full-time equivalent employees based on a ratio of 0.50 employees per 1,000 square feet of building area. Lockers shall be located in proximity to required bicycle storage facilities.

c) Class II bike lanes shall be incorporated into the design for all project streets.

d) The project shall incorporate pedestrian pathways between on-site uses.

e) Site design and building placement shall provide pedestrian connections between internal and external facilities.

f) The project shall provide pedestrian connections to residential uses within 0.25 mile from the project site.

g) A minimum of two electric vehicle-charging stations for automobiles or light-duty trucks shall be provided at each building. In addition, parking facilities with 200 parking spaces or more shall be designed and constructed so that at least six percent of the total parking spaces are capable of supporting future electric vehicle supply equipment (EVSE) charging locations. Sizing of conduit and service capacity at the time of construction shall be sufficient to install Level 2 Electric Vehicle Supply Equipment (EVSE) or greater.

h) Each building shall provide indoor and/or outdoor - bicycle storage space consistent with the City Municipal Code and the California Green Building Standards Code. Each building shall provide a minimum of two shower and changing facilities for employees.

i) Each building shall provide preferred and designated parking for any combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles equivalent to the number identified in California Green Building Standards Code Section 5.106.5.2 or the Moreno Valley Municipal Code whichever requires the higher number of carpool/vanpool stalls.

j) The following information shall be provided to tenants: onsite electric vehicle charging locations and instructions, bicycle parking, shower facilities, transit availability and the schedules, telecommunicating benefits, alternative work schedule benefits, and energy efficiency.

Mitigated operational emissions for full buildout are shown in **Table 50**, *Operational Regional Air Pollutant Emissions (Mitigated)*. Note that the emissions are based on conservative assumptions and does not subtract existing emissions that would cease to exist (i.e., assumes all emissions are net new). As shown in Table 57, even with implementation of the mitigation measures, emissions are still significant.

Table 50
Operational Regional Air Pollutant Emissions (Mitigated)

Source	Emissions (pounds per day)					
	VOC	NO_X	CO[1]	SO_2	PM_{10}	$PM_{2.5}$
Vehicles: Local and trucks	45	1,341	867	10	387	125
Area	311	0	4	0	0	0
Onsite Equipment	8	91	107	0	0	0
Total Project Emissions	**363**	**1,432**	**978**	**10**	**388**	**125**
Significance Threshold	**55**	**55**	**550**	**150**	**150**	**55**
Significant Impact?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Notes:
- PM_{10} and $PM_{2.5}$ emissions include exhaust and road dust.
- Landscaping emissions are negligible.
- On-site equipment emissions include emissions from yard trucks, forklifts, and stationary generators.

VOC = volatile organic compounds NO_X = nitrogen oxides CO = carbon monoxide PM_{10} and $PM_{2.5}$ = particulate matter

[1] Mitigation requiring the use of natural gas and propane equipment lead to decreases in PM and NO_X, but may lead to increases in CO; therefore, the mitigated CO values are greater than unmitigated values.

During overlap of construction and operation, VOC, NO_X, CO, PM_{10}, and $PM_{2.5}$ would continue to exceed SCAQMD significance thresholds after mitigation, as shown in **Table 51**, *Combined Construction and Operational Regional Air Pollutant Emissions (Year by Year, Pounds per Day) – Mitigated*. Therefore, impacts are significant and unavoidable. The emissions do not take into account the existing onsite agricultural emissions.

Table 51
Combined Construction and Operational Regional Air Pollutant Emissions (Year by Year, Pounds per Day) – Mitigated

Year	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
2020	160	148	789	2	130	31
2021	207	369	1,032	3	160	40
2022	251	574	1,164	4	220	62
2023	290	730	1,236	5	264	74
2024	328	885	1,238	6	275	75
2025	359	982	1,049	7	263	77
2026	369	983	920	7	261	76
2027	384	1,036	959	7	235	76
2028	406	1,138	1,057	8	393	98
2029	420	1,187	1,103	8	360	100
2030	436	1,245	1,148	9	385	108
2031	451	1,301	1,156	9	403	112
2032	466	1,355	1,188	9	423	119
2033	479	1,401	1,165	10	426	123
2034	495	1,459	1,210	10	469	133
2035	363	1,432	978	10	388	125
Max Daily Emissions	**495**	**1,459**	**1238**	**10**	**469**	**133**
SCAQMD Threshold	**55**	**55**	**550**	**150**	**150**	**55**
Significant?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Notes:
- Year 2020 contains construction emissions only; buildout contains operational emissions only.
- Emissions do not include existing onsite emissions.

VOC = volatile organic compounds; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} and $PM_{2.5}$ = particulate matter

As discussed above, the TIA provides VMT attributable to the project based on the net effect the project has on regional travel as well as project VMT without consideration of a net effect. For informational purposes only, **Table 52,** *Operational Regional Air Pollutant Emissions (Mitigated) – No Net Effect (For Informational Purposes Only* includes mitigated operational mobile emissions without consideration of a net effect in regional traffic volumes.

Table 52
Operational Regional Air Pollutant Emissions (Mitigated) – No Net Effect (For Informational Purposes Only)

Scenario	Source	Emissions (pounds per day)					
		VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Buildout	Vehicles: Local and trucks	106	1,965	1,711	16	871	264
	Area	311	0	4	0	0	0
	Onsite Equipment	8	91	107	0	0	0
	Total Project Emissions	424	2,056	1,822	16	872	265

- PM_{10} and $PM_{2.5}$ emissions include exhaust and road dust.
- Landscaping emissions are negligible.
- Sulfur oxides emissions are under the 150 pounds per day significance threshold and at buildout would be less than 23 pounds per day.

VOC = volatile organic compounds NO_X = nitrogen oxides CO = carbon monoxide PM_{10} and $PM_{2.5}$ = particulate matter
On-site equipment emissions include emissions from yard trucks, forklifts, and stationary generators.

Substantial Pollutant Concentrations

Localized Emissions

With implementation of Mitigation Measures MM-AIR-6 through MM-AIR-10, the project would continue to exceed the localized significance thresholds at one or more of the existing residences located within and outside the project boundaries for PM_{10} (24-hour and/or annual). **Table 53**, *Comparison of Local Project Air Quality Impacts Before and After Mitigation,* compares the project impacts before and after mitigation for those assessment conditions and pollutants that indicated a significant impact before mitigation.

Table 53
Comparison of Local Project Air Quality Impacts Before and After Mitigation

Assessment Condition	Location	Pollutant, Averaging Time, Units	Total Impact Before Mitigation[1]	Total Impact After Mitigation	Significance Threshold	Exceeds Threshold After Mitigation?
Project Development Schedule Year 2025	Inside Project Boundaries	PM_{10} 24-hour, µg/m^3	5.7	5.6	2.5	**Yes**
		PM_{10}, Annual, µg/m^3	2.6	2.6	1.0	**Yes**
Project Development Schedule Year 2025	Outside Project Boundaries	PM_{10} 24-hour, µg/m^3	5.4	5.2	2.5	**Yes**
Project Development Schedule Year 2022	Inside Project Boundaries	NO_X National 1 hour, ppm	0.106	0.068	0.100	**No**
		PM_{10} 24-hour, µg/m^3	5.2	5.2	2.5	**Yes**
		PM_{10} Annual, µg/m^3	1.4	1.4	1.0	**Yes**
	Outside Project Boundaries	PM_{10} 24-hour, µg/m^3	4.0	4.0	2.5	**Yes**
Project Development Schedule Year 2035 Build Out	Inside Project Boundaries	PM_{10} 24 hour, µg/m^3	8.3	8.3	2.5	**Yes**
		PM_{10} Annual, µg/m^3	4.6	4.6	1.0	**Yes**
	Outside Project Boundaries	PM_{10} 24 hour, µg/m^3	2.50	2.49	2.5	**No**

Notes:
1 Total Impacts include the incremental impacts from the project plus the pollutant background.
µg/m^3 = micrograms per cubic meter (a unit of concentration); ppm = parts per million (a unit of concentration)

Cancer Risks

Mitigation Measures MM-AIR-1, MM-AIR-2, and MM-AIR-4 through MM-AIR-10 to reduce construction and operational emissions of criteria pollutants would reduce the estimated cancer risks associated with the project. Additionally, the following mitigation measure is required to ensure that significant health risk does not occur at on-site sensitive receptors.

MM-AIR-12 (a) The house at 30220 Dracaea Avenue shall be demolished prior to the issuance of the first grading permit for grading within the World Logistics Center.

(b) An air filtration system meeting ASHRSE Standard 52.2 MERV-13 standards shall be offered to the owners of the houses located at 13100 World Logistics Center Parkway (formerly Theodore Street) and 12400 World Logistics Center Parkway (formerly Theodore Street). The developer shall offer to install the air filtration system to the owners of the two properties within two months of the certification of the Final Revised FEIR. Prior to the issuance of the first grading permit within the World Logistics Center, documentation shall be provided to the City confirming that an offer to install the air filtration system has been extended to the owners of each of the two properties. The owners of the two properties shall be under no obligation to accept the offer. Each property owner shall have two years from the receipt of the offer to accept the offer. Upon acceptance of each offer, the developer shall work with each owner to ensure the air filtration system is properly installed within one year of acceptance.

Through mitigation requirements, new technology diesel engines are required for the WLC project. The mitigation conditions require that all diesel trucks accessing the project during operation be model year 2010 or newer and that all on-site equipment be Tier 4.

Mitigation Measures MM-AIR-1 and MM-AIR-2 require 2010-compliant trucks for operation and Tier 4 equipment for construction, both of which rely on diesel particulate filters. These vehicles reduce emissions by 90 percent when compared to 2006 vehicles and by 99 percent when compared to uncontrolled diesel engines. Recent emissions testing by CARB revealed that these diesel engines are cleaner than originally estimated. These findings, which are reflected in the CARB emissions factor model EMFAC2017, are 70 percent cleaner than previously estimated.

Beginning in 2001, USEPA and CARB began issuing a series of regulations that require new diesel-powered vehicles and equipment to use the latest emissions control technology. This technology relies on two components. The first is a diesel particulate filter, which is capable of reducing particulate matter emissions by over 90 percent (required for new engines beginning in 2007). The second technology is selective catalytic reduction, which reduces emissions of nitrogen oxides by over 90 percent (required for new engines beginning in 2010). Diesel emissions from equipment equipped with this technology is referred to as New Technology Diesel Engines (NTDE).

Mitigation Measure MM-AIR-8 encourages the use of alternative fueled vehicles on the project site. As discussed above, a High EV Penetration scenario assumes that up to 40 percent of the project's heavy duty trucks would be electric-powered; however, no reduction in emissions has been taken.

As discussed above, the HRA has been prepared consistent with "Current OEHHA Guidance". Although air quality significance thresholds have been established for outdoor environments, a significant portion of human exposure to air pollutants occurs indoors where people spend more than 90 percent of their time.[87] One approach to reduce exposure is the installation of high efficiency panel filters inside the HVAC system. Air filters and other air-cleaning devices are designed to remove pollutants from indoor air. Some are installed in the ductwork of a home's central heating, ventilating, and air-conditioning (HVAC) system to clean the air in the entire

[87] U.S. EPA. 2011. Exposure Factors Handbook. Chapter 16. Activity Factors, Table 16-111. https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252

house. In studies of the effectiveness of air filtration systems in classrooms and by the EPA in residences,[88, 89] the combination of an HVAC system with a high performance panel filter reduced indoor levels of fine particulate matter, $PM_{2.5}$ and smaller particles by 70 to 90 percent.

The use of a filtration system consisting of the application of filters with a rating of ASHRSE Standard 52.2 MERV-13, as required by Mitigation MM-AIR-12, is sufficient to capture a significant portion of the diesel particulate matter. However, the filtration system would not remove the smallest of particles (less than approximately 0.01 to 0.2 micron in diameter). MERV-13 filters would, however, reduce particles in the range of 0.3 to 1 micron by up to 75 percent and particles larger than 1 micron by 90 percent.[90] Based on measurement studies of the size distribution of the collected DPM, approximately 0.1 to 10 percent of the total DPM mass includes particles between 0.01 and 0.2 micrometer in diameter, particles between 0.3 and 1 micrometer in diameter comprise 70 percent of the total DPM mass, and particles above 1 micrometer comprise 5 to 20 percent of the total DPM mass.[91]

Since the cancer risk from DPM is calculated from the mass of DPM emitted, the quantity of DPM reduced by the action of air filters would thus equate to a reduction in cancer risk. The application of MERV-13 air filter filtration system would result in a reduction of DPM exposures by approximately 70 percent.

DPM size:	0.01 to 0.2 µm	0.3 to 1 µm	Greater than 1 µm
Calculation:	10% mass x 0% reduction	70% mass x 75% reduction	20% mass x 90% reduction
Reduction:	0% reduction	52.5% reduction	18% reduction

Attributing an adjustment for time that windows might be open, residents would be outside, or for different compounds that result in the cancer risk would reduce the efficacy of the filters by about 20 percent, bringing the total cancer risk reduction from the filters to 50 percent.

The use of the filters would bring the OEHHA-calculated risk below the SCAQMD threshold eliminating any possible risk from the project on any onsite or offsite receptors within the study area.

Residential Receptors

Table 54, Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Construction (Construction and Operation HRA), With Mitigation, and **Figure 25**, Incremental Project Cancer Risk – With Mitigation (Construction and Operation), shows the cancer risks for the construction and operation HRA

[88] SCAQMD. Air Filtration in Schools. http://www.aqmd.gov/docs/default-source/technology-research/clean-fuels-program/clean-fuels-program-advisory-group---february-3-2010/air-filtration-in-schools.pdf

[89] U.S. EPA. Publications about Indoor Air Quality. https://www.epa.gov/indoor-air-quality-iaq/publications-about-indoor-air-quality#residential-air-cleaners

[90] CARB. 2013. Rulemaking to Consider Proposed Amendments to the Air Designations for State Ambient Air Quality Standards, 2013. https://www.arb.ca.gov/regact/2012/area12/area12.htm

[91] Dieselnet.com. Diesel Exhaust Particle Size, 2002. https://www.dieselnet.com/tech/dpm_size.php

after application of mitigation. As noted, the cancer risks are substantially lower after mitigation, and the SCAQMD cancer risk significance threshold would not be exceeded at any of the onsite or offsite receptors within the study area. The large reduction in cancer risk after mitigation is attributable principally to the reduced emissions associated with the commitment to Tier 4 construction equipment. The impact of this mitigation is largely felt during the first 3 to 5 years of construction when "Current OEHHA Guidance" assigns large age sensitivity factors to the first few years of the 30-year exposure duration. **Table 55**, Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Full Operation in 2035, With Mitigation, and **Figure 26**, Incremental Project Cancer Risk – With Mitigation (30 Years of Full Operation), shows the mitigated cancer risk from the 30-year full project buildout.

School Sensitive Receptors

With the application of the mitigation measures discussed above, the maximum cancer risk would be approximately 3.0 in one million at Bear Valley Elementary School for both the construction + operational scenario and the full operational scenario. Therefore, maximum impacts at schools are less than the 10 in one million significance threshold with the implementation of mitigation and are less than significant.

Worker Receptors

The highest worker cancer risk estimates after the application of mitigation is approximately 1.8 in one million for the construction + operational scenario and 1.6 in one million for the full operational scenario. Therefore, cancer risk for worker receptors anywhere in the revised HRA's study area is less than the 10 in one million significance threshold with the implementation of mitigation and are less than significant.

Cancer Burden

With the application of mitigation measures, the cancer burden is estimated to be 0.48 out of a population of about 142,397 individuals that were estimated to have a cancer risk of 1 in a million or more after mitigation. The is less than the SCAQMD threshold for cancer burden of 0.5. Therefore, the project would not exceed the SCAQMD's cancer burden significance threshold after the application of mitigation.

In summary, the implementation of all the recommended mitigation measures, including the requirement to use 2010 diesel engine emissions standards, Tier 4 construction equipment, and installation of air filters at the identified on-site residence will reduce the OEHHA-calculated cancer risk to below 10 in one million at all sensitive receptors. Therefore, impacts would be less than significant.

Table 54
Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Construction (Construction and Operation HRA), With Mitigation

Receptor Location	Incremental Increase in Cancer Risk During Project Construction (risk/million)	Incremental Increase in Cancer Risk During Project Operation (risk/million)	Total Incremental Increase in Cancer Risk[1] (risk/million)	SCAQMD Cancer Risk Significance Threshold (risk/million)	Exceeds Threshold?
Maximum risk anywhere in the modeling domain[2]	4.9	4.2	9.1	10	No
Existing residences within the project boundaries					
13241 World Logistics Center Pkwy	4.9	4.2	9.1	10	No
13100 World Logistics Center Pkwy	3.3	4.6	7.9	10	No
13200 World Logistics Center Pkwy	4.0	3.8	7.8	10	No
30220 Dracaea Ave	4.1	4.8	8.9	10	No
29080 Dracaea Ave	2.3	2.5	4.8	10	No
29140 Dracaea Ave	2.5	2.7	5.2	10	No
Maximum risk at any area outside of the project boundaries[3]	1.4	4.3	5.7	10	No

Notes:
* Pursuant to Mitigation Measure MM-AQ-12, the Applicant shall install MERV-13 air filters at the residence located at 13241 World Logistics Center Parkway (formerly Theodore Avenue).
1 Cancer risk calculation conservatively assumed all receptors modeled are residential receptors. 30-year average exposures from 2020 to 2049 (includes diesel PM emissions from construction and operation); cancer risk estimates derived from the EMFAC2017 emission model and "Current OEHHA Guidance" for estimating cancer risks.
2 Location is at existing residences within the boundaries of the project.
3 Location is adjacent to the midwestern boundary of the project.

Table 55a
Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Receptors Starting from Beginning of Project Full Operation in 2035, With Mitigation

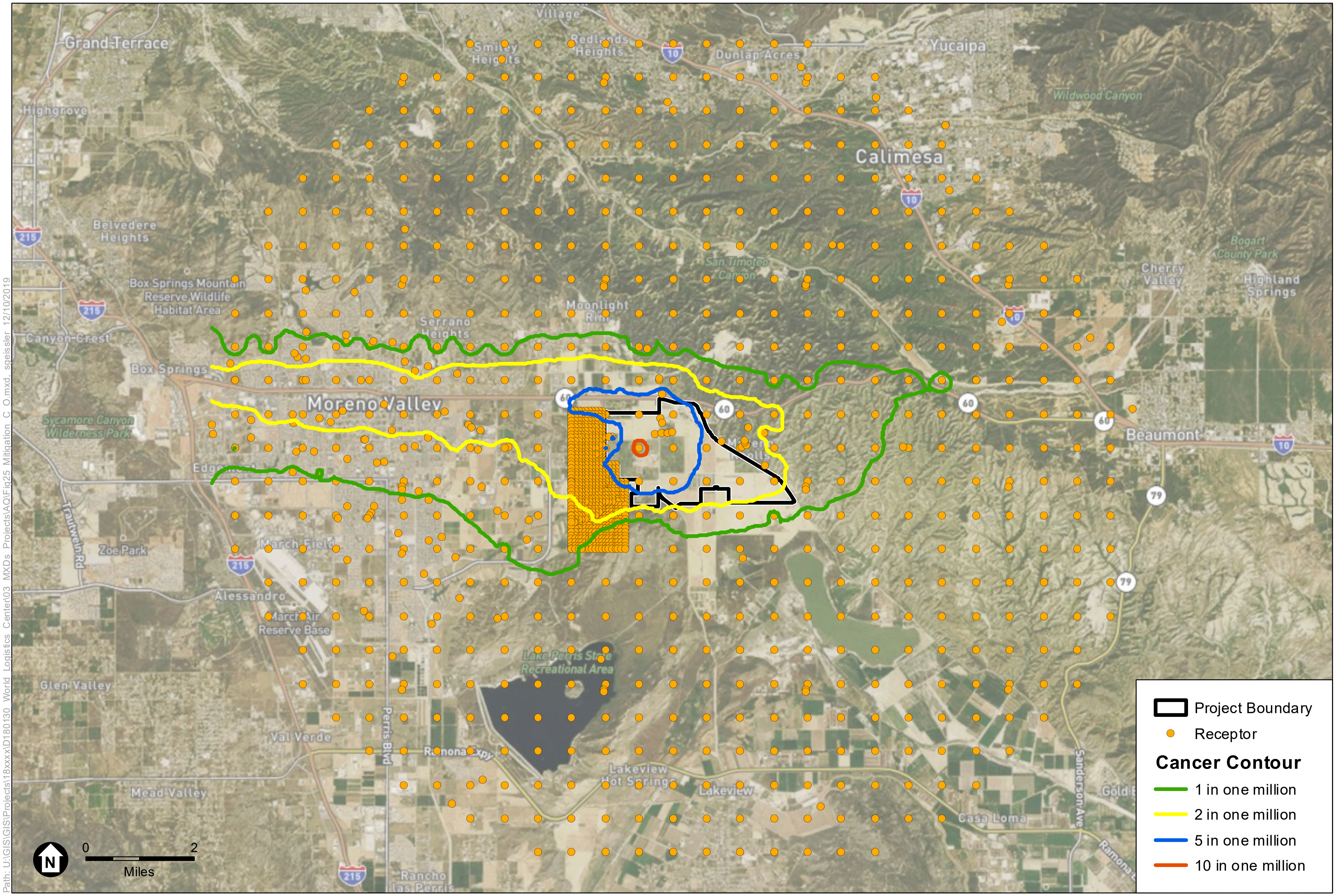
Receptor Location	Total Incremental Increase in Cancer Risk[1] (risk/million)	SCAQMD Cancer Risk Significance Threshold (risk/million)	Exceeds Threshold?
Maximum risk anywhere in the modeling domain[2]	14.2	10	Yes
Maximum risk within the project boundaries[3]	10.7	10	Yes
Maximum risk at any area outside of the project boundaries[4]	9.5	10	No
Maximum risk along SR60 freeway outside of the project boundaries[5]	9.5	10	No

Notes:
1 Conservatively assumed all receptors in the studied domain are residential receptors and will have 30-year average exposures from 2035 to 2064 (includes diesel PM emissions from full project operation); cancer risk estimates derived from the TIA, EMFAC2017 emission model, SCAQMD HRA guidance and "Current OEHHA Guidance" for estimating cancer risks.
2 Location is at the existing residence immediately to the north of the project boundary and is owned by the project sponsor.
3 Location is at the existing residence located at 30220 Dracaea Avenue.
4 Location is to the northwest of the project boundary, on the west side of Redlands Boulevard and south of Eucalyptus Avenue.
5 Location is south of SR 60 freeway, same as the location in footnote (4), which to the northwest of the project boundary, on the west side of Redlands Boulevard and south of Eucalyptus Avenue.

Table 55b
Estimated Cancer Risks, 30-Year Exposure Duration for Sensitive/Residential Onsite Receptors Starting from Beginning of Project Full Operation in 2035, With Mitigation & Installation of MERV-13 Filters

Receptor Location	Total Incremental Increase in Cancer Risk[1] (risk/million)	SCAQMD Cancer Risk Significance Threshold (risk/million)	Exceeds Threshold?
12400 World Logistics Center Parkway	7.1	10	No
30220 Dracaea Avenue	5.35	10	No
13241 World Logistics Center Parkway	4.75	10	No

Notes:
1 DieselNet.com, 2002

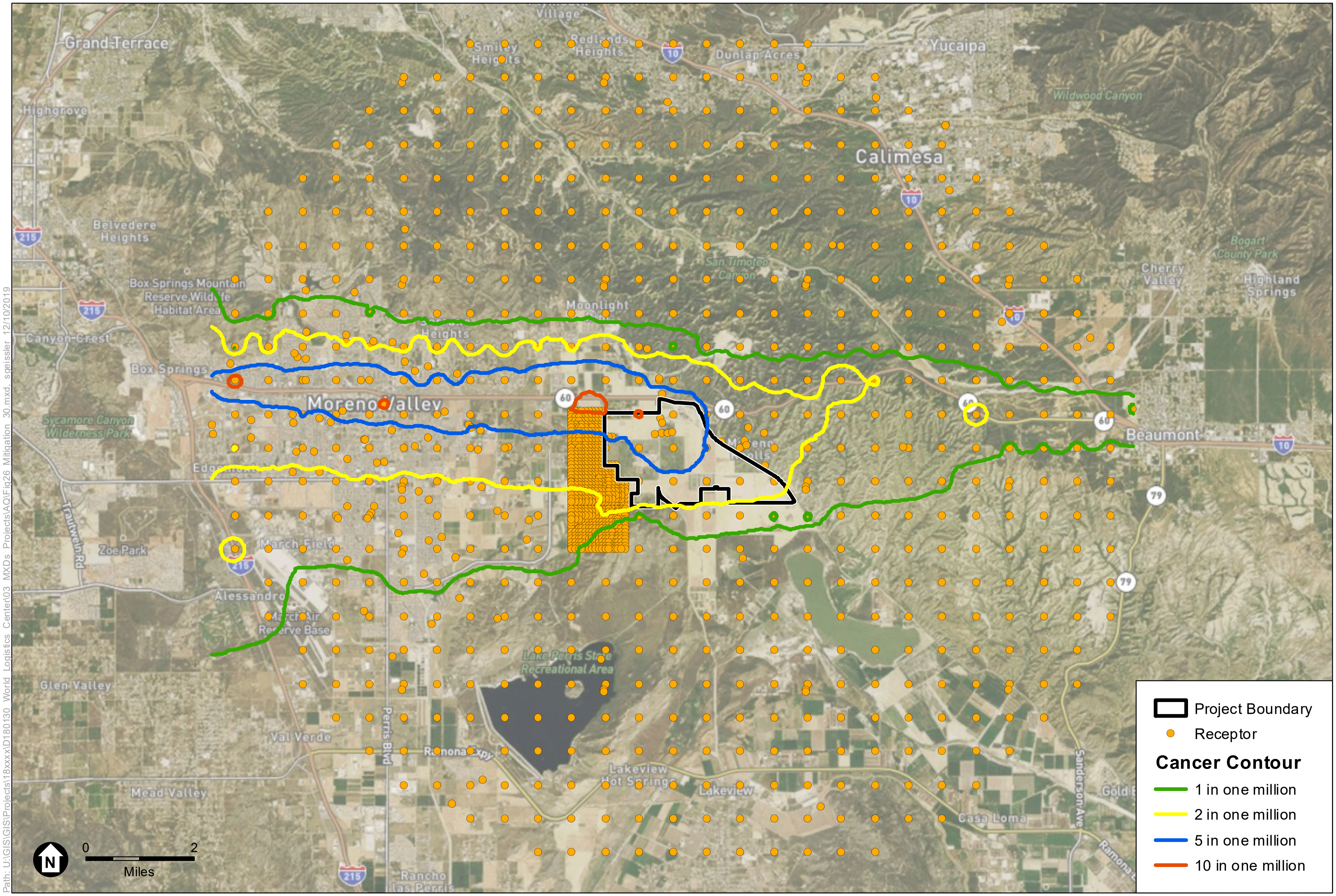


SOURCE: ESRI 2019; ESA, 2019.

World Logistics Center

Figure 25
Incremental Project Cancer Risk – with Mitigation (Construction and Operation)

ESA



SOURCE: ESRI 2019; ESA 2019.

World Logistics Center

Figure 26
Incremental Project Cancer Risk – with Mitigation
(30 Years of Full Operation)

ESA

6.2 Greenhouse Gas Emissions

Greenhouse Gas Emissions

Implementation of MM-AIR-7, MM-AIR-8, MM-AIR-9, MM-AIR-11, and MM-GHG-1 would result in reductions in greenhouse gas emissions and ensure consistency with applicable plans, policies, and regulations. Additional mitigation includes the following:

MM-GHG-1 The World Logistics Center project shall implement the following requirements to reduce solid waste and greenhouse gas emissions from construction and operation of project development:

a) Prior to January 1, 2020, divert a minimum of 50 percent of landfill waste generated by operation of the project. After January 1, 2020, development shall divert a minimum of 75 percent of landfill waste. In January of each calendar year after project approval the developer and/or Property Owners Association shall certify the percentage of landfill waste diverted on an annual basis.

b) Prior to January 1, 2020, recycle and/or salvage at least 50 percent of non-hazardous construction and demolition debris. After January 1, 2020, recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris. In January of each calendar year after project approval the developer and/or Property Owners Association shall certify the percentage of landfill waste diverted on an annual basis.

   Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled. Calculations can be done by weight or volume, but must be consistent throughout.

c) The applicant shall submit a Recyclables Collection and Loading Area Plan for construction related materials prior to issuance of a building permit with the Building Division and for operational aspects of the project prior to the issuance of the occupancy permit to the Public Works Department. The plan shall conform to the Riverside County Waste Management Department's Design Guidelines for Recyclable Collection and Loading Areas.

d) Prior to issuance of certificate of occupancy, the recyclables collection and loading area shall be constructed in compliance with the Recyclables Collection and Loading Area plan.

e) Prior to issuance of certificate of occupancy, documentation shall be provided to the City confirming that recycling is available for each building.

f) Within six months after occupancy of a building, the City shall confirm that all tenants have recycling procedures set in place to recycle all items that are recyclable, including but not limited to paper, cardboard, glass, plastics, and metals.

g) The property owner shall advise all tenants of the availability of community recycling and composting services.

h) Existing onsite street material shall be recycled for new project streets to the extent feasible.

MM-GHG-2 Prior to approval of a precise grading permit for each plot plan for development within the World Logistics Center Specific Plan (WLCSP), the developer shall submit landscape plans that demonstrate compliance with the World Logistics Center Specific Plan, the State of California Model Water Efficient Landscape Ordinance (AB 1881), and Conservation in Landscaping Act (AB 325). This measure shall be implemented to the satisfaction of the Planning Division. Said landscape plans shall incorporate the following:

- Use of xeriscape, drought-tolerant, and water-conserving landscape plant materials wherever feasible and as outlined in Section 6.0 of the World Logistics Center Specific Plan;
- Use of vacuums, sweepers, and other “dry” cleaning equipment to reduce the use of water for wash down of exterior areas;
- Weather-based automatic irrigation controllers for outdoor irrigation (i.e., use moisture sensors);
- Use of irrigation systems primarily at night or early morning, when evaporation rates are lowest;
- Use of recirculation systems in any outdoor water features, fountains, etc.;
- Use of low-flow sprinkler heads in irrigation system;
- Provide information to the public in conspicuous places regarding outdoor water conservation; and
- Use of reclaimed water for irrigation if it becomes available.

MM-GHG-3 All buildings shall include water-efficient design features outlined in Section 4.0 of the World Logistics Center Specific Plan. This measure shall be implemented to the satisfaction of the Land Development/Public Works. These design features shall include, but not be limited to the following:

- Instantaneous (flash) or solar water heaters;

- Automatic on and off water facets;
- Water-efficient appliances;
- Low-flow fittings, fixtures and equipment;
- Use of high efficiency toilets (1.28 gallons per flush [gpf] or less);
- Use of waterless or very low water use urinals (0.0 gpf to 0.25 gpf);
- Use of self-closing valves for drinking fountains;
- Infrared sensors on drinking fountains, sinks, toilets and urinals;
- Low-flow showerheads;
- Water-efficient ice machines, dishwashers, clothes washers, and other water-using appliances;
- Cooling tower recirculating system where applicable;
- Provide information to the public in conspicuous places regarding indoor water conservation; and
- Use of reclaimed water for wash down if it becomes available.

MM-GHG-4 Prior to approval of a precise grading permit for each plot plan, irrigation plans shall be submitted to and approved by the City demonstrating that the development will have separate irrigation lines for recycled water. All irrigation systems shall be designed so that they will function properly with recycled water if it becomes available. This measure shall be implemented to the satisfaction of the City Planning Division and Land Development Division/Public Works.

MM-GHG-5 Each application for a building permit shall include energy calculations to demonstrate compliance with the California Energy Efficiency Standards (Title 24, Part 6). Plans shall show the following:

- Energy-efficient roofing systems, such as “cool” roofs, that reduce roof temperatures significantly during the summer and therefore reduce the energy requirement for air conditioning.
- Cool pavement materials such as lighter-colored pavement materials, porous materials, or permeable or porous pavement, for all roadways and walkways not within the public right-of-way, to minimize the absorption of solar heat and subsequent transfer of heat to its surrounding environment.
- Energy-efficient appliances that achieve the 2016 California Appliance Energy Efficiency Standards (e.g., EnergyStar Appliances) and use of sunlight-filtering window coatings or double-paned windows.

MM-GHG-6 Prior to the issuance of any building permits within the World Logistics Center site, each project developer shall submit energy calculations used to demonstrate compliance with the performance approach to the California Energy Efficiency Standards, for each new structure. Plans may include but are not necessarily limited to implementing the following as appropriate:

- High-efficiency air-conditioning with electronic management system (computer) control.
- Isolated High-efficiency air-conditioning zone control by floors/separable activity areas.
- Use of Energy Star ® exit lighting or exit signage.

MM-GHG-7 Prior to the issuance of a building permit, new development shall demonstrate that each building has implemented the following:

- Install solar panels with a capacity equal to the peak daily demand for the ancillary office uses in each warehouse building or up to the limit allowed by Moreno Valley Utility's restriction on distributed solar PV connecting to their grid, whichever is greater;
- Increase efficiency for buildings by implementing either 10 percent over the 2008 Title 24's energy saving requirements for the Title 24 requirements in place at the time the building permit is approved, whichever is more strict; and
- Require the equivalent of "Leadership in Energy and Environmental Design Certified" for the buildings constructed at the World Logistics Center based on Leadership in Energy and Environmental Design Certified standards in effect at the time of project approval.

This measure shall be implemented to the satisfaction of the Building and Safety and Planning Divisions.

The WLCSP incorporates site and building designs that emphasize conservation of water and energy, which in turn help reduce greenhouse gas emissions (WLCSP September 2014, Section 1.3.2, Green Building-Sustainable Development). The current proposed Project Design Features go substantially beyond that previous commitment with energy conservation measures that exceed minimal compliance with current (2016) Title 24 requirements by about 17 percent at Phase 1 and 16 percent at full buildout, as outlined in the WLC Sustainable Energy Plan.[92] **Table 56**, *Greenhouse Gas Emissions Reduction Analysis,* evaluates to what degree various design features of the project will reduce potential GHG emissions.

92 WSP. World Logistics Center Comparison of Renewable Energy Technologies. 2018

Table 57, *GHG Reductions at Buildout,* shows the GHG emissions and mitigation reductions after implementation of Project Design Features and mitigation at buildout only. **Table 58**, *Project GHG Emissions (Year by Year With Mitigation),* shows the mitigated GHG emissions for each year from 2020 through construction and 30 years operation of all Project facilities. Total uncapped GHG emissions are below the threshold of significance for every year and are therefore less than significant after mitigation.

Table 56
Greenhouse Gas Emissions Reduction Analysis

Category	Operational Mitigation Measure or Project Design Feature[1]	Calculation Method and Reductions
Construction Fuel	**Mitigation Measure MM-AQ-1** would require that construction equipment be Tier 4.	This reduction was estimated in CalEEMod. Tier 4 construction equipment would have fewer $PM_{2.5}$ emissions, and therefore black carbon emissions.
Construction Waste	Regulation in the California Green Building Standards require that projects divert (reduce or recycle) at least 50 percent of waste.	This reduction was estimated using the U.S. EPA's Waste Reduction Model (WARM) version 13.
On-Road Vehicles: Local	*Project Design Feature:* Local bus service to the area is provided by the Riverside Transit Agency. Local bus routes would typically be extended into the project area when adequate demand is generated from this employment center. Future bus routes could circulate on available looped routes with adequate right-of-way along the major arterial roadways of Redlands Boulevard, Theodore Street, and Alessandro Boulevard. Likewise, the industrial collector roadways provide access to locations nearest building front entrances. Due to building scale, bus stops may be spread out by grouped entrances or centralized gateway drive areas as compared to individual business entries.	The California Air Pollution Control Officer's Association (CAPCOA) report's reduction measure TRT-1 indicates a 5.2 percent reduction in commute vehicle miles traveled for low-density suburbs for inclusion of a commute trip reduction program. However, this reduction is not used in this analysis. No reductions are taken for these measures in order to provide a conservative analysis.
	Mitigation Measure MM-AQ-10: Class II bike lanes.	
	Mitigation Measure MM-AQ-10: Participate in Riverside County's rideshare program	
	Mitigation Measure MM-AQ-10: Lockers for employees.	
	Mitigation Measure MM-AQ-10: Bicycle storage and changing rooms	
	Project Design Features: The project would have pedestrian circulation (, sidewalks, and a multiuse trail.	
	Mitigation Measure MM-AQ-10: Safe pedestrian connections	
	Mitigation Measure MM-AQ-10: Parking for fuel-efficient vehicles	
On-road Vehicles: Long haul trucks	**Mitigation Measure MM-AQ-6:** Require model year 2010 diesel trucks or later.	This was implemented by utilizing the emission factors for medium-heavy duty and heavy-heavy duty trucks from EMFAC2017 for year 2010 and after.

Table 56
Greenhouse Gas Emissions Reduction Analysis

Category	Operational Mitigation Measure or Project Design Feature[1]	Calculation Method and Reductions
On-road Vehicles: all	*Pavley-I Regulation:* A clean-car standard to reduce greenhouse gas emissions from new passenger vehicles (light duty automobiles and medium duty vehicles) from 2009 through 2016. *Low Carbon Fuel Standard:* A fuel standard that requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. *California Mobile Source Strategy:* This 2016 plan includes targets for zero emission vehicles (ZEVs) that exceed assumptions included in EMFAC 2014. Project design includes supporting infrastructure to accommodate future EV populations consistent with targets in the Mobile Source Strategy.	EMFAC2017 provides emission factors for carbon dioxide that include these regulations. Therefore, both the unmitigated and mitigated emissions account for these regulations.
Electricity and Natural Gas: Title 24	**Mitigation Measures MM-GHG-5** and **MM-GHG-6** would reduce electricity related emissions. In addition, the project would require LEED certification for buildings and would require buildings to exceed Title 24 (2008 version) by 10 percent or comply with the current version in place. Project design includes energy conservation measures that would enable the project to exceed 2019 Title 24 energy standards by lowering electrical demand with implementation of sustainability measures such as high efficiency appliances and skylights.	Reductions from exceeding the requirements of Title 24 (2016) were accounted for in calculations.
Electricity, Lighting	**Mitigation Measures MM-GHG-6** (lighting efficiency) and **MM-GHG-7** (Title 24) would reduce electricity from lighting. Project design includes energy conservation measures that lower electrical demand with implementation of sustainability measures such as high efficiency lighting and motion sensors.	Reductions due to efficient lighting were accounted for in calculations.
Electricity: Solar	**Mitigation Measure MM-GHG-7** requires that the project install solar panels. Project design includes on-site solar panel installation.	The estimated electricity generation from onsite solar is 24,083 MWh per year, which is 5.0 percent of the electricity demand at buildout. Therefore, 5.0 percent of the unmitigated electricity-related GHG emissions are reduced by solar generation.
Water	**Mitigation Measure MM-GHG-2** would reduce outdoor water usage	CalEEMod mitigation for water-efficient irrigation systems (6.1% reduction, CalEEMod default)

Table 56
Greenhouse Gas Emissions Reduction Analysis

Category	Operational Mitigation Measure or Project Design Feature[1]	Calculation Method and Reductions
	Mitigation Measure MM-GHG-3 would reduce interior water usage, including low flow fittings, fixtures and equipment.	CalEEMod mitigation for: - low-flow toilet (20% reduction in flow, CalEEMod default) - low flow bathroom faucet (32% reduction in flow, CalEEMod default) - low-flow kitchen faucet (18% reduction in flow, CalEEMod default) - low-flow shower (20% reduction in flow, CalEEMod default)
	Mitigation Measure MM-GHG-4 would allow reclaimed water to be used for irrigation.	No reductions are taken for the potential use of reclaimed water.
Waste	**Mitigation Measure MM-GHG-1**: Recycling and composting to divert construction and operational waste by at least 50 percent before 2020 and 75 percent thereafter.	The project would commit to reducing construction and operational waste by 50 percent prior to 2020 and 75 percent thereafter; therefore, a 75 percent reduction is applied.
	Project Design Feature: Specific Plan (Section 5.1.6) requires that all development within the project provide enclosures or compactors for trash and recyclable materials.	

[1] Project design features are from the Project Description and WLC Sustainable Energy Plan (WSP, 2018); mitigation measures are shown in Section 1.0, Table 1.B.

Table 57
GHG Reductions at Buildout (with Mitigation)

Source	GHG Emissions (mt CO_2e) at Buildout		
	Unmitigated	Reductions from Mitigation	With Reductions (Mitigated)
Capped Emissions			
Construction	7,391	0	7,391
Net Mobile	179,355	-557	178,798
Yard trucks	7,172	0	7,172
Generator	267	19	286
Forklifts	257	0	257
Electricity	34,147	-4,715	29,432
Water	2,548	-268	2,280
Natural gas	4,689	-4,689	0
Solar	0	-3,386	-3,386
Total Capped	**238,686**	**-13,596**	**222,230**
Uncapped Emissions			
Construction Refrigerants and Waste	166	-17	149
Waste	19,193	-14,395	4,798
Refrigerants	2,572	0	2,572
Land use change	1,154	0	1,154
Sequestration	-111	0	-111
Total Uncapped	**22,974**	**-14,412**	**8,562**
Threshold	**10,000**	**-**	**10,000**
Significant Impact?	**Yes**	**-**	**No**

Notes:
mt CO_2e = metric tons of carbon dioxide equivalents which is calculated from the emissions (tons/year) by multiplying by the individual global warming potential (carbon dioxide – 1, methane – 21, nitrous oxide – 310, hydrofluorocarbons – 1500, black carbon 760) and converted to metric tons by multiplying by 0.9072.
1 - Electricity and natural gas emissions estimates account for PDFs that improve energy efficiency and eliminate the use of building natural gas; includes electricity use by on-site EV chargers. Electricity-based emissions result in an increase due to the inclusion of EV charging stations and electric outlets for electrical property maintenance equipment.
2 - Construction would no longer occur at buildout; however, according to SCAQMD recommendations, construction emissions are included as amortized over 30 years.

Table 58a
Project GHG Emissions (Year by Year With Mitigation)

Source	GHG Mitigated Emissions (mt CO_2e/year)														
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Capped Emissions															
Construction	18,770	22,198	23,363	23,511	22,113	16,408	12,424	11,692	12,000	11,452	12,311	10,610	9,993	7,451	7,430
Net Mobile	0	20,982	41,248	60,829	79,602	96,308	102,643	112,971	123,218	132,710	141,787	150,466	158,748	166,632	174,108
Yard trucks	0	813	1,625	2,438	3,250	4,053	4,371	4,689	5,016	5,334	5,652	5,970	6,288	6,606	6,924
Generator	0	32	65	97	130	162	174	187	200	213	225	238	251	263	276
Forklifts	0	29	58	87	117	145	157	168	180	191	203	214	226	237	248
Electricity	0	5,487	10,505	16,725	22,319	32,535	36,088	36,779	36,207	35,461	35,096	34,716	34,056	33,116	31,366
Water	0	119	239	398	557	853	1,148	1,304	1,398	1,492	1,626	1,778	1,929	2,081	2,181
Natural gas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar	0	-179	-357	-595	-834	-1,276	-1,705	-1,931	-2,068	-2,204	-2,398	-2,618	-2,838	-3,059	-3,203
Total Capped	**18,770**	**49,483**	**76,746**	**103,490**	**127,254**	**149,188**	**155,300**	**165,860**	**176,151**	**184,649**	**194,501**	**201,374**	**208,653**	**213,328**	**219,330**
Uncapped Emissions															
Construction Refrigerants and Waste	192	192	192	192	190	85	124	127	124	124	124	124	124	124	101
Waste	0	544	1,087	1,631	2,175	2,712	2,924	3,137	3,356	3,569	3,781	3,994	4,207	4,419	4,632
Refrigerants	0	291	583	874	1,166	1,454	1,568	1,682	1,799	1,913	2,027	2,141	2,255	2,369	2,483
Land use change	0	131	262	392	523	652	704	755	807	858	910	961	1,012	1,063	1,114
Sequestration	0	-13	-25	-38	-50	-63	-68	-72	-77	-82	-87	-92	-97	-102	-107
Total Uncapped	**192**	**1,145**	**2,098**	**3,051**	**4,003**	**4,840**	**5,252**	**5,628**	**6,009**	**6,382**	**6,755**	**7,128**	**7,501**	**7,874**	**8,223**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Table 58b
Project GHG Emissions (Year by Year With Mitigation)

Source	GHG Mitigated Emissions (mt CO_2e/year)														
	2035 (Buildout)	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**
Capped Emissions															
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Mobile	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798	178,798
Yard trucks	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172
Generator	286	286	267	267	267	267	267	267	267	267	267	267	267	267	267
Forklifts	257	257	257	257	257	257	257	257	257	257	257	257	257	257	257
Electricity	29,432	26,712	23,744	20,776	17,808	14,840	11,872	8,904	5,936	2,968	0	0	0	0	0
Water	2,280	2,308	2,308	2,308	2,308	2,308	2,308	2,308	2,308	2,308	0	0	0	0	0
Natural gas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386
Total Capped	**214,839**	**212,148**	**209,161**	**206,193**	**203,225**	**200,257**	**197,289**	**194,321**	**191,353**	**188,385**	**183,109**	**183,109**	**183,109**	**183,109**	**183,109**
Uncapped Emissions															
Construction Refrigerants and Waste	149	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798
Refrigerants	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572
Land use change	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154
Sequestration	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111
Total Uncapped	**8,563**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Table 58c
Project GHG Emissions (Year by Year With Mitigation)

Source	GHG Mitigated Emissions (mt CO_2e/year)															
	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	Total (2020-2064)
Capped Emissions																
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	221,727
Net Mobile	153,767	132,239	107,555	87,478	57,152	45,312	40,356	37,703	35,225	31,920	28,525	25,491	22,779	21,191	19,714	5,090,636
Yard trucks	6,168	5,304	4,314	3,509	2,293	1,818	1,619	1,512	1,413	1,280	1,144	1,022	914	850	791	204,561
Generator	230	198	161	131	85	68	60	56	53	48	43	38	34	32	29	7,821
Forklifts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,122
Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	563,449
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,159
Natural gas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar	-2,912	-2,505	-2,037	-1,657	-1,082	-858	-764	-714	-667	-605	-540	-483	-431	-401	-373	-92,091
Subtotal, capped	**157,252**	**135,237**	**109,993**	**89,461**	**58,448**	**46,339**	**41,270**	**38,557**	**36,023**	**32,644**	**29,172**	**26,068**	**23,295**	**21,671**	**20,161**	**6,042,384**
Uncapped Emissions																
Construction Refrigerants and Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,289
Waste	4,126	3,549	2,886	2,348	1,534	1,216	1,083	1,012	945	857	765	684	611	569	529	136,855
Refrigerants	2,212	1,902	1,547	1,258	822	652	580	542	507	459	410	367	328	305	284	73,356
Land use change	993	854	694	565	369	293	261	243	227	206	184	165	147	137	127	32,922
Sequestration	-95	-82	-67	-54	-35	-28	-25	-23	-22	-20	-18	-16	-14	-13	-12	-3,159
Subtotal, uncapped	**7,236**	**6,223**	**5,061**	**4,116**	**2,689**	**2,132**	**1,899**	**1,774**	**1,658**	**1,502**	**1,342**	**1,199**	**1,072**	**997**	**928**	**242,263**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	**450,000**
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

mt CO_2e = metric tons of carbon dioxide equivalents, which is calculated from the emissions (tons/year) by multiplying by the individual global warming potential (carbon dioxide – 1, methane – 21, nitrous oxide – 310, hydrofluorocarbons – 1500, black carbon 760) and converted to metric tons by multiplying by 0.9072.
1 - Electricity and natural gas emissions estimates account for PDFs that improve energy efficiency and eliminate the use of building natural gas; includes electricity use by on-site EV chargers.
2 - Estimated construction emissions are included prior to buildout.
3 – 2036 is the first full year that the Project would be built out. Years from buildout until 2049 are conservatively estimated to be equivalent to buildout year emissions and exclude construction emissions since construction activity would cease after buildout. Years post-2049 take into account the phasing out of structures as they reach their presumed 30-year lifetime.
4 – Electricity emissions decrease to zero in 2045 after RPS has reached 100% renewable electricity
Source: *ESA, 2019*

The Scoping Plan Scenario assumes that California's 2016 Mobile Source Strategy (MSS) would be implemented as a key strategy in the 2017 Scoping Plan Update for meeting the state's 2030 GHG target (presented in the Energy section as Vehicle Scenario B: Medium EV Penetration). The MSS has a target of 4.2 million zero emission vehicles (ZEVs) in operation statewide by 2030. As explained in the Energy Section, after 2025 the sales and penetration of ZEVs under the MSS start to exceed the numbers assumed by EMFAC2017. **Table 59**, *California and SCAQMD Electric Vehicle (EV) Penetration Estimates,* shows that under the MSS approximately 5.2 percent of the passenger vehicle (LDA, LDT1, and LDT2) and light truck (MDV) fleet is expected to powered by electricity or other zero emission engines by 2025 in the South Coast AQMD region, compared to 2.5 percent of passenger vehicles and 1.6 percent of light trucks using EMFAC2017 assumptions. By 2035, 21 percent of passenger vehicles and 22.5 percent of light trucks are expected to be ZEVs in the South Coast AQMD region, compared to 4.7 percent of passenger vehicles and 3.9 percent of light trucks using EMFAC2017 assumptions.

AB 32/SB 32 capped emissions are shown for informational purposes in **Table 60**, *Project Operational GHG Emissions (Year by Year With Mitigation and Medium EV Penetration) – Scoping Plan Scenario, For Informational Purposes Only*, as those emissions are not compared with the SCAQMD's significance threshold. The emissions presented under the Scoping Plan scenario (Table 60) assume successful implementation of the 2017 Scoping Plan Update, which included the Mobile Source Strategy in addition to the Pavley regulations, the Low Carbon Fuel Standard, and California's Advanced Clean Car program. The mobile emissions estimates for future years are based on emission factors that account for higher penetrations of electric vehicles (EVs) than assumed by EMFAC.

Table 59
California and SCAQMD Electric Vehicle (EV) Penetration Estimates

Jurisdiction	Year	Passenger Vehicles			Light Trucks		
		Total	EVs	% EVs	Total	EVs	% EVs
South Coast Air Basin using EMFAC2017 Model	2020	9,125,366	103,722	1.1%	1,539,990	3,852	0.3%
	2025	10,034,980	252,889	2.5%	1,627,185	26,375	1.6%
	2030	10,907,401	417,413	3.8%	1,733,368	51,603	3.0%
	2035	11,642,018	546,208	4.7%	1,849,556	72,433	3.9%
South Coast Air Basin with Governor's order and MSS	2020	9,125,366	103,722	1.1%	1,539,990	3,852	0.3%
	2025	10,034,980	517,550	5.2%	1,627,185	83,921	5.2%
	2030	10,907,401	1,444,602	13.2%	1,733,368	229,571	13.2%
	2035	11,642,018	2,447,659	21.0%	1,849,556	416,980	22.5%

LDA, LDT1, and LDT2 = Passenger cars (EMFAC category)
MDV = Light Duty Trucks (EMFAC category)

Sources: CARB, 2017b - based on EMFAC2011 Categories, and EMFAC2017 Volume III - Technical Documentation

Table 60a
Project GHG Emissions (Year by Year with Mitigation and Medium EV Penetration) – Scoping Plan Scenario, For Informational Purposes Only

Source	GHG Mitigated Emissions (mt CO_2e/year)														
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Capped Emissions															
Construction	18,770	22,198	23,363	23,511	22,113	16,408	12,424	11,692	12,000	11,452	12,311	10,610	9,993	7,451	7,430
Mobile	0	20,982	41,248	60,829	79,602	94,618	102,528	112,913	123,228	132,810	141,992	150,778	159,165	167,154	174,742
Yard trucks	0	813	1,625	2,438	3,250	4,053	4,371	4,689	5,016	5,334	5,652	5,970	6,288	6,606	6,924
Generator	0	32	65	97	130	162	174	187	200	213	225	238	251	263	276
Forklifts	0	29	58	87	117	145	157	168	180	191	203	214	226	237	248
Electricity	0	5,634	10,785	17,172	22,915	33,404	40,224	42,353	42,411	42,184	42,583	42,956	42,870	42,326	40,453
Water	0	119	239	398	557	853	1,148	1,304	1,398	1,492	1,626	1,778	1,929	2,081	2,181
Natural gas	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Solar	0	-179	-357	-595	-834	-1,276	-1,705	-1,931	-2,068	-2,204	-2,398	-2,618	-2,838	-3,059	-3,203
Total Capped	**18,770**	**49,629**	**77,027**	**103,937**	**127,851**	**148,367**	**159,322**	**171,376**	**182,365**	**191,474**	**202,194**	**209,926**	**217,884**	**223,060**	**229,051**
Uncapped Emissions															
Construction Refrigerants and Waste	192	192	192	192	190	85	124	127	124	124	124	124	124	124	101
Waste	0	544	1,087	1,631	2,175	2,712	2,924	3,137	3,356	3,569	3,781	3,994	4,207	4,419	4,632
Refrigerants	0	291	583	874	1,166	1,454	1,568	1,682	1,799	1,913	2,027	2,141	2,255	2,369	2,483
Land use change	0	131	262	392	523	652	704	755	807	858	910	961	1,012	1,063	1,114
Sequestration	0	-13	-25	-38	-50	-63	-68	-72	-77	-82	-87	-92	-97	-102	-107
Total Uncapped	**192**	**1,145**	**2,098**	**3,051**	**4,003**	**4,840**	**5,252**	**5,628**	**6,009**	**6,382**	**6,755**	**7,128**	**7,501**	**7,874**	**8,223**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Table 60b
Project GHG Emissions (Year by Year with Mitigation and Medium EV Penetration) – Scoping Plan Scenario, For Informational Purposes Only

Source	GHG Mitigated Emissions (mt CO_2e/year)														
	2035 (Buildout)	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Capped Emissions															
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mobile	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356	172,356
Yard trucks	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172	7,172
Generator	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
Forklifts	257	257	257	257	257	257	257	257	257	257	257	257	257	257	257
Electricity	38,279	34,818	30,949	27,080	23,212	19,343	15,475	11,606	7,737	3,869	0	0	0	0	0
Water	2,280	2,308	2,308	2,308	2,308	2,308	2,308	2,308	2,308	2,308	0	0	0	0	0
Natural gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Solar	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386	-3,386
Total Capped	**217,245**	**213,812**	**209,943**	**206,075**	**202,206**	**198,337**	**194,469**	**190,600**	**186,731**	**182,863**	**176,686**	**176,686**	**176,686**	**176,686**	**176,686**
Uncapped Emissions															
Construction Refrigerants and Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798	4,798
Refrigerants	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572	2,572
Land use change	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154	1,154
Sequestration	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111	-111
Total	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**	**8,414**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Table 60c
Project GHG Emissions (Year by Year with Mitigation and Medium EV Penetration) – Scoping Plan Scenario, For Informational Purposes Only

Source	GHG Mitigated Emissions (mt CO_2e/year)															
	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	Total (2020-2064)
Capped Emissions																
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	221,727
Mobile	148,226	127,475	103,680	84,326	55,093	43,680	38,902	36,344	33,956	30,770	27,497	24,572	21,958	20,428	19,003	4,963,844
Yard trucks	6,168	5,304	4,314	3,509	2,293	1,818	1,619	1,512	1,413	1,280	1,144	1,022	914	850	791	204,561
Generator	246	211	172	140	91	72	65	60	56	51	46	41	36	34	32	8,152
Forklifts	221	190	155	126	82	65	58	54	51	46	41	37	33	30	28	7,340
Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	680,637
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,159
Natural gas	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Solar	-2,912	-2,505	-2,037	-1,657	-1,082	-858	-764	-714	-667	-605	-540	-483	-431	-401	-373	-92,091
Total Capped	**151,950**	**130,677**	**106,284**	**86,444**	**56,477**	**44,777**	**39,879**	**37,257**	**34,808**	**31,543**	**28,188**	**25,189**	**22,510**	**20,941**	**19,481**	**6,034,349**
Uncapped Emissions																
Construction Refrigerants and Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,140
Waste	4,126	3,549	2,886	2,348	1,534	1,216	1,083	1,012	945	857	765	684	611	569	529	136,855
Refrigerants	2,212	1,902	1,547	1,258	822	652	580	542	507	459	410	367	328	305	284	73,356
Land use change	993	854	694	565	369	293	261	243	227	206	184	165	147	137	127	32,922
Sequestration	-95	-82	-67	-54	-35	-28	-25	-23	-22	-20	-18	-16	-14	-13	-12	-3,159
Total Uncapped	**7,236**	**6,223**	**5,061**	**4,116**	**2,689**	**2,132**	**1,899**	**1,774**	**1,658**	**1,502**	**1,342**	**1,199**	**1,072**	**997**	**928**	**242,114**
Threshold	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	**450,000**
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

mt CO_2e = metric tons of carbon dioxide equivalents, which is calculated from the emissions (tons/year) by multiplying by the individual global warming potential (carbon dioxide – 1, methane – 21, nitrous oxide – 310, hydrofluorocarbons – 1500, black carbon 760) and converted to metric tons by multiplying by 0.9072.
1 - Electricity and natural gas emissions estimates account for PDFs that improve energy efficiency and eliminate the use of building natural gas; includes electricity use by on-site EV chargers.
2 - Estimated construction emissions are included prior to buildout.
3 – 2035 is the first full year that the Project would be built out. Years from buildout until 2049 are conservatively estimated to be equivalent to buildout year emissions and exclude construction emissions since construction activity would cease after buildout. Years post-2049 take into account the phasing out of structures as they reach their presumed 30-year lifetime.
4 – Electricity emissions decrease to zero in 2045 after RPS has reached 100% renewable electricity
Source: *ESA, 2019*

Plan, Policy, Regulation Consistency

The WLCSP contains a sustainability section that emphasizes water and energy conservation throughout the project design, which in turn will help reduce GHG emissions (Section 1.3.2, Green Building-Sustainable Development). The WLC Sustainable Energy Plan includes additional Project Design Features that go beyond the WLSCP with energy conservation measures that exceed minimal compliance with current (2016) Title 24 requirements by about 17 percent at Phase 1 and 16 percent at full buildout.[93]

As previously identified, implementation of the project could result in the development of an approximately 40.6 million square foot high cube-logistics distribution logistics. The project includes a variety of physical attributes and operational programs that would help reduce operational-source pollutant emissions from worker commuting, including GHG emissions. Future development that would occur under the project would be consistent with greenhouse gas emission reduction strategies and policies, including the City's Climate Change Strategy. The project would implement the Mitigation Measures listed above to reduce its contribution to GHG emissions and to ensure it does not conflict with or impede implementation of reduction goals identified in AB 32, SB 32, Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor. In addition, the project would also be subject to all applicable regulatory requirements, which would also reduce the GHG emissions of the project. Therefore, the project would not conflict with any applicable plan, program, policy, or regulation related to the reduction of GHG emissions. Impacts are considered less than significant.

Similar to the discussion of cumulative air quality impacts, the project may employ workers locally from the City. This has the benefit of improving the local jobs/housing balance leading to air quality benefits in terms of shorter trip lengths, which lead to lower emissions than if the workforce was derived from distant locations.

The State of California has adopted a number of policies, including AB 32, SB 32, Governor's Executive Order S-3-05, the Pavley vehicle standards, the Advanced Clean Car program, and the Mobile Source Strategy, which collectively provide the structure and commitment to address California's contribution to global climate change. Since the project is consistent with these policies, including being below the SCAQMD threshold for greenhouse gases that was structured in accordance with these State policies, the project is consistent with greenhouse gas plans, policies, and regulations and impacts are less than significant after mitigation.

93 WSP. World Logistics Center Comparison of Renewable Energy Technologies. 2018

Prepared for
Highland Fairview

Prepared by
Ramboll US Corporation

Project Number
1690014654

Date
December, 2019

HIGHLAND FAIRVIEW WORLD LOGISTICS CENTER ADDITIONAL INFORMATION REGARDING POTENTIAL HEALTH EFFECTS OF AIR QUALITY IMPACTS

MORENO VALLEY, CALIFORNIA

RAMBOLL

CONTENTS

APPENDICES

1. INTRODUCTION

This report presents an estimate of the potential health effects of the emissions of criteria pollutants that may result from the construction and operation of the Highland Fairview World Logistics Center Project (the Project).[1]

FRIANT RANCH DECISION

As background, Environmental Impact Reports (EIRs) prepared pursuant to the California Environmental Quality Act (CEQA) have long evaluated project-related health effects of toxic air contaminants, such as diesel particulate matter, through quantitative and/or qualitative means relative to air district-issued thresholds of significance. However, EIRs historically have not evaluated the specific health effects of project-related increases in criteria pollutants, other than to note and summarize scientific literature regarding the general effect of those pollutants on health. Instead, in accordance with air district-issued thresholds of significance and industry standard practice at the time, CEQA analysis historically and traditionally focused on estimating project-related mass emissions totals for criteria pollutants and, in certain cases, conducting dispersion modeling to assess impacts on local ambient air quality concentrations.

In December 2018, the California Supreme Court issued its decision in *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502 (hereinafter referred to as "the Friant Ranch decision"). The Court noted that the EIR at issue in the Friant Ranch decision disclosed the project's significant impacts attributable to the emissions of criteria pollutants, including oxides of nitrogen (NOx), and particulate matter (PM), but did not correlate the project's emissions to health effects. In finding the EIR inadequate in that respect, the Court held that the EIR should have "relate[d] the expected adverse air quality impacts to likely health consequences or explain[ed] in meaningful detail why it is not feasible at the time of drafting to provide such an analysis, so that the public may make informed decisions regarding the costs and benefits of" the project. (Id. at p. 510.)

CEQA practitioners and other expert agencies (like air districts) are still developing tools and methodologies to provide the type of CEQA analysis described in the Friant Ranch decision. In this report, Ramboll presents one method that can be used to correlate project-related mass emissions totals for criteria pollutants to estimated health effects. More specifically, in order to estimate the health effects of the increases of criteria pollutants for the Project, Ramboll applied a photochemical grid model (PGM), Comprehensive Air Quality Model with extensions (CAMx), to estimate the small increases in concentrations of ozone and $PM_{2.5}$ in the region as a result of the emissions of criteria and precursor pollutants from the Project. Ramboll then applied a U.S. Environmental Protection Agency (USEPA)-authored program, the Benefits Mapping and Analysis Program (BenMAP)[2], to estimate the resulting health effects from the small increases in concentration. Only the health effects of ozone and $PM_{2.5}$ are estimated, as those are the pollutants that USEPA uses in BenMAP to estimate the health

[1] Criteria pollutants are those pollutants with an air pollution standard or pollutants which are precursors to those with a standard. Pollutants with an air pollution standard include nitrogen dioxide, sulfur dioxide (SO_2), ozone, carbon monoxide (CO), particulate matter smaller than 2.5 microns in diameter and 10 microns in diameter, and ozone. Precursor pollutants to criteria pollutants include oxides of nitrogen (NOx), oxides of sulfur (SOx), carbon monoxide (CO), and volatile organic compounds (VOCs).

[2] https://www.epa.gov/benmap/benmap-ce-manual-and-appendices.

effects of emissions of NOx, VOCs, CO, SO_2, and $PM_{2.5}$. Ozone and $PM_{2.5}$ have the most critical health effects and thus are the emissions evaluated to determine the Project's health effects.

ADDITIONAL EVALUATION

In light of the Friant Ranch decision, this analysis estimates the health effects of criteria pollutants and their precursors, specifically those that are evaluated by the USEPA in rulemaking setting the national ambient air quality standards: NOx, VOC [also known as reactive organic gases, or ROG, which are virtually the same as VOC with some slight differences] [3],CO, ozone, SO_2, and $PM_{2.5}$. USEPA's default health effect functions in BenMAP for PM use fine particulate matter ($PM_{2.5}$) as the causal PM agent, so the health effects of PM_{10} are represented using $PM_{2.5}$ as a surrogate. NOx and VOCs are not criteria air pollutants but, in the presence of sunlight, they form ozone and contribute to the formation of secondary $PM_{2.5}$ and thus are analyzed here. As a conservative measure, SO_2 and CO are evaluated due to their small contribution to the formation of secondary $PM_{2.5}$ and ozone. The health effects from ozone and $PM_{2.5}$ are examined for this Project because the USEPA has determined that these criteria pollutants would have the greatest effect on human health. The emissions of other criteria and precursor pollutants, including VOC, NOx, CO and SO_2, are analyzed in their contribution in the formation of ozone and secondary $PM_{2.5}$.

Additionally, NO_2 and CO concentration changes due to the Project are not evaluated here individually, as a localized significance threshold (LST) analysis has been performed as presented in Section 4.3 of the Draft Recirculated Revised Sections of the Final Environmental Report (Draft Recirculated RSFEIR), where Project plus background contributions are compared to the National Ambient Air Quality Standards (NAAQS). The NAAQS are health based thresholds and thus a direct comparison against such thresholds allows evaluation of potential health effects. Further, there are currently no NO_2 non-attainment areas in the United States, even after the 1-hour standard was implemented. Similarly, SO_2 concentration changes are also not individually evaluated here as there are no current SO_2 non-attainment areas in the state of California. Even so, as noted above, contributions of NOx, CO, and SO_2 are all still evaluated here in their contribution to the formation of ozone and secondary $PM_{2.5}$, the two criteria pollutants the USEPA has determined to have the greatest effect on human health.

The evaluation presented herein serves to describe the potential health effects of the criteria pollutant emissions disclosed in Section 4.3 of the Project's Draft Recirculated RSFEIR. This evaluation does not make a new significance determination, as the Project's air quality impacts were already found to be significant and unavoidable. Instead, this evaluation provides additional information regarding the potential health effects of the previously identified significant air quality impacts.

[3] Reactive organic gas (ROG) emissions are quantified and modeled as VOCs in this assessment. ROG means total organic gases minus the California Air Resources Board's (ARB's) "exempt" compounds (e.g., methane, ethane, CFCs, etc.). ROG is similar, but not identical, to USEPA's term "VOC", which is based on USEPA's exempt list, which is slightly different from ARB's list.

2. TECHNICAL APPROACH

The first step in the process is to run the PGM with appropriate information to assess the small increases in ambient air concentrations of pollutants that the Project emissions may cause. PGMs require a database of information, including the spatial allocation of emissions, in the area to be modeled. This includes both base (background/existing) emissions and Project emissions. The latest publicly available PGM database for Southern California, which contains base emissions, was developed by the South Coast Air Quality Management District (SCAQMD) in support of its adopted 2016 Air Quality Management Plan (AQMP)[4] and was adapted for use in this analysis. This PGM database is tailored for Southern California using California-specific input tools (e.g., the Emission FACtors (EMFAC)[5] mobile source emissions model) and uses a high-resolution 4- kilometer (km) horizontal grid to better simulate meteorology and air quality in the complex terrain and coastal environment of California.

Project emissions included NO_X, SO_2, CO, respirable (PM_{10}) and fine ($PM_{2.5}$) primary particulate matter (PM), and VOCs. As discussed above, NO_X and VOC are precursors to ozone and, along with SO_2, are also precursors to secondarily formed $PM_{2.5}$. CO also plays a smaller role in the formation of ozone and is thus conservatively evaluated here.

The USEPA's air quality modeling guidelines (Appendix W[6]) and ozone and $PM_{2.5}$ modeling guidance[7] recommend using a PGM to estimate ozone and secondary $PM_{2.5}$ concentrations. The USEPA's modeling guidance does not recommend specific PGMs but provides procedures for determining an appropriate PGM on a case-by-case basis. Both the modeling guidelines and guidance note that the CAMx[8] and the Community Multiscale Air Quality (CMAQ[9]) PGMs have been used extensively in the past and would be acceptable PGMs. As such, the USEPA has prepared a memorandum[10] documenting the suitability for using CAMx and CMAQ for ozone and secondary $PM_{2.5}$ modeling of single-sources or group of sources.

To estimate the potential outcome of the Project's emissions on ambient air concentrations, the Project's unmitigated and mitigated emissions were added to the CAMx 4-km annual PGM modeling database.[11] Operational and construction emissions from the Project were estimated as described in Section 4.3 of the Draft Recirculated RSFEIR.[12] For this analysis, both unmitigated and mitigated Project emissions were evaluated. In both cases, total emissions modeled reflect the maximum combined (operational + construction) emissions by

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4 https://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp.

5 https://www.arb.ca.gov/emfac/.

6 https://www3.epa.gov/ttn/scram/appendix_w/2016/AppendixW_2017.pdf.

7 https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf.

8 http://www.camx.com/.

9 https://www.epa.gov/cmaq.

10 https://www3.epa.gov/ttn/scram/guidance/clarification/20170804-Photochemical_Grid_Model_Clarification_Memo.pdf.

11 SCAQMD performed Weather Research and Forecasting (WRF) meteorological modeling for the 4-km domain and 2012 calendar year that has been processed by WRFCAMx to generate CAMx 2012 4-km meteorological inputs for the domain. The CMAQ 2012 emissions have been converted to the format used by CAMx using the CMAQ2CAMx processor.

12 To the extent that the Draft Recirculated RSFEIR used conservative inputs to estimate Project-related criteria pollutants and precursors, the analysis provided herein also is conservatively influenced by those inputs.

pollutant. These maxima may occur in different years for different pollutants, though each pollutant's maximum year is conservatively analyzed collectively in a single year assessment. Full operational emissions (at Project buildout) were modeled for all pollutants, and the balance of emissions were allocated to construction sources, with the distribution of emissions types representative of the maximum construction years. This allows for analysis of the worst-case emissions scenario over a single construction or operational year. Full operational emissions (at Project buildout) are expected to have the greatest contribution to health effects due to the proximity of the mobile source emissions to dense population centers, and thus were modeled in full. Additional construction emissions were evaluated to conservatively represent a potential year where construction and operation may coincide, though in reality the situation of full operations plus construction is hypothetical, and conservative for the purposes of this analysis.

For use in PGMs, each Project emissions source must be spatially distributed across the modeling grid cells so that they can be incorporated into the gridded emission inventory. Operational emissions include area sources (architectural coatings, VOCs in consumer products, and landscaping equipment), emergency generators, off-road equipment, and emissions associated with motor vehicle use. Construction emissions include off-road equipment, paving, architectural coatings, fugitive dust, and emissions associated with hauling, vendor, and worker activity. Operational area sources and off-road equipment emissions were evenly distributed within the Project site. Emergency generator emissions were evenly distributed across all emergency generator point source locations. The operational mobile source category includes both passenger vehicles and trucks. The operational mobile sources are also spatially distributed in both the site's grid cells, as well as the grid cells for the local and regional roadways with Project travel. Non-road construction emissions (off-road equipment, paving, architectural coating, and fugitive dust) were allocated to specific plots within the Project area. On-road mobile construction emissions were spatially distributed to the Project site and nearby roadways. Annual emission estimates from the Project were spatially gridded, temporally allocated, and chemically speciated to be used for photochemical grid modelling using the Sparse Matrix Operator Kerner Emissions (SMOKE) emissions modelling system supported by the USEPA. The emissions inventories, spatial allocation, and SMOKE inputs and outputs are shown in **Appendix A.**

As discussed above, the SCAQMD's Southern California 2016 AQMP modeling database was used for this Project. The Southern California 4-km CAMx modeling database is based on a 2012 base meteorological year and includes future year emission scenarios. The 2031 future year projections were used for this analysis, as that is the nearest future year to full operational buildout with base emissions available as of the date of this report. The Project's emissions were tagged for treatment by the source apportionment tools in CAMx to obtain the incremental ozone and $PM_{2.5}$ concentration changes due to the Project's emissions. More details and inputs for the PGM modeling are included in **Appendix B.**

Following completion of the CAMx source apportionment modeling, Ramboll used the USEPA's BenMAP[13, 14] program to estimate the potential health effects of the Project's

[13] https://www.epa.gov/benmap/how-benmap-ce-estimates-health-and-economic-effects-air-pollution.

[14] https://www.epa.gov/sites/production/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf.

contribution to ozone and $PM_{2.5}$ concentration. BenMAP uses the concentration estimates produced by CAMx, along with population and health effect concentration-response (C-R) functions, to estimate various health effects of the concentration increases. BenMAP has a wide history of applications by the USEPA and others, including for local-scale analysis[15] as needed for assessing the health effects of a project's emissions. Ramboll used the USEPA default BenMAP health effects C-R functions that are typically used in national rulemaking, such as the health effects assessment[16] for the 2012 $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS). The health effects estimated for $PM_{2.5}$ include mortality (all causes), hospital admissions (respiratory, asthma, cardiovascular), emergency room visits (asthma), and acute myocardial infarction (non-fatal). For ozone, the endpoints estimated include mortality, emergency room visits (respiratory) and hospital admissions (respiratory). BenMAP applies "effect functions" to calculate incremental health effects from incremental changes in PM and ozone, and an underlying assumption is that there is a causal link between PM and ozone exposures and health effects. The effect functions are derived from statistical correlations reported in epidemiologic studies that compare fluctuations in air pollutant levels measured at central monitors against small fluctuations in population-wide health effects. These are statistical correlations and do not establish a cause-and-effect relationship between small fluctuations in the level of one (or many) ambient air pollutants and health effects, particularly mortality. For example, there is no toxicological or experimental study that has demonstrated or supported that small incremental changes in PM concentrations as a whole, or major PM components, at ambient levels can cause any serious health effects, let alone death (USEPA, 2009). That being said, in an overabundance of caution, and as an expression of the precautionary principal, BenMAP uses these studies to characterize the potential human health effect of small changes in PM and ozone concentrations. Details on the BenMAP inputs and outputs and definitions for the health effects are shown in **Appendix C.**

[15] https://www.epa.gov/benmap/benmap-ce-applications-articles-and-presentations#local.

[16] https://www3.epa.gov/ttn/naaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf.

3. RESULTS

This section presents the results of the health effects analysis for the incremental increases in $PM_{2.5}$ and ozone resulting from primary and precursor emissions for these constituents. The results presented here describe the potential health effects of the criteria pollutant emissions already disclosed in Section 4.3 of the Draft Recirculated RSFEIR, and the results themselves do not constitute a new significance determination, as the Project's air quality impacts were already found to be significant and unavoidable.

It is important to note there are a number of conservative assumptions built into this evaluation, beginning with the quantification of emissions themselves. These conservative assumptions include, but are not limited to, the following:

- Potential reductions due to mitigation measure 4.3.6.2A(d) which restricts idling of all diesel powered construction equipment, delivery vehicles, and delivery trucks to three minutes has conservatively not been accounted for (discussed further in Appendix A).
- Evaluation of full operational emissions at Project buildout, plus additional construction emissions to reflect the potential maximum combined year (discussed further in Appendix A);
- Assumption that health effects occur at any concentration, including small incremental concentrations (discussed further in Appendix C);
- Assumption that all $PM_{2.5}$ is of equal toxicity (discussed further in Appendix C);

As such, results presented below are meant to represent an upper bound of potential health effects, and actual effects may be zero.

POTENTIAL PROJECT HEALTH EFFECTS

Overall, the estimated health effects from ozone and $PM_{2.5}$ are minimal in light of background incidences. **Tables 3-1 through 3-4** below show the annual percent of background health incidence for $PM_{2.5}$ and Ozone health effects associated with the Unmitigated and Mitigated Project, respectively. The "background health incidence" is the actual incidence of health effects (based on available data) as estimated in the local population in the absence of additional emissions from the Project.[17] When taken into context, the small increase in incidences and the very small percent of the number of background incidences indicate that these health effects are minimal in a developed, urban environment.

[17] Background health statistics were obtained from data included in the BenMAP model, and the sources are referenced in the BenMAP manual (USEPA, 2018). For example, EPA obtained mortality rates from the Centers for Disease Control (CDC) WONDER database, and hospital admissions rates from the Healthcare Cost and Utilization Project (HCUP).

Unmitigated Project Health Effects

Table 3-1. BenMAP-Estimated Annual Mean $PM_{2.5}$ Health Effects of the Unmitigated Project Emissions Across the Southern California Model Domain [1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Background Health Incidence (Annual)
Emergency Room Visits, Asthma [0-99]	0.0051%	130,805
Mortality, All Cause [30-99]	0.0047%	325,048
Hospital Admissions, Asthma [0-64]	0.0029%	17,730
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions) [65-99]	0.00063%	224,047
Hospital Admissions, All Respiratory [65-99]	0.0016%	193,354
Acute Myocardial Infarction, Nonfatal [18-24]	0.0020%	36
Acute Myocardial Infarction, Nonfatal [25-44]	0.0021%	1,904
Acute Myocardial Infarction, Nonfatal [45-54]	0.0020%	5,241
Acute Myocardial Infarction, Nonfatal [55-64]	0.0020%	9,226
Acute Myocardial Infarction, Nonfatal [65-99]	0.0019%	40,966

[1] Health effects are shown terms of incidences of each health endpoint and how it compares to the base values (2035 base year health effect incidences or "background health incidence"). Health effects and background health incidences are across the Southern California model domain.

[2] Affected age ranges are shown in square brackets.

Potential $PM_{2.5}$-related health effects associated with unmitigated Project-related increases in ambient air concentrations include asthma-related emergency room visits (6.63 incidences per year), asthma-related hospital admissions (0.52 incidences per year), all cardiovascular-related hospital admissions (not including myocardial infarctions) (1.42 incidences per year), all respiratory-related hospital admissions (3.17 incidences per year), mortality (15.19 incidences per year), and nonfatal acute myocardial infarction (less than 0.78 incidences per year for all age groups) (discussed further in Appendix C).

Table 3-2. BenMAP-Estimated Annual Mean Ozone Health Effects of the Unmitigated Project Emissions Across the Southern California Model Domain[1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Background Health Incidence (Annual)
Hospital Admissions, All Respiratory [65-99]	0.00075%	193,354
Mortality, Non-Accidental [0-99]	0.00033%	210,692
Emergency Room Visits, Asthma [0-17]	0.014%	50,722
Emergency Room Visits, Asthma [18-99]	0.010%	80,084

1 Health effects are shown terms of incidences of each health endpoint and how it compares to the base values (2035 base year health effect incidences, or "background health incidence"). Health effects and background health incidences are across the Southern California model domain.

2 Affected age ranges are shown in square brackets.

Potential ozone-related health effects associated with unmitigated Project-related increases in ambient air concentrations include respiratory-related hospital admissions (1.46 incidences per year), mortality (0.69 incidences per year), and asthma-related emergency room visits for any age range (lower than 8.20 incidences per year for all age groups) (discussed further in Appendix C).

Mitigated Project Health Effects

Table 3-3. BenMAP-Estimated Annual Mean $PM_{2.5}$ Health Effects of the Mitigated Project Emissions Across the Southern California Model Domain [1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Background Health Incidence (Annual)
Emergency Room Visits, Asthma [0-99]	0.0047%	130,805
Mortality, All Cause [30-99]	0.0044%	325,048
Hospital Admissions, Asthma [0-64]	0.0028%	17,730
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions) [65-99]	0.00059%	224,047
Hospital Admissions, All Respiratory [65-99]	0.0015%	193,354
Acute Myocardial Infarction, Nonfatal [18-24]	0.0019%	36
Acute Myocardial Infarction, Nonfatal [25-44]	0.0020%	1,904
Acute Myocardial Infarction, Nonfatal [45-54]	0.0019%	5,241
Acute Myocardial Infarction, Nonfatal [55-64]	0.0019%	9,226
Acute Myocardial Infarction, Nonfatal [65-99]	0.0018%	40,966

1 Health effects are shown terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence"). Health effects and background health incidences are across the Southern California model domain.
2 Affected age ranges are shown in square brackets.

Potential $PM_{2.5}$-related health effects associated with mitigated Project-related increases in ambient air concentrations include asthma-related emergency room visits (6.2 incidences per year), asthma-related hospital admissions (0.49 incidences per year), all cardiovascular-related hospital admissions (not including myocardial infarctions) (1.33 incidences per year), all respiratory-related hospital admissions (2.98 incidences per year), mortality (14.17 incidences per year), and nonfatal acute myocardial infarction (less than 0.724 incidences per year for all age groups) (discussed further in Appendix C).

Table 3-4. BenMAP-Estimated Annual Mean Ozone Health Effects of the Mitigated Project Emissions Across the Southern California Model Domain[1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Background Health Incidence (Annual)
Hospital Admissions, All Respiratory [65-99]	0.00062%	193,354
Mortality, Non-Accidental [0-99]	0.00027%	210,692
Emergency Room Visits, Asthma [0-17]	0.011%	50,722
Emergency Room Visits, Asthma [18-99]	0.0085%	80,084

[1] Health effects are shown terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence"). Health effects and background health incidences are across the Southern California model domain.
[2] Affected age ranges are shown in square brackets.

Potential ozone-related health effects associated with mitigated Project-related increases in ambient air concentrations include respiratory-related hospital admissions (1.20 incidences per year), mortality (0.56 incidences per year), and asthma-related emergency room visits for any age range (lower than 6.84 incidences per year for all age groups) (discussed further in Appendix C).

Because the health effects from ozone and $PM_{2.5}$ are minimal in light of background incidences, and health effects from other criteria pollutants would be even smaller, the health effects of those other criteria pollutants were not quantified.

POTENTIAL CUMULATIVE HEALTH EFFECTS

Maximum daily operational and construction emissions were estimated for 354 projects (herein referred to as "cumulative projects") in the region surrounding the Project, as described further in Section 4.3 of the Draft Recirculated RSFEIR. Maximum daily operational emissions for all cumulative projects are reflective of year 2035, consistent with the full buildout year for the Project. Construction emissions vary by project but occur within years 2020 through year 2035. To capture both potential operational and construction emissions from the cumulative projects in a single year, either maximum daily operational or construction emissions were used for each project, evaluated on a pollutant basis (shown in Appendix A).

Potential health effects from the cumulative project emissions can be generally characterized using the Project level modeling results and a comparison of overall emissions. Emissions from cumulative projects would be subject to the similar meteorological and photochemical reaction conditions as the Project assessment. The application of an overall scaling factor based on emissions, as presented here, is likely conservative since the cumulative projects are unlikely to have the same distribution of mobile emissions to the Los Angeles area as the Project.

Tables 3-5 and 3-6 below show the estimated annual percent of background health incidence for $PM_{2.5}$ and Ozone health effects associated with cumulative projects (including the unmitigated Project). When taken into context, the small percent of the number of background incidences indicate that these health effects are minimal in a developed, urban environment.

Table 3-5. Estimated Annual $PM_{2.5}$ Health Effects of Cumulative Project Emissions

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Background Health Incidence (Annual)
Emergency Room Visits, Asthma [0-99]	0.16%	130,805
Mortality, All Cause [30-99]	0.14%	325,048
Hospital Admissions, Asthma [0-64]	0.09%	17,730
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions) [65-99]	0.02%	224,047
Hospital Admissions, All Respiratory [65-99]	0.05%	193,354
Acute Myocardial Infarction, Nonfatal [18-24]	0.06%	36
Acute Myocardial Infarction, Nonfatal [25-44]	0.07%	1,904
Acute Myocardial Infarction, Nonfatal [45-54]	0.06%	5,241
Acute Myocardial Infarction, Nonfatal [55-64]	0.06%	9,226
Acute Myocardial Infarction, Nonfatal [65-99]	0.06%	40,966

[1] Estimated health effects are compared to the base (2035 base year health effect incidences) values across the Southern California model domain.

[2] Affected age ranges are shown in square brackets.

Potential $PM_{2.5}$-related health effects associated with increases in ambient air concentrations estimated from cumulative Projects (including the unmitigated Project) include asthma-related emergency room visits (204 incidences per year), asthma-related hospital admissions (16 incidences per year), all cardiovascular-related hospital admissions (not including myocardial infarctions) (44 incidences per year), all respiratory-related hospital admissions (98 incidences per year), mortality (467 incidences per year), and nonfatal acute myocardial infarction (less than 24 incidences per year for all age groups) (discussed further in Appendix C).

Table 3-6. Estimated Annual Ozone Health Effects of Cumulative Project Emissions

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Background Health Incidence (Annual)
Hospital Admissions, All Respiratory [65-99]	0.02%	193,354
Mortality, Non-Accidental [0-99]	0.01%	210,692
Emergency Room Visits, Asthma [0-17]	0.31%	50,722
Emergency Room Visits, Asthma [18-99]	0.23%	80,084

[1] Estimated health effects are compared to the base (2035 base year health effect incidences) values across the Southern California model domain.

[2] Affected age ranges are shown in square brackets.

Potential ozone-related health effects associated with increases in ambient air concentrations estimated from cumulative Projects (including the unmitigated Project) include respiratory-related hospital admissions (33 incidences per year), mortality (16 incidences per year), and asthma-related emergency room visits for any age range (lower than 188 incidences per year for all age groups) (discussed further in Appendix C).

UNCERTAINTY

Analyses that evaluate the increases in concentrations resulting from individual sources, and the health effects of increases or decreases in pollutants as a result of regulation on a localized basis, are routinely done. This analysis does not tie the increase in concentration to a specific health effect in an individual; however, it does use scientific correlations of certain types of health effects from pollution to estimate increases in effects to the population at large.

There is a degree of uncertainty in these results from a combination of the uncertainty in the emissions themselves, the increase in concentration resulting from the PGM and the uncertainty of the application of the C-R increase. All simulations of physical processes, whether ambient air concentrations, or health effects from air pollution, have a level of uncertainty associated with them, due to simplifying assumptions. The overall uncertainty is a combination of the uncertainty associated with each piece of the modeling study, in this case, the emissions quantification, the emissions model, the PGM, and BenMAP. While these results reflect a level of uncertainty, regulatory agencies, including the USEPA have judged that, even with the uncertainty in the results, the results provide sufficient information to the public to allow them to understand the potential health effects of increases or decreases in air pollution (USEPA 2012).

The approach and methodology of this analysis ensures that the uncertainty is of a conservative nature. In addition to the conservative assumptions built into the emissions noted above, there are a number of assumptions built into the application of C-R functions in BenMAP that may lead to an overestimation of health effects. For example, for all-cause mortality health effects from $PM_{2.5}$, these estimates are based on a single epidemiological study that found an association between $PM_{2.5}$ concentrations and mortality.[18] While similar studies suggest that such an association exists, there remains uncertainty regarding a clear causal link. This uncertainty stems from the limitations of epidemiological studies, such as inadequate exposure estimates and the inability to control for many factors that could explain the association between $PM_{2.5}$and mortality such as lifestyle factors like smoking. Several reviews have evaluated the scientific evidence of health effects from specific particulate components (e.g., Rohr and Wyzga 2012; Lippmann and Chen, 2009; Kelly and Fussell, 2007). These reviews indicate that the evidence is strongest for combustion-derived components of PM including elemental carbon (EC), organic carbon (OC) and various metals (e.g., nickel and vanadium); however, there is still no definitive data that points to any particular component of PM as being more toxic than other components. The USEPA has also stated that results from various studies have shown the importance of considering particle size, composition, and particle source in determining the health effects of PM (USEPA, 2009). Further, the USEPA (2009) found that studies have reported that particles from industrial sources and from coal combustion appear to be the most significant contributors to PM-related mortality, consistent with the findings by Rohr and Wyzga (2012) and others. This is particularly important to note here, as the majority of PM emissions generated from the Project are from entrained roadway dust, brakewear, and tirewear (see Appendix A), and not from combustion. Therefore, because they do not consider the relative toxicity of PM components, the results presented here are conservative.

Air pollution epidemiology studies are ecological studies. This means that they are population-based, observational epidemiological studies that look for patterns between population exposure and population disease rates. They do not use data at the individual level (e.g., correlations between regional mortality rates and community air pollution levels). Epidemiologists generally consider relative risks (RRs, a measure of the association between exposures and health effects) from these types of studies that are greater than 3 to 4 to reflect strong associations and to be supportive of a causal link, while smaller RRs (1.5 to 3) are considered to be weak, and require other lines of evidence (e.g., toxicological evidence, plausible biological mechanism) to demonstrate causality (Taubes 1995). For example, the RR of lung cancer for heavy smokers is in the range of 10 to 20, whereas PM associations with mortality yield RRs in the range of 1.01 to 1.05, i.e., very close to the RR = 1.0, which indicates little to no association.

Aside from the uncertainty as to the causal basis of the statistical associations in air pollution epidemiology studies of PM and mortality, some epidemiological studies have found no correlation between mortality and increased PM (Enstrom, 2005; 2017; Lipfert et al., 2000; Murray and Nelson, 2000; Greven et al., 2011; You et al.,2018; Zhou et al.,2015). Although there are a greater number of publications reporting a positive PM association for mortality compared to those reporting no association.

Another uncertainty highlighted by the USEPA (2012) that applies to potential health effects from both $PM_{2.5}$ and ozone, is the assumption of a log-linear response between exposure and health effects, without consideration for a threshold below which effects may not be

[18] For $PM_{2.5}$ mortality estimates, BenMAP relies on the study by Krewski et al. (2009). This study conducted multiple sensitivity analyses using different statistical model specifications. For all-cause mortality, the authors reported positive associations between exposures to $PM_{2.5}$ and all-cause mortality that ranged from a 3% to a 6% increase in mortality per increase in 10 ug/m^3 of $PM_{2.5}$, depending on the model used and the exposure data considered. The default USEPA value in BenMAP is the 6% increase, or double the low end of the range.

measurable. The issue of a threshold for $PM_{2.5}$ and ozone is highly debatable and can have significant implications for health effects analyses as it requires consideration of current air pollution levels and calculating effects only for areas that exceed threshold levels. Without consideration of a threshold, any incremental contribution to existing ambient air pollution levels, whether below or above the applicable threshold for a given criteria pollutant, is assumed to adversely affect health. Although the USEPA traditionally does not consider thresholds in its cost-benefit analyses, the NAAQS itself is a health-based threshold level that the USEPA has developed based on evaluating the most current evidence of health effects.

As noted above, the health effects estimation using this method presumes that effects seen at large concentration differences can be linearly scaled down to (i.e., correspond to) small increases in concentration, with no consideration of potential thresholds below which health effects may not occur. This methodology of linearly scaling health effects is broadly accepted for use in regulatory evaluations and is considered as being health protective (USEPA, 2010), but potentially overstates the potential effects. In summary, health effects presented are conservatively estimated, and the actual effects may be zero.

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APPENDIX A
EMISSIONS INVENTORY, SPATIAL ALLOCATION, AND SMOKE SETUP HIGHLAND FAIRVIEW WORLD LOGISTICS CENTER MORENO VALLEY, CALIFORNIA

1. INTRODUCTION

As set forth in Section 4.3 of the Project's Draft Recirculated Revised Sections of the Final Environmental Impact Report (Draft Recirculated RSFEIR), construction and operational emissions from the Project were estimated using methodologies consistent with the California Emissions Estimator Model (CalEEMod®) and Project-specific data, where available. The model employs widely accepted calculation methodologies for emission estimates combined with appropriate default data if site-specific information is not available. In order to allow for a more accurate representation of mobile source operational emissions associated with the Project, mobile source emission factors were estimated using EMFAC2017. These emission factors were then used to estimate mobile source operational emissions using Project-specific traffic data.

Annual emission estimates from the Project need to be spatially gridded, temporally allocated, and chemically speciated to be used for photochemical grid modeling. The Sparse Matrix Operator Kerner Emissions (SMOKE) emissions modeling system (Coats, 1996; Coats and Houyoux, 1996)[1] is used for this process.

Section 2 of this Appendix describes in detail the development of the gridded Project emissions.

2. PROJECT EMISSIONS AND SPATIAL ALLOCATION

Both unmitigated and mitigated emissions were estimated for the Project to support the photochemical grid model (PGM) and are allocated into 4 kilometer (km) x 4 km grid cells. This section describes those emissions and how they were spatially allocated.

2.1 Project Emissions and Spatial Allocation

For use in PGMs, emissions must be spatially allocated over the area so that they can be incorporated into the gridded emission inventory. The total unmitigated emission inventory for the Project is below in **Table 2-1a** and the total mitigated emission inventory for the Project is below in **Table 2-1b**. Mobile source emissions were split into sub-categories based on Project-specific data and EMFAC2017 emission rates. For particulate matter, less than 2.5 microns in diameter ($PM_{2.5}$) emissions are used in the modelling; less than 10 microns in diameter (PM_{10}) emissions are presented for information below.

All emissions listed in **Table 2-1a** represent the sum of the maximum daily unmitigated emissions for the maximum operational and maximum construction emission years. Total emissions modeled reflect the maximum combined (operational + construction) emissions by pollutant. These maxima may occur in different years for different pollutants, though each pollutant's maximum year is conservatively analyzed collectively in a single year assessment. Full operational emissions (at Project buildout) were modeled for all pollutants, and the balance of emissions were allocated to construction sources, with the distribution of emissions types representative of the maximum construction years. This allows for analysis of the worst-case emissions scenario over a single construction or operational year. Full operational emissions (at Project buildout) are expected to have the greatest contribution to health effects due to the proximity of the mobile source emissions to dense population centers, and thus were modeled in full. Additional construction emissions were evaluated to conservatively represent a potential year where construction and operation may coincide, though in reality the situation of full operations plus construction is hypothetical, and conservative for the purposes of this analysis.

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[1] https://www.cmascenter.org/smoke/.

Table 2-1a. Maximum Daily Unmitigated Criteria Air Pollutant Emissions Estimates

Emission Category	ROG lbs/day	NOx lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day	SO_2 lbs/day	CO lbs/day
Operational Emissions						
On-Road Mobile	45	1,361	388	125	9.63	867
Diurnal	1.96	0	0	0	0	0
Hotsoak	1.50	0	0	0	0	0
Idling Exhaust	5.7	35	0.18	0.18	0.07	80
Brakewear	0	0	113	48	0	0
Tirewear	0	0	29	7.4	0	0
Resting Loss	2.0	0	0	0	0	0
Road Dust	0	0	232	57	0	0
Running Exhaust	20	1,288	13	12	9.55	746
Running Loss	10.71	0	0	0	0	0
Starting Exhaust	2.51	38	0.02	0.02	0.01	41
Emergency Generators	2.06	62	1.88	1.86	0.00	11
Architectural Coatings	103	0	0	0	0	0
Consumer Products	207	0	0	0	0	0
Landscaping	0.38	0.04	0.01	0.01	0.0003	4.12
Off-Road Mobile	7.18	183	0.50	0.50	0	78
Total Operational	**364**	**1,606**	**390**	**127**	**9.63**	**961**
Construction Emissions						
Fugitive Dust	0	0	29.95	4.91	0	0
Off-Road Equipment	75	204	2.16	2.15	0.38	184
Paving	50	0	0	0	0	0
Architectural Coating	111	0	0	0	0	0
On-Road Mobile	3.37	7.4	50.5	2.22	0.06	5.04
Diurnal	0.13	0	0	0	0	0
Hotsoak	0.26	0	0	0	0	0
Idling Exhaust	0.80	0.98	0.00001	0.00004	0.003	0.88
Brakewear	0	0	0.00830	0.01085	0	0
Tirewear	0	0	0.00337	0.00244	0	0
Resting Loss	0.13	0	0	0	0	0
Road Dust	0	0	50.50	2.21	0	0
Running Exhaust	0.59	5.58	0.00170	0.00478	0.06	2.88
Running Loss	0.97	0	0	0	0	0
Starting Exhaust	0.49	0.80	0.00001	0.00001	0.0003	1.27
Total Construction	**239**	**212**	**82.6**	**9.3**	**0.45**	**189**
Total Combined	**603**	**1,818**	**473**	**137**	**10.07**	**1,150**

Table 2-1a. Maximum Daily Unmitigated Criteria Air Pollutant Emissions Estimates

Emission Category	ROG lbs/day	NOx lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day	SO_2 lbs/day	CO lbs/day

Abbreviations:
CO - Carbon Monoxide
lbs – Pounds
NOx - Nitrogen Oxides
$PM_{2.5.}$ - Particulate Matter less than 2.5 microns in diameter
$PM_{10.}$ - Particulate Matter less than 10 microns in diameter
ROG - Reactive Organic Gas
SO_2 - Sulfur Dioxide

The emissions listed in **Table 2-1b** represent the sum of the maximum daily mitigated emissions for the maximum operational and maximum construction emission years. Mitigated construction emissions were scaled using the approach described for unmitigated emissions. The mitigated emission inventory includes mitigation measures 4.3.6.2A through E, 4.3.6.3A through F, 4.3.6.4A, and 4.3.6.5A, as listed in Section 4.3 of the Draft Recirculated RSFEIR. Potential reductions due to mitigation measure 4.3.6.2A(d) which restricts idling of all diesel powered construction equipment, delivery vehicles, and delivery trucks to three minutes has conservatively not been accounted for (the emissions presented here assume five minutes of idling per vehicle).

Table 2-1b. Maximum Daily Mitigated Criteria Air Pollutant Emissions Estimates

Emission Category	ROG lbs/day	NOx lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day	SO_2 lbs/day	CO lbs/day
Operational Emissions						
On-Road Mobile	45	1,341	387	125	9.60	867
Diurnal	1.96	0	0	0	0	0
Hotsoak	1.50	0	0	0	0	0
Idling Exhaust	5.7	35	0.18	0.17	0.07	80
Brakewear	0	0	113	48	0	0
Tirewear	0	0	29	7.4	0	0
Resting Loss	2.0	0	0	0	0	0
Road Dust	0	0	232	57	0	0
Running Exhaust	20	1,269	13	12	9.53	746
Running Loss	10.71	0	0	0	0	0
Starting Exhaust	2.51	38	0.02	0.02	0.01	41
Emergency Generators	0.56	0	0.00	0.00	0.00	28
Architectural Coatings	103	0	0	0	0	0
Consumer Products	207	0	0	0	0	0
Landscaping	0.38	0.04	0.01	0.01	0.0003	4.12
Off-Road Mobile	7.18	91	0.50	0.50	0	78
Total Operational	**363**	**1,432**	**388**	**125**	**9.60**	**978**

Table 2-1b. Maximum Daily Mitigated Criteria Air Pollutant Emissions Estimates

Emission Category	ROG lbs/day	NOx lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day	SO_2 lbs/day	CO lbs/day
Construction Emissions						
Fugitive Dust	0	0	29.95	4.92	0	0
Off-Road Equipment	23	23	0.57	0.57	0.41	255
Paving	55	0	0	0	0	0
Architectural Coating	50	0	0	0	0	0
On-Road Mobile	3.45	4.1	50.5	2.23	0.07	5.31
Diurnal	0.13	0	0	0	0	0
Hotsoak	0.29	0	0	0	0	0
Idling Exhaust	0.71	0.51	0.00004	0.00008	0.003	0.68
Brakewear	0	0	0.02370	0.02075	0	0
Tirewear	0	0	0.00960	0.00491	0	0
Resting Loss	0.13	0	0	0	0	0
Road Dust	0	0	50.50	2.20	0	0
Running Exhaust	0.58	3.09	0.00483	0.00938	0.06	3.19
Running Loss	1.07	0	0	0	0	0
Starting Exhaust	0.55	0.51	0.00002	0.00003	0.0003	1.44
Total Construction	**132**	**27**	**81.1**	**7.7**	**0.47**	**260**
Total	**495**	**1,459**	**469**	**133**	**10.07**	**1,238**

Abbreviations:
CO - Carbon Monoxide
lbs – Pounds
NOx - Nitrogen Oxides
$PM_{2.5}$. - Particulate Matter less than 2.5 microns in diameter
PM_{10}. - Particulate Matter less than 10 microns in diameter
ROG - Reactive Organic Gas
SO_2 - Sulfur Dioxide

Mobile emissions include light, medium, and heavy-duty vehicles. **Table 2-2** below provides a summary of the spatial distribution of operational mobile emissions broken down by roadway for the regional freeway segments. For roadways within the Project vicinity, emissions were distributed using the VMT modeled for the Project Operational HRA. The overall distribution percentages were weighted based on the vehicle miles travelled (VMT). This breakdown was applied to both unmitigated and mitigated mobile emissions.

Table 2-2. Operational Mobile Emission Distribution

Location	Roadway	Overall Project Distribution			
		Cars	Light Trucks	Medium Trucks	Heavy Trucks
Project Vicinity		26%	33%	42%	29%
Regional Segments	I-10	11%	5%	5%	4%
	I-110	5%	5%	4%	6%
	SR-215 (North of SR-60)	3%	2%	1%	1%
	SR-215 (South of SR-60)	4%	2%	2%	1%
	SR-60 (between I-215 and SR-71/Gary Ave)	20%	21%	18%	21%
	SR-60 - (between SR-71/Gary Ave and I-110/SR-91)	10%	12%	9%	17%
	SR-91 (between Spruce St/SR-60 and I-15)	6%	6%	6%	6%
	SR-91 (between I-15 and I-110)	14%	14%	14%	15%

Project emissions are allocated according to their expected location into 4 km x 4 km grid cells for the PGM. **Figure 2-1a** below shows a close-up of the Project boundary overlay with the 4-km grid. Operational area sources and off-road equipment emissions were evenly distributed within the Project site. Emergency generator emissions were evenly distributed across all emergency generator point source locations as shown in Figure 2-1a.

Figure 2-1a. Overlap of Model Grid Cells on Project Site

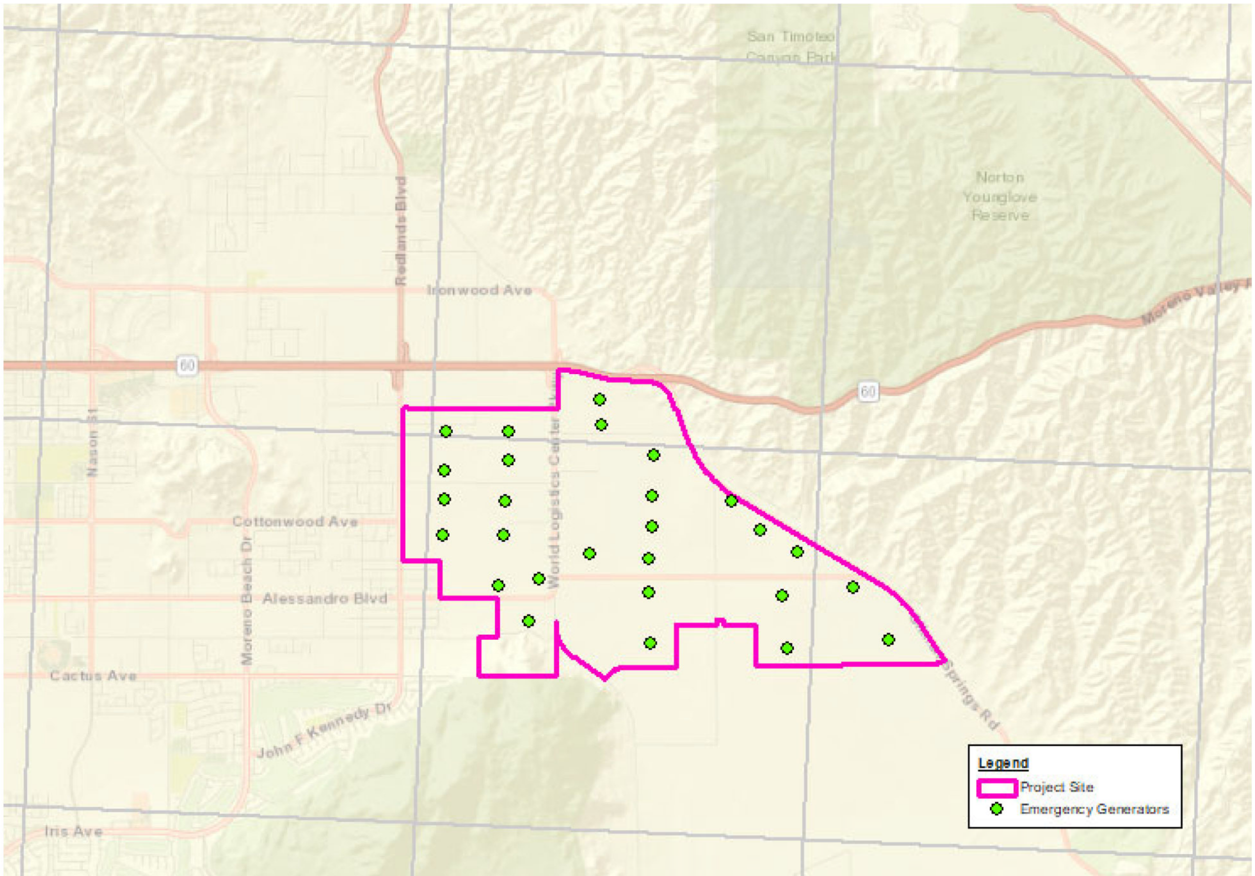
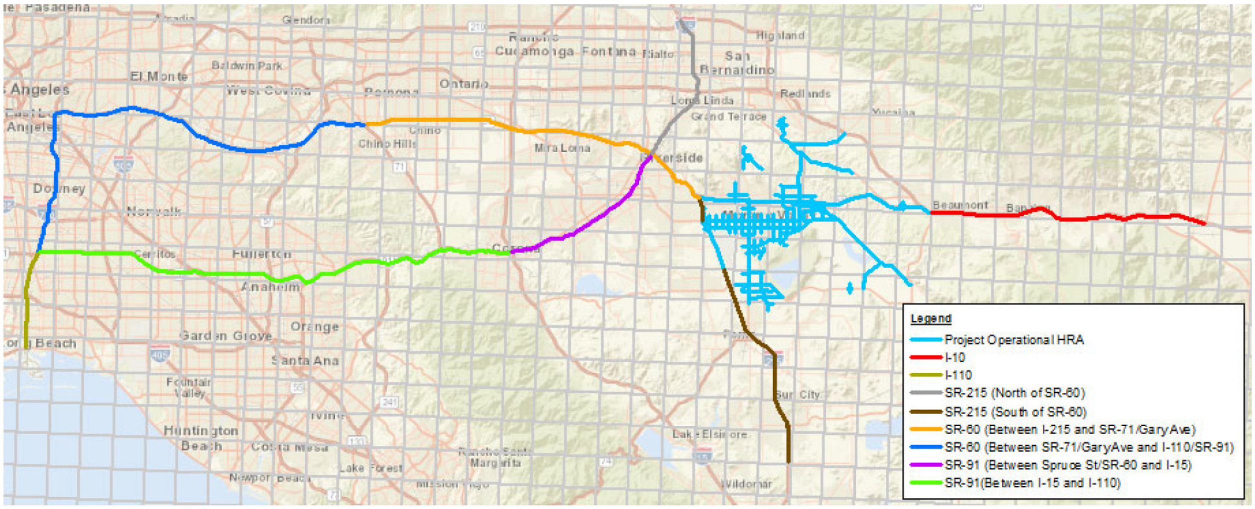


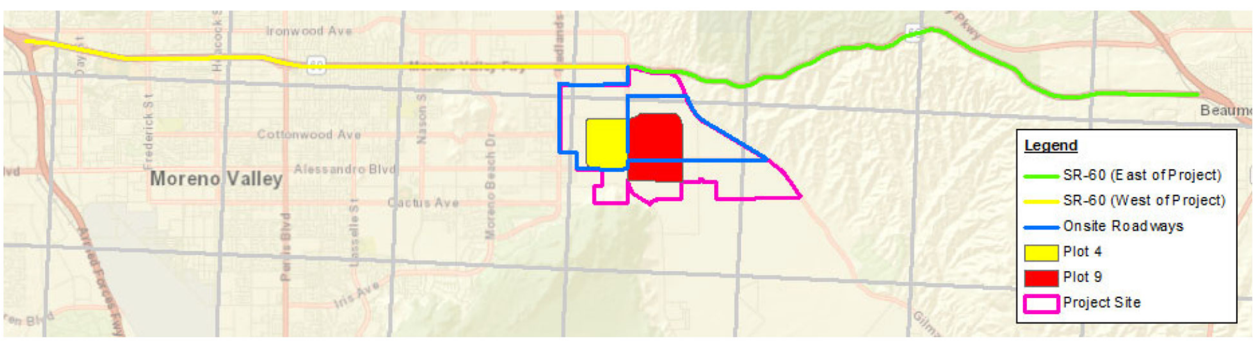
Figure 2-1b shows the full extent of operational roadways modeled. Emissions on links in the Project Vicinity were allocated using VMT modeled in the Project Operational HRA. VMT that was not modeled in the Operational HRA was allocated to regional freeway links. This includes the portions of the I-10, SR-60, SR-91, I-110 and SR-215 shown on the figure, with overall project distributions as assigned in **Table 2-2**. For major roadways that cross into multiple cells, emissions were allocated proportionally based on the length of roadway within each cell.

Figure 2-1b. Roadways Modeled



Construction emissions were allocated to sources modeled in the Project Construction HRA. Off-road equipment activity was allocated to Plots 4 and 9 based on the location of activity in the maximum construction year. As these plots are located within the same grid cell as the majority of the Project site, they were determined to be a reasonable representation of construction off-road equipment activity. On-site on-road emissions were evenly distributed within the Project Site. Off-site on-road emissions were evenly distributed to the road segments modeled in the Project Construction HRA (see green, yellow, and blue links in the figure below). The location of the Project construction sources are shown in **Figure 2-1c**.

Figure 2-1c. Modeled Construction Sources



2.2 Convert Project Inventories to SMOKE Input Format

The first step in the emissions processing was to convert the Project emission inventory into the Flat File 2010 (FF10) format for input to SMOKE. Appropriate Source Classification Codes (SCCs) were then assigned to the Project emissions sources. **Table 2-3** provides the SCC assigned to each Project source.

Table 2-3. Assigned SCC to Project Emission Sources

Emission Source	SCC	SCC Description
Architectural Coatings	2401001000	Solvent Utilization; Surface Coating; Architectural Coatings; Total: All Solvent Types
Consumer Products	2460000000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Processes; Total: All Solvent Types
Consumer Products	2460100000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Personal Care Products; Total: All Solvent Types
Consumer Products	2460200000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Household Products; Total: All Solvent Types
Consumer Products	2460400000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Automotive Aftermarket Products; Total: All Solvent Types
Consumer Products	2460500000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Coatings and Related Products; Total: All Solvent Types
Consumer Products	2460600000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Adhesives and Sealants; Total: All Solvent Types
Consumer Products	2460800000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All FIFRA Related Products; Total: All Solvent Types
Consumer Products	2460900000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; Miscellaneous Products (Not Otherwise Covered);Total: All Solvent Types
Consumer Products	2461021000	Solvent Utilization; Miscellaneous Non-industrial: Commercial; Cutback Asphalt; Total: All Solvent Types
Energy	20200202	Internal Combustion Engines; Industrial; Natural Gas; Reciprocating
Energy	20200102	Internal Combustion Engines; Industrial; Distillate Oil (Diesel); Reciprocating
Construction Dust	2311020000	Industrial Processes; Construction: SIC 15 - 17;Industrial/Commercial/Institutional; Total
Off-road equipment	2265004010	Mobile Sources; Off-highway Vehicle Gasoline, 4-Stroke;Lawn and Garden Equipment; Lawn Mowers (Residential)
Off-road equipment	2267003070	Mobile Sources; LPG; Industrial Equipment; Terminal Tractors
Off-road equipment	2268003020	Mobile Sources; CNG; Industrial Equipment; Forklifts
Mobile	220100111B	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Brake Wear
Mobile	220100111R	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Resting
Mobile	220100111S	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Start

Table 2-3. Assigned SCC to Project Emission Sources		
Emission Source	**SCC**	**SCC Description**
Mobile	220100111T	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Tire Wear
Mobile	220100111V	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Eva (except Refueling)
Mobile	220100111X	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Exhaust
Mobile	220102011B	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5);Rural Interstate: Brake Wear
Mobile	220102011R	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5);Rural Interstate: Resting
Mobile	220102011S	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5);Rural Interstate: Start
Mobile	220102011T	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5);Rural Interstate: Tire Wear
Mobile	220102011V	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5);Rural Interstate: Eva (except Refueling)
Mobile	220102011X	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5);Rural Interstate: Exhaust
Mobile	220107011B	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Brake Wear
Mobile	220107011I	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Idle
Mobile	220107011R	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Resting
Mobile	220107011S	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Start
Mobile	220107011T	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Tire Wear
Mobile	220107011V	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Eva (except Refueling)
Mobile	220107011X	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Exhaust
Mobile	220361008B	Mobile Sources; Highway Vehicles - Compressed Natural Gas (CNG);Combination Short-haul Truck; All on and off-network processes except refueling: Brake Wear

Table 2-3. Assigned SCC to Project Emission Sources

Emission Source	SCC	SCC Description
Mobile	220361008I	Mobile Sources; Highway Vehicles - Compressed Natural Gas (CNG);Combination Short-haul Truck; All on and off-network processes except refueling: Idle
Mobile	220361008T	Mobile Sources; Highway Vehicles - Compressed Natural Gas (CNG);Combination Short-haul Truck; All on and off-network processes except refueling: Tire Wear
Mobile	220361008X	Mobile Sources; Highway Vehicles - Compressed Natural Gas (CNG);Combination Short-haul Truck; All on and off-network processes except refueling: Exhaust
Mobile	223000111B	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Vehicles (LDDV);Rural Interstate: Brake Wear
Mobile	223000111T	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Vehicles (LDDV);Rural Interstate: Tire Wear
Mobile	223000111X	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Vehicles (LDDV);Rural Interstate: Exhaust
Mobile	223006011B	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT);Rural Interstate: Brake Wear
Mobile	223006011T	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT);Rural Interstate: Tire Wear
Mobile	223006011X	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT);Rural Interstate: Exhaust
Mobile	223007111B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B;Rural Interstate: Brake Wear
Mobile	223007111I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B;Rural Interstate: Idle
Mobile	223007111T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B;Rural Interstate: Tire Wear
Mobile	223007111X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B;Rural Interstate: Exhaust
Mobile	2230072110	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5;Rural Interstate: Total
Mobile	223007211B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5;Rural Interstate: Brake Wear
Mobile	223007211I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5;Rural Interstate: Idle
Mobile	223007211T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5;Rural Interstate: Tire Wear

Table 2-3. Assigned SCC to Project Emission Sources

Emission Source	SCC	SCC Description
Mobile	223007211X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5;Rural Interstate: Exhaust
Mobile	223007311B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7;Rural Interstate: Brake Wear
Mobile	223007311I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7;Rural Interstate: Idle
Mobile	223007311S	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7;Rural Interstate: Start
Mobile	223007311T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7;Rural Interstate: Tire Wear
Mobile	223007311X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7;Rural Interstate: Exhaust
Mobile	2270000000	Mobile Sources; Off-highway Vehicle Diesel; Compression Ignition Equipment except Rail and Marine; Total
Mobile	22940000H1	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Light-Heavy-Duty Trucks (8501-10000 lbs)
Mobile	22940000H2	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Light-Heavy-Duty Trucks (10000-14000 lbs)
Mobile	22940000HT	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Heavy-Heavy Duty Trucks
Mobile	22940000LD	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Passenger Cars
Mobile	22940000MD	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Medium-Duty Trucks (6000-8500 lbs)
Mobile	22940000MT	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Medium-Heavy Duty Trucks
Mobile	22940000T1	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Light-Duty Trucks (0-3750 lbs)
Mobile	22940000T2	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives - Light-Duty Trucks (3751-5750 lbs)
Mobile	22960000HT	Mobile Sources; Unpaved Roads; All Unpaved Roads; Total: Fugitives - Heavy-Heavy Duty Trucks
Mobile	22960000LD	Mobile Sources; Unpaved Roads; All Unpaved Roads; Total: Fugitives - Passenger Cars
Mobile	22960000MT	Mobile Sources; Unpaved Roads; All Unpaved Roads; Total: Fugitives - Medium-Heavy Duty Trucks
Mobile	22960000T1	Mobile Sources; Unpaved Roads; All Unpaved Roads; Total: Fugitives - Light-Duty Trucks (0-3750 lbs)
Mobile	22960000T2	Mobile Sources; Unpaved Roads; All Unpaved Roads; Total: Fugitives - Light-Duty Trucks (3751-5750 lbs)

2.2.1 Generate Spatial Surrogates for 4-km Domains

As part of the analysis, the Project source emissions need to be spatially allocated to appropriate geographic locations. The emissions can be allocated to modeling grid cells using gridding surrogates. To process the Project emissions, a Project area-based spatial surrogate was developed. The surrogate was developed using the US Environmental Protection Agency (USEPA's) Spatial Allocation Tool,[2] which combines geographical information system (GIS)-based data (shapefiles) and modeling domain definitions to generate the appropriate gridded surrogate data set. The Project sources were then assigned specific surrogates for gridding by cross-referencing the SCCs. As mentioned above, all unmitigated and mitigated Project emissions were distributed in the modeling grid cells where the Project is located as shown in **Figures 2-1a and 2-1b**. The mobile sources are spatially distributed in the site's grid cells and surrounding grid cells, as outlined in **Table 2-2**.

2.2.2 SMOKE 4 km Processing of Project Emissions

SMOKE system was used to process emissions for the Southern California 4-km modeling grid shown in **Figures 2-1a and 2-1b**. A representative week from each month (seven days a month) was used to represent the entire month's emissions. Holidays were modeled separately as if they were a Sunday. SMOKE was applied to perform following tasks:

1. Chemical Speciation: Emission estimates of criteria pollutants were speciated for the SAPRC07 AERO6 chemical mechanism employed in Community Multiscale Air Quality (CMAQ) in SMOKE processing. Speciation profiles compatible with the SAPRC07 AERO6 mechanism from the South Coast Air Quality Management District's (SCAQMD) modeling system were used to be consistent with the regional modeling emissions. Those emissions were then converted into Comprehensive Air Quality Model with extensions (CAMx)-ready formats using CMAQ2CAMx conversion program and species mapping.

2. Temporal Allocation: Annual emission estimates were resolved on an hourly timescale for CAMx modeling. These allocations were determined from the particular source category, specified by the SCC. Monthly, weekly, and diurnal profiles were cross-referenced to the SCCs to provide the appropriate temporal resolution. The temporal profiles were also obtained from the Bay Area Air Quality Management District's (BAAQMD) emissions modeling system, as they were unavailable from SCAQMD.

3. Spatial Allocation: The Project emission estimates were spatially resolved to the grid cells for modeling using spatial surrogates as described above.

2.2.3 QA/QC of Emissions Modeling

Standard quality assurance/quality control (QA/QC) was conducted during all aspects of the SMOKE emissions processing. These steps followed the approach recommended in the USEPA modeling guidance (USEPA, 2007). SMOKE includes quality assurance (QA) and reporting features to keep track of the adjustments at each processing stage and ensure that data integrity is not compromised. Ramboll carefully reviewed the SMOKE log files for error messages and ensured that appropriate source profiles were used. All error records reported during processing were reviewed and resolved. This is important to ensure that source categories are correctly characterized. Ramboll also compared SMOKE input and output emissions: summary tables were generated to compare input inventory totals against model-ready output totals to confirm consistency. Spatial plots were generated to visually verify correct spatial allocation of the emissions.

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[2] https://www.cmascenter.org/sa-tools/documentation/4.2/html/srgtool/SurrogateToolUserGuide_4_2.pdf.

2.2.4 Merge SMOKE Pre-merged Emissions to Generate CAMx-ready Emission Inputs

The final step in the emissions processing is to merge the Project gridded emissions with other regional components through the gridded merge program (MRGUAM) for CAMx. The daily emissions were merged in the time format required by CAMx.

2.2.5 Emissions Summary

Summaries of the unmitigated and mitigated Project gridded CAMx model-ready emissions data are provided in this section. **Tables 2-4 and 2-5** summarize the unmitigated and mitigated Project emission inventory data input to SMOKE from the FF10 data files in pounds per day by source type. **Tables 2-6 and 2-7** present the emissions data after SMOKE processing for unmitigated and mitigated, respectively. The consistency in data in Tables 2-4 and 2-6 and in Tables 2-5 and 2-7 offer confidence in the correct operation of the SMOKE emissions processing for CAMx.

Table 2-4. Unmitigated Project Emission Inventory Data Input to SMOKE by Source Type (lbs/day)

Emission Category	ROG	NOx	PM_{10}	$PM_{2.5}$	SO_2	CO
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Operational Emissions						
On-Road Mobile	45	1,361	388	125	9.6	867
Emergency Generators	2.06	62.1	2	2	0	11
Architectural Coatings	103	0	0	0	0	0
Consumer Products	207	0	0	0	0	0
Landscaping	0.38	0	0.01	0.01	0	4
Off-Road Mobile	7.18	183	0.50	0.50	0	78
Total Operational	**364**	**1,606**	**390**	**127**	**9.6**	**961**
Construction Emissions						
Fugitive Dust	0	0	29.95	4.91	0	0
Off-Road Equipment	75	204	2.16	2.15	0.38	184
Paving	50	0	0	0	0	0
Architectural Coating	111	0	0	0	0	0
On-Road Mobile	3.4	7.4	51	2.2	0.06	5.0
Total Construction	**239**	**212**	**82.6**	**9.3**	**0.45**	**189**
Total	**603**	**1,818**	**473**	**137**	**10**	**1,150**

Abbreviations:
CO - Carbon Monoxide
lbs – Pounds
NOx - Nitrogen Oxides
$PM_{2.5}$. - Particulate Matter less than 2.5 microns in diameter
PM_{10}. - Particulate Matter less than 10 microns in diameter
ROG - Reactive Organic Gas
SO_2 - Sulfur Dioxide

Table 2-5. Mitigated Project Emission Inventory Data Input to SMOKE by Source Type (lbs/day)

Emission Category	ROG lbs/day	NOx lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day	SO_2 lbs/day	CO lbs/day
Operational Emissions						
On-Road Mobile	45	1,341	387	125	9.6	868
Emergency Generators	0.56	0.4	0	0	0	28
Architectural Coatings	103	0	0	0	0	0
Consumer Products	207	0	0	0	0	0
Landscaping	0.38	0	0.01	0.01	0	4
Off-Road Mobile	7.18	91	0.50	0.50	0	78
Total Operational	**363**	**1,432**	**388**	**125**	**10**	**978**
Construction Emissions						
Fugitive Dust	0	0	29.95	4.92	0	0
Off-Road Equipment	23	23	0.57	0.57	0.41	255
Paving	55	0	0	0	0	0
Architectural Coating	50	0	0	0	0	0
On-Road Mobile	3.4	4.1	51	2.2	0.07	5.3
Total Construction	**132**	**27**	**81.1**	**7.7**	**0.47**	**260**
Total	**495**	**1,459**	**469**	**133**	**10**	**1,238**

Abbreviations:
CO - Carbon Monoxide
lbs – Pounds
NOx - Nitrogen Oxides
$PM_{2.5.}$ - Particulate Matter less than 2.5 microns in diameter
$PM_{10.}$ - Particulate Matter less than 10 microns in diameter
ROG - Reactive Organic Gas
SO_2 - Sulfur Dioxide

Table 2-6. Unmitigated Project Emission Inventory Data Output from SMOKE by Project Region (lbs/day)

Type	ROG	NOx	PM_{10}	$PM_{2.5}$	SO_2	CO
Onsite	573.4	608.4	183.5	38.0	1.1	459.7
Offsite	29.7	1,209.3	289.1	98.6	9.0	690.4
Total	**603**	**1,818**	**473**	**137**	**10**	**1,150**

Abbreviations:
CO - Carbon Monoxide
NOx - Nitrogen Oxides
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in diameter
PM_{10} - Particulate Matter less than 10 microns in diameter
SO_2 - Sulfur Dioxide
VOC - Volatile Organic Compounds

Table 2-7. Mitigated Project Emission Inventory Data Output from SMOKE by Project Region (lbs/day)

Type	ROG	NOx	PM_{10}	$PM_{2.5}$	SO_2	CO
Onsite	465.4	271.1	180.0	34.6	1.1	547.8
Offsite	29.3	1,187.9	289.1	98.6	9.0	690.5
Total	**495**	**1,459**	**469**	**133**	**10**	**1,238**

Abbreviations:
CO - Carbon Monoxide
NOx - Nitrogen Oxides
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in diameter
PM_{10} - Particulate Matter less than 10 microns in diameter
SO_2 - Sulfur Dioxide
VOC - Volatile Organic Compounds

Spatial displays of the gridded emissions data are presented below. Ramboll examined the gridded emissions in 4-km grid to verify accurate spatial allocation by SMOKE. **Figures 2-2 through 2-7** displays gridded emissions for the unmitigated Project inventory in the 4-km modeling grid and **Figures 2-8 through 2-13** displays gridded emissions for the mitigated Project inventory in the 4-km modelling grid.

Figure 2-2. Spatial Distribution of Unmitigated CO Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

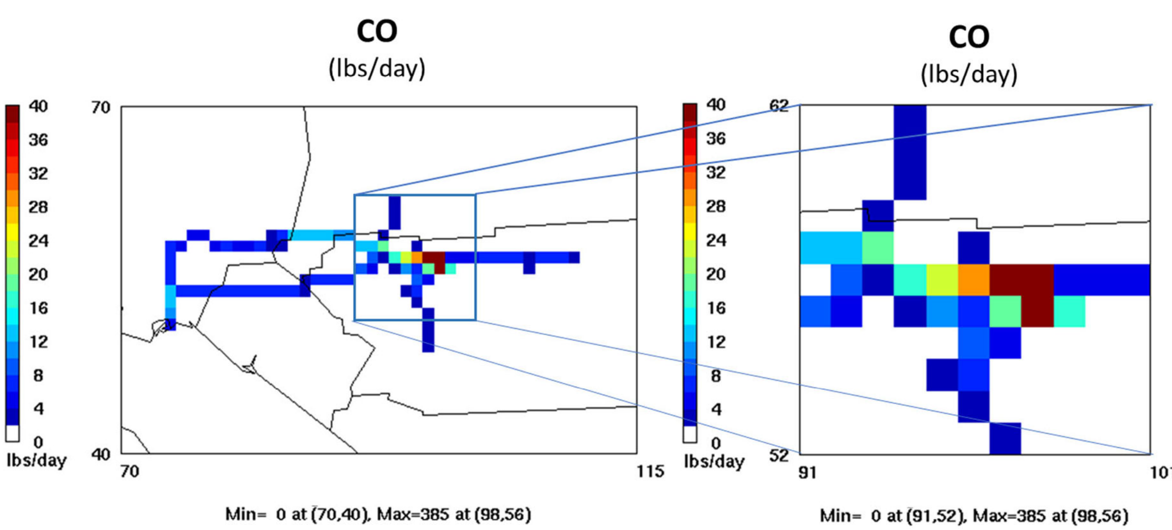


Figure 2-3. Spatial Distribution of Unmitigated NO_x Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

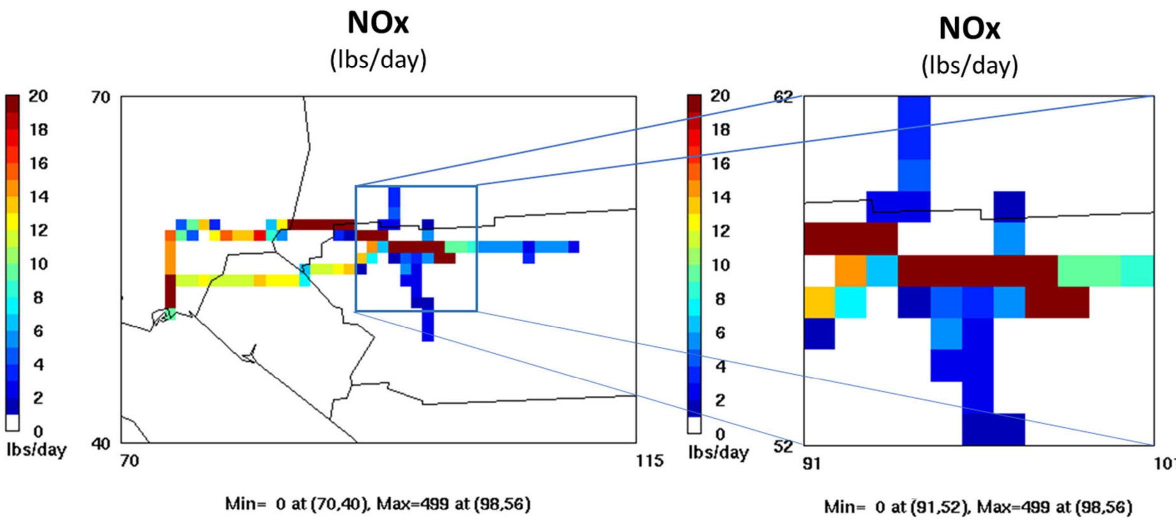


Figure 2-4. Spatial Distribution of Unmitigated VOC Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

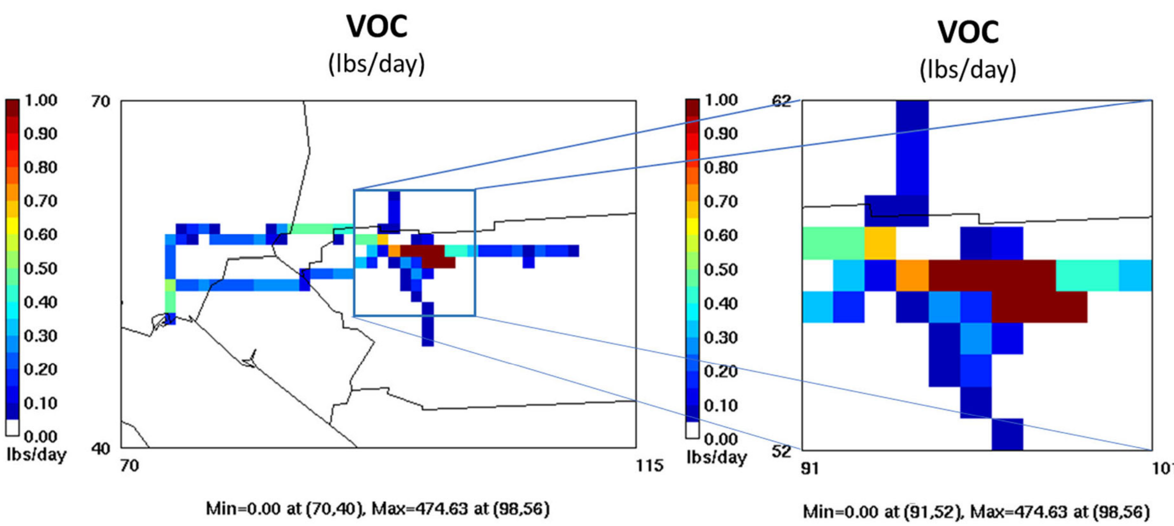


Figure 2-5. Spatial Distribution of Unmitigated SO2 Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

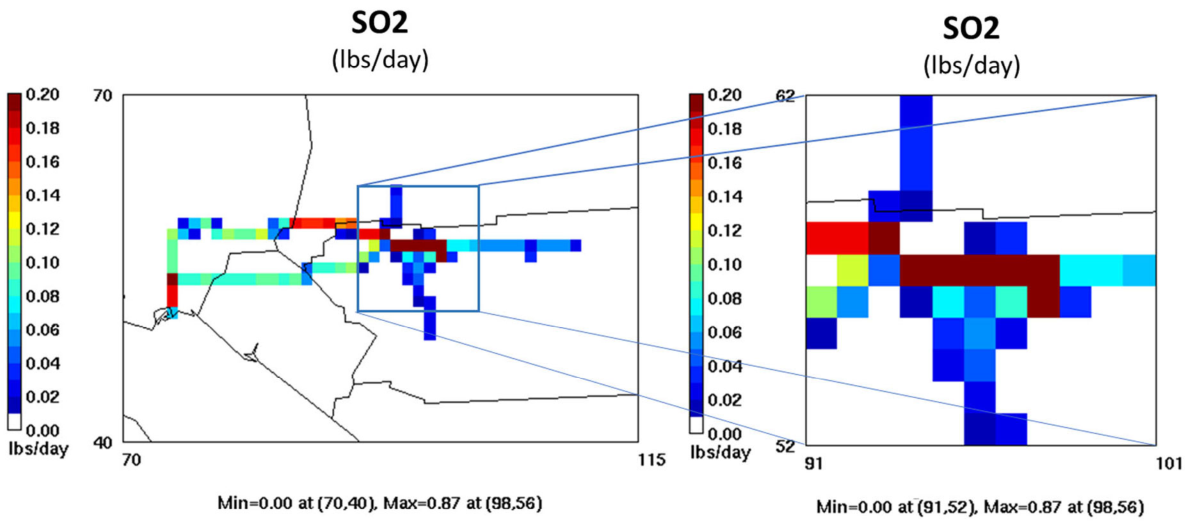


Figure 2-6. Spatial Distribution of Unmitigated PM10 Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

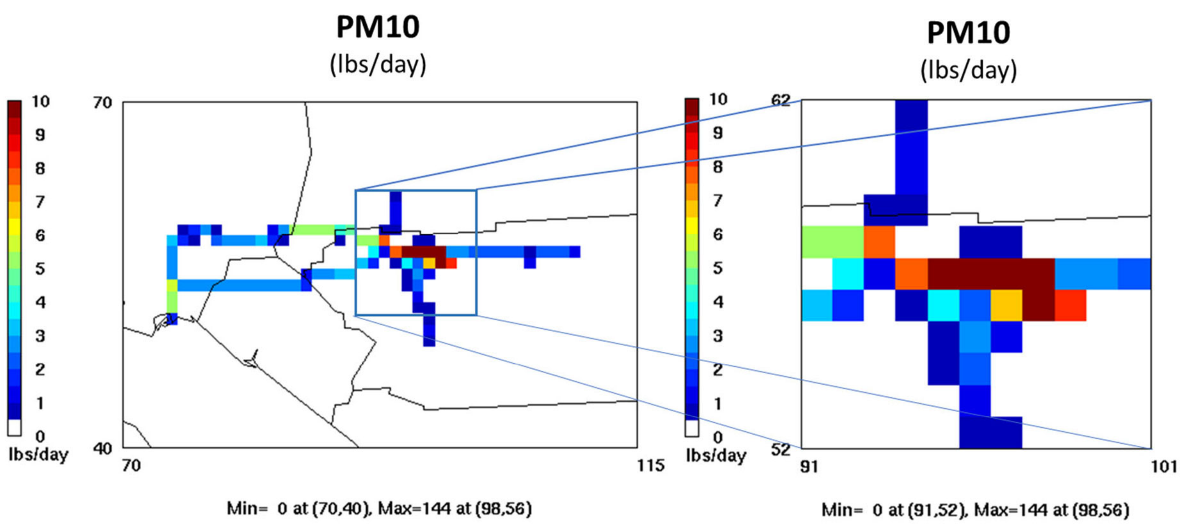


Figure 2-7. Spatial Distribution of Unmitigated PM2.5 Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

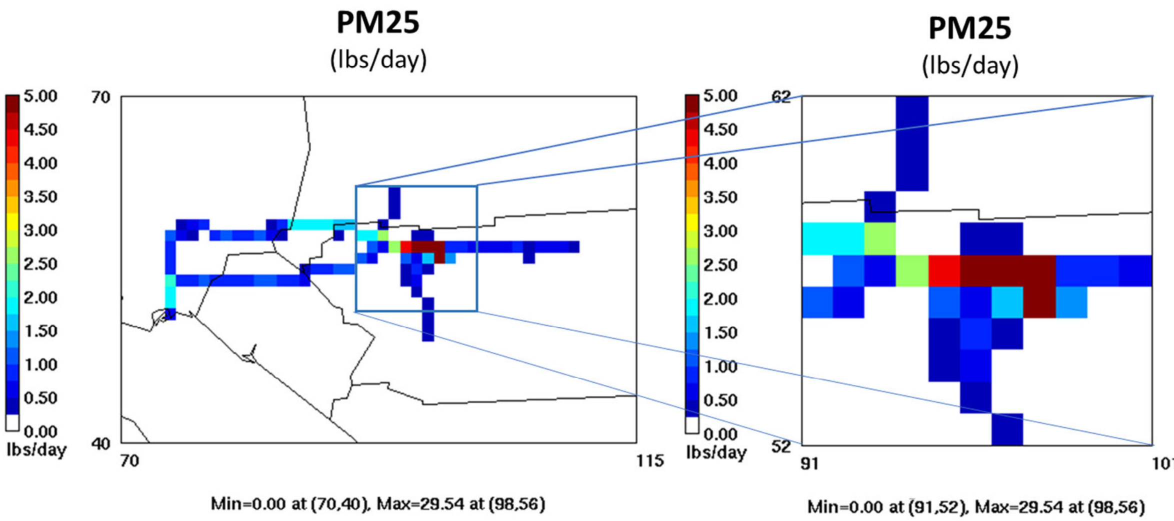


Figure 2-8. Spatial Distribution of Mitigated CO Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

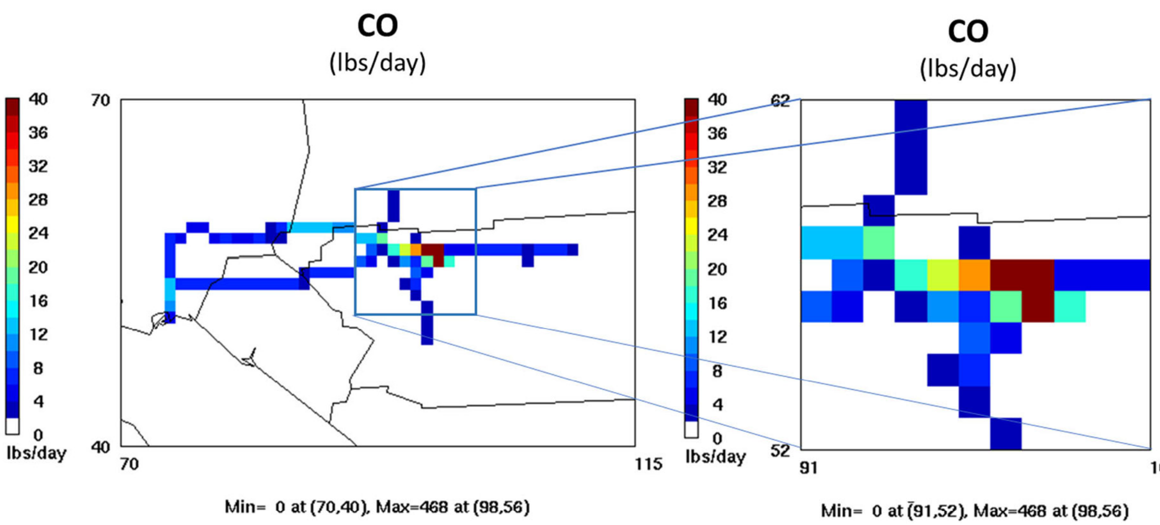


Figure 2-9. Spatial Distribution of Mitigated NO_x Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

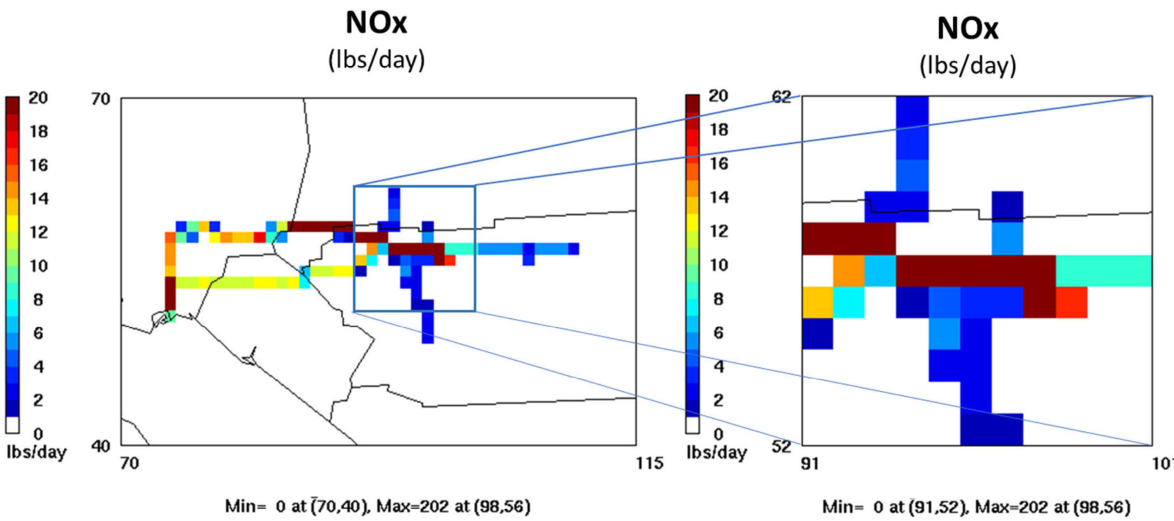


Figure 2-10. Spatial Distribution of Mitigated VOC Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

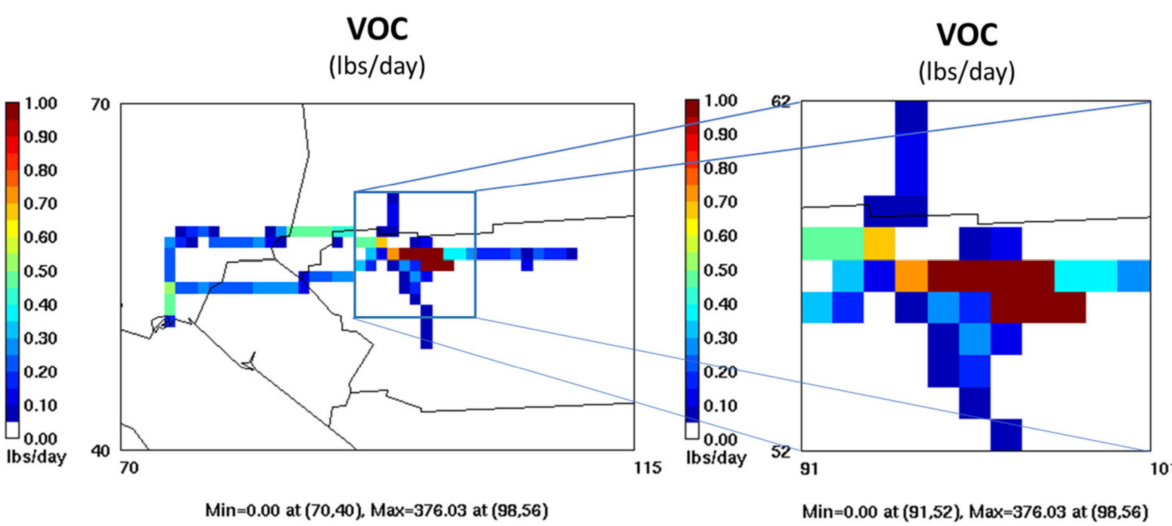


Figure 2-11. Spatial Distribution of Mitigated SO_2 Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

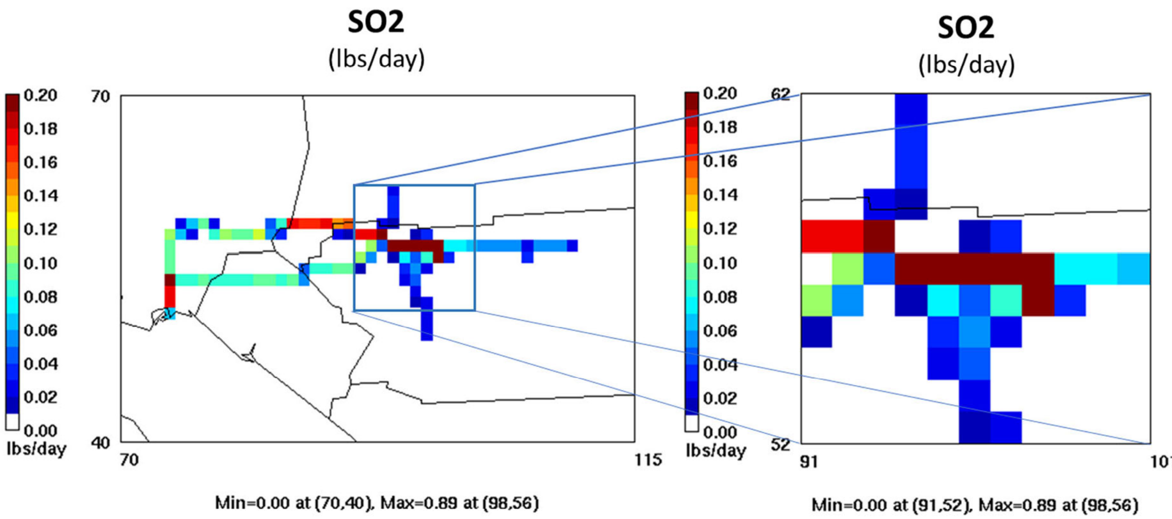


Figure 2-12. Spatial Distribution of Mitigated PM_{10} Emissions (in lbs/day) for the Project in the Southern California 4-km Domain

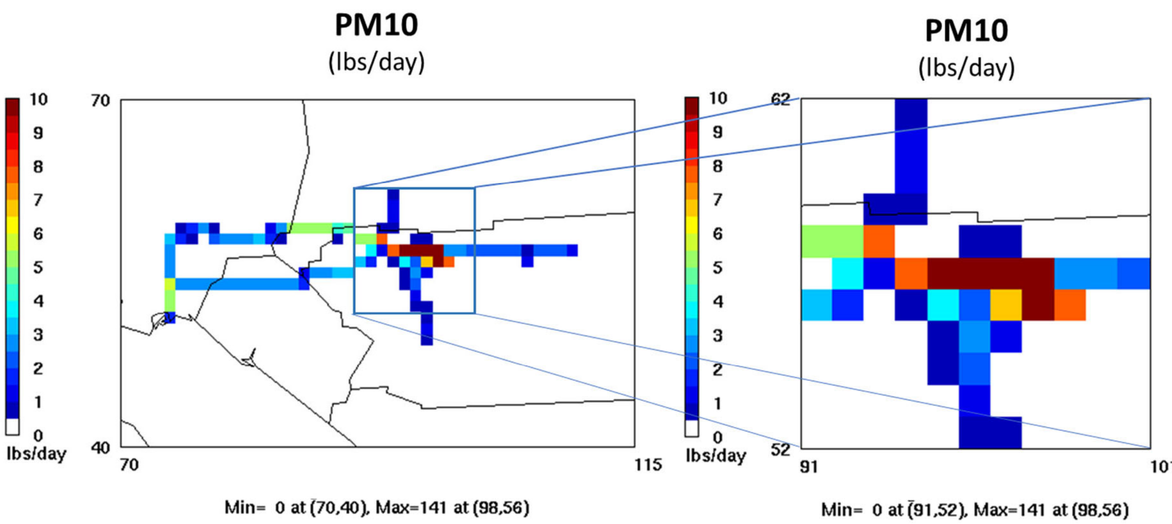
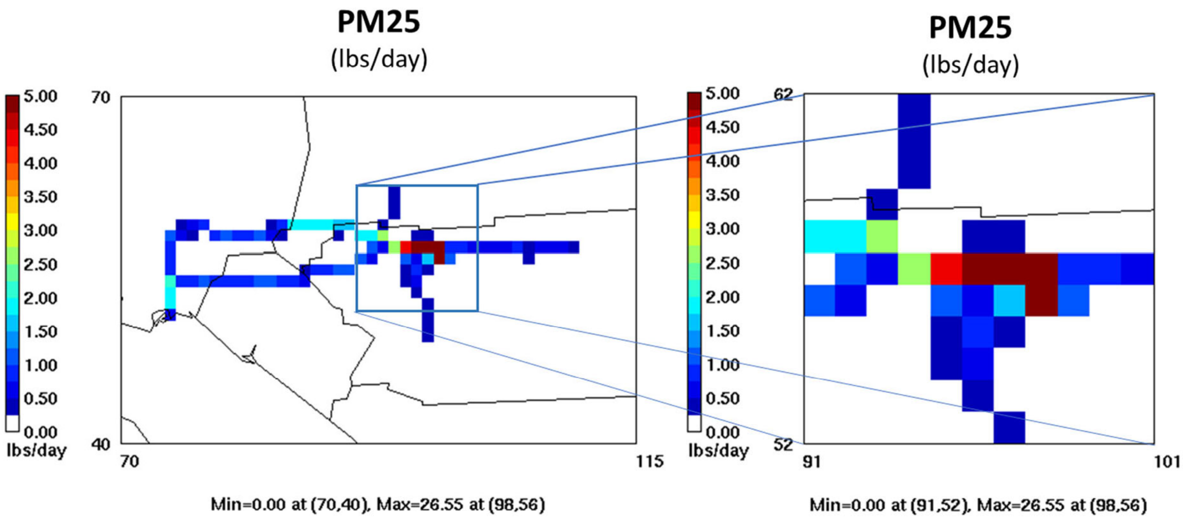


Figure 2-13. Spatial Distribution of Mitigated $PM_{2.5}$ Emissions (in lbs/day) for the Project in the Southern California 4-km Domain



3. CUMULATIVE EMISSIONS

Maximum daily operational and construction emissions were estimated for 349 projects (herein referred to as "cumulative projects") in the region surrounding the Project, as described further in Section 6.3 of the Draft Recirculated RSFEIR. Maximum daily operational emissions for all cumulative projects are reflective of year 2035, consistent with the full buildout year for the Project. Construction emissions vary by project but occur within years 2020 through year 2035. To capture both potential operational and construction emissions from the cumulative projects in a single year, either maximum daily operational or construction emissions were used for each project, evaluated on a pollutant basis. Resulting maximum daily emissions for each of the cumulative projects are shown in **Table 3-1** below.

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
B-001	159.63	376.90	682.82	1.90	230.13	64.81
B-002	17.12	15.71	101.66	0.25	30.84	8.66
B-003	44.60	125.63	190.78	0.53	64.30	18.11
B-004	292.73	62.82	146.98	0.71	82.18	23.03
B-005	63.58	60.33	176.22	0.86	96.70	27.35
B-006	312.85	72.13	295.58	1.28	165.89	44.92
B-007	20.93	62.82	83.39	0.23	28.10	7.91

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
B-008	31.35	125.63	134.08	0.37	45.19	13.09
B-009	215.26	546.63	920.77	2.56	310.33	87.39
B-010	30.79	73.66	43.56	0.11	10.53	6.54
B-011	104.50	98.54	140.66	0.27	34.90	12.01
B-012	8.37	7.67	49.67	0.12	15.07	4.23
B-013	91.43	251.27	391.07	1.09	131.80	37.12
B-014	33.86	125.63	144.84	0.40	48.82	13.75
C-001	103.21	87.59	125.03	0.24	31.02	8.71
C-002	319.38	499.42	877.00	2.29	296.44	81.82
C-003	67.60	31.84	45.45	0.09	11.28	3.17
H-001	30.44	62.82	121.67	0.34	41.01	11.55
H-002	22.83	62.82	91.04	0.25	30.68	8.64
H-003	45.04	125.63	192.64	0.54	64.93	18.28
H-004	292.08	62.82	221.02	0.99	123.91	33.88
H-005	38.99	9.21	13.07	0.03	3.24	0.91
H-006	315.70	298.17	425.61	0.81	105.59	29.65
H-007	30.23	62.82	48.10	0.08	10.53	6.55
H-008	20.38	62.82	89.12	0.19	22.30	6.55
H-009	15.95	11.89	80.48	0.14	16.60	4.83
M-001	333.75	106.20	69.14	0.30	36.23	10.03
M-002	126.64	303.00	298.23	2.27	198.18	56.08
M-003	359.18	176.72	128.30	1.17	92.10	26.35
M-004	101.14	47.70	68.08	0.13	16.89	4.74
M-005	184.81	222.58	253.57	1.79	163.11	46.13
M-006	101.90	42.48	34.98	0.15	20.47	12.01
M-007	313.29	73.66	43.56	0.27	21.45	6.54
M-008	300.51	532.68	1,476.21	5.11	660.05	179.57

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
M-009	27.88	62.82	40.79	0.08	10.53	6.55
M-010	259.30	68.24	42.18	0.23	17.75	6.54
M-011	62.32	29.34	41.89	0.08	10.39	2.92
MV-001	141.34	133.36	190.36	0.36	47.23	13.26
MV-002	39.47	62.82	92.67	0.24	29.94	8.42
MV-003	280.95	125.91	115.21	0.92	77.77	22.15
MV-004	24.22	25.70	79.45	0.38	44.42	12.45
MV-005	108.06	50.96	72.74	0.14	18.05	5.07
MV-006	347.82	73.66	43.56	0.30	23.82	6.81
MV-007	17.70	42.48	22.27	0.05	20.47	12.01
MV-008	32.90	68.24	42.18	0.10	10.53	6.54
MV-009	7.12	42.48	22.27	0.04	10.53	6.54
MV-010	26.70	68.24	42.18	0.10	10.53	6.54
MV-011	13.75	42.48	22.27	0.05	20.47	12.01
MV-012	4.28	7.07	29.64	0.12	15.38	4.16
MV-013	55.83	9.32	8.06	0.02	2.01	0.66
MV-014	22.14	73.66	43.56	0.11	10.53	6.55
MV-015	35.69	73.66	43.56	0.11	10.53	6.54
MV-016	18.26	68.24	42.18	0.10	10.53	6.54
MV-017	31.11	73.66	43.56	0.11	10.53	6.54
MV-018	0.44	2.41	3.44	0.01	0.85	0.24
MV-019	3.70	2.76	18.68	0.03	3.85	1.12
MV-020	7.49	41.08	58.63	0.11	14.55	4.08
MV-021	74.37	26.80	29.64	0.12	15.38	4.16
MV-022	1.93	1.51	8.28	0.02	2.79	0.79
MV-023	74.90	73.66	74.24	0.18	22.52	6.54
MV-024	24.12	62.82	40.79	0.09	11.09	6.55

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
MV-025	26.27	73.66	43.56	0.11	10.53	6.54
MV-026	32.40	73.66	43.56	0.11	10.53	6.54
MV-027	19.03	42.48	22.27	0.04	10.53	6.54
MV-028	28.42	42.48	22.27	0.05	20.47	12.01
MV-029	28.42	62.82	56.90	0.16	19.18	6.55
MV-030	26.91	73.66	43.56	0.11	10.53	6.54
MV-031	30.08	68.24	42.18	0.10	10.53	6.54
MV-032	23.78	73.66	43.56	0.11	10.53	6.55
MV-033	30.64	68.24	42.18	0.10	10.53	6.54
MV-034	29.52	68.24	42.18	0.10	10.53	6.54
MV-035	14.32	42.48	22.27	0.05	20.47	12.01
MV-036	1.68	1.54	9.97	0.02	3.02	0.85
MV-037	40.05	38.00	111.00	0.54	60.91	17.23
MV-038	11.21	11.90	36.79	0.18	20.57	5.77
MV-039	41.34	43.88	135.62	0.65	75.83	21.25
MV-040	91.42	21.38	17.08	0.04	4.05	2.46
MV-041	384.38	88.36	64.15	0.59	46.05	13.17
MV-042	207.10	68.24	42.18	0.18	14.18	6.54
MV-043	13.77	13.07	38.17	0.19	20.94	5.92
MV-044	294.12	73.66	49.08	0.45	35.23	10.08
MV-045	80.96	38.16	54.46	0.10	13.51	3.79
MV-046	8.47	23.30	16.91	0.15	12.14	3.47
MV-047	9.25	42.48	22.27	0.05	20.47	12.01
MV-048	47.85	57.78	236.77	1.03	132.88	35.98
MV-049	50.28	60.72	248.81	1.08	139.64	37.81
MV-050	9.17	9.73	30.08	0.14	16.82	4.71
MV-051	19.88	21.10	65.21	0.31	36.46	10.22

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
MV-052	22.71	24.10	74.51	0.36	41.66	11.68
MV-053	27.68	76.17	55.30	0.50	39.70	11.36
MV-054	293.41	105.91	76.89	0.70	55.20	15.79
MV-056	9.25	42.48	22.27	0.05	20.47	12.01
MV-057	21.07	68.24	42.18	0.10	10.53	6.54
MV-058	0.39	0.30	1.66	0.005	0.56	0.16
MV-059	35.69	73.66	43.56	0.11	10.53	6.54
MV-060	29.81	73.66	43.56	0.11	10.53	6.54
MV-061	92.91	78.83	112.53	0.22	27.92	7.84
MV-062	28.13	62.82	112.36	0.31	37.87	10.66
MV-063	33.43	62.82	45.73	0.13	15.41	6.55
MV-064	28.20	73.66	43.56	0.11	10.53	6.54
MV-065	18.33	42.48	22.27	0.04	10.53	6.54
MV-066	78.83	68.24	44.69	0.11	13.56	6.54
MV-067	24.42	62.82	40.79	0.09	11.23	6.55
MV-068	106.87	42.48	22.27	0.07	10.53	6.54
MV-069	10.15	9.63	28.13	0.14	15.44	4.37
MV-070	75.70	68.24	42.91	0.10	13.02	6.54
MV-071	17.29	42.48	22.27	0.04	10.53	6.54
MV-072	15.26	21.38	15.73	0.03	4.05	2.46
MV-073	30.30	42.48	22.27	0.05	20.47	12.01
MV-074	21.80	62.82	40.79	0.08	10.53	6.55
MV-075	38.91	125.63	196.29	0.35	40.48	13.09
MV-076	144.64	136.49	194.82	0.37	48.33	13.57
MV-077	247.25	73.66	45.18	0.22	25.26	7.08
MV-078	13.44	14.26	44.08	0.21	24.65	6.91
MV-079	170.32	42.48	24.86	0.15	20.47	12.01

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
MV-080	41.29	21.38	27.69	0.05	6.87	2.46
MV-081	15.50	42.66	30.97	0.28	22.23	6.36
MV-082	11.07	30.47	22.12	0.20	15.88	4.54
MV-083	9.20	9.76	30.18	0.15	16.87	4.73
MV-084	2.58	2.74	8.47	0.04	4.74	1.33
MV-085	72.32	61.32	87.52	0.17	21.71	6.54
MV-086	3.43	2.69	14.69	0.04	4.95	1.39
MV-087	21.11	42.48	22.27	0.04	10.53	6.54
MV-088	15.26	9.05	8.05	0.01	0.92	0.66
MV-089	15.26	9.05	8.05	0.01	0.92	0.66
MV-090	13.79	9.03	8.05	0.01	1.13	0.66
MV-091	28.20	73.66	43.56	0.11	10.53	6.54
MV-093	3.36	3.08	19.94	0.05	6.05	1.70
MV-094	83.53	73.66	47.36	0.12	14.37	6.54
MV-095	90.34	76.64	109.40	0.21	27.14	7.62
MV-096	44.13	73.66	43.56	0.11	10.53	6.54
MV-097	32.38	62.82	44.28	0.12	14.92	6.55
MV-098	9.25	42.48	22.27	0.05	20.47	12.01
MV-099	30.30	42.48	22.27	0.05	20.47	12.01
MV-100	60.98	68.24	42.18	0.10	10.53	6.54
MV-101	16.92	9.03	8.05	0.01	1.40	0.66
MV-102	78.08	26.80	16.75	0.04	5.61	2.64
MV-103	94.99	42.48	22.27	0.08	10.53	6.54
MV-104	173.12	42.48	24.97	0.15	20.47	12.01
MV-105	15.26	9.05	8.05	0.01	0.92	0.66
MV-106	15.26	9.05	8.05	0.01	0.92	0.66
MV-107	10.37	21.38	15.09	0.03	4.05	2.46

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
MV-108	5.75	8.94	8.05	0.01	0.92	0.66
MV-109	53.45	125.63	228.64	0.64	77.06	21.70
MV-110	21.11	42.48	22.27	0.04	10.53	6.54
MV-111	10.26	21.38	15.45	0.03	4.05	2.46
MV-112	19.01	9.06	8.05	0.01	0.92	0.66
MV-113	29.72	62.82	40.79	0.08	10.53	6.55
MV-114	10.81	8.94	8.05	0.01	0.92	0.66
MV-115	0.90	8.94	8.05	0.01	0.92	0.66
MV-116	14.32	42.48	22.27	0.05	20.47	12.01
MV-117	48.43	21.38	16.04	0.03	4.05	2.46
MV-118	10.37	21.38	15.09	0.03	4.05	2.46
MV-119	19.95	68.24	42.18	0.10	10.53	6.54
MV-120	97.82	83.00	118.48	0.23	29.39	8.25
MV-121	8.31	8.94	8.05	0.01	0.92	0.66
MV-123	26.18	9.12	8.75	0.02	2.17	0.66
MV-124	72.32	61.32	87.52	0.17	21.71	6.54
MV-125	15.26	21.38	15.73	0.03	4.05	2.46
MV-126	24.32	62.82	48.63	0.14	16.39	6.55
P-001	6.63	5.19	28.35	0.08	9.55	2.69
P-002	13.29	36.56	26.54	0.24	19.06	5.45
P-003	10.24	28.17	20.45	0.19	14.68	4.20
P-004	88.81	42.48	22.27	0.07	10.53	6.54
P-005	213.42	68.24	42.18	0.19	14.61	6.54
P-006	278.31	73.66	50.86	0.24	28.44	7.97
P-007	315.44	62.82	100.86	0.49	56.39	15.81
P-008	111.93	42.48	22.27	0.10	20.47	12.01
P-009	297.77	73.66	44.09	0.21	24.20	6.84

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
P-010	37.65	103.60	75.21	0.69	53.99	15.45
P-011	30.36	28.80	84.14	0.41	46.17	13.06
P-012	210.69	68.24	42.18	0.19	21.52	6.54
P-014	318.13	73.66	53.09	0.48	38.11	10.90
P-015	17.29	47.58	34.54	0.32	24.80	7.09
P-016	29.01	79.83	57.96	0.53	41.61	11.90
P-017	12.84	35.34	25.66	0.23	18.42	5.27
P-018	34.26	94.27	68.44	0.62	49.13	14.06
P-019	15.45	42.51	30.86	0.28	22.16	6.34
P-020	19.30	53.11	38.56	0.35	27.68	7.92
P-021	3.76	10.36	7.52	0.07	5.40	1.54
P-022	176.35	42.48	25.12	0.15	20.47	12.01
P-023	92.93	42.48	22.27	0.07	10.53	6.54
P-024	388.08	89.21	64.77	0.59	46.50	13.30
P-025	481.27	73.66	45.92	0.42	32.97	9.43
P-026	376.38	73.66	68.80	0.33	38.47	10.78
P-027	19.13	52.65	38.22	0.35	27.44	7.85
P-028	310.75	73.66	56.79	0.27	31.76	8.90
P-030	25.50	62.82	101.80	0.28	34.31	9.66
P-031	26.33	42.48	22.27	0.05	10.53	6.54
P-032	298.19	281.62	401.98	0.77	99.73	28.00
P-033	89.97	188.45	384.86	1.07	129.71	36.53
P-034	392.21	192.98	140.11	1.28	100.58	28.77
P-035	25.27	21.38	16.24	0.03	4.05	2.46
P-036	295.79	232.06	183.83	1.45	117.29	33.51
P-037	8.85	6.93	37.87	0.11	12.76	3.59
P-038	10.79	8.44	46.14	0.13	15.55	4.38

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
P-039	363.44	73.66	43.56	0.32	24.89	7.12
P-040	25.21	73.66	43.56	0.11	10.53	6.55
P-041	77.34	42.48	22.27	0.06	10.53	6.54
P-042	34.59	68.24	42.18	0.10	10.53	6.54
P-043	32.33	68.24	42.18	0.10	10.53	6.54
P-044	29.67	42.48	22.27	0.05	20.47	12.01
P-045	26.33	42.48	22.27	0.05	10.53	6.54
P-046	24.80	62.82	57.64	0.10	11.89	6.55
P-047	26.99	62.82	107.80	0.30	36.33	10.23
P-048	42.44	73.66	43.56	0.11	10.53	6.54
P-049	23.58	73.66	43.56	0.11	10.53	6.55
P-050	74.37	35.04	50.01	0.10	12.41	3.48
P-051	19.95	68.24	42.18	0.10	10.53	6.54
P-052	26.59	73.66	43.56	0.11	10.53	6.54
P-053	24.42	62.82	40.79	0.09	11.23	6.55
P-054	24.63	62.82	49.25	0.14	16.60	6.55
P-055	208.76	197.09	281.32	0.54	69.80	19.60
P-056	18.50	9.04	8.05	0.01	0.92	0.66
P-057	77.42	9.50	8.32	0.02	1.32	0.66
P-058	175.42	42.48	25.96	0.13	20.47	12.01
P-059	25.14	62.82	50.28	0.14	16.95	6.55
P-060	8.58	8.94	8.05	0.01	0.92	0.66
P-061	7.75	21.33	15.48	0.14	11.12	3.18
R-001	44.32	53.52	219.33	0.95	123.10	33.33
R-002	12.90	35.51	25.78	0.24	18.51	5.29
R-003	16.85	17.88	55.27	0.27	30.90	8.66
R-004	67.87	68.24	42.18	0.10	11.67	6.54

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
R-005	231.96	73.66	185.24	0.74	96.09	26.00
R-006	27.03	42.48	22.27	0.05	10.53	6.54
R-007	52.22	24.57	35.07	0.07	8.70	2.46
R-008	11.83	42.48	22.27	0.05	20.47	12.01
R-009	701.42	3,844.34	5,487.47	10.50	1,361.41	382.27
R-010	43.91	10.32	14.73	0.03	3.65	1.03
R-011	158.12	42.48	54.33	0.24	30.49	12.01
R-012	57.11	26.88	38.37	0.07	9.52	2.67
R-013	7.00	8.94	8.05	0.01	0.92	0.66
R-014	7.39	8.94	8.05	0.01	0.92	0.66
R-015	26.03	62.82	40.79	0.10	11.97	6.55
R-016	3.68	8.94	8.05	0.01	0.92	0.66
R-017	86.35	73.66	48.96	0.12	14.85	6.54
R-018	233.52	320.38	766.09	3.69	428.35	120.05
R-019	19.37	42.48	22.27	0.04	10.53	6.54
R-020	387.41	89.06	64.66	0.59	46.42	13.28
R-021	9.63	42.48	22.27	0.04	10.53	6.54
R-022	10.37	21.38	15.09	0.03	4.05	2.46
R-023	15.14	9.03	8.05	0.01	1.25	0.66
R-024	241.87	591.67	1,034.58	2.88	348.69	98.19
R-025	65.37	68.24	42.18	0.10	11.23	6.54
R-026	268.27	169.90	321.69	0.98	122.05	33.93
R-027	6.95	8.94	8.05	0.01	0.92	0.66
R-028	24.21	73.66	43.56	0.11	10.53	6.54
R-029	7.28	8.94	8.05	0.01	0.92	0.66
R-030	107.62	91.35	130.39	0.25	32.35	9.08
R-031	22.77	21.38	16.09	0.03	4.05	2.46

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
R-032	41.51	9.75	13.92	0.03	3.45	0.97
R-033	19.02	21.38	15.92	0.03	4.05	2.46
R-034	22.79	9.04	8.05	0.01	0.92	0.66
R-035	32.18	42.48	22.27	0.05	20.47	12.01
R-036	21.81	42.48	22.27	0.04	10.53	6.54
R-037	11.36	8.94	8.05	0.01	0.93	0.66
R-038	6.73	8.94	8.05	0.01	0.92	0.66
R-039	20.88	62.82	83.18	0.23	28.03	7.89
R-040	4.69	8.94	8.05	0.01	0.92	0.66
R-041	43.09	9.22	8.05	0.01	1.55	0.66
R-042	30.95	62.82	123.74	0.34	41.70	11.74
R-043	28.39	68.24	42.18	0.10	10.53	6.54
R-044	7.66	8.94	8.05	0.01	0.92	0.66
R-045	70.54	9.49	8.23	0.02	2.54	0.69
R-046	20.42	68.24	42.18	0.10	10.53	6.54
R-047	100.07	21.38	17.27	0.04	4.05	2.46
R-048	70.01	32.98	47.07	0.09	11.68	3.28
R-049	26.21	62.82	41.65	0.08	10.53	6.55
R-050	4.56	21.38	15.01	0.03	4.05	2.46
R-051	4.62	8.94	8.05	0.01	0.92	0.66
R-052	18.26	68.24	42.18	0.10	10.53	6.54
R-053	16.57	42.48	22.27	0.05	20.47	12.01
R-054	14.32	42.48	22.27	0.05	20.47	12.01
R-055	11.50	42.48	22.27	0.05	20.47	12.01
R-056	67.70	42.48	22.27	0.07	10.53	6.54
R-057	88.61	42.48	22.27	0.07	10.53	6.54
R-058	5.33	8.94	8.05	0.01	0.92	0.66

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
R-059	7.75	8.94	8.05	0.01	0.92	0.66
R-060	94.37	26.80	17.12	0.07	9.09	2.64
R-061	197.38	186.33	265.97	0.51	65.99	18.53
R-062	3.64	8.94	8.05	0.01	0.92	0.66
R-063	13.39	21.38	15.65	0.03	4.05	2.46
R-064	5.87	21.38	15.01	0.03	4.05	2.46
R-065	35.15	68.24	42.18	0.10	10.53	6.54
R-066	11.64	9.03	8.05	0.01	0.95	0.66
RC-001	60.52	188.45	258.85	0.72	87.24	24.57
RC-002	96.75	251.27	413.83	1.15	139.48	39.28
RC-003	165.05	376.90	706.00	1.96	237.95	67.01
RC-005	36.28	125.63	155.19	0.43	52.30	14.73
RC-006	278.31	62.82	95.70	0.41	53.71	14.54
RC-007	267.88	96.69	70.19	0.64	50.39	14.42
RC-009	319.91	62.82	84.66	0.41	46.47	13.12
RC-010	262.94	170.02	525.55	2.53	293.85	82.36
RC-011	377.48	73.66	43.56	0.33	25.85	7.40
RC-012	196.58	42.48	35.91	0.17	20.47	12.01
RC-013	25.76	62.82	102.84	0.29	34.66	9.76
RC-014	100.41	73.66	56.97	0.14	17.28	6.54
RC-015	29.31	62.82	40.79	0.08	10.53	6.55
RC-017	17.44	9.03	8.05	0.01	1.44	0.66
RC-018	9.63	42.48	22.27	0.04	10.53	6.54
RC-019	49.16	23.12	33.01	0.06	8.19	2.46
RC-020	5.43	8.94	8.05	0.01	0.92	0.66
RC-021	15.07	9.03	8.05	0.01	0.92	0.66
RC-022	27.06	62.82	40.79	0.08	10.53	6.55

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
RC-023	48.84	21.38	16.08	0.03	4.05	2.46
RC-024	98.49	42.48	22.27	0.08	10.53	6.54
RC-025	79.01	21.38	16.75	0.03	4.05	2.46
RC-026	4.75	8.94	8.05	0.01	0.92	0.66
RC-027	97.40	42.48	22.27	0.08	10.53	6.54
RC-028	10.62	8.94	8.05	0.01	0.92	0.66
RC-029	15.33	9.03	8.05	0.01	1.26	0.66
RC-030	333.77	76.73	55.70	0.51	39.99	11.44
RC-031	93.24	42.48	22.27	0.07	10.53	6.54
RC-032	35.12	125.63	150.22	0.42	50.63	14.26
RC-033	19.95	62.82	79.46	0.22	26.78	7.54
RC-034	22.42	62.82	89.39	0.25	30.13	8.48
RC-035	139.65	314.09	602.02	1.68	204.38	57.49
RC-036	24.27	62.82	96.84	0.27	32.64	9.19
RC-037	29.10	62.82	116.29	0.32	39.19	11.04
RC-038	307.88	111.14	80.69	0.74	57.92	16.57
RC-039	22.20	68.24	42.18	0.10	10.53	6.54
RD-001	3.97	3.10	16.97	0.05	5.72	1.61
RD-002	2.66	2.08	11.38	0.03	3.84	1.08
RD-003	33.37	73.66	43.56	0.11	10.53	6.54
RD-004	37.94	73.66	43.56	0.11	10.53	6.54
RD-005	11.09	30.51	22.15	0.20	15.90	4.55
RD-006	44.93	21.38	30.15	0.06	7.48	2.46
RD-007	118.61	55.95	79.86	0.15	19.81	5.56
RD-008	25.29	42.48	22.27	0.05	20.47	12.01
RD-009	40.83	21.38	27.38	0.05	6.79	2.46
RD-010	75.04	42.48	22.27	0.06	10.53	6.54

Table 3-1. Cumulative Emissions Inventory

Project ID	Maximum Daily Emissions (lb/day)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
RD-011	51.63	24.29	34.67	0.07	8.60	2.46
RD-012	13.31	36.64	26.60	0.24	19.10	5.46
RD-013	22.43	61.73	44.82	0.41	32.17	9.20
RD-014	17.10	47.04	34.15	0.31	24.52	7.01
RD-015	9.37	25.78	18.71	0.17	13.43	3.84
RD-016	15.83	43.56	31.62	0.29	22.70	6.49
SB-001	13.60	37.44	27.18	0.25	19.51	5.58
SB-002	6.94	19.10	13.87	0.13	9.96	2.85
SB-003	13.14	36.17	26.26	0.24	18.85	5.39
SB-004	17.22	47.39	34.40	0.31	24.70	7.07
SB-005	6.24	17.18	12.48	0.11	8.96	2.56
SB-006	12.02	33.09	24.02	0.22	17.24	4.93
SB-007	19.39	68.24	42.18	0.10	10.53	6.54
SB-008	22.76	68.24	42.18	0.10	10.53	6.54
SJ-001	283.22	735.02	1,049.18	2.01	260.30	73.09
SJ-002	16.72	62.82	66.42	0.18	22.39	6.55
SJ-003	30.03	62.82	120.01	0.33	40.45	11.39
SJ-004	31.72	62.82	126.84	0.35	42.75	12.04
Total	**26,381**	**26,742**	**33,893**	**109**	**12,738**	**4,076**

4. REFERENCES

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/3/ USEPA, 2007. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5 and Regional Haze. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA-454/B-07-002.

APPENDIX B
PGM INPUTS, OUTPUTS, AND ASSUMPTIONS
HIGHLAND FAIRVIEW WORLD LOGISTICS CENTER MORENO VALLEY, CALIFORNIA

1. REGIONAL AIR QUALITY MODELING PLATFORM

The Southern California 2012 4- kilometer (km) Comprehensive Air Quality Model with extensions (CAMx)[1] modeling database along with a 2031 emissions database were used in this assessment. The 2012 base case is based on a Photochemical Grid Model (PGM) database developed by the South Coast Air Quality Management District (SCAQMD) as part of the modeling and attainment demonstration for their 2016 Air Quality Management Plan[2]. This PGM database is tailored for Southern California and reflects updated emissions estimates, new technical information and enhanced air quality modeling techniques. The database uses a high-resolution 4-km horizontal grid to better simulate meteorology and air quality in the complex terrain and coastal environment of California. This contrasts with the United States Environmental Protection Agency's (USEPA's) national modeling platforms[3] used for national rulemakings (e.g., transport rules such as CSAPR[4] or defining new National Ambient Air Quality Standards [NAAQS]) that use a coarser 12-km horizontal grid resolution. The model domain is shown in **Figure 1-1**.

Details of the model inputs, configuration, and results are presented in Section 2 of this Appendix.

Figure 1-1. Air Quality Modeling Domain for Southern California

1 http://www.camx.com.

2 http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp.

3 https://www.epa.gov/air-emissions-modeling/2014-2016-version-7-air-emissions-modeling-platforms.

4 https://www.epa.gov/csapr.

2. REGIONAL GRID MODELING

This section describes the regional PGM modeling setup to assess the outcome of the unmitigated and mitigated Project emissions on the ambient Particulate Matter less than 2.5 microns in diameter ($PM_{2.5}$) levels in the region. The 2012 base case modeling databases were developed by the SCAQMD for the Community Multiscale Air Quality (CMAQ) PGM. The CMAQ annual 2012 4-km modeling database and annual 2012 4-km Weather Research and Forecasting (WRF) meteorological model output files were obtained from the SCAQMD. The SCAQMD CMAQ and WRF 2012 4-km data were then processed to generate a 2012 4-km annual PGM modeling database suitable for the CAMx. The following paragraphs describe how Ramboll developed the CAMx 2012 4-km annual database used in this study, starting with the SCAQMD CMAQ and WRF 2012 4-km data. Preparation of the Project unmitigated and mitigated emissions inputs for CAMx is discussed in **Appendix A**.

2.1 Model Inputs and Configuration

The SCAQMD emissions database has both 2012 and 2031 future year projections for CMAQ area and in-line point emissions. Ramboll converted both years' emissions to corresponding CAMx area and point-source emissions files using the CMAQ2CAMx interface program[5]. Sea salt emissions were developed using an emissions processor that integrates published sea spray flux algorithms to estimate sea salt PM emissions for input to CAMx. The CAMx sea salt emissions were then merged with area emissions files.

The most commonly used prognostic meteorological models to provide meteorological fields for air quality modeling are the Weather Research and Forecasting (WRF) model (Skamarock et al., 2005) and the Fifth-Generation Mesoscale Model (MM5; Grell et al, 1994). MM5 is a nonhydrostatic, prognostic meteorological model developed in the 1970s by Pennsylvania State University and the National Center for Atmospheric Research (NCAR) and has been widely used for urban- and regional-scale photochemical, fine particulate, and regional haze regulatory modeling studies. However, development of MM5 ceased in 2006, and WRF has become the new standard model used in place of the older MM5 for regulatory air quality applications in the US. Developed jointly by NCAR and the National Center for Environmental Prediction in late 1990s, WRF has been under continuous development, improvement, testing and open peer-review for more than 10 years and used world-wide by hundreds of researchers and practitioners around the globe for a variety of mesoscale studies. SCAQMD adopted WRF version 3.6 for the 2012 simulations. For the current application, the meteorology remains unchanged for the future year simulation and SCAQMD WRF 2012 4-km model outputs were processed using the WRFCAMx[6] processor to generate the meteorological fields ready for CAMx. The WRF model employs a terrain-following coordinate system defined by pressure, using multiple layers that extend from the surface to 50 millibars (approximately 19 kilometers above ground level [AGL]). A layer averaging scheme is adopted for CAMx simulations to reduce the computational burden. **Table 2-1** presents the mapping from the WRF vertical layer structure to the CAMx vertical layers.

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5 http://www.camx.com/download/support-software.aspx.

6 WRFCAMx is available on the CAMx website (http://www.camx.com/download/support-software.aspx).

Table 2-1. Vertical Layer Structure for WRF and CAMx Modeling

WRF		CAMx			
Layer	**Height (m)**	**Layer**	**Height (m)**	**Thickness (m)**	**Sigma**
30	19260	18	19260	4769	0.0000
29	17456				
28	15900				
27	14492	17	14492	6027	0.0788
26	13185				
25	11945				
24	10755				
23	9597				
22	8465	16	8465	4906	0.2930
21	7345				
20	6237				
19	5177				
18	4295				
17	3559	15	3559	1560	0.6254
16	2944				
15	2430				
14	1999	14	1999	358	0.7733
13	1641	13	1641	300	0.8107
12	1341	12	1341	251	0.8431
11	1090	11	1090	209	0.8709
10	881	10	881	175	0.8946
9	706	9	706	146	0.9148
8	561	8	561	121	0.9319
7	439	7	439	101	0.9463
6	338	6	338	85	0.9585
5	253	5	253	70	0.9688
4	183	4	183	59	0.9774
3	124	3	124	49	0.9846
2	75	2	75	41	0.9907
1	34	1	34	34	0.9958
0	0		0	0	1

The SCAQMD data set provided the lateral boundary conditions (BCs) for the 4-km state-wide modeling grid. The SCAQMD simulated a 12-km domain whose boundary concentrations were extracted from a global model simulation for the year 2012. The Model for Ozone and Related Chemical Tracers Version 4 (MOZART-4; Emmons et al., 2010) is a global chemical transport model developed jointly by NCAR, the Geophysical Fluid Dynamics Laboratory, and the Max Planck Institute for Meteorology, and simulates chemistry and transport of tropospheric gases and bulk aerosols. The 12-km outputs were saved and used to derive the boundary conditions for the 4-km domain. The CMAQ2CAMX processor was used to convert the CMAQ 4-km boundary conditions to suitable CAMx BCs. The model was initialized from clean initial concentrations and five days of spin-up period were used for the 4-km grids to minimize their influence.

Additional data used in the air quality modeling include ozone column data from the Ozone Monitoring Instrument (OMI), which continues the Total Ozone Mapping Spectrometer (TOMS) record for total ozone and other atmospheric parameters related to ozone chemistry (OMI officially replaced the TOMS ozone column satellite data on January 1, 2006). OMI data are available every 24-hours and are obtained from the TOMS ftp site[7]. The CAMx O3MAP program reads the OMI ozone column txt file data and interpolates to fill gaps and generated gridded daily ozone column input data. The OMI data is used in the CAMx (TUV) radiation models, which is a radiative transfer model that develops clear-sky photolysis rate inputs for CAMx. The land use file was generated with the WRFCAMx processor and modified to remove lakes and set coastal waters with a surf zone width of 50 m; this file was used to update the emissions database and provide more realistic representation of sea salt emissions.

Table 2-2 presents the CAMx configuration used for the modeling in this Project analysis. In the past, the Carbon-Bond IV (CB4) chemical mechanism (Gery et al., 1989) has been predominantly used for the California State Implementation Plan (SIP) modeling. In 1999, however, the California Air Resources Board's (CARB's) Reactivity Scientific Advisory Committee recommended switching to the 1999 State-wide Air Pollution Research Center (SAPRC99) chemical mechanism (Carter, 2000) based on a comprehensive review by Stockwell (1999), and SAPRC99 has since been the mechanism of choice for the California SIPs. The 2007 update to the SAPRC chemistry mechanism, called SAPRC07 (Carter, 2010), replaced the dated SAPRC99 mechanism. The version implemented in CAMx is SAPRC07TC, which includes additional model species to explicitly represent selected toxics and reactive organic compounds and uses numerical expressions of rate constants that are compatible with the current chemistry mechanism solver. The partitioning of inorganic aerosol constituents (sulfate, nitrate, ammonium and chloride) between gas and aerosol phases is performed using the ISORROPIA module. The Secondary Organic Aerosol Processor (SOAP) is a semi-volatile equilibrium scheme used to perform the organic aerosol-gas partitioning. These processes are described in more detailed in the CAMx user guide.[8]

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7 ftp://toms.gsfc.nasa.gov/pub/omi/data/.

8 http://www.camx.com/files/camxusersguide_v6-50.pdf

Table 2-2. CAMx Modeling Configuration

Science Option	Configuration	Notes
Model Code	CAMx v6.5	Released April 2018
Horizontal Grid	4-km 1-way nesting	
O3 and PM 4-km	156 x 102 grid cells	
Vertical Grid	18 vertical layers extending up to ~19 km AGL	Collapsed from 30 WRF layers (see Table 3-1)
Initial Conditions	Clean initial conditions	5-day spin-up for 4-km domain
Boundary Conditions	CMAQ 4km lateral concentrations converted to CAMx	
Photolysis Rate	Photolysis rates lookup table	Derived from satellite measurements and TUV processor
Gas-phase Chemistry	SAPRC07TC	Solved by the Euler Backward Iterative (EBI) solver
Aerosol-phase Chemistry	ISORROPIA (inorganic aerosol) SOAP v2.1 (organic aerosol)	
Meteorological Input Pre-processor	WRFCAMx v4.7	
Advection	Piecewise Parabolic Method (PPM)	
Diffusion	Eddy diffusion algorithm	

2.2 Model Results

The future modeling scenario was simulated using the CAMx source apportionment technology. Both cumulative concentrations from all the sources and the concentrations from Project-specific unmitigated and mitigated emissions are derived from separate simulations following the model configuration discussed in the previous section. The model results of hourly $PM_{2.5}$ concentrations were processed into aggregated metrics that are relevant to health effects.

$PM_{2.5}$ Model Results

The metrics relevant to the $PM_{2.5}$ health effects selected in this study are 24-hour annual average concentrations (see **Appendix C**).

Unmitigated Project

Figure 2-1 shows spatial plots of annual average and a single day episode maximum 24-hour average $PM_{2.5}$ concentrations from the base case and the unmitigated Project emissions. In the 2031 base case scenario, the highest concentrations occur in Los Angeles County and the central portion of Imperial County. Annual $PM_{2.5}$ concentrations in these counties generally range between 10 and 20 micrograms per cubic meter ($\mu g/m^3$) with isolated regions that could be higher than 25 $\mu g/m^3$.

Contributions of the unmitigated Project emissions to annual average $PM_{2.5}$ are 0.266 $\mu g/m^3$ at the most impacted area and represent a 3.2 percent increase over the base case concentrations at that location. Contributions to the maximum 24-hour average $PM_{2.5}$ are 0.781 $\mu g/m^3$ at the most impacted area and represent a 2.4 percent increase over the base case concentrations at that location. **Figure 2-2** presents increases in annual average and maximum 24-hour average $PM_{2.5}$ due to the unmitigated Project emissions by $PM_{2.5}$ chemical component at the grid cell of maximum concentration change. The figure shows that on average, the primary concentrations of crustal material (labeled other), elemental carbon and primary organic aerosol account for about 86 percent of the contributions at the location of maximum impact, while the other 14 percent is due to secondary PM (sulfate, ammonium and nitrate). The maximum 24-hr impacts show a larger impact from secondary PM, in particular nitrate alone represents 41 percent of the Project unmitigated scenario contributions.

Figure 2-1. Results of the 4 km $PM_{2.5}$ Modeling Domain
$PM_{2.5}$ Concentrations from the Base Case Scenario (left panels);
Increases in $PM_{2.5}$ due to the Unmitigated Project (center and right panels);
Annual Averages (top panels); Maximum 24-hour Averages (bottom panels)

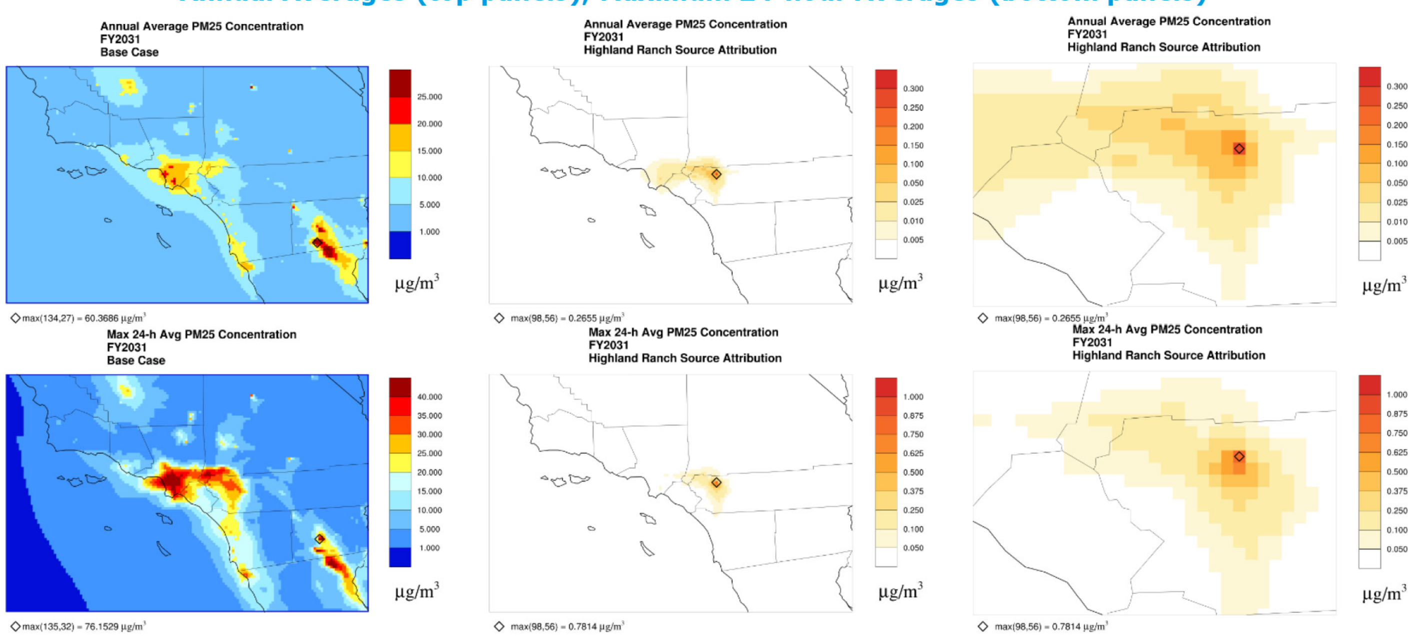
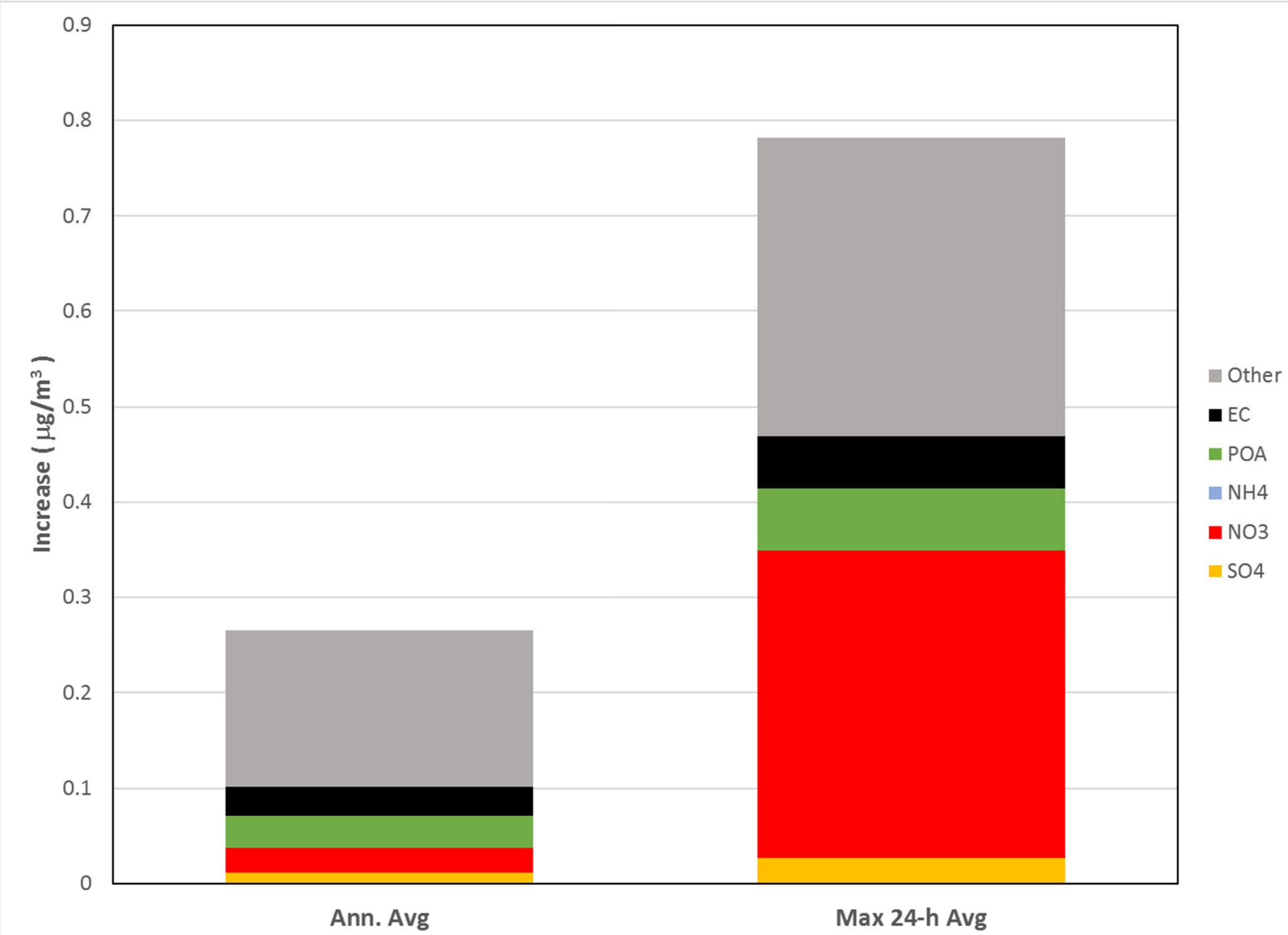


Figure 2-2. Increases in Annual Average and Episode Maximum 24-hour Average $PM_{2.5}$ Concentrations due to the Unmitigated Project by $PM_{2.5}$ Component: fine particulate sulfate (SO_4), nitrate (NO_3), ammonium (NH_4), primary organic aerosol (POA), elemental carbon (EC), and other primary PM (Other); Where the Maximum Change due to Project Emissions Occurred



Mitigated Project

Figure 2-3 shows spatial plots of annual average and a single day episode maximum 24-hour average $PM_{2.5}$ concentrations from the base case and the mitigated Project emissions. Contributions of the mitigated Project emissions to annual average $PM_{2.5}$ are 0.233 $\mu g/m^3$ at the most impacted area and represent a 2.8 percent increase over the base case concentrations at that location. Contributions to the maximum 24-hour average $PM_{2.5}$ are 0.607 $\mu g/m^3$ at the most impacted area and represent a 1.9 percent increase over the base case concentrations at that location. **Figure 2-4** presents increases in annual average and maximum 24-hour average $PM_{2.5}$ due to the mitigated Project emissions by $PM_{2.5}$ chemical component at the grid cell of maximum concentration change. The figure shows that on average, the primary concentrations of crustal material (labeled other), elemental carbon and primary organic aerosol account for about 89 percent of the contributions at the location of maximum impact, while the other 11 percent is due to secondary PM (sulfate, ammonium and nitrate). The maximum 24-hr impacts show a larger impact from secondary PM, in particular nitrate alone represents 31 percent of the Project mitigated scenario contributions.

Figure 2-3. Results of the 4 km $PM_{2.5}$ Modeling Domain
$PM_{2.5}$ Concentrations from the Base Case Scenario (left panels);
Increases in $PM_{2.5}$ due to the Mitigated Project (center and right panels);
Annual Averages (top panels);
Maximum 24-hour Averages (bottom panels)

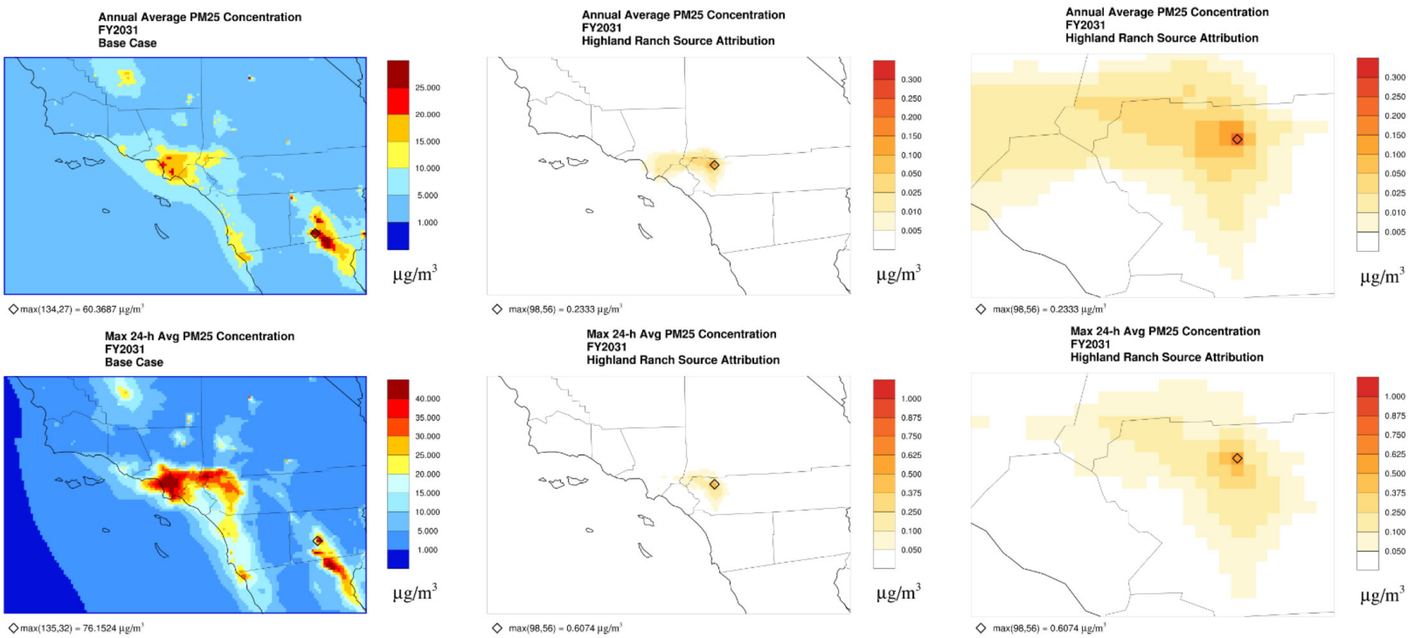
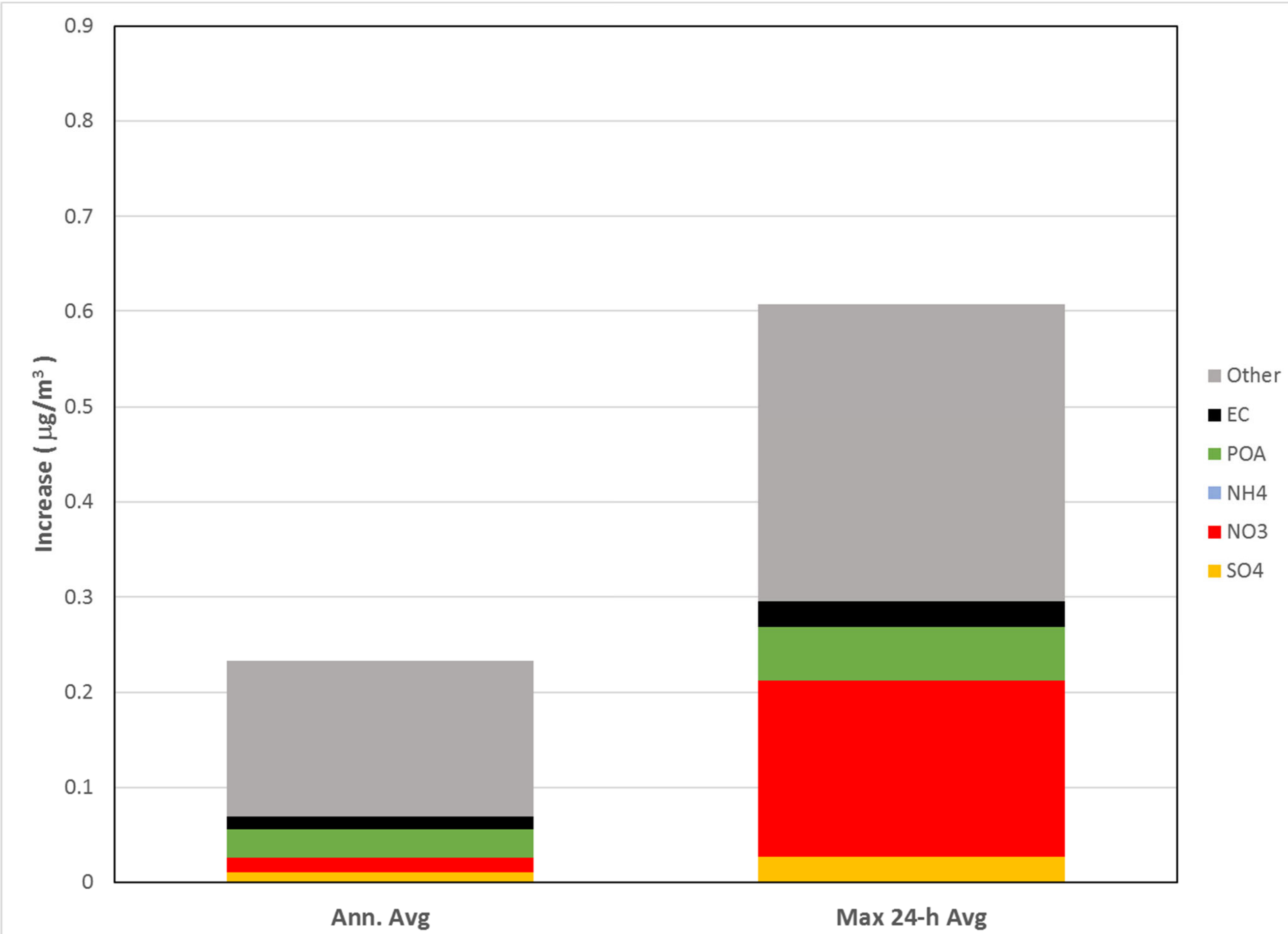


Figure 2-4. Increases in Annual Average and Episode Maximum 24-hour Average $PM_{2.5}$ Concentrations due to the Mitigated Project by $PM_{2.5}$ Component: fine particulate sulfate (SO_4), nitrate (NO_3), ammonium (NH_4), primary organic aerosol (POA), elemental carbon (EC), and other primary PM (Other); Where the Maximum Change due to Project Emissions Occurred



Ozone Model Results

The metrics relevant to the ozone health effects selected in this study are consistent with the ozone NAAQS (see **Appendix C**). The model provides hourly concentrations that are further post-processed to produce maximum daily average 8-hour (MDA8) ozone concentrations for each day.

Unmitigated Project

Figure 2-5 displays spatial plots of the annual average MDA8 ozone for the 2031 emissions scenario and the corresponding annual average MDA8 increases due to the unmitigated Project emissions. In the 2031 base case emissions scenario, the eastern portion of Los Angeles County, the western portions of San Bernardino and Riverside counties and the northern portion of Orange County show the largest concentrations ranging between 50 and 56 ppb. The maximum impact to the annual average MDA8 ozone concentrations due to the unmitigated Project is 0.213 ppb and occurs in northern Riverside County where it represents a 0.41 percent increase over the base case concentrations. **Figure 2-6** displays MDA8 ozone for the base case and increases in MDA8 ozone due to the unmitigated Project on July 10, the day that the unmitigated Project has the highest ozone contribution for the entire modeling year. The highest MDA8 ozone contribution due to the unmitigated Project is 1.44 ppb (Figure 2-4, right) that occurs in northern Riverside County where total MDA8 ozone concentrations are 79.9 ppb.

Figure 2-5. Annual Average MDA8 Ozone Concentrations from the Base Case Scenario (left) and Increases in Annual Average MDA8 Ozone Concentrations due to the Unmitigated Project (right) for the Annual Modeling of the 2031 Emissions Scenario

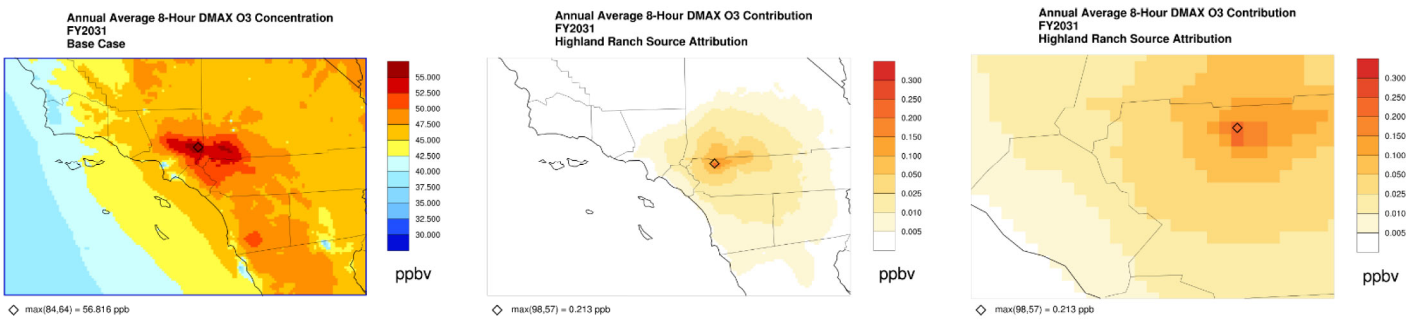
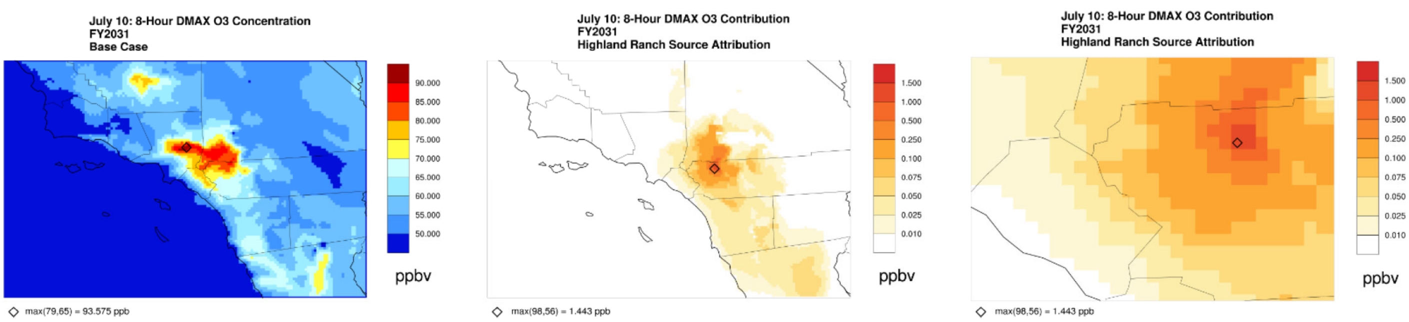


Figure 2-6. MDA8 Ozone Concentrations from the Base Case Scenario (left) and Increases in MDA8 Ozone Concentrations due to the Unmitigated Project (right) on July 10, the Day with the Highest Unmitigated Project Ozone Contributions for the Annual Modeling of the 2031 Emissions Scenario



Mitigated Project

Figure 2-7 displays spatial plots of the annual average MDA8 ozone for the 2031 emissions scenario and the corresponding annual average MDA8 increases due to the mitigated Project emissions. The maximum impact to the annual average MDA8 ozone concentrations due to the mitigated Project is 0.165 ppb and occurs in northern Riverside County where it represents a 0.31 percent increase over the base case concentrations. **Figure 2-8** displays MDA8 ozone for the base case and increases in MDA8 ozone due to the mitigated Project on July 10, the day that the mitigated Project has the highest ozone contribution for the entire modeling year. The highest MDA8 ozone contribution due to the mitigated Project is 0.924 ppb (Figure 2-4, right) that occurs in northern Riverside County where total MDA8 ozone concentrations are 84.8 ppb.

Figure 2-7. Annual Average MDA8 Ozone Concentrations from the Base Case Scenario (left) and Increases in Annual Average MDA8 Ozone Concentrations due to the Mitigated Project (right) for the Annual Modeling of the 2031 Emissions Scenario

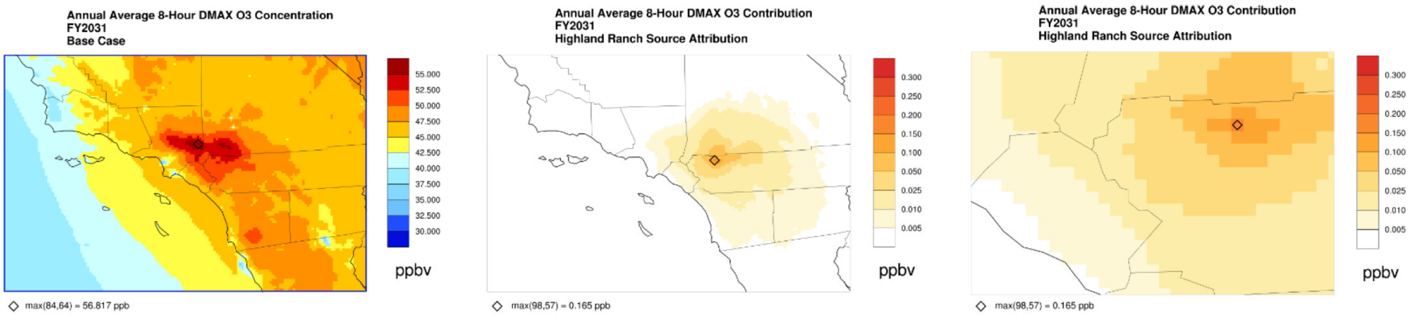
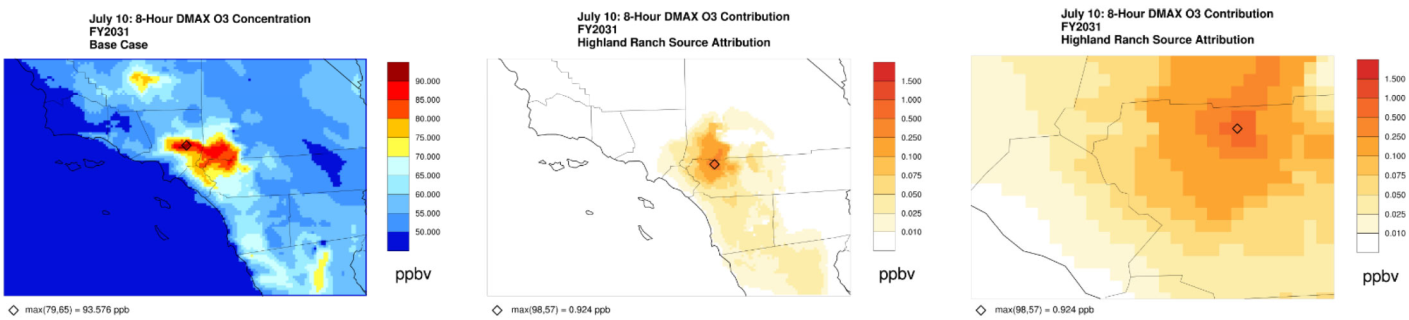


Figure 2-8. MDA8 Ozone Concentrations from the Base Case Scenario (left) and Increases in MDA8 Ozone Concentrations due to the Mitigated Project (right) on July 10, the Day with the Highest Mitigated Project Ozone Contributions for the Annual Modeling of the 2031 Emissions Scenario



3. REFERENCES

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/2/ Emmons, L.K., Walters, S., Hess, P.G., Lamarque, J.F., Pfister, G.G., Fillmore, D., Granier, C., Guenther, A., Kinnison, D., Laepple, T., Orlando, J., Tie, X., Tyndall, G., Wiedinmyer, C., Baughcum, S.L., Kloster, S., 2010. Description and evaluation of the Model for Ozone and Related chemical Tracers, Version 4 (MOZART-4), Geoscientific Model Development, 3, 43-67.

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/6/ Stockwell, W.R., 1999. Review of the updated maximum incremental reactivity scale of Dr. William Carter. Division of Atmospheric Sciences, Desert Research Institute, November 29, 1999. http://www.cert.ucr.edu/~carter/pubs/stockrev.pdf.

APPENDIX C
BENMAP AND POTENTIAL HEALTH EFFECTS HIGHLAND FAIRVIEW WORLD LOGISTICS CENTER MORENO VALLEY, CALIFORNIA

1. HEALTH EFFECTS ANALYSIS

The potential health effects of ozone and Particulate Matter less than 2.5 microns in diameter ($PM_{2.5}$) concentrations associated with the Project's emissions were estimated using the Environmental Benefits Mapping and Analysis Program (BenMAP), Community Edition v1.5 (March 2019).[1] BenMAP, originally developed by the United States Environmental Protection Agency (USEPA), is a powerful and flexible tool that helps users estimate human health effects and economic value resulting from changes in air quality. BenMAP outputs include PM- and ozone-related health endpoints such as premature mortality, hospital admissions, and emergency room visits. BenMAP uses the following simplified formula to relate changes in ambient air pollution to certain health endpoints (USEPA, 2018)[2]:

$$\text{Health Effect} = \text{Air Quality Change} \times \text{Health Effect Estimate} \times \text{Exposed Population} \times \text{Background Health Incidence}$$

- Air Quality Change - The difference between the starting air pollution level (the base) and the air pollution level after some change, such as a new source.
- Health Effect Estimate - An estimate of the percentage change in an adverse health effect due to a one unit change in ambient air pollution. Effect estimates, also referred to as concentration-response (C-R) functions, are obtained from epidemiological studies.
- Exposed Population - The number of people affected by the air quality change. The government census office is a good source for this information. This analysis uses data from PopGrid, which is an add-on program to BenMAP that allocates the block-level U.S. Census population to a user-defined grid.[3]
- Background Health Incidence - An estimate of the average number of people that die (or suffer from some adverse health effect) in a given population over a given period of time. For example, the health incidence rate might be the probability that a person will die in a given year. Health incidence rates and other health data are typically collected by the government as well as the World Health Organization.[4]

BenMAP applies "effect functions" to calculate incremental health effects from incremental changes in PM and ozone, and an underlying assumption is that there is a causal link between PM and ozone exposures and health effects. The effect functions are derived from statistical correlations reported in epidemiologic studies that compare fluctuations in air pollutant levels measured at central monitors against small fluctuations in population-wide health effects. These are statistical correlations and do not establish a cause-and-effect relationship between small fluctuations in the level of one (or many) ambient air pollutants and health effects, particularly mortality. For example, there is no toxicological or experimental study that has demonstrated or supported that small incremental changes in PM concentrations as a whole, or major PM components, at ambient levels can cause any serious health

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1 http://www.epa.gov/air/benmap/.

2 The common function used for calculating health effects is the following log-linear function: Health Effect = Background Health Incidence x [1 – exponential (Health Effect Estimate * Air Quality Change)] x Exposed Population.

3 https://www.epa.gov/benmap/benmap-community-edition.

4 Background health statistics were obtained from data included in the BenMAP model, and the sources are referenced in the BenMAP manual (AAI, 2018). For example, EPA obtained mortality rates from the Centers for Disease Control (CDC) WONDER database, and hospital admissions rates from the Healthcare Cost and Utilization Project (HCUP).

effects, let alone death (USEPA, 2009). That being said, in an overabundance of caution, and as an expression of the precautionary principal, BenMAP uses these studies to characterize the potential human health effect of small changes in PM and ozone concentrations.

The health endpoints analyzed in this study and the BenMAP results are presented in Section 2 of this appendix.

2. PROJECT HEALTH EFFECTS ANALYSIS RESULTS

This section presents the health effects of the unmitigated and mitigated Project emissions on the population in the Southern California model domain, estimated by the BenMAP model.

The Comprehensive Air Quality Model with extensions (CAMx) modeling results (**Appendix B**) are processed to generate aggregated daily averages $PM_{2.5}$ and maximum daily 8-hour ozone appropriate for various health endpoints. The CAMx simulation results from the full year (January to December) are used to estimate the health effects of $PM_{2.5}$ and ozone. BenMAP translates increases in the pollutant concentration associated with the Project emissions to changes in the incidence rate for each health effect using a C-R function derived from previously published epidemiological studies. BenMAP often provides multiple C-R functions based on different epidemiological studies for a given health endpoint. The USEPA default C-R functions were used when evaluating health effects, except for more refined population data. This analysis uses population data from PopGrid, which allocates the census population to each modeled 4x4 kilometer (km) grid cell.

The population used for both the quantified health effects and the calculation of background health incidence presented here is for the future year 2035[5], for consistency with the Project buildout year. This is conservative compared to utilizing a 2031 population that would have been consistent with the CAMx model year.

2.1 $PM_{2.5}$ Health Effects

Although there are a large number of potential health endpoints that could be included in the analysis as described above, Ramboll selected the key health endpoints that have been the focus of recent United States Environmental Protection Agency (USEPA) risk assessments (e.g., USEPA, 2010; USEPA, 2014). For example, the USEPA notes that health endpoints were selected based on consideration of at-risk populations (e.g. asthmatics), endpoints that have public health significance, and endpoints for which information is sufficient to support a quantitative concentration-response relationship (USEPA, 2014).

The health endpoints and associated C-R functions examined in this study are presented in **Table** . Each C-R function is based on a certain age range for the given health endpoint depending on the underlying epidemiological study on which it is based.

[5] For background incidence rates, BenMAP projects likely mortality rates for future years, but for other health effects, incidence rates are based on population changes only and may not reflect rates for future years.

Table 2-1. Summary of $PM_{2.5}$ Health Endpoints Used in this Study

Health Endpoint	Age Range	Daily Metric	Seasonal Metric	Annual Metric	C-R Function Selected
Emergency Room Visits, Asthma	0-99	24-hr mean			Mar et al., 2010[1]
Mortality, All Cause	30-99	24-hr mean	Quarterly mean	Mean	Krewski et al., 2009[1]
Hospital Admissions, Asthma	0-64	24-hr mean	-	-	Sheppard, 2003[1]
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65-99	24-hr mean	-	-	Bell, 2012[1]
Hospital Admissions, All Respiratory	65-99	24-hr mean	-	-	Zanobetti et al., 2009[1]
Acute Myocardial Infarction, Nonfatal	18-24	24-hr mean	-	-	Zanobetti et al., 2009[1]
Acute Myocardial Infarction, Nonfatal	25-44	24-hr mean	-	-	
Acute Myocardial Infarction, Nonfatal	45-54	24-hr mean	-	-	
Acute Myocardial Infarction, Nonfatal	55-64	24-hr mean	-	-	
Acute Myocardial Infarction, Nonfatal	65-99	24-hr mean	-	-	

[1] C-R functions available in BenMAP (USEPA, 2018).

Unmitigated Project $PM_{2.5}$ Health Effects

Increases in the BenMAP-estimated annual health effect incidences and percent of background health incidence associated with the unmitigated Project emissions are presented in **Table 2-2.** These values reflect the total health effects across the Southern California model domain.

The results show that the highest health effect is for all-cause mortality, with an estimated mean increased incidence of 15.19 deaths per year associated with the Project mitigated emissions. Smaller mean increased incidences were estimated for other relevant $PM_{2.5}$-related health effects: 6.63 increase in incidence of asthma related emergency room visits, 3.17 increase in incidence of respiratory hospital admissions, and 1.42 increase in incidence of cardiovascular hospital admissions.

It should be noted, however, that the estimated increased incidence in those health effects are quite minor compared to the background health incidence values (shown in Table 2-2 as percent of Background Health Incidence). For example, for mortality, the increase of 15.19 deaths per year associated with project emissions represents 0.0047% of the total all-cause mortality for people ages 30 to 99.

Table 2-2. BenMAP-Estimated Annual Mean PM2.5 Health Effects of the Unmitigated Project Emissions Across the Southern California Model Domain[1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Mean)	Background Health Incidence (Annual)
Emergency Room Visits, Asthma [0-99]	0.0051%	6.63	130,805
Mortality, All Cause [30-99]	0.0047%	15.19	325,048
Hospital Admissions, Asthma [0-64]	0.0029%	0.523	17,730
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions) [65-99]	0.00063%	1.42	224,047
Hospital Admissions, All Respiratory [65-99]	0.0016%	3.17	193,354
Acute Myocardial Infarction, Nonfatal [18-24]	0.0020%	0.00072	36
Acute Myocardial Infarction, Nonfatal [25-44]	0.0021%	0.041	1,904
Acute Myocardial Infarction, Nonfatal [45-54]	0.0020%	0.105	5,241
Acute Myocardial Infarction, Nonfatal [55-64]	0.0020%	0.188	9,226
Acute Myocardial Infarction, Nonfatal [65-99]	0.0019%	0.776	40,966

1 Health effects are shown in terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects and background health incidences are across the Southern California model domain.

2 Affected age ranges are shown in square brackets.

Mitigated Project $PM_{2.5}$ Health Effects

Increases in the BenMAP-estimated annual health effect incidences and percent of background health incidence associated with the mitigated Project emissions are presented in **Table 2-3**. These values reflect the total health effects across the Southern California model domain.

The results show that the highest health effect is for all-cause mortality, with an estimated mean increased incidence of 14.17 deaths per year associated with the Project mitigated emissions. Smaller mean increased incidences were estimated for other relevant $PM_{2.5}$-related health effects: 6.20 increase in incidence of asthma related emergency room visits, 2.98 increase in incidence of respiratory hospital admissions, and 1.33 increase in incidence of cardiovascular hospital admissions.

It should be noted, however, that the estimated increased incidence in those health effects are quite minor compared to the background health incidence values (shown in Table 2-3 as percent of Background Health Incidence). For example, for mortality, the increase of 14.17 deaths per year associated with project emissions represents 0.0044% of the total all-cause mortality for people ages 30 to 99.

Table 2-3. BenMAP-Estimated Annual Mean PM2.5 Health Effects of the Mitigated Project Emissions Across the Southern California Model Domain[1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Mean)	Background Health Incidence (Annual)
Emergency Room Visits, Asthma [0-99]	0.0047%	6.20	130,805
Mortality, All Cause [30-99]	0.0044%	14.17	325,048
Hospital Admissions, Asthma [0-64]	0.0028%	0.490	17,730
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions) [65-99]	0.00059%	1.33	224,047
Hospital Admissions, All Respiratory [65-99]	0.0015%	2.98	193,354
Acute Myocardial Infarction, Nonfatal [18-24]	0.0019%	0.00067	36
Acute Myocardial Infarction, Nonfatal [25-44]	0.0020%	0.038	1,904
Acute Myocardial Infarction, Nonfatal [45-54]	0.0019%	0.098	5,241
Acute Myocardial Infarction, Nonfatal [55-64]	0.0019%	0.176	9,226
Acute Myocardial Infarction, Nonfatal [65-99]	0.0018%	0.724	40,966

1 Health effects are shown in terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects and background health incidences are across the Southern California model domain.

2 Affected age ranges are shown in square brackets.

2.2 Ozone Health Effects

As noted above, although a larger number of health endpoints could be evaluated, Ramboll selected the health endpoints based on recent USEPA risk assessments (USEPA, 2010; USEPA, 2014). The health endpoints and associated C-R functions examined in this study are presented in **Table 2-4.** Each C-R function is associated with a certain age range for the given health endpoint depending on the epidemiological study on which it is based.

Table 2-4. Summary of Ozone Health Endpoints Used in this Study.

Health Endpoint	Age Range	Daily Metric	Seasonal Metric	Annual Metric	C-R Function Selected
Hospital Admissions, All Respiratory	65 - 99	MDA8	-	-	Katsouyanni et al., 2009[1]
Mortality, Non-Accidental	0 - 99	MDA8	-	-	Smith et al., 2009[1]
Emergency Room Visits, Asthma	0 - 17	MDA8	-	-	Mar and Koenig, 2009[1]
Emergency Room Visits, Asthma	18 - 99	MDA8	-	-	Mar and Koenig, 2009[1]

1 C-R function available in BenMAP (USEPA, 2018).

Unmitigated Project Ozone Health Effects

Increases in the BenMAP-estimated annual health effect incidences and percent of background health incidence associated with the unmitigated Project emissions are presented in **Table 2-5.** These values reflect the total health effects across the Southern California model domain.

For this project, asthma related emergency room visits are associated with the highest health effects associated with the unmitigated project emissions in the Southern California domain (8.20 increase for adults ages 18 to 99 and 6.93 increase for children ages 0 to 17). Hospital admissions due to respiratory issues for adults age 65-99 and non-accidental mortality have lower incidence increases (1.46 and 0.69 respectively).

It should be noted, however, that the estimated increases in those health effect incidences are quite minor compared to the background health incidence (shown in Table 2-5 as Percent of Background Health Incidence). For example, the increase in asthma emergency room visits represents 0.014% of the total asthma-related emergency room visits for children.

Table 2-5. BenMAP-Estimated Annual Mean Ozone Health Effects of the Unmitigated Project Emissions Across the Southern California Model Domain[1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Mean)	Background Health Incidence (Annual)
Hospital Admissions, All Respiratory [65-99]	0.00075%	1.46	193,354
Mortality, Non-Accidental [0-99]	0.00033%	0.69	210,692
Emergency Room Visits, Asthma [0-17]	0.014%	6.93	50,722
Emergency Room Visits, Asthma [18-99]	0.010%	8.20	80,084

[1] Health effects are shown in terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects and background health incidences are across the Southern California model domain.

[2] Affected age ranges are shown in square brackets.

Mitigated Project Ozone Health Effects

Increases in the BenMAP-estimated annual health effect incidences and percent of background health incidence associated with the mitigated Project emissions are presented in **Table 2-6**. These values reflect the total health effects across the Southern California model domain.

For this project, asthma related emergency room visits are associated with the highest health effects associated with the mitigated project emissions in the Southern California domain (6.84 increase for adults ages 18 to 99 and 5.80 increase for children ages 0 to 17). Hospital admissions due to respiratory issues for adults age 65-99 and non-accidental mortality have lower incidence increases (1.20 and 0.56 respectively).

It should be noted, however, that the estimated increases in those health effect incidences are quite minor compared to the background health incidence (shown in Table 2-6 as Percent of Background Health Incidence). For example, the increase in asthma emergency room visits represents 0.011% of the total asthma-related emergency room visits for children.

Table 2-6. BenMAP-Estimated Annual Mean Ozone Health Effects of the Mitigated Project Emissions Across the Southern California Model Domain[1]

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Mean)	Background Health Incidence (Annual)
Hospital Admissions, All Respiratory [65-99]	0.00062%	1.20	193,354
Mortality, Non-Accidental [0-99]	0.00027%	0.56	210,692
Emergency Room Visits, Asthma [0-17]	0.011%	5.80	50,722
Emergency Room Visits, Asthma [18-99]	0.009%	6.84	80,084

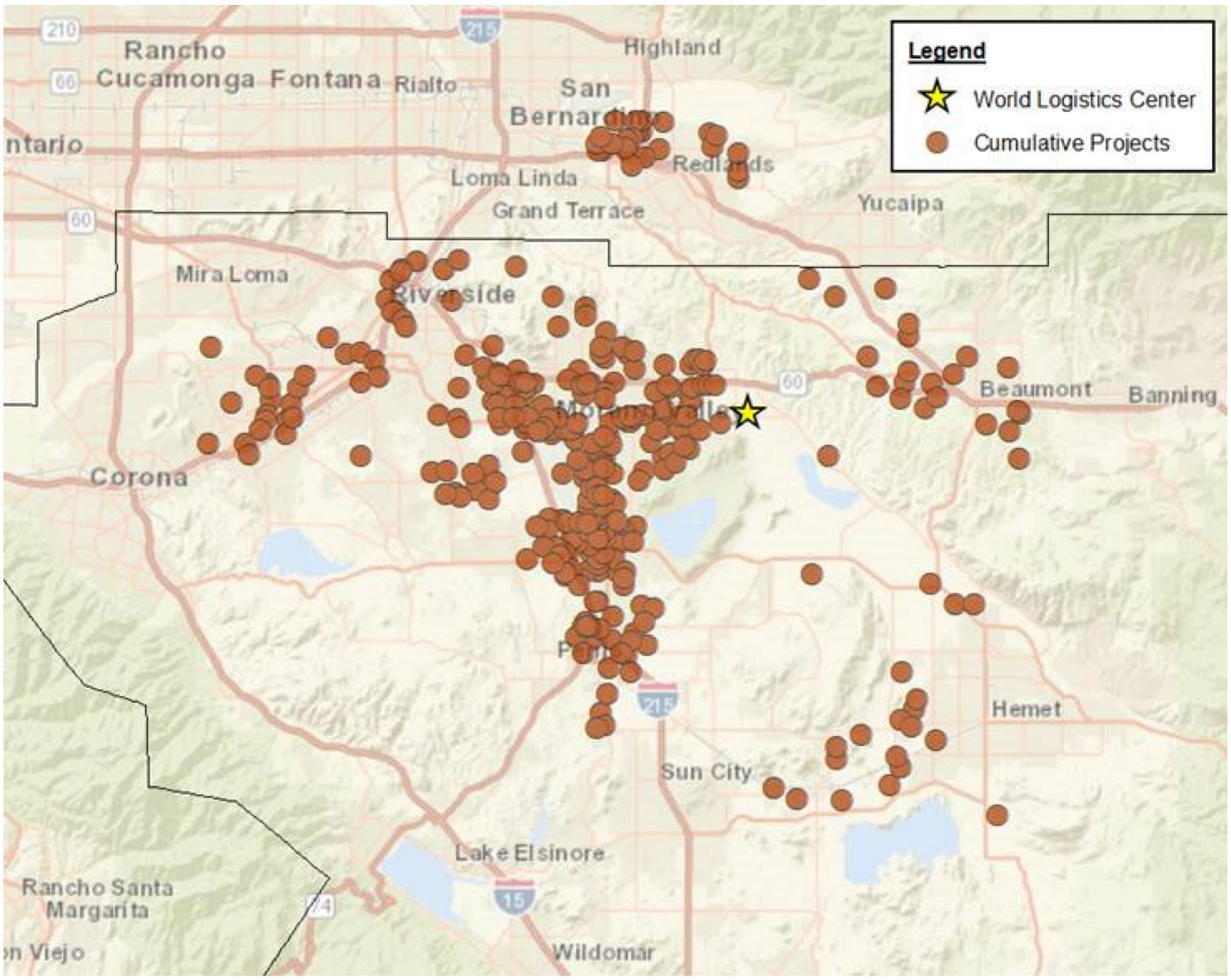
[1] Health effects are shown in terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects and background health incidences are across the Southern California model domain.

[2] Affected age ranges are shown in square brackets.

3. CUMULATIVE HEALTH EFFECTS

Potential health effects from the cumulative project emissions can be generally characterized using the Project level modeling results and a comparison of overall emissions. Cumulative project locations are shown in **Figure 3-1** below and would be subject to the similar meteorological and photochemical reaction conditions as the Project assessment. The application of an overall scaling factor based on emissions, as presented here, is likely conservative since the cumulative projects are unlikely to have the same distribution of mobile emissions to the Los Angeles area as the Project.

Figure 3-1. Cumulative Project Locations



Concentrations changes, and thus health effects, from $PM_{2.5}$ are driven by primary $PM_{2.5}$ components (see Appendix B), with smaller contributions from NOx, VOC, and SO_2 on secondary $PM_{2.5}$ formation. Based on a ratio of total $PM_{2.5}$ emissions from the cumulative projects to the unmitigated Project $PM_{2.5}$ emissions, approximate health effect results from $PM_{2.5}$ were calculated. Combined estimated health effects from the cumulative projects and from the modeled unmitigated Project are shown in **Table 3-1** below.

Table 3-1. Estimated Annual $PM_{2.5}$ Health Effects of Cumulative Project Emissions

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Estimated)	Background Health Incidence (Annual)
Emergency Room Visits, Asthma [0-99]	0.16%	204	130,805
Mortality, All Cause [30-99]	0.14%	467	325,048
Hospital Admissions, Asthma [0-64]	0.09%	16	17,730
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions) [65-99]	0.02%	44	224,047
Hospital Admissions, All Respiratory [65-99]	0.05%	98	193,354
Acute Myocardial Infarction, Nonfatal [18-24]	0.06%	0.02	36
Acute Myocardial Infarction, Nonfatal [25-44]	0.07%	1	1,904
Acute Myocardial Infarction, Nonfatal [45-54]	0.06%	3	5,241
Acute Myocardial Infarction, Nonfatal [55-64]	0.06%	6	9,226
Acute Myocardial Infarction, Nonfatal [65-99]	0.06%	24	40,966

1 Estimated health effects are compared to the base (2035 base year health effect incidences) values across the Southern California model domain.

2 Affected age ranges are shown in square brackets.

Concentration changes, and thus health effects, from ozone are driven primarily by emissions of VOC and NOx, with some contribution from CO. Based on a ratio of total VOC and NOx emissions from the cumulative projects to the unmitigated Project VOC and NOx emissions, approximate health effect results from ozone were calculated. Combined estimated health effects from the cumulative projects and from the modeled unmitigated Project are shown in **Table 3-2** below.

Table 3-2. Estimated Annual Ozone Health Effects of Cumulative Project Emissions

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Estimated)	Background Health Incidence (Annual)
Hospital Admissions, All Respiratory [65-99]	0.02%	33	193,354
Mortality, Non-Accidental [0-99]	0.01%	16	210,692
Emergency Room Visits, Asthma [0-17]	0.31%	159	50,722
Emergency Room Visits, Asthma [18-99]	0.23%	188	80,084

Table 3-2. Estimated Annual Ozone Health Effects of Cumulative Project Emissions

Health Endpoint[2]	Annual Percent of Background Health Incidence (%)	Potential Incidences (Annual, Estimated)	Background Health Incidence (Annual)

[1] Estimated health effects are compared to the base (2035 base year health effect incidences) values across the Southern California model domain.

[2] Affected age ranges are shown in square brackets.

4. CONCLUSION

The $PM_{2.5}$ and ozone concentration changes modeled by CAMx for unmitigated and mitigated Project emissions were converted to health effects on various health endpoints including premature mortality, hospitalizations, and emergency room visits, using the BenMAP health effects assessment model and USEPA defaults for health endpoints. Estimated changes in the health effect incidences are presented across the grids in the Southern California model domain. Across the board, the estimated increases in those health effect incidences are quite minor compared to the background health incidence values, with the largest $PM_{2.5}$ health effect from unmitigated Project emissions (all-cause mortality) representing only 0.0047% of the background health incidence across the Southern California model domain. When taken into context, the small increase in incidences and the very small percent of the number of background incidences indicate that these health effects are minimal in a developed, urban environment.

Similarly, for estimated cumulative health effects, the estimated increases in those health effect incidences are quite minor compared to the background health incidence values, with the largest $PM_{2.5}$ health effect from all-cause mortality representing only 0.14% of the background health incidence across the Southern California model domain.

Uncertainty

The approach and methodology of this analysis ensures that the uncertainty is of a conservative nature. In addition to the conservative assumptions built into the emissions noted above, there are a number of assumptions built into the application of C-R functions in BenMAP that may lead to an overestimation of health effects. For example, for all-cause mortality health effects from $PM_{2.5}$, these estimates are based on a single epidemiological study that found an association between $PM_{2.5}$ concentrations and mortality.[6] While similar studies suggest that such an association exists, there remains uncertainty regarding a clear causal link. This uncertainty stems from the limitations of epidemiological studies, such as inadequate exposure estimates and the inability to control for many factors that could explain the association between $PM_{2.5}$ and mortality such as lifestyle factors like smoking. Several reviews have evaluated the scientific evidence of health effects from specific particulate components (e.g., Rohr and Wyzga 2012; Lippmann and Chen, 2009; Kelly and Fussell, 2007). These reviews indicate that the evidence is strongest for combustion-derived components of PM including elemental carbon (EC), organic carbon (OC) and various metals (e.g., nickel and vanadium), however, there is still no definitive data that points to any particular component of PM as being more toxic than other components. The USEPA has also stated that results from various studies have shown the importance of considering particle size, composition, and particle source in determining the health effects of PM (USEPA, 2009). Further, the USEPA (2009) found that studies have reported that particles from industrial sources and from coal combustion appear to be the most significant contributors to PM-related mortality, consistent with the findings by Rohr and Wyzga (2012) and others. This is particularly important to note here, as the majority of PM emissions generated from the Project are from entrained roadway dust, breakwear, and tirewear (see Appendix A), and not from combustion. Therefore, because they do not consider the relative toxicity of PM components, the results presented here are conservative.

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6 For $PM_{2.5}$ mortality estimates, BenMAP relies on the study by Krewski et al. (2009). This study conducted multiple sensitivity analyses using different statistical model specifications. For all-cause mortality, the authors reported positive associations between exposures to $PM_{2.5}$ and all-cause mortality that ranged from a 3% to a 6% increase in mortality per increase in 10 ug/m^3 of $PM_{2.5}$, depending on the model used and the exposure data considered. The default USEPA value in BenMAP is the 6% increase, or double the low end of the range.

Air pollution epidemiology studies are ecological studies. This means that they are population-based, observational epidemiological studies that look for patterns between population exposure and population disease rates. They do not use data at the individual level (e.g., correlations between regional mortality rates and community air pollution levels). Epidemiologists generally consider relative risks (RRs, a measure of the association between exposures and health effects) from these types of studies that are greater than 3 to 4 to reflect strong associations and to be supportive of a causal link, while smaller RRs (1.5 to 3) are considered to be weak, and require other lines of evidence (e.g., toxicological evidence, plausible biological mechanism) to demonstrate causality (Taubes 1995). For example, the RR of lung cancer for heavy smokers is in the range of 10 to 20, whereas PM associations with mortality yield RRs in the range of 1.01 to 1.05, i.e., very close to the RR = 1.0, which indicates little to no association.

Aside from the uncertainty as to the causal basis of the statistical associations in air pollution epidemiology studies of PM and mortality, some epidemiological studies have found no correlation between mortality and increased PM (Enstrom, 2005; 2017; Lipfert et al., 2000; Murray and Nelson, 2000; Greven et al., 2011; You et al.,2018; Zhou et al.,2015). Although there are a greater number of publications reporting a positive PM association for mortality compared to those reporting no association.

Another uncertainty highlighted by the USEPA (2012) that applies to potential health effects from both $PM_{2.5}$ and ozone, is the assumption of a log-linear response between exposure and health effects, without consideration for a threshold below which effects may not be measurable. The issue of a threshold for $PM_{2.5}$ and ozone is highly debatable and can have significant implications for health effects analyses as it requires consideration of current air pollution levels and calculating effects only for areas that exceed threshold levels. Without consideration of a threshold, any incremental contribution to existing ambient air pollution levels, whether below or above the applicable threshold for a given criteria pollutant, is assumed to adversely affect health. Although the USEPA traditionally does not consider thresholds in its cost-benefit analyses, the NAAQS itself is a health-based threshold level that the USEPA has developed based on evaluating the most current evidence of health effects.

As noted above, the health effects estimation using this method presumes that effects seen at large concentration differences can be linearly scaled down to (i.e., correspond to) small increases in concentration, with no consideration of potential thresholds below which health effects may not occur. This methodology of linearly scaling health effects is broadly accepted for use in regulatory evaluations and is considered as being health protective (USEPA, 2010), but potentially overstates the potential effects. In summary, health effects presented in this report are conservatively estimated, and the actual effects may be zero.

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Appendix E
Energy

ESA

E-1 Vehicle Energy Technical Report

WORLD LOGISTICS CENTER

Transportation Energy Technical Study

Prepared for
City of Moreno Valley
14177 Frederick Street
Moreno Valley, California 92552

November 2019

Prepared by:
ESA, with contributions from CALSTART

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WORLD LOGISTICS CENTER (WLC)

Transportation Energy Technical Study

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1.Project Background

Environmental Science Associates (ESA) is providing this Transportation Energy Technical Report in support of the California Environmental Quality Act (CEQA) document development for the World Logistics Center (WLC) Project being considered by the City of Moreno Valley. This report assesses the feasibility of implementing available technologies and other measures for improving energy performance and/or reducing harmful air pollutants emissions from transportation sources resulting from implementation of the Project, based on Project applicability, relative cost, commercial readiness, funding availability, policy and regulatory support, potential industry partners, and other factors.

The proposed Project as evaluated by the May 2015 Draft Environmental Impact Report (DEIR) is the World Logistics Center Specific Plan (WLCSP), a master plan covering 2,610 acres and proposing a maximum of 40.4 million square feet of "high-cube logistics" warehouse distribution uses (approximately 99.5 percent of the total building area) classified as "Logistics Development" (LD) and 200,000 square feet (approximately 0.5 percent) of warehousing-related uses classified as "Light Logistics" (LL).

High cube logistics warehouses are characterized by a high level of automated material handling systems and truck activities that typically occur outside of the peak traffic hour. High cube logistics warehouses are generally used for the storage of manufactured goods prior to their distribution to retail outlets. High-cube warehouse and logistics facilities include ancillary office and maintenance space along with the outdoor storage of trucks, trailers, and shipping containers.

The WLCSP describes warehousing and logistics activities consistent with the storage and processing of manufactured goods and materials prior to their distribution to other facilities and retail outlets. Refrigerated warehouse space is not an allowed use within the Specific Plan area (see Mitigation Measure 4.3.6.3E in the DEIR). LD land uses provide a location for businesses to sort, organize, and transfer products from one shipping process to another.

Project Design Features and Sustainable Development Standards

The WLCSP requires sustainable development standards be implemented so that new development within the Project area minimizes energy consumption, conserves water, and uses recycled or sustainable building materials, where feasible (WLCSP September 2014, Section 1.3.2, Green Building-Sustainable Development). It provides developers with a specific framework for identifying and implementing a variety of practicable and measurable green building design, construction, operations, and maintenance. All new development within the project area will be required to meet the California Building Energy Standards in effect at the time construction commences. In addition, buildings within the Specific Plan will be structurally upgraded to be "solar ready" (i.e., allow the installation of solar photovoltaic systems on the roof of each building) (WLCSP Section 1.3.2, Green Building – Sustainable Development). The WLCSP will require extensive energy conservation measures, solar energy systems, and underground utilities to be installed on future development.

The sustainability guidelines for the World Logistics Center serve the following functions to:

- Assist in meeting California's greenhouse gas reduction targets as set forth through Executive Order S-3-05 and Assembly Bill 32 and its amendment Assembly Bill SB 32 (also known as the Global Warming Solutions Act of 2006);
- Assist in the region's development of a Sustainable Communities Strategy pursuant to Senate Bill 375;
- Assist in meeting other state and local goals and requirements, including Assembly Bill 1385, The Complete Streets Act;
- Establish practical and innovative solutions for the developer, business, and residential community to improve resource efficiency and reduce consumption of energy, water, and raw materials; and
- Support waste management reduction identified in AB 341.

Building Design and Construction Features:

- Achieve applicable elements of certification from the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED)[1], and encourages LEED certification best practices for use of recycled materials and products, such as recycled steel, and crushed concrete and pavement materials;
- Install electric vehicle charging stations per the local building code (6 percent of parking spaces);
- Construct "Solar ready" buildings;
- Implement design and construction techniques will be employed to reduce the heat island effect, including the use of materials that have a low solar reflectance index such as white roofs and light-colored pavements;
- Develop waste management plan and a comprehensive recycling and management program to divert at least 50 percent of waste from landfill, including storage and collection of recyclables, building and material reuse, and careful construction waste management;
- Incorporate the use of passive heating and cooling into the design or modification of the high-cube warehouse development (e.g., white building colors and roof insulation to minimize heat gain, and landscaping to help shade buildings);
- Install outdoor electric outlets to accommodate the use of electrical property maintenance equipment (Section 12.4 of the WLCSP);
- Install advanced irrigation systems, drought-tolerant plants, the use of mulch, recycled and other permissible alternative sources of water, and turfless plantings with alternative landscaping materials such as rock and other materials that do not require potable water sources.

Transportation Features:

- Construct sidewalks and a multiuse trail for pedestrian circulation; and
- RTA will determine if and when bus service will be provided by RTA.
- All streets are designed to accommodate bus services (WLCSP Section 3.2.4)

Solid Waste Diversion Features:

[1] Section 1.3.2 of the WLCSP state that all buildings of at least 500,000 square feet shall be designed to meet or exceed the LEED Certified Building Standards

- Require that all development within the project provide enclosures or compactors for trash and recyclable materials per Specific Plan (Section 5.1.6).

Relevant Policies and Regulations

The following plans, policies and regulations support the state's long-term energy policies and goals, including GHG reduction targets as expressed by SB 32 and Governor's Executive Order S-3-05 (40 percent below 1990 levels and 80 percent below 1990 levels, respectively).[2] These policy and regulatory developments are driving investments in technologies, infrastructure, and new markets that represent California's transition to a more energy-efficient, low carbon economy. They are an important consideration in assessing the costs and benefits of new transportation energy technologies as they apply to the Project and to the state's larger energy goals.

2017 Scoping Plan Update

On December 14, 2017, the California Air Resources Board (CARB) approved the final version of *California's 2017 Climate Change Scoping Plan* (2017 Scoping Plan Update), which outlines the proposed framework of action for achieving the 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990 levels.[3] The 2017 Scoping Plan Update identifies key sectors of the implementation strategy, which includes improvements in low carbon energy, industry, transportation sustainability, natural and working lands, waste management, and water. Through a combination of data synthesis and modeling, CARB determined that the target Statewide 2030 emissions limit is 260 MMTCO2e, and that further commitments will need to be made to achieve an additional reduction of 50 MMTCO2e beyond current policies and programs. The cornerstone of the 2017 Scoping Plan Update is an expansion of the Cap-and-Trade program to meet the aggressive 2030 GHG emissions goal and ensure achievement of the 2050 limit set forth by Executive Order B-30-15.

The Scoping Plan strategy for meeting the 2030 GHG target includes the full range of measures developed or required by legislation with 2030 as their target date and include: extending the low carbon fuel standard (LCFS) to an 18 percent reduction in carbon intensity beyond 2020; the requirements of SB 350 to increase renewables to 50 percent and to double energy efficiency savings of existing buildings; the Mobile Source Strategy targets for more zero emission vehicles and much cleaner trucks and transit; the Sustainable Freight Action Plan to improve freight efficiency and transition to zero emission freight handling technologies; and the requirements under SB 1383 to reduce anthropogenic black carbon 50 percent and hydrofluorocarbon and methane emissions by 40 percent below 2013 levels by 2030, and the Cap-and-Trade Program that extends through 2030.

California's climate stabilization strategy relies on contributions from all sectors of the economy, which includes continued investment in renewable energy such as solar photovoltaics (Solar PV), wind, and other types of distributed generation. In addition to being an integral factor in meeting GHG reduction goals, shifting to clean, local, and efficient use of energy also reinvests energy expenditures on local economies and reduces risks associated with exposure to volatile global and national oil and gas commodity prices (CARB, 2017).

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2 The majority of California's energy use generates GHG emissions. Increasing renewable energy and energy efficiency are key components to California's overall strategy to reduce energy sector GHG emissions, as described in the 2017 Scoping Plan Update

3 CARB, *California's 2017 Climate Change Scoping Plan: The strategy for achieving California's 2030 greenhouse gas target*, November, 2017, https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf; accessed December 18, 2017.

California Cap and Trade Program

Authorized by the California Global Warming Solutions Act of 2006 (AB 32), the cap-and-trade program is a core strategy in the Scoping Plan for the state to meet its reduction targets for 2020 and 2030, and ultimately achieve an 80 percent reduction from 1990 levels by 2050. Pursuant to its authority under AB 32, CARB has designed and adopted a California Cap-and-Trade Program to reduce GHG emissions from major sources (deemed "covered entities") by setting a firm cap on statewide GHG emissions and employing market mechanisms to achieve AB 32's emission-reduction mandate of returning to 1990 levels of emissions by 2020.[4] Under the Cap-and-Trade program, an overall limit is established for GHG emissions from capped sectors (e.g., electricity generation, petroleum refining, cement production, and large industrial facilities that emit more than 25,000 metric tons CO_2e per year) and declines over time, and facilities subject to the cap can trade permits to emit GHGs. The statewide cap for GHG emissions from the capped sectors commenced in 2013 and declines over time, achieving GHG emission reductions throughout the Program's duration.[5] On July 17, 2017 the California legislature passed Assembly Bill 398, extending the Cap-and-Trade program through December 31, 2030.

The Cap-and-Trade Regulation provides a firm cap, ensuring that the 2020 and 2030 statewide emission limits will not be exceeded. An inherent feature of the Cap-and-Trade Program is that it does not direct GHG emissions reductions to occur in any discrete location or by any particular source. Rather, GHG emissions reductions are assured on a State-wide basis.

Renewable Energy

A core component of the state's climate stabilization strategy, as described in the 2017 Scoping Plan Update, is widespread electrification of buildings, appliances, and transportation in conjunction with decarbonization of the electricity sector (CARB, 2017). The California Renewable Portfolio Standard (RPS), as updated by SB 350, requires utilities and electric service providers to procure at least 50 percent of total electricity from eligible renewable energy resources by 2030.

Statewide, solar and wind installations have grown exponentially in recent years. With renewables increasingly serving the state's electricity demand there is a growing need for storage solutions that increase grid reliability in the face of variable demand combined with the inherent seasonal and diurnal fluctuations in solar and wind generation.

Additional challenges facing expansion of renewable energy include overcoming electric equipment performance, cost-effectiveness, and consumer acceptance.

Transportation Energy

Pavley Regulation and the California Mobile Source Strategy

Assembly Bill 1493 (2002) requires CARB to set GHG emission standards for passenger vehicles, light duty trucks, and other vehicles whose primary use is non-commercial personal transportation manufactured in and after 2009. In setting these standards, CARB must consider cost effectiveness, technological feasibility, economic impacts, and provide maximum flexibility to manufacturers. The federal Clean Air Act ordinarily preempts state regulation of motor vehicle emission standards; however, California is allowed to set its own standards with a

4 17 CCR §§ 95800 to 96023.

5 See generally 17 CCR §§ 95811, 95812.

federal waiver from the USEPA, granted in 2009. Known as the Pavley Clean Car Standards, AB 1493 regulated GHG emissions from new passenger vehicles (light duty automobiles and medium duty vehicles) from 2009 through 2016.

In January 2012, CARB approved the Advanced Clean Cars (ACC) program, a new emissions-control program for model years 2015 through 2025. The program includes components to reduce smog-forming pollution, reduce GHG emissions, promote clean cars, and provide the fuels for clean cars. The zero emissions vehicle (ZEV) program acts as the focused technology of the Advanced Clean Cars program by requiring manufacturers to produce increasing numbers of ZEVs and plug-in hybrid electric vehicles (PHEV) in the 2018 to 2025 model years (CARB, 2017).

In May 2016, CARB released the updated Mobile Source Strategy that demonstrates how the State can simultaneously meet air quality standards, achieve GHG emission reduction targets, decrease health risk from transportation emissions, and reduce petroleum consumption over the next fifteen years, through a transition to zero-emission and low-emission vehicles, cleaner transit systems and reduction of vehicle miles traveled. The Mobile Source Strategy calls for 1.5 million ZEVs (including plug-in hybrid electric, battery-electric, and hydrogen fuel cell vehicles) by 2025 and 4.2 million ZEVs by 2030. It also calls for more stringent GHG requirements for light-duty vehicles beyond 2025 as well as GHG reductions from medium-duty and heavy-duty vehicles and increased deployment of zero-emission trucks primarily for class 3 – 7 "last mile" delivery trucks in California. Statewide, the Mobile Source Strategy would result in a 45 percent reduction in GHG emissions, and a 50 percent reduction in the consumption of petroleum-based fuels (CARB, 2016).

Transportation Electrification

Complementing the Mobile Source Strategy and the state's push toward zero carbon electricity, SB 350 orders the CPUC to direct the six investor-owned electric utilities in the state to file Applications for programs that "accelerate widespread transportation electrification." These programs are required to reduce dependence on petroleum, increase the adoption of zero-emission vehicles, help meet air quality standards, and reduce GHG emissions.

On January 11, 2018, the CPUC approved the first transportation electrification applications under SB 350 from the three large investor-owned utilities. The decision approves 15 projects with combined budgets of $42 million. In SCE territory, $16 million was approved for projects that help expand residential and transit bus EV charging infrastructure, including in or adjacent to disadvantaged communities, as well as crane and heavy duty vehicle electrification at the Port of Long Beach. In PG&E and San Diego Gas and Electric territories, projects are similar but also include electrification of delivery vehicles and commercial shuttle fleets, and demonstration projects for electrification of school buses and medium- or heavy-duty vehicles fleets (CPUC, 2018).

In January 2018, Governor Brown signed Executive Order B-48-18, setting targets of 200 hydrogen fueling stations and 250,000 electric vehicle chargers to support 1.5 million ZEVs on California roads by 2025, on the path to 5 million ZEVs by 2030. The initiative is designed to focus multi-stakeholder efforts on deploying charging and fueling infrastructure as well as making ZEVs increasingly affordable to own and operate.

Title 24, Part 11, of the California Code of Regulations (California Building Energy Standards) includes construction requirements for non-residential projects that are designed to facilitate installation of future electric vehicle supply equipment (EVSE) to support electric vehicle (EV) charging. Under the current regulation (2016), section 5.106.5.3 requires construction plans and specifications for large project (those with more than 200 total parking spaces) to include raceways for future EVSE at a minimum of 6 percent of the total parking spaces.

Low Carbon Fuel Standard

The overall goal with the low carbon fuel standard is to lower the carbon intensity of California transportation fuel. The standard initially required a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. With adoption of the 2017 Scoping Plan, the standard has been changed to a reduction of at least 18 percent. Recent proposed amendments by CARB indicate that the program will be extended to 2030 with a greenhouse gas reduction target of 20 percent. A significant expansion of the renewable fuel market has been included in the CARB staff proposal.

CARB Low NOx Regulation

Shifting away from fossil fuels is especially important for heavy duty vehicles because while they comprise just 7 percent of all vehicles in California, they account for 33 percent of NOx emissions from all sources (Chandler, Espino, and O'Dea 2017). CARB has identified that reductions of up to 90 percent are needed for heavy-duty trucks to meet NOx reduction targets. In 2013, California established an optional low-NOx standard to pave the way for a future mandatory standard. A more stringent low-NOx regulation is expected in the 2021/2023 timeframe. When implemented, this regulation will continue to drive the deployment of zero or near-zero emissions truck solutions. This development has been taken into consideration in estimating the number of zero emission trucks projected in this study.

CARB Advanced Clean Local Truck Rule

The goal with the Advanced Clean Local Truck Rule is to accelerate the early market adoption of zero emission trucks that are usually centrally fueled, have duty cycles with low average speed and stop-and-go operation. The rule focuses on urban, mostly vocational trucks, but includes class 7-8 urban goods movement trucks as well. The proposed regulatory schedule begins with the 2023 vehicle model year with early action credits given for pre-2023 vehicle models. The regulation is scheduled for CARB board consideration in November 2018.

The Clean Port Plan 2.0 for Ports of Long Beach and Los Angeles

The ports of Long Beach and Los Angeles have set goals to drastically reduce air pollution over the next decades and move towards zero emissions solutions. It is anticipated that new fee structures will be implemented in 2021 that favors low-NOx engine and zero emission solutions.

SCAG Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)

In April, 2016, the Southern California Association of Governments (SCAG) adopted the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), which provides a vision for transportation throughout the region for the next 25 years. It considers the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address mobility needs. The 2016 RTP/SCS describes how the region can attain the GHG emission-reduction targets set by CARB by achieving an 8 percent reduction by 2020, 18 percent reduction by 2035, and 21 percent reduction by 2040 compared to the 2005 level on a per capita basis.

The 2016 RTP/SCS includes $70.7 billion in goods movement strategies, and a Goods Movement Appendix that addresses the region's challenges in moving freight while reducing harmful emissions generated by trucks and other goods movement sources.

SCAG Comprehensive Regional Goods Movement Plan and Implementation Plan

This report from SCAG, issued in 2012, presents a long-range comprehensive plan for the goods movement system in Southern California. The Plan is designed to ensure that the region continues to play a vital role in the global supply chain while meeting regional economic goals, addressing critical mobility challenges, preserving the environment, and contributing to community livability and quality of life goals. The Plan is the final product of the SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy, a four-year effort to collect data, conduct analyses, and engage with regional, statewide and national stakeholders covering various aspects of the region's goods movement system

California Sustainable Freight Action Plan (2016)

California Sustainable Freight Action Plan includes strategies to improve freight efficiency and transition to zero emission freight handling technologies. It includes goals to achieve 25 percent improvement of freight system efficiency by 2030, and to deploy over 100,000 freight vehicles and equipment capable of zero emission operation, and maximize near-zero emission freight vehicles and equipment powered by renewable energy by 2030.

2.Project Transportation Energy Demand

Trips and Vehicle Counts

Table 1 provides estimates of daily vehicle forecasts for the project derived from the revised traffic model output and based on the assumption that two vehicle trips represents one vehicle on site. Table 1 shows the project vehicle forecasts estimates for each vehicle category modeled in the traffic analysis (WSP, 2018) and indicates how the categories correlate with the vehicle types used by the Emission FACtors (EMFAC) model, which is the standard tool used in CEQA analysis to calculate emission rates from motor vehicles operating on highways, freeways and local roads in California.

Table 1: Project Vehicle Forecasts (daily):

Project Category	EMFAC Category	2025	2035
Passenger Vehicles	LDA, LDT1, LDT2, MCY	11,766	20,299
Light Trucks (2axle)	MDT	875	1,532
Medium Trucks (3 axle)	LHDT1, LHDT2	1,113	1,964
Heavy Trucks (4+ axle)	MHDT, HHDT	3,261	5,605
TOTAL		17,015	29,400

Note: Assumes 2 trips = 1 vehicle

Vehicle Fuel Use Estimates

Table 2 shows the breakdown of vehicle fuels forecasted by EMFAC 2017 for the vehicle fleet in the South Coast AQMD for the years 2025 and 2035. By 2025, 2.5 percent of passenger vehicles and 1.6 percent of light trucks are projected to be EVs. By 2035, 4.7 percent of passenger vehicles and 3.9 percent of light trucks are expected to be EVs. EMFAC projects zero electric trucks in these future years.

Table 2: Fleet Mix by Fuel Type

Air Quality Vehicle Type	% Gas	% Diesel	% Electric	% Natural Gas
Interim Year 2025				
Passenger cars	96.6%	0.9%	2.5%	0.0%
Light trucks	95.9%	2.5%	1.6%	0.0%
Medium Trucks	51.5%	48.5%	0.0%	0.0%
Heavy Trucks	9.6%	88.2%	0.0%	2.2%
Horizon Year 2035				
Passenger cars	94.3%	1.0%	4.7%	0.0%
Light trucks	93.0%	3.1%	3.9%	0.0%
Medium Trucks	44.3%	55.7%	0.0%	0.0%
Heavy Trucks	8.9%	88.6%	0.0%	2.5%
Source: EMFAC2017, South Coast Air Basin, Calendar Year 2025 & 2035				

Table 3 provides annual fuel use estimates for the vehicles associated with project operation in 2025 and 2035, based on the traffic modeling results and the EMFAC 2017 fuel mix data.

Table 3: Projections of Annual Fuel and Electricity Use by WLC Fleet

Vehicle Category	Gasoline (gal)	Diesel (gal)	Electricity (MWh)	Natural Gas (MMBtu)
2025				
Passenger Vehicles	14,494	84	4,206	0
Light Trucks	1,131	22	173	0
Medium Trucks	2,487	1,249	0	0
Heavy Trucks	3,345	31,109	0	612
2035				
Passenger Vehicles	21,460	154	27,351	0
Light Trucks	1,520	41	793	0
Medium Trucks	3,045	2,020	0	0
Heavy Trucks	4,303	43,131	0	1,094

Note: Based on 2018 WLC traffic modeling results and the EMFAC 2017 fuel mix data

Electric Vehicle (EV) Forecasts and Electricity Loads

Theoretically, each vehicle that visits the WLC site represents an EV charging opportunity. However, the fueling station and convenience market are quick stops and not considered good candidates for locating EV charging stations. Table 4 provides a summary of vehicles trips by EMFAC vehicle category, with trips to the fueling station and convenience market subtracted from the totals. Table 4 provides a summary of the project's vehicle forecasts in 2025 and 2035 that represent EV charging opportunities.

Table 4: Project Trip Generation (average daily trips):

Phase 1 - 2025	Average daily trips	gas station and convenience mkt trips	Net trips	Max vehicles with EV charging potential
Passenger vehicles	23,532	669	22,863	11,431
Light Trucks (2 axle)	1,751	296	1,455	727
Medium Trucks (3 axle)	2,226	0	2,226	1,113
Heavy Trucks	6,143	379	6,143	3,072
Total	**34,031**	**1,344**	**32,687**	**16,343**
Full Build-Out - 2035				
Pass vehicles	40,598	669	39,929	19,964
Light Trucks (2 axle)	3,064	296	2,768	1,384
Medium Trucks (3 axle)	3,928	0	3,928	1,964
Heavy Trucks	10,831	379	10,831	5,415
Total	**58,800**	**1,344**	**57,456**	**28,728**

Note: assumes 2 trips = 1 vehicle

Using the daily vehicle forecasts provided in Table 4, anticipated EV counts and the corresponding average and peak electricity loads were estimated for three different EV penetration scenarios as described below.

Vehicle Scenario A: Low EV Penetration

Scenario A reflects the requirements of current state building code (Title 24, part 11), stipulating that 6 percent of parking spaces be constructed to accommodate the future installation of electric vehicle supply equipment (EVSE) for future electric vehicle charging. Scenario A assumes that EV charging stations will be installed at 6 percent of the parking spaces by the completion of Phase 1. This Scenario assumes no increase in the stringency of the requirement, as any change in the regulatory minimums would be purely speculative at this time. Scenario A also assumes that the code-compliant charging stations would be used only for charging passenger vehicles and light duty truck EVs, and there would be no charging of medium-duty or heavy-duty truck EVs. Table 5 indicates the number of EV charging stations needed for 2025 and 2035 based on these assumptions.

Table 5: EV Charging Station Requirements at WLC

Stage of Development	WLC WAREHOUSE BUILDINGS			WLC PARKING REQUREMENTS		
	Total Bldg SF	Avg Bldg SF (approximate)	# Bldgs	Avg per Bldg	WLC Total	EV Charging Equipped (6%)
Phase 1 - 2025	22,946,000	1,500,000	15	584	8,781	527
Full build out - 2035	40,600,000	1,500,000	27	575	15,536	932

For determining the breakdown of vehicle types and fuels powering the fleet, Scenario A relies on EMFAC 2017[6]. As shown in Table 6, EMFAC 2017 forecasts approximately 619,000 passenger EVs (2.5 percent of total) and 59,000 light truck EVs (1.4 percent of total) statewide by 2025, and approximately 1.4 million passenger EVs (4.7 percent of total) and 172,000 light truck EVs (3.7 percent of total) statewide by 2035.[7] For the South Coast Air Basin, EMFAC 2017 forecasts the same percentages of passenger EVs and 1.6 percent of light truck EV populations by 2025, and slightly higher percentages by 2035. Based on the percentages for the South Coast Air Basin, the number of passenger EVs estimated to access the Project area on any day under Scenario A were determined to be 300 for Phase 1 (2025) and 991 for full build-out in 2035.

Table 6: EMFAC 2017 EV Forecasts for State of California and South Coast Air Basin [a]

		Passenger Vehicles			Light Trucks		
		Total	EVs	% EVs	Total	EVs	% EVs
South Coast Air Basin	2020	9,125,366	103,722	1.1%	1,539,990	3,852	0.3%
	2025	10,034,980	252,889	2.5%	1,627,185	26,375	1.6%
	2030	10,907,401	417,413	3.8%	1,733,368	51,603	3.0%
	2035	11,642,018	546,208	4.7%	1,849,556	72,433	3.9%
Statewide	2020	22,409,020	262,338	1.2%	4,131,850	8,393	0.2%
	2025	24,876,417	619,462	2.5%	4,207,663	59,187	1.4%
	2030	27,344,052	1,038,403	3.8%	4,367,848	119,836	2.7%
	2035	29,511,582	1,380,703	4.7%	4,600,339	172,291	3.7%

Notes:

a: reflects EMFAC 2017 assumptions based on Governor's Order calling for 1.5 million ZEVs statewide by 2025

6 The Emission FACtors (EMFAC) model is the standard method used in CEQA analysis to calculate emission rates from motor vehicles operating on highways, freeways and local roads in California.

7 As interpreted by the project traffic modeling, passenger vehicles include all LDA, LDT1, and LDT2 category vehicles in EMFAC

Scenario A energy demand calculations assume that passenger EVs would have an average battery size of 100 kWh in the year 2025, equating to an average charge capacity of 80 kWh (80 percent). Passenger cars in 2035 would have an average battery size of 200 kWh, equating to an average charge capacity of 160 kWh (80 percent).

Scenario A assumes that half of the passenger EV population on site each day would charge their batteries to full capacity. If Level 2 AC chargers with a minimum charging rate of 19.2 kW (highest rate currently available) were provided, it would take approximately 4 hours to fully charge a vehicle with a 100 kWh battery. If the site was served by DC power blocks that spread the power delivery across multiple vehicles simultaneously in response to site energy management requirements, the charging time could be much faster. DC power blocks provide power at up to 500 kW, but it is reasonable to assume an average charging rate would be 100 kW, resulting in a charging time of approximately 48 minutes for a vehicle with a 100 kWh battery.

Peak electricity loads for servicing the EVs were provided by WSP in their World Logistics Center *Sustainable Energy Plan* (WSP, 2018).[8]

The EV numbers and electricity loads for Scenario A, using the methods and assumptions outlined above, are presented in Table 7.

Table 7: Scenario A Charging Loads (Low EV Penetration)

Vehicle Type	2025			2035		
	Population	Peak Rate (MW)	Avg Daily (MWh)	Population	Peak Rate (MW)	Avg Daily (MWh)
Passenger Vehicles	288	0.7	11.5	937	5.7	74.9
Light Trucks (2 axle)	12	0.03	0.5	54	0.2	2.2
Medium Trucks (3 axle)	0	0	0	0	0	0
Heavy Trucks (4+ axle)	0	0	0	0	0	0
Total	**300**	**0.7**	**12.0**	**991**	**5.9**	**77.1**

Vehicle Scenario B: Medium EV Penetration

This scenario reflects the same assumption regarding electric vehicle charging infrastructure as used in Scenario A (EV charging stations will be installed at 6 percent of parking spaces by the completion of Phase 1) but with higher electric vehicle populations consistent with the goals of California's 2017 Scoping Plan Update and 2016 Mobile Source Strategy, which are both designed to enable statewide attainment of the SB 32 GHG Target of 40 percent below 1990 levels by 2030. As with Scenario A, Scenario B includes passenger and light truck EVs, but

8 As explained in the WSP report, peak EV charging rate was estimated by allocating the annual electricity consumption of EVs according to the building operating schedules. The resulting peak electric load imposed by EV charging is about 25 percent of the aggregate nameplate capacity of all charging stations. This result is in line with industry expectations that charging blocks managed with automated 'smart' controls will reduce the coincident peak demand to 20-25 percent of the aggregate capacity of the individual charging stations.

no charging of medium-duty or heavy-duty truck EVs. The higher numbers of passenger and light truck EVs result in a higher vehicle charging load for the project.

Table 8 summarizes EV population estimates that are aligned with Governor Brown's Executive Order calling for 1.5 million ZEVs by 2025, and the Mobile Source Strategy calling for 4.2 million ZEVs by 2030, which works out to approximately 5.2 percent of combined vehicles (passenger + light trucks) in 2025 and 13.2 percent in 2030. The EV population estimates (21 percent of passenger vehicles and 22.5 percent of light trucks) for 2035 are based on the conservative assumption that the EV population increase from 2025 to 2030 due to the Mobile Source Strategy is repeated over the five year period from 2030 to 2035. Based on that rate, as shown in Table 8, there would be approximately 7.2 million ZEVs in operation statewide by 2035. Assuming the EV percentages would be the same for the proposed Project located in the South Coast Air Basin, the Project would be visited by 627 EVs per day by 2025 and 4,509 EVs by 2035.

Table 8: EV Forecasts Based on Mobile Source Strategy [a]

		Passenger Vehicles			Light Trucks		
		Total	**EVs**	**% EVs**	**Total**	**EVs**	**% EVs**
South Coast Air Basin	2020	9,125,366	103,722	1.1%	1,539,990	3,852	0.3%
	2025	10,034,980	517,550	5.2%	1,627,185	83,921	5.2%
	2030	10,907,401	1,444,602	13.2%	1,733,368	229,571	13.2%
	2035[b]	11,642,018	2,447,659	21.0%	1,849,556	416,980	22.5%
Statewide	2020	22,409,020	262,338	1.2%	4,131,850	8,393	0.2%
	2025	24,876,417	1,282,991	5.2%	4,207,663	217,009	5.2%
	2030	27,344,052	3,621,512	13.2%	4,367,848	578,488	13.2%
	2035[b]	29,511,582	6,204,620	21.0%	4,600,339	1,037,141	22.5%

Notes:

a: reflects Mobile Source Strategy calling for 4.2 million ZEVs statewide by 2030

b: assumes the 2025-2030 EV population increase trend (over EMFAC 2017 forecast) continues through 2035

Charging loads for the light truck category were determined using the daily mileage estimates and average kWh/mile consumption for each vehicle category, using data from the U.S. Department of Energy's Alternative Fuels Data Center.[9]

Like Scenario A, Scenario B assumes that EVs in 2025 would have an average battery size of 100 kWh, and by 2035 they would have an average battery size of 200 kWh. Due to the higher EV populations the demand for fast charging will be higher, and it is reasonably assumed that DC power blocks, which manage power delivery across multiple vehicles simultaneously in response to site energy requirements, would be used at the site to handle the increased loads. Like Scenario A, it is assumed that the average charging rate for DC power block chargers would be 100 kW. At that rate a 200 kWh battery (160 kWh capacity) would take approximately 96 minutes to charge.

Scenario B assumes 100 percent of the charging stations at the site would be served by DC charging blocks that can charge up to 500 kW per vehicle and can spread the power delivery across multiple vehicles simultaneously in response to site energy management requirements. The average charging rate for these stations is assumed to be 100 kW.

Peak electricity loads for servicing the EVs were provided by WSP in their World Logistics Center *Sustainable Energy Plan* (WSP, 2018).

The EV numbers and electricity loads for Scenario B, using the methods and assumptions outlined above, are presented in Table 9.

Table 9: Scenario B Charging Loads (Medium EV Penetration)

Vehicle Type	2025			2035		
	Population	Peak Rate (MW)	Avg Daily (MWh)	Population	Peak Rate (MW)	Avg Daily (MWh)
Passenger Vehicles	590	1.4	23.6	4,197	25.6	336
Light Trucks (2 axle)	38	0.2	1.5	312	0.8	12.8
Medium Trucks (3 axle)	0	0	0	0	0	0
Heavy Trucks (4+ axle)	0	0	0	0	0	0
Total	**627**	**1.6**	**25.1**	**4,509**	**26.4**	**349**

Vehicle Scenario C: High EV Penetration

Scenario C is the same as Scenario B with respect to passenger and light truck EVs, but includes estimates for medium duty and heavy duty EV trucks based on CALSTART's zero-emission transformation model that takes into account how nascent zero emission solutions, namely technologies from the transit bus segment, evolve and transition into other medium- and heavy-duty categories. As with the light duty truck estimates, the projections take into account funding programs, sales trends, technology development, and upcoming regulations. In addition,

[9] https://www.afdc.energy.gov/

the estimates consider regulatory and commercialization studies completed by CALSTART, including potential regulations related to zero emission drayage trucks and access by zero emission trucks to city centers.

CALSTART's zero emission transformation model indicates that 10 percent of medium-duty and 20 percent of heavy-duty trucks servicing the South Coast Air Basin could feasibly be EVs by 2025; by 2035, the forecasts indicate conservatively that 20 percent of medium-duty and 30 percent of heavy-duty trucks could be EVs. Charging loads for the light truck category were determined using the daily mileage estimates and average kWh/mile consumption for each vehicle category, using data from the U.S. Department of Energy's Alternative Fuels Data Center.[10]

The EV numbers and electricity loads for Scenario C, using the EV truck population forecasts for the South Coast Air Basin and the methods and assumptions outlined above, are presented in Table 9.

Table 9: Scenario C Charging Loads (High EV Penetration)

Vehicle Type	2025			2035		
	Population	Peak Rate (MW)	Avg Daily (MWh)	Population	Peak Rate (MW)	Avg Daily (MWh)
Passenger Vehicles	590	1.4	24	4,197	26	336
Light Trucks (2 axle)	38	0.2	1.5	312	0.8	12.5
Medium Trucks (3 axle)	111	0.5	6.0	393	1.6	21
Heavy Trucks (4+ axle)	614	18	229	1,625	46	607
Total	**1,353**	**19.6**	**261**	**6,527**	**74**	**976**

3. Transportation Energy Best Practices and Emerging Technologies

Zero Emission Vehicles

Zero emission vehicle (ZEV) technology is developing rapidly for both light-duty and heavy-duty vehicles. ZEVs can be powered by grid electricity stored in a battery, by electricity produced onboard the vehicle through a fuel cell, or through electricity provided by sources outside the vehicle such as overhead catenary wires that are currently used for light rail and some transit buses. ZEVs achieve zero tailpipe emissions by utilizing electric drive to power the vehicle instead of fuel combustion, and achieve higher system efficiency compared to fossil fuel powered vehicles. The GHG emissions associated with a ZEV are generally lower than GHG emissions associated with an equivalent vehicle powered by fossil fuel, with the difference dependent on the carbon footprint of the electricity or fuel cell energy used to power the ZEV.

[10] https://www.afdc.energy.gov/

ZEVs discussed here include plug-in battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV) and hybrid electric vehicles (HEV), fuel cell electric vehicles (FCEV), and Range Extended Electric Vehicles (REEV) with a fuel cell or fossil-fuel powered engine.

Overall, electric engines result in lower PM and NO_X emissions when compared to conventional diesel engines, and can greatly reduce GHG emissions if the electricity is supplied by renewable sources. However, electric equipment can cost 20 to 40 percent more than its internal combustion counterpart. Electric equipment has a downtime for recharging. The batteries typically provide enough power for approximately 6 hours of constant use. After that, 8 to 16 hours are required to recharge batteries, followed by 8 hours for batteries to cool before using. Faster charging batteries can restore batteries from 20 to 100 percent in 60 to 90 minutes, though more expensive than a standard battery. In addition, battery charging stations and battery transporters are required. Although PHEVs are generally more expensive than similar conventional and hybrid vehicles, some cost can be recovered through fuel savings, a federal tax credit, or state incentives. Plug-in EVs and PHEVs use electricity from the grid to run some or all of the time reducing operating costs and petroleum consumption, relative to conventional vehicles and PHEVs. PHEVs typically produce lower levels of emissions, depending on the electricity source. PHEVs generally have larger battery packs than HEVs, which makes it possible to drive moderate distances using just electricity (approximately 10 to 40-plus miles in current models). The PHEV fuel consumption depends on the distance driven between battery charges. PHEV batteries can be charged by an outside electric power source, by the internal combustion engine, or through regenerative braking. HEVs combine the benefits of high fuel economy and low emissions with the power and range of conventional vehicles, without requiring a plug-in to charge the batteries.

As highlighted by the CEC in an annual Progress Report (CEC, 2017d), ZEV technology and supporting infrastructure is advancing rapidly in California:

- Nearly 300,000 ZEVs have been sold in California (predominantly light duty vehicles).
- Battery technology has improved, and the costs of batteries and other components have fallen dramatically. Based on manufacturer announcements, available models of PHEVs and BEVs are expected to increase nearly three-fold over the next five model years from the 25 models offered today.
- Due to substantial investments in the past several years, ZEV electric infrastructure in California has grown substantially. This trend is expected to accelerate as new infrastructure developments emerge. More than 10,000 Level 2[11] and 1,500 direct current fast charger (DCFC) connectors have been deployed across California.
- California is developing the first major fuel cell electric vehicle (FCEV) market and hydrogen fueling network in the United States. Three FCEV models are for sale in California, and 28 retail hydrogen refueling stations are open in California with an additional 32 stations proposed or already in development. Toyota and Honda have also announced partnerships with private companies for financial support of additional stations in California and the Northeast.

[11] Level 2 chargers use 208/240 volts, up to 19.2 kW (80 amps), whereas Level 1 chargers use 110/120 volts, 1.4 to 1.9 kW (12 to 16 amps).

CEC's 2017 Progress Report outlines the state's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP), funded by vehicle and vessel registration, vehicle identification plates, and smog-abatement fees (per Assembly Bill 118), is providing up to $100 million per year to fund ZEV technology development and readiness planning, EV charging infrastructure, hydrogen refueling stations, clean vehicle rebate programs, and standards development. More than $129 million has been provided by the ARFVTP to date for California companies to demonstrate advanced ZEV technologies for medium- and heavy-duty trucks, buses, and freight movement.

Another more recent report by Next 10 concludes that California will meet or exceed its 1.5 million by 2025 ZEV goal, but that the state's charging infrastructure is not keeping pace with the growth of its electric vehicle fleet. Through October 2017, more than 337,000 ZEVs had been sold in California, and ZEV sales increased 29.1 per-cent in California over the previous year. Meanwhile, California has 16,549 public and nonresidential private-sector charging outlets - most in the nation by far but only 0.05 public charging outlets per ZEV. Studies show that California will need 125,000 to 220,000 charging ports from private and public sources by 2020 in order to provide adequate infrastructure (Next 10, 2018).

Electric Vehicle Charging Infrastructure

Charging Stations

Many plug-in electric vehicle owners may do the majority of their charging at home (or at fleet facilities, in the case of fleets). Some employers offer access to charging at the workplace. In many states, plug-in electric vehicle drivers also have access to public charging stations at libraries, shopping centers, hospitals, and businesses. The charging infrastructure is rapidly expanding, providing drivers with the convenience, range, and confidence to meet more of their transportation needs with plug-in vehicles. PHEVs have added flexibility, because they can also refuel with gasoline or diesel (or possibly other fuels in the future) when necessary (U.S. Department of Energy, 2016).

Charging equipment for plug-in electric vehicles (PHEVs or EVs) is classified by the rate at which the batteries are charged. Note than, in addition to the charging station itself, charging times vary based on how depleted the battery is, how much energy it holds, the type of battery, and the type of EV. The charging time can range from 15 minutes to 20 hours or more, depending on these factors.

- Level 1 chargers: Operating on 120-volts, Level 1 chargers offer the slowest type of charging. For plug-in hybrids with smaller battery packs (i.e., a typical passenger PHEV), it may be enough to recharge the vehicle in a few hours to overnight.

- Level 2 chargers: Most dedicated home and public charging stations use Level 2 chargers, which operate at 240 Volts and are at least twice as fast as Level 1 charging due to the higher amperage of the circuit. BEVs like the Nissan Leaf typically require a Level 2 charger to provide overnight charging.

- DC Fast Chargers: A direct current fast charger (DCFC) uses direct current (DC) rather than household alternating current (AC) and is very high-powered. DCFCs are generally practical only at public sites, such as along highways, given the higher cost of the electric utility having to install dedicated high-power lines. Unlike Level 1 and Level 2 chargers, which use a standard "J-1772" type connector for plugging in the vehicle, there are three different kinds of DC quick charging connectors:

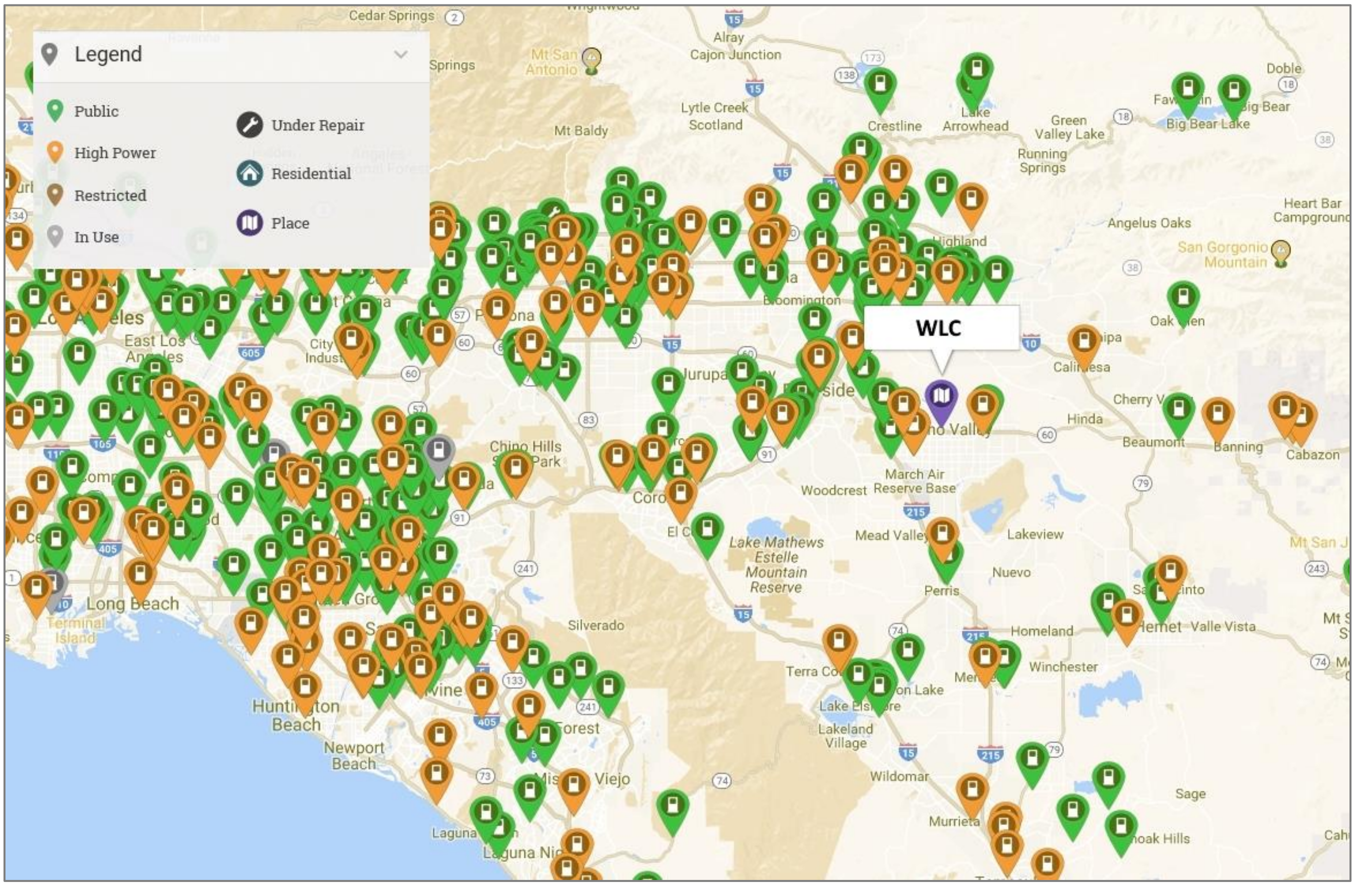
- CHAdeMO: This is currently the most popular standard, used by the Nissan Leaf, Mitsubishi i-MiEV, and Kia Soul EV.
- CCS (Combined Charging Standard): All U.S. makers except Tesla and all German makers use this standard, including cars from BMW, Chevrolet, Ford, Mercedes-Benz, Volkswagen, and Volvo that are fitted with quick-charging ports.
- Tesla Supercharger: As usual, Tesla has gone its own way and created a dedicated network of free, high-powered fast-charging stations that can only be used by Tesla owners.

- Modular DC Power Blocks: With these systems, the maximum charging power can be dedicated to just one vehicle or spread between several vehicles depending on the demand. They address the ever-growing demands of increased current and power densities in networked applications while providing maximum flexibility for system configuration. An example of a scalable modular architecture that can grow as the charging demand grows is the ChargePoint Express Plus station with an accompanying Power Cube, and a solution by ABB that includes Power Converter modules and Charge-Boxes.

The cost of charging stations is variable depending upon the type of charging station and location (curbside or garage). Component cost of charging stations vary based on hardware, electrical materials and labor, other materials and labor, transformer, mobilization, and permitting. (Greenbiz.com 2016).

Public charging stations are not as ubiquitous as gas stations, but charging equipment manufacturers, automakers, utilities, Clean Cities coalitions, municipalities, and government agencies are establishing a rapidly expanding network of charging infrastructure. Almost all public sites offer Level 2 charging, with a few providing DCFCs, increasingly with both CHAdeMO and CCS cables. Plug-in electric vehicles can be recharged at stations available within close distance of the WLC site, as shown in **Figure 1**, *Electric Vehicle Charging Stations near World Logistics Center Site,* below.

Figure 1 Electric Vehicle Charging Stations near WLC



Source: www.plugshare.com

Applicability to Proposed Project:

The adoption of ZEV passenger vehicles by WLC employees is beyond the direct control of the Proposed Project. However, providing on-site EV charging stations for employees to use as they park their vehicles would help incentivize the use of such vehicles, helping to reduce the GHG emissions associated with commuting. By 2025, it is expected that modular DC power blocks will be the preferred EV charging solution for the WLC site, given the projected EV population and the anticipated need for power load management.

Road-Connected Power

This technology, well established in the transit industry (e.g., electric trolley-bus), is used widely in mining with extremely heavy equipment and is now being demonstrated for heavy haul trucks in Europe and the United States. Power is transferred to the vehicle from an overhead catenary wire to an apparatus mounted on the roof of the vehicle known as a pantograph. Roadway power infrastructure is typically complicated and expensive, and may be appropriate only in certain areas or applications.

Applicability to Proposed Project:

For passenger vehicles and light duty trucks, road-connected power is not a feasible technology for passenger vehicles at this time.

For medium and heavy-duty trucks, despite there being demonstration projects at ports and other sites with heavy truck traffic, installing road connected power at a site like the WLC would only be effective if a critical mass of vehicles visiting the site were fitted with special equipment to connect with the overhead catenary line used to transmit electrical energy. For effective charging, vehicles would have to do most or all of their driving on site. This technology does not represent a feasible approach to supporting the Project's use of zero emission trucks.

Plug-in All-Electric Vehicles (BEV)

All-electric vehicles (EVs), sometimes referred to as battery electric vehicles (BEVs), use a battery to store the electrical energy from a plug-in source that powers the electric motor (there is no internal combustion motor). EV batteries are charged by plugging the vehicle into an electric power source. Although most U.S. electricity production contributes to air pollution, the USEPA categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or emissions. Because EVs use no fuel, widespread use of these vehicles could dramatically reduce petroleum consumption.

The efficiency and driving range of BEVs varies substantially based on vehicle size, driving conditions and driving habits. Extreme outside temperatures tend to reduce range, because more energy must be used to heat or cool the cabin. High driving speeds reduce range because of the energy required to overcome increased drag. Compared with gradual acceleration, rapid acceleration reduces range. Hauling heavy loads or driving up significant inclines also reduces range.

Passenger BEVs

As described above, there is strong momentum in California in growing the fleet of passenger EVs to meet or exceed the state's ZEV targets of 1.5 million by 2025 and 4.2 million by 2030. A high percentage of these are expected to be BEVs, but charging infrastructure is not keeping pace, and more public and nonresidential private-sector charging outlets are needed (Next 10, 2018).

Currently available passenger BEVs have a shorter driving range per charge than most conventional vehicles have per tank of gas. BEV manufacturers typically target a range of more than 200 miles on a fully charged vehicle. According to the U.S. Department of Transportation, Federal Highway Administration, 100 miles is sufficient for more than 90 percent of all household vehicle trips in the United States. For longer trips, it is necessary to recharge the vehicle or swap the battery.

Applicability to Proposed Project:

As outlined in the Electric Vehicle Scenarios above, a significant population of passenger EVs is expected to visit the site at Phase 1 (2025) and full buildout of the project (2035). Developing the supporting infrastructure (i.e., cable raceways) for installing EV charging stations will enable WLC to more readily and cost effectively provide this service to future tenants if and when demand dictates. For a project the size of WLC, the current Title 24 building code requires that 6 percent of parking spaces be constructed to accommodate electric vehicle supply equipment (EVSE) for future electric vehicle charging.

Truck BEVs

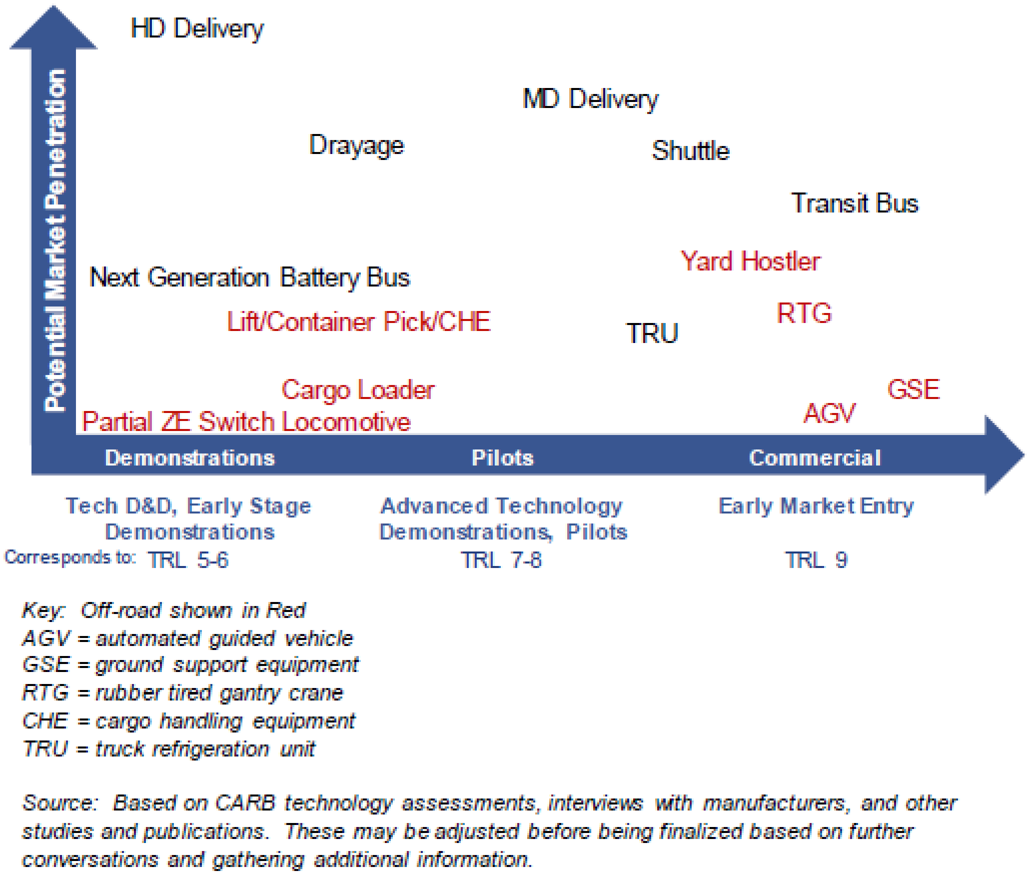
CARB has recently assessed the five- to ten-year outlook for BEV technology in the medium-duty (8,501 to 14,000 pounds (lbs.) Gross Vehicle Weight Rating (GVWR)) and heavy-duty (14,001 lbs. and above GVWR) truck and bus market (CARB, 2015). The study found that battery electric transit buses and shuttle buses are increasingly available from a variety of manufacturers, as are other medium-duty BEVs, primarily delivery vehicles. BEV trucks currently in the marketplace typically use lithium-ion battery chemistries. BEVs are just beginning to penetrate the heavy-duty vehicle market. To date, most medium- and heavy-duty BEV truck deployments in California have been in the urban vocational work truck category, focusing on urban transit buses and intracity delivery with daily ranges of generally 100 miles or less.

Heavy duty and medium duty delivery trucks, drayage trucks all have large potential for market penetration but lag transit buses and shuttles in terms of technology development. While transit buses have already been commercialized, medium duty BEVs are undergoing pilots and advanced demonstration projects, while drayage heavy duty BEVs are still in the early demonstration phase.

Applicability to Proposed Project:

Figure 2 provides a snapshot of the market penetration and technology development status for BEV trucks. BEV solutions for heavy duty applications are in the early phases of commercial market deployment. BEV applications in the medium duty delivery and work truck segments are also in the early market or late pilot deployment stage. As the project gets built out, several truck BEV options may become feasible for the tenants depending on the specific distances traveled and duty cycles of the vehicles deployed. Recognizing that the timeline for market penetration and technology development is currently speculative, developing the supporting infrastructure for charging these vehicles (i.e., cable raceways to support EV supply equipment) will enable WLC to provide future EV charging capabilities to future tenants as truck BEVs become commercially available.

Figure 2 Technology and Commercialization Status – Battery Electric Trucks



Source: CALSTART, 2018

Hybrid Electric Vehicles (HEVs) and Plug-in Hybrid Electric Vehicles (PHEV)

Hybrid electric vehicles (HEVs) are powered by an internal combustion engine or other propulsion source that can be run on conventional or alternative fuel, and an electric motor that uses energy stored in a battery (but not recharged from a plug-in source). Electric drive is typically used at low speeds for shorter distances, while blended electric-fuel mode is used at higher speeds and longer distances. The extra power provided by the electric motor allows for a smaller combustion engine. Additionally, the battery can power auxiliary loads like sound systems and headlights, and reduce engine idling when stopped. Together, HEVs combine the benefits of high fuel economy and low emissions with the power and range of conventional vehicles.

A HEV cannot plug into off-board sources of electricity to charge the battery. Instead, the HEV uses regenerative braking and the internal combustion engine to charge the battery. The HEV captures energy normally lost during braking by using the electric motor as a generator, and storing the captured energy in the battery. The energy from the battery provides extra power during acceleration.

Plug-in hybrid electric vehicles (PHEVs) are powered by both an electric motor using electricity stored in batteries, or an internal combustion engine or other propulsion source, using a fuel such as gasoline or diesel. Electric drive is typically used at low speeds for shorter distances, while blended electric-fuel mode is used at higher speeds and longer distances. Using electricity from the grid to run the vehicle some or all of the time reduces operating costs and petroleum consumption, relative to conventional vehicles. PHEVs might also produce lower levels of emissions, depending on the electricity source.

PHEVs generally have larger battery packs than non-plug-in hybrid electric vehicles (discussed below). This makes it possible to drive moderate distances using just electricity (about 10 to 40-plus miles in current models), commonly referred to as the "all-electric range" of the vehicle.

During urban driving, most of a PHEV's power comes from stored electricity, if the battery is charged. For example, a light-duty PHEV driver might drive to and from work on all-electric power, plug in the vehicle to charge it at night, and be ready for another all-electric commute the next day. The internal combustion engine powers the vehicle when the battery is mostly depleted, during rapid acceleration, or when intensive heating or air conditioning is required. Some heavy-duty PHEVs work the opposite way, with the internal combustion engine used for driving to and from a job site and electricity used to power the vehicle's equipment or control the cab's climate while at the job site. The PHEV fuel consumption depends on the distance driven between battery charges. For example, if the PHEV is never plugged in to charge, the fuel economy will be about the same as a similarly sized non-plug-in hybrid electric vehicle. If the PHEV is driven a shorter distance than its all-electric range, and plugged in to charge between trips, it may be possible to use only electric power.

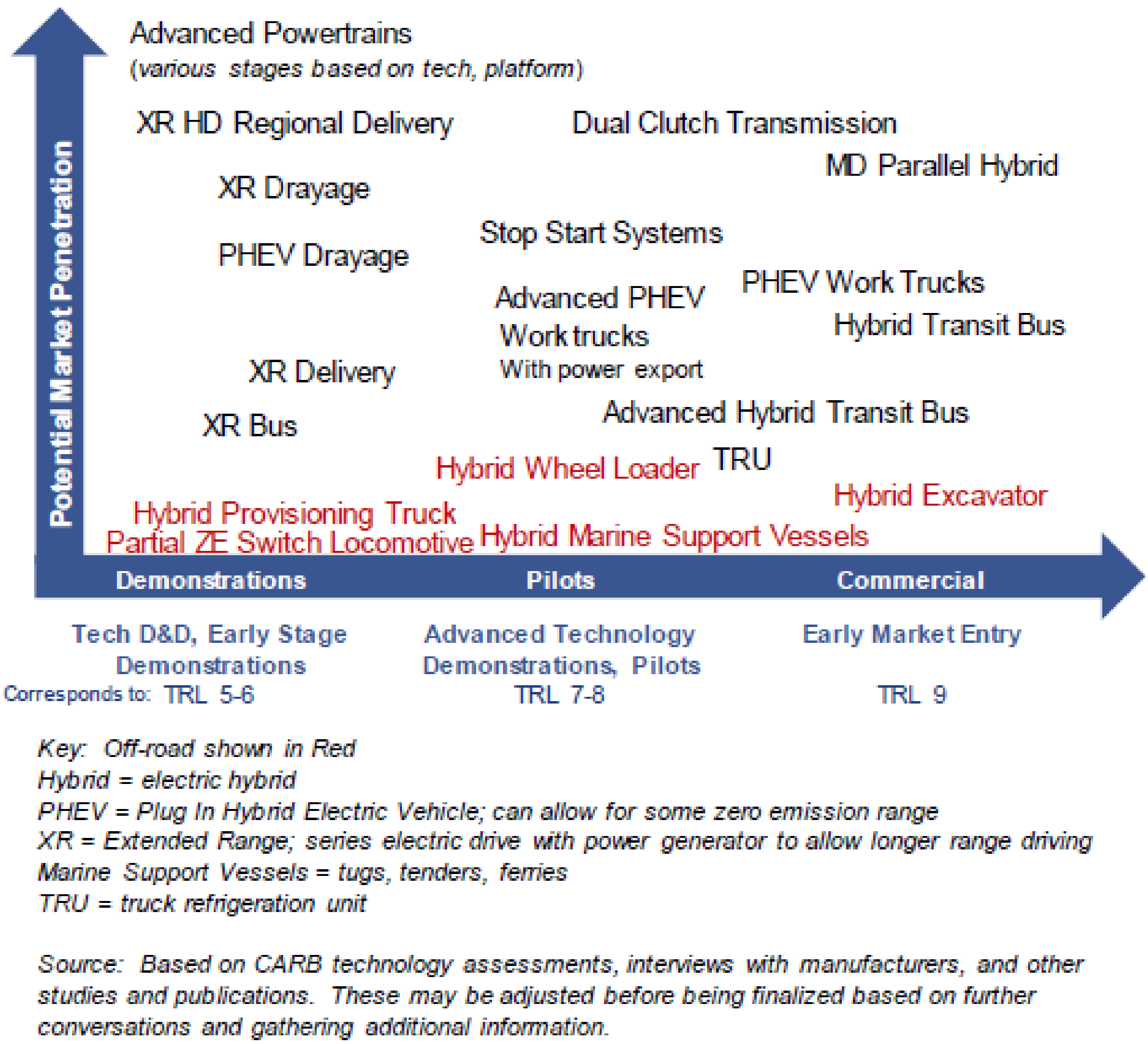
PHEV batteries can be charged by an outside electric power source, by the internal combustion engine, or through regenerative braking. During braking, the electric motor acts as a generator, using the energy to charge the battery (U.S. Department of Energy, 2016).

Applicability to Proposed Project:

California’s growing the fleet of passenger EVs includes BEVs, HEVs, and PHEVs, all contributing the state’s ZEV targets of 1.5 million by 2025 and 4.2 million by 2030. The full range of EV types should be expected in the fleet mix visiting the WLC in 2025. It is speculative to state what the fleet mix will be in 2035, but the all three EV types should be anticipated in designing the charging infrastructure.

There are currently early market offerings in the medium-duty delivery and work truck categories that are applicable to this project. Hybrid systems show promise to enable the electrification of the driveline of heavy duty trucks by augmenting the range with a secondary power system. Figure 3 provides a snapshot of the market penetration and technology development status for HEV and PHEV trucks.

Figure 3 Technology and Commercialization Status – Hybrid Electric Trucks

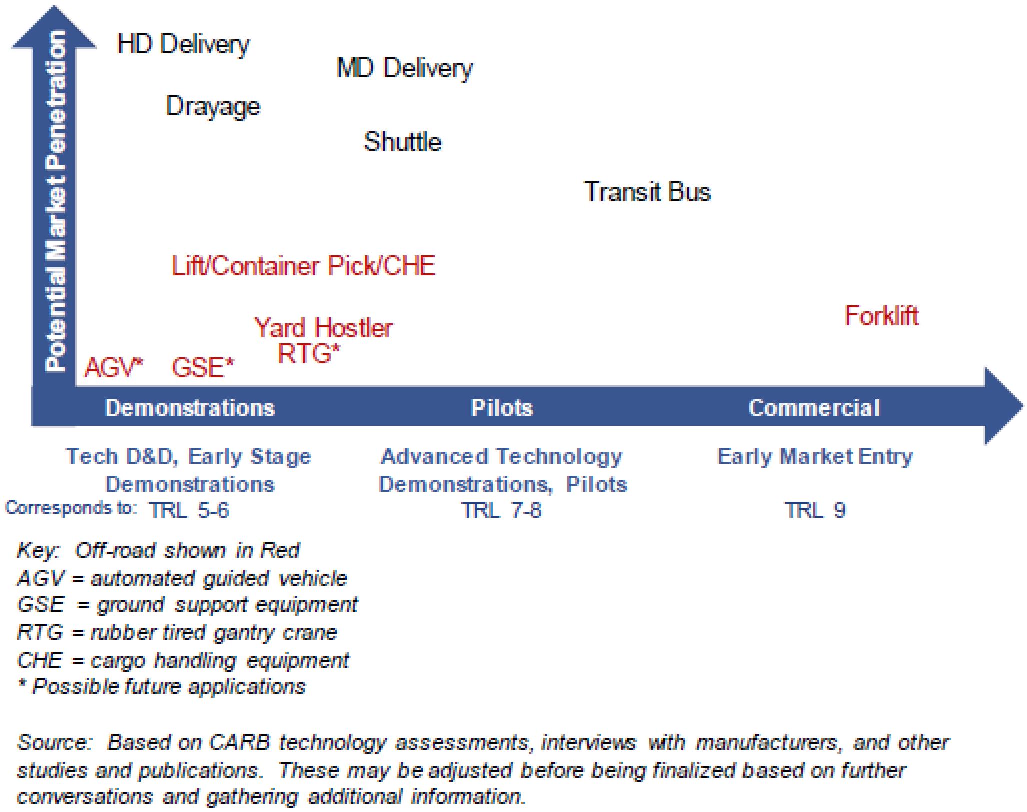


Source: CALSTART, 2018

Range Extended Electric Vehicle (REEV) – Fuel Cell

Range extended electric vehicles that utilize a fuel cell as an additional energy source are promising and deserve attention. In particular, medium-duty delivery vehicles have been identified as a viable vehicle category in the near term. In on road applications fuel cell buses are approaching commercial technology readiness levels. Advancements in the commercialization of both battery electric trucks and fuel cell electric buses have the potential to expedite the commercialization of fuel cell electric trucks. Figure 4 provides a snapshot of the market penetration and technology development status for fuel cell electric trucks.

Figure 4 Technology and Commercialization Status – Fuel Cell Electric Trucks



Source: CALSTART, 2018

Cost and Availability of Zero Emission Trucks

Medium-duty and heavy-duty zero emission trucks currently cost significantly more than conventionally fueled trucks and buses, but funding exists to help offset the higher cost. This includes CARB's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), which is funded by Low Carbon Transportation investments and the Air Quality Improvement Program (AQIP), offers a purchase voucher on a first-come, first-served basis. Vouchers are available for electric, hybrid, fuel cell, and low-NOx natural gas trucks and buses. The program has been operating for over eight years and over 4000 vouchers have been issued. Base voucher amounts range from $20,000 to $315,000 depending on vehicle size and technology.[12] In addition, the California State Transportation Agency/Caltrans funds transit expansion and capital improvement projects with Greenhouse Gas Reduction Fund monies, some of which have gone to EV transit buses. The Goods Movement Emission Reduction Program funded by Proposition 1B provides funds to existing truck owners who wish to upgrade to EVs (CARB, 2015).

[12] Examples of current eligible vehicles can be found at: https://www.californiahvip.org/eligible-technologies/

Ongoing pilot projects and demonstration projects for emerging ZEV technologies are being funded by CARB, the California Energy Commission (CEC), and local air control districts including the South Coast Air Quality Management District (SCAQMD), some of which are described below under "Technology Demonstration Projects."

As indicated in Table 10, there were very few heavy duty EV trucks operating in California in 2015, but there were hundreds of medium-duty EVs on the road, and the number has grown. Many of these vehicles are being used for urban delivery. CARB expects widespread penetration of such medium duty EV trucks into the market place in the next 5 to 10 years. UPS recently received 17 fully electric EVI delivery vans purchased with CEC demonstration funds, with each van costing around $143,000, including the purchase of the chassis and decommissioning of the existing powertrain (CARB, 2015).

TABLE 10
SUMMARY OF MEDIUM-DUTY AND HEAVY-DUTY EV POPULATIONS IN 2015

Vehicle	Technology Readiness	Number in Service	Notes
Transit Bus	Commercially Available	Approximately 40 in California, and > 2,500 worldwide	3 models commercially available in U.S.
School Bus	Limited Commercial Availability	4 in California	3 new buses ordered in SCAQMD 6 repowers underway with V2G
Medium-Duty (8,501 to 14,000 lbs. GVWR) [a]	Limited Commercial Availability	300+	Focused on delivery service
Heavy-Duty (> 14,000 lbs. GVWR)	Demonstration Phase	2 Drayage 1 Refuse	13 Class-8 Trucks under construction

Source: CARB, 2015
Notes:
a. GVWR = Gross Vehicle Weight Rating

Zenith Motors offers an electric delivery/work van that can also be configured as a 12-passenger shuttle. The vans offer a range option of 90 or 120 miles, using LiPO4 batteries, with around 6 hours required to recharge. With the available HVIP vouchers, Zenith is offering the 120 mile 350 cargo van configuration for a net cost of $40,400, which is comparable to the analogous Ram ProMaster gasoline unit (CARB, 2015).

Zero Emission Truck Technology Demonstration Projects

A number of zero emission truck technologies are being tested and demonstrated in the South Coast Air Basin and throughout California that aim to advance their commercial development goods movement.

Countywide Zero-Emission Trucks Collaborative

At the request of partner agencies, the Los Angeles County Metropolitan Transportation Authority (Metro) has taken the lead in forming a Countywide Zero-Emission Trucks Collaborative to promote development and deployment of zero-emission trucks in Los Angeles County. The Collaborative will include ports of Long Beach and Los Angeles, Caltrans, Southern California Association of Governments (SCAG), and SCAQMD. The Collaborative is currently developing pilot projects as well as demonstration projects for zero-emission trucks.

Advancing zero-emission truck technology and implementation will help achieve the air quality objectives of Metro's Long Range Transportation Plan, goods movement program, and the agency's over-arching goal of creating a more sustainable transportation system. The collective efforts will be critical to meeting the stringent, federal health-based air standards proposed by the USEPA. The SDAQMD believes that should the new standards be adopted by USEPA, then a significant percentage of vehicles will need to achieve zero or near-zero-emissions by 2023. However, to date, the focus has been on dedicated zero-emission electric truck technology along the I-710 (see "I-710 Corridor Zero-Emission Truck Commercialization Study" below). As part of the I-710 Corridor Project EIR/EIS, Metro has explored the feasibility of zero-emission trucks, including an Alternative with a 17-mile zero-emission, dedicated freight corridor in response to community air quality concerns. Metro has been investigating vehicle technologies that could meet the zero-emission requirement of the corridor. However, there are a series of challenges to overcome and critical stages in the development process to be completed before commercialization of zero-emission trucks will be realized. Establishing a coalition focused on technology advancement and implementation will help align Metro's policies and leverage its investments with those of partner agencies to realize our common vision for zero-emission trucks, clean air, and sustainable communities (Metro 2016).

Advanced Technology for Truck Corridors

The Advanced Technology for Truck Corridors pilot project being led by CalTrans brings together Integrated Corridor Management, Active Traffic Management, Freight Advanced Traveler Information System, and Connected Vehicle advanced technology platforms as an integrated strategy to improve system efficiency and support the goals of the California Sustainable Freight Action Plan (CalTrans, 2016):

- Increase freight system efficiency of freight operations at specific facilities and along freight corridors such that more cargo can be moved with fewer emissions.
- Accelerate use of clean vehicle and equipment technologies and fuels of freight through targeted introduction of zero emission or near-zero emission (ZE/NZE) technologies, and continued development of renewable fuels.
- Encourage State and federal incentive programs to continue supporting zero and near-zero pilot and demonstration projects in the freight sector.
- Accelerate use of clean vehicle, equipment, and fuels in freight sector through targeted introduction of ZE/NZE technologies, and continued development of renewable fuels. This includes developing policy options that encourage ZE/NZE vehicles on primary freight corridors (e.g., Interstate-710); examples of such policy options include a separated ZE/ NZE freight lane, employing market mechanisms such as favorable road pricing for ZE/NZE vehicles, and developing fuel storage and distribution infrastructure along those corridors.

The Advanced Technology for Truck Corridors Pilot Project Work Plan (CalTrans, 2017) describes the project occurring in phases. The first phase will mainly involve advance technology deployment along I-710 and nearby arterials, the second phase will involve State Route 60 and I-10, and the third phase will involve improvements along I-15. The components include

- **Integrated Corridor Management** where Intelligent Transportation Systems (ITS) will incorporate Vehicle-to-Infrastructure (V2I) communications using the latest Connected Vehicle (CV) technology. New ITS infrastructure will allow for the collection of truck-specific data on all freeways, including lane-by-lane information, freight vehicle classification, and truck length data. Data from these systems will be transmitted to the Caltrans Advanced Traffic Management System and others through the Regional Integration of Intelligent Transportation Systems network.

- **Active Traffic Management** incorporating a series of advanced Active Traffic Management (ATM) strategies that address congestion using various methods to manage and control traffic in real-time based on prevailing conditions, and to make informed, performance-driven decisions regarding traffic management.

- **Connected Vehicle Technology**, which has the potential to transform transportation through the creation of safe, interoperable wireless communications networks among passenger cars, buses, commercial trucks, trains, traffic signals, smart phones, and other connected devices. This technology aims to address some of the biggest challenges in surface transportation with respect to safety, mobility, and the environment.

- **Support for Zero and Near-Zero Emission Trucks:** The Pilot supports the region's efforts to increase the number of ZE and NZE trucks operating within and around the San Pedro Bay Port Complex by setting a target for deploying ZE charging stations and other alternative fueling stations along the I-710 south corridor. The objective of SCAQMD's program is to deploy up to 500 ZE and low Nitrogen Oxide (NOx)/NZE trucks on the I-710 Corridor between 2018 and 2025 (Phase 1) and another 500 ZE and NZE trucks between 2026 and 2035 (Phase 2) for a total of 1,000 ZE and NZE trucks. The program is intended to help build a fleet of ZE and NZE trucks that would utilize the I-710 Corridor as the I-710 Project comes online. It is envisioned that incentive funding for vehicle replacements, vehicle conversions, and/or purchase subsidies will develop.

I-710 Corridor Zero-Emission Truck Commercialization Study

CALSTART recently completed a zero emission truck commercialization study to support the I-710 Corridor Project (CALSTART, 2013). CALSTART reviewed a number of reports and studies to evaluate which zero-emission truck technologies could potentially meet the needs of the I-710 Corridor Project and drayage users, developing a preliminary business case for the more feasible technology alternatives, and describing a commercialization plan for these zero-emission capable trucks based on the technologies recommended. The study concludes that zero-emission capable drayage trucks can be developed, demonstrated, and commercially deployed (roughly 10,000 trucks) by 2025.

Through user surveys and interviews with drayage operators, CALSTART determined a market need for at least 100 miles in range capability, before refueling is needed (one-tank range), and preferably 200 miles. Additional performance requirements identified that are independent of fuel technology include:

- The vehicle must have sufficient power for operation (400 horsepower; 1,200 to 1,800 foot-pounds of torque);

- The vehicle must have at least 100 miles in range capability, before refueling is needed (one-tank range), and preferably 200 miles; and
- The vehicle must have the capability to be used on all delivery routes.

Key findings of the CALSTART study include:

- BEV designs can deliver 100+ miles of range but based on their analysis have a challenging business case.
- REEV with Fuel Cell designs can deliver more than 100 miles of zero emission range, and offer a reasonable business cases when utilization is high. Electrical infrastructure needs are lower than BEVs, and hydrogen infrastructure needs should be manageable in the I-710 region.
- REEV with Engine (CNG) can deliver 50 miles of ZE range and up to 250 more miles of "very low emissions" range. CALSTART concludes that this option has the best business case of the examined alternatives, provided CNG costs are low and utilization is high. Electrical infrastructure needs are lower than BEVs, and CNG infrastructure is already under development.
- The optimal technology for a zero-emission capable Class 8 drayage truck depends upon the zero-emission range required:
  - 20 miles ZE range: HEV, PHEV, REEV, and BEV architectures are all suitable;
  - 50 miles ZE range: Both REEV and BEV designs are optimal;
  - 100 miles ZE range: Both REEV and BEV designs are optimal; and
  - Over 100 miles ZE range: REEV with Fuel Cell is the primary viable option.

The CALSTART study emphasizes supporting infrastructure as a key to the successful deployment of any zero-emission truck implementation. First, and foremost, sufficient refueling and/or recharging stations are needed. Infrastructure development should proceed concurrently with the development and deployment of zero-emission trucks for operations to be successful. As with any scaling up of zero emission truck operations, additional studies are required to determine infrastructure needs for the I-710 Corridor Project. Full commercialization will require several paths of parallel activity, including focused vehicle and infrastructure development; demonstration projects; a supportive regulatory framework; enhanced operational and business case assessment; and fleet training, maintenance training, and decision support.

The CALSTART study found that the current cost of a zero emission truck is approximately double the cost of a conventional diesel truck. However, costs of the key components of batteries and fuel cells are expected to fall dramatically as technology advances and volumes increase. Future operating costs (i.e., primarily fuel costs) can be reasonably estimated based on fuel consumption and predicted fuel costs but maintenance costs will remain difficult to estimate until enough zero emission trucks are in operation for long enough to collect data and ascertain maintenance needs.

Additional Zero Emission Truck Demonstration Projects

Recently, the South Coast Air Quality Management District (SCAQMD) submitted comments to the California Department of Toxic Substances Control (DTSC) regarding the air quality impacts analyzed in the Draft Program EIR for the Santa Susana Field Laboratory Project, describing several zero emission truck demonstration projects underway in the South Coast Air Basin (SCAQMD, 2017), For each of these projects, the SCAQMD memo provides details on technology development, funding information and incremental vehicle cost:

- **CARB Zero Emission Drayage Truck Demonstration Project –** SCAQMD received an award of approximately $23.6 million in 2016 to develop and demonstrate zero emission drayage trucks under CARB's Low Carbon Transportation Greenhouse Gas Reduction Fund Investments Program.
- **2012 DOE Zero Emission Drayage Truck Demonstration Project (ZECT I)**
- **DOE Zero Emission Cargo Transport Demonstration Project (ZECT II)**
- **CEC Sustainable Freight Transportation Project**
- **Overhead Catenary Truck Project**

Low Carbon Fuels

Biodiesel Fuel

Biodiesel is a cleaner burning diesel replacement fuel, produced from a renewable diverse mix of resources including agricultural oils, recycled cooking oil, and animal fats. Meeting strict technical fuel quality and engine performance specifications (American Society of Testing & Materials (ASTM) D6751), biodiesel can be used in existing diesel engines without modification, and is covered by all major engine manufacturers' warranties, most often in blends of 5 percent up to 20 percent (known as B20) biodiesel. Biodiesel is produced in nearly every state in the country. Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the 1990 Amendments to the federal Clean Air Act. Health testing was performed based on inhalation of biodiesel exhaust at different concentrations. Results of the testing concluded that biodiesel exhaust concentrations expected to be observed on the field would not pose a threat to human health (Sharp, 1998)

Biodiesel that meets ASTM D6751 and is legally registered with the USEPA, is a legal motor fuel for sale and distribution (Biodiesel.org 2016). The use of biodiesel in a conventional diesel engine, not equipped with new diesel after treatment, results in substantial reduction of unburned hydrocarbons, carbon monoxide (CO), and PM compared to emissions from diesel fuel. In addition, the exhaust emissions of sulfur oxides and sulfates (major components of acid rain) from biodiesel are essentially eliminated compared to higher sulfur diesel (Biodiesel.org 2016).

Of the major exhaust pollutants, both unburned hydrocarbons and NO_X are ozone (or smog) forming precursors. The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, CO, and PM. However, emissions of NO_X are either slightly reduced or slightly increased depending on the duty cycle of the engine and testing methods used. Biodiesel further enhances the advantages of diesel by reducing vehicle emissions. B20, a 20 percent blend of biodiesel and conventional diesel, reduces emissions of hydrocarbons by 20 percent and CO and PM emissions by 12 percent. Based on engine testing, using the most stringent emissions testing protocols required by USEPA for certification of fuels or fuel additives in the U.S., the overall ozone forming potential of the hydrocarbon emissions from biodiesel was nearly 50 percent less than that measured for diesel fuel. New Technology Diesel Engines (NTDE) (i.e. those with PM traps and selective catalytic reduction, SCR, technology required for on-road applications in the US after 2010) reduce emissions of both PM and NO_X with B20 by over 90 percent compared to a conventional diesel engine based on model year 2004 emissions standards. This makes NTDEs as clean as or cleaner than either gasoline or natural gas fueled engines (Biodiesel.org 2016).

Biodiesel Availability

Biodiesel is available nationwide, and can be purchased directly from biodiesel producers and marketers, petroleum distributors, or at a few public retailers throughout the nation (Biodiesel.org 2016). Biodiesel fuel is available at fueling stations within _____ miles of the WLC site, as shown in **Figure 5**, *Biodiesel Fueling Stations near World Logistics Center Site*, below.

Biodiesel Usage

Biodiesel usage is growing rapidly in every market segment where conventional diesel fuel is used. Some of the leading types of consumers of biodiesel fuels include state and municipal governments, school districts, U.S. Department of Defense, agriculture, cruise ships, mining, commercial trucking and truck stop operators. Many cities and states have started to require that their trucks and buses use biodiesel fuels. Notable examples of municipal users in California include the cities of San Francisco, San Jose, and Santa Monica. Some states such as Washington, Louisiana and Minnesota now also mandate that a certain percentage of all diesel fuel sold must be biodiesel.

Use of biodiesel is diverse, with a variety of users (e.g., municipalities, agencies, and utilities) and equipment and vehicle fleets, such as the following examples (Berkeleybioddiesel.org 2016):

- New common rail engines use biodiesel fuel, B5 or B20, depending on manufacturer.
- Automobile manufacturer acceptance and vehicular usage of biodiesel fuel began when Chrysler released the Jeep Liberty CRD diesels into the American market with B5, which was an indication of at least partial acceptance of biodiesel fuel usage in the automotive industry.
- The City of Halifax, Nova Scotia updated its bus system to allow the fleet of city buses to run completely on a fish-oil based biodiesel fuel.
- The McDonalds Corporation in United Kingdom produced biodiesel from the waste oil of its restaurants and use as biodiesel fuel to run its vehicle fleet. The British Train Operating Company, Virgin Trains was transformed to run on B20. The Royal Train runs onB100.
- The Disneyland Theme Park operates its park trains on B98 biodiesel blends.
- Caterpillar Corporation uses of blends up to B20 in its off-road Tier 4 938K wheel loader. Caterpillar has approved the use of B20 biodiesel across its range of compact and mid-range engines.
- Komatsu Corporation announced that an acceptable biodiesel fuel blend of up to B20 can be used for all Komatsu engines.
- The Volvo Corporation warranty statement for Volvo Trucks' D11, D13, and D16 engines that the use of biodiesel up to a maximum of B20 in and of itself, will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the bio fuel used in the blend conforms to ASTM standards.

- The John Deere Corporation announced that all John Deere engines can use biodiesel blends. B5 blends are preferred, but concentrations up to B20 can be used providing the biodiesel used in the fuel blend meets the ASTM standards.

Applications of biodiesel fuel can also be seen as a heating fuel in domestic and commercial boilers, using a blend of heating oil and standardized biofuel, known as "bio heat" (Berkeleybioddiesel.org 2016).

As of 2015, the annual U.S. production of biodiesel was 1,263 million gallons (U.S. Energy Information Administration (EIA 2016), and 32 million gallons in California (California Biodiesel Alliance 2016).

The USEPA has set a target of 18.8 billion (bn) gallons blended into the U.S.' fuel supply in 2017, up 4 percent from the 18.1 bn gallons set for this year, which includes 14.8 bn for conventional biofuels, mainly ethanol, up from 14.5 bn for this year. This figure is still far below the 24 bn gallon target in the Renewable Fuel Standard set in 2007 by Congress, which was aimed at cutting US oil imports and increasing renewable fuel use. In addition:

- Total renewable fuel volumes would grow by nearly 700 million gallons between 2016 and 2017.
- Biomass-based biodiesel, which must achieve at least 50 percent lifecycle emissions reductions, would grow by 100 million gallons between 2017 and 2018.
- Cellulosic biofuel, which requires 60 percent lifecycle carbon emissions reductions, would grow by 82 million gallons, or 35 percent, between 2016 and 2017.

Biodiesel Benefits and Drawbacks

The use of biodiesel has benefits and drawbacks. According to a USEPA study, the use of B20 can reduce emissions of hydrocarbons by 20 percent, CO by 11 percent, and PM by 10 percent; however it can increase NO_X emissions by 2 percent. The use of biodiesel does not contribute substantial amounts of GHGs to the global climate change problem since they only emit back to the environment the CO_2 that their source plants absorbed from the atmosphere as part of the natural carbon cycle. A benefit of biodiesel is that it can be used in existing diesel engines with no physical changes needed.

Many producers have been unable to produce biodiesel that meets ASTM 6751 quality due primarily to their inability to remove all impurities and water during the washing and refining processes. The USEPA found that the use of B20 can reduce fuel efficiency by 1 to 2 percent. B100, and other diesel/biodiesel blends, are more expensive to consumers than standard diesel fuel, as a result of the rapidly rising feedstock prices and production problems of producers.

Applicability to Proposed Project:

Future tenants and suppliers of the WLCSP warehouses may choose to use biodiesel. Given that buildout of the WLC will result in daily emissions of NOx well in excess of applicable significance levels, and NOx is the primary culprit in the Basin's ozone nonattainment status, the use of biodiesel in Project-related vehicles should not be mandated. However, because the use of biodiesel results in a reduction of hydrocarbons, CO, and PM as compared to conventional diesel, its use should not be discouraged or limited.

Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG)

CNG and LNG are two forms of natural gas currently used in vehicles. CNG is produced by compressing natural gas to less than 1 percent of its volume at standard atmospheric pressure. To provide adequate driving range, CNG is stored onboard a vehicle in a compressed gaseous state within cylinders at a pressure of 3,000 to 3,600 pounds per square inch. CNG is used in light-, medium-, and heavy-duty applications. A CNG-powered vehicle gets about the same fuel economy as a conventional gasoline vehicle on a gallon of gasoline equivalent (GGE) basis. GGE is the typical way CNG is sold at public fueling stations. One GGE equals about 5.66 pounds of CNG.

LNG is natural gas that has been converted to liquid form for easier storage and transport. LNG is produced by purifying natural gas and super-cooling it to approximately -260 °F to turn it into a liquid. During the process known as liquefaction, natural gas is cooled below its boiling point, removing most of the compounds found in the fuel. The remaining natural gas is primarily methane with small amounts of other hydrocarbons. LNG must be kept at cold temperatures and stored in double-walled, vacuum-insulated pressure vessels. Because of LNG's relatively high production cost as well as the need to store it in expensive cryogenic tanks, the fuel's widespread use in commercial applications has been limited. One GGE equals about 1.5 gallons of LNG (U.S. Department of Energy, 2016).

There are three types of natural gas vehicles (NGVs):

- **Dedicated:** designed to run only on natural gas.
- **Bi-fuel**: have two separate fueling systems that enable them to run on either natural gas or gasoline.
- **Dual-fuel**: traditionally limited to heavy-duty applications have fuel systems that run on natural gas, and use diesel fuel for ignition assistance.

Light-duty vehicles are typically equipped with dedicated or bi-fuel systems, while heavy-duty vehicles use dedicated or dual-fuel systems. On the vehicle, natural gas is stored in tanks as CNG. Dedicated NGVs only have one fuel tank, and are not as heavy as bi-fuel NGVs and can offer more cargo capacity. The driving range of NGVs is generally less than that of comparable conventional vehicles because of the lower energy density of natural gas. Extra storage tanks can increase range, but the additional weight may displace cargo capacity.

LNG, a more expensive option, is used in some heavy-duty vehicles. The form of natural gas used is typically chosen based on the range an application needs. Because it is a liquid, the energy density of LNG is greater than CNG, so more fuel can be stored onboard the vehicle. As a result, LNG is more suitable than CNG for trucks that require longer ranges because liquid is more dense than gas, and, therefore, more energy can be stored by volume in a given tank. LNG is typically used in medium- and heavy-duty vehicles, such as Class 7 and 8 trucks requiring a greater range.

CNG/LNG Availability

Natural gas powers approximately 150,000 vehicles in the United States and approximately 15.2 million vehicles worldwide. Both CNG and LNG are domestically produced, relatively low priced, and commercially available. Considered alternative fuels under the Energy Policy Act of 1992, CNG and LNG are sold in units of GGEs or diesel gallon equivalents (DGEs) based on the energy content of a gallon of gasoline or diesel fuel. A CNG/LNG fueling station is planned for the WLC site, as described in the WLC Specific Plan. It would service smaller on-site CNG vehicles (e.g., forklifts) associated with the warehouses and would also be publically available for refueling.

CNG/LNG Usage

CNG and LNG usage has been supported by various companies in the past for off-road construction trucks and on-road heavy duty trucks, such as the following:

- With regard to off-road construction trucks, Caterpillar is developing large CNG powered mining trucks that would be used mainly for hauling mining ore, debris, and soil.
- For on-road trucks, Volvo offers two CNG-powered on-road heavy duty day cabs (Model VNL and VNM) equipped with a factory-installed Cummins ISL G engine (available 2013). The larger, more robust VNL model features a 12-liter Cummins- Westport ISX12 G gas engine. As of November 2016, Volvo VNL models are commercially available with the ISX12 natural gas engine.
- Terex introduced its first natural-gas-fueled mixer truck -- the front-discharge FD5000 "Great Lakes" --with a new 12-liter Cummins ISX12G engine available in ratings up to 400 hp and 1450 ft. lb. of torque, in 2014.
- Freightliner Trucks showcased its first 114SD concrete mixer with CNG technology at the 2013 World of Concrete in Las Vegas. In addition, there are other Freightliner trucks that run off of natural gas.

These engines discussed above are also incorporated into a number of mass transit uses. CNG/LNG is used in a variety of heavy-duty sources, such as school buses, transit buses, capacity trucks, tractors, and freightliners.

CNG/LNG Benefits and Drawbacks

Natural gas vehicles are good choices for centrally fueled fleets. CNG tank technology and safety are improving, and in many cases CNG can provide operators with adequate range (less than 250 miles/day) for their operations. For vehicles needing to travel long distances (greater than 250 miles/day), LNG is a better choice. The advantages of natural gas as a transportation fuel include its domestic availability, widespread distribution infrastructure, low cost, and inherently clean-burning qualities.

The horsepower, acceleration, and cruise speed of NGVs are comparable to those of equivalent conventional vehicles. However, torque levels are slightly lower compared to diesel fueled engines. The Cummins ISL G natural gas engine has a diesel counterpart, the ISL 9 engine. The ISL G (natural gas) provides torque levels of up to 1,000 lb-ft, while the ISL 9 (diesel) provides torque levels of up to 1,300 lb-ft. Although the ISL G and ISL 9 engines are rated for 80,000 lb line haul applications, the deficiency in torque result in trucks travelling slower to the receiver destination. As torque is required for hauling heavy loads upgrade, use of natural gas engines may not be feasible for hauling heavy loads.

Compared with conventional diesel and gasoline vehicles, NGVs can produce some emissions benefits. When used as a vehicle fuel, natural gas can offer life cycle GHG emissions benefits over conventional fuels, depending on vehicle type, drive cycle, and engine calibration. In addition, using natural gas may reduce some types of tailpipe emissions from fuel combustion in a vehicle's engine. The emissions of primary concern include the regulated emissions of hydrocarbons, NO_X, CO, as well as CO_2. Due to increasingly stringent emissions regulations, the gap has narrowed between tailpipe emissions benefits from NGVs and conventional vehicles with modern emissions controls. USEPA is requiring all fuels and vehicle types to meet increasingly lower, near zero, thresholds for tailpipe emissions of air pollutants. Still, NGVs continue to provide emissions benefits, especially when replacing older conventional vehicles or when considering life cycle emissions (ADFC 2016).

There are many heavy-duty NVGs —as well as a number of light-duty NGVs—available from original equipment manufacturers. Qualified system retrofitters can also economically, safely, and reliably convert many vehicles for natural gas operation.

However, unlike biodiesel, which is a fuel which can be used interchangeably with conventional diesel with no physical alteration of the engine needed, powering heavy duty equipment with CNG or LNG requires a major engine retrofit or for new equipment to be purchased with a CNG/LNG compatible engine to be installed by the original engine manufacturer (OEM). Thus, the use of CNG or LNG can prove to be costly.

California's Low Carbon Fuel Standard (LCFS) is starting to drive a growing preference for EVs over natural gas and other fossil-fueled vehicles. Even after accounting for the emissions associated with generating electricity (based on California's grid mix), electric buses, for example, typically have 70 percent lower GHGs and 50 percent lower NOX emissions than diesel and natural gas buses on a life cycle basis (Chandler, Espino, and O'Dea 2017). The LCFS helps make electric trucks and buses more affordable to companies and government agencies that purchase heavy-duty vehicle fleets because they can generate and sell LCFS credits and use the proceeds however best serves their business needs.

Applicability to Proposed Project:

The WLC Specific Plan requires that smaller on-site service vehicles associated with the warehouses will (such as forklifts) use non-diesel fuels such as compressed natural gas (CNG). The Proposed Project would include a CNG/LNG fueling station on-site that would service these vehicles and would also provide refueling to the public. Environmental Analysis for the project indicates that 204 trucks could refuel at the station each day based on trip rates presented in the Project's traffic study. The environmental analysis is conservative in that the traffic study uses a gas station with convenience store for deriving trip generation rates, which would be higher than for a CNG/LNG station.

CNG and LNG vehicles, along with a supporting refueling infrastructure, are applicable to the Proposed Project, and the Proposed Project is providing the refueling infrastructure to support their use. However, future growth of CNG/LNG trucks is speculative due to the financial incentive of the LCFS, increasingly strict NOx regulations, and market competition from BEVs and other ZEVs. Future tenants and suppliers of the WLCSP warehouses may choose to use trucks powered by natural gas. Given that buildout of the WLC will result in daily emissions of NOx well in excess of applicable significance levels, and NOx is the primary culprit in the Basin's ozone nonattainment status, the use of natural gas in Project-related vehicles could benefit the project relative to the use of diesel-powered trucks, but it should not be mandated because ZEVs provide even more benefit.

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E-2 WSP Renewable Technology Feasibility Report

HIGHLAND FAIRVIEW

WORLD LOGISTICS CENTER

COMPARISON OF RENEWABLE ENERGY TECHNOLOGIES

MAY 24, 2018

WORLD LOGISTICS CENTER

COMPARISON OF RENEWABLE ENERGY TECHNOLOGIES

TECHNICAL REPORT (5TH DRAFT)

PROJECT NO.: 12877B
DATE: MAY 2018

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EXECUTIVE SUMMARY

OVERVIEW

At the request of Highland Fairview, WSP has conducted a comparison of renewable energy technologies and energy efficiency strategies which could be incorporated into the World Logistics Center (WLC) project ("Project") to reduce its energy use and energy-related environmental impacts.

The Project is a 40.6 million square foot logistics campus on the eastern side of the City of Moreno Valley. For the purposes of this analysis the project is assumed to be developed in two phases. Phase 1 consists of 15 buildings totaling 22,560,000 sf and is assumed to be completed in the year 2025. Phase 2 consists of 12 buildings totaling 18,040,000 sf and is assumed to be completed in 2040.

WSP's approach involved first estimating the Project's overall energy needs. This is known as the "Demand-Side Energy Analysis." WSP then identified specific ways that these energy needs could be reduced through the incorporation of a variety of energy efficiency technologies into the project design. Once the Demand-Side Energy Analysis was complete, WSP evaluated various means for supplying renewable clean energy to meet the reduced energy needs. This is known as the "Supply-Side Energy Analysis".

DEMAND-SIDE ENERGY ANALYSIS

The demand-side energy analysis was conducted using the IES hourly energy simulation software. To utilize the software, an accurate model of a typical Project building was developed, which included the details of a typical building such as the type of building construction material (concrete, wood, or metal), the amount of heating, ventilation and air-conditioning (HVAC) equipment, the type and extent of interior lighting, and the type and extent of material-handling equipment that would go into a typical WLC building. This established a prototype building that would be minimally compliant with the State of California's Title 24 building code requirements.
The Title 24-compliant prototype was then modified to incorporate the energy conservation measures (ECMs) to which the Project has committed in the WLC Specific Plan. The adjusted model represented the baseline model against which the energy performance of several additional ECMs were compared, creating a Project Building Model that took the Project well beyond Title 24 compliance.

The Demand-Side Analysis showed the package of ECMs in the Project Building Model provided a 17% improvement in energy performance and an equally impressive 18% reduction in GHG emissions over the baseline model. Key ECMs assumed in the Project Building Model were variable refrigerant flow (VRF) heat pumps providing heating and cooling to the office spaces, direct evaporative cooling as the first cooling stage and VRF as the supplemental cooling stage for any potential air-conditioned warehouse spaces, LED lighting throughout the offices and warehouses, and LED exterior and parking lot lighting.

The estimated overall energy demand for the Project assumes that all WLC buildings will incorporate the features of the Project Building Model, and will also accommodate electric vehicle (EV) energy usage at WLC, as discussed herein. While EV usage is expected to increase substantially over time, EV energy usage was not included in the

Demand-Side Analysis to highlight the effectiveness of the ECM's, which do not have any effect or offer any benefits regarding EV energy usage. A Summary of the Overall Energy Analysis Results with EV usage included is below.

SUPPLY-SIDE ENERGY ANALYSIS

The Project Building Model incorporating the recommended ECMs provided the analytical baseline against which potential renewable clean energy options were measured. WSP evaluated the Project site, its land uses, the circulation plan and existing utilities, along with other constraints and opportunities, to compile a comprehensive list of potential energy supply options. A screening process was applied to narrow the comprehensive list down to those several options that held the greatest potential for being successfully implemented at the Project. Screening criteria that caused some of the energy supply options to be discarded involved safety considerations, regulatory barriers, air emissions concerns, and technical impracticalities. The following table summarizes the Energy Resources considered.

Energy Resources Screening Results

Supply Option	Screening Criteria				
	Carbon	Resiliency	Financial	Technical	Regulatory
Recommended for further investigation:					
Combined Cooling, Heat and Power (CCHP)	—	✓	✓	✓	—
Ground Source Heat Pump (GSHP)	✓	—	—	—	✓
Solar photovoltaic (PV)	✓	—	—	✓	✓
Solar PV + battery	✓	✓	—	✓	✓
Off-site procurement	—	—	✓	✓	—
Not recommended for further investigation:					
Biomass	✓	✓	—	✗	✗
Biogas/landfill gas	✓	✓	—	✗	—
District energy	✓	✓	✗	✗	—
In-line hydro	✓	✓	—	✗	—
Microgrid	✓	✓	✗	✓	✗
Natural gas pressure recovery	✓	✓	—	✗	—
Wind	✓	—	—	✗	✗

The energy supply options emerging from the screening process were then subjected to engineering analysis to develop a technical basis for identifying the single best supply-side option for use at the WLC project. Ground-source heat pumps (GSHPs); combined cooling, heat, and power (CCHP); and solar photovoltaics (PV) with and without battery storage were modeled with the HOMER Energy simulation tool and other specialized software. Purchasing of green power (offsite procurement) from renewable energy projects located away from the WLC site was also considered among the sustainable energy options.

SUPPLY-SIDE CONCLUSIONS

WSP concluded in its analysis that GSHPs are not recommended for the Project due to the cooling requirements within the building being much greater than the building heating needs as a result of year-round weather conditions at the WLC site. Such an imbalance would cause the geoexchange field (where excess heat removed from the building by the cooling process is transferred via piping into the ground) to grow increasingly warmer over time. This, in turn, would degrade GSHP performance in providing building space cooling.

CCHP produces air emissions, resulting from the combustion of fossil fuels, that exacerbate the poor air quality of Moreno Valley and the entire South Coast Air Quality Basin. Furthermore, CCHP increases the Project's GHG emissions since it produces more GHG emissions than California's increasingly green grid.

Moreno Valley Utilities (MVU) is the utility provider for the Project and while solar PV is a viable option, MVU has limitations in its Electric Service Rules on the amount of PV allowed for commercial and industrial projects. A system that combines PV with battery storage of excess solar generation was considered, but the MVU solar sizing limitations and the estimated WLC Project demands do not result in excess solar generation to charge a battery. In addition, MVU's Time-of-Use rate structure is not compatible with the Project's peak electrical usage (load curve) making the use of batteries to deliver any meaningful reduction an unviable option.

Considering the air emissions constraints, MVU rate structures, Project electric load curves, and MVU PV sizing rules, rooftop PV systems without energy storage were determined to be the Project's best sustainable clean energy supply option. To determine the specific allowable PV size, WSP analyzed the hourly electric loads simulated using the IES modeling software. Phase 1 building simulation produced a minimum daytime electric load of about 600 kW. The minimum daytime electric load for Phase 2 buildings was simulated to be about 1,600 kW. Thus, since MVU limits on-site PV size to one-half the minimum electric demand a building experiences during daytime hours, Phase 1 buildings can provide up to 300 kW of PV (one-half the 600 kW minimum daytime electric load) and Phase 2 buildings can provide up to 800 kW (one-half the 1,600 kW minimum daytime electric load). The combination of the recommended ECM package and allowed rooftop solar enables the Project to meet more than 50% of its annual energy requirements from renewable energy.

Utilizing the maximum permitted amount of rooftop PV would enable the Project office spaces to achieve effectively net-zero energy (NZE) operations. In Phase 1 this would amount to the equivalent of fifteen 60,000 square-foot NZE office buildings. At full build-out this would amount to the equivalent of twenty-seven 60,000 square-foot NZE office buildings. To put this in context, the entire state of California has about 30 NZE office buildings in operation, under construction, or publicly committed as of 2016.

WSP's IES computer model of the Project buildings established the following annual energy usage of the office spaces for each building and the PV generation for each building as follows. Note that advances over time in energy efficiency technologies are assumed to result in less energy usage by Phase 2 offices:

Office Demand and PV Generation per Building

Description	Phase 1		Phase 2	
	Annual Energy Use (kWh/yr)	Peak Demand (kW)	Annual Energy (kWh/yr)	Peak Demand (kW)
Office-only energy usage per building	474,120	280	417,230	270
PV generation per building	512,400	300	1,366,400	800
Total project office energy usage	7,111,800	4,200	5,006,707	3,240
Total project PV generation	7,686,000	4,500	16,396,800	9,600

As shown in the table above, the use of PV in each phase would cover both the peak electric load generated by the offices and the annual energy usage of the offices, thereby achieving effective NZE status for the offices. Due to the highly speculative nature of the EV penetration in Phase 2, project mitigation measures require the project to upgrade the structural integrity of the roof on each building to accommodate the possibility of future solar installation over the entire roof. At a minimum, the project will install enough solar power in both phases to meet energy needs of the Project's office spaces.

ELECTRIC VEHICLE CHARGING LOADS

The use of electric vehicles (EVs) by the motoring public and in industry is projected to increase substantially over the period of Project build-out. Title 24 currently requires 6% of on-site parking spaces be designed to accommodate EV charging of passenger and light-duty truck vehicle classes. These minimum Title 24 requirements were applied to estimate the additional Phase 1 electricity usage at the Project attributable to EV charging. Because Phase 2 build-out concludes in 2040, EV charging energy usage is highly speculative, but the Project analysis assumed EV projections consistent with California policy trends.

The projected EV electric needs are significant for Phase 1 of the Project, amounting to about 6% of the total energy usage. At full build-out of the Project, projected EV impact is substantial, accounting for more than one-third of total energy usage by the WLC project. The incremental EV charging needs determine the overall minimum daytime electric load on each building. This, in turn, defines MVU's allowable amount of PV on each building's roof, establishing 300 kW as the expected maximum amount of allowed PV on each Phase 1 building, and accounting for the increase to a maximum of 800 kW of PV expected to be allowed on each Phase 2 building.

OVERALL PROJECT ELECTRICITY NEEDS

The combination of the electricity consumed by the buildings and that used by on-site EV chargers will result in a significant new load to be met by MVU's system. The table below summarizes the megawatts of peak electric demand projected to be associated with each phase of WLC development.

Peak Electric Demand for WLC Development

Stage	Number of Buildings	Total Peak Demand (MW)
Phase 1	15	36.5
Full Build	27	83.3

SUMMARY OF ENERGY ANALYSIS RESULTS

A summary of the projected energy performance of the Project is presented in the following tables. Phase 1 results are multiplied by the 15 buildings that are planned for the initial phase of construction. Build-out results are multiplied by 27 buildings in the total Project (15 buildings in Phase 1 plus 12 buildings in Phase 2). The first table summarizes the impact of the recommended ECM package, relative to buildings that are minimally compliant with Title 24. Note that these figures *do not include EV electricity usage or PV generation* in order to paint a clear picture of the efficacy of the recommended ECM package. The results demonstrate that the recommended ECMs are expected to deliver energy savings of 16 – 17%.

Energy Efficiency Performance for WLC Development

Stage	Energy Savings (MWh/yr)	Energy Savings (%)	GHG Savings (tonnes CO_2e/yr)	GHG Savings (%)	Renewable Energy Supply (%)*
Phase 1	34,892	16.7%	6,019	10%	49%
Full Build	57,449	16.2%	9,085	18%	55%

The second table summarizes the impact of the allowed PV capacities, relative to buildings incorporating the recommended ECM package. Note that these figures *include EV electricity usage* in order to paint a clear picture of the efficacy of on-site electricity generation via PV. This explains the much smaller values for energy savings and GHG savings.

Solar PV Performance for WLC Development

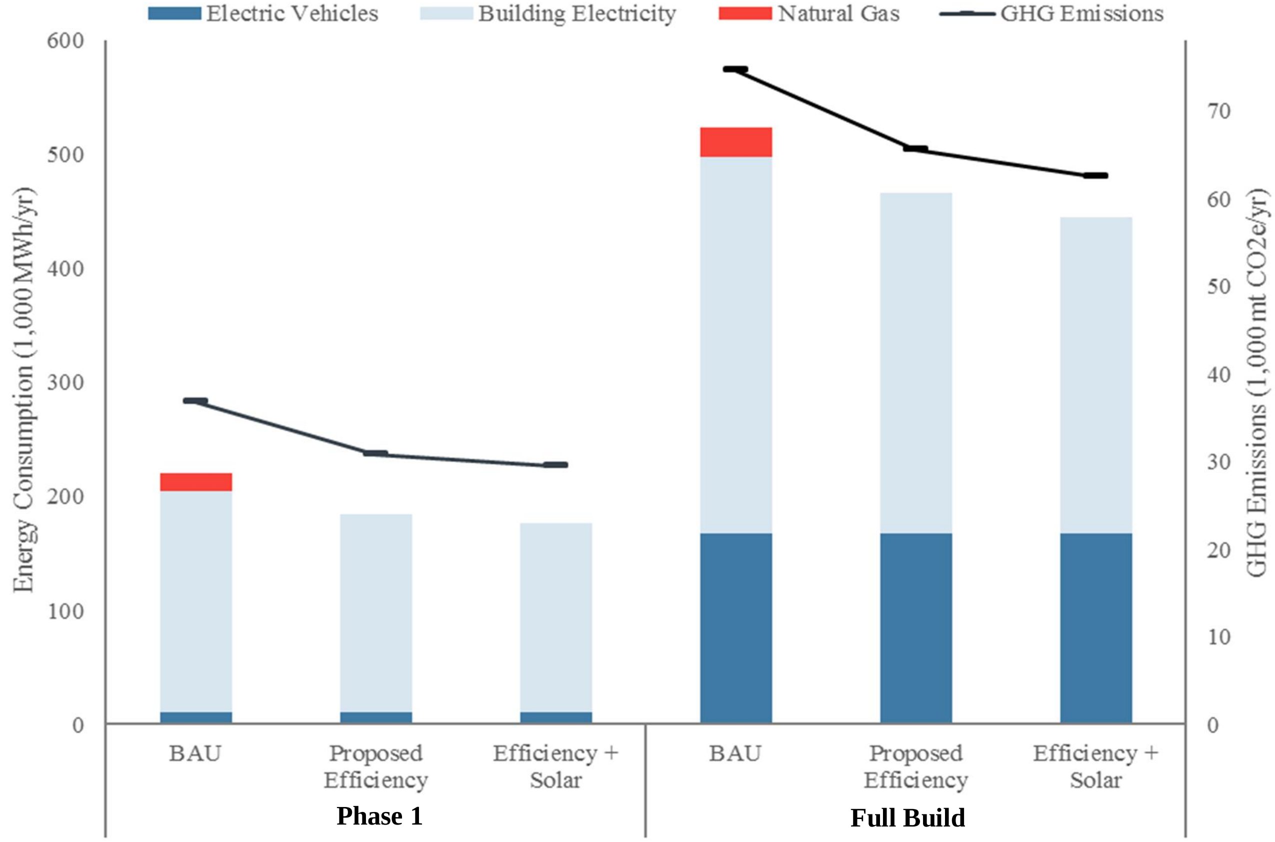
Stage	Energy Savings (MWh/yr)	Energy Savings (%)	GHG Savings (tonnesCO2e/yr)	GHG Savings (%)	Renewable Energy Supply (%)*
Phase 1	7,686	4%	1,276	4%	51%
Full Build	24,083	5%	3,386	5%	57%

*Renewable energy fraction takes account of renewables on the California grid

The bar chart below graphically presents the projected energy usage and GHG emissions for the entire Project at the end of Phase 1 and the end of Phase 2. The business-as-usual (BAU) bar reflects minimal compliance with Title 24;

the middle bar represents the recommended ECM package; and the third bar shows the combination of the ECM package and allowable PV.

Phase 1 and Full Build-Out Energy and GHG Results



OFF-SITE RENEWABLE ENERGY PROCUREMENT

Under current regulations, WLC tenants will be able to purchase electricity only from MVU. In the interest of completeness of the discussion on the topic of renewable energy, we herein describe multiple off-site renewable electricity procurement methods that are available in many other electric utility service territories. These include:

— Unbundled renewable energy certificates (RECs);
— Power purchase agreements (PPAs);
— Community choice aggregation (CCA);
— Green tariffs.

There is no one-size-fits-all recommendation for procurement of off-site renewable energy. Each customer's circumstances are likely to be unique, so the best off-site procurement option for one may very well not be the best option for another.

To meet the Project Objectives and the City's Economic Development Objectives (see Section 3.6 of the Project Final EIR and Section 1.3.1 of the WLC Specific Plan), WLC must establish and maintain a competitive position in meeting these objectives. The price premium associated with off-site renewable energy procurement would increase

WLC tenant utility costs and thus run counter to the Project Objectives and the City's Economic Development Objectives. Even if regulations allowed it, it would be counterproductive to require WLC tenants to procure renewable energy from off-site sources. For these reasons, the concept of requiring a tenant to procure off-site renewable energy was not considered a viable sustainable supply option to impose on the Project. Should electricity regulations change in the future to allow procurement of off-site renewable energy, and should WLC tenants elect for corporate, marketing, or other reasons to pursue procurement of off-site renewable energy, the means of doing so via one of the means presented in this report may become available to them.

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1 INTRODUCTION

1.1 AUTHORIZATION

WSP has been engaged to undertake an analysis of feasible renewable energy technologies that make sense for the World Logistics Center (WLC).

1.2 PURPOSE

The objective of this analysis is to identify potential renewable energy options for the WLC that will improve energy performance and reduce greenhouse gas (GHG) emissions of the WLC. The analysis considers Phase 1 and Phase 2 of the WLC. This document reports on analytical outcomes including:

- High level screening of all potential demand-side options to maximize the energy efficiency of the buildings and therefore minimize WLC energy consumption,
- High level screening of all potential supply-side options to deliver sustainable energy to the buildings,
- More detailed analysis of the options that show the best potential.

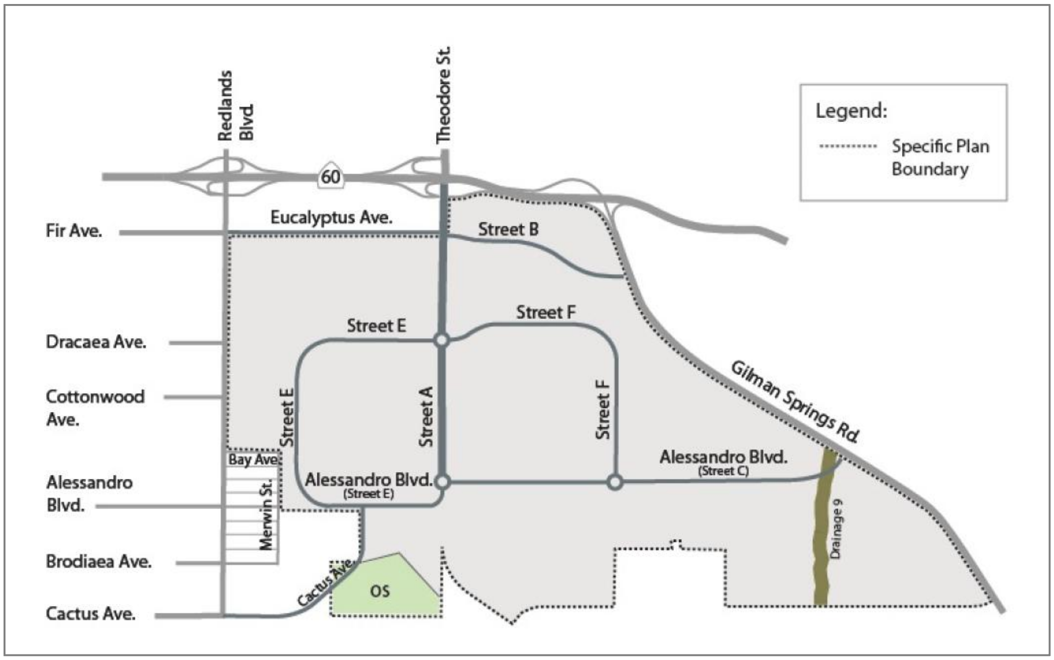
Evaluations considered the financial, energy, carbon, and technical feasibility of each option. Obviously infeasible options were screened out, including any supply-side options involving combustion of fossil fuels, due to Moreno Valley and the entire South Coast Air Quality Basin being out of compliance for NO_x and other air pollutants. This analysis includes electricity consumption of mobile energy end uses, including electric forklifts used in future WLC warehouses and electric passenger vehicles and electric light-duty trucks expected to be charged in future WLC parking lots.

2 BACKGROUND

2.1 WORLD LOGISTICS CENTER

The World Logistics Center (WLC) is a master-planned development encompassing 2,610 acres in Moreno Valley California, as shown in Figure 1. At full build-out the development will include up to 40.6 million square feet of building area. The vision for the World Logistics Center is to establish a world class corporate park specifically designed to support large-scale logistics operations.

Figure 1: WLC Map



WSP has undertaken an energy analysis the results of which are presented in this report. This report is intended to guide development of an updated EIR and help determine the best path forward to incorporate renewable energy into the development.

2.2 ENERGY CONTEXT

2.2.1 ELECTRIC UTILITIES

Moreno Valley Electric Utility (MVU) is expected to provide electric services to the WLC. A report developed by Utility Specialists determined that MVU will need to construct additional substation capacity beyond already planned expansions to meet the electric needs of the WLC. Therefore, reducing peak electricity demand from the WLC can also reduce the additional substation capacity required to serve the WLC.

Tenants of the WLC will contract for utility services directly with MVU. The rate structure for each account is determined by the monthly maximum demand. WSP expects that all proposed buildings in the WLC will exceed the 20 kW demand threshold specified by MVU and will therefore be subject to *Schedule C – Large General Service*. Tenants will also be eligible for *Schedule TOU-LGS – Time of Use – Large General Service* rates. However, analysis using energy models and

15-minute interval consumption data from five existing logistics buildings in the MVU service territory determined that a time-of-use rate is not advantageous to the customer. Therefore, the WSP analysis was conducted with the assumption that tenants at the WLC will be subject to the rates specified in *Schedule C – Large General Service* for primary voltage customers. The rate structure is such that customers can decrease their energy costs by reducing monthly peak electricity demand, reducing electricity consumption, or improving the power factor of their facility. Analysis of the renewable energy options within this report considers the impact of reducing monthly peak electricity demand and reducing electricity consumption.

MVU offers a solar net energy metering program to its customers. A successor rate to net energy metering, NEM 2.0, was adopted by the City Council on April 17, 2018. Under this new rate, customers will be paid for any excess generation at the end of each billing period, and will receive a dollar-denominated credit on their bill. However, based on conversation with MVU, WSP expects that this program will not be available to the WLC because of the expected size of each of the warehouses at the development. Furthermore, MVU imposes limits on the capacity of on-site solar PV generation that can be installed by their customers. Per *Resolution No. 2017-20* the "maximum solar generating capacity that will be approved to be connected to each meter is up to 50% of the meter minimum daytime load." This dramatically limits the amount of on-site solar generation that can be installed at WLC buildings.

2.2.2 NATURAL GAS UTILITIES

Southern California Gas Company (SCG) provides natural gas services in the WLC area for space heating and service water in the business-as-usual scenario. It is assumed that the tenants of the WLC will contract for natural gas services directly with SCG and be subject to the *GN-10* rates. A new natural gas distribution network at the site is required to provide natural gas services to individual buildings. In an all-electric scenario where WLC buildings do not consume natural gas, there is no need for a natural gas distribution network and capital cost savings can be realized.

2.2.3 GHG EMISSIONS

Electricity emissions factors for both Phase 1 and Phase 2 were calculated using 2016 eGRID factors for California-Mexico Power Area (CAMX) and changes in the energy resource mix projected by U.S. Energy Information Administration (EIA). As discussed in Appendix A: Current and Future Energy Context, the EIA projects that the California grid's emission factor will decline 31% from current levels by 2025 and 41% by 2040.

For natural gas, an emissions factor of 117 lb CO_2e/MMBTU (pounds of CO_2-equivalent per million BTU) was used to calculated GHG emissions per guidance from EPA's mandatory reporting rule. This emissions factor was held constant for both Phase 1 and Phase 2.

Table 1: GHG emissions factors

Phasing	Grid Electricity (lb CO_2e /MWh)	Natural Gas (lb CO_2e /MMBTU)
Phase 1 (2025)	366	117
Phase 2 (2040)	310	117

2.2.4 CRITERIA POLLUTANTS

The Moreno Valley air shed within the South Coast Air Quality Management District (SCAQMD) currently exceeds allowable NO_x limits by a factor of three. Consequently, distributed energy resources that emit NO_x were excluded from further analysis.

3 BASELINE PERFORMANCE

3.1 PROJECT PHASING

The WLC project will be built out over a 20-year period. For purposes of this analysis, it was assumed that there will be a total of 27 distribution centers, each of approximately 1.5 M ft^2, planned for construction completion by 2040. Fifteen of the 27 buildings will be built during Phase 1 (2020-2025) with the remaining 12 buildings being constructed during Phase 2 (2025 – 2040). When complete, WLC will total approximately 40.6 M ft^2 of floor area.

Based on the distribution centers that currently exist within the MVU service territory, this analysis assumes that about 11% of the WLC buildings will feature air-conditioned warehouses. No refrigerated warehouses were included.

The complete phasing schedule is detailed in Table 2.

Table 2: WLC phasing schedule

		Unconditioned	Air-Conditioned	Total
Phase 1 2020 - 2025	**Number of Buildings**	13	2	15
	Floor Area (ft^2)	19.55 M	3.01 M	22.56 M
Phase 2 2025 - 2040	**Number of Buildings**	11	1	12
	Floor Area (ft^2)	16.54 M	1.5 M	18.04 M
Full Buildout	**Number of Buildings**	24	3	27
	Floor Area (ft^2)	36.09 M	4.51 M	40.6 M

3.2 PROTOTYPE BUILDINGS

WSP developed Title 24-compliant energy models for air-conditioned and unconditioned prototype buildings. Each model contains details about building construction; lighting systems and controls; heating, ventilating, and air-conditioning (HVAC) systems and controls; and office equipment. The prototype buildings were created based on the building space usages, floor areas, and operating schedules specified in Table 3.

Table 3: Prototype building characteristics

Primary Usage	Area Breakdown		Operating Schedule		
	Area (ft^2)	Percent	Weekdays	Saturday	Sunday/Holiday
Office	60,144	4%	8:00 AM – 6:00 PM	Not Operational	Not Operational
Warehouse	1,443,556	96%	8:00 AM – 12:00 AM	8:00 AM – 4:00 PM	Not Operational
Whole Building	**1,503,700**	**100%**			

As-built construction drawings and actual metered electricity usage data for the existing Skechers building and a sample of other distribution center buildings in the MVU territory were used to estimate the process loads (such as electric forklifts and conveyance systems) within the warehouses. The process loads were extracted from hourly metered data by subtracting the lighting and HVAC loads produced by the baseline building energy models. The resulting estimate of process equipment electricity usage was spot-checked against actual metered data collected by MVU on select Skechers forklift battery chargers and conveyance motors. This estimated process load data was adjusted to account for WLC's projected operating schedule and then used as inputs to the prototype models.

The air-conditioned and unconditioned prototype models were then driven with Moreno Valley long-term average weather data to produce the baseline annual hourly building energy loads against which the energy demand-side options and the energy supply-side options were evaluated (see Sections 4 and 5).

Figure 2 details monthly energy consumption for both the air-conditioned and unconditioned warehouses. Lighting and equipment is responsible for most of the energy consumption, even in the air-conditioned warehouses. Energy usage in the air-conditioned warehouses is highest during the winter months with natural gas representing 30% of the monthly energy consumption. In contrast, the unconditioned warehouse shows little seasonal variation. *Note that the Title 24-compliant buildings use natural gas for space heating and for domestic hot water.*

Figure 2: Baseline monthly energy consumption

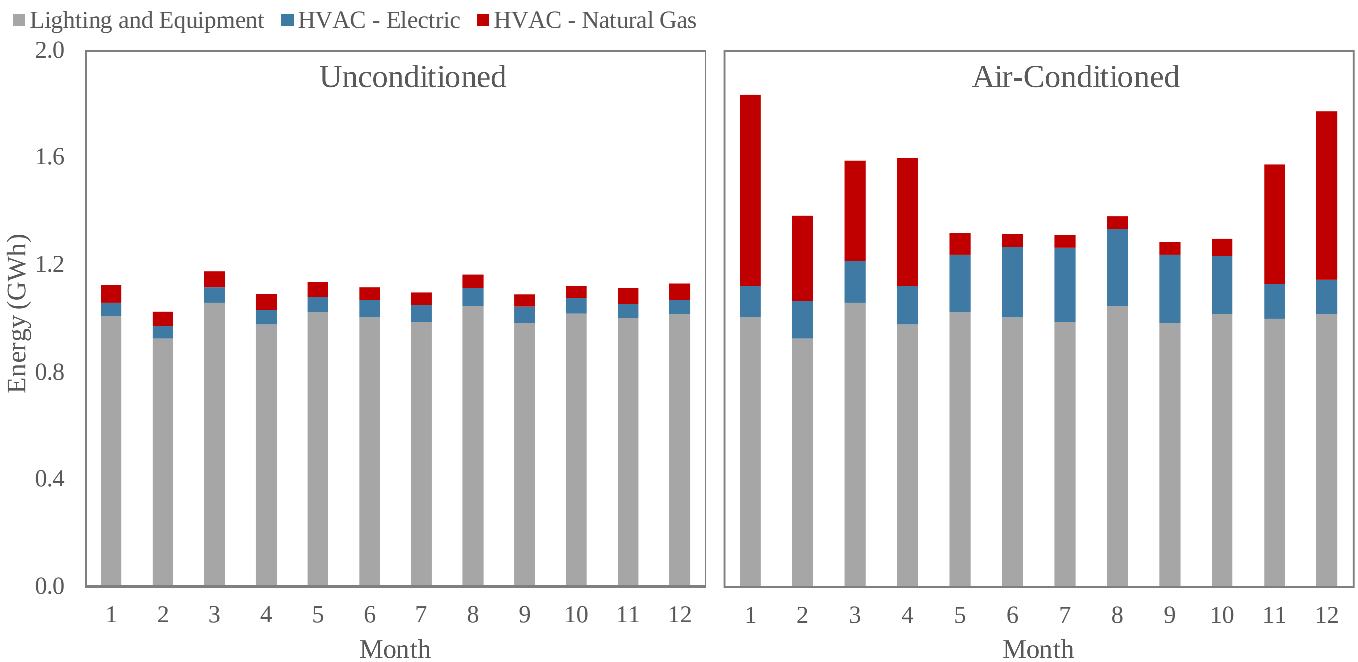
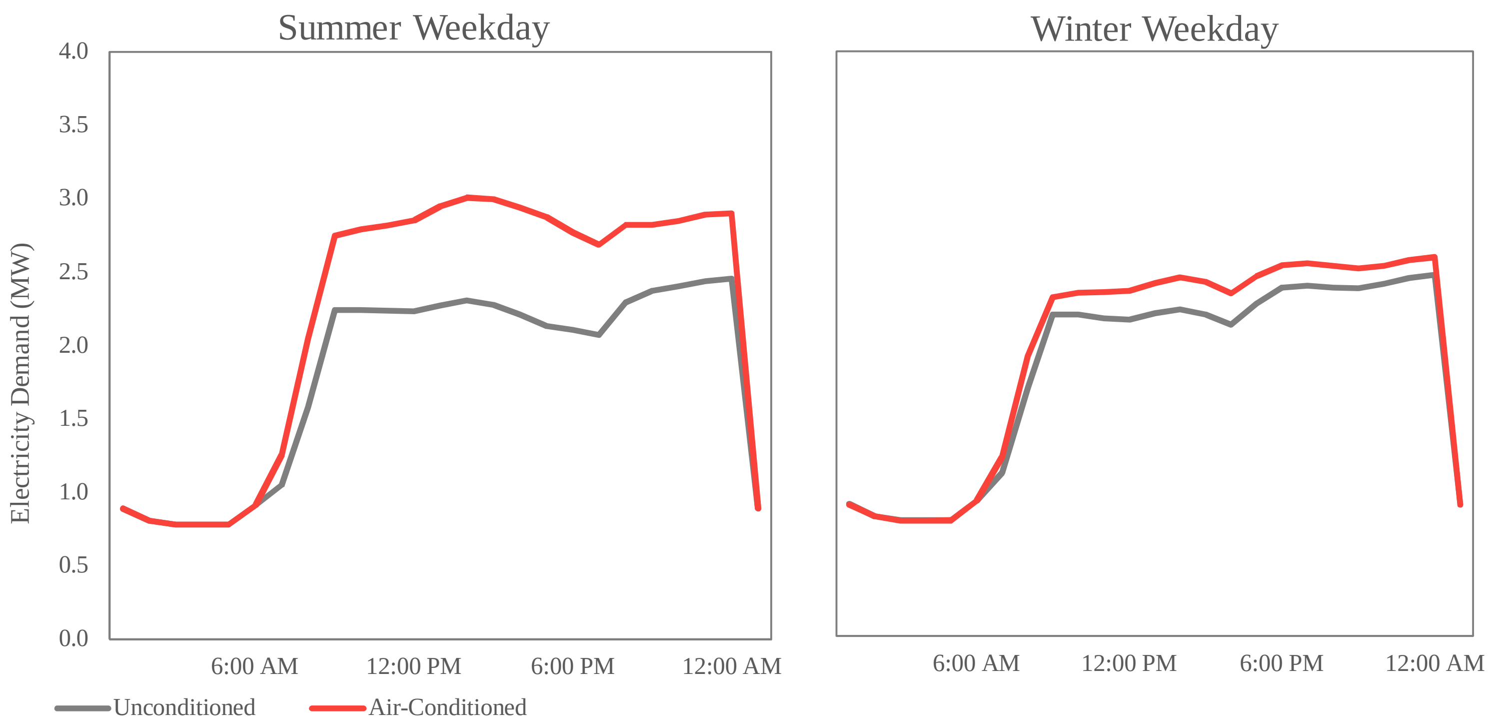


Figure 3 details an average weekday electric load profile projected for the Phase 1 unconditioned and air-conditioned WLC buildings during the summer and winter. As anticipated, the warehouse's operating schedule determines the shape of the load profiles. Demand quickly ramps up during the start of the 8:00 AM shifts and then remains relatively flat for the rest of the day. There is a small dip around 6:00 PM when the office schedule ends but the major drop happens at 12:00 AM when the warehouse shift ends. The need for air conditioning adds to the air-conditioned warehouse demand during the summer while there is little difference between the unconditioned and air-conditioned warehouses during the winter.

Figure 3: Average weekday electric load profiles for Phase 1 buildings



The peak electric demand for each of the 13 Phase 1 buildings with an unconditioned warehouse is projected to be about 2.1 MW, including estimated EV charging loads. The peak for each of the two Phase 1 buildings with air-conditioned warehouses is projected to be about 4.1 MW. Total aggregated peak demand at the end of Phase 1 construction is projected to be approximately 34.9 MW across 13 buildings with unconditioned warehouses and two buildings with air-conditioned warehouses. *Note that these are peak demand values as opposed to the average demand values depicted in Figure 3.*

For Phase 2, the peak electric demand for each of the 11 Phase 2 buildings with an unconditioned warehouse is projected to be about 3.7 MW, including the substantially greater EV charging loads that are projected for the 2025 – 2040 Phase 2 period. The peak for the one Phase 2 building with an air-conditioned warehouse is projected to be about 5.4 MW. Total aggregated peak demand at full build-out is projected to be approximately 58.2 MW across 24 buildings with unconditioned warehouses and three buildings with air-conditioned warehouses.

3.3 ELECTRIC VEHICLES

In addition to building energy consumption, electric vehicles are expected to contribute significantly to the electricity demand and consumption at the WLC. For this analysis, electric vehicle (EV) demand and consumption were calculated based on Title 24 code requirements, vehicle traffic, battery sizes, and anticipated charging requirements. Only passenger EVs and light-duty truck EVs were considered. No medium-duty or heavy-duty trucks were included since current code is silent on these vehicle classes. The resulting hourly data was then added to the building model outputs to create combined load profiles.

Peak EV charging rate was estimated by allocating the annual electricity consumption of EVs – the average daily consumption multiplied by 365 – on an hourly basis per the building operating schedules. Specifically, EV charging was assumed to follow the same hourly schedule as that of the building interior lighting and process loads. Logically, when the lights are on and the process equipment is operating, staff are on duty and the vehicles that brought them to the building are parked in the parking lot. The annual EV electricity usage was allocated across each week day and each weekend day such that the hourly EV load shape tracked the lighting and process load shape all year long.

The resulting peak electric load imposed by EV charging is about 25% of the aggregate nameplate capacity of all charging stations. This result is in line with industry expectations that charging blocks managed with automated 'smart' controls will reduce the coincident peak demand to 20-25% of the aggregate capacity of the individual charging stations. So for example, when all charging stations of a 100 kW-rated charging block are plugged into EVs, the block is expected to experience a maximum power draw of only about 25 kW at any point in time.

The incremental EV charging loads projected for WLC determine the peak and the minimum daytime electric loads on each building. The daytime minimum defines the maximum amount of PV that MVU's rules allow on each building's roof. See Section 5.4 for details.

3.4 BASELINE ENERGY PERFORMANCE

Because of the anticipated improvements in building energy performance and the expected rise of electric vehicles, Phase 2 models were adjusted to 2040 conditions. The electric vehicle load is expected to increase 20-fold during Phase 2 while the average Title 24-compliant building energy consumption is expected to decrease by about 13% in Phase 2. The breakdown of energy usage intensity (kWh/ft^2-yr) is shown in Table 4 for Phase 1 and Phase 2 buildings with unconditioned and air-conditioned warehouses.

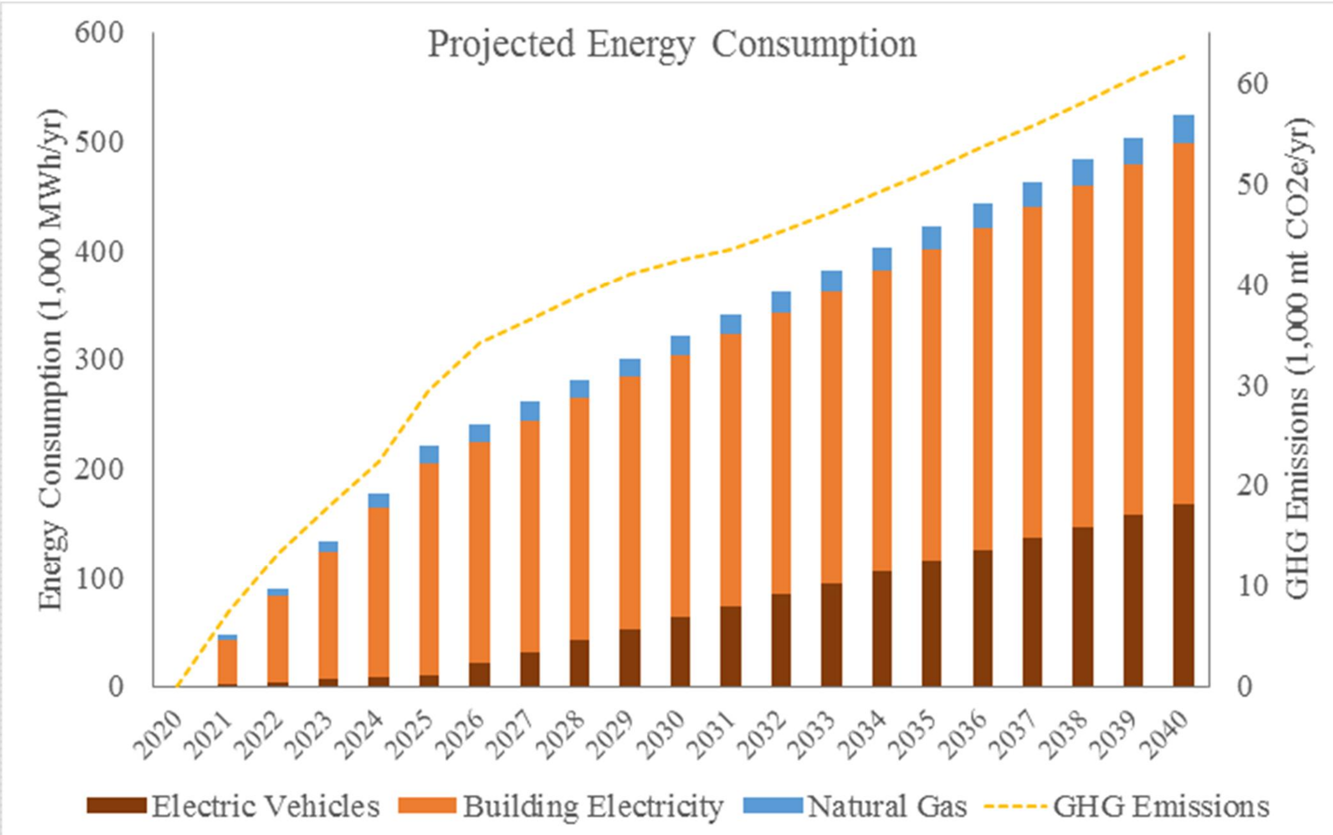
Table 4: Breakdown of energy usage intensity (kWh/ft^2-yr) for Title 24-compliant buildings

End Use	Phase 1		Phase 2	
	Unconditioned	Air-Conditioned	Unconditioned	Air-Conditioned
Equipment and Lighting	8.02	8.02	7.08	7.08
HVAC	0.88	3.73	0.81	3.43
Building Total	8.90	11.75	7.88	10.51
Electric Vehicles	0.48	0.48	9.66	9.66
TOTAL	**9.38**	**12.23**	**17.55**	**20.17**

3.5 WLC ENERGY PROJECTIONS

Based on the results of the energy modeling and electric vehicle load definitions, the Title 24-compliant annual energy consumption and GHG emissions profile shown in the following figure were derived for the WLC over the buildout of the project. This projection considers expected changes to California's electric grid (ever-increasing amounts of renewable electricity in the mix) as well as the estimated increased penetration of passenger EVs and light-duty truck EVs at WLC in future years.

Figure 4: Projected Title 24-compliant annual energy consumption and GHG emissions of WLC over build-out period



4 DEMAND-SIDE ENERGY ANALYSIS

4.1 RECOMMENDED MEASURES

Energy efficiency is often the most cost-effective method to reduce the energy and carbon impacts of a building. Regulatory constraints limiting the capacity of on-site renewables that can be implemented at the WLC, outlined further in Section 5: Supply-Side Energy Strategy, further highlight the importance of reducing energy consumption through demand-side measures.

Using the baseline energy models discussed in Section 3: Baseline Performance, WSP evaluated a wide range of energy conservation measures (ECMs) to identify the most cost-effective set for reducing building energy consumption and related emissions beyond Title 24 energy code. The engineering analysis underpinning this proposal led WSP to reject some of the evaluated demand-side options because they are duplicative with other more advantageous options or are incompatible with the most advantageous HVAC systems. The ECMs outlined in Table 5 are the best choice for the WLC based on maximizing environmental protections in the most cost-effective manner practical.

The ECMs address internal loads, such as lighting and equipment, as well as the energy required to provide heating, cooling, and domestic hot water. While most energy consumption is due to lighting and equipment loads, there is still an opportunity to reduce the amount of energy required to provide heating and cooling for the buildings. For the office space, the recommended system is underfloor air distribution coupled with water-cooled variable refrigerant flow (VRF) technology that is served by a shared water loop. The shared water loop allows for sharing of energy among zones so that if one zone requires heating while another requires cooling, energy can be transferred between zones resulting in built-in energy recovery. If additional cooling is needed during extremely warm weather, a cooling tower provides supplemental heat rejection to the atmosphere.

Air-conditioned warehouse spaces are recommended to be served by displacement ventilation whereby conditioned air is delivered at low velocity from air diffusers near floor level. Cooling of supply air is achieved via direct evaporative cooling sections that deliver sufficiently cool air at required warehouse conditions for most hours during the typical weather year. During hours that evaporative cooling doesn't meet the cooling load or doesn't maintain acceptable relative humidity in the warehouse, VRF systems are utilized for supplemental space cooling. The shared water loop of the warehouse VRF systems is connected to an air-to-water heat pump to provide supplemental cooling via heat rejection to the atmosphere. When heating requirements exceed the heat recovered within the shared water loop by the VRF units, supplemental heat for the water loop is extracted from the atmosphere by the same air-to-water heat pump running in reverse.

Because all heating and cooling in the buildings is provided via direct evaporative cooling and heat pumps, natural gas is not required. This allows the WLC to eliminate on-site fossil fuel combustion that would normally be associated with service water and space heating, thereby eliminating associated air emissions. Additionally, in all-electric buildings there is not a need for natural gas distribution infrastructure. Cleaner options could be considered by WLC tenants to fuel back-up generators, including E85 (85% ethanol, 15% gasoline), biodiesel, propane, and batteries. SCAQMD discusses permitted emergency generation at http://www.aqmd.gov/home/permits/emergency-generators#Fact1.

The WLC Specific Plan has previously publicly committed to certain energy efficiency features that will appear in the WLC buildings. The ECMs in Table 5 go substantially beyond that previous commitment in terms of the features of the buildings. They individually and collectively, in addition to the HVAC systems recommended above, reduce the amount of energy consumed by the various equipment that the buildings will contain. This package of ECMs delivers energy performance that exceeds minimal compliance with current Title 24 requirements by 16-17%. Table 6 summarizes the energy performance of the ECM package.

Table 5: ECM Descriptions

Category	ECM Description	Application Area
Envelope	Optimal Choice of Vertical Fenestration Construction	All
	Optimal Choice of Skylight Construction	Warehouse
	Optimal Window to Wall Ratio	All
	Optimal Skylight to Roof Ratio	Warehouse
Exterior Loads	LED exterior lighting	All
	Daylight sensor based exterior lighting	All
Internal Equip. Loads	Automatic Receptacle Control	Office
	Highest Efficiency Office Equipment	Office
	Highest Efficiency Other Internal Loads	Office
Lighting	Multi-Level Switching	All
	High Performance Lighting (LED)	All
	Use separate controls for lighting areas near windows	All
	Occupant sensors	Office
Daylighting	High-on-wall continuous daylighting windows/clerestory windows	Warehouse
	Optimal Daylighting Control	All
	Dimming daylight controls	Office
HVAC	Thermostat setback/setup	Office
	Shut off outdoor air and exhaust air dampers during unoccupied periods	Office
	Supply air temperature reset	Office
	High Performance Fans	All
	Variable Speed Fans	Office
	High efficiency pumps	All
	Variable Speed Pump motors	All
	Reduce service water consumption	All
	Efficient service water pumping	All
	Integrated and optimized air side economizer	Office
	Direct Evaporative Cooling	Warehouse
	Variable refrigerant flow heat pump & cooling	Office
	Dedicated Outside Air System Ventilation with Heat Recovery	Office
	Demand controlled ventilation/CO_2 controls	Office

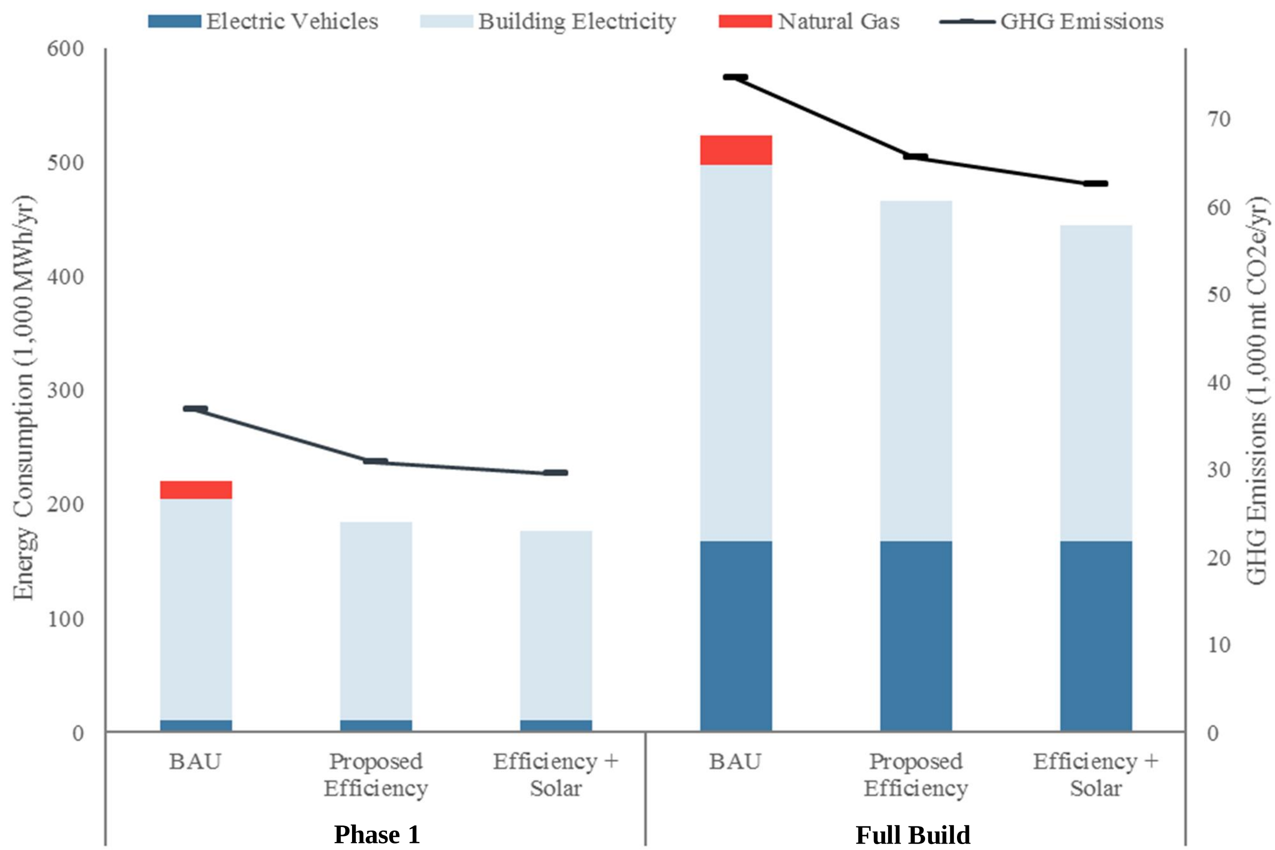
Table 6: Efficiency Scenario Performance

Stage	Energy Savings (MWh/yr)	Energy Savings (%)	GHG Savings (tonnes CO_2e/yr)	GHG Savings (%)	Renewable Energy Supply (%)*
Phase 1	34,892	16.7%	6,019	10%	49%
Full build	57,449	16.2%	9,085	18%	55%

*Renewable energy fraction takes account of renewables on the California grid

The impact of the recommended ECMs on the annual energy consumption and GHG emissions of the WLC at the end of Phase 1 is shown in Figure 5.

Figure 5: Phase 1 and Full Build-Out Energy and GHG Results



4.2 TENANT LOADS

It is unknown at this time who will be the tenants within the WLC buildings. Warehouse operations could vary widely, from relatively low-energy operations featuring high-pile goods storage and materials to relatively high-energy operations featuring highly automated facilities with extensive material handling equipment. WSP's analysis assumes the typical WLC tenant will have highly automated warehouse operations. Because the WLC developer has no direct control over warehouse equipment and operations, the ECM analysis did not consider any opportunities to reduce energy usage by warehouse equipment.

5 SUPPLY-SIDE ENERGY STRATEGY

5.1 ENERGY SUPPLY SCREENING

As a preliminary step in developing a sustainable energy strategy for WLC, WSP has undertaken a high-level screening analysis of renewable energy technologies. The purpose is to identify feasible supply options. The screening criteria used in this exercise are categorized in the matrix below as Carbon, Resiliency, Financial, Technical, and Regulatory:

Table 7: Screening Criteria Matrix

Screening Criteria	✓	✕	—
Carbon	Net carbon emissions will be reduced	Net carbon emissions will not be reduced	Effect on net carbon emissions is unclear without analysis
Resiliency	Energy resiliency will be enhanced	Energy resiliency will not be enhanced	Effect on energy resiliency is unclear without analysis
Financial	Financial performance will likely be attractive	Financial performance will likely be unattractive	Financial performance is unclear without analysis
Technical	No anticipated technical challenges	Technical challenges are expected	Existence of technical challenges is unclear without analysis
Regulatory	No anticipated regulatory challenges	Regulatory challenges are expected	Existence of regulatory challenges is unclear without analysis

Incorporating high-performance energy efficiency into the WLC is the least-cost sustainable energy resource available and, thus, should be the first step in reducing energy demand and greenhouse gas (GHG) emissions. Furthermore, improving the energy efficiency of the buildings will reduce the additional electrical distribution capacity that must be built to supply the WLC, and MVU may be able to avoid associated substation, transformer, and local distribution capital costs. WLC has committed to achieve energy efficiency 10% better than 2008 Title 24 code or the most current code at the time of construction, whichever is more efficient. Additional, cost effective efficiency improvements are possible through adoption of additional available energy efficiency opportunities identified by the Energy Demand Side Analysis task (see Section 5 of this report).

In the business-as-usual (BAU) scenario, each warehouse will be served by 12 kV service from the Moreno Valley Electric Utility (MVU). Currently the WLC developer intends to own the buildings. However, under certain circumstance, the developer may wish to sell portions of an individual building or an entire building. In any case, the developer expects that the building occupants will be responsible for paying utility bills.

The figure below shows the results of the high-level qualitative screening analysis.

Table 8: Energy Resources Screening Results

Supply Option	Screening Criteria				
	Carbon	Resiliency	Financial	Technical	Regulatory
Recommended for further investigation:					
Combined Cooling, Heat and Power (CCHP)	—	✓	✓	✓	—
Ground Source Heat Pump (GSHP)	✓	—	—	—	✓
Solar photovoltaic (PV)	✓	—	—	✓	✓
Solar PV + battery	✓	✓	—	✓	✓
Off-site procurement	—	—	✓	✓	—
Not recommended for further investigation:					
Biomass	✓	✓	—	✗	✗
Biogas/landfill gas	✓	✓	—	✗	—
District energy	✓	✓	✗	✗	—
In-line hydro	✓	✓	—	✗	—
Microgrid	✓	✓	✗	✓	✗
Natural gas pressure recovery	✓	✓	—	✗	—
Wind	✓	—	—	✗	✗

The WLC build-out cycle will occur over 20 years. The evident trends in the decreasing capital cost and the increasing efficiency over time of PV, batteries, lighting technology, and controls technology have been considered and are reflected in the analyses underpinning the comparison of renewable energy technologies.

Energy supply options that warrant further investigation are discussed in sections 5.3 – 5.6. These investigations were conducted using the HOMER energy modeling software. Several supply options were removed from consideration and are discussed briefly described below.

Biomass:

Biomass systems replace conventional fuel boilers with boilers that burn biofuels, such as agricultural residues, forest and mill residues, and urban wood waste. Biomass systems can be used to generate heat only, or, generate both heat and electricity. Because WLC is expected to have minimal heating loads, the most advantageous configuration would be to use biomass to generate electricity and potentially heat for use in an absorption chiller.

An analysis using National Renewable Energy Lab's System Advisor Model found that there are limited biomass resources available within a 50-mile radius of WLC, enough for roughly 11 MW of generating capacity, and that these resources primarily consist of urban wood waste. Due to the logistical complexity of obtaining and ensuring sufficient feedstock and concerns about criteria pollutant emissions, specifically NO_x in this SCAQMD air shed, WSP has not given biomass further consideration.

Biogas/landfill gas:

Biogas is a methane-rich gas, similar to natural gas, that can be generated from wastewater treatment plants, landfills, and anaerobic digesters. Biogas could potentially be sourced from the Badlands Landfill, which is less than a mile north of the planned site of WLC. However, the amount of gas presently being captured at the landfill is relatively small – 1.3 million cubic feet per day, which is sufficient to generate roughly 2 MW of electricity. Much of the gas is already being used to generate electricity at the Badlands Landfill[1]. Therefore, WSP has not given further consideration to the direct use of biogas.

District energy:

District energy distribution is a common approach for supplying both heating and cooling energy to universities, medical and military campuses, and urban areas. District energy can be a tool for achieving GHG and energy use reductions by serving buildings with centralized, high-efficiency equipment instead of distributed, less efficient systems. District energy systems can open the opportunity to recover heat rejection from one building to be used as a heat source in another building. Lastly, district energy systems can reduce the overall plant equipment installed in the district, since diversity (not all buildings peak at the same time) and back-up systems can be centralized.

However, the benefits mentioned above are best realized by dense development with a large building diversity, i.e. a mixture of commercial, community, residential, and retail space. In the WLC, it is expected that the buildings will have similar loads, therefore reducing the potential for capital savings to be unlocked by a district energy system's ability to exploit high demand diversity on the customer side. While there are no technical constraints to district energy, most of the warehouses are unconditioned and so the distance between air-conditioned spaces in the WLC makes the cost of installing a district energy distribution system prohibitively expensive.

In addition, SCAQMD air quality standards are greatly exceeded by current air pollution levels in the WLC air shed. District energy systems that are energized by the combustion of fuels will exacerbate the already untenable local air quality and so are not given further consideration. District energy energized by electrically driven heat pumps are discussed in Section 5.2 below.

In-line hydro:

WSP understands that a 145-inch diameter water transmission pipeline, owned by the California Aqueduct/Metropolitan Water District, crosses the project area. In-line turbines can be used to generate electricity from water flowing through transmission pipelines. While this offers the opportunity for zero-carbon electricity to be generated at WLC, the generation potential is expected to be small and complexity relatively high. Therefore, WSP did not give further consideration to in-line hydro.

Microgrid:

Microgrids are local electricity distribution systems that can be "islanded", ie, they can operate independently of the regional grid when the latter experiences a failure. The resiliency provided by microgrids can sustain operations that are mission-critical. Such resilience can also greatly benefit operations that value the ability to continue operating in the face of a grid interruption. However, electricity distribution regulations preclude delivery of electric power across public rights-of-way by any entity besides the utility. Furthermore, MVU is currently precluded from owning/operating generation assets. Finally, the extra expense of the specialized microgrid equipment causes microgrid economics to favor high-density collections of buildings, such as urban districts and campuses. The layout of WLC and MVU restrictions only accommodate small clusters of buildings, perhaps two or three buildings. At this scale, a microgrid is impractical and so WSP has not given microgrids further consideration.

Natural gas pressure recovery:

Several high-pressure natural gas pipelines cross the property. These can be used to generate electricity by dropping the high pressure in the pipes down to local distribution pressure through expansion turbines. There are strict rules and safety standards governing the natural gas transmission facilities. While this offers the opportunity for zero-carbon electricity to be

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[1] EPA's LMOP database, *Landfill- and project-level data (2018).xlsx*, February 2018.

generated at WLC, the generation potential is expected to be small and complexity relatively high. Therefore, WSP has not given further consideration to natural gas pressure recovery.

Wind:

The annual average wind speed in Moreno Valley is relatively low[2]. In addition, while utility-scale wind farms are very cost competitive, smaller-scale wind technology deployments are less so. Furthermore, on-site deployment of wind turbines would likely face opposition by regulators and the public over safety and noise concerns. For these reasons, WSP has not given further consideration to on-site wind.

5.2 GROUND-SOURCE HEAT PUMP

A ground-source heat pump (GSHP) plant uses a reversible chiller (heat pump) to provide both heating and cooling to the building(s) being served. Typically, a ground loop consisting of a field of vertical geo-exchange boreholes (300-600 ft deep) is drilled below the lowest parking level of the site. Other configurations, such as foundation- and slab-integrated exchange fields, have been used successfully in numerous locations.

Under the right conditions, these systems can provide improved heating and cooling performance seasonally compared to an air-source heat pump or traditional natural gas or electric resistance heating. Furthermore, they can eliminate noise, rooftop equipment, and cooling towers and associated water use. GSHP heating and cooling is one means to make the transition to an all-electric energy profile, thereby creating a possible pathway for WLC to eventually offer buildings with the potential to be powered by 100% renewable energy.

However, GSHP is not recommended in the WLC location due to building space cooling requirements being much greater than space heating needs. Such an imbalance would cause the geo-exchange field to grow increasingly warmer over time. This, in turn, would degrade GSHP performance in providing building space cooling. For this reason, VRF reversible heat pumps are recommended for offices and air-conditioned warehouses. These systems also create a possible pathway for WLC to eventually offer buildings with the potential to be powered by 100% renewable energy.

5.3 FUEL CELL COMBINED COOLING, HEAT, AND POWER

CCHP plants generate electricity and useful thermal energy through the capture of waste heat. Combined heat and power plants (CHP) supply thermal energy as heat and combined cooling heat and power plants (CCHP) provide thermal energy as both heating and cooling, the latter by means of an absorption chiller. Making use of waste heat from electricity generation increases the overall efficiency of the plant.

WSP evaluated the suitability for CCHP – using a fuel cell as primary plant equipment – to reduce lifetime GHG emissions from the WLC. While fuel cells are costlier than combustion turbines and reciprocating engines (the CCHP primary equipment alternatives), they have the advantage of dramatically lowering NO_x emissions, which is an important criterion in this SCAQMD air shed.

Because the California electricity grid features so much renewable energy and is therefore so clean, and getting cleaner every year, on-site electricity generation by CCHP, energized by natural gas-fed fuel cells, actually produces more GHG emissions and requires more overall energy consumption when compared to WLC receiving all required energy from the grid.

While fuel cells offer an advantage through shifting energy usage from electricity to cheaper natural gas, they would increase site energy consumption and GHG emissions compared to the base case while decreasing the percentage of renewables in the WLC's energy supply due to decreased use of cleaner grid electricity. Because California's grid electricity already contains a high percentage of renewable electricity, it is less carbon intensive than the electricity generated by a fuel cell. While fuel cells are more efficient than the natural gas-fired power plants that operate during periods of peak power demand on the

[2] Wind resource estimates developed by AWS Truepower, LLC for windNavigator . Web: http://www.windnavigator.com | http://www.awstruepower.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 11 WGS84.

California grid, the long-term expectation of the California Energy Commission and EIA is that the majority of new capacity in California will come from renewables, not from gas-fired plants. Considering this, using generating capacity at WLC that relies on natural gas, even if it is efficient fuel cells, will increase WLC emissions.

Table 9 summarizes the performance of fuel cell CCHP at WLC. Negative values indicate net increases compared to baseline.

Table 9: Fuel Cell CCHP Performance

Stage	Energy Savings (MWh/yr)	Energy Savings (%)	GHG Savings (tonnes CO_2e/yr)	GHG Savings (%)	Renewable Energy Supply (%)*
Phase 1	-95,739	-52%	-18,425	-60%	19%
Full build	-240,849	-52%	-50,888	-78%	21%

*Renewable energy fraction takes account of renewables on the California grid

5.4 SOLAR PV

On-site solar PV generation is scalable, becoming more cost competitive as project size increases, and can thus be a foundational component of WLC's sustainable energy strategy. Understanding available options and trade-offs is important to optimize the use of solar at WLC. WSP has analyzed the feasibility and impact of on-site solar at the WLC, considering the trade-offs between roof- and ground-mounted solar and current and future electric rate structures.

As pointed out in Section 2.2.1, MVU limits on-site PV size to one-half the minimum electric demand a building experiences during daytime hours. To determine the specific allowable PV size, WSP analyzed the hourly electric loads simulated using the IES modeling software. Phase 1 building simulation produced a minimum daytime electric load of about 600 kW. The minimum daytime electric load for Phase 2 buildings was simulated to be about 1,600 kW. Thus, to stay within all the constraints facing the WLC project, Phase 1 buildings can feature 300 kW of PV (one-half the 600 kW minimum daytime electric load) and Phase 2 buildings can feature 800 kW. At these PV system sizes, a total of 4.5 MW of PV capacity would exist at WLC at the end of Phase 1 and a total of 14.1 MW of PV capacity would exist at WLC at full build-out.

The WLC Specific Plan commits to meet the annual energy requirements of all office spaces with PV, thereby effectively achieving net-zero energy (NZE) office operations. Since each individual WLC building is expected to feature about 60,000 sqft of office space, this is the equivalent of fifteen 60,000 square-foot office buildings at WLC achieving NZE consumption by 2025. The entire state of California has about 30 NZE office buildings in operation, under construction, or publicly committed as of 2016[3]. Thus, the WLC Specific Plan will grow California's NZE office population by about 50% by 2025. At full WLC build-out there will be the equivalent of twenty seven 60,000 square-foot office buildings achieving NZE status.

WSP estimates that the offices in each typical WLC building will consume about 474,120 kWh/yr and experience peak electric demand of about 280 kW. The maximum allowed amount of PV capacity/building in Phase 1 (300 kW) will generate about 512,275 kWh/yr at the WLC location. The maximum allowed amount of PV capacity/building in Phase 2 (800 kW) will generate about 1,366,400 kWh/yr. Thus, in all cases, the maximum allowed PV capacities are sufficient in both Phase 1 and Phase 2 to satisfy 100% of the office energy needs, thereby meeting the NZE objective for WLC office space.

[3] New Buildings Institute, 2016 List of Zero Net Energy Buildings

Table 10 summarizes the performance of solar PV at WLC in the amounts allowed by MVU.

Table 10: Solar PV Performance

Stage	Energy Savings (MWh/yr)	Energy Savings (%)	GHG Savings (tonnes CO_2e/yr)	GHG Savings (%)	Renewable Energy Supply (%)*
Phase 1	7,686	4%	1,276	4%	51%
Full build	24,083	5%	3,386	5%	57%

*Renewable energy fraction takes account of renewables on the California grid

5.5 ENERGY STORAGE

Energy storage using either Lithium-ion batteries or Vehicle-to-Grid technology (see below) is not viable under current regulatory and economic conditions. For example, MVU currently has no policies or rules that would allow WLC to use battery storage to increase usage of solar electricity. However, these conditions may change. In the future, energy storage may help:

— maximize direct use of on-site renewable electricity generation,

— optimize the building's demand curve ("peak shaving") to reduce strain on the electric grid and lower WLC tenant demand charges,

— shift WLC on-site electricity generation to time-of-use periods with lower electricity rates ("load shifting").

5.5.1 LITHIUM-ION BATTERIES

Lithium-ion (Li-ion) batteries can connect to electrical systems and store electricity. Because of the MVU solar sizing limit, there is no excess solar generation available to charge a battery with the Phase 1 and Phase 2 300 kW and 800 kW solar systems. In addition, MVU currently disallows the use of batteries to get around the PV size limits by enabling the generation and storage of excess solar output without feeding power to MVU's system.   Consequently, greater renewable energy penetration at WLC is not currently possible. Further, MVU's rate structures, combined with WLC's load characteristics, make battery integration unviable – MVU's Time-of-Use rates do not match up with WLC's peak electric usage and WLC's electric load profiles are not 'spikey' enough for batteries to deliver meaningful reductions in the electric demand charge.

5.5.2 VEHICLE-TO-GRID

This section is included in the report for completeness of the energy storage discussion. Vehicle-to-grid (V2G) technology is not currently available but is expected to become available at some point during WLC build-out period.

A V2G system uses the on-board battery packs of parked electric vehicles as distributed energy resources to store electricity for use during peak electricity demand periods. Smart controls on EV charging stations will enable each EV owner to decide whether or not to allow V2G charging and discharging of the EV's battery pack. MVU rules and rate structures would need to change to accommodate V2G technology and to incentivize EV owners to make their vehicle's batteries available while the vehicle is parked.

Vehicle manufactures currently do not enable 2-way V2G exchanges of electricity, but this is expected to change in the coming years. Like stationary Li-ion batteries, V2G could be used by WLC in the future to maximize use of on-site renewable electricity and perform peak-shaving and load-shifting functions if MVU's rules and rate structures were to change. Electric vehicle population estimates for WLC suggest that significant amounts of potential V2G storage would be available for Phase 1 if electricity exchanges were enabled. With the anticipated proliferation of electric vehicles, V2G storage potential will increase substantially for Phase 2. Should V2G technology be enabled in the future, it should be investigated.

5.6 OFF-SITE RENEWABLE ENERGY PROCUREMENT

Various mechanisms exist for many electricity customers to procure renewable energy from off-site projects, including renewable energy certificates, green tariffs, power purchase agreements, virtual power purchase agreements, community choice aggregation, and directed biogas. Procurement of off-site renewable energy can hedge against energy cost fluctuations, support the development of new renewable energy projects, and allow electricity consumers to claim the environmental benefits associated with the renewable energy generation. However, off-site procurement of renewable energy does not reduce the consumers' reliance on the electric grid to transport electricity nor the natural gas grid to transport biogas. Furthermore, off-site renewable energy procurement is likely to come at a cost premium to the energy end-user.

Under current regulations, WLC tenants will be able to purchase electricity only from MVU. Should electricity regulations change in the future to allow procurement of off-site renewable energy, and should WLC tenants elect for corporate, marketing, or other reasons to pursue procurement of off-site renewable energy, the means of doing so via one of the means presented in this report may become available to them.

The price premium associated with off-site renewable energy procurement would increase WLC tenant utility costs and thus run counter to the Project Objectives and the City's Economic Development Objectives (see Section 3.6 of the Project Final EIR and Section 1.3.1 of the WLC Specific Plan). Even if regulations allowed it, it would be counterproductive to require WLC tenants to procure renewable energy from off-site sources. Rather, WLC must establish and maintain a competitive position that supports achievement of the Project and City objectives. For these reasons, the concept of requiring a tenant to procure off-site renewable energy was not considered a viable sustainable supply option to impose on the Project. However, for the sake of completeness, WSP has evaluated the means for off-site procurement of renewable energy at WLC. We herein describe multiple off-site renewable electricity procurement methods that are available in many other electric utility service territories. These include:

— Unbundled renewable energy certificates (RECs);
— Power purchase agreements (PPAs);
— Community choice aggregation (CCA);
— Green tariffs.

Each option is evaluated on the following criteria:

— Market credibility;
— Relevance to future zero net energy regulations expected to be implemented in California;
— Risk profile;
— Impact on lifetime energy costs of the development.

Pricing of green power is highly variable depending on the particular circumstances surrounding each individual project or the current pricing offered by commodities markets. Thus, it is impossible to estimate with any accuracy what might be the impact on overall WLC energy costs if green power were part of the equation. The discussions below present some limited indications of possible cost considerations. It would be prudent to assume that some amount of cost premium would come with green power. To the extent this is the case, the resulting higher electricity costs would run counter to the strategic objective of the City of Moreno Valley to use low-cost electricity as an economic development tool.

5.6.1 BACKGROUND INFORMATION

RENEWABLE ENERGY CLAIMS

Renewable electricity generation projects produce two products of interest; physical electricity and RECs. RECs are an important characteristic of green power to understand, because they are the mechanism that allows an organization to claim the renewable benefits of a green power project. The Environmental Protection Agency (EPA) defines a REC as the representation of the property rights to the environmental, social, and other non-power qualities of one MWh of renewable electricity generation, which can be sold as a separate commodity from the electricity being produced by the renewable energy system.[4]

If RECs are sold together with their associated electricity, they are known as bundled RECs. If they are sold separately, they are known as unbundled RECs.

To be able to claim and communicate the renewable energy benefits from any green power, an organization must own and retire the RECs associated with the green power, or have the RECs retired on its behalf per the Federal Trade Commission's Green Guides.[5]

For all options evaluated herein other than unbundled RECs and Community Choice Aggregation, it is assumed the end purchaser of off-site renewable energy can claim ownership to the associated RECs per the FTC's guidelines.

ZERO ENERGY BUILDINGS IN CALIFORNIA

Relevant to this project, the California Energy Efficiency Strategic Plan indicates that "50% of commercial buildings will be retrofit to Zero Net Energy by 2030."[6] Zero Net Energy for the commercial sector being defined as "an energy-efficient building where, on a source-energy basis, the actual annual consumed energy is less than or equal to the on-site renewable generated energy." Source energy is all energy consumed on-site "plus the energy consumed in the extraction, processing and transport of primary fuels such as coal, oil and natural gas; energy losses in thermal combustion in power generation plants; and energy losses in transmission and distribution to the building site."[7]

For the purposes of this analysis, it is assumed that the California Energy Efficiency Strategic Plan is aligned with the U.S. Department of Energy (USDOE) definition of Zero Energy Buildings and the associated guidance in relation to the use of off-site energy in achieving zero energy status. USDOE guidance indicates that net zero energy status can be achieved through the purchase of off-site renewable electricity for energy efficient buildings that have maximized the installation of on-site renewable energy. The USDOE Zero Energy Building definition does not include specific guidance on what off-site renewable energy procurement mechanisms can be used toward net zero energy status.

5.6.2 UNBUNDLED RENEWABLE ENERGY CERTIFICATES (RECS)

An organization can directly purchase RECs that are unbundled from the electricity supply. When purchased as unbundled commodities, RECs provide no physical electricity to the purchaser. Instead, the purchaser will continue to contract with their utility for electricity generated by the region's grid mix (including non-renewable fuel sources), but purchase the environmental attributes from individual green power projects.

RECs may be purchased in regulated or deregulated markets, and across markets, providing renewable attributes to electricity use at facilities of choice, regardless of geography or local green power resources. However, because unbundled RECs are typically purchased from existing renewable energy projects, their impact on the development of new green power projects is not as direct or significant as with other green power procurement options. Unbundled RECs are typically available for a price premium of about 1% of the cost of physical power.

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[4] https://www.epa.gov/greenpower/renewable-energy-certificates-recs
[5] https://www.ftc.gov/sites/default/files/attachments/press-releases/ftc-issues-revised-green-guides/greenguidesstatement.pdf
[6] http://www.cpuc.ca.gov/ZNE/
[7] https://www.energy.gov/sites/prod/files/2015/09/f26/bto_common_definition_zero_energy_buildings_093015.pdf

Table 11: Unbundled RECs.

CRITERIA	EVALUATION
Market credibility	Based on WSP's experience in the renewable energy marketplace through memberships such as Rocky Mountain Institute's (RMI's) Business Renewable Center, corporate renewable energy buyers are evolving their renewable energy procurement strategies to go beyond unbundled RECs. This evolution is due to the desire to have more of an impact on development of new renewable energy generation. Unbundled RECs typically come from renewable energy generation already in operation, and thus are perceived to have a lower impact on new generation.
Relevance to future zero net energy regulations expected to be implemented in California	Per USDOE, energy efficient buildings can achieve net-zero energy status using RECs if physical limitations preclude the building from fully meeting its energy demand with on-site renewables. These buildings can achieve net zero energy status with the "REC-ZEB" qualifier.WSP's opinion is that unbundled RECs would qualify under the current forecasted regulation only after the demand and supply side options outlined herein are implemented. It is uncertain whether the limitations on the size of on-site solar imposed by MVU would qualify the buildings in the WLC to achieve net zero status using RECs. Importantly, unbundled RECs are increasingly being considered low impact, and the leading governing bodies in the net zero energy space may require long-term contracts for such procurement. WSP is aware that market credibility is shifting away from unbundled RECs.
Risk profile	Purchasers of unbundled RECs are subject to spot pricing on an ongoing (e.g., annual) procurement cycle. There is no physical power risk associated with unbundled purchases.
Impact on lifetime energy costs of the project	There is no direct financial return on investment in purchasing unbundled RECs, nor does the purchase reduce vulnerability to future increases in electricity prices. Regardless if WLC tenants purchase unbundled RECs, there will be an increase to the energy costs of the project. Unbundled RECs are typically available for about 1% of the cost of physical power.

5.6.3 POWER PURCHASER AGREEMENTS (PPAs)

PPAs are contractual agreements used in the utility power sector for the long-term purchase of electricity produced by a specific project. For electricity producers, PPAs offer long-term revenue certainty with a credit-worthy purchaser that allows the project to attract capital investment. For electricity purchasers, PPAs offer a long-term supply of green power with price stability. In California, "Direct Access" agreements offer an alternative similar to a PPA, but using the utility as an intermediary. However, the program is currently at capacity and therefore not available to WLC tenants.[8]

Alternatively, WLC tenants may consider a virtual power purchase agreement (VPPA), also known as a synthetic PPA or "contract for differences." A VPPA is a financial swap that allows an electricity purchaser to provide financial and credit support to a project developer by setting a floor price for electricity sold by the project to the wholesale electricity market. If the wholesale price is below the floor price, the purchaser pays the developer the difference. If the wholesale price exceeds

[8] http://www.cpuc.ca.gov/General.aspx?id=7881

the floor price, the developer pays the purchaser. In return for guaranteeing a floor price, the purchaser may receive RECs from the project.

This option is a potential solution for customers that have electricity load distributed over many facilities or with loads in regulated electricity markets, like California. Unlike a physical PPA, synthetic PPAs do not include the physical consumption of electricity and therefore, there is no need for a purchaser's facilities to be in the same power market as the project. The combination of wholesale electricity market revenues and the floor price provides financial and credit support to the project owner sufficient to proceed with project financing and construction, thereby providing the critical support necessary for a new project to be implemented.

From an electricity purchaser's perspective, a VPPA can provide a long-term fixed supply of RECs along with potential for annual revenues on the contract. The purchaser, in a sense, is making a bet that market prices will continue to rise and that revenue from increasing prices will flow through the project to the purchaser. If properly structured, this contract can hedge against future electricity price increases or volatility. Purchasers must also understand the risk and financial exposure they face if market prices decline over the term of the agreement.

PPA pricing is highly dependent on the deal, and given the confidential, bilateral nature of the deals, pricing details are not publicly available. Moreover, VPPA deals discussed in the report, beyond a long-term contract for RECs, are often structured to be a hedge against of the price of electricity being procured by the offtaker (e.g., WLC tenants from MVU). VPPA pricing has fallen considerably over the past several years. Current publicly available estimates have VPPA prices at $22/MWh. As to whether this would represent a price premium, be cost-neutral, or result in increased income is dependent on the deal structure and electricity market pricing forecasts. The VPPA imposes an incremental cost on top of the cost WLC tenants pay to MVU for electricity. If the VPPA yields a cost savings, this benefit would effectively reduce the net cost paid to MVU for delivered electricity. However, if the VPPA yields a cost adder, it would effectively raise the net cost of delivered electricity. See https://www.epa.gov/greenpower/green-power-pricing for more details.

Table 12: VPPA Evaluation

CRITERIA	EVALUATION
Market credibility	PPA and VPPA transactions are viewed as having a higher impact relative to development of new renewable energy generation sources when compared to purchasing unbundled RECs. Net zero energy certification through voluntary programs such as the International Future Living Institute may require the project to be located physically close to the WLC.[9]
Relevance to future zero net energy regulations expected to be rolled out in California	The previously referenced Department of Energy paper titled "A Common Definition for Zero Energy Buildings" dated 2015 does not specifically address PPAs or VPPAs in the context contemplated in this report. However, if the RECs are obtained through the PPA or VPPA, WSP expects that these procurement methods will qualify for achieving zero net energy status per the Department of Energy Guidance, once efficiency and on-site renewables have been maximized.
Risk profile	There are several risk factors to evaluate when completing investment-grade due diligence on a PPA or VPPA contract, many of which are beyond the scope of this analysis. However, two risks germane to WLC are the typical contract length and price risk. Both are addressed just below. - Contract length: While the market is currently grappling with overcoming the length of typical deals, current structures are long-term commitments of 10-20 years. If WLC tenants are party to a PPA or VPPA, assuming the transactional complexity due to multi-party offtakers could be overcome, they would be contracting for a length of time (again, 10-20 years) that many businesses are not comfortable with. For example, this term may in fact be longer than the lease agreement at WLC. - Price risk: In PPAs and VPPAs, the purchaser can be exposed if future electricity prices drop below contract pricing. Contracts are typically for an electricity price forecast believed to outperform escalation of their current utility's forecasted rate. Some purchasers find value in having price certainty, which a PPA or VPPA could provide depending on the details of the contract.
Impact on lifetime energy costs of the project	PPAs and VPPAs can provide a hedge or "price stability" mechanism for electricity. If structured well, there should be either minimal or, at best, an improvement on the lifetime energy costs of the project. The discussion on price brings up the issue of the parties at the WLC that would enter into the PPA or VPPA. There are two options: the developer of the WLC or the tenants. Due to transaction costs and complexity, it is likely the only applicable party to execute a PPA or VPPA would be the developer. However, since the developer is not responsible for purchasing electricity – the tenants are – the transaction costs and any reconciliation of the price of the energy delivered to WLC and the price of the PPA or VPPA would likely have to be incorporated into the lease agreements.

[9] https://living-future.org/wp-content/uploads/2017/03/Net-Zero-Energy-Offsite-Renewables-Exception.pdf

5.6.4 COMMUNITY CHOICE AGGREGATION (CCA)

Community Choice Aggregation (CCA) is a program that allows cities and counties to buy and/or generate electricity for residents and businesses within their areas."[10] Basically, CCA is intended to provide utility rate payers with more options, which are increasingly providing green power procurement options.

CCA options are not currently available in Moreno Valley.[11] The below evaluation is provided in the circumstance that CCA options become available to WLC in the future. CCAs in California have shown they can be competitive with local utility pricing.

Table 13: CCA Evaluation

CRITERIA	EVALUATION
Market credibility	Purchasing from a CCA who has a higher than the required renewable energy fuel mix by actively bringing new renewable energy projects on line as opposed to procuring unbundled RECs would be viewed as credibly procuring renewable energy.
Relevance to future zero net energy regulations expected to be rolled out in California	As highlighted in the unbundled REC section above, the current DOE definition for zero energy buildings is not clear on certain emerging renewable energy procurement options such as PPAs, CCA, and green tariffs. Based on a New Building Institute paper titled "ZNE Project Guide for State Buildings", co-sponsored by California utilities PG&E and Southern California Edison, procurement from a CCA would qualify towards a zero energy build status.[12]
Risk profile	CCA procurement has a similar risk profile to conventional procurement from the local utility.
Impact on lifetime energy costs of the project	CCAs in California have shown to be competitive with local utility pricing.

5.6.5 GREEN TARIFF

Electricity markets in a growing number of states offer customers the ability to purchase green power directly from a local utility. These agreements allow the customer to contract for some or all of their purchased electricity to be attributed to existing green power projects feeding into the local grid. The utility will then retire the coinciding RECs on the customer's behalf, allowing the customer to claim the environmental benefits associated with the purchase of green power. Variations of this mechanism are available in regulated and deregulated markets. In deregulated markets, a customer may directly choose their electricity provider (e.g., CCA programs discussed above), while customers in regulated markets may have the option to pay a premium on their electric bill to claim energy generated from the utility's renewable portfolio.

[10] https://www.pge.com/en_US/residential/customer-service/other-services/alternative-energy-providers/community-choice-aggregation/community-choice-aggregation.page
[11] https://cal-cca.org/
[12] https://newbuildings.org/wp-content/uploads/2018/04/ZneProjectGuideForStateBuildings.pdf

Because utility products and green tariffs are typically based on existing renewable energy projects, their impact on the development of new green power projects is not as direct or significant as with other green power procurement options. MVU currently does not have a green tariff option. However, there may be an opportunity for Highland Fairview to work with MVU to develop such a tariff.

Per MVU's Integrated Resource Plan (IRP; 2015-2016), the utility indicates a desire to contract for new renewable energy.[13]

"*It is important to note that, due to typical project development timelines associated with renewable generator development, most of MVU's near-term incremental renewable energy requirements will need to be served by existing generators that have already qualified for California RPS eligibility. Looking forward, MVU may choose to contract with yet-to-be developed resources for renewable energy needs that have been identified in the medium- and long-term planning horizons. These planning horizons will allow sufficient time for necessary solicitation and contracting activities (to be completed by MVU) as well as new resource development. Based on recently completed renewable energy solicitations throughout the market, there appears to be ample renewable energy supply available for interested buyers, although prices are above the cost of conventional energy purchases. As discussed in this Plan, before making firm purchase commitments for additional renewable energy supply, MVU will continue to evaluate the cost/rate impacts that would result from additional renewable energy procurement.*"

Due to the large energy demands WLC will put on MVU, the developer of WLC may consider exploring working with MVU on the development of a green tariff similar to recent projects in regulated markets.[14] For example, Facebook recently worked to deliver two green tariffs with their local utilities in New Mexico and Nebraska.[15]

Pricing analysis for a green tariff (which is distinguished from utility green pricing products which could be the utility simply delivering unbundled RECs as part of the rate) is highly subjective to the structure of the rate. They may be cost competitive with current utility rates. See https://www.nrel.gov/docs/fy17osti/68179.pdf for more details.

Table 14: Green Tariff Evaluation

CRITERIA	EVALUATION
Market credibility	Development of a green tariff by MVU that is delivering renewable energy through an owned asset or a contract with an independent power provider would be perceived as being highly credible.
Relevance to future zero net energy regulations expected to be rolled out in California	As highlighted in the unbundled REC section above, the current DOE definition for zero energy buildings is not clear on some of emerging renewable energy procurement options such as PPAs, CCA, and green tariffs. Provided the rate payer has claim to the environmental attributes of the electricity they are procuring, it is WSP's opinion that such purchases would qualify the building as zero net energy in that it's a similar argument to that made by the New Buildings Institute in the aforementioned paper.
Risk profile	Given MVU would be the offtaker or owner of the renewable energy generation, this option has a similar risk profile to conventional procurement from the local utility.
Impact on lifetime energy costs of the project	Unknown at this time. The rate would be dependent on MVU's agreements or assets. Per their IRP, MVU states "*Based on recently completed renewable energy solicitations throughout the market, there appears to be ample renewable energy supply available for interested buyers, although prices are above the cost of conventional energy purchases.*"

[13] http://www.moreno-valley.ca.us/resident_services/utilities/pdfs/mvuAnnualReport0217.pdf
[14] http://www.wri.org/sites/default/files/emerging-green-tariffs-in-us-regulated-electricity-markets-sep2017_0.pdf
[15] http://buyersprinciples.org/2017/04/05/facebook-implements-new-green-tariff-for-new-nebraska-data-center/

5.7 RECOMMENDED PATH FORWARD

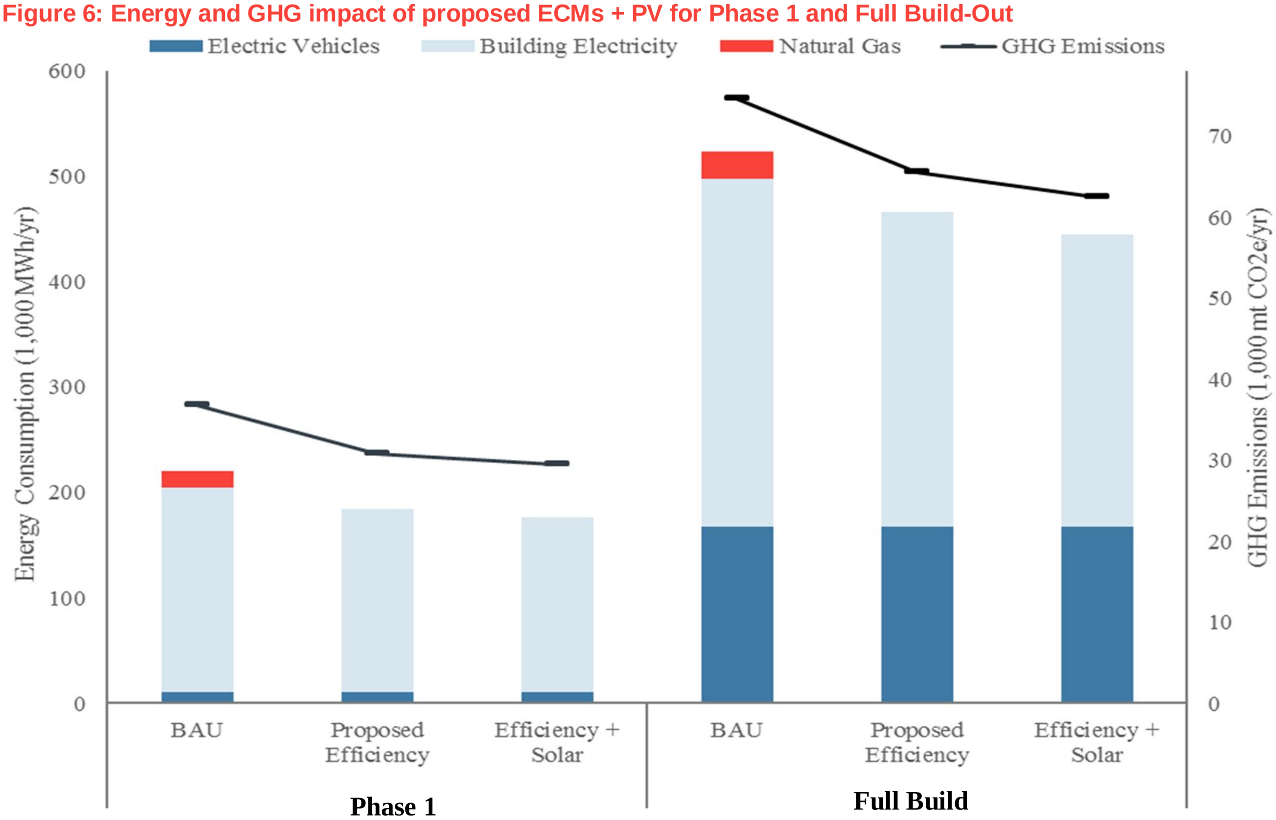
The recommended pathway does not include any on-site combustion or conversion of natural gas to electricity. Any CCHP configuration involving combustion is immediately disqualified due to the significant NO_x emissions it would contribute to an air shed that is already three times over the allowed NO_x limit. While fuel cells emit minimal NO_x and exploit the relatively low cost of natural gas compared to electricity, they result in a net increase in site energy consumption and GHG emissions and are therefore not recommended.

The recommended path forward also does not include requiring WLC tenants to procure renewable energy from off-site sources. The price premium associated with off-site renewable energy procurement would increase WLC tenant utility costs and thus run counter to the Project Objectives and the City's Economic Development Objectives.

The recommended path includes all-electric building systems which eliminates the need for on-site natural gas usage. WLC is then positioned with the future potential to operate 100% on renewable energy. However, PV capacity of 300 kW per building in Phase 1 is the maximum allowed by MVU rules.

The impact of the recommended ECMs and the proposed on-site PV on the annual energy consumption and GHG emissions of the WLC is shown in Figure 6.

Figure 6: Energy and GHG impact of proposed ECMs + PV for Phase 1 and Full Build-Out



6 CONCLUSION

6.1 SUMMARY OF OPPORTUNITIES

The State of California is expected to implement regulations to promote net-zero energy buildings. WLC has the opportunity to proactively embrace all-electric design standards at the outset of project construction. Doing so in advance of these regulations would make WLC net-zero-ready and position it to comply with future net-zero regulations. This, combined with WLC's commitment to solar-ready roof construction, positions the development to achieve its environmental stewardship and sustainability goals.

6.2 SUMMARY OF RECOMMENDATIONS

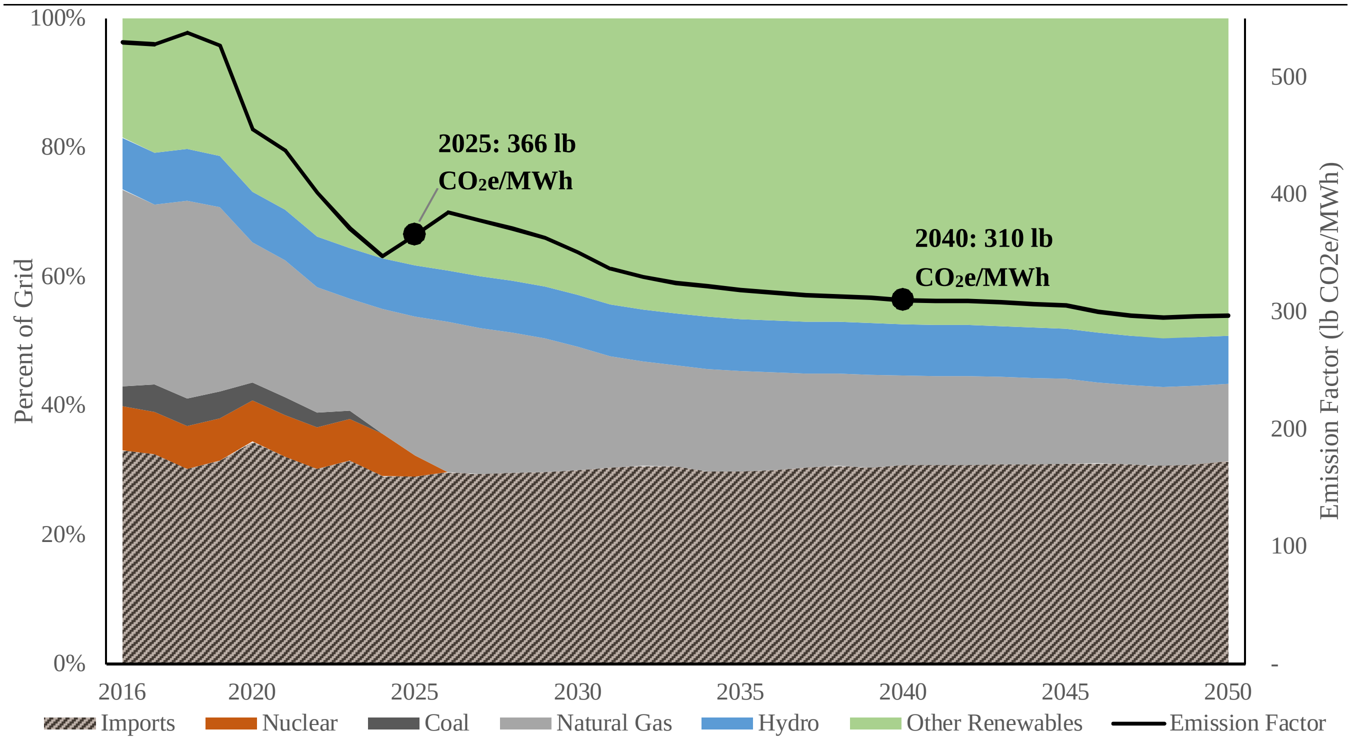
- Establish the ability of WLC to achieve net-zero energy over time by embracing all-electric design standards at the outset of project construction.
- Adopt maximum allowable solar PV capacity of 300 kW per building as a component of the Phase 1 design standards.
- Revisit this analysis with some frequency to capture inevitable changes over time in the MVU solar limit, MVU rate structures, Title 24 requirements, net-zero regulations, and changes in sustainable energy equipment costs.
- Implement recommended ECMs and maximum allowable solar PV capacity in Phase 1.

7 APPENDIX A: CURRENT AND FUTURE ENERGY CONTEXT

7.1 ELECTRIC GRID PROJECTIONS

Driven by an aggressive Renewable Portfolio Standard (RPS)[16] and a decreased reliance on coal, California's grid is one of the cleanest in the country. In 2017, 25% of its electricity was derived from renewable sources and the resulting carbon intensity of 529 lb $CO2_e$/MWh is nearly 50% below the national average of 1,000 lb $CO2_e$ /MWh. As highlighted in the graph below, rapid decarbonization of the California grid is expected to continue. The U.S. Energy Information Administration projects that that the grid's emissions factor will decline 31% from current levels by 2025 and 41% by 2040.

Figure 7: CAMX Emissions Factor Projection



[16] California's RPS requires retail sellers and publicly owned utilities to procure 50% of their electricity from eligible renewable sources by 2030

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E-3 Construction Fuel Consumption

World Logistics Center
Construction Energy Analysis

Annual Fuel Summary

	Heavy-Duty Construction Equipment
21,376,801	Total Project Consumption
1,370,308	Annual Consumption
	Haul Trucks
1,667,280	Total Project Consumption
106,877	Annual Consumption
	Vendor Trucks
1,195,386	Total Project Consumption
76,627	Annual Consumption
	Workers
844,012	Total Project Consumption
54,103	Annual Consumption
2,862,666	Project Consumption of diesel for Haul Trucks and Vendors
183,504	Annual Consumption
24,239,467	Total Gallons Diesel
844,012	Total Gallons Gasoline

15.6	Estimated Project Construction Duration (years)
1,553,812	Annual Average Gallons Diesel
54,103	Annual Average Gallons Gasoline

Riverside County			**Percent of Annual Project Compared to Riverside County**
Source	**Fuel Type**	**Gallons**	
Workers	Gasoline	1,052,000,000	0.0051%
Off-Road/Vendor/Haul Trucks	Diesel	275,000,000	0.5650%

Notes:

1 Gasoline and diesel amounts from CEC, 2019. Available: https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html

World Logistics Center
Construction Energy Analysis

Off-Road Equipment

Equipment ≤ 50 hp		
pounds fuel/hp-hr (OFFROAD2011 model, ≤ 1000 hp):	0.408	lb/hp-hr
diesel pounds/gallon (CARB density assumption):	7.11	lb/gal
diesel gallons/hp-hr:	0.0574	gal/hp-hr
Total <100:	72,413,316	hp-hr
Total diesel gallons:	4,156,006	gal
Equipment > 50 hp		
pounds fuel/hp-hr (OFFROAD2011 model, > 100 hp):	0.367	lb/hp-hr
diesel pounds/gallon (CARB density assumption):	7.11	lb/gal
diesel gallons/hp-hr:	0.0516	gal/hp-hr
Total >100:	333,571,957	hp-hr
Total diesel gallons:	17,220,795	gal
Total diesel gallons (off-road equipment):	**21,376,801**	**gal**

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 2 and 4 (2020) Mass Excavation	Graders	1	10	193	0.41	262	207,321
Plots 2 and 4 (2020) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	262	398,240
Plots 2 and 4 (2020) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	262	70,006
Plots 2 and 4 (2020) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	262	70,006
Plots 2 and 4 (2020) Mass Excavation	Plate Compactors	1	10	354	0.43	262	398,816
Plots 2 and 4 (2020) Mass Excavation	Plate Compactors	1	10	354	0.43	262	398,816
Plots 2 and 4 (2020) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	262	1,215,680
Plots 2 and 4 (2020) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	262	1,215,680
Plots 2 and 4 (2020) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	262	859,360
Plots 2 and 4 (2020) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	262	319,640
Plots 2 and 4 (2020) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	262	146,720
Plots 2 and 4 (2020) Mass Excavation	Rubber Tired Dozers	3	10	85	0.4	262	267,240
Plots 2 and 4 (2020) Mass Excavation	Scrapers	6	10	550	0.48	262	4,150,080
Plots 2 and 4 (2020) Mass Excavation	Scrapers	12	10	550	0.48	262	8,300,160
Plots 2 and 4 (2020) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	262	82,399
Plots 2 and 4 (2020) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	262	17,502

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 2 and 4 (2020) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	262	17,502
Plots 2 and 4 (2020) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	262	146,720
Plots 2 and 4 (2020) Finish Grading	Rubber Tired Dozers	3	10	85	0.4	262	267,240
Plots 2 and 4 (2020) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	262	82,399
Plots 2 and 4 (2020) Utilities	Cement and Mortar Mixers	8	1	9	0.56	262	10,564
Plots 2 and 4 (2020) Utilities	Excavators	2	10	523	0.38	262	1,041,398
Plots 2 and 4 (2020) Utilities	Excavators	5	10	286	0.38	262	1,423,708
Plots 2 and 4 (2020) Utilities	Excavators	2	10	190	0.38	262	378,328
Plots 2 and 4 (2020) Utilities	Excavators	4	10	396	0.38	262	1,577,030
Plots 2 and 4 (2020) Utilities	Excavators	2	10	190	0.38	262	378,328
Plots 2 and 4 (2020) Utilities	Excavators	2	10	188	0.38	262	374,346
Plots 2 and 4 (2020) Utilities	Excavators	8	10	40	0.38	262	318,592
Plots 2 and 4 (2020) Utilities	Forklifts	4	10	89	0.2	262	186,544
Plots 2 and 4 (2020) Utilities	Other Material Handling Equipment	7	1	167	0.4	262	122,511
Plots 2 and 4 (2020) Utilities	Other Material Handling Equipment	16	1	167	0.4	262	280,026
Plots 2 and 4 (2020) Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	262	164,798
Plots 2 and 4 (2020) Utilities	Tractors/Loaders/Backhoes	8	10	90	0.37	262	697,968
Plots 2 and 4 (2020) Landscaping	Excavators	2	10	29	0.38	262	57,745
Plots 2 and 4 (2020) Landscaping	Forklifts	2	10	125	0.2	262	131,000
Plots 2 and 4 (2020) Landscaping	Other Material Handling Equipment	2	1	167	0.4	262	35,003
Plots 2 and 4 (2020) Landscaping	Other Material Handling Equipment	10	1	167	0.4	262	175,016
Plots 2 and 4 (2020) Landscaping	Rubber Tired Loaders	2	10	149	0.36	262	281,074
Plots 2 and 4 (2020) Landscaping	Skid Steer Loaders	2	10	69	0.37	262	133,777
Plots 2 and 4 (2020) Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	262	141,532
Plots 2 and 4 (2020) Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	262	151,226
Plots 2 and 4 (2020) Landscaping	Trenchers	2	10	39	0.5	262	102,180
Plots 2 and 4 (2020) Building Concrete	Cement and Mortar Mixers	15	1	9	0.56	262	19,807
Plots 2 and 4 (2020) Building Concrete	Other Material Handling Equipment	2	1	167	0.4	262	35,003
Plots 2 and 4 (2020) Building Concrete	Pumps	2	10	84	0.74	262	325,718
Plots 2 and 4 (2020) Building Concrete	Tractors/Loaders/Backhoes	4	10	78	0.37	262	302,453
Plots 2 and 4 (2020) Building-Wet Utilities	Excavators	2	10	300	0.38	262	597,360
Plots 2 and 4 (2020) Building-Wet Utilities	Excavators	2	10	179	0.38	262	356,425
Plots 2 and 4 (2020) Building-Wet Utilities	Excavators	2	10	173	0.38	262	344,478
Plots 2 and 4 (2020) Building-Wet Utilities	Other Material Handling Equipment	15	1	167	0.4	262	262,524
Plots 2 and 4 (2020) Building-Wet Utilities	Rubber Tired Loaders	6	10	152	0.36	262	860,198
Plots 2 and 4 (2020) Building-Wet Utilities	Tractors/Loaders/Backhoes	4	10	85	0.37	262	329,596
Plots 2 and 4 (2020) Building-Wet Utilities	Tractors/Loaders/Backhoes	6	10	108	0.37	262	628,171
Plots 2 and 4 (2020) Building-Electrical	Cement and Mortar Mixers	16	1	9	0.56	262	21,128
Plots 2 and 4 (2020) Building-Electrical	Excavators	4	10	40	0.38	262	159,296
Plots 2 and 4 (2020) Building-Electrical	Forklifts	4	10	89	0.2	262	186,544

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 2 and 4 (2020) Building-Electrical	Other Material Handling Equipment	6	1	167	0.4	262	105,010
Plots 2 and 4 (2020) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	262	348,984
Plots 2 and 4 (2020) Temporary Utilities	Cranes	2	10	445	0.29	262	676,222
Plots 2 and 4 (2020) Building-Landscaping	Excavators	2	10	29	0.38	262	57,745
Plots 2 and 4 (2020) Building-Landscaping	Forklifts	2	10	125	0.2	262	131,000
Plots 2 and 4 (2020) Building-Landscaping	Rubber Tired Loaders	2	10	149	0.36	262	281,074
Plots 2 and 4 (2020) Building-Landscaping	Skid Steer Loaders	2	10	69	0.37	262	133,777
Plots 2 and 4 (2020) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	262	141,532
Plots 2 and 4 (2020) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	262	151,226
Plots 2 and 4 (2020) Building-Landscaping	Trenchers	2	10	39	0.5	262	102,180
Plots 2 and 4 (2020) Paving	Other Material Handling Equipment	6	1	167	0.4	262	105,010
Plots 2 and 4 (2020) Paving	Pavers	2	10	126	0.42	262	277,301
Plots 2 and 4 (2020) Paving	Paving Equipment	2	10	131	0.36	262	247,118
Plots 2 and 4 (2020) Paving	Plate Compactors	2	10	8	0.43	262	18,026
Plots 2 and 4 (2020) Paving	Rollers	2	10	81	0.38	262	161,287
Plots 2 and 4 (2020) Paving	Scrapers	2	10	362	0.48	262	910,502
Plots 2 and 4 (2020) Paving	Tractors/Loaders/Backhoes	4	10	90	0.37	262	348,984
Plots 2 and 4 (2020) Curbing/Drive Approaches	Cement and Mortar Mixers	8	1	9	0.56	262	10,564
Plots 2 and 4 (2020) Curbing/Drive Approaches	Other Material Handling Equipment	4	1	167	0.4	262	70,006
Plots 2 and 4 (2020) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	262	93,377
Plots 2 and 4 (2020) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	262	123,559
Plots 2 and 4 (2020) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	262	53,317
Plot 4 (2021) Mass Excavation	Graders	2	10	193	0.41	261	413,059
Plot 4 (2021) Mass Excavation	Off-Highway Trucks	2	10	400	0.38	261	793,440
Plot 4 (2021) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plot 4 (2021) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plot 4 (2021) Mass Excavation	Plate Compactors	2	10	354	0.43	261	794,588
Plot 4 (2021) Mass Excavation	Plate Compactors	2	10	354	0.43	261	794,588
Plot 4 (2021) Mass Excavation	Rubber Tired Dozers	2	10	305	0.4	261	636,840
Plot 4 (2021) Mass Excavation	Rubber Tired Dozers	2	10	140	0.4	261	292,320
Plot 4 (2021) Mass Excavation	Rubber Tired Dozers	3	10	85	0.4	261	266,220
Plot 4 (2021) Mass Excavation	Rubber Tired Dozers	3	10	580	0.4	261	1,816,560
Plot 4 (2021) Mass Excavation	Rubber Tired Dozers	3	10	580	0.4	261	1,816,560
Plot 4 (2021) Mass Excavation	Rubber Tired Dozers	3	10	410	0.4	261	1,284,120
Plot 4 (2021) Mass Excavation	Scrapers	6	10	550	0.48	261	4,134,240
Plot 4 (2021) Mass Excavation	Scrapers	14	10	550	0.48	261	9,646,560
Plot 4 (2021) Mass Excavation	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169
Plot 4 (2021) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 4 (2021) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 4 (2021) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	261	146,160

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 4 (2021) Finish Grading	Rubber Tired Dozers	3	10	85	0.4	261	266,220
Plot 4 (2021) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plot 4 (2021) Utilities	Cement and Mortar Mixers	8	1	9	0.56	261	10,524
Plot 4 (2021) Utilities	Excavators	2	10	523	0.38	261	1,037,423
Plot 4 (2021) Utilities	Excavators	10	10	286	0.38	261	2,836,548
Plot 4 (2021) Utilities	Excavators	2	10	190	0.38	261	376,884
Plot 4 (2021) Utilities	Excavators	4	10	396	0.38	261	1,571,011
Plot 4 (2021) Utilities	Excavators	2	10	190	0.38	261	376,884
Plot 4 (2021) Utilities	Excavators	2	10	188	0.38	261	372,917
Plot 4 (2021) Utilities	Excavators	8	10	40	0.38	261	317,376
Plot 4 (2021) Utilities	Forklifts	4	10	89	0.2	261	185,832
Plot 4 (2021) Utilities	Other Material Handling Equipment	8	1	167	0.4	261	139,478
Plot 4 (2021) Utilities	Other Material Handling Equipment	18	1	167	0.4	261	313,826
Plot 4 (2021) Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169
Plot 4 (2021) Utilities	Tractors/Loaders/Backhoes	8	10	90	0.37	261	695,304
Plot 4 (2021) Building-Concrete	Cement and Mortar Mixers	30	1	9	0.56	261	39,463
Plot 4 (2021) Building-Concrete	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plot 4 (2021) Building-Concrete	Pumps	2	10	84	0.74	261	324,475
Plot 4 (2021) Building-Concrete	Tractors/Loaders/Backhoes	10	10	90	0.37	261	869,130
Plot 4 (2021) Building-Wet Utilities	Excavators	2	10	300	0.38	261	595,080
Plot 4 (2021) Building-Wet Utilities	Excavators	2	10	179	0.38	261	355,064
Plot 4 (2021) Building-Wet Utilities	Excavators	2	10	173	0.38	261	343,163
Plot 4 (2021) Building-Wet Utilities	Other Material Handling Equipment	15	1	167	0.4	261	261,522
Plot 4 (2021) Building-Wet Utilities	Rubber Tired Loaders	6	10	152	0.36	261	856,915
Plot 4 (2021) Building-Wet Utilities	Tractors/Loaders/Backhoes	4	10	108	0.37	261	417,182
Plot 4 (2021) Building-Wet Utilities	Tractors/Loaders/Backhoes	6	10	108	0.37	261	625,774
Plot 4 (2021) Building-Electrical	Cement and Mortar Mixers	18	1	9	0.56	261	23,678
Plot 4 (2021) Building-Electrical	Excavators	10	10	40	0.38	261	396,720
Plot 4 (2021) Building-Electrical	Forklifts	4	10	89	0.2	261	185,832
Plot 4 (2021) Building-Electrical	Other Material Handling Equipment	6	1	167	0.4	261	104,609
Plot 4 (2021) Building-Electrical	Tractors/Loaders/Backhoes	10	10	90	0.37	261	869,130
Plot 4 (2021) Building-Landscaping	Excavators	2	10	29	0.38	261	57,524
Plot 4 (2021) Building-Landscaping	Forklifts	2	10	125	0.2	261	130,500
Plot 4 (2021) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plot 4 (2021) Building-Landscaping	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 4 (2021) Building-Landscaping	Rubber Tired Loaders	2	10	149	0.36	261	280,001
Plot 4 (2021) Building-Landscaping	Skid Steer Loaders	2	10	69	0.37	261	133,267
Plot 4 (2021) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	261	140,992
Plot 4 (2021) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	261	150,649
Plot 4 (2021) Building-Landscaping	Trenchers	2	10	39	0.5	261	101,790

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 4 (2021) Landscaping	Excavators	2	10	29	0.38	261	57,524
Plot 4 (2021) Landscaping	Forklifts	2	10	125	0.2	261	130,500
Plot 4 (2021) Landscaping	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plot 4 (2021) Landscaping	Other Material Handling Equipment	10	1	167	0.4	261	174,348
Plot 4 (2021) Landscaping	Rubber Tired Loaders	2	10	149	0.36	261	280,001
Plot 4 (2021) Landscaping	Skid Steer Loaders	2	10	69	0.37	261	133,267
Plot 4 (2021) Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	261	140,992
Plot 4 (2021) Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	261	150,649
Plot 4 (2021) Landscaping	Trenchers	2	10	39	0.5	261	101,790
Plot 4 (2021) Temporary Utilities	Cranes	2	10	445	0.29	261	673,641
Plot 4 (2021) Curbing/Drive Approaches	Cement and Mortar Mixers	8	1	9	0.56	261	10,524
Plot 4 (2021) Curbing/Drive Approaches	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plot 4 (2021) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	261	93,020
Plot 4 (2021) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	261	123,088
Plot 4 (2021) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	261	53,114
Plot 4 (2021) Paving	Other Material Handling Equipment	6	1	167	0.4	261	104,609
Plot 4 (2021) Paving	Pavers	2	10	126	0.42	261	276,242
Plot 4 (2021) Paving	Paving Equipment	2	10	131	0.36	261	246,175
Plot 4 (2021) Paving	Plate Compactors	2	10	8	0.43	261	17,957
Plot 4 (2021) Paving	Rollers	2	10	81	0.38	261	160,672
Plot 4 (2021) Paving	Scrapers	2	10	362	0.48	261	907,027
Plot 4 (2021) Paving	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plots 4 and 9 (2022) Mass Excavation	Graders	2	10	193	0.41	260	411,476
Plots 4 and 9 (2022) Mass Excavation	Off-Highway Trucks	2	10	400	0.38	260	790,400
Plots 4 and 9 (2022) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plots 4 and 9 (2022) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plots 4 and 9 (2022) Mass Excavation	Plate Compactors	2	10	354	0.43	260	791,544
Plots 4 and 9 (2022) Mass Excavation	Plate Compactors	2	10	354	0.43	260	791,544
Plots 4 and 9 (2022) Mass Excavation	Rubber Tired Dozers	4	10	580	0.4	260	2,412,800
Plots 4 and 9 (2022) Mass Excavation	Rubber Tired Dozers	4	10	580	0.4	260	2,412,800
Plots 4 and 9 (2022) Mass Excavation	Rubber Tired Dozers	4	10	410	0.4	260	1,705,600
Plots 4 and 9 (2022) Mass Excavation	Rubber Tired Dozers	2	10	305	0.4	260	634,400
Plots 4 and 9 (2022) Mass Excavation	Rubber Tired Dozers	2	10	140	0.4	260	291,200
Plots 4 and 9 (2022) Mass Excavation	Rubber Tired Dozers	3	10	85	0.4	260	265,200
Plots 4 and 9 (2022) Mass Excavation	Scrapers	6	10	550	0.48	260	4,118,400
Plots 4 and 9 (2022) Mass Excavation	Scrapers	14	10	550	0.48	260	9,609,600
Plots 4 and 9 (2022) Mass Excavation	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plots 4 and 9 (2022) Finish Grading	Other Construction Equipment	2	10	167	0.42	260	364,728
Plots 4 and 9 (2022) Finish Grading	Other Construction Equipment	2	10	167	0.42	260	364,728
Plots 4 and 9 (2022) Finish Grading	Rubber Tired Dozers	2	10	140	0.4	260	291,200

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 4 and 9 (2022) Finish Grading	Rubber Tired Dozers	4	10	85	0.4	260	353,600
Plots 4 and 9 (2022) Finish Grading	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plots 4 and 9 (2022) Utilities	Cement and Mortar Mixers	8	1	9	0.56	260	10,483
Plots 4 and 9 (2022) Utilities	Excavators	2	10	523	0.38	260	1,033,448
Plots 4 and 9 (2022) Utilities	Excavators	10	10	286	0.38	260	2,825,680
Plots 4 and 9 (2022) Utilities	Excavators	2	10	190	0.38	260	375,440
Plots 4 and 9 (2022) Utilities	Excavators	4	10	396	0.38	260	1,564,992
Plots 4 and 9 (2022) Utilities	Excavators	2	10	190	0.38	260	375,440
Plots 4 and 9 (2022) Utilities	Excavators	2	10	188	0.38	260	371,488
Plots 4 and 9 (2022) Utilities	Excavators	8	10	40	0.38	260	316,160
Plots 4 and 9 (2022) Utilities	Forklifts	4	10	89	0.2	260	185,120
Plots 4 and 9 (2022) Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plots 4 and 9 (2022) Utilities	Other Material Handling Equipment	18	1	167	0.4	260	312,624
Plots 4 and 9 (2022) Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plots 4 and 9 (2022) Utilities	Tractors/Loaders/Backhoes	8	10	90	0.37	260	692,640
Plots 4 and 9 (2022) Building-Concrete	Cement and Mortar Mixers	30	1	9	0.56	260	39,312
Plots 4 and 9 (2022) Building-Concrete	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 4 and 9 (2022) Building-Concrete	Pumps	2	10	84	0.74	260	323,232
Plots 4 and 9 (2022) Building-Concrete	Tractors/Loaders/Backhoes	10	10	90	0.37	260	865,800
Plots 4 and 9 (2022) Building-Wet Utilities	Excavators	2	10	300	0.38	260	592,800
Plots 4 and 9 (2022) Building-Wet Utilities	Excavators	2	10	179	0.38	260	353,704
Plots 4 and 9 (2022) Building-Wet Utilities	Excavators	2	10	173	0.38	260	341,848
Plots 4 and 9 (2022) Building-Wet Utilities	Other Material Handling Equipment	15	1	167	0.4	260	260,520
Plots 4 and 9 (2022) Building-Wet Utilities	Rubber Tired Loaders	6	10	152	0.36	260	853,632
Plots 4 and 9 (2022) Building-Wet Utilities	Tractors/Loaders/Backhoes	4	10	85	0.37	260	327,080
Plots 4 and 9 (2022) Building-Wet Utilities	Tractors/Loaders/Backhoes	6	10	108	0.37	260	623,376
Plots 4 and 9 (2022) Building-Electrical	Cement and Mortar Mixers	18	1	9	0.56	260	23,587
Plots 4 and 9 (2022) Building-Electrical	Excavators	10	10	40	0.38	260	395,200
Plots 4 and 9 (2022) Building-Electrical	Forklifts	4	10	89	0.2	260	185,120
Plots 4 and 9 (2022) Building-Electrical	Other Material Handling Equipment	6	1	167	0.4	260	104,208
Plots 4 and 9 (2022) Building-Electrical	Tractors/Loaders/Backhoes	10	10	90	0.37	260	865,800
Plots 4 and 9 (2022) Building-Landscaping	Excavators	2	10	29	0.38	260	57,304
Plots 4 and 9 (2022) Building-Landscaping	Forklifts	2	10	125	0.2	260	130,000
Plots 4 and 9 (2022) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plots 4 and 9 (2022) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plots 4 and 9 (2022) Building-Landscaping	Rubber Tired Loaders	2	10	149	0.36	260	278,928
Plots 4 and 9 (2022) Building-Landscaping	Skid Steer Loaders	2	10	69	0.37	260	132,756
Plots 4 and 9 (2022) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	260	140,452
Plots 4 and 9 (2022) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	260	150,072
Plots 4 and 9 (2022) Building-Landscaping	Trenchers	2	10	39	0.5	260	101,400

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 4 and 9 (2022) Landscaping	Excavators	2	10	29	0.38	260	57,304
Plots 4 and 9 (2022) Landscaping	Forklifts	2	10	125	0.2	260	130,000
Plots 4 and 9 (2022) Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 4 and 9 (2022) Landscaping	Other Material Handling Equipment	10	1	167	0.4	260	173,680
Plots 4 and 9 (2022) Landscaping	Rubber Tired Loaders	2	10	149	0.36	260	278,928
Plots 4 and 9 (2022) Landscaping	Skid Steer Loaders	2	10	69	0.37	260	132,756
Plots 4 and 9 (2022) Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	260	140,452
Plots 4 and 9 (2022) Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	260	150,072
Plots 4 and 9 (2022) Landscaping	Trenchers	2	10	39	0.5	260	101,400
Plots 4 and 9 (2022) Temporary Utilities	Cranes	2	10	445	0.29	260	671,060
Plots 4 and 9 (2022) Curbing/Drive Approaches	Cement and Mortar Mixers	8	1	9	0.56	260	10,483
Plots 4 and 9 (2022) Curbing/Drive Approaches	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plots 4 and 9 (2022) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	260	92,664
Plots 4 and 9 (2022) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	260	122,616
Plots 4 and 9 (2022) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	260	52,910
Plots 4 and 9 (2022) Paving	Other Material Handling Equipment	6	1	167	0.4	260	104,208
Plots 4 and 9 (2022) Paving	Pavers	2	10	126	0.42	260	275,184
Plots 4 and 9 (2022) Paving	Paving Equipment	2	10	131	0.36	260	245,232
Plots 4 and 9 (2022) Paving	Plate Compactors	2	10	8	0.43	260	17,888
Plots 4 and 9 (2022) Paving	Rollers	2	10	81	0.38	260	160,056
Plots 4 and 9 (2022) Paving	Scrapers	2	10	362	0.48	260	903,552
Plots 4 and 9 (2022) Paving	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 9 (2023) Mass Excavation	Graders	2	10	193	0.41	260	411,476
Plot 9 (2023) Mass Excavation	Off-Highway Trucks	2	10	400	0.38	260	790,400
Plot 9 (2023) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plot 9 (2023) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plot 9 (2023) Mass Excavation	Plate Compactors	2	10	354	0.43	260	791,544
Plot 9 (2023) Mass Excavation	Plate Compactors	2	10	354	0.43	260	791,544
Plot 9 (2023) Mass Excavation	Rubber Tired Dozers	4	10	580	0.4	260	2,412,800
Plot 9 (2023) Mass Excavation	Rubber Tired Dozers	4	10	580	0.4	260	2,412,800
Plot 9 (2023) Mass Excavation	Rubber Tired Dozers	4	10	410	0.4	260	1,705,600
Plot 9 (2023) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	260	317,200
Plot 9 (2023) Mass Excavation	Rubber Tired Dozers	2	10	140	0.4	260	291,200
Plot 9 (2023) Mass Excavation	Rubber Tired Dozers	3	10	85	0.4	260	265,200
Plot 9 (2023) Mass Excavation	Scrapers	6	10	550	0.48	260	4,118,400
Plot 9 (2023) Mass Excavation	Scrapers	12	10	550	0.48	260	8,236,800
Plot 9 (2023) Mass Excavation	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plot 9 (2023) Finish Grading	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 9 (2023) Finish Grading	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 9 (2023) Finish Grading	Rubber Tired Dozers	2	10	140	0.4	260	291,200

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 9 (2023) Finish Grading	Rubber Tired Dozers	4	10	85	0.4	260	353,600
Plot 9 (2023) Finish Grading	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plot 9 (2023) Utilities	Cement and Mortar Mixers	8	1	9	0.56	260	10,483
Plot 9 (2023) Utilities	Excavators	2	10	523	0.38	260	1,033,448
Plot 9 (2023) Utilities	Excavators	10	10	286	0.38	260	2,825,680
Plot 9 (2023) Utilities	Excavators	2	10	190	0.38	260	375,440
Plot 9 (2023) Utilities	Excavators	4	10	396	0.38	260	1,564,992
Plot 9 (2023) Utilities	Excavators	2	10	190	0.38	260	375,440
Plot 9 (2023) Utilities	Excavators	2	10	188	0.38	260	371,488
Plot 9 (2023) Utilities	Excavators	8	10	40	0.38	260	316,160
Plot 9 (2023) Utilities	Forklifts	4	10	89	0.2	260	185,120
Plot 9 (2023) Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plot 9 (2023) Utilities	Other Material Handling Equipment	18	1	167	0.4	260	312,624
Plot 9 (2023) Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plot 9 (2023) Utilities	Tractors/Loaders/Backhoes	8	10	90	0.37	260	692,640
Plot 9 (2023) Building-Concrete	Cement and Mortar Mixers	30	1	9	0.56	260	39,312
Plot 9 (2023) Building-Concrete	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 9 (2023) Building-Concrete	Pumps	2	10	84	0.74	260	323,232
Plot 9 (2023) Building-Concrete	Tractors/Loaders/Backhoes	10	10	90	0.37	260	865,800
Plot 9 (2023) Building-Wet Utilities	Excavators	2	10	300	0.38	260	592,800
Plot 9 (2023) Building-Wet Utilities	Excavators	2	10	179	0.38	260	353,704
Plot 9 (2023) Building-Wet Utilities	Excavators	2	10	173	0.38	260	341,848
Plot 9 (2023) Building-Wet Utilities	Other Material Handling Equipment	15	1	167	0.4	260	260,520
Plot 9 (2023) Building-Wet Utilities	Rubber Tired Loaders	6	10	152	0.36	260	853,632
Plot 9 (2023) Building-Wet Utilities	Tractors/Loaders/Backhoes	6	10	108	0.37	260	623,376
Plot 9 (2023) Building-Wet Utilities	Tractors/Loaders/Backhoes	4	10	85	0.37	260	327,080
Plot 9 (2023) Building-Electrical	Cement and Mortar Mixers	18	1	9	0.56	260	23,587
Plot 9 (2023) Building-Electrical	Excavators	10	10	40	0.38	260	395,200
Plot 9 (2023) Building-Electrical	Forklifts	4	10	89	0.2	260	185,120
Plot 9 (2023) Building-Electrical	Other Material Handling Equipment	6	1	167	0.4	260	104,208
Plot 9 (2023) Building-Electrical	Tractors/Loaders/Backhoes	10	10	90	0.37	260	865,800
Plot 9 (2023) Building-Landscaping	Excavators	2	10	29	0.38	260	57,304
Plot 9 (2023) Building-Landscaping	Forklifts	2	10	125	0.2	260	130,000
Plot 9 (2023) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plot 9 (2023) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plot 9 (2023) Building-Landscaping	Rubber Tired Loaders	2	10	149	0.36	260	278,928
Plot 9 (2023) Building-Landscaping	Skid Steer Loaders	2	10	69	0.37	260	132,756
Plot 9 (2023) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	260	140,452
Plot 9 (2023) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	260	150,072
Plot 9 (2023) Building-Landscaping	Trenchers	2	10	39	0.5	260	101,400

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 9 (2023) Landscaping	Excavators	2	10	29	0.38	260	57,304
Plot 9 (2023) Landscaping	Forklifts	2	10	125	0.2	260	130,000
Plot 9 (2023) Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 9 (2023) Landscaping	Other Material Handling Equipment	10	1	167	0.4	260	173,680
Plot 9 (2023) Landscaping	Rubber Tired Loaders	2	10	149	0.36	260	278,928
Plot 9 (2023) Landscaping	Skid Steer Loaders	2	10	69	0.37	260	132,756
Plot 9 (2023) Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	260	140,452
Plot 9 (2023) Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	260	150,072
Plot 9 (2023) Landscaping	Trenchers	2	10	39	0.5	260	101,400
Plot 9 (2023) Temporary Utilities	Cranes	2	10	445	0.29	260	671,060
Plot 9 (2023) Curbing/Drive Approaches	Cement and Mortar Mixers	8	1	9	0.56	260	10,483
Plot 9 (2023) Curbing/Drive Approaches	Other Material Handling Equipment	6	1	167	0.4	260	104,208
Plot 9 (2023) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	260	92,664
Plot 9 (2023) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	260	122,616
Plot 9 (2023) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	260	52,910
Plot 9 (2023) Paving	Other Material Handling Equipment	6	1	167	0.4	260	104,208
Plot 9 (2023) Paving	Pavers	2	10	126	0.42	260	275,184
Plot 9 (2023) Paving	Paving Equipment	2	10	131	0.36	260	245,232
Plot 9 (2023) Paving	Plate Compactors	2	10	8	0.43	260	17,888
Plot 9 (2023) Paving	Rollers	2	10	81	0.38	260	160,056
Plot 9 (2023) Paving	Scrapers	2	10	362	0.48	260	903,552
Plot 9 (2023) Paving	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 9 (2023) Interchange	Bore/Drill Rigs	1	10	206	0.5	260	267,800
Plot 9 (2023) Interchange	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 9 (2023) Interchange	Cranes	1	10	226	0.29	260	170,404
Plot 9 (2023) Interchange	Excavators	1	10	190	0.38	260	187,720
Plot 9 (2023) Interchange	Graders	1	10	259	0.41	260	276,094
Plot 9 (2023) Interchange	Other General Industrial Equipment	1	10	88	0.34	260	77,792
Plot 9 (2023) Interchange	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plot 9 (2023) Interchange	Rubber Tired Dozers	1	10	410	0.4	260	426,400
Plot 9 (2023) Interchange	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plot 9 (2023) Interchange	Rubber Tired Loaders	1	10	180	0.36	260	168,480
Plot 9 (2023) Interchange	Scrapers	1	10	330	0.48	260	411,840
Plot 9 (2023) Interchange	Tractors/Loaders/Backhoes	1	10	98	0.37	260	94,276
Plot 9 (2023) Interchange	Tractors/Loaders/Backhoes	1	10	90	0.37	260	86,580
Plots 9 and 1,3,20 (2024) Mass Excavation	Graders	2	10	193	0.41	261	413,059
Plots 9 and 1,3,20 (2024) Mass Excavation	Off-Highway Trucks	2	10	400	0.38	261	793,440
Plots 9 and 1,3,20 (2024) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plots 9 and 1,3,20 (2024) Mass Excavation	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plots 9 and 1,3,20 (2024) Mass Excavation	Plate Compactors	2	10	354	0.43	261	794,588

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 9 and 1,3,20 (2024) Mass Excavation	Plate Compactors	2	10	354	0.43	261	794,588
Plots 9 and 1,3,20 (2024) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plots 9 and 1,3,20 (2024) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plots 9 and 1,3,20 (2024) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	261	856,080
Plots 9 and 1,3,20 (2024) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	261	318,420
Plots 9 and 1,3,20 (2024) Mass Excavation	Rubber Tired Dozers	2	10	140	0.4	261	292,320
Plots 9 and 1,3,20 (2024) Mass Excavation	Rubber Tired Dozers	3	10	85	0.4	261	266,220
Plots 9 and 1,3,20 (2024) Mass Excavation	Scrapers	6	10	550	0.48	261	4,134,240
Plots 9 and 1,3,20 (2024) Mass Excavation	Scrapers	12	10	550	0.48	261	8,268,480
Plots 9 and 1,3,20 (2024) Mass Excavation	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169
Plots 9 and 1,3,20 (2024) Utilities	Cement and Mortar Mixers	8	1	9	0.56	262	10,564
Plots 9 and 1,3,20 (2024) Utilities	Excavators	2	10	523	0.38	262	1,041,398
Plots 9 and 1,3,20 (2024) Utilities	Excavators	10	10	286	0.38	262	2,847,416
Plots 9 and 1,3,20 (2024) Utilities	Excavators	2	10	190	0.38	262	378,328
Plots 9 and 1,3,20 (2024) Utilities	Excavators	4	10	396	0.38	262	1,577,030
Plots 9 and 1,3,20 (2024) Utilities	Excavators	2	10	190	0.38	262	378,328
Plots 9 and 1,3,20 (2024) Utilities	Excavators	2	10	188	0.38	262	374,346
Plots 9 and 1,3,20 (2024) Utilities	Excavators	8	10	40	0.38	262	318,592
Plots 9 and 1,3,20 (2024) Utilities	Forklifts	4	10	89	0.2	262	186,544
Plots 9 and 1,3,20 (2024) Utilities	Other Material Handling Equipment	8	1	167	0.4	262	140,013
Plots 9 and 1,3,20 (2024) Utilities	Other Material Handling Equipment	20	1	167	0.4	262	350,032
Plots 9 and 1,3,20 (2024) Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	262	164,798
Plots 9 and 1,3,20 (2024) Utilities	Tractors/Loaders/Backhoes	8	10	90	0.37	262	697,968
Plots 9 and 1,3,20 (2024) Building-Concrete	Cement and Mortar Mixers	30	1	9	0.56	262	39,614
Plots 9 and 1,3,20 (2024) Building-Concrete	Other Material Handling Equipment	2	1	167	0.4	262	35,003
Plots 9 and 1,3,20 (2024) Building-Concrete	Pumps	2	10	84	0.74	262	325,718
Plots 9 and 1,3,20 (2024) Building-Concrete	Tractors/Loaders/Backhoes	10	10	90	0.37	262	872,460
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Excavators	2	10	300	0.38	262	597,360
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Excavators	2	10	179	0.38	262	356,425
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Excavators	2	10	173	0.38	262	344,478
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Other Material Handling Equipment	15	1	167	0.4	262	262,524
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Rubber Tired Loaders	6	10	152	0.36	262	860,198
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Tractors/Loaders/Backhoes	6	10	108	0.37	262	628,171
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	Tractors/Loaders/Backhoes	4	10	85	0.37	262	329,596
Plots 9 and 1,3,20 (2024) Building-Electrical	Cement and Mortar Mixers	12	1	9	0.56	262	15,846
Plots 9 and 1,3,20 (2024) Building-Electrical	Excavators	10	10	40	0.38	262	398,240
Plots 9 and 1,3,20 (2024) Building-Electrical	Forklifts	4	10	89	0.2	262	186,544
Plots 9 and 1,3,20 (2024) Building-Electrical	Other Material Handling Equipment	6	1	167	0.4	262	105,010
Plots 9 and 1,3,20 (2024) Building-Electrical	Tractors/Loaders/Backhoes	10	10	90	0.37	262	872,460
Plots 9 and 1,3,20 (2024) Building-Landscaping	Excavators	2	10	29	0.38	262	57,745

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 9 and 1,3,20 (2024) Building-Landscaping	Forklifts	2	10	125	0.2	262	131,000
Plots 9 and 1,3,20 (2024) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	262	70,006
Plots 9 and 1,3,20 (2024) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	262	70,006
Plots 9 and 1,3,20 (2024) Building-Landscaping	Rubber Tired Loaders	2	10	149	0.36	262	281,074
Plots 9 and 1,3,20 (2024) Building-Landscaping	Skid Steer Loaders	2	10	69	0.37	262	133,777
Plots 9 and 1,3,20 (2024) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	262	141,532
Plots 9 and 1,3,20 (2024) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	262	151,226
Plots 9 and 1,3,20 (2024) Building-Landscaping	Trenchers	2	10	39	0.5	262	102,180
Plots 9 and 1,3,20 (2024) Landscaping	Excavators	2	10	29	0.38	262	57,745
Plots 9 and 1,3,20 (2024) Landscaping	Forklifts	2	10	125	0.2	262	131,000
Plots 9 and 1,3,20 (2024) Landscaping	Other Material Handling Equipment	2	1	167	0.4	262	35,003
Plots 9 and 1,3,20 (2024) Landscaping	Other Material Handling Equipment	10	1	167	0.4	262	175,016
Plots 9 and 1,3,20 (2024) Landscaping	Rubber Tired Loaders	2	10	149	0.36	262	281,074
Plots 9 and 1,3,20 (2024) Landscaping	Skid Steer Loaders	2	10	69	0.37	262	133,777
Plots 9 and 1,3,20 (2024) Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	262	141,532
Plots 9 and 1,3,20 (2024) Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	262	151,226
Plots 9 and 1,3,20 (2024) Landscaping	Trenchers	2	10	39	0.5	262	102,180
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	Cement and Mortar Mixers	8	1	9	0.56	262	10,564
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	Other Material Handling Equipment	6	1	167	0.4	262	105,010
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	Paving Equipment	2	10	99	0.36	262	186,754
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	Paving Equipment	2	10	131	0.36	262	247,118
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	2	10	55	0.37	262	106,634
Plots 9 and 1,3,20 (2024) Temporary Utilities	Cranes	2	10	445	0.29	262	676,222
Plots 9 and 1,3,20 (2024) Interchange	Bore/Drill Rigs	1	10	206	0.5	262	269,860
Plots 9 and 1,3,20 (2024) Interchange	Cement and Mortar Mixers	4	1	9	0.56	262	5,282
Plots 9 and 1,3,20 (2024) Interchange	Cranes	1	10	226	0.29	262	171,715
Plots 9 and 1,3,20 (2024) Interchange	Excavators	1	10	190	0.38	262	189,164
Plots 9 and 1,3,20 (2024) Interchange	Graders	1	10	259	0.41	262	278,218
Plots 9 and 1,3,20 (2024) Interchange	Other General Industrial Equipment	1	10	88	0.34	262	78,390
Plots 9 and 1,3,20 (2024) Interchange	Other Material Handling Equipment	4	1	167	0.4	262	70,006
Plots 9 and 1,3,20 (2024) Interchange	Rubber Tired Dozers	1	10	410	0.4	262	429,680
Plots 9 and 1,3,20 (2024) Interchange	Rubber Tired Dozers	1	10	140	0.4	262	146,720
Plots 9 and 1,3,20 (2024) Interchange	Rubber Tired Loaders	1	10	180	0.36	262	169,776
Plots 9 and 1,3,20 (2024) Interchange	Scrapers	1	10	330	0.48	262	415,008
Plots 9 and 1,3,20 (2024) Interchange	Tractors/Loaders/Backhoes	1	10	98	0.37	262	95,001
Plots 9 and 1,3,20 (2024) Interchange	Tractors/Loaders/Backhoes	1	10	90	0.37	262	87,246
Plots 9 and 1,3,20 (2024) Finish Grading	Other Material Handling Equipment	2	1	167	0.4	262	35,003
Plots 9 and 1,3,20 (2024) Finish Grading	Other Material Handling Equipment	2	1	167	0.4	262	35,003
Plots 9 and 1,3,20 (2024) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	262	146,720
Plots 9 and 1,3,20 (2024) Finish Grading	Rubber Tired Dozers	4	10	85	0.4	262	356,320

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 9 and 1,3,20 (2024) Finish Grading	Tractors/Loaders/Backhoes	2	10	85	0.37	262	164,798
Plots 9 and 1,3,20 (2024) Paving	Other Material Handling Equipment	6	1	167	0.4	262	105,010
Plots 9 and 1,3,20 (2024) Paving	Pavers	2	10	126	0.42	262	277,301
Plots 9 and 1,3,20 (2024) Paving	Paving Equipment	2	10	131	0.36	262	247,118
Plots 9 and 1,3,20 (2024) Paving	Plate Compactors	2	10	8	0.43	262	18,026
Plots 9 and 1,3,20 (2024) Paving	Rollers	2	10	81	0.38	262	161,287
Plots 9 and 1,3,20 (2024) Paving	Scrapers	2	10	362	0.48	262	910,502
Plots 9 and 1,3,20 (2024) Paving	Tractors/Loaders/Backhoes	4	10	90	0.37	262	348,984
Plots 5 and 10 (2025) Mass Excavation	Graders	1	10	193	0.41	261	206,529
Plots 5 and 10 (2025) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	261	396,720
Plots 5 and 10 (2025) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 5 and 10 (2025) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 5 and 10 (2025) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plots 5 and 10 (2025) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plots 5 and 10 (2025) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plots 5 and 10 (2025) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plots 5 and 10 (2025) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	261	856,080
Plots 5 and 10 (2025) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	261	318,420
Plots 5 and 10 (2025) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plots 5 and 10 (2025) Mass Excavation	Rubber Tired Dozers	3	10	85	0.4	261	266,220
Plots 5 and 10 (2025) Mass Excavation	Scrapers	2	10	550	0.48	261	1,378,080
Plots 5 and 10 (2025) Mass Excavation	Scrapers	7	10	550	0.48	261	4,823,280
Plots 5 and 10 (2025) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plots 5 and 10 (2025) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plots 5 and 10 (2025) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plots 5 and 10 (2025) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plots 5 and 10 (2025) Finish Grading	Rubber Tired Dozers	3	10	85	0.4	261	266,220
Plots 5 and 10 (2025) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plots 5 and 10 (2025) Utilities	Cement and Mortar Mixers	8	1	9	0.56	261	10,524
Plots 5 and 10 (2025) Utilities	Excavators	2	10	523	0.38	261	1,037,423
Plots 5 and 10 (2025) Utilities	Excavators	10	10	286	0.38	261	2,836,548
Plots 5 and 10 (2025) Utilities	Excavators	2	10	190	0.38	261	376,884
Plots 5 and 10 (2025) Utilities	Excavators	4	10	396	0.38	261	1,571,011
Plots 5 and 10 (2025) Utilities	Excavators	2	10	190	0.38	261	376,884
Plots 5 and 10 (2025) Utilities	Excavators	2	10	188	0.38	261	372,917
Plots 5 and 10 (2025) Utilities	Excavators	8	10	40	0.38	261	317,376
Plots 5 and 10 (2025) Utilities	Forklifts	4	10	89	0.2	261	185,832
Plots 5 and 10 (2025) Utilities	Other Material Handling Equipment	8	1	167	0.4	261	139,478
Plots 5 and 10 (2025) Utilities	Other Material Handling Equipment	18	1	167	0.4	261	313,826
Plots 5 and 10 (2025) Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 5 and 10 (2025) Utilities	Tractors/Loaders/Backhoes	8	10	90	0.37	261	695,304
Plots 5 and 10 (2025) Building-Concrete	Cement and Mortar Mixers	20	1	9	0.56	261	26,309
Plots 5 and 10 (2025) Building-Concrete	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plots 5 and 10 (2025) Building-Concrete	Pumps	2	10	84	0.74	261	324,475
Plots 5 and 10 (2025) Building-Concrete	Tractors/Loaders/Backhoes	6	10	90	0.37	261	521,478
Plots 5 and 10 (2025) Building-Wet Utilities	Excavators	2	10	300	0.38	261	595,080
Plots 5 and 10 (2025) Building-Wet Utilities	Excavators	2	10	179	0.38	261	355,064
Plots 5 and 10 (2025) Building-Wet Utilities	Excavators	2	10	173	0.38	261	343,163
Plots 5 and 10 (2025) Building-Wet Utilities	Other Material Handling Equipment	10	1	167	0.4	261	174,348
Plots 5 and 10 (2025) Building-Wet Utilities	Rubber Tired Loaders	6	10	152	0.36	261	856,915
Plots 5 and 10 (2025) Building-Wet Utilities	Tractors/Loaders/Backhoes	6	10	108	0.37	261	625,774
Plots 5 and 10 (2025) Building-Wet Utilities	Tractors/Loaders/Backhoes	4	10	85	0.37	261	328,338
Plots 5 and 10 (2025) Building-Electrical	Cement and Mortar Mixers	8	1	9	0.56	261	10,524
Plots 5 and 10 (2025) Building-Electrical	Excavators	6	10	40	0.38	261	238,032
Plots 5 and 10 (2025) Building-Electrical	Forklifts	4	10	89	0.2	261	185,832
Plots 5 and 10 (2025) Building-Electrical	Other Material Handling Equipment	6	1	167	0.4	261	104,609
Plots 5 and 10 (2025) Building-Electrical	Tractors/Loaders/Backhoes	6	10	90	0.37	261	521,478
Plots 5 and 10 (2025) Building-Landscaping	Excavators	2	10	29	0.38	261	57,524
Plots 5 and 10 (2025) Building-Landscaping	Forklifts	2	10	125	0.2	261	130,500
Plots 5 and 10 (2025) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 5 and 10 (2025) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 5 and 10 (2025) Building-Landscaping	Rubber Tired Loaders	2	10	149	0.36	261	280,001
Plots 5 and 10 (2025) Building-Landscaping	Skid Steer Loaders	2	10	69	0.37	261	133,267
Plots 5 and 10 (2025) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	261	140,992
Plots 5 and 10 (2025) Building-Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	261	150,649
Plots 5 and 10 (2025) Building-Landscaping	Trenchers	2	10	39	0.5	261	101,790
Plots 5 and 10 (2025) Landscaping	Excavators	2	10	29	0.38	261	57,524
Plots 5 and 10 (2025) Landscaping	Forklifts	2	10	125	0.2	261	130,500
Plots 5 and 10 (2025) Landscaping	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plots 5 and 10 (2025) Landscaping	Other Material Handling Equipment	10	1	167	0.4	261	174,348
Plots 5 and 10 (2025) Landscaping	Rubber Tired Loaders	2	10	149	0.36	261	280,001
Plots 5 and 10 (2025) Landscaping	Skid Steer Loaders	2	10	69	0.37	261	133,267
Plots 5 and 10 (2025) Landscaping	Tractors/Loaders/Backhoes	2	10	73	0.37	261	140,992
Plots 5 and 10 (2025) Landscaping	Tractors/Loaders/Backhoes	2	10	78	0.37	261	150,649
Plots 5 and 10 (2025) Landscaping	Trenchers	2	10	39	0.5	261	101,790
Plots 5 and 10 (2025) Temporary Utilities	Cranes	2	10	445	0.29	261	673,641
Plots 5 and 10 (2025) Curbing/Drive Approaches	Cement and Mortar Mixers	6	1	9	0.56	261	7,893
Plots 5 and 10 (2025) Curbing/Drive Approaches	Other Material Handling Equipment	6	1	167	0.4	261	104,609
Plots 5 and 10 (2025) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	261	93,020
Plots 5 and 10 (2025) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	261	123,088

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 5 and 10 (2025) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	261	53,114
Plots 5 and 10 (2025) Paving	Other Material Handling Equipment	6	1	167	0.4	261	104,609
Plots 5 and 10 (2025) Paving	Pavers	2	10	126	0.42	261	276,242
Plots 5 and 10 (2025) Paving	Paving Equipment	2	10	131	0.36	261	246,175
Plots 5 and 10 (2025) Paving	Plate Compactors	2	10	8	0.43	261	17,957
Plots 5 and 10 (2025) Paving	Rollers	2	10	81	0.38	261	160,672
Plots 5 and 10 (2025) Paving	Scrapers	2	10	362	0.48	261	907,027
Plots 5 and 10 (2025) Paving	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plots 10 and 8 (2026) Mass Excavation	Graders	1	10	193	0.41	261	206,529
Plots 10 and 8 (2026) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	261	396,720
Plots 10 and 8 (2026) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 10 and 8 (2026) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plots 10 and 8 (2026) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plots 10 and 8 (2026) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plots 10 and 8 (2026) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plots 10 and 8 (2026) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plots 10 and 8 (2026) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	261	856,080
Plots 10 and 8 (2026) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	261	318,420
Plots 10 and 8 (2026) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plots 10 and 8 (2026) Mass Excavation	Rubber Tired Dozers	2	10	85	0.4	261	177,480
Plots 10 and 8 (2026) Mass Excavation	Scrapers	2	10	550	0.48	261	1,378,080
Plots 10 and 8 (2026) Mass Excavation	Scrapers	6	10	550	0.48	261	4,134,240
Plots 10 and 8 (2026) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plots 10 and 8 (2026) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plots 10 and 8 (2026) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plots 10 and 8 (2026) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plots 10 and 8 (2026) Finish Grading	Rubber Tired Dozers	2	10	85	0.4	261	177,480
Plots 10 and 8 (2026) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plots 10 and 8 (2026) Utilities	Cement and Mortar Mixers	4	1	9	0.56	261	5,262
Plots 10 and 8 (2026) Utilities	Excavators	1	10	523	0.38	261	518,711
Plots 10 and 8 (2026) Utilities	Excavators	10	10	286	0.38	261	2,836,548
Plots 10 and 8 (2026) Utilities	Excavators	1	10	190	0.38	261	188,442
Plots 10 and 8 (2026) Utilities	Excavators	2	10	396	0.38	261	785,506
Plots 10 and 8 (2026) Utilities	Excavators	1	10	190	0.38	261	188,442
Plots 10 and 8 (2026) Utilities	Excavators	1	10	188	0.38	261	186,458
Plots 10 and 8 (2026) Utilities	Excavators	4	10	40	0.38	261	158,688
Plots 10 and 8 (2026) Utilities	Forklifts	2	10	89	0.2	261	92,916
Plots 10 and 8 (2026) Utilities	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 10 and 8 (2026) Utilities	Other Material Handling Equipment	10	1	167	0.4	261	174,348
Plots 10 and 8 (2026) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 10 and 8 (2026) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plots 10 and 8 (2026) Building-Concrete	Cement and Mortar Mixers	20	1	9	0.56	261	26,309
Plots 10 and 8 (2026) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plots 10 and 8 (2026) Building-Concrete	Pumps	1	10	84	0.74	261	162,238
Plots 10 and 8 (2026) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plots 10 and 8 (2026) Building-Wet Utilities	Excavators	1	10	300	0.38	261	297,540
Plots 10 and 8 (2026) Building-Wet Utilities	Excavators	1	10	179	0.38	261	177,532
Plots 10 and 8 (2026) Building-Wet Utilities	Excavators	1	10	173	0.38	261	171,581
Plots 10 and 8 (2026) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	261	139,478
Plots 10 and 8 (2026) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	261	428,458
Plots 10 and 8 (2026) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	261	312,887
Plots 10 and 8 (2026) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169
Plots 10 and 8 (2026) Building-Electrical	Cement and Mortar Mixers	5	1	9	0.56	261	6,577
Plots 10 and 8 (2026) Building-Electrical	Excavators	4	10	40	0.38	261	158,688
Plots 10 and 8 (2026) Building-Electrical	Forklifts	2	10	89	0.2	261	92,916
Plots 10 and 8 (2026) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plots 10 and 8 (2026) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plots 10 and 8 (2026) Building-Landscaping	Excavators	1	10	29	0.38	261	28,762
Plots 10 and 8 (2026) Building-Landscaping	Forklifts	1	10	125	0.2	261	65,250
Plots 10 and 8 (2026) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plots 10 and 8 (2026) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 10 and 8 (2026) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	261	140,000
Plots 10 and 8 (2026) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	261	66,633
Plots 10 and 8 (2026) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	261	70,496
Plots 10 and 8 (2026) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	261	75,325
Plots 10 and 8 (2026) Building-Landscaping	Trenchers	1	10	39	0.5	261	50,895
Plots 10 and 8 (2026) Landscaping	Excavators	1	10	29	0.38	261	28,762
Plots 10 and 8 (2026) Landscaping	Forklifts	1	10	125	0.2	261	65,250
Plots 10 and 8 (2026) Landscaping	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plots 10 and 8 (2026) Landscaping	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plots 10 and 8 (2026) Landscaping	Rubber Tired Loaders	1	10	149	0.36	261	140,000
Plots 10 and 8 (2026) Landscaping	Skid Steer Loaders	1	10	69	0.37	261	66,633
Plots 10 and 8 (2026) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	261	70,496
Plots 10 and 8 (2026) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	261	75,325
Plots 10 and 8 (2026) Landscaping	Trenchers	1	10	39	0.5	261	50,895
Plots 10 and 8 (2026) Temporary Utilities	Cranes	1	10	445	0.29	261	336,821
Plots 10 and 8 (2026) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	261	3,946
Plots 10 and 8 (2026) Curbing/Drive Approaches	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plots 10 and 8 (2026) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	261	93,020
Plots 10 and 8 (2026) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	261	123,088

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 10 and 8 (2026) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	261	53,114
Plots 10 and 8 (2026) Paving	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plots 10 and 8 (2026) Paving	Pavers	1	10	126	0.42	261	138,121
Plots 10 and 8 (2026) Paving	Paving Equipment	1	10	131	0.36	261	123,088
Plots 10 and 8 (2026) Paving	Plate Compactors	1	10	8	0.43	261	8,978
Plots 10 and 8 (2026) Paving	Rollers	1	10	81	0.38	261	80,336
Plots 10 and 8 (2026) Paving	Scrapers	1	10	362	0.48	261	453,514
Plots 10 and 8 (2026) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	261	173,826
Plot 8 (2027) Mass Excavation	Graders	1	10	193	0.41	261	206,529
Plot 8 (2027) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	261	396,720
Plot 8 (2027) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 8 (2027) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plot 8 (2027) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plot 8 (2027) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plot 8 (2027) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plot 8 (2027) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plot 8 (2027) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	261	856,080
Plot 8 (2027) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	261	318,420
Plot 8 (2027) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plot 8 (2027) Mass Excavation	Rubber Tired Dozers	2	10	85	0.4	261	177,480
Plot 8 (2027) Mass Excavation	Scrapers	2	10	550	0.48	261	1,378,080
Plot 8 (2027) Mass Excavation	Scrapers	6	10	550	0.48	261	4,134,240
Plot 8 (2027) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plot 8 (2027) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 8 (2027) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 8 (2027) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plot 8 (2027) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	261	88,740
Plot 8 (2027) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plot 8 (2027) Utilities	Cement and Mortar Mixers	4	1	9	0.56	261	5,262
Plot 8 (2027) Utilities	Excavators	1	10	523	0.38	261	518,711
Plot 8 (2027) Utilities	Excavators	5	10	286	0.38	261	1,418,274
Plot 8 (2027) Utilities	Excavators	1	10	190	0.38	261	188,442
Plot 8 (2027) Utilities	Excavators	2	10	396	0.38	261	785,506
Plot 8 (2027) Utilities	Excavators	1	10	190	0.38	261	188,442
Plot 8 (2027) Utilities	Excavators	1	10	188	0.38	261	186,458
Plot 8 (2027) Utilities	Excavators	4	10	40	0.38	261	158,688
Plot 8 (2027) Utilities	Forklifts	2	10	89	0.2	261	92,916
Plot 8 (2027) Utilities	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plot 8 (2027) Utilities	Other Material Handling Equipment	10	1	167	0.4	261	174,348
Plot 8 (2027) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 8 (2027) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plot 8 (2027) Building-Concrete	Cement and Mortar Mixers	20	1	9	0.56	261	26,309
Plot 8 (2027) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 8 (2027) Building-Concrete	Pumps	1	10	84	0.74	261	162,238
Plot 8 (2027) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plot 8 (2027) Building-Wet Utilities	Excavators	1	10	300	0.38	261	297,540
Plot 8 (2027) Building-Wet Utilities	Excavators	1	10	179	0.38	261	177,532
Plot 8 (2027) Building-Wet Utilities	Excavators	1	10	173	0.38	261	171,581
Plot 8 (2027) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	261	139,478
Plot 8 (2027) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	261	428,458
Plot 8 (2027) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	261	312,887
Plot 8 (2027) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169
Plot 8 (2027) Building-Electrical	Cement and Mortar Mixers	5	1	9	0.56	261	6,577
Plot 8 (2027) Building-Electrical	Excavators	4	10	40	0.38	261	158,688
Plot 8 (2027) Building-Electrical	Forklifts	2	10	89	0.2	261	92,916
Plot 8 (2027) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 8 (2027) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plot 8 (2027) Building-Landscaping	Excavators	1	10	29	0.38	261	28,762
Plot 8 (2027) Building-Landscaping	Forklifts	1	10	125	0.2	261	65,250
Plot 8 (2027) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plot 8 (2027) Building-Landscaping	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plot 8 (2027) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	261	140,000
Plot 8 (2027) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	261	66,633
Plot 8 (2027) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	261	70,496
Plot 8 (2027) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	261	75,325
Plot 8 (2027) Building-Landscaping	Trenchers	1	10	39	0.5	261	50,895
Plot 8 (2027) Landscaping	Excavators	1	10	29	0.38	261	28,762
Plot 8 (2027) Landscaping	Forklifts	1	10	125	0.2	261	65,250
Plot 8 (2027) Landscaping	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 8 (2027) Landscaping	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plot 8 (2027) Landscaping	Rubber Tired Loaders	1	10	149	0.36	261	140,000
Plot 8 (2027) Landscaping	Skid Steer Loaders	1	10	69	0.37	261	66,633
Plot 8 (2027) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	261	70,496
Plot 8 (2027) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	261	75,325
Plot 8 (2027) Landscaping	Trenchers	1	10	39	0.5	261	50,895
Plot 8 (2027) Temporary Utilities	Cranes	1	10	445	0.29	261	336,821
Plot 8 (2027) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	261	3,946
Plot 8 (2027) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plot 8 (2027) Paving	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 8 (2027) Paving	Pavers	1	10	126	0.42	261	138,121

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 8 (2027) Paving	Paving Equipment	1	10	131	0.36	261	123,088
Plot 8 (2027) Paving	Plate Compactors	1	10	8	0.43	261	8,978
Plot 8 (2027) Paving	Rollers	1	10	81	0.38	261	80,336
Plot 8 (2027) Paving	Scrapers	1	10	362	0.48	261	453,514
Plot 8 (2027) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	261	173,826
Plots 11 and 6,7 (2028) Mass Excavation	Graders	1	10	193	0.41	260	205,738
Plots 11 and 6,7 (2028) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	260	395,200
Plots 11 and 6,7 (2028) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 11 and 6,7 (2028) Mass Excavation	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plots 11 and 6,7 (2028) Mass Excavation	Plate Compactors	1	10	354	0.43	260	395,772
Plots 11 and 6,7 (2028) Mass Excavation	Plate Compactors	1	10	354	0.43	260	395,772
Plots 11 and 6,7 (2028) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	260	1,206,400
Plots 11 and 6,7 (2028) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	260	1,206,400
Plots 11 and 6,7 (2028) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	260	852,800
Plots 11 and 6,7 (2028) Mass Excavation	Rubber Tired Dozers	2	10	305	0.4	260	634,400
Plots 11 and 6,7 (2028) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plots 11 and 6,7 (2028) Mass Excavation	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plots 11 and 6,7 (2028) Mass Excavation	Scrapers	2	10	550	0.48	260	1,372,800
Plots 11 and 6,7 (2028) Mass Excavation	Scrapers	6	10	550	0.48	260	4,118,400
Plots 11 and 6,7 (2028) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 11 and 6,7 (2028) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 6,7 (2028) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 6,7 (2028) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plots 11 and 6,7 (2028) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plots 11 and 6,7 (2028) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 11 and 6,7 (2028) Utilities	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plots 11 and 6,7 (2028) Utilities	Excavators	1	10	523	0.38	260	516,724
Plots 11 and 6,7 (2028) Utilities	Excavators	5	10	286	0.38	260	1,412,840
Plots 11 and 6,7 (2028) Utilities	Excavators	1	10	190	0.38	260	187,720
Plots 11 and 6,7 (2028) Utilities	Excavators	2	10	396	0.38	260	782,496
Plots 11 and 6,7 (2028) Utilities	Excavators	1	10	190	0.38	260	187,720
Plots 11 and 6,7 (2028) Utilities	Excavators	1	10	188	0.38	260	185,744
Plots 11 and 6,7 (2028) Utilities	Excavators	4	10	40	0.38	260	158,080
Plots 11 and 6,7 (2028) Utilities	Forklifts	2	10	89	0.2	260	92,560
Plots 11 and 6,7 (2028) Utilities	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plots 11 and 6,7 (2028) Utilities	Other Material Handling Equipment	10	1	167	0.4	260	173,680
Plots 11 and 6,7 (2028) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 11 and 6,7 (2028) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 11 and 6,7 (2028) Building-Concrete	Cement and Mortar Mixers	10	1	9	0.56	260	13,104
Plots 11 and 6,7 (2028) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	260	17,368

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 11 and 6,7 (2028) Building-Concrete	Pumps	1	10	84	0.74	260	161,616
Plots 11 and 6,7 (2028) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 11 and 6,7 (2028) Building-Wet Utilities	Excavators	1	10	300	0.38	260	296,400
Plots 11 and 6,7 (2028) Building-Wet Utilities	Excavators	1	10	179	0.38	260	176,852
Plots 11 and 6,7 (2028) Building-Wet Utilities	Excavators	1	10	173	0.38	260	170,924
Plots 11 and 6,7 (2028) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plots 11 and 6,7 (2028) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	260	426,816
Plots 11 and 6,7 (2028) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	260	311,688
Plots 11 and 6,7 (2028) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plots 11 and 6,7 (2028) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plots 11 and 6,7 (2028) Building-Electrical	Excavators	4	10	40	0.38	260	158,080
Plots 11 and 6,7 (2028) Building-Electrical	Forklifts	2	10	89	0.2	260	92,560
Plots 11 and 6,7 (2028) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 11 and 6,7 (2028) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 11 and 6,7 (2028) Building-Landscaping	Excavators	1	10	29	0.38	260	28,652
Plots 11 and 6,7 (2028) Building-Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plots 11 and 6,7 (2028) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 11 and 6,7 (2028) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 11 and 6,7 (2028) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plots 11 and 6,7 (2028) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plots 11 and 6,7 (2028) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plots 11 and 6,7 (2028) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plots 11 and 6,7 (2028) Building-Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plots 11 and 6,7 (2028) Landscaping	Excavators	1	10	29	0.38	260	28,652
Plots 11 and 6,7 (2028) Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plots 11 and 6,7 (2028) Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 6,7 (2028) Landscaping	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plots 11 and 6,7 (2028) Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plots 11 and 6,7 (2028) Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plots 11 and 6,7 (2028) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plots 11 and 6,7 (2028) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plots 11 and 6,7 (2028) Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plots 11 and 6,7 (2028) Temporary Utilities	Cranes	1	10	445	0.29	260	335,530
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	260	3,931
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	260	92,664
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	260	122,616
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	260	52,910
Plots 11 and 6,7 (2028) Paving	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 11 and 6,7 (2028) Paving	Pavers	1	10	126	0.42	260	137,592

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 11 and 6,7 (2028) Paving	Paving Equipment	1	10	131	0.36	260	122,616
Plots 11 and 6,7 (2028) Paving	Plate Compactors	1	10	8	0.43	260	8,944
Plots 11 and 6,7 (2028) Paving	Rollers	1	10	81	0.38	260	80,028
Plots 11 and 6,7 (2028) Paving	Scrapers	1	10	362	0.48	260	451,776
Plots 11 and 6,7 (2028) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	260	173,160
Plot 11 (2029) Mass Excavation	Graders	1	10	193	0.41	261	206,529
Plot 11 (2029) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	261	396,720
Plot 11 (2029) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 11 (2029) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 11 (2029) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plot 11 (2029) Mass Excavation	Plate Compactors	1	10	354	0.43	261	397,294
Plot 11 (2029) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plot 11 (2029) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	261	1,211,040
Plot 11 (2029) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	261	856,080
Plot 11 (2029) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	261	318,420
Plot 11 (2029) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plot 11 (2029) Mass Excavation	Rubber Tired Dozers	1	10	85	0.4	261	88,740
Plot 11 (2029) Mass Excavation	Scrapers	1	10	550	0.48	261	689,040
Plot 11 (2029) Mass Excavation	Scrapers	6	10	550	0.48	261	4,134,240
Plot 11 (2029) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plot 11 (2029) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 11 (2029) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 11 (2029) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	261	146,160
Plot 11 (2029) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	261	88,740
Plot 11 (2029) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plot 11 (2029) Utilities	Cement and Mortar Mixers	4	1	9	0.56	261	5,262
Plot 11 (2029) Utilities	Excavators	1	10	523	0.38	261	518,711
Plot 11 (2029) Utilities	Excavators	5	10	286	0.38	261	1,418,274
Plot 11 (2029) Utilities	Excavators	1	10	190	0.38	261	188,442
Plot 11 (2029) Utilities	Excavators	2	10	396	0.38	261	785,506
Plot 11 (2029) Utilities	Excavators	1	10	190	0.38	261	188,442
Plot 11 (2029) Utilities	Excavators	1	10	188	0.38	261	186,458
Plot 11 (2029) Utilities	Excavators	4	10	40	0.38	261	158,688
Plot 11 (2029) Utilities	Forklifts	2	10	89	0.2	261	92,916
Plot 11 (2029) Utilities	Other Material Handling Equipment	4	1	167	0.4	261	69,739
Plot 11 (2029) Utilities	Other Material Handling Equipment	10	1	167	0.4	261	174,348
Plot 11 (2029) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	261	82,085
Plot 11 (2029) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plot 11 (2029) Building-Concrete	Cement and Mortar Mixers	10	1	9	0.56	261	13,154
Plot 11 (2029) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	261	17,435

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 11 (2029) Building-Concrete	Pumps	1	10	84	0.74	261	162,238
Plot 11 (2029) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plot 11 (2029) Building-Wet Utilities	Excavators	1	10	300	0.38	261	297,540
Plot 11 (2029) Building-Wet Utilities	Excavators	1	10	179	0.38	261	177,532
Plot 11 (2029) Building-Wet Utilities	Excavators	1	10	173	0.38	261	171,581
Plot 11 (2029) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	261	139,478
Plot 11 (2029) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	261	428,458
Plot 11 (2029) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	261	312,887
Plot 11 (2029) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	261	164,169
Plot 11 (2029) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	261	5,262
Plot 11 (2029) Building-Electrical	Excavators	4	10	40	0.38	261	158,688
Plot 11 (2029) Building-Electrical	Forklifts	2	10	89	0.2	261	92,916
Plot 11 (2029) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 11 (2029) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	261	347,652
Plot 11 (2029) Building-Landscaping	Excavators	1	10	29	0.38	261	28,762
Plot 11 (2029) Building-Landscaping	Forklifts	1	10	125	0.2	261	65,250
Plot 11 (2029) Building-Landscaping	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 11 (2029) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plot 11 (2029) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	261	140,000
Plot 11 (2029) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	261	66,633
Plot 11 (2029) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	261	70,496
Plot 11 (2029) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	261	75,325
Plot 11 (2029) Building-Landscaping	Trenchers	1	10	39	0.5	261	50,895
Plot 11 (2029) Landscaping	Excavators	1	10	29	0.38	261	28,762
Plot 11 (2029) Landscaping	Forklifts	1	10	125	0.2	261	65,250
Plot 11 (2029) Landscaping	Other Material Handling Equipment	1	1	167	0.4	261	17,435
Plot 11 (2029) Landscaping	Other Material Handling Equipment	5	1	167	0.4	261	87,174
Plot 11 (2029) Landscaping	Rubber Tired Loaders	1	10	149	0.36	261	140,000
Plot 11 (2029) Landscaping	Skid Steer Loaders	1	10	69	0.37	261	66,633
Plot 11 (2029) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	261	70,496
Plot 11 (2029) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	261	75,325
Plot 11 (2029) Landscaping	Trenchers	1	10	39	0.5	261	50,895
Plot 11 (2029) Temporary Utilities	Cranes	1	10	445	0.29	261	336,821
Plot 11 (2029) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	261	3,946
Plot 11 (2029) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	261	34,870
Plot 11 (2029) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	261	93,020
Plot 11 (2029) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	261	123,088
Plot 11 (2029) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	261	53,114
Plot 11 (2029) Paving	Other Material Handling Equipment	3	1	167	0.4	261	52,304
Plot 11 (2029) Paving	Pavers	1	10	126	0.42	261	138,121

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 11 (2029) Paving	Paving Equipment	1	10	131	0.36	261	123,088
Plot 11 (2029) Paving	Plate Compactors	1	10	8	0.43	261	8,978
Plot 11 (2029) Paving	Rollers	1	10	81	0.38	261	80,336
Plot 11 (2029) Paving	Scrapers	1	10	362	0.48	261	453,514
Plot 11 (2029) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	261	173,826
Plot 11 (2030) Mass Excavation	Graders	1	10	193	0.41	260	205,738
Plot 11 (2030) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	260	395,200
Plot 11 (2030) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2030) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2030) Mass Excavation	Plate Compactors	1	10	354	0.43	260	395,772
Plot 11 (2030) Mass Excavation	Plate Compactors	1	10	354	0.43	260	395,772
Plot 11 (2030) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	260	1,206,400
Plot 11 (2030) Mass Excavation	Rubber Tired Dozers	2	10	580	0.4	260	1,206,400
Plot 11 (2030) Mass Excavation	Rubber Tired Dozers	2	10	410	0.4	260	852,800
Plot 11 (2030) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	260	317,200
Plot 11 (2030) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plot 11 (2030) Mass Excavation	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plot 11 (2030) Mass Excavation	Scrapers	6	10	550	0.48	260	4,118,400
Plot 11 (2030) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 11 (2030) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2030) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2030) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plot 11 (2030) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plot 11 (2030) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 11 (2030) Utilities	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 11 (2030) Utilities	Excavators	1	10	523	0.38	260	516,724
Plot 11 (2030) Utilities	Excavators	5	10	286	0.38	260	1,412,840
Plot 11 (2030) Utilities	Excavators	1	10	190	0.38	260	187,720
Plot 11 (2030) Utilities	Excavators	2	10	396	0.38	260	782,496
Plot 11 (2030) Utilities	Excavators	1	10	190	0.38	260	187,720
Plot 11 (2030) Utilities	Excavators	1	10	188	0.38	260	185,744
Plot 11 (2030) Utilities	Excavators	4	10	40	0.38	260	158,080
Plot 11 (2030) Utilities	Forklifts	2	10	89	0.2	260	92,560
Plot 11 (2030) Utilities	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plot 11 (2030) Utilities	Other Material Handling Equipment	10	1	167	0.4	260	173,680
Plot 11 (2030) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 11 (2030) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 11 (2030) Building-Concrete	Cement and Mortar Mixers	10	1	9	0.56	260	13,104
Plot 11 (2030) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2030) Building-Concrete	Pumps	1	10	84	0.74	260	161,616

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 11 (2030) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 11 (2030) Building-Wet Utilities	Excavators	1	10	300	0.38	260	296,400
Plot 11 (2030) Building-Wet Utilities	Excavators	1	10	179	0.38	260	176,852
Plot 11 (2030) Building-Wet Utilities	Excavators	1	10	173	0.38	260	170,924
Plot 11 (2030) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plot 11 (2030) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	260	426,816
Plot 11 (2030) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	260	311,688
Plot 11 (2030) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plot 11 (2030) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 11 (2030) Building-Electrical	Excavators	4	10	40	0.38	260	158,080
Plot 11 (2030) Building-Electrical	Forklifts	2	10	89	0.2	260	92,560
Plot 11 (2030) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2030) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 11 (2030) Building-Landscaping	Excavators	1	10	29	0.38	260	28,652
Plot 11 (2030) Building-Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plot 11 (2030) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 11 (2030) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 11 (2030) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plot 11 (2030) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plot 11 (2030) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plot 11 (2030) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plot 11 (2030) Building-Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plot 11 (2030) Landscaping	Excavators	1	10	29	0.38	260	28,652
Plot 11 (2030) Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plot 11 (2030) Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2030) Landscaping	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plot 11 (2030) Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plot 11 (2030) Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plot 11 (2030) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plot 11 (2030) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plot 11 (2030) Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plot 11 (2030) Temporary Utilities	Cranes	1	10	445	0.29	260	335,530
Plot 11 (2030) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	260	3,931
Plot 11 (2030) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 11 (2030) Paving	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2030) Paving	Pavers	1	10	126	0.42	260	137,592
Plot 11 (2030) Paving	Paving Equipment	1	10	131	0.36	260	122,616
Plot 11 (2030) Paving	Plate Compactors	1	10	8	0.43	260	8,944
Plot 11 (2030) Paving	Rollers	1	10	81	0.38	260	80,028
Plot 11 (2030) Paving	Scrapers	1	10	362	0.48	260	451,776

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 11 (2030) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	260	173,160
Plot 11 (2031) Mass Excavation	Graders	1	10	193	0.41	260	205,738
Plot 11 (2031) Mass Excavation	Off-Highway Trucks	1	10	400	0.38	260	395,200
Plot 11 (2031) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2031) Mass Excavation	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2031) Mass Excavation	Plate Compactors	1	10	354	0.43	260	395,772
Plot 11 (2031) Mass Excavation	Plate Compactors	1	10	354	0.43	260	395,772
Plot 11 (2031) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	260	317,200
Plot 11 (2031) Mass Excavation	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plot 11 (2031) Mass Excavation	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plot 11 (2031) Mass Excavation	Scrapers	6	10	550	0.48	260	4,118,400
Plot 11 (2031) Mass Excavation	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 11 (2031) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2031) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2031) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plot 11 (2031) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plot 11 (2031) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 11 (2031) Utilities	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 11 (2031) Utilities	Excavators	1	10	523	0.38	260	516,724
Plot 11 (2031) Utilities	Excavators	5	10	286	0.38	260	1,412,840
Plot 11 (2031) Utilities	Excavators	1	10	190	0.38	260	187,720
Plot 11 (2031) Utilities	Excavators	2	10	396	0.38	260	782,496
Plot 11 (2031) Utilities	Excavators	1	10	190	0.38	260	187,720
Plot 11 (2031) Utilities	Excavators	1	10	188	0.38	260	185,744
Plot 11 (2031) Utilities	Excavators	4	10	40	0.38	260	158,080
Plot 11 (2031) Utilities	Forklifts	2	10	89	0.2	260	92,560
Plot 11 (2031) Utilities	Other Material Handling Equipment	4	1	167	0.4	260	69,472
Plot 11 (2031) Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plot 11 (2031) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 11 (2031) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 11 (2031) Building-Concrete	Cement and Mortar Mixers	10	1	9	0.56	260	13,104
Plot 11 (2031) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2031) Building-Concrete	Pumps	1	10	84	0.74	260	161,616
Plot 11 (2031) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 11 (2031) Building-Wet Utilities	Excavators	1	10	300	0.38	260	296,400
Plot 11 (2031) Building-Wet Utilities	Excavators	1	10	179	0.38	260	176,852
Plot 11 (2031) Building-Wet Utilities	Excavators	1	10	173	0.38	260	170,924
Plot 11 (2031) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plot 11 (2031) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	260	426,816
Plot 11 (2031) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	260	311,688

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 11 (2031) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plot 11 (2031) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 11 (2031) Building-Electrical	Excavators	4	10	40	0.38	260	158,080
Plot 11 (2031) Building-Electrical	Forklifts	2	10	89	0.2	260	92,560
Plot 11 (2031) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2031) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 11 (2031) Building-Landscaping	Excavators	1	10	29	0.38	260	28,652
Plot 11 (2031) Building-Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plot 11 (2031) Building-Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2031) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 11 (2031) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plot 11 (2031) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plot 11 (2031) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plot 11 (2031) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plot 11 (2031) Building-Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plot 11 (2031) Landscaping	Excavators	1	10	29	0.38	260	28,652
Plot 11 (2031) Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plot 11 (2031) Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 11 (2031) Landscaping	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plot 11 (2031) Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plot 11 (2031) Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plot 11 (2031) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plot 11 (2031) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plot 11 (2031) Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plot 11 (2031) Temporary Utilities	Cranes	1	10	445	0.29	260	335,530
Plot 11 (2031) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	260	3,931
Plot 11 (2031) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 11 (2031) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	260	92,664
Plot 11 (2031) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	260	122,616
Plot 11 (2031) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	260	52,910
Plot 11 (2031) Paving	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 11 (2031) Paving	Pavers	1	10	126	0.42	260	137,592
Plot 11 (2031) Paving	Paving Equipment	1	10	131	0.36	260	122,616
Plot 11 (2031) Paving	Plate Compactors	1	10	8	0.43	260	8,944
Plot 11 (2031) Paving	Rollers	1	10	81	0.38	260	80,028
Plot 11 (2031) Paving	Scrapers	1	10	362	0.48	260	451,776
Plot 11 (2031) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	260	173,160
Plots 11 and 12 (2032) Mass Excavation	Rubber Tired Dozers	1	10	305	0.4	260	317,200
Plots 11 and 12 (2032) Mass Excavation	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plots 11 and 12 (2032) Mass Excavation	Scrapers	6	10	550	0.48	260	4,118,400

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 11 and 12 (2032) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 12 (2032) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 12 (2032) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plots 11 and 12 (2032) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plots 11 and 12 (2032) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 11 and 12 (2032) Utilities	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plots 11 and 12 (2032) Utilities	Excavators	1	10	523	0.38	260	516,724
Plots 11 and 12 (2032) Utilities	Excavators	5	10	286	0.38	260	1,412,840
Plots 11 and 12 (2032) Utilities	Excavators	1	10	190	0.38	260	187,720
Plots 11 and 12 (2032) Utilities	Excavators	2	10	396	0.38	260	782,496
Plots 11 and 12 (2032) Utilities	Excavators	1	10	190	0.38	260	187,720
Plots 11 and 12 (2032) Utilities	Excavators	1	10	188	0.38	260	185,744
Plots 11 and 12 (2032) Utilities	Excavators	4	10	40	0.38	260	158,080
Plots 11 and 12 (2032) Utilities	Forklifts	2	10	89	0.2	260	92,560
Plots 11 and 12 (2032) Utilities	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 11 and 12 (2032) Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plots 11 and 12 (2032) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 11 and 12 (2032) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 11 and 12 (2032) Building-Concrete	Cement and Mortar Mixers	10	1	9	0.56	260	13,104
Plots 11 and 12 (2032) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 12 (2032) Building-Concrete	Pumps	1	10	84	0.74	260	161,616
Plots 11 and 12 (2032) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 11 and 12 (2032) Building-Wet Utilities	Excavators	1	10	300	0.38	260	296,400
Plots 11 and 12 (2032) Building-Wet Utilities	Excavators	1	10	179	0.38	260	176,852
Plots 11 and 12 (2032) Building-Wet Utilities	Excavators	1	10	173	0.38	260	170,924
Plots 11 and 12 (2032) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plots 11 and 12 (2032) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	260	426,816
Plots 11 and 12 (2032) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	260	311,688
Plots 11 and 12 (2032) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plots 11 and 12 (2032) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plots 11 and 12 (2032) Building-Electrical	Excavators	4	10	40	0.38	260	158,080
Plots 11 and 12 (2032) Building-Electrical	Forklifts	2	10	89	0.2	260	92,560
Plots 11 and 12 (2032) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 11 and 12 (2032) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 11 and 12 (2032) Building-Landscaping	Excavators	1	10	29	0.38	260	28,652
Plots 11 and 12 (2032) Building-Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plots 11 and 12 (2032) Building-Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 12 (2032) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 11 and 12 (2032) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plots 11 and 12 (2032) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 11 and 12 (2032) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plots 11 and 12 (2032) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plots 11 and 12 (2032) Building-Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plots 11 and 12 (2032) Landscaping	Excavators	1	10	29	0.38	260	28,652
Plots 11 and 12 (2032) Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plots 11 and 12 (2032) Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 11 and 12 (2032) Landscaping	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plots 11 and 12 (2032) Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plots 11 and 12 (2032) Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plots 11 and 12 (2032) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plots 11 and 12 (2032) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plots 11 and 12 (2032) Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plots 11 and 12 (2032) Temporary Utilities	Cranes	1	10	445	0.29	260	335,530
Plots 11 and 12 (2032) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	260	3,931
Plots 11 and 12 (2032) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 11 and 12 (2032) Paving	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 11 and 12 (2032) Paving	Pavers	1	10	126	0.42	260	137,592
Plots 11 and 12 (2032) Paving	Paving Equipment	1	10	131	0.36	260	122,616
Plots 11 and 12 (2032) Paving	Plate Compactors	1	10	8	0.43	260	8,944
Plots 11 and 12 (2032) Paving	Rollers	1	10	81	0.38	260	80,028
Plots 11 and 12 (2032) Paving	Scrapers	1	10	362	0.48	260	451,776
Plots 11 and 12 (2032) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	260	173,160
Plot 12 (2033) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 12 (2033) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 12 (2033) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plot 12 (2033) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plot 12 (2033) Utilities	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 12 (2033) Utilities	Excavators	1	10	523	0.38	260	516,724
Plot 12 (2033) Utilities	Excavators	5	10	286	0.38	260	1,412,840
Plot 12 (2033) Utilities	Excavators	1	10	190	0.38	260	187,720
Plot 12 (2033) Utilities	Excavators	2	10	396	0.38	260	782,496
Plot 12 (2033) Utilities	Excavators	1	10	190	0.38	260	187,720
Plot 12 (2033) Utilities	Excavators	1	10	188	0.38	260	185,744
Plot 12 (2033) Utilities	Excavators	4	10	40	0.38	260	158,080
Plot 12 (2033) Utilities	Forklifts	2	10	89	0.2	260	92,560
Plot 12 (2033) Utilities	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 12 (2033) Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plot 12 (2033) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plot 12 (2033) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 12 (2033) Building-Concrete	Cement and Mortar Mixers	10	1	9	0.56	260	13,104

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 12 (2033) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 12 (2033) Building-Concrete	Pumps	1	10	84	0.74	260	161,616
Plot 12 (2033) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 12 (2033) Building-Wet Utilities	Excavators	1	10	300	0.38	260	296,400
Plot 12 (2033) Building-Wet Utilities	Excavators	1	10	179	0.38	260	176,852
Plot 12 (2033) Building-Wet Utilities	Excavators	1	10	173	0.38	260	170,924
Plot 12 (2033) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plot 12 (2033) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	260	426,816
Plot 12 (2033) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	260	311,688
Plot 12 (2033) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plot 12 (2033) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plot 12 (2033) Building-Electrical	Excavators	4	10	40	0.38	260	158,080
Plot 12 (2033) Building-Electrical	Forklifts	2	10	89	0.2	260	92,560
Plot 12 (2033) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plot 12 (2033) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plot 12 (2033) Building-Landscaping	Excavators	1	10	29	0.38	260	28,652
Plot 12 (2033) Building-Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plot 12 (2033) Building-Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 12 (2033) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 12 (2033) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plot 12 (2033) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plot 12 (2033) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plot 12 (2033) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plot 12 (2033) Building-Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plot 12 (2033) Landscaping	Excavators	1	10	29	0.38	260	28,652
Plot 12 (2033) Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plot 12 (2033) Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plot 12 (2033) Landscaping	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plot 12 (2033) Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plot 12 (2033) Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plot 12 (2033) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plot 12 (2033) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plot 12 (2033) Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plot 12 (2033) Temporary Utilities	Cranes	1	10	445	0.29	260	335,530
Plot 12 (2033) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	260	3,931
Plot 12 (2033) Curbing/Drive Approaches	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plot 12 (2033) Curbing/Drive Approaches	Paving Equipment	1	10	99	0.36	260	92,664
Plot 12 (2033) Curbing/Drive Approaches	Paving Equipment	1	10	131	0.36	260	122,616
Plot 12 (2033) Curbing/Drive Approaches	Tractors/Loaders/Backhoes	1	10	55	0.37	260	52,910
Plot 12 (2033) Paving	Other Material Handling Equipment	3	1	167	0.4	260	52,104

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plot 12 (2033) Paving	Pavers	1	10	126	0.42	260	137,592
Plot 12 (2033) Paving	Paving Equipment	1	10	131	0.36	260	122,616
Plot 12 (2033) Paving	Plate Compactors	1	10	8	0.43	260	8,944
Plot 12 (2033) Paving	Rollers	1	10	81	0.38	260	80,028
Plot 12 (2033) Paving	Scrapers	1	10	362	0.48	260	451,776
Plot 12 (2033) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	260	173,160
Plots 12 and 21,22 (2034) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 12 and 21,22 (2034) Finish Grading	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 12 and 21,22 (2034) Finish Grading	Rubber Tired Dozers	1	10	140	0.4	260	145,600
Plots 12 and 21,22 (2034) Finish Grading	Rubber Tired Dozers	1	10	85	0.4	260	88,400
Plots 12 and 21,22 (2034) Finish Grading	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 12 and 21,22 (2034) Utilities	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plots 12 and 21,22 (2034) Utilities	Excavators	1	10	523	0.38	260	516,724
Plots 12 and 21,22 (2034) Utilities	Excavators	5	10	286	0.38	260	1,412,840
Plots 12 and 21,22 (2034) Utilities	Excavators	1	10	190	0.38	260	187,720
Plots 12 and 21,22 (2034) Utilities	Excavators	2	10	396	0.38	260	782,496
Plots 12 and 21,22 (2034) Utilities	Excavators	1	10	190	0.38	260	187,720
Plots 12 and 21,22 (2034) Utilities	Excavators	1	10	188	0.38	260	185,744
Plots 12 and 21,22 (2034) Utilities	Excavators	4	10	40	0.38	260	158,080
Plots 12 and 21,22 (2034) Utilities	Forklifts	2	10	89	0.2	260	92,560
Plots 12 and 21,22 (2034) Utilities	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 12 and 21,22 (2034) Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plots 12 and 21,22 (2034) Utilities	Tractors/Loaders/Backhoes	1	10	85	0.37	260	81,770
Plots 12 and 21,22 (2034) Utilities	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 12 and 21,22 (2034) Building-Concrete	Cement and Mortar Mixers	5	1	9	0.56	260	6,552
Plots 12 and 21,22 (2034) Building-Concrete	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 12 and 21,22 (2034) Building-Concrete	Pumps	1	10	84	0.74	260	161,616
Plots 12 and 21,22 (2034) Building-Concrete	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320
Plots 12 and 21,22 (2034) Building-Wet Utilities	Excavators	1	10	300	0.38	260	296,400
Plots 12 and 21,22 (2034) Building-Wet Utilities	Excavators	1	10	179	0.38	260	176,852
Plots 12 and 21,22 (2034) Building-Wet Utilities	Excavators	1	10	173	0.38	260	170,924
Plots 12 and 21,22 (2034) Building-Wet Utilities	Other Material Handling Equipment	8	1	167	0.4	260	138,944
Plots 12 and 21,22 (2034) Building-Wet Utilities	Rubber Tired Loaders	3	10	152	0.36	260	426,816
Plots 12 and 21,22 (2034) Building-Wet Utilities	Tractors/Loaders/Backhoes	3	10	108	0.37	260	311,688
Plots 12 and 21,22 (2034) Building-Wet Utilities	Tractors/Loaders/Backhoes	2	10	85	0.37	260	163,540
Plots 12 and 21,22 (2034) Building-Electrical	Cement and Mortar Mixers	4	1	9	0.56	260	5,242
Plots 12 and 21,22 (2034) Building-Electrical	Excavators	4	10	40	0.38	260	158,080
Plots 12 and 21,22 (2034) Building-Electrical	Forklifts	2	10	89	0.2	260	92,560
Plots 12 and 21,22 (2034) Building-Electrical	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 12 and 21,22 (2034) Building-Electrical	Tractors/Loaders/Backhoes	4	10	90	0.37	260	346,320

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 12 and 21,22 (2034) Building-Landscaping	Excavators	1	10	29	0.38	260	28,652
Plots 12 and 21,22 (2034) Building-Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plots 12 and 21,22 (2034) Building-Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 12 and 21,22 (2034) Building-Landscaping	Other Material Handling Equipment	2	1	167	0.4	260	34,736
Plots 12 and 21,22 (2034) Building-Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plots 12 and 21,22 (2034) Building-Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plots 12 and 21,22 (2034) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plots 12 and 21,22 (2034) Building-Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plots 12 and 21,22 (2034) Building-Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plots 12 and 21,22 (2034) Landscaping	Excavators	1	10	29	0.38	260	28,652
Plots 12 and 21,22 (2034) Landscaping	Forklifts	1	10	125	0.2	260	65,000
Plots 12 and 21,22 (2034) Landscaping	Other Material Handling Equipment	1	1	167	0.4	260	17,368
Plots 12 and 21,22 (2034) Landscaping	Other Material Handling Equipment	5	1	167	0.4	260	86,840
Plots 12 and 21,22 (2034) Landscaping	Rubber Tired Loaders	1	10	149	0.36	260	139,464
Plots 12 and 21,22 (2034) Landscaping	Skid Steer Loaders	1	10	69	0.37	260	66,378
Plots 12 and 21,22 (2034) Landscaping	Tractors/Loaders/Backhoes	1	10	73	0.37	260	70,226
Plots 12 and 21,22 (2034) Landscaping	Tractors/Loaders/Backhoes	1	10	78	0.37	260	75,036
Plots 12 and 21,22 (2034) Landscaping	Trenchers	1	10	39	0.5	260	50,700
Plots 12 and 21,22 (2034) Temporary Utilities	Cranes	1	10	445	0.29	260	335,530
Plots 12 and 21,22 (2034) Curbing/Drive Approaches	Cement and Mortar Mixers	3	1	9	0.56	260	3,931
Plots 12 and 21,22 (2034) Paving	Other Material Handling Equipment	3	1	167	0.4	260	52,104
Plots 12 and 21,22 (2034) Paving	Pavers	1	10	126	0.42	260	137,592
Plots 12 and 21,22 (2034) Paving	Paving Equipment	1	10	131	0.36	260	122,616
Plots 12 and 21,22 (2034) Paving	Plate Compactors	1	10	8	0.43	260	8,944
Plots 12 and 21,22 (2034) Paving	Rollers	1	10	81	0.38	260	80,028
Plots 12 and 21,22 (2034) Paving	Scrapers	1	10	362	0.48	260	451,776
Plots 12 and 21,22 (2034) Paving	Tractors/Loaders/Backhoes	2	10	90	0.37	260	173,160
Plots 2 and 4 (2020) Building Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 2 and 4 (2020) Building Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 2 and 4 (2020) Building Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 2 and 4 (2020) Building Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 2 and 4 (2020) Building Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 2 and 4 (2020) Building Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 4 (2021) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 4 (2021) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 4 (2021) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 4 (2021) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 4 (2021) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 4 (2021) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 4 and 9 (2022) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 4 and 9 (2022) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 4 and 9 (2022) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 4 and 9 (2022) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 4 and 9 (2022) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 4 and 9 (2022) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 9 (2023) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 9 (2023) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 9 (2023) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 9 (2023) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 9 (2023) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 9 (2023) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 9 and 1,3,20 (2024) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 9 and 1,3,20 (2024) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 9 and 1,3,20 (2024) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 9 and 1,3,20 (2024) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 9 and 1,3,20 (2024) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 9 and 1,3,20 (2024) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 5 and 10 (2025) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 5 and 10 (2025) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 5 and 10 (2025) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 5 and 10 (2025) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 5 and 10 (2025) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 5 and 10 (2025) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 10 and 8 (2026) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 10 and 8 (2026) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 10 and 8 (2026) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 10 and 8 (2026) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 10 and 8 (2026) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 10 and 8 (2026) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 8 (2027) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 8 (2027) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 8 (2027) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 8 (2027) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 8 (2027) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 8 (2027) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 11 and 6,7 (2028) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 11 and 6,7 (2028) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 11 and 6,7 (2028) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 11 and 6,7 (2028) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 11 and 6,7 (2028) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Plots 11 and 6,7 (2028) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 11 (2029) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 11 (2029) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 11 (2029) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 11 (2029) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 11 (2029) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 11 (2029) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 11 (2030) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 11 (2030) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 11 (2030) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 11 (2030) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 11 (2030) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 11 (2030) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 11 (2031) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 11 (2031) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 11 (2031) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 11 (2031) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 11 (2031) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 11 (2031) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 11 and 12 (2032) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 11 and 12 (2032) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 11 and 12 (2032) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 11 and 12 (2032) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 11 and 12 (2032) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 11 and 12 (2032) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plot 12 (2033) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plot 12 (2033) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plot 12 (2033) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plot 12 (2033) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plot 12 (2033) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plot 12 (2033) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
Plots 12 and 21,22 (2034) Building-Concrete	Cement and Mortar Mixers	24	24	9	0.56	10	29,030
Plots 12 and 21,22 (2034) Building-Concrete	Generator Sets	4	12	84	0.74	10	29,837
Plots 12 and 21,22 (2034) Building-Concrete	Other Material Handling Equipment	2	24	167	0.4	10	32,064
Plots 12 and 21,22 (2034) Building-Concrete	Pumps	2	24	84	0.74	10	29,837
Plots 12 and 21,22 (2034) Building-Concrete	Tractors/Loaders/Backhoes	8	24	90	0.37	10	63,936
Plots 12 and 21,22 (2034) Building-Concrete	Tractors/Loaders/Backhoes	4	24	85	0.37	10	30,192
						Total >100	333,571,957

Building Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
						Total <100	72,413,316

World Logistics Center
Construction Energy Analysis

On-Road Workers (LDA, LDT1, LDT2)

EMFAC2014 Gasoline Fuel Consumption Factor:[1]	0.0362	gallons/mile	miles/gallon	
Total Worker VMT:	457,663	miles	27.7	
Total VMT gasoline gallons (workers):	**16,549**			

1. California Air Resources Board, EMFAC2017 (South Coast Air Basin; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plots 2 and 4 (2020) Mass Excavation	262	50	0.5	6,550
Plots 2 and 4 (2020) Finish Grading	262	15	0.5	1,965
Plots 2 and 4 (2020) Utilities	262	40	0.5	5,240
Plots 2 and 4 (2020) Landscaping	262	10	0.5	1,310
Plots 2 and 4 (2020) Building Concrete	262	25	0.5	3,275
Plots 2 and 4 (2020) Building-Wet Utilities	262	25	0.5	3,275
Plots 2 and 4 (2020) Building-Electrical	262	15	0.5	1,965
Plots 2 and 4 (2020) Temporary Utilities	262	0	0.5	-
Plots 2 and 4 (2020) Building-Landscaping	262	10	0.5	1,310
Plots 2 and 4 (2020) Paving	262	25	0.5	3,275
Plots 2 and 4 (2020) Curbing/Drive Approaches	262	10	0.5	1,310
Plot 4 (2021) Mass Excavation	261	50	0.5	6,525
Plot 4 (2021) Finish Grading	261	15	0.5	1,958
Plot 4 (2021) Utilities	261	40	0.5	5,220
Plot 4 (2021) Building-Concrete	261	25	0.5	3,263
Plot 4 (2021) Building-Wet Utilities	261	25	0.5	3,263
Plot 4 (2021) Building-Electrical	261	15	0.5	1,958
Plot 4 (2021) Building-Landscaping	261	10	0.5	1,305
Plot 4 (2021) Landscaping	261	10	0.5	1,305
Plot 4 (2021) Temporary Utilities	261	0	0.5	-
Plot 4 (2021) Curbing/Drive Approaches	261	10	0.5	1,305
Plot 4 (2021) Paving	261	25	0.5	3,263
Plots 4 and 9 (2022) Mass Excavation	260	50	0.5	6,500
Plots 4 and 9 (2022) Finish Grading	260	12.5	0.5	1,625
Plots 4 and 9 (2022) Utilities	260	25	0.5	3,250
Plots 4 and 9 (2022) Building-Concrete	260	37.5	0.5	4,875
Plots 4 and 9 (2022) Building-Wet Utilities	260	25	0.5	3,250

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plots 4 and 9 (2022) Building-Electrical	260	15	0.5	1,950
Plots 4 and 9 (2022) Building-Landscaping	260	17.5	0.5	2,275
Plots 4 and 9 (2022) Landscaping	260	25	0.5	3,250
Plots 4 and 9 (2022) Temporary Utilities	260	0	0.5	-
Plots 4 and 9 (2022) Curbing/Drive Approaches	260	12.5	0.5	1,625
Plots 4 and 9 (2022) Paving	260	17.5	0.5	2,275
Plot 9 (2023) Mass Excavation	260	50	0.5	6,500
Plot 9 (2023) Finish Grading	260	10	0.5	1,300
Plot 9 (2023) Utilities	260	10	0.5	1,300
Plot 9 (2023) Building-Concrete	260	50	0.5	6,500
Plot 9 (2023) Building-Wet Utilities	260	25	0.5	3,250
Plot 9 (2023) Building-Electrical	260	15	0.5	1,950
Plot 9 (2023) Building-Landscaping	260	25	0.5	3,250
Plot 9 (2023) Interchange	260	0	0.5	-
Plot 9 (2023) Landscaping	260	40	0.5	5,200
Plot 9 (2023) Temporary Utilities	260	0	0.5	-
Plot 9 (2023) Curbing/Drive Approaches	260	15	0.5	1,950
Plot 9 (2023) Paving	260	10	0.5	1,300
Plots 9 and 1,3,20 (2024) Mass Excavation	261	50	0.5	6,525
Plots 9 and 1,3,20 (2024) Finish Grading	262	25	0.5	3,275
Plots 9 and 1,3,20 (2024) Utilities	262	25	0.5	3,275
Plots 9 and 1,3,20 (2024) Building-Concrete	262	37.5	0.5	4,913
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	262	25	0.5	3,275
Plots 9 and 1,3,20 (2024) Building-Electrical	262	15	0.5	1,965
Plots 9 and 1,3,20 (2024) Building-Landscaping	262	17.5	0.5	2,293
Plots 9 and 1,3,20 (2024) Interchange	262	12.5	0.5	1,638
Plots 9 and 1,3,20 (2024) Landscaping	262	25	0.5	3,275
Plots 9 and 1,3,20 (2024) Temporary Utilities	262	0	0.5	-
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	262	10	0.5	1,310
Plots 9 and 1,3,20 (2024) Paving	262	17.5	0.5	2,293
Plots 5 and 10 (2025) Mass Excavation	261	50	0.5	6,525
Plots 5 and 10 (2025) Finish Grading	261	15	0.5	1,958
Plots 5 and 10 (2025) Utilities	261	40	0.5	5,220
Plots 5 and 10 (2025) Building-Concrete	261	10	0.5	1,305
Plots 5 and 10 (2025) Building-Wet Utilities	261	25	0.5	3,263
Plots 5 and 10 (2025) Building-Electrical	261	25	0.5	3,263
Plots 5 and 10 (2025) Building-Landscaping	261	15	0.5	1,958
Plots 5 and 10 (2025) Landscaping	261	0	0.5	-
Plots 5 and 10 (2025) Temporary Utilities	261	10	0.5	1,305
Plots 5 and 10 (2025) Curbing/Drive Approaches	261	25	0.5	3,263

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plots 5 and 10 (2025) Paving	261	10	0.5	1,305
Plots 10 and 8 (2026) Mass Excavation	261	50	0.5	6,525
Plots 10 and 8 (2026) Finish Grading	261	15	0.5	1,958
Plots 10 and 8 (2026) Utilities	261	40	0.5	5,220
Plots 10 and 8 (2026) Building-Concrete	261	25	0.5	3,263
Plots 10 and 8 (2026) Building-Wet Utilities	261	25	0.5	3,263
Plots 10 and 8 (2026) Building-Electrical	261	15	0.5	1,958
Plots 10 and 8 (2026) Building-Landscaping	261	10	0.5	1,305
Plots 10 and 8 (2026) Landscaping	261	10	0.5	1,305
Plots 10 and 8 (2026) Temporary Utilities	261	0	0.5	-
Plots 10 and 8 (2026) Curbing/Drive Approaches	261	10	0.5	1,305
Plots 10 and 8 (2026) Paving	261	25	0.5	3,263
Plot 8 (2027) Mass Excavation	261	50	0.5	6,525
Plot 8 (2027) Finish Grading	261	12.5	0.5	1,631
Plot 8 (2027) Utilities	261	25	0.5	3,263
Plot 8 (2027) Building-Concrete	261	37.5	0.5	4,894
Plot 8 (2027) Building-Wet Utilities	261	25	0.5	3,263
Plot 8 (2027) Building-Electrical	261	15	0.5	1,958
Plot 8 (2027) Building-Landscaping	261	17.5	0.5	2,284
Plot 8 (2027) Landscaping	261	25	0.5	3,263
Plot 8 (2027) Temporary Utilities	261	0	0.5	-
Plot 8 (2027) Curbing/Drive Approaches	261	12.5	0.5	1,631
Plot 8 (2027) Paving	261	17.5	0.5	2,284
Plots 11 and 6,7 (2028) Mass Excavation	260	50	0.5	6,500
Plots 11 and 6,7 (2028) Finish Grading	260	10	0.5	1,300
Plots 11 and 6,7 (2028) Utilities	260	10	0.5	1,300
Plots 11 and 6,7 (2028) Building-Concrete	260	50	0.5	6,500
Plots 11 and 6,7 (2028) Building-Wet Utilities	260	25	0.5	3,250
Plots 11 and 6,7 (2028) Building-Electrical	260	15	0.5	1,950
Plots 11 and 6,7 (2028) Building-Landscaping	260	25	0.5	3,250
Plots 11 and 6,7 (2028) Landscaping	260	0	0.5	-
Plots 11 and 6,7 (2028) Temporary Utilities	260	40	0.5	5,200
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	260	0	0.5	-
Plots 11 and 6,7 (2028) Paving	260	15	0.5	1,950
Plot 11 (2029) Mass Excavation	261	10	0.5	1,305
Plot 11 (2029) Finish Grading	261	50	0.5	6,525
Plot 11 (2029) Utilities	261	25	0.5	3,263
Plot 11 (2029) Building-Concrete	261	25	0.5	3,263
Plot 11 (2029) Building-Wet Utilities	261	37.5	0.5	4,894
Plot 11 (2029) Building-Electrical	261	25	0.5	3,263

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plot 11 (2029) Building-Landscaping	261	15	0.5	1,958
Plot 11 (2029) Landscaping	261	17.5	0.5	2,284
Plot 11 (2029) Temporary Utilities	261	12.5	0.5	1,631
Plot 11 (2029) Curbing/Drive Approaches	261	25	0.5	3,263
Plot 11 (2029) Paving	261	0	0.5	-
Plot 11 (2030) Mass Excavation	260	50	0.5	6,500
Plot 11 (2030) Finish Grading	260	15	0.5	1,950
Plot 11 (2030) Utilities	260	40	0.5	5,200
Plot 11 (2030) Building-Concrete	260	10	0.5	1,300
Plot 11 (2030) Building-Wet Utilities	260	25	0.5	3,250
Plot 11 (2030) Building-Electrical	260	25	0.5	3,250
Plot 11 (2030) Building-Landscaping	260	15	0.5	1,950
Plot 11 (2030) Landscaping	260	0	0.5	-
Plot 11 (2030) Temporary Utilities	260	10	0.5	1,300
Plot 11 (2030) Curbing/Drive Approaches	260	25	0.5	3,250
Plot 11 (2030) Paving	260	10	0.5	1,300
Plot 11 (2031) Mass Excavation	260	50	0.5	6,500
Plot 11 (2031) Finish Grading	260	15	0.5	1,950
Plot 11 (2031) Utilities	260	40	0.5	5,200
Plot 11 (2031) Building-Concrete	260	25	0.5	3,250
Plot 11 (2031) Building-Wet Utilities	260	25	0.5	3,250
Plot 11 (2031) Building-Electrical	260	15	0.5	1,950
Plot 11 (2031) Building-Landscaping	260	10	0.5	1,300
Plot 11 (2031) Landscaping	260	10	0.5	1,300
Plot 11 (2031) Temporary Utilities	260	0	0.5	-
Plot 11 (2031) Curbing/Drive Approaches	260	10	0.5	1,300
Plot 11 (2031) Paving	260	25	0.5	3,250
Plots 11 and 12 (2032) Mass Excavation	260	50	0.5	6,500
Plots 11 and 12 (2032) Finish Grading	260	12.5	0.5	1,625
Plots 11 and 12 (2032) Utilities	260	25	0.5	3,250
Plots 11 and 12 (2032) Building-Concrete	260	37.5	0.5	4,875
Plots 11 and 12 (2032) Building-Wet Utilities	260	25	0.5	3,250
Plots 11 and 12 (2032) Building-Electrical	260	15	0.5	1,950
Plots 11 and 12 (2032) Building-Landscaping	260	17.5	0.5	2,275
Plots 11 and 12 (2032) Landscaping	260	25	0.5	3,250
Plots 11 and 12 (2032) Temporary Utilities	260	0	0.5	-
Plots 11 and 12 (2032) Curbing/Drive Approaches	260	12.5	0.5	1,625
Plots 11 and 12 (2032) Paving	260	17.5	0.5	2,275
Plot 12 (2033) Finish Grading	260	50	0.5	6,500
Plot 12 (2033) Utilities	260	10	0.5	1,300

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plot 12 (2033) Building-Concrete	260	10	0.5	1,300
Plot 12 (2033) Building-Wet Utilities	260	50	0.5	6,500
Plot 12 (2033) Building-Electrical	260	25	0.5	3,250
Plot 12 (2033) Building-Landscaping	260	15	0.5	1,950
Plot 12 (2033) Landscaping	260	25	0.5	3,250
Plot 12 (2033) Temporary Utilities	260	0	0.5	-
Plot 12 (2033) Curbing/Drive Approaches	260	40	0.5	5,200
Plot 12 (2033) Paving	260	0	0.5	-
Plots 12 and 21,22 (2034) Finish Grading	260	15	0.5	1,950
Plots 12 and 21,22 (2034) Utilities	260	10	0.5	1,300
Plots 12 and 21,22 (2034) Building-Concrete	260	50	0.5	6,500
Plots 12 and 21,22 (2034) Building-Wet Utilities	260	25	0.5	3,250
Plots 12 and 21,22 (2034) Building-Electrical	260	25	0.5	3,250
Plots 12 and 21,22 (2034) Building-Landscaping	260	37.5	0.5	4,875
Plots 12 and 21,22 (2034) Landscaping	260	25	0.5	3,250
Plots 12 and 21,22 (2034) Temporary Utilities	260	15	0.5	1,950
Plots 12 and 21,22 (2034) Curbing/Drive Approaches	260	17.5	0.5	2,275
Plots 12 and 21,22 (2034) Paving	260	12.5	0.5	1,625
			Total Worker VMT:	**457,663**

World Logistics Center
Construction Energy Analysis

On-Road Workers (LDA, LDT1, LDT2)

EMFAC2014 Gasoline Fuel Consumption Factor:[1]	0.0362	gallons/mile	miles/gallon	
Total Worker VMT:	22,883,125	miles		27.7
Total VMT gasoline gallons (workers):	**827,463**			

1. California Air Resources Board, EMFAC2017 (South Coast Air Basin; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plots 2 and 4 (2020) Mass Excavation	262	50	25	327,500
Plots 2 and 4 (2020) Finish Grading	262	15	25	98,250
Plots 2 and 4 (2020) Utilities	262	40	25	262,000
Plots 2 and 4 (2020) Landscaping	262	10	25	65,500
Plots 2 and 4 (2020) Building Concrete	262	25	25	163,750
Plots 2 and 4 (2020) Building-Wet Utilities	262	25	25	163,750
Plots 2 and 4 (2020) Building-Electrical	262	15	25	98,250
Plots 2 and 4 (2020) Temporary Utilities	262	0	25	-
Plots 2 and 4 (2020) Building-Landscaping	262	10	25	65,500
Plots 2 and 4 (2020) Paving	262	25	25	163,750
Plots 2 and 4 (2020) Curbing/Drive Approaches	262	10	25	65,500
Plot 4 (2021) Mass Excavation	261	50	25	326,250
Plot 4 (2021) Finish Grading	261	15	25	97,875
Plot 4 (2021) Utilities	261	40	25	261,000
Plot 4 (2021) Building-Concrete	261	25	25	163,125
Plot 4 (2021) Building-Wet Utilities	261	25	25	163,125
Plot 4 (2021) Building-Electrical	261	15	25	97,875
Plot 4 (2021) Building-Landscaping	261	10	25	65,250
Plot 4 (2021) Landscaping	261	10	25	65,250
Plot 4 (2021) Temporary Utilities	261	0	25	-
Plot 4 (2021) Curbing/Drive Approaches	261	10	25	65,250
Plot 4 (2021) Paving	261	25	25	163,125
Plots 4 and 9 (2022) Mass Excavation	260	50	25	325,000
Plots 4 and 9 (2022) Finish Grading	260	12.5	25	81,250
Plots 4 and 9 (2022) Utilities	260	25	25	162,500
Plots 4 and 9 (2022) Building-Concrete	260	37.5	25	243,750
Plots 4 and 9 (2022) Building-Wet Utilities	260	25	25	162,500

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plots 4 and 9 (2022) Building-Electrical	260	15	25	97,500
Plots 4 and 9 (2022) Building-Landscaping	260	17.5	25	113,750
Plots 4 and 9 (2022) Landscaping	260	25	25	162,500
Plots 4 and 9 (2022) Temporary Utilities	260	0	25	-
Plots 4 and 9 (2022) Curbing/Drive Approaches	260	12.5	25	81,250
Plots 4 and 9 (2022) Paving	260	17.5	25	113,750
Plot 9 (2023) Mass Excavation	260	50	25	325,000
Plot 9 (2023) Finish Grading	260	10	25	65,000
Plot 9 (2023) Utilities	260	10	25	65,000
Plot 9 (2023) Building-Concrete	260	50	25	325,000
Plot 9 (2023) Building-Wet Utilities	260	25	25	162,500
Plot 9 (2023) Building-Electrical	260	15	25	97,500
Plot 9 (2023) Building-Landscaping	260	25	25	162,500
Plot 9 (2023) Interchange	260	0	25	-
Plot 9 (2023) Landscaping	260	40	25	260,000
Plot 9 (2023) Temporary Utilities	260	0	25	-
Plot 9 (2023) Curbing/Drive Approaches	260	15	25	97,500
Plot 9 (2023) Paving	260	10	25	65,000
Plots 9 and 1,3,20 (2024) Mass Excavation	261	50	25	326,250
Plots 9 and 1,3,20 (2024) Finish Grading	262	25	25	163,750
Plots 9 and 1,3,20 (2024) Utilities	262	25	25	163,750
Plots 9 and 1,3,20 (2024) Building-Concrete	262	37.5	25	245,625
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	262	25	25	163,750
Plots 9 and 1,3,20 (2024) Building-Electrical	262	15	25	98,250
Plots 9 and 1,3,20 (2024) Building-Landscaping	262	17.5	25	114,625
Plots 9 and 1,3,20 (2024) Interchange	262	12.5	25	81,875
Plots 9 and 1,3,20 (2024) Landscaping	262	25	25	163,750
Plots 9 and 1,3,20 (2024) Temporary Utilities	262	0	25	-
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	262	10	25	65,500
Plots 9 and 1,3,20 (2024) Paving	262	17.5	25	114,625
Plots 5 and 10 (2025) Mass Excavation	261	50	25	326,250
Plots 5 and 10 (2025) Finish Grading	261	15	25	97,875
Plots 5 and 10 (2025) Utilities	261	40	25	261,000
Plots 5 and 10 (2025) Building-Concrete	261	10	25	65,250
Plots 5 and 10 (2025) Building-Wet Utilities	261	25	25	163,125
Plots 5 and 10 (2025) Building-Electrical	261	25	25	163,125
Plots 5 and 10 (2025) Building-Landscaping	261	15	25	97,875
Plots 5 and 10 (2025) Landscaping	261	0	25	-
Plots 5 and 10 (2025) Temporary Utilities	261	10	25	65,250
Plots 5 and 10 (2025) Curbing/Drive Approaches	261	25	25	163,125

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plots 5 and 10 (2025) Paving	261	10	25	65,250
Plots 10 and 8 (2026) Mass Excavation	261	50	25	326,250
Plots 10 and 8 (2026) Finish Grading	261	15	25	97,875
Plots 10 and 8 (2026) Utilities	261	40	25	261,000
Plots 10 and 8 (2026) Building-Concrete	261	25	25	163,125
Plots 10 and 8 (2026) Building-Wet Utilities	261	25	25	163,125
Plots 10 and 8 (2026) Building-Electrical	261	15	25	97,875
Plots 10 and 8 (2026) Building-Landscaping	261	10	25	65,250
Plots 10 and 8 (2026) Landscaping	261	10	25	65,250
Plots 10 and 8 (2026) Temporary Utilities	261	0	25	-
Plots 10 and 8 (2026) Curbing/Drive Approaches	261	10	25	65,250
Plots 10 and 8 (2026) Paving	261	25	25	163,125
Plot 8 (2027) Mass Excavation	261	50	25	326,250
Plot 8 (2027) Finish Grading	261	12.5	25	81,563
Plot 8 (2027) Utilities	261	25	25	163,125
Plot 8 (2027) Building-Concrete	261	37.5	25	244,688
Plot 8 (2027) Building-Wet Utilities	261	25	25	163,125
Plot 8 (2027) Building-Electrical	261	15	25	97,875
Plot 8 (2027) Building-Landscaping	261	17.5	25	114,188
Plot 8 (2027) Landscaping	261	25	25	163,125
Plot 8 (2027) Temporary Utilities	261	0	25	-
Plot 8 (2027) Curbing/Drive Approaches	261	12.5	25	81,563
Plot 8 (2027) Paving	261	17.5	25	114,188
Plots 11 and 6,7 (2028) Mass Excavation	260	50	25	325,000
Plots 11 and 6,7 (2028) Finish Grading	260	10	25	65,000
Plots 11 and 6,7 (2028) Utilities	260	10	25	65,000
Plots 11 and 6,7 (2028) Building-Concrete	260	50	25	325,000
Plots 11 and 6,7 (2028) Building-Wet Utilities	260	25	25	162,500
Plots 11 and 6,7 (2028) Building-Electrical	260	15	25	97,500
Plots 11 and 6,7 (2028) Building-Landscaping	260	25	25	162,500
Plots 11 and 6,7 (2028) Landscaping	260	0	25	-
Plots 11 and 6,7 (2028) Temporary Utilities	260	40	25	260,000
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	260	0	25	-
Plots 11 and 6,7 (2028) Paving	260	15	25	97,500
Plot 11 (2029) Mass Excavation	261	10	25	65,250
Plot 11 (2029) Finish Grading	261	50	25	326,250
Plot 11 (2029) Utilities	261	25	25	163,125
Plot 11 (2029) Building-Concrete	261	25	25	163,125
Plot 11 (2029) Building-Wet Utilities	261	37.5	25	244,688
Plot 11 (2029) Building-Electrical	261	25	25	163,125

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plot 11 (2029) Building-Landscaping	261	15	25	97,875
Plot 11 (2029) Landscaping	261	17.5	25	114,188
Plot 11 (2029) Temporary Utilities	261	12.5	25	81,563
Plot 11 (2029) Curbing/Drive Approaches	261	25	25	163,125
Plot 11 (2029) Paving	261	0	25	-
Plot 11 (2030) Mass Excavation	260	50	25	325,000
Plot 11 (2030) Finish Grading	260	15	25	97,500
Plot 11 (2030) Utilities	260	40	25	260,000
Plot 11 (2030) Building-Concrete	260	10	25	65,000
Plot 11 (2030) Building-Wet Utilities	260	25	25	162,500
Plot 11 (2030) Building-Electrical	260	25	25	162,500
Plot 11 (2030) Building-Landscaping	260	15	25	97,500
Plot 11 (2030) Landscaping	260	0	25	-
Plot 11 (2030) Temporary Utilities	260	10	25	65,000
Plot 11 (2030) Curbing/Drive Approaches	260	25	25	162,500
Plot 11 (2030) Paving	260	10	25	65,000
Plot 11 (2031) Mass Excavation	260	50	25	325,000
Plot 11 (2031) Finish Grading	260	15	25	97,500
Plot 11 (2031) Utilities	260	40	25	260,000
Plot 11 (2031) Building-Concrete	260	25	25	162,500
Plot 11 (2031) Building-Wet Utilities	260	25	25	162,500
Plot 11 (2031) Building-Electrical	260	15	25	97,500
Plot 11 (2031) Building-Landscaping	260	10	25	65,000
Plot 11 (2031) Landscaping	260	10	25	65,000
Plot 11 (2031) Temporary Utilities	260	0	25	-
Plot 11 (2031) Curbing/Drive Approaches	260	10	25	65,000
Plot 11 (2031) Paving	260	25	25	162,500
Plots 11 and 12 (2032) Mass Excavation	260	50	25	325,000
Plots 11 and 12 (2032) Finish Grading	260	12.5	25	81,250
Plots 11 and 12 (2032) Utilities	260	25	25	162,500
Plots 11 and 12 (2032) Building-Concrete	260	37.5	25	243,750
Plots 11 and 12 (2032) Building-Wet Utilities	260	25	25	162,500
Plots 11 and 12 (2032) Building-Electrical	260	15	25	97,500
Plots 11 and 12 (2032) Building-Landscaping	260	17.5	25	113,750
Plots 11 and 12 (2032) Landscaping	260	25	25	162,500
Plots 11 and 12 (2032) Temporary Utilities	260	0	25	-
Plots 11 and 12 (2032) Curbing/Drive Approaches	260	12.5	25	81,250
Plots 11 and 12 (2032) Paving	260	17.5	25	113,750
Plot 12 (2033) Finish Grading	260	50	25	325,000
Plot 12 (2033) Utilities	260	10	25	65,000

Building Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Plot 12 (2033) Building-Concrete	260	10	25	65,000
Plot 12 (2033) Building-Wet Utilities	260	50	25	325,000
Plot 12 (2033) Building-Electrical	260	25	25	162,500
Plot 12 (2033) Building-Landscaping	260	15	25	97,500
Plot 12 (2033) Landscaping	260	25	25	162,500
Plot 12 (2033) Temporary Utilities	260	0	25	-
Plot 12 (2033) Curbing/Drive Approaches	260	40	25	260,000
Plot 12 (2033) Paving	260	0	25	-
Plots 12 and 21,22 (2034) Finish Grading	260	15	25	97,500
Plots 12 and 21,22 (2034) Utilities	260	10	25	65,000
Plots 12 and 21,22 (2034) Building-Concrete	260	50	25	325,000
Plots 12 and 21,22 (2034) Building-Wet Utilities	260	25	25	162,500
Plots 12 and 21,22 (2034) Building-Electrical	260	25	25	162,500
Plots 12 and 21,22 (2034) Building-Landscaping	260	37.5	25	243,750
Plots 12 and 21,22 (2034) Landscaping	260	25	25	162,500
Plots 12 and 21,22 (2034) Temporary Utilities	260	15	25	97,500
Plots 12 and 21,22 (2034) Curbing/Drive Approaches	260	17.5	25	113,750
Plots 12 and 21,22 (2034) Paving	260	12.5	25	81,250
			Total Worker VMT:	**22,883,125**

World Logistics Center
Construction Energy Analysis

On-Road Vendor Trucks

			miles/gallomn
	0.1337	gallons/mile	7.5
	169,710	miles	
Total VMT diesel gallons (on-road vendor trucks):	**22,697**		
			Estimated Fuel Savings from
EMFAC2014 Diesel Fuel Consumption Factor:[2]	0.6687	gallons/hour	*Anti-Idling Regulation (64 percent based on*
Total Haul Truck Idle-Hours per Year:	28,285	hours	*estimated CARB emissions reductions):* [3]
Total Idling diesel gallons (on-road haul trucks):	**18,914**		*52,540*
Total diesel gallons (on-road haul trucks):	**41,612**	gal	

1. California Air Resources Board, EMFAC2017 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2017 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, https://www.arb.ca.gov/regact/idling/idling.htm, accessed November 2016.

Building Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Plots 2 and 4 (2020) Mass Excavation	262	9	0.5	1,179	197
Plots 2 and 4 (2020) Finish Grading	262	2	0.5	262	44
Plots 2 and 4 (2020) Utilities	262	25	0.5	3,275	546
Plots 2 and 4 (2020) Landscaping	262	6	0.5	786	131
Plots 2 and 4 (2020) Building Concrete	262	2	0.5	262	44
Plots 2 and 4 (2020) Building-Wet Utilities	262	15	0.5	1,965	328
Plots 2 and 4 (2020) Building-Electrical	262	6	0.5	786	131
Plots 2 and 4 (2020) Temporary Utilities	262	0	0.5	-	-
Plots 2 and 4 (2020) Building-Landscaping	262	7	0.5	917	153
Plots 2 and 4 (2020) Paving	262	6	0.5	786	131
Plots 2 and 4 (2020) Curbing/Drive Approaches	262	4	0.5	524	87
Plot 4 (2021) Mass Excavation	261	9	0.5	1,175	196
Plot 4 (2021) Finish Grading	261	2	0.5	261	44
Plot 4 (2021) Utilities	261	25	0.5	3,263	544
Plot 4 (2021) Building-Concrete	261	2	0.5	261	44
Plot 4 (2021) Building-Wet Utilities	261	2	0.5	261	44
Plot 4 (2021) Building-Electrical	261	6	0.5	783	131
Plot 4 (2021) Building-Landscaping	261	7	0.5	914	152
Plot 4 (2021) Landscaping	261	6	0.5	783	131
Plot 4 (2021) Temporary Utilities	261	0	0.5	-	-
Plot 4 (2021) Curbing/Drive Approaches	261	4	0.5	522	87
Plot 4 (2021) Paving	261	6	0.5	783	131
Plots 4 and 9 (2022) Mass Excavation	260	12	0.5	1,560	260
Plots 4 and 9 (2022) Finish Grading	260	4.5	0.5	585	98
Plots 4 and 9 (2022) Utilities	260	14.5	0.5	1,885	314

Building Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Plots 4 and 9 (2022) Building-Concrete	260	8.5	0.5	1,105	184
Plots 4 and 9 (2022) Building-Wet Utilities	260	15	0.5	1,950	325
Plots 4 and 9 (2022) Building-Electrical	260	6	0.5	780	130
Plots 4 and 9 (2022) Building-Landscaping	260	4.5	0.5	585	98
Plots 4 and 9 (2022) Landscaping	260	15.5	0.5	2,015	336
Plots 4 and 9 (2022) Temporary Utilities	260	0	0.5	-	-
Plots 4 and 9 (2022) Curbing/Drive Approaches	260	5	0.5	650	108
Plots 4 and 9 (2022) Paving	260	6	0.5	780	130
Plot 9 (2023) Mass Excavation	260	15	0.5	1,950	325
Plot 9 (2023) Finish Grading	260	7	0.5	910	152
Plot 9 (2023) Utilities	260	4	0.5	520	87
Plot 9 (2023) Building-Concrete	260	15	0.5	1,950	325
Plot 9 (2023) Building-Wet Utilities	260	15	0.5	1,950	325
Plot 9 (2023) Building-Electrical	260	6	0.5	780	130
Plot 9 (2023) Building-Landscaping	260	2	0.5	260	43
Plot 9 (2023) Interchange	260	0	0.5	-	-
Plot 9 (2023) Landscaping	260	25	0.5	3,250	542
Plot 9 (2023) Temporary Utilities	260	0	0.5	-	-
Plot 9 (2023) Curbing/Drive Approaches	260	6	0.5	780	130
Plot 9 (2023) Paving	260	6	0.5	780	130
Plots 9 and 1,3,20 (2024) Mass Excavation	261	11.5	0.5	1,501	250
Plots 9 and 1,3,20 (2024) Finish Grading	262	14.5	0.5	1,900	317
Plots 9 and 1,3,20 (2024) Utilities	262	14.5	0.5	1,900	317
Plots 9 and 1,3,20 (2024) Building-Concrete	262	8.5	0.5	1,114	186
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	262	15	0.5	1,965	328
Plots 9 and 1,3,20 (2024) Building-Electrical	262	6	0.5	786	131
Plots 9 and 1,3,20 (2024) Building-Landscaping	262	4.5	0.5	590	98
Plots 9 and 1,3,20 (2024) Interchange	262	2	0.5	262	44
Plots 9 and 1,3,20 (2024) Landscaping	262	15.5	0.5	2,031	338
Plots 9 and 1,3,20 (2024) Temporary Utilities	262	0	0.5	-	-
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	262	5.5	0.5	721	120
Plots 9 and 1,3,20 (2024) Paving	262	6	0.5	786	131
Plots 5 and 10 (2025) Mass Excavation	261	9	0.5	1,175	196
Plots 5 and 10 (2025) Finish Grading	261	2	0.5	261	44
Plots 5 and 10 (2025) Utilities	261	25	0.5	3,263	544
Plots 5 and 10 (2025) Building-Concrete	261	6	0.5	783	131
Plots 5 and 10 (2025) Building-Wet Utilities	261	2	0.5	261	44
Plots 5 and 10 (2025) Building-Electrical	261	15	0.5	1,958	326
Plots 5 and 10 (2025) Building-Landscaping	261	6	0.5	783	131
Plots 5 and 10 (2025) Landscaping	261	0	0.5	-	-
Plots 5 and 10 (2025) Temporary Utilities	261	7	0.5	914	152
Plots 5 and 10 (2025) Curbing/Drive Approaches	261	6	0.5	783	131
Plots 5 and 10 (2025) Paving	261	4	0.5	522	87
Plots 10 and 8 (2026) Mass Excavation	261	9	0.5	1,175	196
Plots 10 and 8 (2026) Finish Grading	261	2	0.5	261	44
Plots 10 and 8 (2026) Utilities	261	25	0.5	3,263	544
Plots 10 and 8 (2026) Building-Concrete	261	2	0.5	261	44

Building Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Plots 10 and 8 (2026) Building-Wet Utilities	261	2	0.5	261	44
Plots 10 and 8 (2026) Building-Electrical	261	6	0.5	783	131
Plots 10 and 8 (2026) Building-Landscaping	261	7	0.5	914	152
Plots 10 and 8 (2026) Landscaping	261	6	0.5	783	131
Plots 10 and 8 (2026) Temporary Utilities	261	0	0.5	-	-
Plots 10 and 8 (2026) Curbing/Drive Approaches	261	4	0.5	522	87
Plots 10 and 8 (2026) Paving	261	6	0.5	783	131
Plot 8 (2027) Mass Excavation	261	12	0.5	1,566	261
Plot 8 (2027) Finish Grading	261	4.5	0.5	587	98
Plot 8 (2027) Utilities	261	14.5	0.5	1,892	315
Plot 8 (2027) Building-Concrete	261	8.5	0.5	1,109	185
Plot 8 (2027) Building-Wet Utilities	261	15	0.5	1,958	326
Plot 8 (2027) Building-Electrical	261	6	0.5	783	131
Plot 8 (2027) Building-Landscaping	261	4.5	0.5	587	98
Plot 8 (2027) Landscaping	261	15.5	0.5	2,023	337
Plot 8 (2027) Temporary Utilities	261	0	0.5	-	-
Plot 8 (2027) Curbing/Drive Approaches	261	5	0.5	653	109
Plot 8 (2027) Paving	261	6	0.5	783	131
Plots 11 and 6,7 (2028) Mass Excavation	260	15	0.5	1,950	325
Plots 11 and 6,7 (2028) Finish Grading	260	7	0.5	910	152
Plots 11 and 6,7 (2028) Utilities	260	4	0.5	520	87
Plots 11 and 6,7 (2028) Building-Concrete	260	15	0.5	1,950	325
Plots 11 and 6,7 (2028) Building-Wet Utilities	260	15	0.5	1,950	325
Plots 11 and 6,7 (2028) Building-Electrical	260	6	0.5	780	130
Plots 11 and 6,7 (2028) Building-Landscaping	260	2	0.5	260	43
Plots 11 and 6,7 (2028) Landscaping	260	0	0.5	-	-
Plots 11 and 6,7 (2028) Temporary Utilities	260	25	0.5	3,250	542
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	260	0	0.5	-	-
Plots 11 and 6,7 (2028) Paving	260	6	0.5	780	130
Plot 11 (2029) Mass Excavation	261	6	0.5	783	131
Plot 11 (2029) Finish Grading	261	11.5	0.5	1,501	250
Plot 11 (2029) Utilities	261	14.5	0.5	1,892	315
Plot 11 (2029) Building-Concrete	261	14.5	0.5	1,892	315
Plot 11 (2029) Building-Wet Utilities	261	8.5	0.5	1,109	185
Plot 11 (2029) Building-Electrical	261	15	0.5	1,958	326
Plot 11 (2029) Building-Landscaping	261	6	0.5	783	131
Plot 11 (2029) Landscaping	261	4.5	0.5	587	98
Plot 11 (2029) Temporary Utilities	261	2	0.5	261	44
Plot 11 (2029) Curbing/Drive Approaches	261	15.5	0.5	2,023	337
Plot 11 (2029) Paving	261	0	0.5	-	-
Plot 11 (2030) Mass Excavation	260	9	0.5	1,170	195
Plot 11 (2030) Finish Grading	260	2	0.5	260	43
Plot 11 (2030) Utilities	260	25	0.5	3,250	542
Plot 11 (2030) Building-Concrete	260	6	0.5	780	130
Plot 11 (2030) Building-Wet Utilities	260	2	0.5	260	43
Plot 11 (2030) Building-Electrical	260	15	0.5	1,950	325
Plot 11 (2030) Building-Landscaping	260	6	0.5	780	130

Building Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Plot 11 (2030) Landscaping	260	0	0.5	-	-
Plot 11 (2030) Temporary Utilities	260	7	0.5	910	152
Plot 11 (2030) Curbing/Drive Approaches	260	6	0.5	780	130
Plot 11 (2030) Paving	260	4	0.5	520	87
Plot 11 (2031) Mass Excavation	260	9	0.5	1,170	195
Plot 11 (2031) Finish Grading	260	2	0.5	260	43
Plot 11 (2031) Utilities	260	25	0.5	3,250	542
Plot 11 (2031) Building-Concrete	260	2	0.5	260	43
Plot 11 (2031) Building-Wet Utilities	260	2	0.5	260	43
Plot 11 (2031) Building-Electrical	260	6	0.5	780	130
Plot 11 (2031) Building-Landscaping	260	7	0.5	910	152
Plot 11 (2031) Landscaping	260	6	0.5	780	130
Plot 11 (2031) Temporary Utilities	260	0	0.5	-	-
Plot 11 (2031) Curbing/Drive Approaches	260	4	0.5	520	87
Plot 11 (2031) Paving	260	6	0.5	780	130
Plots 11 and 12 (2032) Mass Excavation	260	12	0.5	1,560	260
Plots 11 and 12 (2032) Finish Grading	260	4.5	0.5	585	98
Plots 11 and 12 (2032) Utilities	260	14.5	0.5	1,885	314
Plots 11 and 12 (2032) Building-Concrete	260	8.5	0.5	1,105	184
Plots 11 and 12 (2032) Building-Wet Utilities	260	15	0.5	1,950	325
Plots 11 and 12 (2032) Building-Electrical	260	6	0.5	780	130
Plots 11 and 12 (2032) Building-Landscaping	260	4.5	0.5	585	98
Plots 11 and 12 (2032) Landscaping	260	15.5	0.5	2,015	336
Plots 11 and 12 (2032) Temporary Utilities	260	0	0.5	-	-
Plots 11 and 12 (2032) Curbing/Drive Approaches	260	5	0.5	650	108
Plots 11 and 12 (2032) Paving	260	6	0.5	780	130
Plot 12 (2033) Finish Grading	260	15	0.5	1,950	325
Plot 12 (2033) Utilities	260	7	0.5	910	152
Plot 12 (2033) Building-Concrete	260	4	0.5	520	87
Plot 12 (2033) Building-Wet Utilities	260	15	0.5	1,950	325
Plot 12 (2033) Building-Electrical	260	15	0.5	1,950	325
Plot 12 (2033) Building-Landscaping	260	6	0.5	780	130
Plot 12 (2033) Landscaping	260	2	0.5	260	43
Plot 12 (2033) Temporary Utilities	260	0	0.5	-	-
Plot 12 (2033) Curbing/Drive Approaches	260	25	0.5	3,250	542
Plot 12 (2033) Paving	260	0	0.5	-	-
Plots 12 and 21,22 (2034) Finish Grading	260	6	0.5	780	130
Plots 12 and 21,22 (2034) Utilities	260	6	0.5	780	130
Plots 12 and 21,22 (2034) Building-Concrete	260	11.5	0.5	1,495	249
Plots 12 and 21,22 (2034) Building-Wet Utilities	260	14.5	0.5	1,885	314
Plots 12 and 21,22 (2034) Building-Electrical	260	14.5	0.5	1,885	314
Plots 12 and 21,22 (2034) Building-Landscaping	260	8.5	0.5	1,105	184
Plots 12 and 21,22 (2034) Landscaping	260	15	0.5	1,950	325
Plots 12 and 21,22 (2034) Temporary Utilities	260	6	0.5	780	130
Plots 12 and 21,22 (2034) Curbing/Drive Approaches	260	4.5	0.5	585	98
Plots 12 and 21,22 (2034) Paving	260	2	0.5	260	43
		Total Vendor Truck VMT:		169,710	

Building Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
			Total Idle-Hours:		28,285

World Logistics Center
Construction Energy Analysis

On-Road Vendor Trucks

			miles/gallomn
	0.1337	gallons/mile	7.5
	########	miles	
Total VMT diesel gallons (on-road vendor trucks):	########		
			Estimated Fuel Savings from Anti-Idling Regulation (64 percent based on estimated CARB emissions reductions):[3]
EMFAC2014 Diesel Fuel Consumption Factor:[2]	0.6687	gallons/hour	
Total Haul Truck Idle-Hours per Year:	28,285	hours	
Total Idling diesel gallons (on-road haul trucks):	**18,914**		52,540
Total diesel gallons (on-road haul trucks):	########	gal	

1. California Air Resources Board, EMFAC2017 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2017 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, https://www.arb.ca.gov/regact/idling/idling.htm, accessed November 2016.

Building Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Plots 2 and 4 (2020) Mass Excavation	262	9	25.0	58,950	197
Plots 2 and 4 (2020) Finish Grading	262	2	25.0	13,100	44
Plots 2 and 4 (2020) Utilities	262	25	25.0	163,750	546
Plots 2 and 4 (2020) Landscaping	262	6	25.0	39,300	131
Plots 2 and 4 (2020) Building Concrete	262	2	25.0	13,100	44
Plots 2 and 4 (2020) Building-Wet Utilities	262	15	25.0	98,250	328
Plots 2 and 4 (2020) Building-Electrical	262	6	25.0	39,300	131
Plots 2 and 4 (2020) Temporary Utilities	262	0	25.0	-	-
Plots 2 and 4 (2020) Building-Landscaping	262	7	25.0	45,850	153
Plots 2 and 4 (2020) Paving	262	6	25.0	39,300	131
Plots 2 and 4 (2020) Curbing/Drive Approaches	262	4	25.0	26,200	87
Plot 4 (2021) Mass Excavation	261	9	25.0	58,725	196
Plot 4 (2021) Finish Grading	261	2	25.0	13,050	44
Plot 4 (2021) Utilities	261	25	25.0	163,125	544
Plot 4 (2021) Building-Concrete	261	2	25.0	13,050	44
Plot 4 (2021) Building-Wet Utilities	261	2	25.0	13,050	44
Plot 4 (2021) Building-Electrical	261	6	25.0	39,150	131
Plot 4 (2021) Building-Landscaping	261	7	25.0	45,675	152
Plot 4 (2021) Landscaping	261	6	25.0	39,150	131
Plot 4 (2021) Temporary Utilities	261	0	25.0	-	-
Plot 4 (2021) Curbing/Drive Approaches	261	4	25.0	26,100	87
Plot 4 (2021) Paving	261	6	25.0	39,150	131
Plots 4 and 9 (2022) Mass Excavation	260	12	25.0	78,000	260
Plots 4 and 9 (2022) Finish Grading	260	4.5	25.0	29,250	98
Plots 4 and 9 (2022) Utilities	260	14.5	25.0	94,250	314
Plots 4 and 9 (2022) Building-Concrete	260	8.5	25.0	55,250	184
Plots 4 and 9 (2022) Building-Wet Utilities	260	15	25.0	97,500	325
Plots 4 and 9 (2022) Building-Electrical	260	6	25.0	39,000	130
Plots 4 and 9 (2022) Building-Landscaping	260	4.5	25.0	29,250	98
Plots 4 and 9 (2022) Landscaping	260	15.5	25.0	100,750	336
Plots 4 and 9 (2022) Temporary Utilities	260	0	25.0	-	-
Plots 4 and 9 (2022) Curbing/Drive Approaches	260	5	25.0	32,500	108
Plots 4 and 9 (2022) Paving	260	6	25.0	39,000	130
Plot 9 (2023) Mass Excavation	260	15	25.0	97,500	325
Plot 9 (2023) Finish Grading	260	7	25.0	45,500	152
Plot 9 (2023) Utilities	260	4	25.0	26,000	87
Plot 9 (2023) Building-Concrete	260	15	25.0	97,500	325
Plot 9 (2023) Building-Wet Utilities	260	15	25.0	97,500	325
Plot 9 (2023) Building-Electrical	260	6	25.0	39,000	130
Plot 9 (2023) Building-Landscaping	260	2	25.0	13,000	43
Plot 9 (2023) Interchange	260	0	25.0	-	-
Plot 9 (2023) Landscaping	260	25	25.0	162,500	542
Plot 9 (2023) Temporary Utilities	260	0	25.0	-	-
Plot 9 (2023) Curbing/Drive Approaches	260	6	25.0	39,000	130
Plot 9 (2023) Paving	260	6	25.0	39,000	130
Plots 9 and 1.3.20 (2024) Mass Excavation	261	11.5	25.0	75,038	250
Plots 9 and 1.3.20 (2024) Finish Grading	262	14.5	25.0	94,975	317
Plots 9 and 1.3.20 (2024) Utilities	262	14.5	25.0	94,975	317
Plots 9 and 1.3.20 (2024) Building-Concrete	262	8.5	25.0	55,675	186
Plots 9 and 1.3.20 (2024) Building-Wet Utilities	262	15	25.0	98,250	328
Plots 9 and 1.3.20 (2024) Building-Electrical	262	6	25.0	39,300	131
Plots 9 and 1.3.20 (2024) Building-Landscaping	262	4.5	25.0	29,475	98
Plots 9 and 1.3.20 (2024) Interchange	262	2	25.0	13,100	44
Plots 9 and 1.3.20 (2024) Landscaping	262	15.5	25.0	101,525	338
Plots 9 and 1.3.20 (2024) Temporary Utilities	262	0	25.0	-	-
Plots 9 and 1.3.20 (2024) Curbing/Drive Approaches	262	5.5	25.0	36,025	120
Plots 9 and 1.3.20 (2024) Paving	262	6	25.0	39,300	131
Plots 5 and 10 (2025) Mass Excavation	261	9	25	58,725	196
Plots 5 and 10 (2025) Finish Grading	261	2	25	13,050	44
Plots 5 and 10 (2025) Utilities	261	25	25	163,125	544
Plots 5 and 10 (2025) Building-Concrete	261	6	25	39,150	131
Plots 5 and 10 (2025) Building-Wet Utilities	261	2	25	13,050	44
Plots 5 and 10 (2025) Building-Electrical	261	15	25	97,875	326
Plots 5 and 10 (2025) Building-Landscaping	261	6	25	39,150	131
Plots 5 and 10 (2025) Landscaping	261	0	25	-	-
Plots 5 and 10 (2025) Temporary Utilities	261	7	25	45,675	152
Plots 5 and 10 (2025) Curbing/Drive Approaches	261	6	25	39,150	131
Plots 5 and 10 (2025) Paving	261	4	25	26,100	87
Plots 10 and 8 (2026) Mass Excavation	261	9	25	58,725	196
Plots 10 and 8 (2026) Finish Grading	261	2	25	13,050	44
Plots 10 and 8 (2026) Utilities	261	25	25	163,125	544
Plots 10 and 8 (2026) Building-Concrete	261	2	25	13,050	44
Plots 10 and 8 (2026) Building-Wet Utilities	261	2	25	13,050	44
Plots 10 and 8 (2026) Building-Electrical	261	6	25	39,150	131
Plots 10 and 8 (2026) Building-Landscaping	261	7	25	45,675	152
Plots 10 and 8 (2026) Landscaping	261	6	25	39,150	131
Plots 10 and 8 (2026) Temporary Utilities	261	0	25	-	-
Plots 10 and 8 (2026) Curbing/Drive Approaches	261	4	25	26,100	87
Plots 10 and 8 (2026) Paving	261	6	25	39,150	131
Plot 8 (2027) Mass Excavation	261	12	25	78,300	261
Plot 8 (2027) Finish Grading	261	4.5	25	29,363	98
Plot 8 (2027) Utilities	261	14.5	25	94,613	315
Plot 8 (2027) Building-Concrete	261	8.5	25	55,463	185
Plot 8 (2027) Building-Wet Utilities	261	15	25	97,875	326
Plot 8 (2027) Building-Electrical	261	6	25	39,150	131
Plot 8 (2027) Building-Landscaping	261	4.5	25	29,363	98
Plot 8 (2027) Landscaping	261	15.5	25	101,138	337
Plot 8 (2027) Temporary Utilities	261	0	25	-	-
Plot 8 (2027) Curbing/Drive Approaches	261	5	25	32,625	109
Plot 8 (2027) Paving	261	6	25	39,150	131
Plots 11 and 6.7 (2028) Mass Excavation	260	15	25	97,500	325
Plots 11 and 6.7 (2028) Finish Grading	260	7	25	45,500	152
Plots 11 and 6.7 (2028) Utilities	260	4	25	26,000	87
Plots 11 and 6.7 (2028) Building-Concrete	260	15	25	97,500	325
Plots 11 and 6.7 (2028) Building-Wet Utilities	260	15	25	97,500	325
Plots 11 and 6.7 (2028) Building-Electrical	260	6	25	39,000	130
Plots 11 and 6.7 (2028) Building-Landscaping	260	2	25	13,000	43
Plots 11 and 6.7 (2028) Landscaping	260	0	25	-	-
Plots 11 and 6.7 (2028) Temporary Utilities	260	25	25	162,500	542
Plots 11 and 6.7 (2028) Curbing/Drive Approaches	260	0	25	-	-
Plots 11 and 6.7 (2028) Paving	260	6	25	39,000	130
Plot 11 (2029) Mass Excavation	261	6	25	39,150	131
Plot 11 (2029) Finish Grading	261	11.5	25	75,038	250
Plot 11 (2029) Utilities	261	14.5	25	94,613	315
Plot 11 (2029) Building-Concrete	261	14.5	25	94,613	315
Plot 11 (2029) Building-Wet Utilities	261	8.5	25	55,463	185
Plot 11 (2029) Building-Electrical	261	15	25	97,875	326
Plot 11 (2029) Building-Landscaping	261	6	25	39,150	131
Plot 11 (2029) Landscaping	261	4.5	25	29,363	98
Plot 11 (2029) Temporary Utilities	261	2	25	13,050	44
Plot 11 (2029) Curbing/Drive Approaches	261	15.5	25	101,138	337
Plot 11 (2029) Paving	261	0	25	-	-
Plot 11 (2030) Mass Excavation	260	9	25	58,500	195
Plot 11 (2030) Finish Grading	260	2	25	13,000	43
Plot 11 (2030) Utilities	260	25	25	162,500	542
Plot 11 (2030) Building-Concrete	260	6	25	39,000	130
Plot 11 (2030) Building-Wet Utilities	260	2	25	13,000	43
Plot 11 (2030) Building-Electrical	260	15	25	97,500	325
Plot 11 (2030) Building-Landscaping	260	6	25	39,000	130
Plot 11 (2030) Landscaping	260	0	25	-	-
Plot 11 (2030) Temporary Utilities	260	7	25	45,500	152
Plot 11 (2030) Curbing/Drive Approaches	260	6	25	39,000	130
Plot 11 (2030) Paving	260	4	25	26,000	87
Plot 11 (2031) Mass Excavation	260	9	25	58,500	195
Plot 11 (2031) Finish Grading	260	2	25	13,000	43
Plot 11 (2031) Utilities	260	25	25	162,500	542
Plot 11 (2031) Building-Concrete	260	2	25	13,000	43
Plot 11 (2031) Building-Wet Utilities	260	2	25	13,000	43
Plot 11 (2031) Building-Electrical	260	6	25	39,000	130
Plot 11 (2031) Building-Landscaping	260	7	25	45,500	152
Plot 11 (2031) Landscaping	260	6	25	39,000	130
Plot 11 (2031) Temporary Utilities	260	0	25	-	-
Plot 11 (2031) Curbing/Drive Approaches	260	4	25	26,000	87
Plot 11 (2031) Paving	260	6	25	39,000	130
Plots 11 and 12 (2032) Mass Excavation	260	12	25	78,000	260
Plots 11 and 12 (2032) Finish Grading	260	4.5	25	29,250	98
Plots 11 and 12 (2032) Utilities	260	14.5	25	94,250	314
Plots 11 and 12 (2032) Building-Concrete	260	8.5	25	55,250	184
Plots 11 and 12 (2032) Building-Wet Utilities	260	15	25	97,500	325
Plots 11 and 12 (2032) Building-Electrical	260	6	25	39,000	130
Plots 11 and 12 (2032) Building-Landscaping	260	4.5	25	29,250	98
Plots 11 and 12 (2032) Landscaping	260	15.5	25	100,750	336
Plots 11 and 12 (2032) Temporary Utilities	260	0	25	-	-
Plots 11 and 12 (2032) Curbing/Drive Approaches	260	5	25	32,500	108
Plots 11 and 12 (2032) Paving	260	6	25	39,000	130
Plot 12 (2033) Finish Grading	260	15	25	97,500	325
Plot 12 (2033) Utilities	260	7	25	45,500	152
Plot 12 (2033) Building-Concrete	260	4	25	26,000	87
Plot 12 (2033) Building-Wet Utilities	260	15	25	97,500	325
Plot 12 (2033) Building-Electrical	260	15	25	97,500	325
Plot 12 (2033) Building-Landscaping	260	6	25	39,000	130
Plot 12 (2033) Landscaping	260	2	25	13,000	43
Plot 12 (2033) Temporary Utilities	260	0	25	-	-
Plot 12 (2033) Curbing/Drive Approaches	260	25	25	162,500	542
Plot 12 (2033) Paving	260	0	25	-	-
Plots 12 and 21.22 (2034) Finish Grading	260	6	25	39,000	130
Plots 12 and 21.22 (2034) Utilities	260	6	25	39,000	130
Plots 12 and 21.22 (2034) Building-Concrete	260	11.5	25	74,750	249
Plots 12 and 21.22 (2034) Building-Wet Utilities	260	14.5	25	94,250	314
Plots 12 and 21.22 (2034) Building-Electrical	260	14.5	25	94,250	314
Plots 12 and 21.22 (2034) Building-Landscaping	260	8.5	25	55,250	184
Plots 12 and 21.22 (2034) Landscaping	260	15	25	97,500	325
Plots 12 and 21.22 (2034) Temporary Utilities	260	6	25	39,000	130
Plots 12 and 21.22 (2034) Curbing/Drive Approaches	260	4.5	25	29,250	98
Plots 12 and 21.22 (2034) Paving	260	2	25	13,000	43
			Total Vendor Truck VMT:	8,485,475	
			Total Idle-Hours:		28,285

World Logistics Center
Construction Energy Analysis

On-Road Haul Trucks

	0.1551	gallons/mile	miles/gallon	
	137,496	miles	6.45	
Total VMT diesel gallons (on-road haul trucks):	**21,328**			
				Estimated Fuel Savings from
EMFAC2014 Diesel Fuel Consumption Factor:[2]	0.7756	gallons/hour		*Anti-Idling Regulation (64 percent based on*
Total Haul Truck Idle-Hours per Year:	22,916	hours		*estimated CARB emissions reductions):*[3]
Total Idling diesel gallons (on-road haul trucks):	**17,774**			*49,371*
Total diesel gallons (on-road haul trucks):	**39,102**	gal		

1. California Air Resources Board, EMFAC2017 (South Coast Air Basin; T7 Single Construction; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2017 (South Coast Air Basin; T7 Single Construction; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, https://www.arb.ca.gov/regact/idling/idling.htm, accessed November 2016.

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 2 and 4 (2020) Mass Excavation	262	1705	0.5	853	142
Plots 2 and 4 (2020) Finish Grading	262	26	0.5	13	2
Plots 2 and 4 (2020) Utilities	262	6260	0.5	3,130	522
Plots 2 and 4 (2020) Landscaping	262	0	0.5	-	-
Plots 2 and 4 (2020) Building Concrete	262	7512	0.5	3,756	626
Plots 2 and 4 (2020) Building-Wet Utilities	262	2191	0.5	1,096	183
Plots 2 and 4 (2020) Building-Electrical	262	5008	0.5	2,504	417
Plots 2 and 4 (2020) Temporary Utilities	262	0	0.5	-	-
Plots 2 and 4 (2020) Building-Landscaping	262	0	0.5	-	-
Plots 2 and 4 (2020) Paving	262	528	0.5	264	44
Plots 2 and 4 (2020) Curbing/Drive Approaches	262	624	0.5	312	52
Plot 4 (2021) Mass Excavation	261	1705	0.5	853	142
Plot 4 (2021) Finish Grading	261	52	0.5	26	4
Plot 4 (2021) Utilities	261	6260	0.5	3,130	522
Plot 4 (2021) Building-Concrete	261	7512	0.5	3,756	626
Plot 4 (2021) Building-Wet Utilities	261	7512	0.5	3,756	626
Plot 4 (2021) Building-Electrical	261	5008	0.5	2,504	417
Plot 4 (2021) Building-Landscaping	261	0	0.5	-	-
Plot 4 (2021) Landscaping	261	0	0.5	-	-
Plot 4 (2021) Temporary Utilities	261	0	0.5	-	-
Plot 4 (2021) Curbing/Drive Approaches	261	624	0.5	312	52
Plot 4 (2021) Paving	261	528	0.5	264	44
Plots 4 and 9 (2022) Mass Excavation	260	2945	0.5	1,473	245
Plots 4 and 9 (2022) Finish Grading	260	26	0.5	13	2

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 4 and 9 (2022) Utilities	260	3442	0.5	1,721	287
Plots 4 and 9 (2022) Building-Concrete	260	5848.5	0.5	2,924	487
Plots 4 and 9 (2022) Building-Wet Utilities	260	2191	0.5	1,096	183
Plots 4 and 9 (2022) Building-Electrical	260	2556	0.5	1,278	213
Plots 4 and 9 (2022) Building-Landscaping	260	3756	0.5	1,878	313
Plots 4 and 9 (2022) Landscaping	260	3130	0.5	1,565	261
Plots 4 and 9 (2022) Temporary Utilities	260	0	0.5	-	-
Plots 4 and 9 (2022) Curbing/Drive Approaches	260	2816	0.5	1,408	235
Plots 4 and 9 (2022) Paving	260	264	0.5	132	22
Plot 9 (2023) Mass Excavation	260	4185	0.5	2,093	349
Plot 9 (2023) Finish Grading	260	0	0.5	-	-
Plot 9 (2023) Utilities	260	624	0.5	312	52
Plot 9 (2023) Building-Concrete	260	4185	0.5	2,093	349
Plot 9 (2023) Building-Wet Utilities	260	2191	0.5	1,096	183
Plot 9 (2023) Building-Electrical	260	104	0.5	52	9
Plot 9 (2023) Building-Landscaping	260	7512	0.5	3,756	626
Plot 9 (2023) Interchange	260	0	0.5	-	-
Plot 9 (2023) Landscaping	260	6260	0.5	3,130	522
Plot 9 (2023) Temporary Utilities	260	0	0.5	-	-
Plot 9 (2023) Curbing/Drive Approaches	260	5008	0.5	2,504	417
Plot 9 (2023) Paving	260	0	0.5	-	-
Plots 9 and 1,3,20 (2024) Mass Excavation	261	2635	0.5	1,318	220
Plots 9 and 1,3,20 (2024) Finish Grading	262	3442	0.5	1,721	287
Plots 9 and 1,3,20 (2024) Utilities	262	3442	0.5	1,721	287
Plots 9 and 1,3,20 (2024) Building-Concrete	262	5848.5	0.5	2,924	487
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	262	2191	0.5	1,096	183
Plots 9 and 1,3,20 (2024) Building-Electrical	262	2556	0.5	1,278	213
Plots 9 and 1,3,20 (2024) Building-Landscaping	262	3756	0.5	1,878	313
Plots 9 and 1,3,20 (2024) Interchange	262	1408.5	0.5	704	117
Plots 9 and 1,3,20 (2024) Landscaping	262	3130	0.5	1,565	261
Plots 9 and 1,3,20 (2024) Temporary Utilities	262	0	0.5	-	-
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	262	312	0.5	156	26
Plots 9 and 1,3,20 (2024) Paving	262	264	0.5	132	22
Plots 5 and 10 (2025) Mass Excavation	261	7	0.5	3	1
Plots 5 and 10 (2025) Finish Grading	261	0	0.5	0	0
Plots 5 and 10 (2025) Utilities	261	24	0.5	12	2
Plots 5 and 10 (2025) Building-Concrete	261	0	0.5	-	-
Plots 5 and 10 (2025) Building-Wet Utilities	261	29	0.5	14	2
Plots 5 and 10 (2025) Building-Electrical	261	8	0.5	4	1
Plots 5 and 10 (2025) Building-Landscaping	261	19	0.5	10	2
Plots 5 and 10 (2025) Landscaping	261	0	0.5	-	-
Plots 5 and 10 (2025) Temporary Utilities	261	0	0.5	-	-
Plots 5 and 10 (2025) Curbing/Drive Approaches	261	2	0.5	1	0
Plots 5 and 10 (2025) Paving	261	2	0.5	1	0
Plots 10 and 8 (2026) Mass Excavation	261	7	0.5	3	1
Plots 10 and 8 (2026) Finish Grading	261	0	0.5	0	0

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 10 and 8 (2026) Utilities	261	24	0.5	12	2
Plots 10 and 8 (2026) Building-Concrete	261	29	0.5	14	2
Plots 10 and 8 (2026) Building-Wet Utilities	261	29	0.5	14	2
Plots 10 and 8 (2026) Building-Electrical	261	19	0.5	10	2
Plots 10 and 8 (2026) Building-Landscaping	261	0	0.5	-	-
Plots 10 and 8 (2026) Landscaping	261	0	0.5	-	-
Plots 10 and 8 (2026) Temporary Utilities	261	0	0.5	-	-
Plots 10 and 8 (2026) Curbing/Drive Approaches	261	2	0.5	1	0
Plots 10 and 8 (2026) Paving	261	2	0.5	1	0
Plot 8 (2027) Mass Excavation	261	11	0.5	6	1
Plot 8 (2027) Finish Grading	261	0	0.5	0	0
Plot 8 (2027) Utilities	261	13	0.5	7	1
Plot 8 (2027) Building-Concrete	261	22	0.5	11	2
Plot 8 (2027) Building-Wet Utilities	261	8	0.5	4	1
Plot 8 (2027) Building-Electrical	261	10	0.5	5	1
Plot 8 (2027) Building-Landscaping	261	14	0.5	7	1
Plot 8 (2027) Landscaping	261	12	0.5	6	1
Plot 8 (2027) Temporary Utilities	261	0	0.5	-	-
Plot 8 (2027) Curbing/Drive Approaches	261	11	0.5	5	1
Plot 8 (2027) Paving	261	1	0.5	1	0
Plots 11 and 6,7 (2028) Mass Excavation	260	16	0.5	8	1
Plots 11 and 6,7 (2028) Finish Grading	260	0	0.5	-	-
Plots 11 and 6,7 (2028) Utilities	260	2	0.5	1	0
Plots 11 and 6,7 (2028) Building-Concrete	260	16	0.5	8	1
Plots 11 and 6,7 (2028) Building-Wet Utilities	260	8	0.5	4	1
Plots 11 and 6,7 (2028) Building-Electrical	260	0	0.5	0	0
Plots 11 and 6,7 (2028) Building-Landscaping	260	29	0.5	14	2
Plots 11 and 6,7 (2028) Landscaping	260	0	0.5	-	-
Plots 11 and 6,7 (2028) Temporary Utilities	260	24	0.5	12	2
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	260	0	0.5	-	-
Plots 11 and 6,7 (2028) Paving	260	19	0.5	10	2
Plot 11 (2029) Mass Excavation	261	0	0.5	-	-
Plot 11 (2029) Finish Grading	261	10	0.5	5	1
Plot 11 (2029) Utilities	261	13	0.5	7	1
Plot 11 (2029) Building-Concrete	261	13	0.5	7	1
Plot 11 (2029) Building-Wet Utilities	261	22	0.5	11	2
Plot 11 (2029) Building-Electrical	261	8	0.5	4	1
Plot 11 (2029) Building-Landscaping	261	10	0.5	5	1
Plot 11 (2029) Landscaping	261	14	0.5	7	1
Plot 11 (2029) Temporary Utilities	261	5	0.5	3	0
Plot 11 (2029) Curbing/Drive Approaches	261	12	0.5	6	1
Plot 11 (2029) Paving	261	0	0.5	-	-
Plot 11 (2030) Mass Excavation	260	1705	0.5	853	142
Plot 11 (2030) Finish Grading	260	26	0.5	13	2
Plot 11 (2030) Utilities	260	6260	0.5	3,130	522
Plot 11 (2030) Building-Concrete	260	0	0.5	-	-

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plot 11 (2030) Building-Wet Utilities	260	7512	0.5	3,756	626
Plot 11 (2030) Building-Electrical	260	2191	0.5	1,096	183
Plot 11 (2030) Building-Landscaping	260	5008	0.5	2,504	417
Plot 11 (2030) Landscaping	260	0	0.5	-	-
Plot 11 (2030) Temporary Utilities	260	0	0.5	-	-
Plot 11 (2030) Curbing/Drive Approaches	260	528	0.5	264	44
Plot 11 (2030) Paving	260	624	0.5	312	52
Plot 11 (2031) Mass Excavation	260	1705	0.5	853	142
Plot 11 (2031) Finish Grading	260	52	0.5	26	4
Plot 11 (2031) Utilities	260	6260	0.5	3,130	522
Plot 11 (2031) Building-Concrete	260	7512	0.5	3,756	626
Plot 11 (2031) Building-Wet Utilities	260	7512	0.5	3,756	626
Plot 11 (2031) Building-Electrical	260	5008	0.5	2,504	417
Plot 11 (2031) Building-Landscaping	260	0	0.5	-	-
Plot 11 (2031) Landscaping	260	0	0.5	-	-
Plot 11 (2031) Temporary Utilities	260	0	0.5	-	-
Plot 11 (2031) Curbing/Drive Approaches	260	624	0.5	312	52
Plot 11 (2031) Paving	260	528	0.5	264	44
Plots 11 and 12 (2032) Mass Excavation	260	2945	0.5	1,473	245
Plots 11 and 12 (2032) Finish Grading	260	26	0.5	13	2
Plots 11 and 12 (2032) Utilities	260	3442	0.5	1,721	287
Plots 11 and 12 (2032) Building-Concrete	260	5848.5	0.5	2,924	487
Plots 11 and 12 (2032) Building-Wet Utilities	260	2191	0.5	1,096	183
Plots 11 and 12 (2032) Building-Electrical	260	2556	0.5	1,278	213
Plots 11 and 12 (2032) Building-Landscaping	260	3756	0.5	1,878	313
Plots 11 and 12 (2032) Landscaping	260	3130	0.5	1,565	261
Plots 11 and 12 (2032) Temporary Utilities	260	0	0.5	-	-
Plots 11 and 12 (2032) Curbing/Drive Approaches	260	2816	0.5	1,408	235
Plots 11 and 12 (2032) Paving	260	264	0.5	132	22
Plot 12 (2033) Finish Grading	260	4185	0.5	2,093	349
Plot 12 (2033) Utilities	260	0	0.5	-	-
Plot 12 (2033) Building-Concrete	260	624	0.5	312	52
Plot 12 (2033) Building-Wet Utilities	260	4185	0.5	2,093	349
Plot 12 (2033) Building-Electrical	260	2191	0.5	1,096	183
Plot 12 (2033) Building-Landscaping	260	104	0.5	52	9
Plot 12 (2033) Landscaping	260	7512	0.5	3,756	626
Plot 12 (2033) Temporary Utilities	260	0	0.5	-	-
Plot 12 (2033) Curbing/Drive Approaches	260	6260	0.5	3,130	522
Plot 12 (2033) Paving	260	0	0.5	-	-
Plots 12 and 21,22 (2034) Finish Grading	260	5008	0.5	2,504	417
Plots 12 and 21,22 (2034) Utilities	260	0	0.5	-	-
Plots 12 and 21,22 (2034) Building-Concrete	260	2635	0.5	1,318	220
Plots 12 and 21,22 (2034) Building-Wet Utilities	260	3442	0.5	1,721	287
Plots 12 and 21,22 (2034) Building-Electrical	260	3442	0.5	1,721	287
Plots 12 and 21,22 (2034) Building-Landscaping	260	5848.5	0.5	2,924	487
Plots 12 and 21,22 (2034) Landscaping	260	2,191	0.5	1,096	183

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 12 and 21,22 (2034) Temporary Utilities	260.0	2,556.0	0.5	1,278	213
Plots 12 and 21,22 (2034) Curbing/Drive Approaches	260	3756	0.5	1,878	313
Plots 12 and 21,22 (2034) Paving	260	1408.5	0.5	704	117
			Total VMT:	137,496	
			Total Idle hours:		22,916

World Logistics Center
Construction Energy Analysis

On-Road Haul Trucks

	0.1551	gallons/mile	miles/gallon	
	10,324,213	miles	6.45	
Total VMT diesel gallons (on-road haul trucks):	**1,601,486**			
				Estimated Fuel Savings from
EMFAC2017 Diesel Fuel Consumption Factor:2	0.7756	gallons/hour		*Anti-Idling Regulation (64 percent based on*
Total Haul Truck Idle-Hours per Year:	34,414	hours		*estimated CARB emissions reductions):* [3]
Total Idling diesel gallons (on-road haul trucks):	**26,691**			*74,143*
Total diesel gallons (on-road haul trucks):	**1,628,178**	gal		

1. California Air Resources Board, EMFAC2017 (South Coast Air Basin; T7 Single Construction; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2017 (South Coast Air Basin; T7 Single Construction; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, https://www.arb.ca.gov/regact/idling/idling.htm, accessed November 2016.

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 2 and 4 (2020) Mass Excavation	262	1705	25	42,625	142
Plots 2 and 4 (2020) Finish Grading	262	26	25	650	2
Plots 2 and 4 (2020) Utilities	262	6260	25	156,500	522
Plots 2 and 4 (2020) Landscaping	262	0	25	-	-
Plots 2 and 4 (2020) Building Concrete	262	7512	25	187,800	626
Plots 2 and 4 (2020) Building-Wet Utilities	262	2191	25	54,775	183
Plots 2 and 4 (2020) Building-Electrical	262	5008	25	125,200	417
Plots 2 and 4 (2020) Temporary Utilities	262	0	25	-	-
Plots 2 and 4 (2020) Building-Landscaping	262	0	25	-	-
Plots 2 and 4 (2020) Paving	262	528	25	13,200	44
Plots 2 and 4 (2020) Curbing/Drive Approaches	262	624	25	15,600	52
Plot 4 (2021) Mass Excavation	261	1705	25	42,625	142
Plot 4 (2021) Finish Grading	261	52	25	1,300	4
Plot 4 (2021) Utilities	261	6260	25	156,500	522
Plot 4 (2021) Building-Concrete	261	7512	25	187,800	626
Plot 4 (2021) Building-Wet Utilities	261	7512	25	187,800	626
Plot 4 (2021) Building-Electrical	261	5008	25	125,200	417
Plot 4 (2021) Building-Landscaping	261	0	25	-	-
Plot 4 (2021) Landscaping	261	0	25	-	-
Plot 4 (2021) Temporary Utilities	261	0	25	-	-
Plot 4 (2021) Curbing/Drive Approaches	261	624	25	15,600	52
Plot 4 (2021) Paving	261	528	25	13,200	44
Plots 4 and 9 (2022) Mass Excavation	260	2945	25	73,625	245
Plots 4 and 9 (2022) Finish Grading	260	26	25	650	2

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 4 and 9 (2022) Utilities	260	3442	25	86,050	287
Plots 4 and 9 (2022) Building-Concrete	260	5848.5	25	146,213	487
Plots 4 and 9 (2022) Building-Wet Utilities	260	2191	25	54,775	183
Plots 4 and 9 (2022) Building-Electrical	260	2556	25	63,900	213
Plots 4 and 9 (2022) Building-Landscaping	260	3756	25	93,900	313
Plots 4 and 9 (2022) Landscaping	260	3130	25	78,250	261
Plots 4 and 9 (2022) Temporary Utilities	260	0	25	-	-
Plots 4 and 9 (2022) Curbing/Drive Approaches	260	2816	25	70,400	235
Plots 4 and 9 (2022) Paving	260	264	25	6,600	22
Plot 9 (2023) Mass Excavation	260	4185	25	104,625	349
Plot 9 (2023) Finish Grading	260	0	25	-	-
Plot 9 (2023) Utilities	260	624	25	15,600	52
Plot 9 (2023) Building-Concrete	260	4185	25	104,625	349
Plot 9 (2023) Building-Wet Utilities	260	2191	25	54,775	183
Plot 9 (2023) Building-Electrical	260	104	25	2,600	9
Plot 9 (2023) Building-Landscaping	260	7512	25	187,800	626
Plot 9 (2023) Interchange	260	0	25	-	-
Plot 9 (2023) Landscaping	260	6260	25	156,500	522
Plot 9 (2023) Temporary Utilities	260	0	25	-	-
Plot 9 (2023) Curbing/Drive Approaches	260	5008	25	125,200	417
Plot 9 (2023) Paving	260	0	25	-	-
Plots 9 and 1,3,20 (2024) Mass Excavation	261	2635	25	65,875	220
Plots 9 and 1,3,20 (2024) Finish Grading	262	3442	25	86,050	287
Plots 9 and 1,3,20 (2024) Utilities	262	3442	25	86,050	287
Plots 9 and 1,3,20 (2024) Building-Concrete	262	5848.5	25	146,213	487
Plots 9 and 1,3,20 (2024) Building-Wet Utilities	262	2191	25	54,775	183
Plots 9 and 1,3,20 (2024) Building-Electrical	262	2556	25	63,900	213
Plots 9 and 1,3,20 (2024) Building-Landscaping	262	3756	25	93,900	313
Plots 9 and 1,3,20 (2024) Interchange	262	1408.5	25	35,213	117
Plots 9 and 1,3,20 (2024) Landscaping	262	3130	25	78,250	261
Plots 9 and 1,3,20 (2024) Temporary Utilities	262	0	25	-	-
Plots 9 and 1,3,20 (2024) Curbing/Drive Approaches	262	312	25	7,800	26
Plots 9 and 1,3,20 (2024) Paving	262	264	25	6,600	22
Plots 5 and 10 (2025) Mass Excavation	261	1705	25	42,625	142
Plots 5 and 10 (2025) Finish Grading	261	26	25	650	2
Plots 5 and 10 (2025) Utilities	261	6260	25	156,500	522
Plots 5 and 10 (2025) Building-Concrete	261	0	25	-	-
Plots 5 and 10 (2025) Building-Wet Utilities	261	7512	25	187,800	626
Plots 5 and 10 (2025) Building-Electrical	261	2191	25	54,775	183
Plots 5 and 10 (2025) Building-Landscaping	261	5008	25	125,200	417
Plots 5 and 10 (2025) Landscaping	261	0	25	-	-
Plots 5 and 10 (2025) Temporary Utilities	261	0	25	-	-
Plots 5 and 10 (2025) Curbing/Drive Approaches	261	528	25	13,200	44
Plots 5 and 10 (2025) Paving	261	624	25	15,600	52
Plots 10 and 8 (2026) Mass Excavation	261	1705	25	42,625	142
Plots 10 and 8 (2026) Finish Grading	261	52	25	1,300	4

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 10 and 8 (2026) Utilities	261	6260	25	156,500	522
Plots 10 and 8 (2026) Building-Concrete	261	7512	25	187,800	626
Plots 10 and 8 (2026) Building-Wet Utilities	261	7512	25	187,800	626
Plots 10 and 8 (2026) Building-Electrical	261	5008	25	125,200	417
Plots 10 and 8 (2026) Building-Landscaping	261	0	25	-	-
Plots 10 and 8 (2026) Landscaping	261	0	25	-	-
Plots 10 and 8 (2026) Temporary Utilities	261	0	25	-	-
Plots 10 and 8 (2026) Curbing/Drive Approaches	261	624	25	15,600	52
Plots 10 and 8 (2026) Paving	261	528	25	13,200	44
Plot 8 (2027) Mass Excavation	261	2945	25	73,625	245
Plot 8 (2027) Finish Grading	261	26	25	650	2
Plot 8 (2027) Utilities	261	3442	25	86,050	287
Plot 8 (2027) Building-Concrete	261	5848.5	25	146,213	487
Plot 8 (2027) Building-Wet Utilities	261	2191	25	54,775	183
Plot 8 (2027) Building-Electrical	261	2556	25	63,900	213
Plot 8 (2027) Building-Landscaping	261	3756	25	93,900	313
Plot 8 (2027) Landscaping	261	3130	25	78,250	261
Plot 8 (2027) Temporary Utilities	261	0	25	-	-
Plot 8 (2027) Curbing/Drive Approaches	261	2816	25	70,400	235
Plot 8 (2027) Paving	261	264	25	6,600	22
Plots 11 and 6,7 (2028) Mass Excavation	260	4185	25	104,625	349
Plots 11 and 6,7 (2028) Finish Grading	260	0	25	-	-
Plots 11 and 6,7 (2028) Utilities	260	624	25	15,600	52
Plots 11 and 6,7 (2028) Building-Concrete	260	4185	25	104,625	349
Plots 11 and 6,7 (2028) Building-Wet Utilities	260	2191	25	54,775	183
Plots 11 and 6,7 (2028) Building-Electrical	260	104	25	2,600	9
Plots 11 and 6,7 (2028) Building-Landscaping	260	7512	25	187,800	626
Plots 11 and 6,7 (2028) Landscaping	260	0	25	-	-
Plots 11 and 6,7 (2028) Temporary Utilities	260	6260	25	156,500	522
Plots 11 and 6,7 (2028) Curbing/Drive Approaches	260	0	25	-	-
Plots 11 and 6,7 (2028) Paving	260	5008	25	125,200	417
Plot 11 (2029) Mass Excavation	261	0	25	-	-
Plot 11 (2029) Finish Grading	261	2635	25	65,875	220
Plot 11 (2029) Utilities	261	3442	25	86,050	287
Plot 11 (2029) Building-Concrete	261	3442	25	86,050	287
Plot 11 (2029) Building-Wet Utilities	261	5848.5	25	146,213	487
Plot 11 (2029) Building-Electrical	261	2191	25	54,775	183
Plot 11 (2029) Building-Landscaping	261	2556	25	63,900	213
Plot 11 (2029) Landscaping	261	3756	25	93,900	313
Plot 11 (2029) Temporary Utilities	261	1408.5	25	35,213	117
Plot 11 (2029) Curbing/Drive Approaches	261	3130	25	78,250	261
Plot 11 (2029) Paving	261	0	25	-	-
Plot 11 (2030) Mass Excavation	260	1705	25	42,625	142
Plot 11 (2030) Finish Grading	260	26	25	650	2
Plot 11 (2030) Utilities	260	6260	25	156,500	522
Plot 11 (2030) Building-Concrete	260	0	25	-	-

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plot 11 (2030) Building-Wet Utilities	260	7512	25	187,800	626
Plot 11 (2030) Building-Electrical	260	2191	25	54,775	183
Plot 11 (2030) Building-Landscaping	260	5008	25	125,200	417
Plot 11 (2030) Landscaping	260	0	25	-	-
Plot 11 (2030) Temporary Utilities	260	0	25	-	-
Plot 11 (2030) Curbing/Drive Approaches	260	528	25	13,200	44
Plot 11 (2030) Paving	260	624	25	15,600	52
Plot 11 (2031) Mass Excavation	260	1705	25	42,625	142
Plot 11 (2031) Finish Grading	260	52	25	1,300	4
Plot 11 (2031) Utilities	260	6260	25	156,500	522
Plot 11 (2031) Building-Concrete	260	7512	25	187,800	626
Plot 11 (2031) Building-Wet Utilities	260	7512	25	187,800	626
Plot 11 (2031) Building-Electrical	260	5008	25	125,200	417
Plot 11 (2031) Building-Landscaping	260	0	25	-	-
Plot 11 (2031) Landscaping	260	0	25	-	-
Plot 11 (2031) Temporary Utilities	260	0	25	-	-
Plot 11 (2031) Curbing/Drive Approaches	260	624	25	15,600	52
Plot 11 (2031) Paving	260	528	25	13,200	44
Plots 11 and 12 (2032) Mass Excavation	260	2945	25	73,625	245
Plots 11 and 12 (2032) Finish Grading	260	26	25	650	2
Plots 11 and 12 (2032) Utilities	260	3442	25	86,050	287
Plots 11 and 12 (2032) Building-Concrete	260	5848.5	25	146,213	487
Plots 11 and 12 (2032) Building-Wet Utilities	260	2191	25	54,775	183
Plots 11 and 12 (2032) Building-Electrical	260	2556	25	63,900	213
Plots 11 and 12 (2032) Building-Landscaping	260	3756	25	93,900	313
Plots 11 and 12 (2032) Landscaping	260	3130	25	78,250	261
Plots 11 and 12 (2032) Temporary Utilities	260	0	25	-	-
Plots 11 and 12 (2032) Curbing/Drive Approaches	260	2816	25	70,400	235
Plots 11 and 12 (2032) Paving	260	264	25	6,600	22
Plot 12 (2033) Finish Grading	260	4185	25	104,625	349
Plot 12 (2033) Utilities	260	0	25	-	-
Plot 12 (2033) Building-Concrete	260	624	25	15,600	52
Plot 12 (2033) Building-Wet Utilities	260	4185	25	104,625	349
Plot 12 (2033) Building-Electrical	260	2191	25	54,775	183
Plot 12 (2033) Building-Landscaping	260	104	25	2,600	9
Plot 12 (2033) Landscaping	260	7512	25	187,800	626
Plot 12 (2033) Temporary Utilities	260	0	25	-	-
Plot 12 (2033) Curbing/Drive Approaches	260	6260	25	156,500	522
Plot 12 (2033) Paving	260	0	25	-	-
Plots 12 and 21,22 (2034) Finish Grading	260	5008	25	125,200	417
Plots 12 and 21,22 (2034) Utilities	260	0	25	-	-
Plots 12 and 21,22 (2034) Building-Concrete	260	2635	25	65,875	220
Plots 12 and 21,22 (2034) Building-Wet Utilities	260	3442	25	86,050	287
Plots 12 and 21,22 (2034) Building-Electrical	260	3442	25	86,050	287
Plots 12 and 21,22 (2034) Building-Landscaping	260	5848.5	25	146,213	487
Plots 12 and 21,22 (2034) Landscaping	260	2,191	25	54,775	183

Building Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Plots 12 and 21,22 (2034) Temporary Utilities	260.0	2,556.0	25	63,900	213
Plots 12 and 21,22 (2034) Curbing/Drive Approaches	260	3756	25	93,900	313
Plots 12 and 21,22 (2034) Paving	260	1408.5	25	35,213	117
				10,324,213	
					34,414

This tool provides a quick estimation of the fuel use and emissions for your equipment in a specific year. The results may slightly differ from those from the official inventory model.
Instructions:
Enter the horsepwer, model year, and other details about your equipment in the Input box.
Make sure to update the ***load factor*** for your equipment using the lookup table.
The ***Output*** box gives a quick estimation of the fuel use, NOx, PM, and THC emission for your equipment.

Input

Input	Input Engine Here
Horsepower (hp)	120
Model year	2011
Calendar year	2015
Activity (annual hours)	250
Accumulated hours on equipment (estimate using annual-hours*age if you only know the age of the equipment)	1000
Load factor (check the lookup table)	0.2

Results

Results	
Fuel Used (gallon)	310
NOx Emissions (kg)	15.4
PM Emissions (kg)	0.7
THC Emissions (kg)	0.7
CO2 Emissions (kg)	3162.6
NOx Emission Factor (including deterioration and fuel correction factor): gram/bhp-hr	2.57
PM Emission Factor (including deterioration and fuel correction factor): gram/bhp-hr	0.12
THC Emission Factor (including deterioration and fuel correction factor): gram/ bhp-hr	0.11

Intermediate steps

HPbin	175
NOx_EF0	2.67
NOx_DR	3.5E-05
NOx_FCF	0.950
PM_EF0	0.12
PM_DR	8.6E-06
PM_FCF	0.90
THC_EF0	0.10
THC_DR	2.5E-05
THC_FCF	0.90
NOx_EF (g/hp-hr)	2.57
PM_EF (g/hp-hr)	0.12
THC_EF (g/hp-hr)	0.11
CO2_EF (kg/gallon-diesel)*	10.21
BSFC (lb/hp-hr)	0.367
Unit conversion (lb/gallon)	7.109

*Reference: www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf

Loac Factor Lookup Table

Equipment Category	Equipment Type	Details	Load Factor
Agriculture equipment	Agricultural tractors		0.48
	Combine harvesters		0.44
	Forage & silage harvesters		0.44
	Cotton pickers		0.44
	Nut harvester		0.44
	Other harvesters		0.44
	Balers (self propelled)		0.50
	Bale wagons (self propelled)		0.50
	Swathers/windrowers/hay conditioners		0.48
	Hay Squeeze/Stack retriever		0.42
	Sprayers/Spray rigs		0.42
	Construction equipment		0.40
	Other non-mobile		0.48
	Forklifts		0.40
	Atvs		0.40
	Others		0.40
Portable equipment	All portable equipment		0.31
Cargo Handling Equipment	Construction equipment		0.55
	Container handling equipment		0.59
	Forklift		0.30
	Other general industrial equipment		0.51
	Rtg crane		0.20
	Yard tractor		0.39
Transport Refrigeration Units (TRU)	TRU on trailers	25 HP and over, MY2012 and Older	0.46
	TRU on trailers	25 HP and over, MY2013 and Newer	0.38
	TRU on trailers	23 HP and Over, below 25 HP, All years	0.46
	TRU on trucks	Below 23 HP, All Model years	0.56
	TRU on railcars	25 HP and over, MY2012 and Older	0.33
	TRU on railcars	25 HP and over, MY2013 and Newer	0.27
	TRU on railcars	Below 25 HP, All Model years	0.33
	TRU with generators	25 HP and over, MY2012 and Older	0.46
	TRU with generators	25 HP and Over, MY2013 and Newer	0.38
	TRU with generators	23 HP and Over, below 25 HP, All Model Years	0.46
Ground Support Equipment	Passenger Stand		0.40
	A/C Tug Narrow Body		0.54
	A/C Tug Wide Body		0.54
	Baggage Tug		0.37
	Belt Loader		0.34
	Bobtail		0.37
	Cargo Loader		0.34
	Cargo Tractor		0.36
	Forklift (GSE)		0.20
	Lift (GSE)		0.34
	Other GSE		0.34
Construction and Industrial Equipment	Cranes		0.29
	Crawler Tractors		0.43
	Excavators		0.38
	Graders		0.41
	Off-Highway Tractors		0.44
	Off-Highway Trucks		0.38
	Other Construction Equipment		0.42
	Pavers		0.42
	Paving Equipment		0.36
	Rollers		0.38
	Rough Terrain Forklifts		0.40
	Rubber Tired Dozers		0.40
	Rubber Tired Loaders		0.36
	Scrapers		0.48
	Skid Steer Loaders		0.37
	Surfacing Equipment		0.30
	Tractors/Loaders/Backhoes		0.37
	Trenchers		0.50
	Aerial Lifts		0.31
	Forklifts		0.20
	Other General Industrial Equipment		0.34
	Other Material Handling Equipment		0.40
	Sweepers/Scrubbers		0.46
Oil and Drill Rigs	Drill Rig (Mobile)		0.50
	Workover Rig (Mobile)		0.50
	Bore/Drill Rigs		0.50

EMFAC2017 Emissions Inventory
Region Type: Air Basin
Region: South Coast
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Fuel_Consumption
SOUTH CO	2020	HHDT	Aggregate	Aggregated	GAS	87.06695208	7544.942081	1.924993227
SOUTH CO	2020	HHDT	Aggregate	Aggregated	DSL	94401.00533	11283644.05	1766.775921
SOUTH CO	2020	HHDT	Aggregate	Aggregated	NG	4355.501273	177332.3374	81.93282418
SOUTH CO	2020	LDA	Aggregate	Aggregated	GAS	6178149.091	245245789.6	8365.832232
SOUTH CO	2020	LDA	Aggregate	Aggregated	DSL	49858.7341	2047191.978	44.27440932
SOUTH CO	2020	LDA	Aggregate	Aggregated	ELEC	89063.98818	3493455.584	0
SOUTH CO	2020	LDT1	Aggregate	Aggregated	GAS	673575.0448	25456837.2	1009.703307
SOUTH CO	2020	LDT1	Aggregate	Aggregated	DSL	436.3696382	10308.34943	0.467774015
SOUTH CO	2020	LDT1	Aggregate	Aggregated	ELEC	2427.188659	91067.68136	0
SOUTH CO	2020	LDT2	Aggregate	Aggregated	GAS	2108549.59	81418834.91	3534.790518
SOUTH CO	2020	LDT2	Aggregate	Aggregated	DSL	11074.63811	498881.6758	14.81780046
SOUTH CO	2020	LDT2	Aggregate	Aggregated	ELEC	12230.90008	414287.5504	0
SOUTH CO	2020	LHDT1	Aggregate	Aggregated	GAS	173614.6174	6333810.586	612.6252653
SOUTH CO	2020	LHDT1	Aggregate	Aggregated	DSL	103329.3828	4276352.725	203.9630505
SOUTH CO	2020	LHDT2	Aggregate	Aggregated	GAS	28771.81583	1018932.099	113.1501167
SOUTH CO	2020	LHDT2	Aggregate	Aggregated	DSL	40572.86872	1644689.797	86.79286353
SOUTH CO	2020	MCY	Aggregate	Aggregated	GAS	269351.1059	1916380.232	52.6214956
SOUTH CO	2020	MDV	Aggregate	Aggregated	GAS	1509432.595	54618603.59	2902.923832
SOUTH CO	2020	MDV	Aggregate	Aggregated	DSL	26705.37886	1126984.42	43.60769552
SOUTH CO	2020	MDV	Aggregate	Aggregated	ELEC	3852.020312	134619.071	0
SOUTH CO	2020	MH	Aggregate	Aggregated	GAS	35045.56901	331213.3277	66.05937563
SOUTH CO	2020	MH	Aggregate	Aggregated	DSL	11453.97402	113100.7197	10.93302012
SOUTH CO	2020	MHDT	Aggregate	Aggregated	GAS	24612.44595	1335068.759	269.6494288
SOUTH CO	2020	MHDT	Aggregate	Aggregated	DSL	116761.6622	7338725.152	723.8084841
SOUTH CO	2020	OBUS	Aggregate	Aggregated	GAS	5846.82319	252354.2354	51.34879326
SOUTH CO	2020	OBUS	Aggregate	Aggregated	DSL	4066.240591	300794.1374	37.44688162
SOUTH CO	2020	SBUS	Aggregate	Aggregated	GAS	2268.162807	93420.86198	10.43507716
SOUTH CO	2020	SBUS	Aggregate	Aggregated	DSL	6271.332305	198203.0432	26.62266433
SOUTH CO	2020	UBUS	Aggregate	Aggregated	GAS	938.2571472	88202.7311	18.36430248
SOUTH CO	2020	UBUS	Aggregate	Aggregated	DSL	18.19691831	1877.446227	0.296796191
SOUTH CO	2020	UBUS	Aggregate	Aggregated	ELEC	12.11693886	1072.906717	0
SOUTH CO	2020	UBUS	Aggregate	Aggregated	NG	5222.885974	571203.4089	144.1754651

VMT	Fuel Consumption (gal/day)	Annual VMT	ıal Fuel Consumption (gals)
18622369	2490584	6,797,164,758.09	909,063,308.01
gal/mi			
0.1337415	7.477108248		

EMFAC2017 Emissions Inventory

Region Type: Air Basin
Region: South Coast
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Populatior	VMT	Trips	Fuel_Consumption
SOUTH CO	2020	All Other Buses	Aggregate	Aggregate	DSL	3150.14	183816.726	26461.1422	18.7149406
SOUTH CO	2020	LDA	Aggregate	Aggregate	GAS	6178149	245245790	29171004	8365.83223
SOUTH CO	2020	LDA	Aggregate	Aggregate	DSL	49858.7	2047191.98	236026.476	44.2744093
SOUTH CO	2020	LDA	Aggregate	Aggregate	ELEC	89064	3493455.58	446754.784	0
SOUTH CO	2020	LDT1	Aggregate	Aggregate	GAS	673575	25456837.2	3092733.34	1009.70331
SOUTH CO	2020	LDT1	Aggregate	Aggregate	DSL	436.37	10308.3494	1529.80218	0.46777402
SOUTH CO	2020	LDT1	Aggregate	Aggregate	ELEC	2427.19	91067.6814	11955.9197	0
SOUTH CO	2020	LDT2	Aggregate	Aggregate	GAS	2108550	81418834.9	9872322.88	3534.79052
SOUTH CO	2020	LDT2	Aggregate	Aggregate	DSL	11074.6	498881.676	54951.1663	14.8178005
SOUTH CO	2020	LDT2	Aggregate	Aggregate	ELEC	12230.9	414287.55	62115.0794	0
SOUTH CO	2020	LHD1	Aggregate	Aggregate	GAS	173615	6333810.59	2586599.11	612.625265
SOUTH CO	2020	LHD1	Aggregate	Aggregate	DSL	103329	4276352.72	1299753.65	203.963051
SOUTH CO	2020	LHD2	Aggregate	Aggregate	GAS	28771.8	1018932.1	428657.186	113.150117
SOUTH CO	2020	LHD2	Aggregate	Aggregate	DSL	40572.9	1644689.8	510355.648	86.7928635
SOUTH CO	2020	MCY	Aggregate	Aggregate	GAS	269351	1916380.23	538702.212	52.6214956
SOUTH CO	2020	MDV	Aggregate	Aggregate	GAS	1509433	54618603.6	6970807.91	2902.92383
SOUTH CO	2020	MDV	Aggregate	Aggregate	DSL	26705.4	1126984.42	131705.033	43.6076955
SOUTH CO	2020	MDV	Aggregate	Aggregate	ELEC	3852.02	134619.071	19750.8597	0
SOUTH CO	2020	MH	Aggregate	Aggregate	GAS	35045.6	331213.328	3505.95872	66.0593756
SOUTH CO	2020	MH	Aggregate	Aggregate	DSL	11454	113100.72	1145.3974	10.9330201
SOUTH CO	2020	Motor Coach	Aggregate	Aggregate	DSL	916.105	116977.411	13375.1274	18.731941
SOUTH CO	2020	OBUS	Aggregate	Aggregate	GAS	5846.82	252354.235	116983.238	51.3487933
SOUTH CO	2020	PTO	Aggregate	Aggregate	DSL	0	176778.952	0	36.7581963
SOUTH CO	2020	SBUS	Aggregate	Aggregate	GAS	2268.16	93420.862	9072.65123	10.4350772
SOUTH CO	2020	SBUS	Aggregate	Aggregate	DSL	6271.33	198203.043	72370.3053	26.6226643
SOUTH CO	2020	T6 Ag	Aggregate	Aggregate	DSL	19.6429	218.054583	86.4288167	0.02481043
SOUTH CO	2020	T6 CAIRP heavy	Aggregate	Aggregate	DSL	446.07	88799.3109	6512.61531	8.01914752
SOUTH CO	2020	T6 CAIRP small	Aggregate	Aggregate	DSL	233.435	12340.8476	3408.15225	1.18210681
SOUTH CO	2020	T6 instate construction heavy	Aggregate	Aggregate	DSL	4054.98	275690.545	18332.4016	28.1831622
SOUTH CO	2020	T6 instate construction small	Aggregate	Aggregate	DSL	14124.7	721061.752	63857.0606	72.8708728
SOUTH CO	2020	T6 instate heavy	Aggregate	Aggregate	DSL	18502.8	2507593.31	213520.127	238.187185
SOUTH CO	2020	T6 instate small	Aggregate	Aggregate	DSL	70646.5	3544993.31	815250.457	354.066367
SOUTH CO	2020	T6 OOS heavy	Aggregate	Aggregate	DSL	254.967	50953.5321	3722.51103	4.59778773
SOUTH CO	2020	T6 OOS small	Aggregate	Aggregate	DSL	135.07	7080.84594	1972.02343	0.67920486
SOUTH CO	2020	T6 Public	Aggregate	Aggregate	DSL	6648.81	101706.244	20168.0533	12.9532819
SOUTH CO	2020	T6 utility	Aggregate	Aggregate	DSL	1694.72	28287.3938	19489.3218	3.04455779
SOUTH CO	2020	T6TS	Aggregate	Aggregate	GAS	24612.4	1335068.76	492445.818	269.649429
SOUTH CO	2020	T7 Ag	Aggregate	Aggregate	DSL	14.8378	252.575311	65.2863243	0.04436246
SOUTH CO	2020	T7 CAIRP	Aggregate	Aggregate	DSL	9582.09	1734645.99	139898.501	256.922836
SOUTH CO	2020	T7 CAIRP construction	Aggregate	Aggregate	DSL	1076.68	198030.913	4867.62771	27.7712143
SOUTH CO	2020	T7 NNOOS	Aggregate	Aggregate	DSL	10476.8	2114657.85	152961.954	303.319739
SOUTH CO	2020	T7 NOOS	Aggregate	Aggregate	DSL	3766.55	681535.17	54991.6834	103.346222
SOUTH CO	2020	T7 POLA	Aggregate	Aggregate	DSL	13120.5	1606065.94	99715.6884	282.593311
SOUTH CO	2020	T7 Public	Aggregate	Aggregate	DSL	8123.02	164573.585	24639.8135	29.0956097
SOUTH CO	2020	T7 Single	Aggregate	Aggregate	DSL	12556	890294.14	144894.407	137.911303
SOUTH CO	2020	T7 single construction	Aggregate	Aggregate	DSL	6965.69	491278.272	31491.5937	76.2068277
SOUTH CO	2020	T7 SWCV	Aggregate	Aggregate	DSL	2684.77	109695.462	10470.6135	54.0468004
SOUTH CO	2020	T7 SWCV	Aggregate	Aggregate	NG	4355.5	177332.337	16986.455	81.9328242
SOUTH CO	2020	T7 tractor	Aggregate	Aggregate	DSL	19595.4	2696937.45	248861.111	393.43887
SOUTH CO	2020	T7 tractor construction	Aggregate	Aggregate	DSL	5766.76	405261.322	26071.2925	63.0776655
SOUTH CO	2020	T7 utility	Aggregate	Aggregate	DSL	671.926	13636.4223	7727.14713	2.24296506
SOUTH CO	2020	T7IS	Aggregate	Aggregate	GAS	87.067	7544.94208	1742.03558	1.92499323
SOUTH CO	2020	UBUS	Aggregate	Aggregate	GAS	938.257	88202.7311	3753.02859	18.3643025
SOUTH CO	2020	UBUS	Aggregate	Aggregate	DSL	18.1969	1877.44623	72.7876732	0.29679619
SOUTH CO	2020	UBUS	Aggregate	Aggregate	ELEC	12.1169	1072.90672	48.4677554	0
SOUTH CO	2020	UBUS	Aggregate	Aggregate	NG	5222.89	571203.409	20891.5439	144.175465

Haul Trucks (T7 Single Construction)			
VMT	Fuel Consumption (gal/day)	Annual VMT	Annual Fuel Consumption
491278	76207	179,316,569	27,815,492
gal/mi			
0.155119475	6.446643786		

Workers (LDA,LDT1, LDT2)			
VMT	Fuel Consumption (gal/day)	Annual VMT	Annual Fuel Consumption
358676655	12969886	130,916,978,908	4,734,008,405
gal/mi			
0.0362	27.65457256		

Temporary Construction Trailer		
Land Use	**Square Feet**	**Energy Use per year (kWh)**
General Office	1,000	12,990
Note: CalEEMod 2016.3.2 used to estimate energy use for temporary construction office		

Electric-powered Construction Equipment

kWh/hp-hr
0.7457

Equipment	# of Equipment	Hours/Day	Horsepower	Load Factor	Number Days	Total hp-hr	kWh	kWh/yr
Cranes	3	12	231	0.29	944	2,276,588	1,697,652	108,824
Signal Boards	2	12	6	0.82	1485	175,349	130,757.60	8,382
Total	-	-	-	-	-	**2,451,937**	**1,828,409**	**117,206**

Notes:

1. Cranes horsepower and load factors taken from CalEEMod

2. Conversion factor taken from University of North Carolina Unit Conversion Dictionary; Source: http://www.unc.edu/~rowlett/units/dictH.html

E-4 WLC Operational Energy Demand and VMT

WLC CNG Fueling Station Consumption

Truck CNG Capacity	Unit
75	DGE
139.3	SCF/DGE
10,448	SCF

State CNG/LNG Annual Fuel Use (million CF)	MMBtu
2,110,829	2,184,708,015

Source	Fuel Capacity	ADT	Trucks/Day	Fuel Use/Day (CF)	Fuel Use/Yr (MMCF)	% of State	MMBtu
Heavy Duty Trucks	10,448	408	204	2,131,290	777.92	0.037%	805,148

Sources:

1 US Energy Information Administration, California Natural Gas Consumption by Year (2018). Available at: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus

2 US Department of Energy, Case Study - Natural Gas Regional Transport Trucks (2016). Available at: https://www.afdc.energy.gov/uploads/publication/ng_regional_transport_trucks.pdf

3 Alternative Fuels Data Center, Gasonline and Diesel Gallon Equivalency Methodology. Available at: https://www.afdc.energy.gov/fuels/equivalency_methodology.html

4 WSP, Traffic Impact Analysis Report for The World Logistics Center (2018).

World Logistics Center
Operational Fuel Use
Forklifts

Forklift Assumptions

Parameter	Value	Reference/Source
Quantity of non-diesel forklifts per light logistics planning area	5	Highland Fairview 10/11/13
Number of light logistics planning areas	3	
Quantity of non-diesel forklifts	15	
Average daily operating hours per forklift	4	
Horsepower	93	Cat Lift Trucks, LG Gas Cushion Tire Lift Trucks, Model GC35K, http://www.cat-lift.com/_cat/PDFs/CLT-PDF030/CLT-PDF030.html
Load factor	0.2	
Annual days of operation	260	
Annual hp-hr	290,160	
Btu/hp-hr	2,542.5	EPA Conversion factor, https://www3.epa.gov/ttnchie1/ap42/appendix/appa.pdf
Annual Btu	737,731,800	
Annual MMBtu	**737.73**	

World Logistics Center
Operational Fuel Use
Yard Trucks/Hostlers

Yard Trucks/Hostlers

Parameter	**Value**	**Source/Reference**
Number of yard trucks per facility	2	Highland Fairview, October 10, 2013
Fuel type	Propane	
Average building/facility area, sq. ft.	1,500,000	
Warehouse area (minus logistics), sq. ft.	40,400,000	
Average number of buildings	26.9	
Yard trucks	54	
Horsepower	199	Port of Los Angeles Inventory of Emissions - 2016. Starcrest Consulting Group. Table 5.1 (average HP of propane yard tractor).
WHP	155	Wheel Horsepower to Crankshaft Horsepower Guestimator (Rear-Wheel Drive). http://www.mk5cortinaestate.co.uk/calculator4.php
Load factor	0.39	CARB's Emission Inventory Development for Cargo Handling Equipment. https://www.arb.ca.gov/regact/2011/cargo11/cargoappb.pdf
Maximum daily operating hours per truck	7	
Annual days of operation	260	
Annual hp-hr	5,926,357	
Btu/hp-hr	2,454	EPA Conversion Factor, https://www3.epa.gov/ttnchie1/ap42/appendix/appa.pdf
Annual Btu	14,543,279,587	
Annual MMBtu	**14,543.28**	

World Logistics Center
Operational Energy Analysis
2025 Low EV Scenario
Fuel Usage from VMT

VMT		
LDA	326,275	miles/year
LDT1	24,073	miles/year
LDT2	120,472	miles/year
LHDT1	35,977	miles/year
LHDT2	17,249	miles/year
MDV	25,945	miles/year
HHDT	179,492	miles/year
MHDT	107,645	miles/year

Fuel Type:[1]	GAS	DSL	ELEC	NG	
Percent:					
LDA	96.1%	1.0%	2.9%	0.0%	100.0%
LDT1	98.6%	0.0%	1.4%	0.0%	100.0%
LDT2	97.5%	0.8%	1.8%	0.0%	100.0%
LHDT1	55.9%	44.1%	0.0%	0.0%	100.0%
LHDT2	35.4%	64.6%	0.0%	0.0%	100.0%
MDV	95.9%	2.5%	1.6%	0.0%	100.0%
HHDT	0.1%	94.7%	0.0%	5.3%	100.0%
MHDT	16.3%	83.7%	0.0%	0.0%	100.0%
Miles per Gallon Fuel:					
LDA	33.50	52.50	-	-	
LDT1	28.60	23.60	-	-	
LDT2	27.30	38.60	-	-	
LHDT1	10.90	22.60	-	-	
LHDT2	9.50	20.40	-	-	
MDV	22.00	29.60	-	-	
HHDT	4.50	7.30	-	2.30	
MHDT	5.30	11.50	-	-	
Annual VMT by Fuel Type :					miles/year
LDA	313,648	3,165	9,462	0	
LDT1	23,729	10	335	0	
LDT2	117,424	904	2,144	0	
LHDT1	20,097	15,880	0	0	
LHDT2	6,110	11,139	0	0	
MDV	24,884	638	420	0	
HHDT	126	169,925	0	9,441	
MHDT	17,578	90,066	0	0	
Total	523,595	291,727	12,361	9,441	
Annual Fuel Savings from Electric Vehicles:[2]			415		gal/year
Annual fuel use by vehicle type:					(assumed t
	gal/year	**gal/year**		**MMbtu/year**	
LDA	9,363	60	-	-	
LDT1	830	0	-	-	
LDT2	4,301	23	-	-	
LHDT1	1,844	703	-	-	
LHDT2	643	546	-	-	
MDV	1,131	22	-	-	
HHDT	28	23,277	-	612	
MHDT	3,317	7,832	-	-	
Total	**21,456**	**32,464**	**0**	**612**	

Notes:
1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2023; Annual; All vehicle types; Aggregate model year; Aggregate speed). https://www.arb.ca.gov/emfac/2014/
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.

World Logistics Center
Operational Energy Analysis
2025 Medium EV Scenario
Fuel Usage from VMT

VMT		
LDA	326,275	miles/year
LDT1	24,073	miles/year
LDT2	120,472	miles/year
LHDT1	35,977	miles/year
LHDT2	17,249	miles/year
MDV	25,945	miles/year
HHDT	179,492	miles/year
MHDT	107,645	miles/year

Fuel Type:[1]	GAS	DSL	ELEC	NG	
Percent:					
LDA	93.8%	1.0%	5.2%	0.0%	100.0%
LDT1	94.8%	0.0%	5.2%	0.0%	100.0%
LDT2	94.0%	0.8%	5.2%	0.0%	100.0%
LHDT1	55.9%	44.1%	0.0%	0.0%	100.0%
LHDT2	35.4%	64.6%	0.0%	0.0%	100.0%
MDV	92.3%	2.5%	5.2%	0.0%	100.0%
HHDT	0.1%	94.7%	0.0%	5.3%	100.0%
MHDT	16.3%	83.7%	0.0%	0.0%	100.0%
Miles per Gallon Fuel:					
LDA	33.50	52.50	-	-	
LDT1	28.60	23.60	-	-	
LDT2	27.30	38.60	-	-	
LHDT1	10.90	22.60	-	-	
LHDT2	9.50	20.40	-	-	
MDV	22.00	29.60	-	-	
HHDT	4.50	7.30	-	2.30	
MHDT	5.30	11.50	-	-	
Annual VMT by Fuel Type :					miles/year
LDA	306,046	3,165	16,966	0	
LDT1	22,821	10	1,252	0	
LDT2	113,244	904	6,265	0	
LHDT1	20,097	15,880	0	0	
LHDT2	6,110	11,139	0	0	
MDV	23,947	638	1,349	0	
HHDT	126	169,925	0	9,441	
MHDT	17,578	90,066	0	0	
Total	509,968	291,727	25,832	9,441	
Annual Fuel Savings from Electric Vehicles:[2]			867		gal/year
Annual fuel use by vehicle type:					(assumed t
	gal/year	**gal/year**		**kBtu/year**	
LDA	9,136	60	-	-	
LDT1	798	0	-	-	
LDT2	4,148	23	-	-	
LHDT1	1,844	703	-	-	
LHDT2	643	546	-	-	
MDV	1,089	22	-	-	
HHDT	28	23,277	-	612	
MHDT	3,317	7,832	-	-	
Total	**21,002**	**32,464**	**0**	**612**	

Notes:
1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2023; Annual; All vehicle types; Aggregate model year; Aggregate speed). https://www.arb.ca.gov/emfac/2014/
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.

World Logistics Center
Operational Energy Analysis
2025 High EV Scenario
Fuel Usage from VMT

VMT		
LDA	326,275	miles/year
LDT1	24,073	miles/year
LDT2	120,472	miles/year
LHDT1	35,977	miles/year
LHDT2	17,249	miles/year
MDV	25,945	miles/year
HHDT	179,492	miles/year
MHDT	107,645	miles/year

Fuel Type:[1]	GAS	DSL	ELEC	NG	
Percent:					
LDA	93.8%	1.0%	5.2%	0.0%	100.0%
LDT1	94.8%	0.0%	5.2%	0.0%	100.0%
LDT2	94.0%	0.8%	5.2%	0.0%	100.0%
LHDT1	50.9%	39.1%	10.0%	0.0%	100.0%
LHDT2	30.4%	59.6%	10.0%	0.0%	100.0%
MDV	92.3%	2.5%	5.2%	0.0%	100.0%
HHDT	0.1%	74.7%	20.0%	5.3%	100.0%
MHDT	16.3%	63.7%	20.0%	0.0%	100.0%
Miles per Gallon Fuel:					
LDA	33.50	52.50	-	-	
LDT1	28.60	23.60	-	-	
LDT2	27.30	38.60	-	-	
LHDT1	10.90	22.60	-	-	
LHDT2	9.50	20.40	-	-	
MDV	22.00	29.60	-	-	
HHDT	4.50	7.30	-	2.30	
MHDT	5.30	11.50	-	-	
Annual VMT by Fuel Type :					miles/year
LDA	306,046	3,165	16,966	0	
LDT1	22,821	10	1,252	0	
LDT2	113,244	904	6,265	0	
LHDT1	18,312	14,067	3,598	0	
LHDT2	5,244	10,280	1,725	0	
MDV	23,947	638	1,349	0	
HHDT	126	134,080	35,898	9,441	
MHDT	17,578	68,570	21,529	0	
Total	507,318	231,714	88,582	9,441	
Annual Fuel Savings from Electric Vehicles:[2]			2973		gal/year
Annual fuel use by vehicle type:					(assumed t
	gal/year	**gal/year**		**kBtu/year**	
LDA	9,136	60	-	-	
LDT1	798	0	-	-	
LDT2	4,148	23	-	-	
LHDT1	1,680	622	-	-	
LHDT2	552	504	-	-	
MDV	1,089	22	-	-	
HHDT	28	18,367	-	612	
MHDT	3,317	5,963	-	-	
Total	**20,747**	**25,562**	**0**	**612**	

Notes:

1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2023; Annual; All vehicle types; Aggregate model year; Aggregate speed). https://www.arb.ca.gov/emfac/2014/
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.

World Logistics Center
Operational Energy Analysis
2035 Low EV Scenario
Fuel Usage from VMT

VMT		
LDA	598,447	miles/year
LDT1	44,154	miles/year
LDT2	220,968	miles/year
LHDT1	57,934	miles/year
LHDT2	27,805	miles/year
MDV	45,362	miles/year
HHDT	301,181	miles/year
MHDT	180,624	miles/year

Fuel Type:[1]	GAS	DSL	ELEC	NG	
Percent:					
LDA	93.6%	1.1%	5.3%	0.0%	100.0%
LDT1	97.0%	0.0%	3.0%	0.0%	100.0%
LDT2	95.4%	0.9%	3.7%	0.0%	100.0%
LHDT1	48.7%	51.3%	0.0%	0.0%	100.0%
LHDT2	29.4%	70.6%	0.0%	0.0%	100.0%
MDV	93.0%	3.1%	3.9%	0.0%	100.0%
HHDT	0.1%	93.3%	0.0%	6.6%	100.0%
MHDT	14.3%	85.7%	0.0%	0.0%	100.0%
Miles per Gallon Fuel:					
LDA	40.00	61.20	-	-	
LDT1	33.85	30.02	-	-	
LDT2	34.07	45.45	-	-	
LHDT1	12.37	25.50	-	-	
LHDT2	10.72	22.95	-	-	
MDV	27.75	34.98	-	-	
HHDT	5.28	8.95	-	2.71	
MHDT	6.08	13.21	-	-	
Annual VMT by Fuel Type :					miles/year
LDA	560,303	6,634	31,511	0	
LDT1	42,820	6	1,327	0	
LDT2	210,815	2,052	8,101	0	
LHDT1	28,216	29,718	0	0	
LHDT2	8,183	19,622	0	0	
MDV	42,167	1,419	1,776	0	
HHDT	240	281,013	0	19,927	
MHDT	25,864	154,760	0	0	
Total	918,607	495,224	42,716	19,927	
Annual Fuel Savings from Electric Vehicles:[2]			1187		gal/year
Annual fuel use by vehicle type:					(assumed t
	gal/year	**gal/year**		**kBtu/year**	
LDA	14,006	108	-	-	
LDT1	1,265	0	-	-	
LDT2	6,189	45	-	-	
LHDT1	2,282	1,166	-	-	
LHDT2	764	855	-	-	
MDV	1,520	41	-	-	
HHDT	45	31,414	-	1,094	
MHDT	4,257	11,716	-	-	
Total	**30,327**	**45,345**	**0**	**1,094**	

Notes:
1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2023; Annual; All vehicle types; Aggregate model year; Aggregate speed). https://www.arb.ca.gov/emfac/2014/
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.

World Logistics Center
Operational Energy Analysis
2035 Medium EV Scenario
Fuel Usage from VMT

VMT		
LDA	598,447	miles/year
LDT1	44,154	miles/year
LDT2	220,968	miles/year
LHDT1	57,934	miles/year
LHDT2	27,805	miles/year
MDV	45,362	miles/year
HHDT	301,181	miles/year
MHDT	180,624	miles/year

Fuel Type:[1]	GAS	DSL	ELEC	NG	
Percent:					
LDA	77.9%	1.1%	21.0%	0.0%	100.0%
LDT1	79.0%	0.0%	21.0%	0.0%	100.0%
LDT2	78.1%	0.9%	21.0%	0.0%	100.0%
LHDT1	48.7%	51.3%	0.0%	0.0%	100.0%
LHDT2	29.4%	70.6%	0.0%	0.0%	100.0%
MDV	74.4%	3.1%	22.5%	0.0%	100.0%
HHDT	0.1%	93.3%	0.0%	6.6%	100.0%
MHDT	14.3%	85.7%	0.0%	0.0%	100.0%
Miles per Gallon Fuel:					
LDA	40.00	61.20	-	-	
LDT1	33.85	30.02	-	-	
LDT2	34.07	45.45	-	-	
LHDT1	12.37	25.50	-	-	
LHDT2	10.72	22.95	-	-	
MDV	27.75	34.98	-	-	
HHDT	5.28	8.95	-	2.71	
MHDT	6.08	13.21	-	-	
Annual VMT by Fuel Type :					miles/year
LDA	466,191	6,634	125,674	0	
LDT1	34,882	6	9,272	0	
LDT2	172,513	2,052	46,403	0	
LHDT1	28,216	29,718	0	0	
LHDT2	8,183	19,622	0	0	
MDV	33,749	1,419	10,206	0	
HHDT	240	281,013	0	19,927	
MHDT	25,864	154,760	0	0	
Total	769,837	495,224	191,556	19,927	
Annual Fuel Savings from Electric Vehicles:[2]			5325		gal/year
Annual fuel use by vehicle type:					(assumed t
	gal/year	**gal/year**		**kBtu/year**	
LDA	11,654	108	-	-	
LDT1	1,030	0	-	-	
LDT2	5,064	45	-	-	
LHDT1	2,282	1,166	-	-	
LHDT2	764	855	-	-	
MDV	1,216	41	-	-	
HHDT	45	31,414	-	1,094	
MHDT	4,257	11,716	-	-	
Total	**26,313**	**45,345**	**0**	**1,094**	

Notes:
1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2023; Annual; All vehicle types; Aggregate model year; Aggregate speed). https://www.arb.ca.gov/emfac/2014/
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.

World Logistics Center
Operational Energy Analysis
2035 High EV Scenario
Fuel Usage from VMT

VMT		
LDA	598,447	miles/year
LDT1	44,154	miles/year
LDT2	220,968	miles/year
LHDT1	57,934	miles/year
LHDT2	27,805	miles/year
MDV	45,362	miles/year
HHDT	301,181	miles/year
MHDT	180,624	miles/year

Fuel Type:[1]	GAS	DSL	ELEC	NG	
Percent:					
LDA	77.9%	1.1%	21.0%	0.0%	100.0%
LDT1	79.0%	0.0%	21.0%	0.0%	100.0%
LDT2	78.1%	0.9%	21.0%	0.0%	100.0%
LHDT1	38.7%	41.3%	20.0%	0.0%	100.0%
LHDT2	19.4%	60.6%	20.0%	0.0%	100.0%
MDV	74.4%	3.1%	22.5%	0.0%	100.0%
HHDT	0.1%	63.3%	30.0%	6.6%	100.0%
MHDT	14.3%	55.7%	30.0%	0.0%	100.0%
Miles per Gallon Fuel:					
LDA	40.00	61.20	-	-	
LDT1	33.85	30.02	-	-	
LDT2	34.07	45.45	-	-	
LHDT1	12.37	25.50	-	-	
LHDT2	10.72	22.95	-	-	
MDV	27.75	34.98	-	-	
HHDT	5.28	8.95	-	2.71	
MHDT	6.08	13.21	-	-	
Annual VMT by Fuel Type :					miles/year
LDA	466,191	6,634	125,674	0	
LDT1	34,882	6	9,272	0	
LDT2	172,513	2,052	46,403	0	
LHDT1	22,421	23,927	11,587	0	
LHDT2	5,394	16,850	5,561	0	
MDV	33,749	1,419	10,206	0	
HHDT	240	190,647	90,354	19,927	
MHDT	25,864	100,607	54,187	0	
Total	761,252	342,142	353,245	19,927	
Annual Fuel Savings from Electric Vehicles:[2]			9820		gal/year
Annual fuel use by vehicle type:					(assumed t
	gal/year	**gal/year**		**kBtu/year**	
LDA	11,654	108	-	-	
LDT1	1,030	0	-	-	
LDT2	5,064	45	-	-	
LHDT1	1,813	938	-	-	
LHDT2	503	734	-	-	
MDV	1,216	41	-	-	
HHDT	45	21,312	-	1,094	
MHDT	4,257	7,617	-	-	
Total	**25,584**	**30,796**	**0**	**1,094**	

Notes:

1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2023; Annual; All vehicle types; Aggregate model year; Aggregate speed). https://www.arb.ca.gov/emfac/2014/
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.

E-5 EV Scenario Assumptions

Phase 1 = 2025 completion
Phase 2 = 2035 completion

Project Total Daily Vehicle Counts
(trips to fueling station and convenience market not included)
Assumes 2 trips = 1 vehicle

	2025	2035
Passenger Vehicles	11,431	19,964
Light Trucks (2axle)	727	1,384
Medium Trucks (3 axle)	1,113	1,964
Large Trucks (4+ axle)	3,072	5,416
TOTAL	16,343	28,728

EV population and charging scenarios

A Project: EMFAC (1.1 million ZEVs in California by 2025)

Passenger EV Parking Spaces 527 932 per building code: 527 EV charging stations in 2025; 932 in 2035

Passenger vehicles and light trucks 2025: Assume 80% locations are for Level 2 chargers @ 19.2 kW, highest rate; I vehicle per EV station per day; 4 hour charge time for 100 kWh battery;
20% locations with DC power blocks that can charge up to 500 kW per vehicle and can spread across multiple vehicles as needed
2025 avg batterysize = 100 kWh; charge capacity = 80 kWh (80 %)
Peak load assumptions to be provided by WSP

Passenger vehicles & light trucks 2035: 10% locations are for Level 2 chargers @ 19.2 kW, highest rate; I vehicle per EV station per day; 8 hour charge time (larger batteries)
90% locations with DC charging using power blocks providing up to 500 kW; can spread load across multiple vehicles as needed (100 kW avg)
Average battery size = 200 kWh; charge capacity = 160 kWh
Peak load assumptions to be provided by WSP

Assume no truck charging

	2025	peak rate (MW)	avg daily (MWh)	annual	2035	peak rate (MW)	avg daily (MWh)	annual		
Passenger Vehicles	288	0.7	11.5	4,206	937	5.7	74.9	27,351	Avg daily MWh are ESA estimates; peak MW from WSP	
Light Trucks (2 axle)	12	0.06	0.47	173	54	0.1	2.2	793		
Medium Trucks (3 axle)	0	0	0	0	0	0	0	0		4205.9893
Large Trucks (4+ axle)	0	0	0	0	0	0	0	0		27350.776
	300	**0.75**	**12.0**	4,379	**991**	**5.9**	**77.1**	28,144		

B Modified Project: 2017 Scoping Plan w/ Moble Source Strategy and charging stations for cars and light trucks per exisitng building code

Passenger EV Parking Spaces 527 2,058 For 2025 use existing building code: for 2035 scale the Scenario A spaces based on expected EV population per MSS

Passenger vehicles 2025: 100% locations with DC charging using power blocks providing up to 500 kW; can spread load across multiple vehicles as needed (100 kW avg)
Passenger vehicles 2040: 100% locations with DC charging using power blocks providing up to 500 kW; can spread load across multiple vehicles as needed (100 kW avg)
Light Duty Trucks: based on MSS targets for overall EVs
Medium Duty Trucks: NA
Heavy Duty Trucks: NA
Peak loads: Peak load methodology provided by WSP

	2025	peak rate (MW)	avg daily (MWh)		2035	peak rate (MW)	avg daily (MWh)		
Passenger Vehicles	590	1.4	23.6	8,608	4,197	25.6	335.8	122,564	Avg Daily MWh from ESA; Peak MW from WSP
Light Trucks (2 axle)*	38	0.2	1.5	549	312	0.8	12.5	4,568	Peak and avg daily loads from WSP
Medium Trucks (3 axle)*	0				0				Peak values derived using WSP factors
Large Trucks (4+ axle)*	0				0				Peak values derived using WSP factors
	627	**1.6**	**25.1**	9,157	**4,509**	**26.4**	**348.3**	127,132	

C Modified Project: 2017 Scoping Plan w/ MSS and Sustainable Freight Action Plan and existing/expected truck regulations (CALSTART Beehive model)

Passenger EV Parking Spaces 527 2,058 same assumptions as Scenario B

Passenger vehicles: same assumptions as Scenario B
Assume peak rate = all stations charging simultaneously
Light Duty Trucks: 22.5% by 2035 (conservative) Same as Scenario B
Medium Duty Trucks: 20% by 2035 (conservative)
(large) Heavy Duty Trucks: 30% by 2035 (conservative)
Peak loads: Peak load methodology provided by WSP

	2025	peak rate (MW)	avg daily (MWh)	annual Mwh	2035	peak rate (MW)	avg daily (MWh)	annual Mwh
Passenger Vehicles	590	1.4	23.6	8,608	4,197	25.6	335.8	122,564
Light Trucks (2 axle)*	38	0.1	1.5	549	312	1.0	12.5	4,568
Medium Trucks (3 axle)*	111	0.5	6.0	2,189	393	1.6	21.2	7,728
Large Trucks (4+ axle)*	614	17.5	229.4	83,743	1,625	46.3	606.7	221,462
	1353	**19.5**	**260.5**	95,089	**6,527**	**74.4**	**976.2**	356,321

peak/avg ratio = 0.076238

2016 Sustainable Freight Action Plan
By 2030, deploy over 100,000 freight vehicles and equipment capable of zero emission operation and maximize near-zero emission freight vehicles and equipment powered by renewable energy

2016 Mobile Source Strategy: Cleaner Technologies and Fuels Scenario
By 2030 - 4.2 ZEVs = 1.8 million pure ZEVs operating Statewide, and 2.4 million PHEVs

From CA Plug-in Electric Vehicle Collaborative: ***Plugging in at Work***
Available at: http://www.pevcollaborative.org/Policy-makers

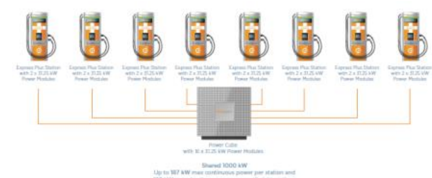
Type of Charging	Power Levels (installed circuit rating)	Miles of Range per Hour of Charging*
AC Level 1	110/120VAC at 15 or 20 Amps	~4-6 miles/hr.
AC Level 2		
3.3 kW (low)	208/240VAC at 30 Amps	8-12 miles/hr.
6.6 kW (medium)	208/240VAC at 40 Amps	16-24 miles/hr.
9.6 kW (high)	208/240VAC at 50 Amps	24-36 miles/hr.
19.2 kW (highest)	208/240VAC at 100 Amps	> 60 miles/hr.

* Refer to vehicle specifications for exact ratings.

Figure 1. Charging power levels and miles of range refilled.

EV charging - power loads per charging station

Level 2 highest	240V/100A =	19.2 kW		21.36651
avg battery charge capacity:	**80 kWh**	4.2 hrs	charging time	
	100 kWh battery			
	30360 3.6432	9.6 2765.582		
DC fast chargers	250-450V DC; 90 kW	90 kW		
	200-600V DC; 240 kW	240		
	charging block 500 kW	500 kW		
avg battery charge capacity:	**160 kWh**	2.2 hrs	90 kWcharging time	
	200 kWh battery	0.32 hrs	500 kW charging time	



*Projected numbers based on CALSTART/CARB 3-Year Funding Plan, and potential ZE Drayage Regulation and ZE City Center Access Regulation in 2025

https://www.chargepoint.com/products/commercial/express-plus/

Table 25: WLC Trips by Vehicle Type

ADT = average daily trips

Phase and Vehicle Type	AM Peak Hour			PM Peak Hour			ADT	gas station and convenience mkt trips	Net trips	Max Number of daily vehicles with EV charging potential	total vehicles
	In	Out	Total	In	Out	Total					
Phase 1 - 2025											
Pass Vehicles (LDA+LDT1+LDT2)	763	691	1,454	608	1,349	1,958	23,532	669	22,863	11,431	11,766
Light Trucks (2 axle)	52	56	108	52	66	118	1,751	296	1,455	727	875
Medium Trucks (3 axle)	35	41	76	54	65	119	2,226	0	2,226	1,113	1,113
Heavy Trucks (using alternative fuel station, so non-diesel)	14	13	27	11	10	21	379	379	0	0	190
Heavy Trucks	174	207	380	121	148	269	6,143	0	6,143	3,072	3,072
Total	**1,037**	**1,008**	**2,046**	**846**	**1,638**	**2,484**	**34,031**		**32,687**	**16,343**	17,015
Phase 2 - 2026 to 2035								1,344			
Pass Veh	517	487	1,003	429	973	1,402	17,066				
Light Trucks	35	42	77	39	46	85	1,313				
Medium Trucks	26	31	58	41	49	90	1,702				
Heavy Trucks	130	157	288	92	111	203	4,688				
Total	**709**	**718**	**1,426**	**602**	**1,179**	**1,781**	**24,769**				
Full Build-Out - 2035											
Pass Veh	1,280	1,178	2,458	1,038	2,322	3,360	40,598	669	39,929	19,964	20,299
Light Trucks (2 axle)	87	98	185	90	112	203	3,064	296	2,768	1,384	1,532
Medium Trucks (3 axle)	61	73	134	95	114	209	3,928	0	3,928	1,964	1,964
Heavy Trucks (using alternative fuel station, so non-diesel)	14	13	27	11	10	21	379	379	0	0	190
Heavy Trucks	304	364	668	214	259	473	10,831	0	10,831	5,415	5,415
Total	**1,746**	**1,726**	**3,472**	**1,447**	**2,818**	**4,265**	**58,800**		**57,456**	**28,728**	29,400
								1,344			

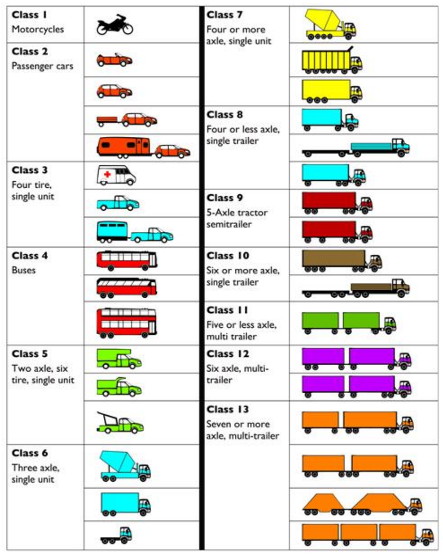
Scenario:	A		B	
		EMFAC	**Scoping Plan/MSS**	
	2025	2035	2025	2035
Passenger vehicles (LDA + LDT1 + LDT2)	11,431	19,964	11,431	19,964
Passenger EVs	**288**	**937**	**590**	**4,197**
MDVs	727	1,384	727	1,384
MDV EVs	**12**	**54**	**38**	**312**
Light Duty Electric Vehicle Populations	**300**	**991**	**627**	**4,509**

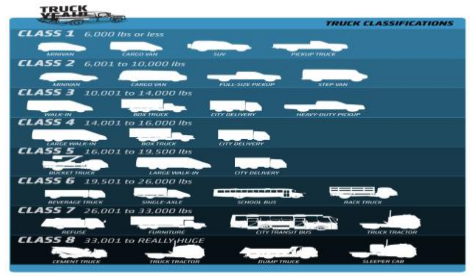
From SCAQMD study: Facility Access: includes Classes 2 and 3 (passenger cars and light trucks), and Classes 1 and 4 (motorcycles and buses) if observed
Local Goods Movement: includes Classes 5 through 7 (two-, three-, and four-axle single-unit trucks) - Local goods movement may also include Cla
Long Distance Goods Movement: includes Classes 8 through 13 (multi-unit trucks)

Vehicle Class Correspondence Table

Description	EMFAC2007 Vehicle	RIVTAM Model (axle-based)	Previous WLC EIR	CalEEMOD Assumed % of Category	Math Check	FHWA System	Fontana Truck Trip Generation Study	ITE/ SCAQMD /NAIOP Study
Bicycles								
Motorcycles	MCY	Passenger Cars	LDA	69.300%	100.000%	Class 1, Motorcycles	Passenger Vehicles	Passenger Vehicles
Passenger Cars	LDA					Class 2, Passenger Cars		
Light-Duty Trucks (GVWR <6000 lbs. and ETW <= 3750 lbs)	LDT1		LDT1	5.113%		Class 3, 4 tire single unit		
Light-Duty Trucks (GVWR <6000 lbs. and ETW 3751-5750 lbs)	LDT2		LDT2	25.588%				
School Buses	SBUS	Light Trucks	MDT	100.000%	100.000%	Class 4, Buses	Large 2-Axle trucks	2- to 4-axle Trucks
Urban Buses	UBUS							
Motor Coach	OBUS							
Other Buses								
All Other Buses								
Motor Homes	MH							
Medium-Duty Trucks (GVWR 6000-8500 lbs)	MDV					Class 5, 2-axle 6-tire single unit		
Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	LHDT1	Medium Trucks	LHDT1	67.532%	100.000%	Class 6	3-Axle Trucks	
Light-Heavy-Duty Trucks (GVWR 10001-14000 lbs)	LHDT2		LHDT2	32.468%				
Medium-Heavy Duty Diesel Agriculture Truck	MHDT	Heavy Trucks	MHDT	37.489%	100.000%	Classes 7-13	4+ Axle Trucks	5+ Axle Trucks
Medium-Heavy Duty Diesel CA International Registration Plan Truck with GVWR>26000 lbs								
Medium-Heavy Duty Diesel CA International Registration Plan Truck with GVWR<=26000 lbs								
Medium-Heavy Duty Diesel instate construction Truck with GVWR>26000 lbs								
Medium-Heavy Duty Diesel instate construction Truck with GVWR<=26000 lbs								
Medium-Heavy Duty Diesel instate Truck with GVWR>26000 lbs								
Medium-Heavy Duty Diesel instate Truck with GVWR<=26000 lbs								
Medium-Heavy Duty Diesel Out-of-state Truck with GVWR>26000 lbs								
Medium-Heavy Duty Diesel Out-of-state Truck with GVWR<=26000 lbs								
Medium-Heavy Duty Diesel Public Fleet Truck								
Medium-Heavy Duty Diesel Utility Fleet Truck								
Medium-Heavy Duty Gasoline Truck								
Heavy-Heavy Duty Diesel Agriculture Truck	HHDT		HHDT	62.511%				
Heavy-Heavy Duty Diesel CA International Registration Plan Truck								
Heavy-Heavy Duty Diesel CA International Registration Plan Construction Truck								
Heavy-Heavy Duty Diesel Non-Neighboring Out-of-state Truck								
Heavy-Heavy Duty Diesel Neighboring Out-of-state Truck								
Heavy-Heavy Duty Diesel Drayage Truck at Other Facilities								
Heavy-Heavy Duty Diesel Drayage Truck in Bay Area								
Heavy-Heavy Duty Diesel Drayage Truck near South Coast								
Heavy-Heavy Duty Diesel Public Fleet Truck								
Heavy-Heavy Duty Diesel Single Unit Truck								
Heavy-Heavy Duty Diesel Single Unit Construction Truck								
Heavy-Heavy Duty Diesel Solid Waste Collection Truck								
Heavy-Heavy Duty Diesel Tractor Truck								
Heavy-Heavy Duty Diesel Tractor Construction Truck								
Heavy-Heavy Duty Diesel Utility Fleet Truck								
Heavy-Heavy Duty Gasoline Truck								
Power Take Off								

FHWA System





Project Category	EMFAC Category	2025	2035
Passenger Vehicles	LDA, LDT1, LDT2	11,766	20,299
Light Trucks (2axle)	MDT	875	1,532
Medium Trucks (3 axle)	LHDT1, LHDT2	1,113	1,964
Large Trucks (4+ axle)	MHDT, HHDT	3,261	5,605
		17,015	29,400

CalEEMOD Default vehicle mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.00071	0.000727

EV Population Forecasts Based on EMFAC and MSS

Methodology	In January 2018, Governor Brown signed Executive Order B-48-18, setting targets of 200 hydrogen fueling stations and 250,000 electric vehicle chargers to support 1.5 million zero-emission vehicles (ZEVs) on California roads by 2025, on the path to 5 million ZEVs by 2030. EMFAC2017 bases its estimates of future ZEV populations on the strategies by which the light duty vehicle manufacturers take to comply with California's ZEV mandate and the Pavley vehicle standards. The 2017+ future projections are based upon the Mid-Range Scenario of the Advanced Clean Cars Midterm Review. For each model year, CARB calculated the fraction of the fleet that will operate similar to a pure zero emission vehicles. This fraction is called EV fraction and is equivalent to the sum of populations of Battery Electric Vehicles (BEVs), Fuel Cell Electric Vehicles (FCEVs), and the fraction of Plug-in Hybrid Electric Vehicles (PHEVs) population that operate like pure ZEVs, divided by the total population of Gasoline and electric fleet. To estimate the fraction of PHEVs that operates like pure ZEVs, EMFAC utilizes utility factors, which are defined as the fraction of VMT the PHEV obtains from the electrical grid. EMFAC 2017 anticipates future sales of EVs through the year 2025 in the PC, LDT1, LDT2, and MDV vehicle categories, and assumes EV sales as a percentage of total vehicles remains constant thereafter. The State's goal from the Mobile Source Strategy (MSS) is to achieve 4.2 million ZEVs in California by 2030, while Executive Order B-48-18 calls for 5 million ZEVs on the road by 2030. Post 2030 estimates for EVs under the MSS scenario conservatively assume that EV sales continue at the same pace after 2030.
Data Sources	EMFAC EV data source: EMFAC2017 Web Database (https://www.arb.ca.gov/emfac/2017/) - based on EMFAC2007 Categories EMFAC2017 Volume III - Technical Documentation, p. 193 - available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-modeling-tools-emfac

Electric Vehicle Penetration - South Coast Air Basin

		EMFAC 2017 - LDA + LDT1 + LI			Governor's order & MSS		
Jurisdiction	**Year**	**Total LDA + LDT Population**	**LDA + LDT EV Population**	**% EV**	**LDA + LDT EV Population**	**% EV**	**Governor's order & MSS**
So Coast Air Basin	2020	9,125,366	103,722	1.1%	103,722	1.1%	
	2025	10,034,980	252,889	2.5%	517,550	5.2%	
	2030	10,907,401	417,413	3.8%	1,444,602	13.2%	
	2035	11,642,018	546,208	4.7%	2,447,659	21.0%	
Statewide	2020	22,409,020	262,338	1.2%	262,338	1.2%	
	2025	24,876,417	619,462	2.5%	1,282,991	5.2%	LDA portion of 1.5 million ZEVs by 2025
	2030	27,344,052	1,038,403	3.8%	3,621,512	13.2%	LDA portion of 4.2 million ZEVs by 2030
	2035	29,511,582	1,380,703	4.7%	6,204,620	21.0%	Assumes the 2025-2030 EV population increase repeats from 2030-2035

		EMFAC 2017 - MDV			Governor's order & MSS		
Jurisdiction	**Year**	**Total MDV Population**	**MDV EV Population**	**% EV**	**MDV EV Population**	**% EV**	**Governor's order & MSS**
So Coast Air Basin	2020	1,539,990	3,852	0.3%	3,852	0.3%	
	2025	1,627,185	26,375	1.6%	83,921	5.2%	
	2030	1,733,368	51,603	3.0%	229,571	13.2%	
	2035	1,849,556	72,433	3.9%	416,980	22.5%	
Statewide	2020	4,131,850	8,393	0.2%	8,393	0.2%	
	2025	4,207,663	59,187	1.4%	217,009	5.2%	MDV portion of 1.5 million ZEVs by 2025
	2030	4,367,848	119,836	2.7%	578,488	13.2%	MDV portion of 4.2 million ZEVs by 2030
	2035	4,600,339	172,291	3.7%	1,037,141	22.5%	Assumes the 2025-2030 EV population increase repeats from 2030-2035

E-6 Cumulative Calculations

1 Electricity

World Logistic Center
Cumulative Energy - Electricity

Cumulative Electrical Consumption Within MVU service Area - Summary

Project ID	Annual Construction (MWh)	Annual Operation (MWh)	Project ID	Annual Construction (MWh)	Annual Operation (MWh)
MV-001	0.86	4,293	MV-052		11,568
MV-002	0.63	3,894	MV-053		6,714
MV-003	0.73	15,041	MV-054	0.74	9,335
MV-004		12,335	MV-056	0.20	160
MV-005	0.37	1,641	MV-057	0.43	371
MV-006	0.83	4,028	MV-058		80
MV-007	0.39	311	MV-059	0.62	631
MV-008	0.68	581	MV-060	0.70	922
MV-009	0.15	110	MV-061	0.52	2,538
MV-010	0.55	471	MV-062	0.60	5,442
MV-011	0.30	241	MV-063	0.69	2,215
MV-012		914	MV-064	0.67	872
MV-013	0.21	391	MV-065	0.17	305
MV-014	0.49	1,072	MV-066	0.70	1,474
MV-015	0.62	631	MV-068	0.36	2,725
MV-016	0.37	321	MV-069		5,391
MV-017	0.67	962	MV-070	0.68	1,415
MV-018		78	MV-071	0.16	288
MV-019		883	MV-074	0.58	1,201
MV-020		1,322	MV-075	1.09	9,286
MV-021	0.24	914	MV-076	0.88	4,394
MV-022		401	MV-077	0.82	7,015
MV-023	0.77	2,449	MV-078		6,844
MV-024	0.50	1,593	MV-079	0.44	1,971
MV-025	0.62	812	MV-080	0.15	625
MV-026	0.69	1,002	MV-081		3,760
MV-027	0.18	317	MV-082		2,686
MV-028	0.27	529	MV-083		4,685
MV-029	0.61	2,756	MV-084		1,316
MV-033	0.63	541	MV-089	0.10	70
MV-034	0.61	521	MV-090	0.06	103
MV-035	0.32	251	MV-093		658
MV-036		329	MV-102	0.25	1,096
MV-037		21,270	MV-105	0.10	70
MV-038		5,712	MV-106	0.10	70
MV-039		21,058	MV-108	0.02	42
MV-040	0.14	528	MV-111	0.06	94
MV-041	0.91	7,788	MV-112	0.11	88
MV-042	0.50	2,397	MV-118	0.14	90
MV-043		7,313	MV-121	0.03	61
MV-044	0.76	5,959	MV-123	0.10	197
MV-045	0.28	1,228	MV-124	0.40	1,974

World Logistic Center

Cumulative Energy - Electricity

Cumulative Electrical Consumption Within MVU service Area - Summary

Project ID	Annual Construction (MWh)	Annual Operation (MWh)
MV-046		2,053
MV-048		19,944
MV-049		20,959
MV-050		4,670
MV-051		10,125

Project ID	Annual Construction (MWh)	Annual Operation (MWh)
MV-126	0.52	2,355
Cum Proj Total	29	296,135
Net Project	1,496	271,529
Total	1,525	567,664
MVU	352,044	352,044
%MVU	0.43%	161.25%

World Logistics Center
Cumulative Energy Electricity

3,000 gallons per acre
9727 kWh/Mgal to supply water
111 kWh/Mgal to treat water
1272 kWh/Mgal to distribute water
1911 kWh/Mgal to wastewater

Off-Road Construction Electricity from Dust Control

			Electricity from Dust Control (kWh)					
Project ID	**Acers**	**Water Use (Mgal)**	**Supply**	**Treat**	**Distribute**	**Wastewater**	**Total (kWh)**	**Annual (kWh)**
B-001	1,056	3.168	30,815	352	4,030	6,054	41,251	3,675
B-003	295	0.88512	8,610	98	1,126	1,691	11,525	1,027
B-004	74	0.2231658	2,171	25	284	426	2,906	1,025
B-006	128	0.383067083	3,726	43	487	732	4,988	1,368
B-007	129	0.38688	3,763	43	492	739	5,038	449
B-008	207	0.62208	6,051	69	791	1,189	8,100	722
B-009	1,424	4.272	41,554	474	5,434	8,164	55,626	4,956
B-010	30	0.0912	887	10	116	174	1,188	660
B-011	17	0.0496125	483	6	63	95	646	642
B-013	605	1.8144	17,649	201	2,308	3,467	23,625	2,105
B-014	224	0.672	6,537	75	855	1,284	8,750	780
C-001	15	0.0441	429	5	56	84	574	578
C-002	182	0.5468793	5,319	61	696	1,045	7,121	1,485
C-003	5	0.01603035	156	2	20	31	209	234
H-001	188	0.56448	5,491	63	718	1,079	7,350	655
H-002	141	0.4224	4,109	47	537	807	5,500	490
H-003	298	0.89376	8,694	99	1,137	1,708	11,638	1,037
H-004	100	0.300290566	2,921	33	382	574	3,910	1,072
H-005	2	0.00461039	45	1	6	9	60	153
H-006	50	0.150113754	1,460	17	191	287	1,955	1,403
H-007	77	0.229836	2,236	26	292	439	2,993	717
H-008	141	0.42168	4,102	47	536	806	5,491	489
M-001	38	0.113667109	1,106	13	145	217	1,480	1,174
M-003	89	0.26709	2,598	30	340	510	3,478	834
M-004	8	0.02401245	234	3	31	46	313	351
M-005	156	0.466709532	4,540	52	594	892	6,077	541
M-006	15	0.045339196	441	5	58	87	590	586
M-007	21	0.06221355	605	7	79	119	810	746
M-008	248	0.7434435	7,231	83	946	1,421	9,680	1,552
M-009	43	0.1296	1,261	14	165	248	1,688	624
M-010	17	0.0514839	501	6	65	98	670	625
M-011	5	0.0147735	144	2	19	28	192	230
MV-001	22	0.06714225	653	7	85	128	874	857
MV-002	100	0.301416	2,932	33	383	576	3,925	629
MV-003	74	0.222315	2,162	25	283	425	2,895	727
MV-005	9	0.02565738	250	3	33	49	334	375
MV-006	23	0.069075	672	8	88	132	899	828
MV-007	10	0.02976	289	3	38	57	388	391
MV-008	19	0.05568	542	6	71	106	725	676
MV-009	4	0.01056	103	1	13	20	138	149
MV-010	15	0.04512	439	5	57	86	588	548
MV-011	8	0.02304	224	3	29	44	300	303
MV-013	2	0.006201	60	1	8	12	81	206
MV-014	34	0.10272	999	11	131	196	1,338	495
MV-015	20	0.06048	588	7	77	116	788	617
MV-016	10	0.03072	299	3	39	59	400	373
MV-017	31	0.09216	896	10	117	176	1,200	667

World Logistics Center
Cumulative Energy Electricity

Off-Road Construction Electricity from Dust Control

			Electricity from Dust Control (kWh)					
Project ID	**Acers**	**Water Use (Mgal)**	**Supply**	**Treat**	**Distribute**	**Wastewater**	**Total (kWh)**	**Annual (kWh)**
MV-021	6	0.016536	161	2	21	32	215	242
MV-023	32	0.096327	937	11	123	184	1,254	768
MV-024	51	0.15264	1,485	17	194	292	1,988	499
MV-025	26	0.07776	756	9	99	149	1,013	620
MV-026	32	0.096	934	11	122	183	1,250	695
MV-027	4	0.012474	121	1	16	24	162	176
MV-028	7	0.02079	202	2	26	40	271	273
MV-029	88	0.264	2,568	29	336	505	3,438	612
MV-030	27	0.07968	775	9	101	152	1,038	635
MV-031	17	0.05088	495	6	65	97	663	618
MV-032	37	0.1104	1,074	12	140	211	1,438	532
MV-033	17	0.05184	504	6	66	99	675	629
MV-034	17	0.04992	486	6	63	95	650	606
MV-035	8	0.024	233	3	31	46	313	316
MV-040	3	0.00906218	88	1	12	17	118	141
MV-041	45	0.133545	1,299	15	170	255	1,739	910
MV-042	14	0.041108835	400	5	52	79	535	499
MV-044	34	0.102173714	994	11	130	195	1,330	762
MV-045	6	0.01920996	187	2	24	37	250	281
MV-047	5	0.01536	149	2	20	29	200	202
MV-054	53	0.1600698	1,557	18	204	306	2,084	735
MV-056	5	0.01536	149	2	20	29	200	202
MV-057	12	0.03552	346	4	45	68	463	431
MV-059	20	0.06048	588	7	77	116	788	617
MV-060	29	0.08832	859	10	112	169	1,150	704
MV-061	13	0.03969	386	4	50	76	517	520
MV-062	174	0.52128	5,070	58	663	996	6,788	605
MV-063	71	0.21216	2,064	24	270	405	2,763	693
MV-064	28	0.08352	812	9	106	160	1,088	666
MV-065	4	0.012012	117	1	15	23	156	170
MV-066	19	0.057981	564	6	74	111	755	704
MV-067	52	0.15456	1,503	17	197	295	2,013	505
MV-068	9	0.026651968	259	3	34	51	347	355
MV-070	19	0.055671	542	6	71	106	725	676
MV-071	4	0.011319	110	1	14	22	147	160
MV-072	2	0.005544	54	1	7	11	72	88
MV-073	7	0.022176	216	2	28	42	289	292
MV-074	40	0.121338	1,180	13	154	232	1,580	585
MV-075	313	0.937962	9,124	104	1,193	1,792	12,213	1,088
MV-076	23	0.068715077	668	8	87	131	895	877
MV-077	23	0.0685971	667	8	87	131	893	823
MV-079	11	0.0338007	329	4	43	65	440	437
MV-080	3	0.00976815	95	1	12	19	127	152
MV-085	10	0.03087	300	3	39	59	402	405
MV-087	5	0.01386	135	2	18	26	180	196
MV-088	1	0.002772	27	0	4	5	36	97
MV-089	1	0.002772	27	0	4	5	36	97
MV-090	1	0.001611855	16	0	2	3	21	56
MV-091	28	0.08352	812	9	106	160	1,088	666
MV-094	20	0.061446	598	7	78	117	800	737
MV-095	13	0.0385875	375	4	49	74	502	506
MV-096	25	0.07488	728	8	95	143	975	763
MV-097	68	0.20544	1,998	23	261	393	2,675	672
MV-098	5	0.01536	149	2	20	29	200	202
MV-099	7	0.022176	216	2	28	42	289	292
MV-100	15	0.044814	436	5	57	86	584	544
MV-101	1	0.0019845	19	0	3	4	26	69

World Logistics Center
Cumulative Energy Electricity

Off-Road Construction Electricity from Dust Control

			Electricity from Dust Control (kWh)					
Project ID	**Acers**	**Water Use (Mgal)**	**Supply**	**Treat**	**Distribute**	**Wastewater**	**Total (kWh)**	**Annual (kWh)**
MV-102	6	0.0173628	169	2	22	33	226	254
MV-103	8	0.0236808	230	3	30	45	308	316
MV-104	11	0.034356063	334	4	44	66	447	444
MV-105	1	0.002772	27	0	4	5	36	97
MV-106	1	0.002772	27	0	4	5	36	97
MV-107	3	0.00864	84	1	11	17	113	137
MV-108	0	0.000655547	6	0	1	1	9	23
MV-109	354	1.0608	10,318	118	1,349	2,027	13,813	1,231
MV-110	5	0.01386	135	2	18	26	180	196
MV-111	1	0.003696	36	0	5	7	48	59
MV-112	1	0.003465	34	0	4	7	45	115
MV-113	46	0.13824	1,345	15	176	264	1,800	666
MV-114	0	0.00125685	12	0	2	2	16	44
MV-115	0	4.7541E-06	0	0	0	0	0	0
MV-116	8	0.024	233	3	31	46	313	316
MV-117	4	0.0107484	105	1	14	21	140	168
MV-118	3	0.00864	84	1	11	17	113	137
MV-119	11	0.0336	327	4	43	64	438	408
MV-120	14	0.04178916	406	5	53	80	544	548
MV-121	0	0.000959396	9	0	1	2	12	33
MV-123	1	0.003087	30	0	4	6	40	102
MV-124	10	0.03087	300	3	39	59	402	405
MV-125	2	0.005544	54	1	7	11	72	88
MV-126	75	0.2256	2,194	25	287	431	2,938	523
MV-127	10	0.031314921	305	3	40	60	408	405
MV-129	68	0.203346	1,978	23	259	389	2,648	934
MV-130	7	0.020433214	199	2	26	39	266	269
MV-131	46	0.13815	1,344	15	176	264	1,799	666
MV-132	34	0.10131	985	11	129	194	1,319	807
P-004	7	0.0221364	215	2	28	42	288	295
P-005	14	0.042366	412	5	54	81	552	514
P-006	26	0.07722	751	9	98	148	1,005	875
P-007	51	0.153134982	1,490	17	195	293	1,994	1,062
P-008	10	0.0310167	302	3	39	59	404	401
P-009	28	0.0826254	804	9	105	158	1,076	937
P-012	19	0.058441126	568	6	74	112	761	709
P-014	37	0.11052	1,075	12	141	211	1,439	824
P-022	12	0.034998	340	4	45	67	456	453
P-023	6	0.016578	161	2	21	32	216	221
P-024	45	0.1348344	1,312	15	172	258	1,756	919
P-025	32	0.0955998	930	11	122	183	1,245	929
P-026	35	0.104455494	1,016	12	133	200	1,360	1,079
P-028	29	0.086229	839	10	110	165	1,123	978
P-030	157	0.47232	4,594	52	601	903	6,150	548
P-031	6	0.017325	169	2	22	33	226	231
P-032	47	0.1417815	1,379	16	180	271	1,846	1,464
P-033	595	1.7856	17,369	198	2,271	3,412	23,250	2,071
P-034	97	0.29166753	2,837	32	371	557	3,798	910
P-035	3	0.00924	90	1	12	18	120	144
P-036	110	0.328653401	3,197	36	418	628	4,279	686
P-039	24	0.07217877	702	8	92	138	940	866
P-040	39	0.11712	1,139	13	149	224	1,525	564
P-041	6	0.019271281	187	2	25	37	251	257
P-042	20	0.05856	570	7	74	112	763	711
P-043	18	0.05472	532	6	70	105	713	664
P-044	7	0.021714	211	2	28	41	283	286
P-045	6	0.017325	169	2	22	33	226	231

World Logistics Center
Cumulative Energy Electricity

Off-Road Construction Electricity from Dust Control

			Electricity from Dust Control (kWh)					
Project ID	**Acers**	**Water Use (Mgal)**	**Supply**	**Treat**	**Distribute**	**Wastewater**	**Total (kWh)**	**Annual (kWh)**
P-046	92	0.275418	2,679	31	350	526	3,586	639
P-047	167	0.50016	4,865	56	636	956	6,513	580
P-048	24	0.072	700	8	92	138	938	734
P-049	36	0.10944	1,065	12	139	209	1,425	527
P-050	6	0.01764	172	2	22	34	230	258
P-051	11	0.0336	327	4	43	64	438	408
P-052	26	0.07872	766	9	100	150	1,025	627
P-053	52	0.15456	1,503	17	197	295	2,013	505
P-054	76	0.22848	2,222	25	291	437	2,975	530
P-055	33	0.099225	965	11	126	190	1,292	1,125
P-056	0	0.00126821	12	0	2	2	17	44
P-057	1	0.003835965	37	0	5	7	50	127
P-058	16	0.0486486	473	5	62	93	633	629
P-059	78	0.23328	2,269	26	297	446	3,038	541
P-060	0	0.00099225	10	0	1	2	13	35
R-004	17	0.049896	485	6	63	95	650	606
R-005	34	0.10335	1,005	11	131	198	1,346	1,067
R-006	6	0.017787	173	2	23	34	232	237
R-007	4	0.012370271	120	1	16	24	161	193
R-008	8	0.023754	231	3	30	45	309	312
R-009	645	1.935464942	18,826	215	2,462	3,699	25,202	2,245
R-010	2	0.005196083	51	1	7	10	68	172
R-011	23	0.070413724	685	8	90	135	917	899
R-012	5	0.013533801	132	2	17	26	176	211
R-013	1	0.00288	28	0	4	6	38	101
R-014	0	0.000850689	8	0	1	2	11	30
R-015	55	0.16482816	1,603	18	210	315	2,146	539
R-016	0	0.001464672	14	0	2	3	19	51
R-017	21	0.063525	618	7	81	121	827	762
R-018	388	1.163168567	11,314	129	1,480	2,223	15,146	1,349
R-019	4	0.012705	124	1	16	24	165	180
R-020	45	0.134599453	1,309	15	171	257	1,753	917
R-021	5	0.0144	140	2	18	28	188	204
R-022	3	0.00864	84	1	11	17	113	137
R-023	1	0.0017726	17	0	2	3	23	62
R-024	1,600	4.8	46,690	533	6,106	9,173	62,501	5,568
R-025	16	0.048048	467	5	61	92	626	583
R-026	86	0.258978488	2,519	29	329	495	3,372	1,115
R-027	0	0.000797769	8	0	1	2	10	28
R-028	29	0.086028	837	10	109	164	1,120	686
R-029	0	0.000836798	8	0	1	2	11	29
R-030	15	0.045988644	447	5	58	88	599	603
R-031	3	0.008316	81	1	11	16	108	132
R-032	2	0.004910976	48	1	6	9	64	163
R-033	2	0.00693	67	1	9	13	90	110
R-034	1	0.002514712	24	0	3	5	33	88
R-035	8	0.023562	229	3	30	45	307	310
R-036	5	0.014322	139	2	18	27	186	203
R-037	0	0.001323	13	0	2	3	17	46
R-038	0	0.00077175	8	0	1	1	10	27
R-039	129	0.38592	3,754	43	491	737	5,025	448
R-040	0	0.0005292	5	0	1	1	7	18
R-041	2	0.004779731	46	1	6	9	62	158
R-042	191	0.57408	5,584	64	730	1,097	7,475	666
R-043	16	0.048	467	5	61	92	625	583
R-044	0	0.000882	9	0	1	2	11	31
R-045	3	0.007841991	76	1	10	15	102	260

World Logistics Center
Cumulative Energy Electricity

Off-Road Construction Electricity from Dust Control

Project ID	Acers	Water Use (Mgal)	Electricity from Dust Control (kWh) Supply	Treat	Distribute	Wastewater	Total (kWh)	Annual (kWh)
R-046	11	0.03440928	335	4	44	66	448	418
R-047	3	0.009922117	97	1	13	19	129	155
R-048	6	0.01660365	162	2	21	32	216	243
R-049	66	0.19902	1,936	22	253	380	2,591	651
R-050	1	0.0036792	36	0	5	7	48	58
R-051	0	0.000520601	5	0	1	1	7	18
R-052	10	0.03072	299	3	39	59	400	373
R-053	9	0.02784	271	3	35	53	363	366
R-054	8	0.024	233	3	31	46	313	316
R-055	6	0.0192	187	2	24	37	250	253
R-056	9	0.0270777	263	3	34	52	353	361
R-057	7	0.022086979	215	2	28	42	288	294
R-058	0	0.000605493	6	0	1	1	8	21
R-059	0	0.000893025	9	0	1	2	12	31
R-060	7	0.020996586	204	2	27	40	273	307
R-061	31	0.093811064	913	10	119	179	1,222	1,128
R-062	0	0.000403736	4	0	1	1	5	14
R-063	2	0.004851	47	1	6	9	63	77
R-064	2	0.0048	47	1	6	9	63	76
R-065	20	0.05952	579	7	76	114	775	723
R-066	0	0.001356075	13	0	2	3	18	47
RC-001	400	1.20096	11,682	133	1,528	2,295	15,638	1,393
RC-002	640	1.92	18,676	213	2,442	3,669	25,000	2,227
RC-003	1,092	3.27552	31,861	364	4,166	6,260	42,651	3,800
RC-005	240	0.72	7,003	80	916	1,376	9,375	835
RC-006	41	0.12402	1,206	14	158	237	1,615	1,281
RC-007	49	0.146130005	1,421	16	186	279	1,903	704
RC-009	53	0.157955577	1,536	18	201	302	2,057	1,095
RC-010	266	0.79794	7,762	89	1,015	1,525	10,390	926
RC-011	25	0.0749694	729	8	95	143	976	899
RC-012	18	0.054525686	530	6	69	104	710	705
RC-013	159	0.47712	4,641	53	607	912	6,213	553
RC-014	25	0.07392	719	8	94	141	963	754
RC-015	45	0.13632	1,326	15	173	261	1,775	657
RC-017	1	0.00204624	20	0	3	4	27	71
RC-018	5	0.0144	140	2	18	28	188	204
RC-019	4	0.011641959	113	1	15	22	152	182
RC-020	0	0.0006174	6	0	1	1	8	22
RC-021	0	0.0007368	7	0	1	1	10	26
RC-022	42	0.12576	1,223	14	160	240	1,638	606
RC-023	2	0.006750315	66	1	9	13	88	107
RC-024	8	0.024556217	239	3	31	47	320	327
RC-025	4	0.0109395	106	1	14	21	142	171
RC-026	1	0.00192	19	0	2	4	25	67
RC-027	8	0.024285937	236	3	31	46	316	324
RC-028	0	0.0012348	12	0	2	2	16	43
RC-029	1	0.001795311	17	0	2	3	23	63
RC-030	39	0.115958505	1,128	13	147	222	1,510	865
RC-031	8	0.02324322	226	3	30	44	303	310
RC-032	232	0.69696	6,779	77	887	1,332	9,075	809
RC-033	123	0.36864	3,586	41	469	704	4,800	428
RC-034	138	0.41472	4,034	46	528	793	5,400	481
RC-035	901	2.704098	26,303	300	3,440	5,168	35,210	3,137
RC-036	150	0.44928	4,370	50	571	859	5,850	521
RC-037	180	0.53952	5,248	60	686	1,031	7,025	626
RC-038	56	0.167968296	1,634	19	214	321	2,187	771
RC-039	12	0.03744	364	4	48	72	488	455

World Logistics Center
Cumulative Energy Electricity

Off-Road Construction Electricity from Dust Control

			Electricity from Dust Control (kWh)					
Project ID	**Acers**	**Water Use (Mgal)**	**Supply**	**Treat**	**Distribute**	**Wastewater**	**Total (kWh)**	**Annual (kWh)**
RD-003	33	0.09888	962	11	126	189	1,288	716
RD-004	21	0.06432	626	7	82	123	838	656
RD-006	4	0.010633392	103	1	14	20	138	166
RD-007	9	0.028167993	274	3	36	54	367	412
RD-008	6	0.01848	180	2	24	35	241	243
RD-009	3	0.009658341	94	1	12	18	126	151
RD-010	6	0.018694319	182	2	24	36	243	249
RD-011	4	0.012230033	119	1	16	23	159	191
SB-007	11	0.03264	317	4	42	62	425	396
SB-008	13	0.0384	374	4	49	73	500	466
SJ-001	123	0.370052987	3,600	41	471	707	4,818	1,321
SJ-002	103	0.30816	2,997	34	392	589	4,013	357
SJ-003	186	0.5568	5,416	62	708	1,064	7,250	646
SJ-004	196	0.58848	5,724	65	749	1,125	7,663	683
WLC-001	19	0.0576	560	6	73	110	750	699

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Climate Zone 10

		Electricity (kWhr/unit)			Natural Gas (kBtU/unit)	
		T24	NT24	Light	T24	NT24
BP	Office Park	3.07	2.60	4.24	2.92	0.000
HI	Heavy Industrial	2.20	5.02	2.93	15.36	17.130
LI	Light Industrial	2.20	5.02	2.93	15.36	17.130
MF	Multi-Family - Mid Rise Apartment	772.17	3054.10	741.44	8764.08	6030.000
MO	Medical Office	3.07	2.79	3.66	3.47	0.000
OG	General Office	3.07	2.79	3.66	3.47	0.000
RC	Retail Commercial	4.58	2.44	5.61	1.92	0.300
SF	Single Family Residential	951.67	6155.97	1608.84	24556.15	6030.000
SR	Senior Residential	877.14	3172.76	1001.10	9544.50	6030.000
WH	Warehouse - Unrefrigerated No Rail	0.37	0.82	1.17	2.00	0.030

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	ınduse_Coı	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
B-001	SF	3,300.00	3,140,511	20,314,701	5,309,172	81,035,295	19,899,000	28,764,384	100,934
B-002	MF	571.00	440,909	1,743,891	423,362	5,004,290	3,443,130	2,608,162	8,447
B-003	SF	922.00	877,440	5,675,804	1,483,350	22,640,770	5,559,660	8,036,595	28,200
B-004	LI	1,734.00	3,814,800	8,704,680	5,080,620	26,634,240	29,703,420	17,600,100	56,338
B-005	HI	2,565.68	5,644,505	12,879,734	7,517,454	39,408,906	43,950,167	26,041,693	83,359
B-006	BP	1,853.25	5,689,482	4,818,454	7,857,786	5,411,494	0	18,365,722	5,411
B-007	SF	403.00	383,523	2,480,856	648,363	9,896,128	2,430,090	3,512,741	12,326
B-008	SF	648.00	616,682	3,989,069	1,042,528	15,912,385	3,907,440	5,648,279	19,820
B-009	SF	4,450.00	4,234,932	27,394,067	7,159,338	109,274,868	26,833,500	38,788,336	136,108
B-010	SF	95.00	90,409	584,817	152,840	2,332,834	572,850	828,066	2,906
B-011	RC	225.00	1,030,500	549,000	1,262,250	432,000	67,500	2,841,750	500
B-012	MF	279.00	215,435	852,094	206,862	2,445,178	1,682,370	1,274,391	4,128
B-013	SF	1,890.00	1,798,656	11,634,783	3,040,708	46,411,124	11,396,700	16,474,147	57,808
B-014	SF	700.00	666,169	4,309,179	1,126,188	17,189,305	4,221,000	6,101,536	21,410
C-001	RC	200.00	916,000	488,000	1,122,000	384,000	60,000	2,526,000	444
C-002	RC	1,000.00	4,580,000	2,440,000	5,610,000	1,920,000	300,000	12,630,000	2,220
C-002	BP	1,579.00	4,847,530	4,105,400	6,694,960	4,610,680	0	15,647,890	4,611
C-003	RC	72.70	332,966	177,388	407,847	139,584	21,810	918,201	161
H-001	SF	588.00	559,582	3,619,710	945,998	14,439,016	3,545,640	5,125,290	17,985
H-002	SF	440.00	418,735	2,708,627	707,890	10,804,706	2,653,200	3,835,251	13,458
H-003	SF	931.00	886,005	5,731,208	1,497,830	22,861,776	5,613,930	8,115,043	28,476
H-004	LI	734.98	1,616,965	3,689,620	2,153,503	11,289,354	12,590,276	7,460,088	23,880
H-004	BP	995.15	3,055,120	2,587,398	4,219,449	2,905,847	0	9,861,966	2,906

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
H-005	RC	20.91	95,762	51,017	117,298	40,145	6,273	264,078	46
H-006	RC	680.79	3,118,009	1,661,123	3,819,221	1,307,113	204,236	8,598,352	1,511
H-007	SR	358.00	314,016	1,135,848	358,394	3,416,931	2,158,740	1,808,258	5,576
H-008	SR	440.00	385,942	1,396,014	440,484	4,199,580	2,653,200	2,222,440	6,853
H-008	SF	145.00	137,992	892,616	233,282	3,560,642	874,350	1,263,890	4,435
H-009	SR	599.00	525,407	1,900,483	599,659	5,717,156	3,611,970	3,025,549	9,329
M-001	RC	10.00	45,800	24,400	56,100	19,200	3,000	126,300	22
M-001	OG	258.10	792,373	720,105	944,653	895,614	0	2,457,131	896
M-001	LI	42.22	92,888	211,954	123,710	648,530	723,263	428,553	1,372
M-001	HI	409.31	900,486	2,054,746	1,199,284	6,287,032	7,011,515	4,154,517	13,299
M-002	WH	4,525.00	1,674,250	3,710,500	5,294,250	9,050,000	135,750	10,679,000	9,186
M-002	OG	469.00	1,439,830	1,308,510	1,716,540	1,627,430	0	4,464,880	1,627
M-002	LI	487.80	1,073,160	2,448,756	1,429,254	7,492,608	8,356,014	4,951,170	15,849
M-003	WH	2,900.00	1,073,000	2,378,000	3,393,000	5,800,000	87,000	6,844,000	5,887
M-004	RC	108.90	498,762	265,716	610,929	209,088	32,670	1,375,407	242
M-005	WH	3,061.82	1,132,872	2,510,688	3,582,324	6,123,630	91,854	7,225,883	6,215
M-005	OG	232.76	714,558	649,386	851,883	807,660	0	2,215,828	808
M-005	LI	1,061.43	2,335,144	5,328,374	3,109,987	16,303,549	18,182,279	10,773,504	34,486
M-006	BP	219.35	673,398	570,304	930,035	640,496	0	2,173,737	640
M-007	WH	675.50	249,935	553,910	790,335	1,351,000	20,265	1,594,180	1,371
M-008	RC	625.00	2,862,500	1,525,000	3,506,250	1,200,000	187,500	7,893,750	1,388
M-008	MO	2,930.00	8,995,100	8,174,700	10,723,800	10,167,100	0	27,893,600	10,167
M-009	SF	135.00	128,475	831,056	217,193	3,315,080	814,050	1,176,725	4,129
M-010	WH	559.00	206,830	458,380	654,030	1,118,000	16,770	1,319,240	1,135
M-011	RC	67.00	306,860	163,480	375,870	128,640	20,100	846,210	149
MV-001	RC	304.50	1,394,610	742,980	1,708,245	584,640	91,350	3,845,835	676
MV-002	SF	262.00	249,338	1,612,864	421,516	6,433,711	1,579,860	2,283,718	8,014
MV-002	MF	216.00	166,789	659,686	160,151	1,893,041	1,302,480	986,625	3,196
MV-003	WH	1,901.00	703,370	1,558,820	2,224,170	3,802,000	57,030	4,486,360	3,859
MV-003	LI	367.00	807,400	1,842,340	1,075,310	5,637,120	6,286,710	3,725,050	11,924
MV-004	LI	937.26	2,061,972	4,705,045	2,746,172	14,396,314	16,055,264	9,513,189	30,452
MV-005	RC	116.36	532,929	283,918	652,780	223,411	34,908	1,469,627	258
MV-006	WH	750.00	277,500	615,000	877,500	1,500,000	22,500	1,770,000	1,523
MV-007	SF	31.00	29,502	190,835	49,874	761,241	186,930	270,211	948
MV-008	SF	58.00	55,197	357,046	93,313	1,424,257	349,740	505,556	1,774
MV-009	SF	11.00	10,468	67,716	17,697	270,118	66,330	95,881	336
MV-010	SF	47.00	44,728	289,331	75,615	1,154,139	283,410	409,675	1,438
MV-011	SF	24.00	22,840	147,743	38,612	589,348	144,720	209,196	734
MV-012	MO	80.00	245,600	223,200	292,800	277,600	0	761,600	278
MV-013	OG	30.00	92,100	83,700	109,800	104,100	0	285,600	104
MV-014	SF	107.00	101,829	658,689	172,146	2,627,508	645,210	932,663	3,273

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
MV-015	SF	63.00	59,955	387,826	101,357	1,547,037	379,890	549,138	1,927
MV-016	SF	32.00	30,453	196,991	51,483	785,797	192,960	278,927	979
MV-017	SF	96.00	91,360	590,973	154,449	2,357,390	578,880	836,782	2,936
MV-018	RC	5.50	25,190	13,420	30,855	10,560	1,650	69,465	12
MV-019	SR	139.00	121,922	441,014	139,153	1,326,686	838,170	702,089	2,165
MV-020	RC	93.79	429,549	228,843	526,151	180,073	28,136	1,184,542	208
MV-021	MO	80.00	245,600	223,200	292,800	277,600	0	761,600	278
MV-022	SF	40.00	38,067	246,239	64,354	982,246	241,200	348,659	1,223
MV-023	MF	417.00	321,995	1,273,560	309,180	3,654,621	2,514,510	1,904,735	6,169
MV-024	SF	159.00	151,316	978,799	255,806	3,904,428	958,770	1,385,920	4,863
MV-025	SF	81.00	77,085	498,634	130,316	1,989,048	488,430	706,035	2,477
MV-026	SF	100.00	95,167	615,597	160,884	2,455,615	603,000	871,648	3,059
MV-027	MF	54.00	41,697	164,921	40,038	473,260	325,620	246,656	799
MV-028	MF	90.00	69,495	274,869	66,730	788,767	542,700	411,094	1,331
MV-029	SF	275.00	261,709	1,692,892	442,431	6,752,941	1,658,250	2,397,032	8,411
MV-030	SF	83.00	78,989	510,946	133,534	2,038,160	500,490	723,468	2,539
MV-031	SF	53.00	50,439	326,266	85,269	1,301,476	319,590	461,973	1,621
MV-032	SF	115.00	109,442	707,937	185,017	2,823,957	693,450	1,002,395	3,517
MV-033	SF	54.00	51,390	332,422	86,877	1,326,032	325,620	470,690	1,652
MV-034	SF	52.00	49,487	320,110	83,660	1,276,920	313,560	453,257	1,590
MV-035	SF	25.00	23,792	153,899	40,221	613,904	150,750	217,912	765
MV-036	MF	56.00	43,242	171,030	41,521	490,788	337,680	255,792	828
MV-037	HI	1,616.13	3,555,493	8,112,988	4,735,270	24,823,803	27,684,358	16,403,750	52,508
MV-038	LI	434.00	954,800	2,178,680	1,271,620	6,666,240	7,434,420	4,405,100	14,101
MV-039	LI	1,600.00	3,520,000	8,032,000	4,688,000	24,576,000	27,408,000	16,240,000	51,984
MV-040	WH	98.40	36,406	80,684	115,122	196,790	2,952	232,212	200
MV-041	WH	1,450.00	536,500	1,189,000	1,696,500	2,900,000	43,500	3,422,000	2,944
MV-042	WH	446.35	165,150	366,007	522,230	892,700	13,391	1,053,386	906
MV-043	HI	555.67	1,222,474	2,789,463	1,628,113	8,535,091	9,518,627	5,640,051	18,054
MV-044	WH	1,109.38	410,470	909,690	1,297,972	2,218,756	33,281	2,618,132	2,252
MV-045	RC	87.12	399,010	212,573	488,743	167,270	26,136	1,100,326	193
MV-046	WH	382.28	141,444	313,470	447,268	764,560	11,468	902,181	776
MV-047	SF	16.00	15,227	98,496	25,741	392,898	96,480	139,464	489
MV-048	BP	1,484.50	4,557,406	3,859,692	6,294,267	4,334,731	0	14,711,365	4,335
MV-049	BP	1,560.05	4,789,341	4,056,120	6,614,595	4,555,334	0	15,460,056	4,555
MV-050	LI	354.81	780,582	1,781,146	1,039,593	5,449,882	6,077,895	3,601,322	11,528
MV-051	LI	769.32	1,692,504	3,861,986	2,254,108	11,816,755	13,178,452	7,808,598	24,995
MV-052	LI	878.96	1,933,712	4,412,379	2,575,353	13,500,826	15,056,585	8,921,444	28,557
MV-053	WH	1,250.00	462,500	1,025,000	1,462,500	2,500,000	37,500	2,950,000	2,538
MV-054	WH	1,738.00	643,060	1,425,160	2,033,460	3,476,000	52,140	4,101,680	3,528
MV-056	SF	16.00	15,227	98,496	25,741	392,898	96,480	139,464	489

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
MV-057	SF	37.00	35,212	227,771	59,527	908,578	223,110	322,510	1,132
MV-058	SF	8.00	7,613	49,248	12,871	196,449	48,240	69,732	245
MV-059	SF	63.00	59,955	387,826	101,357	1,547,037	379,890	549,138	1,927
MV-060	SF	92.00	87,554	566,349	148,013	2,259,166	554,760	801,916	2,814
MV-061	RC	180.00	824,400	439,200	1,009,800	345,600	54,000	2,273,400	400
MV-062	SF	543.00	516,757	3,342,692	873,600	13,333,989	3,274,290	4,733,049	16,608
MV-063	SF	221.00	210,319	1,360,469	355,554	5,426,909	1,332,630	1,926,342	6,760
MV-064	SF	87.00	82,795	535,569	139,969	2,136,385	524,610	758,334	2,661
MV-065	MF	52.00	40,153	158,813	38,555	455,732	313,560	237,521	769
MV-066	MF	251.00	193,815	766,579	186,101	2,199,784	1,513,530	1,146,495	3,713
MV-067	SF	161.00	153,219	991,111	259,023	3,953,540	970,830	1,403,353	4,924
MV-068	HI	207.09	455,589	1,039,572	606,762	3,180,841	3,547,383	2,101,923	6,728
MV-069	HI	409.60	901,116	2,056,182	1,200,122	6,291,425	7,016,414	4,157,420	13,308
MV-070	MF	241.00	186,093	736,038	178,687	2,112,143	1,453,230	1,100,818	3,565
MV-071	MF	49.00	37,836	149,651	36,331	429,440	295,470	223,818	725
MV-072	MF	24.00	18,532	73,298	17,795	210,338	144,720	109,625	355
MV-073	MF	96.00	74,128	293,194	71,178	841,352	578,880	438,500	1,420
MV-074	SR	189.00	165,779	599,652	189,208	1,803,911	1,139,670	954,639	2,944
MV-075	SR	1,461.00	1,281,502	4,635,402	1,462,607	13,944,515	8,809,830	7,379,511	22,754
MV-076	RC	311.63	1,427,279	760,385	1,748,261	598,335	93,490	3,935,925	692
MV-077	LI	533.00	1,172,600	2,675,660	1,561,690	8,186,880	9,130,290	5,409,950	17,317
MV-078	LI	520.00	1,144,000	2,610,400	1,523,600	7,987,200	8,907,600	5,278,000	16,895
MV-079	WH	367.00	135,790	300,940	429,390	734,000	11,010	866,120	745
MV-080	RC	44.30	202,894	108,092	248,523	85,056	13,290	559,509	98
MV-081	WH	700.00	259,000	574,000	819,000	1,400,000	21,000	1,652,000	1,421
MV-082	WH	500.00	185,000	410,000	585,000	1,000,000	15,000	1,180,000	1,015
MV-083	LI	356.00	783,200	1,787,120	1,043,080	5,468,160	6,098,280	3,613,400	11,566
MV-084	LI	99.98	219,952	501,890	292,936	1,535,662	1,712,623	1,014,777	3,248
MV-085	RC	140.00	641,200	341,600	785,400	268,800	42,000	1,768,200	311
MV-086	SF	71.00	67,569	437,074	114,228	1,743,487	428,130	618,870	2,172
MV-087	MF	60.00	46,330	183,246	44,486	525,845	361,800	274,063	888
MV-088	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-089	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-090	RC	7.31	33,480	17,836	41,009	14,035	2,193	92,325	16
MV-091	SF	87.00	82,795	535,569	139,969	2,136,385	524,610	758,334	2,661
MV-093	MF	112.00	86,483	342,059	83,041	981,577	675,360	511,584	1,657
MV-094	MF	266.00	205,397	812,391	197,223	2,331,245	1,603,980	1,215,011	3,935
MV-095	RC	175.00	801,500	427,000	981,750	336,000	52,500	2,210,250	389
MV-096	SF	78.00	74,230	480,166	125,490	1,915,380	470,340	679,885	2,386
MV-097	SF	214.00	203,657	1,317,378	344,292	5,255,016	1,290,420	1,865,327	6,545
MV-098	SF	16.00	15,227	98,496	25,741	392,898	96,480	139,464	489

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	**nduse_Co**	**Landuse_qty**	**kWh**	**kWh**	**kWh**	**kBTU**	**kBTU**	**Electricity (kWh)**	**NG (MMBtu)**
MV-099	MF	96.00	74,128	293,194	71,178	841,352	578,880	438,500	1,420
MV-100	MF	194.00	149,801	592,495	143,839	1,700,232	1,169,820	886,136	2,870
MV-101	RC	9.00	41,220	21,960	50,490	17,280	2,700	113,670	20
MV-102	OG	84.00	257,880	234,360	307,440	291,480	0	799,680	291
MV-103	LI	184.00	404,800	923,680	539,120	2,826,240	3,151,920	1,867,600	5,978
MV-104	WH	373.03	138,021	305,885	436,445	746,060	11,191	880,351	757
MV-105	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-106	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-107	SF	9.00	8,565	55,404	14,480	221,005	54,270	78,448	275
MV-108	RC	2.97	13,616	7,254	16,679	5,708	892	37,549	7
MV-109	SF	1,105.00	1,051,595	6,802,347	1,777,768	27,134,546	6,663,150	9,631,710	33,798
MV-110	MF	60.00	46,330	183,246	44,486	525,845	361,800	274,063	888
MV-111	MF	16.00	12,355	48,866	11,863	140,225	96,480	73,083	237
MV-112	MF	15.00	11,583	45,812	11,122	131,461	90,450	68,516	222
MV-113	SF	144.00	137,040	886,460	231,673	3,536,086	868,320	1,255,173	4,404
MV-114	RC	5.70	26,106	13,908	31,977	10,944	1,710	71,991	13
MV-115	OG	0.02	71	64	84	80	0	219	0
MV-116	SF	25.00	23,792	153,899	40,221	613,904	150,750	217,912	765
MV-117	OG	52.00	159,640	145,080	190,320	180,440	0	495,040	180
MV-118	SF	9.00	8,565	55,404	14,480	221,005	54,270	78,448	275
MV-119	SF	35.00	33,308	215,459	56,309	859,465	211,050	305,077	1,071
MV-120	RC	189.52	868,002	462,429	1,063,207	363,878	56,856	2,393,638	421
MV-121	RC	4.35	19,928	10,616	24,409	8,354	1,305	54,953	10
MV-123	RC	14.00	64,120	34,160	78,540	26,880	4,200	176,820	31
MV-124	RC	140.00	641,200	341,600	785,400	268,800	42,000	1,768,200	311
MV-125	MF	24.00	18,532	73,298	17,795	210,338	144,720	109,625	355
MV-126	SF	235.00	223,642	1,446,653	378,077	5,770,695	1,417,050	2,048,373	7,188
MV-127	WH	340.01	125,804	278,808	397,812	680,020	10,200	802,424	690
MV-129	LI	1,580.00	3,476,000	7,931,600	4,629,400	24,268,800	27,065,400	16,037,000	51,334
MV-130	WH	221.86	82,088	181,924	259,575	443,718	6,656	523,587	450
MV-131	WH	1,500.00	555,000	1,230,000	1,755,000	3,000,000	45,000	3,540,000	3,045
MV-132	WH	1,100.00	407,000	902,000	1,287,000	2,200,000	33,000	2,596,000	2,233
P-001	SF	137.00	130,379	843,368	220,411	3,364,193	826,110	1,194,158	4,190
P-002	WH	600.00	222,000	492,000	702,000	1,200,000	18,000	1,416,000	1,218
P-003	WH	462.30	171,051	379,086	540,891	924,600	13,869	1,091,028	938
P-004	LI	172.00	378,400	863,440	503,960	2,641,920	2,946,360	1,745,800	5,588
P-005	WH	460.00	170,200	377,200	538,200	920,000	13,800	1,085,600	934
P-006	LI	600.00	1,320,000	3,012,000	1,758,000	9,216,000	10,278,000	6,090,000	19,494
P-007	LI	1,189.86	2,617,692	5,973,097	3,486,290	18,276,250	20,382,302	12,077,079	38,659
P-008	LI	241.00	530,200	1,209,820	706,130	3,701,760	4,128,330	2,446,150	7,830
P-009	HI	642.00	1,412,400	3,222,840	1,881,060	9,861,120	10,997,460	6,516,300	20,859

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	**nduse_Co**	**Landuse_qty**	**kWh**	**kWh**	**kWh**	**kBTU**	**kBTU**	**Electricity (kWh)**	**NG (MMBtu)**
P-010	WH	1,700.00	629,000	1,394,000	1,989,000	3,400,000	51,000	4,012,000	3,451
P-011	HI	1,224.99	2,694,985	6,149,465	3,589,229	18,815,892	20,984,130	12,433,679	39,800
P-012	LI	454.09	998,994	2,279,522	1,330,478	6,974,792	7,778,527	4,608,993	14,753
P-014	WH	1,200.00	444,000	984,000	1,404,000	2,400,000	36,000	2,832,000	2,436
P-015	WH	780.82	288,902	640,268	913,554	1,561,630	23,424	1,842,723	1,585
P-016	WH	1,310.00	484,700	1,074,200	1,532,700	2,620,000	39,300	3,091,600	2,659
P-017	WH	580.00	214,600	475,600	678,600	1,160,000	17,400	1,368,800	1,177
P-018	WH	1,547.00	572,390	1,268,540	1,809,990	3,094,000	46,410	3,650,920	3,140
P-019	WH	697.60	258,112	572,032	816,192	1,395,200	20,928	1,646,336	1,416
P-020	WH	871.50	322,455	714,630	1,019,655	1,743,000	26,145	2,056,740	1,769
P-021	WH	170.00	62,900	139,400	198,900	340,000	5,100	401,200	345
P-022	WH	380.00	140,600	311,600	444,600	760,000	11,400	896,800	771
P-023	WH	180.00	66,600	147,600	210,600	360,000	5,400	424,800	365
P-024	WH	1,464.00	541,680	1,200,480	1,712,880	2,928,000	43,920	3,455,040	2,972
P-025	WH	1,038.00	384,060	851,160	1,214,460	2,076,000	31,140	2,449,680	2,107
P-026	LI	811.62	1,785,564	4,074,332	2,378,047	12,466,483	13,903,051	8,237,943	26,370
P-027	WH	864.00	319,680	708,480	1,010,880	1,728,000	25,920	2,039,040	1,754
P-028	LI	670.00	1,474,000	3,363,400	1,963,100	10,291,200	11,477,100	6,800,500	21,768
P-030	SF	492.00	468,222	3,028,737	791,549	12,081,626	2,966,760	4,288,508	15,048
P-031	MF	75.00	57,913	229,058	55,608	657,306	452,250	342,578	1,110
P-032	RC	643.00	2,944,940	1,568,920	3,607,230	1,234,560	192,900	8,121,090	1,427
P-033	SF	1,860.00	1,770,106	11,450,104	2,992,442	45,674,439	11,215,800	16,212,653	56,890
P-034	WH	3,166.86	1,171,737	2,596,823	3,705,223	6,333,714	95,006	7,473,783	6,429
P-035	MF	40.00	30,887	122,164	29,658	350,563	241,200	182,708	592
P-036	WH	3,448.73	1,276,032	2,827,962	4,035,019	6,897,468	103,462	8,139,012	7,001
P-036	RC	50.00	229,000	122,000	280,500	96,000	15,000	631,500	111
P-037	SF	183.00	174,156	1,126,543	294,418	4,493,775	1,103,490	1,595,116	5,597
P-038	SF	223.00	212,222	1,372,781	358,771	5,476,021	1,344,690	1,943,775	6,821
P-039	WH	783.70	289,969	642,634	916,929	1,567,400	23,511	1,849,532	1,591
P-040	SF	122.00	116,104	751,028	196,278	2,995,850	735,660	1,063,411	3,732
P-041	LI	149.74	329,424	751,685	438,732	2,299,976	2,565,012	1,519,841	4,865
P-042	SF	61.00	58,052	375,514	98,139	1,497,925	367,830	531,705	1,866
P-043	SF	57.00	54,245	350,890	91,704	1,399,701	343,710	496,839	1,743
P-044	MF	94.00	72,584	287,085	69,695	823,824	566,820	429,365	1,391
P-045	MF	75.00	57,913	229,058	55,608	657,306	452,250	342,578	1,110
P-046	SR	429.00	376,293	1,361,114	429,472	4,094,591	2,586,870	2,166,879	6,681
P-047	SF	521.00	495,820	3,207,260	838,206	12,793,754	3,141,630	4,541,286	15,935
P-048	SF	75.00	71,375	461,698	120,663	1,841,711	452,250	653,736	2,294
P-049	SF	114.00	108,490	701,781	183,408	2,799,401	687,420	993,679	3,487
P-050	RC	80.00	366,400	195,200	448,800	153,600	24,000	1,010,400	178
P-051	SF	35.00	33,308	215,459	56,309	859,465	211,050	305,077	1,071

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
P-052	SF	82.00	78,037	504,790	131,925	2,013,604	494,460	714,751	2,508
P-053	SF	161.00	153,219	991,111	259,023	3,953,540	970,830	1,403,353	4,924
P-054	SF	238.00	226,497	1,465,121	382,904	5,844,364	1,435,140	2,074,522	7,280
P-055	RC	450.00	2,061,000	1,098,000	2,524,500	864,000	135,000	5,683,500	999
P-056	LI	9.85	21,679	49,467	28,872	151,357	168,799	100,018	320
P-057	WH	41.65	15,411	34,153	48,731	83,300	1,250	98,294	85
P-058	HI	378.00	831,600	1,897,560	1,107,540	5,806,080	6,475,140	3,836,700	12,281
P-059	SF	243.00	231,256	1,495,901	390,948	5,967,144	1,465,290	2,118,105	7,432
P-060	RC	4.50	20,610	10,980	25,245	8,640	1,350	56,835	10
P-061	WH	350.00	129,500	287,000	409,500	700,000	10,500	826,000	711
R-001	BP	1,375.17	4,221,769	3,575,439	5,830,717	4,015,493	0	13,627,925	4,015
R-002	WH	582.77	215,626	477,873	681,843	1,165,544	17,483	1,375,342	1,183
R-003	LI	652.02	1,434,440	3,273,130	1,910,413	10,014,996	11,169,068	6,617,983	21,184
R-004	MF	216.00	166,789	659,686	160,151	1,893,041	1,302,480	986,625	3,196
R-005	MO	500.00	1,535,000	1,395,000	1,830,000	1,735,000	0	4,760,000	1,735
R-006	MF	77.00	59,457	235,166	57,091	674,834	464,310	351,714	1,139
R-007	RC	56.10	256,943	136,886	314,727	107,714	16,830	708,556	125
R-008	SR	37.00	32,454	117,392	37,041	353,147	223,110	186,887	576
R-009	RC	8,777.62	40,201,494	21,417,390	49,242,441	16,853,028	2,633,286	110,861,325	19,486
R-010	RC	23.57	107,928	57,499	132,200	45,245	7,070	297,626	52
R-011	BP	340.66	1,045,816	885,707	1,444,384	994,717	0	3,375,907	995
R-012	RC	61.38	281,110	149,762	344,329	117,845	18,413	775,201	136
R-013	SF	3.00	2,855	18,468	4,827	73,668	18,090	26,149	92
R-014	RC	3.86	17,670	9,414	21,643	7,407	1,157	48,727	9
R-015	SF	171.70	163,398	1,056,955	276,231	4,216,193	1,035,327	1,496,585	5,252
R-016	SF	1.53	1,452	9,392	2,455	37,465	9,200	13,299	47
R-017	MF	275.00	212,347	839,878	203,896	2,410,122	1,658,250	1,256,120	4,068
R-018	LI	9,037.83	19,883,223	45,369,901	26,480,838	138,821,050	154,818,007	91,733,962	293,639
R-019	MF	55.00	42,469	167,976	40,779	482,024	331,650	251,224	814
R-020	WH	1,461.45	540,736	1,198,388	1,709,895	2,922,898	43,843	3,449,020	2,967
R-021	SF	15.00	14,275	92,340	24,133	368,342	90,450	130,747	459
R-022	SF	9.00	8,565	55,404	14,480	221,005	54,270	78,448	275
R-023	RC	8.04	36,819	19,615	45,099	15,435	2,412	101,533	18
R-024	SF	5,000.00	4,758,350	30,779,850	8,044,200	122,780,750	30,150,000	43,582,400	152,931
R-025	MF	208.00	160,611	635,253	154,220	1,822,929	1,254,240	950,084	3,077
R-026	RC	297.95	1,364,613	726,999	1,671,502	572,065	89,385	3,763,114	661
R-026	LI	943.51	2,075,721	4,736,418	2,764,483	14,492,307	16,162,319	9,576,622	30,655
R-026	BP	347.61	1,067,159	903,783	1,473,861	1,015,018	0	3,444,803	1,015
R-027	RC	3.62	16,570	8,828	20,297	6,947	1,085	45,695	8
R-028	SR	134.00	117,537	425,150	134,147	1,278,963	808,020	676,834	2,087
R-029	RC	3.80	17,381	9,260	21,290	7,286	1,139	47,931	8

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
R-030	RC	208.57	955,229	508,899	1,170,051	400,445	62,570	2,634,179	463
R-031	MF	36.00	27,798	109,948	26,692	315,507	217,080	164,438	533
R-032	RC	22.27	102,006	54,344	124,946	42,762	6,682	281,295	49
R-033	MF	30.00	23,165	91,623	22,243	262,922	180,900	137,031	444
R-034	OG	12.17	37,350	33,943	44,528	42,216	0	115,820	42
R-035	MF	102.00	78,761	311,518	75,627	893,936	615,060	465,906	1,509
R-036	MF	62.00	47,875	189,354	45,969	543,373	373,860	283,198	917
R-037	RC	6.00	27,480	14,640	33,660	11,520	1,800	75,780	13
R-038	RC	3.50	16,030	8,540	19,635	6,720	1,050	44,205	8
R-039	SF	402.00	382,571	2,474,700	646,754	9,871,572	2,424,060	3,504,025	12,296
R-040	RC	2.40	10,992	5,856	13,464	4,608	720	30,312	5
R-041	OG	23.12	70,991	64,516	84,634	80,240	0	220,140	80
R-042	SF	598.00	569,099	3,681,270	962,086	14,684,578	3,605,940	5,212,455	18,291
R-043	SF	50.00	47,584	307,799	80,442	1,227,808	301,500	435,824	1,529
R-044	RC	4.00	18,320	9,760	22,440	7,680	1,200	50,520	9
R-045	OG	37.94	116,473	105,850	138,857	131,648	0	361,179	132
R-046	SF	35.84	34,111	220,648	57,666	880,166	216,133	312,425	1,096
R-047	WH	107.73	39,861	88,340	126,046	215,464	3,232	254,248	219
R-048	RC	75.30	344,874	183,732	422,433	144,576	22,590	951,039	167
R-049	SR	310.00	271,913	983,556	310,341	2,958,795	1,869,300	1,565,810	4,828
R-050	SF	3.83	3,647	23,593	6,166	94,111	23,110	33,406	117
R-051	RC	2.36	10,813	5,761	13,245	4,533	708	29,819	5
R-052	SF	32.00	30,453	196,991	51,483	785,797	192,960	278,927	979
R-053	SF	29.00	27,598	178,523	46,656	712,128	174,870	252,778	887
R-054	SF	25.00	23,792	153,899	40,221	613,904	150,750	217,912	765
R-055	SF	20.00	19,033	123,119	32,177	491,123	120,600	174,330	612
R-056	OG	131.00	402,170	365,490	479,460	454,570	0	1,247,120	455
R-057	LI	171.62	377,555	861,512	502,835	2,636,022	2,939,782	1,741,902	5,576
R-058	RC	2.75	12,577	6,700	15,405	5,272	824	34,682	6
R-059	RC	4.05	18,549	9,882	22,721	7,776	1,215	51,152	9
R-060	BP	101.58	311,851	264,108	430,699	296,614	0	1,006,658	297
R-061	RC	425.45	1,948,547	1,038,091	2,386,758	816,858	127,634	5,373,396	944
R-062	RC	1.83	8,386	4,468	10,272	3,516	549	23,126	4
R-063	MF	21.00	16,216	64,136	15,570	184,046	126,630	95,922	311
R-064	SF	5.00	4,758	30,780	8,044	122,781	30,150	43,582	153
R-065	SF	62.00	59,004	381,670	99,748	1,522,481	373,860	540,422	1,896
R-066	RC	6.15	28,167	15,006	34,502	11,808	1,845	77,675	14
RC-001	SF	1,251.00	1,190,539	7,701,118	2,012,659	30,719,744	7,543,530	10,904,316	38,263
RC-002	SF	2,000.00	1,903,340	12,311,940	3,217,680	49,112,300	12,060,000	17,432,960	61,172
RC-003	SF	3,412.00	3,247,098	21,004,170	5,489,362	83,785,584	20,574,360	29,740,630	104,360
RC-005	SF	750.00	713,753	4,616,978	1,206,630	18,417,113	4,522,500	6,537,360	22,940

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
RC-006	BP	600.00	1,842,000	1,560,000	2,544,000	1,752,000	0	5,946,000	1,752
RC-007	WH	1,586.65	587,059	1,301,049	1,856,375	3,173,290	47,599	3,744,482	3,221
RC-009	OG	34.00	104,380	94,860	124,440	117,980	0	323,680	118
RC-009	HI	1,172.71	2,579,962	5,887,004	3,436,040	18,012,826	20,088,522	11,903,007	38,101
RC-010	LI	6,200.00	13,640,000	31,124,000	18,166,000	95,232,000	106,206,000	62,930,000	201,438
RC-011	WH	814.00	301,180	667,480	952,380	1,628,000	24,420	1,921,040	1,652
RC-012	LI	423.67	932,063	2,126,798	1,241,338	6,507,494	7,257,381	4,300,200	13,765
RC-013	SF	497.00	472,980	3,059,517	799,593	12,204,407	2,996,910	4,332,091	15,201
RC-014	MF	320.00	247,094	977,312	237,261	2,804,506	1,929,600	1,461,667	4,734
RC-015	SF	142.00	135,137	874,148	228,455	3,486,973	856,260	1,237,740	4,343
RC-017	RC	9.28	42,502	22,643	52,061	17,818	2,784	117,206	21
RC-018	SF	15.00	14,275	92,340	24,133	368,342	90,450	130,747	459
RC-019	RC	52.80	241,815	128,827	296,197	101,372	15,839	666,839	117
RC-020	RC	2.80	12,824	6,832	15,708	5,376	840	35,364	6
RC-021	WH	8.00	2,960	6,560	9,360	16,000	240	18,880	16
RC-022	SF	131.00	124,669	806,432	210,758	3,216,856	789,930	1,141,859	4,007
RC-023	LI	52.45	115,390	263,299	153,679	805,632	898,469	532,368	1,704
RC-024	LI	190.80	419,764	957,826	559,050	2,930,719	3,268,438	1,936,640	6,199
RC-025	LI	85.00	187,000	426,700	249,050	1,305,600	1,456,050	862,750	2,762
RC-026	SF	2.00	1,903	12,312	3,218	49,112	12,060	17,433	61
RC-027	LI	188.70	415,144	947,284	552,897	2,898,461	3,232,464	1,915,324	6,131
RC-028	RC	5.60	25,648	13,664	31,416	10,752	1,680	70,728	12
RC-029	RC	8.14	37,290	19,866	45,677	15,633	2,443	102,833	18
RC-030	WH	1,259.05	465,849	1,032,421	1,473,089	2,518,100	37,772	2,971,358	2,556
RC-031	LI	180.60	397,320	906,612	529,158	2,774,016	3,093,678	1,833,090	5,868
RC-032	SF	726.00	690,912	4,469,234	1,168,018	17,827,765	4,377,780	6,328,164	22,206
RC-033	SF	384.00	365,441	2,363,892	617,795	9,429,562	2,315,520	3,347,128	11,745
RC-034	SF	432.00	411,121	2,659,379	695,019	10,608,257	2,604,960	3,765,519	13,213
RC-035	SF	2,775.00	2,640,884	17,082,817	4,464,531	68,143,316	16,733,250	24,188,232	84,877
RC-035	OG	80.00	245,600	223,200	292,800	277,600	0	761,600	278
RC-035	MF	102.00	78,761	311,518	75,627	893,936	615,060	465,906	1,509
RC-036	SF	468.00	445,382	2,880,994	752,937	11,492,278	2,822,040	4,079,313	14,314
RC-037	SF	562.00	534,839	3,459,655	904,168	13,800,556	3,388,860	4,898,662	17,189
RC-038	WH	1,823.76	674,791	1,495,483	2,133,799	3,647,520	54,713	4,304,074	3,702
RC-039	SF	39.00	37,115	240,083	62,745	957,690	235,170	339,943	1,193
RD-001	SF	82.00	78,037	504,790	131,925	2,013,604	494,460	714,751	2,508
RD-002	SF	55.00	52,342	338,578	88,486	1,350,588	331,650	479,406	1,682
RD-003	SF	103.00	98,022	634,065	165,711	2,529,283	621,090	897,797	3,150
RD-004	SF	67.00	63,762	412,450	107,792	1,645,262	404,010	584,004	2,049
RD-005	WH	500.60	185,223	410,494	585,704	1,001,204	15,018	1,181,421	1,016
RD-006	RC	48.22	220,866	117,667	270,537	92,590	14,467	609,069	107

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
RD-007	RC	127.75	585,077	311,700	716,655	245,272	38,324	1,613,432	284
RD-008	MF	80.00	61,774	244,328	59,315	701,126	482,400	365,417	1,184
RD-009	RC	43.80	200,613	106,877	245,729	84,100	13,141	553,219	97
RD-010	LI	145.26	319,561	729,180	425,597	2,231,117	2,488,218	1,474,338	4,719
RD-011	RC	55.47	254,030	135,335	311,159	106,493	16,640	700,523	123
RD-012	WH	601.29	222,476	493,055	703,506	1,202,574	18,039	1,419,037	1,221
RD-013	WH	1,013.00	374,810	830,660	1,185,210	2,026,000	30,390	2,390,680	2,056
RD-014	WH	772.00	285,640	633,040	903,240	1,544,000	23,160	1,821,920	1,567
RD-015	WH	423.00	156,510	346,860	494,910	846,000	12,690	998,280	859
RD-016	WH	714.73	264,451	586,081	836,238	1,429,466	21,442	1,686,770	1,451
SB-001	WH	614.33	227,301	503,749	718,764	1,228,656	18,430	1,449,814	1,247
SB-002	WH	313.47	115,984	257,045	366,760	626,940	9,404	739,789	636
SB-003	WH	593.56	219,618	486,722	694,469	1,187,126	17,807	1,400,809	1,205
SB-004	WH	777.62	287,719	637,648	909,815	1,555,240	23,329	1,835,183	1,579
SB-005	WH	282.00	104,340	231,240	329,940	564,000	8,460	665,520	572
SB-006	WH	542.98	200,901	445,241	635,283	1,085,954	16,289	1,281,426	1,102
SB-007	SF	34.00	32,356,780	209,302,980	54,700,560	834,909	205,020	296,360,320	1,040
SB-008	SF	40.00	38,067	246,239	64,354	982,246	241,200	348,659	1,223
SJ-001	RC	1,678.24	7,686,361	4,094,917	9,414,954	3,222	503	21,196,232	4
SJ-002	SF	321.00	305,486	1,976,066	516,438	7,882,524	1,935,630	2,797,990	9,818
SJ-003	SF	580.00	551,969	3,570,463	933,127	14,242,567	3,497,400	5,055,558	17,740
SJ-004	SF	613.00	583,374	3,773,610	986,219	15,052,920	3,696,390	5,343,202	18,749
WLC-001	SF	60.00	57,100	369,358	96,530	1,473,369	361,800	522,989	1,835

World Logistic Center
Cumulative Energy - Electricity Natural Gas

		Water Usage (gal/ unit)	
		Indoor	Outdoor
BP	Office Park	177,734	108,937
HI	Heavy Industrial	231,250	0
LI	Light Industrial	231,250	0
MF	Multi-Family - Mid Rise Apartment	65,154	41,075
MO	Medical Office	125,481	23,901
OG	General Office	177,734	108,934
RC	Retail Commercial	74,073	45,399
SF	Single Family Residential	65,154	41,075
SR	Senior Residential	65,154	41,075
WH	Warehouse - Unrefrigerated No Rail	231,250	0

Electricity Intensity Rates (kWhr/Million Gallons)

Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
9727	111	1272	1911

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
B-001	215,008,200	135,547,500	350.5557	215.0082	3,409,855	38,912	445,907	410,881
B-002	37,202,934	23,453,825	60.656759	37.202934	590,008	6,733	77,155	71,095
B-003	60,071,988	37,871,150	97.943138	60.071988	952,693	10,872	124,584	114,798
B-004	400,987,500	0	400.9875	400.9875	3,900,405	44,510	510,056	766,287
B-005	593,314,425	0	593.314425	593.314425	5,771,169	65,858	754,696	1,133,824
B-006	329,385,800	201,887,657	531.2734573	329.3858	5,167,697	58,971	675,780	629,456
B-007	26,257,062	16,553,225	42.810287	26.257062	416,416	4,752	54,455	50,177
B-008	42,219,792	26,616,600	68.836392	42.219792	669,572	7,641	87,560	80,682
B-009	289,935,300	182,783,750	472.71905	289.9353	4,598,138	52,472	601,299	554,066
B-010	6,189,630	3,902,125	10.091755	6.18963	98,163	1,120	12,837	11,828
B-011	16,666,425	10,214,775	26.8812	16.666425	261,473	2,984	34,193	31,850
B-012	18,177,966	11,459,925	29.637891	18.177966	288,288	3,290	37,699	34,738
B-013	123,141,060	77,631,750	200.77281	123.14106	1,952,917	22,286	255,383	235,323
B-014	45,607,800	28,752,500	74.3603	45.6078	723,303	8,254	94,586	87,157
C-001	14,814,600	9,079,800	23.8944	14.8146	232,421	2,652	30,394	28,311
C-002	74,073,000	45,399,000	119.472	74.073	1,162,104	13,261	151,968	141,554
C-002	280,641,986	172,011,523	452.653509	280.641986	4,402,961	50,245	575,775	536,307
C-003	5,385,107	3,300,507	8.6856144	5.3851071	84,485	964	11,048	10,291
H-001	38,310,552	24,152,100	62.462652	38.310552	607,574	6,933	79,452	73,211
H-002	28,667,760	18,073,000	46.74076	28.66776	454,647	5,188	59,454	54,784
H-003	60,658,374	38,240,825	98.899199	60.658374	961,993	10,978	125,800	115,918
H-004	169,965,050	0	169.96505	169.96505	1,653,250	18,866	216,196	324,803
H-004	176,872,523	108,408,982	285.2815057	176.8725233	2,774,933	31,666	362,878	338,003

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
H-005	1,548,778	949,239	2.498016154	1.548777542	24,298	277	3,177	2,960
H-006	50,428,010	30,907,094	81.33510394	50.42800952	791,147	9,028	103,458	96,368
H-007	23,325,132	14,704,850	38.029982	23.325132	369,918	4,221	48,374	44,574
H-008	28,667,760	18,073,000	46.74076	28.66776	454,647	5,188	59,454	54,784
H-008	9,447,330	5,955,875	15.403205	9.44733	149,827	1,710	19,593	18,054
H-009	39,027,246	24,603,925	63.631171	39.027246	618,940	7,063	80,939	74,581
M-001	740,730	453,990	1.19472	0.74073	11,621	133	1,520	1,416
M-001	45,873,501	28,116,083	73.98958414	45.87350087	719,697	8,213	94,115	87,664
M-001	9,763,838	0	9.7638375	9.7638375	94,973	1,084	12,420	18,659
M-001	94,653,400	0	94.6534	94.6534	920,694	10,507	120,399	180,883
M-002	1,046,406,250	0	1046.40625	1046.40625	10,178,394	116,151	1,331,029	1,999,682
M-002	83,357,246	51,090,046	134.447292	83.357246	1,307,769	14,924	171,017	159,296
M-002	112,803,750	0	112.80375	112.80375	1,097,242	12,521	143,486	215,568
M-003	670,625,000	0	670.625	670.625	6,523,169	74,439	853,035	1,281,564
M-004	8,066,550	4,943,951	13.0105008	8.0665497	126,553	1,444	16,549	15,415
M-005	708,044,719	0	708.0447188	708.0447188	6,887,151	78,593	900,633	1,353,073
M-005	41,368,477	25,354,933	66.72341034	41.36847717	649,019	7,406	84,872	79,055
M-005	245,455,456	0	245.4554563	245.4554563	2,387,545	27,246	312,219	469,065
M-006	38,985,567	23,895,094	62.88066065	38.98556652	611,640	6,980	79,984	74,501
M-007	156,209,375	0	156.209375	156.209375	1,519,449	17,339	198,698	298,516
M-008	46,295,625	28,374,375	74.67	46.295625	726,315	8,288	94,980	88,471
M-008	367,659,330	70,029,930	437.68926	367.65933	4,257,403	48,584	556,741	702,597
M-009	8,795,790	5,545,125	14.340915	8.79579	139,494	1,592	18,242	16,809
M-010	129,268,750	0	129.26875	129.26875	1,257,397	14,349	164,430	247,033
M-011	4,962,891	3,041,733	8.004624	4.962891	77,861	889	10,182	9,484
MV-001	22,555,229	13,823,996	36.379224	22.5552285	353,861	4,038	46,274	43,103
MV-002	17,070,348	10,761,650	27.831998	17.070348	270,722	3,089	35,402	32,621
MV-002	14,073,264	8,872,200	22.945464	14.073264	223,191	2,547	29,187	26,894
MV-003	439,606,250	0	439.60625	439.60625	4,276,050	48,796	559,179	840,088
MV-003	84,868,750	0	84.86875	84.86875	825,518	9,420	107,953	162,184
MV-004	216,741,375	0	216.741375	216.741375	2,108,243	24,058	275,695	414,193
MV-005	8,619,134	5,282,628	13.90176192	8.61913428	135,222	1,543	17,683	16,471
MV-006	173,437,500	0	173.4375	173.4375	1,687,027	19,252	220,613	331,439
MV-007	2,019,774	1,273,325	3.293099	2.019774	32,032	366	4,189	3,860
MV-008	3,778,932	2,382,350	6.161282	3.778932	59,931	684	7,837	7,222
MV-009	716,694	451,825	1.168519	0.716694	11,366	130	1,486	1,370
MV-010	3,062,238	1,930,525	4.992763	3.062238	48,565	554	6,351	5,852
MV-011	1,563,696	985,800	2.549496	1.563696	24,799	283	3,243	2,988
MV-012	10,038,480	1,912,080	11.95056	10.03848	116,243	1,327	15,201	19,184
MV-013	5,332,020	3,268,020	8.60004	5.33202	83,653	955	10,939	10,189
MV-014	6,971,478	4,395,025	11.366503	6.971478	110,562	1,262	14,458	13,322

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
MV-015	4,104,702	2,587,725	6.692427	4.104702	65,097	743	8,513	7,844
MV-016	2,084,928	1,314,400	3.399328	2.084928	33,065	377	4,324	3,984
MV-017	6,254,784	3,943,200	10.197984	6.254784	99,196	1,132	12,972	11,953
MV-018	407,402	249,695	0.657096	0.4074015	6,392	73	836	779
MV-019	9,056,406	5,709,425	14.765831	9.056406	143,627	1,639	18,782	17,307
MV-020	6,947,159	4,257,881	11.20503994	6.947158524	108,991	1,244	14,253	13,276
MV-021	10,038,480	1,912,080	11.95056	10.03848	116,243	1,327	15,201	19,184
MV-022	2,606,160	1,643,000	4.24916	2.60616	41,332	472	5,405	4,980
MV-023	27,169,218	17,128,275	44.297493	27.169218	430,882	4,917	56,346	51,920
MV-024	10,359,486	6,530,925	16.890411	10.359486	164,293	1,875	21,485	19,797
MV-025	5,277,474	3,327,075	8.604549	5.277474	83,696	955	10,945	10,085
MV-026	6,515,400	4,107,500	10.6229	6.5154	103,329	1,179	13,512	12,451
MV-027	3,518,316	2,218,050	5.736366	3.518316	55,798	637	7,297	6,724
MV-028	5,863,860	3,696,750	9.56061	5.86386	92,996	1,061	12,161	11,206
MV-029	17,917,350	11,295,625	29.212975	17.91735	284,155	3,243	37,159	34,240
MV-030	5,407,782	3,409,225	8.817007	5.407782	85,763	979	11,215	10,334
MV-031	3,453,162	2,176,975	5.630137	3.453162	54,764	625	7,162	6,599
MV-032	7,492,710	4,723,625	12.216335	7.49271	118,828	1,356	15,539	14,319
MV-033	3,518,316	2,218,050	5.736366	3.518316	55,798	637	7,297	6,724
MV-034	3,388,008	2,135,900	5.523908	3.388008	53,731	613	7,026	6,474
MV-035	1,628,850	1,026,875	2.655725	1.62885	25,832	295	3,378	3,113
MV-036	3,648,624	2,300,200	5.948824	3.648624	57,864	660	7,567	6,973
MV-037	373,730,756	0	373.7307563	373.7307563	3,635,279	41,484	475,386	714,199
MV-038	100,362,500	0	100.3625	100.3625	976,226	11,140	127,661	191,793
MV-039	370,000,000	0	370	370	3,598,990	41,070	470,640	707,070
MV-040	22,753,844	0	22.75384375	22.75384375	221,327	2,526	28,943	43,483
MV-041	335,312,500	0	335.3125	335.3125	3,261,585	37,220	426,518	640,782
MV-042	103,218,438	0	103.2184375	103.2184375	1,004,006	11,457	131,294	197,250
MV-043	128,498,688	0	128.4986875	128.4986875	1,249,907	14,263	163,450	245,561
MV-044	256,543,663	0	256.5436625	256.5436625	2,495,400	28,476	326,324	490,255
MV-045	6,453,240	3,955,161	10.40840064	6.45323976	101,243	1,155	13,239	12,332
MV-046	88,402,250	0	88.40225	88.40225	859,889	9,813	112,448	168,937
MV-047	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992
MV-048	263,845,590	161,716,650	425.5622395	263.8455898	4,139,444	47,237	541,315	504,209
MV-049	277,273,216	169,946,731	447.2199469	277.2732158	4,350,108	49,641	568,864	529,869
MV-050	82,049,813	0	82.0498125	82.0498125	798,099	9,108	104,367	156,797
MV-051	177,905,250	0	177.90525	177.90525	1,730,484	19,747	226,295	339,977
MV-052	203,259,500	0	203.2595	203.2595	1,977,105	22,562	258,546	388,429
MV-053	289,062,500	0	289.0625	289.0625	2,811,711	32,086	367,688	552,398
MV-054	401,912,500	0	401.9125	401.9125	3,909,403	44,612	511,233	768,055
MV-056	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
MV-057	2,410,698	1,519,775	3.930473	2.410698	38,232	436	5,000	4,607
MV-058	521,232	328,600	0.849832	0.521232	8,266	94	1,081	996
MV-059	4,104,702	2,587,725	6.692427	4.104702	65,097	743	8,513	7,844
MV-060	5,994,168	3,778,900	9.773068	5.994168	95,063	1,085	12,431	11,455
MV-061	13,333,140	8,171,820	21.50496	13.33314	209,179	2,387	27,354	25,480
MV-062	35,378,622	22,303,725	57.682347	35.378622	561,076	6,403	73,372	67,609
MV-063	14,399,034	9,077,575	23.476609	14.399034	228,357	2,606	29,862	27,517
MV-064	5,668,398	3,573,525	9.241923	5.668398	89,896	1,026	11,756	10,832
MV-065	3,388,008	2,135,900	5.523908	3.388008	53,731	613	7,026	6,474
MV-066	16,353,654	10,309,825	26.663479	16.353654	259,356	2,960	33,916	31,252
MV-067	10,489,794	6,613,075	17.102869	10.489794	166,360	1,898	21,755	20,046
MV-068	47,888,638	0	47.8886375	47.8886375	465,813	5,316	60,914	91,515
MV-069	94,719,538	0	94.7195375	94.7195375	921,337	10,514	120,483	181,009
MV-070	15,702,114	9,899,075	25.601189	15.702114	249,023	2,842	32,565	30,007
MV-071	3,192,546	2,012,675	5.205221	3.192546	50,631	578	6,621	6,101
MV-072	1,563,696	985,800	2.549496	1.563696	24,799	283	3,243	2,988
MV-073	6,254,784	3,943,200	10.197984	6.254784	99,196	1,132	12,972	11,953
MV-074	12,314,106	7,763,175	20.077281	12.314106	195,292	2,229	25,538	23,532
MV-075	95,189,994	60,010,575	155.200569	95.189994	1,509,636	17,227	197,415	181,908
MV-076	23,083,591	14,147,827	37.23141778	23.08359121	362,150	4,133	47,358	44,113
MV-077	123,256,250	0	123.25625	123.25625	1,198,914	13,681	156,782	235,543
MV-078	120,250,000	0	120.25	120.25	1,169,672	13,348	152,958	229,798
MV-079	84,868,750	0	84.86875	84.86875	825,518	9,420	107,953	162,184
MV-080	3,281,434	2,011,176	5.2926096	3.2814339	51,481	587	6,732	6,271
MV-081	161,875,000	0	161.875	161.875	1,574,558	17,968	205,905	309,343
MV-082	115,625,000	0	115.625	115.625	1,124,684	12,834	147,075	220,959
MV-083	82,325,000	0	82.325	82.325	800,775	9,138	104,717	157,323
MV-084	23,119,913	0	23.1199125	23.1199125	224,887	2,566	29,409	44,182
MV-085	10,370,220	6,355,860	16.72608	10.37022	162,695	1,857	21,276	19,817
MV-086	4,625,934	2,916,325	7.542259	4.625934	73,364	837	9,594	8,840
MV-087	3,909,240	2,464,500	6.37374	3.90924	61,997	707	8,107	7,471
MV-088	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-089	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-090	541,474	331,867	0.87334032	0.54147363	8,495	97	1,111	1,035
MV-091	5,668,398	3,573,525	9.241923	5.668398	89,896	1,026	11,756	10,832
MV-093	7,297,248	4,600,400	11.897648	7.297248	115,728	1,321	15,134	13,945
MV-094	17,330,964	10,925,950	28.256914	17.330964	274,855	3,137	35,943	33,119
MV-095	12,962,775	7,944,825	20.9076	12.962775	203,368	2,321	26,594	24,772
MV-096	5,082,012	3,203,850	8.285862	5.082012	80,597	920	10,540	9,712
MV-097	13,942,956	8,790,050	22.733006	13.942956	221,124	2,523	28,916	26,645
MV-098	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
MV-099	6,254,784	3,943,200	10.197984	6.254784	99,196	1,132	12,972	11,953
MV-100	12,639,876	7,968,550	20.608426	12.639876	200,458	2,288	26,214	24,155
MV-101	666,657	408,591	1.075248	0.666657	10,459	119	1,368	1,274
MV-102	14,929,656	9,150,456	24.080112	14.929656	234,227	2,673	30,630	28,531
MV-103	42,550,000	0	42.55	42.55	413,884	4,723	54,124	81,313
MV-104	86,263,188	0	86.2631875	86.2631875	839,082	9,575	109,727	164,849
MV-105	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-106	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-107	586,386	369,675	0.956061	0.586386	9,300	106	1,216	1,121
MV-108	220,219	134,971	0.355190256	0.220219029	3,455	39	452	421
MV-109	71,995,170	45,387,875	117.383045	71.99517	1,141,785	13,030	149,311	137,583
MV-110	3,909,240	2,464,500	6.37374	3.90924	61,997	707	8,107	7,471
MV-111	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992
MV-112	977,310	616,125	1.593435	0.97731	15,499	177	2,027	1,868
MV-113	9,382,176	5,914,800	15.296976	9.382176	148,794	1,698	19,458	17,929
MV-114	422,216	258,774	0.6809904	0.4222161	6,624	76	866	807
MV-115	4,088	2,505	0.006593364	0.004087882	64	1	8	8
MV-116	1,628,850	1,026,875	2.655725	1.62885	25,832	295	3,378	3,113
MV-117	9,242,168	5,664,568	14.906736	9.242168	144,998	1,655	18,961	17,662
MV-118	586,386	369,675	0.956061	0.586386	9,300	106	1,216	1,121
MV-119	2,280,390	1,437,625	3.718015	2.28039	36,165	413	4,729	4,358
MV-120	14,038,315	8,604,018	22.64233344	14.03831496	220,242	2,513	28,801	26,827
MV-121	322,292	197,531	0.519822672	0.322291623	5,056	58	661	616
MV-123	1,037,022	635,586	1.672608	1.037022	16,269	186	2,128	1,982
MV-124	10,370,220	6,355,860	16.72608	10.37022	162,695	1,857	21,276	19,817
MV-125	1,563,696	985,800	2.549496	1.563696	24,799	283	3,243	2,988
MV-126	15,311,190	9,652,625	24.963815	15.31119	242,823	2,771	31,754	29,260
MV-127	78,627,313	0	78.6273125	78.6273125	764,808	8,728	100,014	150,257
MV-129	365,375,000	0	365.375	365.375	3,554,003	40,557	464,757	698,232
MV-130	51,304,894	0	51.30489375	51.30489375	499,043	5,695	65,260	98,044
MV-131	346,875,000	0	346.875	346.875	3,374,053	38,503	441,225	662,878
MV-132	254,375,000	0	254.375	254.375	2,474,306	28,236	323,565	486,111
P-001	8,926,098	5,627,275	14.553373	8.926098	141,561	1,615	18,512	17,058
P-002	138,750,000	0	138.75	138.75	1,349,621	15,401	176,490	265,151
P-003	106,906,875	0	106.906875	106.906875	1,039,883	11,867	135,986	204,299
P-004	39,775,000	0	39.775	39.775	386,891	4,415	50,594	76,010
P-005	106,375,000	0	106.375	106.375	1,034,710	11,808	135,309	203,283
P-006	138,750,000	0	138.75	138.75	1,349,621	15,401	176,490	265,151
P-007	275,155,125	0	275.155125	275.155125	2,676,434	30,542	349,997	525,821
P-008	55,731,250	0	55.73125	55.73125	542,098	6,186	70,890	106,502
P-009	148,462,500	0	148.4625	148.4625	1,444,095	16,479	188,844	283,712

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
P-010	393,125,000	0	393.125	393.125	3,823,927	43,637	500,055	751,262
P-011	283,279,631	0	283.2796313	283.2796313	2,755,461	31,444	360,332	541,347
P-012	105,007,850	0	105.00785	105.00785	1,021,411	11,656	133,570	200,670
P-014	277,500,000	0	277.5	277.5	2,699,243	30,803	352,980	530,303
P-015	180,563,469	0	180.5634688	180.5634688	1,756,341	20,043	229,677	345,057
P-016	302,937,500	0	302.9375	302.9375	2,946,673	33,626	385,337	578,914
P-017	134,125,000	0	134.125	134.125	1,304,634	14,888	170,607	256,313
P-018	357,743,750	0	357.74375	357.74375	3,479,773	39,710	455,050	683,648
P-019	161,320,000	0	161.32	161.32	1,569,160	17,907	205,199	308,283
P-020	201,534,375	0	201.534375	201.534375	1,960,325	22,370	256,352	385,132
P-021	39,312,500	0	39.3125	39.3125	382,393	4,364	50,006	75,126
P-022	87,875,000	0	87.875	87.875	854,760	9,754	111,777	167,929
P-023	41,625,000	0	41.625	41.625	404,886	4,620	52,947	79,545
P-024	338,550,000	0	338.55	338.55	3,293,076	37,579	430,636	646,969
P-025	240,037,500	0	240.0375	240.0375	2,334,845	26,644	305,328	458,712
P-026	187,687,125	0	187.687125	187.687125	1,825,633	20,833	238,738	358,670
P-027	199,800,000	0	199.8	199.8	1,943,455	22,178	254,146	381,818
P-028	154,937,500	0	154.9375	154.9375	1,507,077	17,198	197,081	296,086
P-030	32,055,768	20,208,900	52.264668	32.055768	508,378	5,801	66,481	61,259
P-031	4,886,550	3,080,625	7.967175	4.88655	77,497	884	10,134	9,338
P-032	47,628,939	29,191,557	76.820496	47.628939	747,233	8,527	97,716	91,019
P-033	121,186,440	76,399,500	197.58594	121.18644	1,921,918	21,932	251,329	231,587
P-034	732,335,681	0	732.3356813	732.3356813	7,123,429	81,289	931,531	1,399,493
P-035	2,606,160	1,643,000	4.24916	2.60616	41,332	472	5,405	4,980
P-036	797,519,738	0	797.5197375	797.5197375	7,757,474	88,525	1,014,445	1,524,060
P-036	3,703,650	2,269,950	5.9736	3.70365	58,105	663	7,598	7,078
P-037	11,923,182	7,516,725	19.439907	11.923182	189,092	2,158	24,728	22,785
P-038	14,529,342	9,159,725	23.689067	14.529342	230,424	2,629	30,132	27,766
P-039	181,230,625	0	181.230625	181.230625	1,762,830	20,117	230,525	346,332
P-040	7,948,788	5,011,150	12.959938	7.948788	126,061	1,439	16,485	15,190
P-041	34,626,913	0	34.6269125	34.6269125	336,816	3,844	44,045	66,172
P-042	3,974,394	2,505,575	6.479969	3.974394	63,031	719	8,243	7,595
P-043	3,713,778	2,341,275	6.055053	3.713778	58,898	672	7,702	7,097
P-044	6,124,476	3,861,050	9.985526	6.124476	97,129	1,108	12,702	11,704
P-045	4,886,550	3,080,625	7.967175	4.88655	77,497	884	10,134	9,338
P-046	27,951,066	17,621,175	45.572241	27.951066	443,281	5,059	57,968	53,414
P-047	33,945,234	21,400,075	55.345309	33.945234	538,344	6,143	70,399	64,869
P-048	4,886,550	3,080,625	7.967175	4.88655	77,497	884	10,134	9,338
P-049	7,427,556	4,682,550	12.110106	7.427556	117,795	1,344	15,404	14,194
P-050	5,925,840	3,631,920	9.55776	5.92584	92,968	1,061	12,157	11,324
P-051	2,280,390	1,437,625	3.718015	2.28039	36,165	413	4,729	4,358

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
P-052	5,342,628	3,368,150	8.710778	5.342628	84,730	967	11,080	10,210
P-053	10,489,794	6,613,075	17.102869	10.489794	166,360	1,898	21,755	20,046
P-054	15,506,652	9,775,850	25.282502	15.506652	245,923	2,806	32,159	29,633
P-055	33,332,850	20,429,550	53.7624	33.33285	522,947	5,968	68,386	63,699
P-056	2,278,738	0	2.2787375	2.2787375	22,165	253	2,899	4,355
P-057	9,631,563	0	9.6315625	9.6315625	93,686	1,069	12,251	18,406
P-058	87,412,500	0	87.4125	87.4125	850,261	9,703	111,189	167,045
P-059	15,832,422	9,981,225	25.813647	15.832422	251,089	2,865	32,835	30,256
P-060	333,329	204,296	0.537624	0.3333285	5,229	60	684	637
P-061	80,937,500	0	80.9375	80.9375	787,279	8,984	102,953	154,672
R-001	244,414,287	149,806,785	394.2210724	244.414287	3,834,588	43,759	501,449	467,076
R-002	134,766,025	0	134.766025	134.766025	1,310,869	14,959	171,422	257,538
R-003	150,779,163	0	150.7791625	150.7791625	1,466,629	16,736	191,791	288,139
R-004	14,073,264	8,872,200	22.945464	14.073264	223,191	2,547	29,187	26,894
R-005	62,740,500	11,950,500	74.691	62.7405	726,519	8,291	95,007	119,897
R-006	5,016,858	3,162,775	8.179633	5.016858	79,563	908	10,404	9,587
R-007	4,155,569	2,546,929	6.702498672	4.155569373	65,195	744	8,526	7,941
R-008	2,410,698	1,519,775	3.930473	2.410698	38,232	436	5,000	4,607
R-009	650,184,556	398,495,115	1048.679671	650.1845562	10,200,507	116,403	1,333,921	1,242,503
R-010	1,745,530	1,069,827	2.81535768	1.745530245	27,385	313	3,581	3,336
R-011	60,546,264	37,110,111	97.65637506	60.54626441	949,904	10,840	124,219	115,704
R-012	4,546,436	2,786,490	7.332926419	4.546436476	71,327	814	9,327	8,688
R-013	195,462	123,225	0.318687	0.195462	3,100	35	405	374
R-014	285,774	175,149	0.460922976	0.285773634	4,483	51	586	546
R-015	11,186,681	7,052,413	18.23909438	11.18668118	177,412	2,025	23,200	21,378
R-016	99,405	62,668	0.162073585	0.099405458	1,576	18	206	190
R-017	17,917,350	11,295,625	29.212975	17.91735	284,155	3,243	37,159	34,240
R-018	2,089,997,910	0	2089.99791	2089.99791	20,329,410	231,990	2,658,477	3,993,986
R-019	3,583,470	2,259,125	5.842595	3.58347	56,831	649	7,432	6,848
R-020	337,960,081	0	337.9600813	337.9600813	3,287,338	37,514	429,885	645,842
R-021	977,310	616,125	1.593435	0.97731	15,499	177	2,027	1,868
R-022	586,386	369,675	0.956061	0.586386	9,300	106	1,216	1,121
R-023	595,473	364,963	0.960435408	0.595472847	9,342	107	1,222	1,138
R-024	325,770,000	205,375,000	531.145	325.77	5,166,447	58,957	675,616	622,546
R-025	13,552,032	8,543,600	22.095632	13.552032	214,924	2,453	28,106	25,898
R-026	22,070,080	13,526,650	35.59673019	22.07007998	346,249	3,951	45,279	42,176
R-026	218,186,595	0	218.186595	218.186595	2,122,301	24,219	277,533	416,955
R-026	61,781,902	37,867,460	99.6493623	61.78190246	969,289	11,061	126,754	118,065
R-027	267,996	164,254	0.432249696	0.267996114	4,204	48	550	512
R-028	8,730,636	5,504,050	14.234686	8.730636	138,461	1,580	18,107	16,684
R-029	281,107	172,289	0.45339624	0.281107035	4,410	50	577	537

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy ConsEnergy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
R-030	15,449,056	9,468,655	24.91771113	15.44905599	242,375	2,766	31,695	29,523
R-031	2,345,544	1,478,700	3.824244	2.345544	37,198	424	4,864	4,482
R-032	1,649,754	1,011,127	2.660880384	1.649753856	25,882	295	3,385	3,153
R-033	1,954,620	1,232,250	3.18687	1.95462	30,999	354	4,054	3,735
R-034	2,162,312	1,325,291	3.487602888	2.162311844	33,924	387	4,436	4,132
R-035	6,645,708	4,189,650	10.835358	6.645708	105,396	1,203	13,783	12,700
R-036	4,039,548	2,546,650	6.586198	4.039548	64,064	731	8,378	7,720
R-037	444,438	272,394	0.716832	0.444438	6,973	80	912	849
R-038	259,256	158,897	0.418152	0.2592555	4,067	46	532	495
R-039	26,191,908	16,512,150	42.704058	26.191908	415,382	4,740	54,320	50,053
R-040	177,775	108,958	0.2867328	0.1777752	2,789	32	365	340
R-041	4,109,921	2,518,990	6.628910832	4.109921016	64,479	736	8,432	7,854
R-042	38,962,092	24,562,850	63.524942	38.962092	617,907	7,051	80,804	74,457
R-043	3,257,700	2,053,750	5.31145	3.2577	51,664	590	6,756	6,225
R-044	296,292	181,596	0.477888	0.296292	4,648	53	608	566
R-045	6,743,050	4,132,847	10.87589725	6.743050226	105,790	1,207	13,834	12,886
R-046	2,335,315	1,472,251	3.807566047	2.335314822	37,036	423	4,843	4,463
R-047	24,913,025	0	24.913025	24.913025	242,329	2,765	31,689	47,609
R-048	5,577,697	3,418,545	8.9962416	5.5776969	87,506	999	11,443	10,659
R-049	20,197,740	12,733,250	32.93099	20.19774	320,320	3,655	41,888	38,598
R-050	249,703	157,420	0.407122643	0.249702705	3,960	45	518	477
R-051	174,886	107,187	0.282073392	0.174886353	2,744	31	359	334
R-052	2,084,928	1,314,400	3.399328	2.084928	33,065	377	4,324	3,984
R-053	1,889,466	1,191,175	3.080641	1.889466	29,965	342	3,919	3,611
R-054	1,628,850	1,026,875	2.655725	1.62885	25,832	295	3,378	3,113
R-055	1,303,080	821,500	2.12458	1.30308	20,666	236	2,702	2,490
R-056	23,283,154	14,270,354	37.553508	23.283154	365,283	4,168	47,768	44,494
R-057	39,686,200	0	39.6862	39.6862	386,028	4,405	50,481	75,840
R-058	203,404	124,666	0.328070112	0.203404458	3,191	36	417	389
R-059	299,996	183,866	0.4838616	0.29999565	4,707	54	615	573
R-060	18,054,220	11,065,820	29.12004018	18.05421972	283,251	3,232	37,041	34,502
R-061	31,514,136	19,314,868	50.82900398	31.51413563	494,414	5,642	64,654	60,224
R-062	135,628	83,126	0.218753232	0.135627663	2,128	24	278	259
R-063	1,368,234	862,575	2.230809	1.368234	21,699	248	2,838	2,615
R-064	325,770	205,375	0.531145	0.32577	5,166	59	676	623
R-065	4,039,548	2,546,650	6.586198	4.039548	64,064	731	8,378	7,720
R-066	455,549	279,204	0.7347528	0.45554895	7,147	82	935	871
RC-001	81,507,654	51,384,825	132.892479	81.507654	1,292,645	14,751	169,039	155,761
RC-002	130,308,000	82,150,000	212.458	130.308	2,066,579	23,583	270,247	249,019
RC-003	222,305,448	140,147,900	362.453348	222.305448	3,525,584	40,232	461,041	424,826
RC-005	48,865,500	30,806,250	79.67175	48.8655	774,967	8,844	101,342	93,382

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	**Indoors (gal)**	**Outdoors (gal)**	**Water (M gal)**	**Wastewater (M gal)**	**Water Supply**	**Water Treatment**	**Water Distribution**	**Wastewater Treatment**
RC-006	106,640,400	65,362,200	172.0026	106.6404	1,673,069	19,092	218,787	203,790
RC-007	366,911,656	0	366.9116563	366.9116563	3,568,950	40,727	466,712	701,168
RC-009	6,042,956	3,703,756	9.746712	6.042956	94,806	1,082	12,398	11,548
RC-009	271,189,188	0	271.1891875	271.1891875	2,637,857	30,102	344,953	518,243
RC-010	1,433,750,000	0	1433.75	1433.75	13,946,086	159,146	1,823,730	2,739,896
RC-011	188,237,500	0	188.2375	188.2375	1,830,986	20,894	239,438	359,722
RC-012	97,972,531	0	97.97253125	97.97253125	952,979	10,875	124,621	187,226
RC-013	32,381,538	20,414,275	52.795813	32.381538	513,545	5,860	67,156	61,881
RC-014	20,849,280	13,144,000	33.99328	20.84928	330,653	3,773	43,239	39,843
RC-015	9,251,868	5,832,650	15.084518	9.251868	146,727	1,674	19,188	17,680
RC-017	687,397	421,303	1.10870016	0.68739744	10,784	123	1,410	1,314
RC-018	977,310	616,125	1.593435	0.97731	15,499	177	2,027	1,868
RC-019	3,910,906	2,396,976	6.307882656	3.910906254	61,357	700	8,024	7,474
RC-020	207,404	127,117	0.3345216	0.2074044	3,254	37	426	396
RC-021	1,850,000	0	1.85	1.85	17,995	205	2,353	3,535
RC-022	8,535,174	5,380,825	13.915999	8.535174	135,361	1,545	17,701	16,311
RC-023	12,129,063	0	12.1290625	12.1290625	117,979	1,346	15,428	23,179
RC-024	44,122,963	0	44.1229625	44.1229625	429,184	4,898	56,124	84,319
RC-025	19,656,250	0	19.65625	19.65625	191,196	2,182	25,003	37,563
RC-026	130,308	82,150	0.212458	0.130308	2,067	24	270	249
RC-027	43,637,319	0	43.637319	43.637319	424,460	4,844	55,507	83,391
RC-028	414,809	254,234	0.6690432	0.4148088	6,508	74	851	793
RC-029	603,102	369,639	0.972741024	0.603102366	9,462	108	1,237	1,153
RC-030	291,155,313	0	291.1553125	291.1553125	2,832,068	32,318	370,350	556,398
RC-031	41,763,750	0	41.76375	41.76375	406,236	4,636	53,123	79,811
RC-032	47,301,804	29,820,450	77.122254	47.301804	750,168	8,561	98,100	90,394
RC-033	25,019,136	15,772,800	40.791936	25.019136	396,783	4,528	51,887	47,812
RC-034	28,146,528	17,744,400	45.890928	28.146528	446,381	5,094	58,373	53,788
RC-035	180,802,350	113,983,125	294.785475	180.80235	2,867,378	32,721	374,967	345,513
RC-035	14,218,720	8,714,720	22.93344	14.21872	223,074	2,546	29,171	27,172
RC-035	6,645,708	4,189,650	10.835358	6.645708	105,396	1,203	13,783	12,700
RC-036	30,492,072	19,223,100	49.715172	30.492072	483,579	5,518	63,238	58,270
RC-037	36,616,548	23,084,150	59.700698	36.616548	580,709	6,627	75,939	69,974
RC-038	421,744,500	0	421.7445	421.7445	4,102,309	46,814	536,459	805,954
RC-039	2,541,006	1,601,925	4.142931	2.541006	40,298	460	5,270	4,856
RD-001	5,342,628	3,368,150	8.710778	5.342628	84,730	967	11,080	10,210
RD-002	3,583,470	2,259,125	5.842595	3.58347	56,831	649	7,432	6,848
RD-003	6,710,862	4,230,725	10.941587	6.710862	106,429	1,215	13,918	12,824
RD-004	4,365,318	2,752,025	7.117343	4.365318	69,230	790	9,053	8,342
RD-005	115,764,213	0	115.7642125	115.7642125	1,126,038	12,850	147,252	221,225
RD-006	3,572,096	2,189,321	5.761417728	3.572096352	56,041	640	7,329	6,826

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
RD-007	9,462,529	5,799,541	15.26207011	9.462529458	148,454	1,694	19,413	18,083
RD-008	5,212,320	3,286,000	8.49832	5.21232	82,663	943	10,810	9,961
RD-009	3,244,546	1,988,567	5.233112544	3.244545546	50,902	581	6,657	6,200
RD-010	33,590,219	0	33.59021875	33.59021875	326,732	3,729	42,727	64,191
RD-011	4,108,459	2,518,056	6.62651448	4.108458945	64,456	736	8,429	7,851
RD-012	139,047,619	0	139.0476188	139.0476188	1,352,516	15,434	176,869	265,720
RD-013	234,256,250	0	234.25625	234.25625	2,278,611	26,002	297,974	447,664
RD-014	178,525,000	0	178.525	178.525	1,736,513	19,816	227,084	341,161
RD-015	97,818,750	0	97.81875	97.81875	951,483	10,858	124,425	186,932
RD-016	165,282,006	0	165.2820063	165.2820063	1,607,698	18,346	210,239	315,854
SB-001	142,063,350	0	142.06335	142.06335	1,381,850	15,769	180,705	271,483
SB-002	72,489,938	0	72.4899375	72.4899375	705,110	8,046	92,207	138,528
SB-003	137,261,444	0	137.2614438	137.2614438	1,335,142	15,236	174,597	262,307
SB-004	179,824,625	0	179.824625	179.824625	1,749,154	19,961	228,737	343,645
SB-005	65,212,500	0	65.2125	65.2125	634,322	7,239	82,950	124,621
SB-006	125,563,431	0	125.5634313	125.5634313	1,221,355	13,938	159,717	239,952
SB-007	2,215,236	1,396,550	3.611786	2.215236	35,132	401	4,594	4,233
SB-008	2,606,160	1,643,000	4.24916	2.60616	41,332	472	5,405	4,980
SJ-001	124,312,630	76,190,637	200.5032673	124.3126299	1,950,295	22,256	255,040	237,561
SJ-002	20,914,434	13,185,075	34.099509	20.914434	331,686	3,785	43,375	39,967
SJ-003	37,789,320	23,823,500	61.61282	37.78932	599,308	6,839	78,372	72,215
SJ-004	39,939,402	25,178,975	65.118377	39.939402	633,406	7,228	82,831	76,324
WLC-001	3,909,240	2,464,500	6.37374	3.90924	61,997	707	8,107	7,471

2 Natural Gas

World Logistic Center
Cumulative Energy - Natural gas

Cumulative Natural Gas Consumption - Summary

Project ID	Annual MMBtu	Project ID	Annual MMBtu	Project ID	Annual MMBtu
B-001	100,934	MV-078	16,895	R-015	5,252
B-002	8,447	MV-079	745	R-016	47
B-003	28,200	MV-080	98	R-017	4,068
B-004	56,338	MV-081	1,421	R-018	293,639
B-005	83,359	MV-082	1,015	R-019	814
B-006	5,411	MV-083	11,566	R-020	2,967
B-007	12,326	MV-084	3,248	R-021	459
B-008	19,820	MV-085	311	R-022	275
B-009	136,108	MV-086	2,172	R-023	18
B-010	2,906	MV-087	888	R-024	152,931
B-011	500	MV-088	178	R-025	3,077
B-012	4,128	MV-089	178	R-026	661
B-013	57,808	MV-090	16	R-026	30,655
B-014	21,410	MV-091	2,661	R-026	1,015
C-001	444	MV-093	1,657	R-027	8
C-002	2,220	MV-094	3,935	R-028	2,087
C-002	4,611	MV-095	389	R-029	8
C-003	161	MV-096	2,386	R-030	463
H-001	17,985	MV-097	6,545	R-031	533
H-002	13,458	MV-098	489	R-032	49
H-003	28,476	MV-099	1,420	R-033	444
H-004	23,880	MV-100	2,870	R-034	42
H-004	2,906	MV-101	20	R-035	1,509
H-005	46	MV-102	291	R-036	917
H-006	1,511	MV-103	5,978	R-037	13
H-007	5,576	MV-104	757	R-038	8
H-008	6,853	MV-105	178	R-039	12,296
H-008	4,435	MV-106	178	R-040	5
H-009	9,329	MV-107	275	R-041	80
M-001	22	MV-108	7	R-042	18,291
M-001	896	MV-109	33,798	R-043	1,529
M-001	1,372	MV-110	888	R-044	9
M-001	13,299	MV-111	237	R-045	132
M-002	9,186	MV-112	222	R-046	1,096
M-002	1,627	MV-113	4,404	R-047	219
M-002	15,849	MV-114	13	R-048	167
M-003	5,887	MV-115	0	R-049	4,828
M-004	242	MV-116	765	R-050	117
M-005	6,215	MV-117	180	R-051	5
M-005	808	MV-118	275	R-052	979
M-005	34,486	MV-119	1,071	R-053	887
M-006	640	MV-120	421	R-054	765
M-007	1,371	MV-121	10	R-055	612

World Logistic Center
Cumulative Energy - Natural gas

Cumulative Natural Gas Consumption - Summary

Project ID	Annual MMBtu	Project ID	Annual MMBtu	Project ID	Annual MMBtu
M-008	1,388	MV-123	31	R-056	455
M-008	10,167	MV-124	311	R-057	5,576
M-009	4,129	MV-125	355	R-058	6
M-010	1,135	MV-126	7,188	R-059	9
M-011	149	MV-127	690	R-060	297
MV-001	676	MV-129	51,334	R-061	944
MV-002	8,014	MV-130	450	R-062	4
MV-002	3,196	MV-131	3,045	R-063	311
MV-003	3,859	MV-132	2,233	R-064	153
MV-003	11,924	P-001	4,190	R-065	1,896
MV-004	30,452	P-002	1,218	R-066	14
MV-005	258	P-003	938	RC-001	38,263
MV-006	1,523	P-004	5,588	RC-002	61,172
MV-007	948	P-005	934	RC-003	104,360
MV-008	1,774	P-006	19,494	RC-005	22,940
MV-009	336	P-007	38,659	RC-006	1,752
MV-010	1,438	P-008	7,830	RC-007	3,221
MV-011	734	P-009	20,859	RC-009	118
MV-012	278	P-010	3,451	RC-009	38,101
MV-013	104	P-011	39,800	RC-010	201,438
MV-014	3,273	P-012	14,753	RC-011	1,652
MV-015	1,927	P-014	2,436	RC-012	13,765
MV-016	979	P-015	1,585	RC-013	15,201
MV-017	2,936	P-016	2,659	RC-014	4,734
MV-018	12	P-017	1,177	RC-015	4,343
MV-019	2,165	P-018	3,140	RC-017	21
MV-020	208	P-019	1,416	RC-018	459
MV-021	278	P-020	1,769	RC-019	117
MV-022	1,223	P-021	345	RC-020	6
MV-023	6,169	P-022	771	RC-021	16
MV-024	4,863	P-023	365	RC-022	4,007
MV-025	2,477	P-024	2,972	RC-023	1,704
MV-026	3,059	P-025	2,107	RC-024	6,199
MV-027	799	P-026	26,370	RC-025	2,762
MV-028	1,331	P-027	1,754	RC-026	61
MV-029	8,411	P-028	21,768	RC-027	6,131
MV-030	2,539	P-030	15,048	RC-028	12
MV-031	1,621	P-031	1,110	RC-029	18
MV-032	3,517	P-032	1,427	RC-030	2,556
MV-033	1,652	P-033	56,890	RC-031	5,868
MV-034	1,590	P-034	6,429	RC-032	22,206
MV-035	765	P-035	592	RC-033	11,745
MV-036	828	P-036	7,001	RC-034	13,213

World Logistic Center
Cumulative Energy - Natural gas

Cumulative Natural Gas Consumption - Summary

Project ID	Annual MMBtu		Project ID	Annual MMBtu		Project ID	Annual MMBtu
MV-037	52,508		P-036	111		RC-035	84,877
MV-038	14,101		P-037	5,597		RC-035	278
MV-039	51,984		P-038	6,821		RC-035	1,509
MV-040	200		P-039	1,591		RC-036	14,314
MV-041	2,944		P-040	3,732		RC-037	17,189
MV-042	906		P-041	4,865		RC-038	3,702
MV-043	18,054		P-042	1,866		RC-039	1,193
MV-044	2,252		P-043	1,743		RD-001	2,508
MV-045	193		P-044	1,391		RD-002	1,682
MV-046	776		P-045	1,110		RD-003	3,150
MV-047	489		P-046	6,681		RD-004	2,049
MV-048	4,335		P-047	15,935		RD-005	1,016
MV-049	4,555		P-048	2,294		RD-006	107
MV-050	11,528		P-049	3,487		RD-007	284
MV-051	24,995		P-050	178		RD-008	1,184
MV-052	28,557		P-051	1,071		RD-009	97
MV-053	2,538		P-052	2,508		RD-010	4,719
MV-054	3,528		P-053	4,924		RD-011	123
MV-056	489		P-054	7,280		RD-012	1,221
MV-057	1,132		P-055	999		RD-013	2,056
MV-058	245		P-056	320		RD-014	1,567
MV-059	1,927		P-057	85		RD-015	859
MV-060	2,814		P-058	12,281		RD-016	1,451
MV-061	400		P-059	7,432		SB-001	1,247
MV-062	16,608		P-060	10		SB-002	636
MV-063	6,760		P-061	711		SB-003	1,205
MV-064	2,661		R-001	4,015		SB-004	1,579
MV-065	769		R-002	1,183		SB-005	572
MV-066	3,713		R-003	21,184		SB-006	1,102
MV-067	4,924		R-004	3,196		SB-007	1,040
MV-068	6,728		R-005	1,735		SB-008	1,223
MV-069	13,308		R-006	1,139		SJ-001	4
MV-070	3,565		R-007	125		SJ-002	9,818
MV-071	725		R-008	576		SJ-003	17,740
MV-072	355		R-009	19,486		SJ-004	18,749
MV-073	1,420		R-010	52		WLC-001	1,835
MV-074	2,944		R-011	995		***Total Cum.***	3,211,448
MV-075	22,754		R-012	136		***Net Project***	84,771
MV-076	692		R-013	92		***Total***	3,296,219
MV-077	17,317		R-014	9		SoCalGas	873,793,575
						%SoCalGas	0.38%

Source: ESA, 2019

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Climate Zone 10

		Electricity (kWhr/unit)			Natural Gas (kBtU/unit)	
		T24	NT24	Light	T24	NT24
BP	Office Park	3.07	2.60	4.24	2.92	0.000
HI	Heavy Industrial	2.20	5.02	2.93	15.36	17.130
LI	Light Industrial	2.20	5.02	2.93	15.36	17.130
MF	Multi-Family - Mid Rise Apartment	772.17	3054.10	741.44	8764.08	6030.000
MO	Medical Office	3.07	2.79	3.66	3.47	0.000
OG	General Office	3.07	2.79	3.66	3.47	0.000
RC	Retail Commercial	4.58	2.44	5.61	1.92	0.300
SF	Single Family Residential	951.67	6155.97	1608.84	24556.15	6030.000
SR	Senior Residential	877.14	3172.76	1001.10	9544.50	6030.000
WH	Warehouse - Unrefrigerated No Rail	0.37	0.82	1.17	2.00	0.030

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
B-001	SF	3,300.00	3,140,511	20,314,701	5,309,172	81,035,295	19,899,000	28,764,384	100,934
B-002	MF	571.00	440,909	1,743,891	423,362	5,004,290	3,443,130	2,608,162	8,447
B-003	SF	922.00	877,440	5,675,804	1,483,350	22,640,770	5,559,660	8,036,595	28,200
B-004	LI	1,734.00	3,814,800	8,704,680	5,080,620	26,634,240	29,703,420	17,600,100	56,338
B-005	HI	2,565.68	5,644,505	12,879,734	7,517,454	39,408,906	43,950,167	26,041,693	83,359
B-006	BP	1,853.25	5,689,482	4,818,454	7,857,786	5,411,494	0	18,365,722	5,411
B-007	SF	403.00	383,523	2,480,856	648,363	9,896,128	2,430,090	3,512,741	12,326
B-008	SF	648.00	616,682	3,989,069	1,042,528	15,912,385	3,907,440	5,648,279	19,820
B-009	SF	4,450.00	4,234,932	27,394,067	7,159,338	109,274,868	26,833,500	38,788,336	136,108
B-010	SF	95.00	90,409	584,817	152,840	2,332,834	572,850	828,066	2,906
B-011	RC	225.00	1,030,500	549,000	1,262,250	432,000	67,500	2,841,750	500
B-012	MF	279.00	215,435	852,094	206,862	2,445,178	1,682,370	1,274,391	4,128
B-013	SF	1,890.00	1,798,656	11,634,783	3,040,708	46,411,124	11,396,700	16,474,147	57,808
B-014	SF	700.00	666,169	4,309,179	1,126,188	17,189,305	4,221,000	6,101,536	21,410
C-001	RC	200.00	916,000	488,000	1,122,000	384,000	60,000	2,526,000	444
C-002	RC	1,000.00	4,580,000	2,440,000	5,610,000	1,920,000	300,000	12,630,000	2,220
C-002	BP	1,579.00	4,847,530	4,105,400	6,694,960	4,610,680	0	15,647,890	4,611
C-003	RC	72.70	332,966	177,388	407,847	139,584	21,810	918,201	161
H-001	SF	588.00	559,582	3,619,710	945,998	14,439,016	3,545,640	5,125,290	17,985
H-002	SF	440.00	418,735	2,708,627	707,890	10,804,706	2,653,200	3,835,251	13,458
H-003	SF	931.00	886,005	5,731,208	1,497,830	22,861,776	5,613,930	8,115,043	28,476
H-004	LI	734.98	1,616,965	3,689,620	2,153,503	11,289,354	12,590,276	7,460,088	23,880
H-004	BP	995.15	3,055,120	2,587,398	4,219,449	2,905,847	0	9,861,966	2,906

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	ınduse_Coı	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
H-005	RC	20.91	95,762	51,017	117,298	40,145	6,273	264,078	46
H-006	RC	680.79	3,118,009	1,661,123	3,819,221	1,307,113	204,236	8,598,352	1,511
H-007	SR	358.00	314,016	1,135,848	358,394	3,416,931	2,158,740	1,808,258	5,576
H-008	SR	440.00	385,942	1,396,014	440,484	4,199,580	2,653,200	2,222,440	6,853
H-008	SF	145.00	137,992	892,616	233,282	3,560,642	874,350	1,263,890	4,435
H-009	SR	599.00	525,407	1,900,483	599,659	5,717,156	3,611,970	3,025,549	9,329
M-001	RC	10.00	45,800	24,400	56,100	19,200	3,000	126,300	22
M-001	OG	258.10	792,373	720,105	944,653	895,614	0	2,457,131	896
M-001	LI	42.22	92,888	211,954	123,710	648,530	723,263	428,553	1,372
M-001	HI	409.31	900,486	2,054,746	1,199,284	6,287,032	7,011,515	4,154,517	13,299
M-002	WH	4,525.00	1,674,250	3,710,500	5,294,250	9,050,000	135,750	10,679,000	9,186
M-002	OG	469.00	1,439,830	1,308,510	1,716,540	1,627,430	0	4,464,880	1,627
M-002	LI	487.80	1,073,160	2,448,756	1,429,254	7,492,608	8,356,014	4,951,170	15,849
M-003	WH	2,900.00	1,073,000	2,378,000	3,393,000	5,800,000	87,000	6,844,000	5,887
M-004	RC	108.90	498,762	265,716	610,929	209,088	32,670	1,375,407	242
M-005	WH	3,061.82	1,132,872	2,510,688	3,582,324	6,123,630	91,854	7,225,883	6,215
M-005	OG	232.76	714,558	649,386	851,883	807,660	0	2,215,828	808
M-005	LI	1,061.43	2,335,144	5,328,374	3,109,987	16,303,549	18,182,279	10,773,504	34,486
M-006	BP	219.35	673,398	570,304	930,035	640,496	0	2,173,737	640
M-007	WH	675.50	249,935	553,910	790,335	1,351,000	20,265	1,594,180	1,371
M-008	RC	625.00	2,862,500	1,525,000	3,506,250	1,200,000	187,500	7,893,750	1,388
M-008	MO	2,930.00	8,995,100	8,174,700	10,723,800	10,167,100	0	27,893,600	10,167
M-009	SF	135.00	128,475	831,056	217,193	3,315,080	814,050	1,176,725	4,129
M-010	WH	559.00	206,830	458,380	654,030	1,118,000	16,770	1,319,240	1,135
M-011	RC	67.00	306,860	163,480	375,870	128,640	20,100	846,210	149
MV-001	RC	304.50	1,394,610	742,980	1,708,245	584,640	91,350	3,845,835	676
MV-002	SF	262.00	249,338	1,612,864	421,516	6,433,711	1,579,860	2,283,718	8,014
MV-002	MF	216.00	166,789	659,686	160,151	1,893,041	1,302,480	986,625	3,196
MV-003	WH	1,901.00	703,370	1,558,820	2,224,170	3,802,000	57,030	4,486,360	3,859
MV-003	LI	367.00	807,400	1,842,340	1,075,310	5,637,120	6,286,710	3,725,050	11,924
MV-004	LI	937.26	2,061,972	4,705,045	2,746,172	14,396,314	16,055,264	9,513,189	30,452
MV-005	RC	116.36	532,929	283,918	652,780	223,411	34,908	1,469,627	258
MV-006	WH	750.00	277,500	615,000	877,500	1,500,000	22,500	1,770,000	1,523
MV-007	SF	31.00	29,502	190,835	49,874	761,241	186,930	270,211	948
MV-008	SF	58.00	55,197	357,046	93,313	1,424,257	349,740	505,556	1,774
MV-009	SF	11.00	10,468	67,716	17,697	270,118	66,330	95,881	336
MV-010	SF	47.00	44,728	289,331	75,615	1,154,139	283,410	409,675	1,438
MV-011	SF	24.00	22,840	147,743	38,612	589,348	144,720	209,196	734
MV-012	MO	80.00	245,600	223,200	292,800	277,600	0	761,600	278
MV-013	OG	30.00	92,100	83,700	109,800	104,100	0	285,600	104
MV-014	SF	107.00	101,829	658,689	172,146	2,627,508	645,210	932,663	3,273

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
MV-015	SF	63.00	59,955	387,826	101,357	1,547,037	379,890	549,138	1,927
MV-016	SF	32.00	30,453	196,991	51,483	785,797	192,960	278,927	979
MV-017	SF	96.00	91,360	590,973	154,449	2,357,390	578,880	836,782	2,936
MV-018	RC	5.50	25,190	13,420	30,855	10,560	1,650	69,465	12
MV-019	SR	139.00	121,922	441,014	139,153	1,326,686	838,170	702,089	2,165
MV-020	RC	93.79	429,549	228,843	526,151	180,073	28,136	1,184,542	208
MV-021	MO	80.00	245,600	223,200	292,800	277,600	0	761,600	278
MV-022	SF	40.00	38,067	246,239	64,354	982,246	241,200	348,659	1,223
MV-023	MF	417.00	321,995	1,273,560	309,180	3,654,621	2,514,510	1,904,735	6,169
MV-024	SF	159.00	151,316	978,799	255,806	3,904,428	958,770	1,385,920	4,863
MV-025	SF	81.00	77,085	498,634	130,316	1,989,048	488,430	706,035	2,477
MV-026	SF	100.00	95,167	615,597	160,884	2,455,615	603,000	871,648	3,059
MV-027	MF	54.00	41,697	164,921	40,038	473,260	325,620	246,656	799
MV-028	MF	90.00	69,495	274,869	66,730	788,767	542,700	411,094	1,331
MV-029	SF	275.00	261,709	1,692,892	442,431	6,752,941	1,658,250	2,397,032	8,411
MV-030	SF	83.00	78,989	510,946	133,534	2,038,160	500,490	723,468	2,539
MV-031	SF	53.00	50,439	326,266	85,269	1,301,476	319,590	461,973	1,621
MV-032	SF	115.00	109,442	707,937	185,017	2,823,957	693,450	1,002,395	3,517
MV-033	SF	54.00	51,390	332,422	86,877	1,326,032	325,620	470,690	1,652
MV-034	SF	52.00	49,487	320,110	83,660	1,276,920	313,560	453,257	1,590
MV-035	SF	25.00	23,792	153,899	40,221	613,904	150,750	217,912	765
MV-036	MF	56.00	43,242	171,030	41,521	490,788	337,680	255,792	828
MV-037	HI	1,616.13	3,555,493	8,112,988	4,735,270	24,823,803	27,684,358	16,403,750	52,508
MV-038	LI	434.00	954,800	2,178,680	1,271,620	6,666,240	7,434,420	4,405,100	14,101
MV-039	LI	1,600.00	3,520,000	8,032,000	4,688,000	24,576,000	27,408,000	16,240,000	51,984
MV-040	WH	98.40	36,406	80,684	115,122	196,790	2,952	232,212	200
MV-041	WH	1,450.00	536,500	1,189,000	1,696,500	2,900,000	43,500	3,422,000	2,944
MV-042	WH	446.35	165,150	366,007	522,230	892,700	13,391	1,053,386	906
MV-043	HI	555.67	1,222,474	2,789,463	1,628,113	8,535,091	9,518,627	5,640,051	18,054
MV-044	WH	1,109.38	410,470	909,690	1,297,972	2,218,756	33,281	2,618,132	2,252
MV-045	RC	87.12	399,010	212,573	488,743	167,270	26,136	1,100,326	193
MV-046	WH	382.28	141,444	313,470	447,268	764,560	11,468	902,181	776
MV-047	SF	16.00	15,227	98,496	25,741	392,898	96,480	139,464	489
MV-048	BP	1,484.50	4,557,406	3,859,692	6,294,267	4,334,731	0	14,711,365	4,335
MV-049	BP	1,560.05	4,789,341	4,056,120	6,614,595	4,555,334	0	15,460,056	4,555
MV-050	LI	354.81	780,582	1,781,146	1,039,593	5,449,882	6,077,895	3,601,322	11,528
MV-051	LI	769.32	1,692,504	3,861,986	2,254,108	11,816,755	13,178,452	7,808,598	24,995
MV-052	LI	878.96	1,933,712	4,412,379	2,575,353	13,500,826	15,056,585	8,921,444	28,557
MV-053	WH	1,250.00	462,500	1,025,000	1,462,500	2,500,000	37,500	2,950,000	2,538
MV-054	WH	1,738.00	643,060	1,425,160	2,033,460	3,476,000	52,140	4,101,680	3,528
MV-056	SF	16.00	15,227	98,496	25,741	392,898	96,480	139,464	489

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
MV-057	SF	37.00	35,212	227,771	59,527	908,578	223,110	322,510	1,132
MV-058	SF	8.00	7,613	49,248	12,871	196,449	48,240	69,732	245
MV-059	SF	63.00	59,955	387,826	101,357	1,547,037	379,890	549,138	1,927
MV-060	SF	92.00	87,554	566,349	148,013	2,259,166	554,760	801,916	2,814
MV-061	RC	180.00	824,400	439,200	1,009,800	345,600	54,000	2,273,400	400
MV-062	SF	543.00	516,757	3,342,692	873,600	13,333,989	3,274,290	4,733,049	16,608
MV-063	SF	221.00	210,319	1,360,469	355,554	5,426,909	1,332,630	1,926,342	6,760
MV-064	SF	87.00	82,795	535,569	139,969	2,136,385	524,610	758,334	2,661
MV-065	MF	52.00	40,153	158,813	38,555	455,732	313,560	237,521	769
MV-066	MF	251.00	193,815	766,579	186,101	2,199,784	1,513,530	1,146,495	3,713
MV-067	SF	161.00	153,219	991,111	259,023	3,953,540	970,830	1,403,353	4,924
MV-068	HI	207.09	455,589	1,039,572	606,762	3,180,841	3,547,383	2,101,923	6,728
MV-069	HI	409.60	901,116	2,056,182	1,200,122	6,291,425	7,016,414	4,157,420	13,308
MV-070	MF	241.00	186,093	736,038	178,687	2,112,143	1,453,230	1,100,818	3,565
MV-071	MF	49.00	37,836	149,651	36,331	429,440	295,470	223,818	725
MV-072	MF	24.00	18,532	73,298	17,795	210,338	144,720	109,625	355
MV-073	MF	96.00	74,128	293,194	71,178	841,352	578,880	438,500	1,420
MV-074	SR	189.00	165,779	599,652	189,208	1,803,911	1,139,670	954,639	2,944
MV-075	SR	1,461.00	1,281,502	4,635,402	1,462,607	13,944,515	8,809,830	7,379,511	22,754
MV-076	RC	311.63	1,427,279	760,385	1,748,261	598,335	93,490	3,935,925	692
MV-077	LI	533.00	1,172,600	2,675,660	1,561,690	8,186,880	9,130,290	5,409,950	17,317
MV-078	LI	520.00	1,144,000	2,610,400	1,523,600	7,987,200	8,907,600	5,278,000	16,895
MV-079	WH	367.00	135,790	300,940	429,390	734,000	11,010	866,120	745
MV-080	RC	44.30	202,894	108,092	248,523	85,056	13,290	559,509	98
MV-081	WH	700.00	259,000	574,000	819,000	1,400,000	21,000	1,652,000	1,421
MV-082	WH	500.00	185,000	410,000	585,000	1,000,000	15,000	1,180,000	1,015
MV-083	LI	356.00	783,200	1,787,120	1,043,080	5,468,160	6,098,280	3,613,400	11,566
MV-084	LI	99.98	219,952	501,890	292,936	1,535,662	1,712,623	1,014,777	3,248
MV-085	RC	140.00	641,200	341,600	785,400	268,800	42,000	1,768,200	311
MV-086	SF	71.00	67,569	437,074	114,228	1,743,487	428,130	618,870	2,172
MV-087	MF	60.00	46,330	183,246	44,486	525,845	361,800	274,063	888
MV-088	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-089	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-090	RC	7.31	33,480	17,836	41,009	14,035	2,193	92,325	16
MV-091	SF	87.00	82,795	535,569	139,969	2,136,385	524,610	758,334	2,661
MV-093	MF	112.00	86,483	342,059	83,041	981,577	675,360	511,584	1,657
MV-094	MF	266.00	205,397	812,391	197,223	2,331,245	1,603,980	1,215,011	3,935
MV-095	RC	175.00	801,500	427,000	981,750	336,000	52,500	2,210,250	389
MV-096	SF	78.00	74,230	480,166	125,490	1,915,380	470,340	679,885	2,386
MV-097	SF	214.00	203,657	1,317,378	344,292	5,255,016	1,290,420	1,865,327	6,545
MV-098	SF	16.00	15,227	98,496	25,741	392,898	96,480	139,464	489

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
MV-099	MF	96.00	74,128	293,194	71,178	841,352	578,880	438,500	1,420
MV-100	MF	194.00	149,801	592,495	143,839	1,700,232	1,169,820	886,136	2,870
MV-101	RC	9.00	41,220	21,960	50,490	17,280	2,700	113,670	20
MV-102	OG	84.00	257,880	234,360	307,440	291,480	0	799,680	291
MV-103	LI	184.00	404,800	923,680	539,120	2,826,240	3,151,920	1,867,600	5,978
MV-104	WH	373.03	138,021	305,885	436,445	746,060	11,191	880,351	757
MV-105	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-106	MF	12.00	9,266	36,649	8,897	105,169	72,360	54,813	178
MV-107	SF	9.00	8,565	55,404	14,480	221,005	54,270	78,448	275
MV-108	RC	2.97	13,616	7,254	16,679	5,708	892	37,549	7
MV-109	SF	1,105.00	1,051,595	6,802,347	1,777,768	27,134,546	6,663,150	9,631,710	33,798
MV-110	MF	60.00	46,330	183,246	44,486	525,845	361,800	274,063	888
MV-111	MF	16.00	12,355	48,866	11,863	140,225	96,480	73,083	237
MV-112	MF	15.00	11,583	45,812	11,122	131,461	90,450	68,516	222
MV-113	SF	144.00	137,040	886,460	231,673	3,536,086	868,320	1,255,173	4,404
MV-114	RC	5.70	26,106	13,908	31,977	10,944	1,710	71,991	13
MV-115	OG	0.02	71	64	84	80	0	219	0
MV-116	SF	25.00	23,792	153,899	40,221	613,904	150,750	217,912	765
MV-117	OG	52.00	159,640	145,080	190,320	180,440	0	495,040	180
MV-118	SF	9.00	8,565	55,404	14,480	221,005	54,270	78,448	275
MV-119	SF	35.00	33,308	215,459	56,309	859,465	211,050	305,077	1,071
MV-120	RC	189.52	868,002	462,429	1,063,207	363,878	56,856	2,393,638	421
MV-121	RC	4.35	19,928	10,616	24,409	8,354	1,305	54,953	10
MV-123	RC	14.00	64,120	34,160	78,540	26,880	4,200	176,820	31
MV-124	RC	140.00	641,200	341,600	785,400	268,800	42,000	1,768,200	311
MV-125	MF	24.00	18,532	73,298	17,795	210,338	144,720	109,625	355
MV-126	SF	235.00	223,642	1,446,653	378,077	5,770,695	1,417,050	2,048,373	7,188
MV-127	WH	340.01	125,804	278,808	397,812	680,020	10,200	802,424	690
MV-129	LI	1,580.00	3,476,000	7,931,600	4,629,400	24,268,800	27,065,400	16,037,000	51,334
MV-130	WH	221.86	82,088	181,924	259,575	443,718	6,656	523,587	450
MV-131	WH	1,500.00	555,000	1,230,000	1,755,000	3,000,000	45,000	3,540,000	3,045
MV-132	WH	1,100.00	407,000	902,000	1,287,000	2,200,000	33,000	2,596,000	2,233
P-001	SF	137.00	130,379	843,368	220,411	3,364,193	826,110	1,194,158	4,190
P-002	WH	600.00	222,000	492,000	702,000	1,200,000	18,000	1,416,000	1,218
P-003	WH	462.30	171,051	379,086	540,891	924,600	13,869	1,091,028	938
P-004	LI	172.00	378,400	863,440	503,960	2,641,920	2,946,360	1,745,800	5,588
P-005	WH	460.00	170,200	377,200	538,200	920,000	13,800	1,085,600	934
P-006	LI	600.00	1,320,000	3,012,000	1,758,000	9,216,000	10,278,000	6,090,000	19,494
P-007	LI	1,189.86	2,617,692	5,973,097	3,486,290	18,276,250	20,382,302	12,077,079	38,659
P-008	LI	241.00	530,200	1,209,820	706,130	3,701,760	4,128,330	2,446,150	7,830
P-009	HI	642.00	1,412,400	3,222,840	1,881,060	9,861,120	10,997,460	6,516,300	20,859

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
P-010	WH	1,700.00	629,000	1,394,000	1,989,000	3,400,000	51,000	4,012,000	3,451
P-011	HI	1,224.99	2,694,985	6,149,465	3,589,229	18,815,892	20,984,130	12,433,679	39,800
P-012	LI	454.09	998,994	2,279,522	1,330,478	6,974,792	7,778,527	4,608,993	14,753
P-014	WH	1,200.00	444,000	984,000	1,404,000	2,400,000	36,000	2,832,000	2,436
P-015	WH	780.82	288,902	640,268	913,554	1,561,630	23,424	1,842,723	1,585
P-016	WH	1,310.00	484,700	1,074,200	1,532,700	2,620,000	39,300	3,091,600	2,659
P-017	WH	580.00	214,600	475,600	678,600	1,160,000	17,400	1,368,800	1,177
P-018	WH	1,547.00	572,390	1,268,540	1,809,990	3,094,000	46,410	3,650,920	3,140
P-019	WH	697.60	258,112	572,032	816,192	1,395,200	20,928	1,646,336	1,416
P-020	WH	871.50	322,455	714,630	1,019,655	1,743,000	26,145	2,056,740	1,769
P-021	WH	170.00	62,900	139,400	198,900	340,000	5,100	401,200	345
P-022	WH	380.00	140,600	311,600	444,600	760,000	11,400	896,800	771
P-023	WH	180.00	66,600	147,600	210,600	360,000	5,400	424,800	365
P-024	WH	1,464.00	541,680	1,200,480	1,712,880	2,928,000	43,920	3,455,040	2,972
P-025	WH	1,038.00	384,060	851,160	1,214,460	2,076,000	31,140	2,449,680	2,107
P-026	LI	811.62	1,785,564	4,074,332	2,378,047	12,466,483	13,903,051	8,237,943	26,370
P-027	WH	864.00	319,680	708,480	1,010,880	1,728,000	25,920	2,039,040	1,754
P-028	LI	670.00	1,474,000	3,363,400	1,963,100	10,291,200	11,477,100	6,800,500	21,768
P-030	SF	492.00	468,222	3,028,737	791,549	12,081,626	2,966,760	4,288,508	15,048
P-031	MF	75.00	57,913	229,058	55,608	657,306	452,250	342,578	1,110
P-032	RC	643.00	2,944,940	1,568,920	3,607,230	1,234,560	192,900	8,121,090	1,427
P-033	SF	1,860.00	1,770,106	11,450,104	2,992,442	45,674,439	11,215,800	16,212,653	56,890
P-034	WH	3,166.86	1,171,737	2,596,823	3,705,223	6,333,714	95,006	7,473,783	6,429
P-035	MF	40.00	30,887	122,164	29,658	350,563	241,200	182,708	592
P-036	WH	3,448.73	1,276,032	2,827,962	4,035,019	6,897,468	103,462	8,139,012	7,001
P-036	RC	50.00	229,000	122,000	280,500	96,000	15,000	631,500	111
P-037	SF	183.00	174,156	1,126,543	294,418	4,493,775	1,103,490	1,595,116	5,597
P-038	SF	223.00	212,222	1,372,781	358,771	5,476,021	1,344,690	1,943,775	6,821
P-039	WH	783.70	289,969	642,634	916,929	1,567,400	23,511	1,849,532	1,591
P-040	SF	122.00	116,104	751,028	196,278	2,995,850	735,660	1,063,411	3,732
P-041	LI	149.74	329,424	751,685	438,732	2,299,976	2,565,012	1,519,841	4,865
P-042	SF	61.00	58,052	375,514	98,139	1,497,925	367,830	531,705	1,866
P-043	SF	57.00	54,245	350,890	91,704	1,399,701	343,710	496,839	1,743
P-044	MF	94.00	72,584	287,085	69,695	823,824	566,820	429,365	1,391
P-045	MF	75.00	57,913	229,058	55,608	657,306	452,250	342,578	1,110
P-046	SR	429.00	376,293	1,361,114	429,472	4,094,591	2,586,870	2,166,879	6,681
P-047	SF	521.00	495,820	3,207,260	838,206	12,793,754	3,141,630	4,541,286	15,935
P-048	SF	75.00	71,375	461,698	120,663	1,841,711	452,250	653,736	2,294
P-049	SF	114.00	108,490	701,781	183,408	2,799,401	687,420	993,679	3,487
P-050	RC	80.00	366,400	195,200	448,800	153,600	24,000	1,010,400	178
P-051	SF	35.00	33,308	215,459	56,309	859,465	211,050	305,077	1,071

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
P-052	SF	82.00	78,037	504,790	131,925	2,013,604	494,460	714,751	2,508
P-053	SF	161.00	153,219	991,111	259,023	3,953,540	970,830	1,403,353	4,924
P-054	SF	238.00	226,497	1,465,121	382,904	5,844,364	1,435,140	2,074,522	7,280
P-055	RC	450.00	2,061,000	1,098,000	2,524,500	864,000	135,000	5,683,500	999
P-056	LI	9.85	21,679	49,467	28,872	151,357	168,799	100,018	320
P-057	WH	41.65	15,411	34,153	48,731	83,300	1,250	98,294	85
P-058	HI	378.00	831,600	1,897,560	1,107,540	5,806,080	6,475,140	3,836,700	12,281
P-059	SF	243.00	231,256	1,495,901	390,948	5,967,144	1,465,290	2,118,105	7,432
P-060	RC	4.50	20,610	10,980	25,245	8,640	1,350	56,835	10
P-061	WH	350.00	129,500	287,000	409,500	700,000	10,500	826,000	711
R-001	BP	1,375.17	4,221,769	3,575,439	5,830,717	4,015,493	0	13,627,925	4,015
R-002	WH	582.77	215,626	477,873	681,843	1,165,544	17,483	1,375,342	1,183
R-003	LI	652.02	1,434,440	3,273,130	1,910,413	10,014,996	11,169,068	6,617,983	21,184
R-004	MF	216.00	166,789	659,686	160,151	1,893,041	1,302,480	986,625	3,196
R-005	MO	500.00	1,535,000	1,395,000	1,830,000	1,735,000	0	4,760,000	1,735
R-006	MF	77.00	59,457	235,166	57,091	674,834	464,310	351,714	1,139
R-007	RC	56.10	256,943	136,886	314,727	107,714	16,830	708,556	125
R-008	SR	37.00	32,454	117,392	37,041	353,147	223,110	186,887	576
R-009	RC	8,777.62	40,201,494	21,417,390	49,242,441	16,853,028	2,633,286	110,861,325	19,486
R-010	RC	23.57	107,928	57,499	132,200	45,245	7,070	297,626	52
R-011	BP	340.66	1,045,816	885,707	1,444,384	994,717	0	3,375,907	995
R-012	RC	61.38	281,110	149,762	344,329	117,845	18,413	775,201	136
R-013	SF	3.00	2,855	18,468	4,827	73,668	18,090	26,149	92
R-014	RC	3.86	17,670	9,414	21,643	7,407	1,157	48,727	9
R-015	SF	171.70	163,398	1,056,955	276,231	4,216,193	1,035,327	1,496,585	5,252
R-016	SF	1.53	1,452	9,392	2,455	37,465	9,200	13,299	47
R-017	MF	275.00	212,347	839,878	203,896	2,410,122	1,658,250	1,256,120	4,068
R-018	LI	9,037.83	19,883,223	45,369,901	26,480,838	138,821,050	154,818,007	91,733,962	293,639
R-019	MF	55.00	42,469	167,976	40,779	482,024	331,650	251,224	814
R-020	WH	1,461.45	540,736	1,198,388	1,709,895	2,922,898	43,843	3,449,020	2,967
R-021	SF	15.00	14,275	92,340	24,133	368,342	90,450	130,747	459
R-022	SF	9.00	8,565	55,404	14,480	221,005	54,270	78,448	275
R-023	RC	8.04	36,819	19,615	45,099	15,435	2,412	101,533	18
R-024	SF	5,000.00	4,758,350	30,779,850	8,044,200	122,780,750	30,150,000	43,582,400	152,931
R-025	MF	208.00	160,611	635,253	154,220	1,822,929	1,254,240	950,084	3,077
R-026	RC	297.95	1,364,613	726,999	1,671,502	572,065	89,385	3,763,114	661
R-026	LI	943.51	2,075,721	4,736,418	2,764,483	14,492,307	16,162,319	9,576,622	30,655
R-026	BP	347.61	1,067,159	903,783	1,473,861	1,015,018	0	3,444,803	1,015
R-027	RC	3.62	16,570	8,828	20,297	6,947	1,085	45,695	8
R-028	SR	134.00	117,537	425,150	134,147	1,278,963	808,020	676,834	2,087
R-029	RC	3.80	17,381	9,260	21,290	7,286	1,139	47,931	8

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	anduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
R-030	RC	208.57	955,229	508,899	1,170,051	400,445	62,570	2,634,179	463
R-031	MF	36.00	27,798	109,948	26,692	315,507	217,080	164,438	533
R-032	RC	22.27	102,006	54,344	124,946	42,762	6,682	281,295	49
R-033	MF	30.00	23,165	91,623	22,243	262,922	180,900	137,031	444
R-034	OG	12.17	37,350	33,943	44,528	42,216	0	115,820	42
R-035	MF	102.00	78,761	311,518	75,627	893,936	615,060	465,906	1,509
R-036	MF	62.00	47,875	189,354	45,969	543,373	373,860	283,198	917
R-037	RC	6.00	27,480	14,640	33,660	11,520	1,800	75,780	13
R-038	RC	3.50	16,030	8,540	19,635	6,720	1,050	44,205	8
R-039	SF	402.00	382,571	2,474,700	646,754	9,871,572	2,424,060	3,504,025	12,296
R-040	RC	2.40	10,992	5,856	13,464	4,608	720	30,312	5
R-041	OG	23.12	70,991	64,516	84,634	80,240	0	220,140	80
R-042	SF	598.00	569,099	3,681,270	962,086	14,684,578	3,605,940	5,212,455	18,291
R-043	SF	50.00	47,584	307,799	80,442	1,227,808	301,500	435,824	1,529
R-044	RC	4.00	18,320	9,760	22,440	7,680	1,200	50,520	9
R-045	OG	37.94	116,473	105,850	138,857	131,648	0	361,179	132
R-046	SF	35.84	34,111	220,648	57,666	880,166	216,133	312,425	1,096
R-047	WH	107.73	39,861	88,340	126,046	215,464	3,232	254,248	219
R-048	RC	75.30	344,874	183,732	422,433	144,576	22,590	951,039	167
R-049	SR	310.00	271,913	983,556	310,341	2,958,795	1,869,300	1,565,810	4,828
R-050	SF	3.83	3,647	23,593	6,166	94,111	23,110	33,406	117
R-051	RC	2.36	10,813	5,761	13,245	4,533	708	29,819	5
R-052	SF	32.00	30,453	196,991	51,483	785,797	192,960	278,927	979
R-053	SF	29.00	27,598	178,523	46,656	712,128	174,870	252,778	887
R-054	SF	25.00	23,792	153,899	40,221	613,904	150,750	217,912	765
R-055	SF	20.00	19,033	123,119	32,177	491,123	120,600	174,330	612
R-056	OG	131.00	402,170	365,490	479,460	454,570	0	1,247,120	455
R-057	LI	171.62	377,555	861,512	502,835	2,636,022	2,939,782	1,741,902	5,576
R-058	RC	2.75	12,577	6,700	15,405	5,272	824	34,682	6
R-059	RC	4.05	18,549	9,882	22,721	7,776	1,215	51,152	9
R-060	BP	101.58	311,851	264,108	430,699	296,614	0	1,006,658	297
R-061	RC	425.45	1,948,547	1,038,091	2,386,758	816,858	127,634	5,373,396	944
R-062	RC	1.83	8,386	4,468	10,272	3,516	549	23,126	4
R-063	MF	21.00	16,216	64,136	15,570	184,046	126,630	95,922	311
R-064	SF	5.00	4,758	30,780	8,044	122,781	30,150	43,582	153
R-065	SF	62.00	59,004	381,670	99,748	1,522,481	373,860	540,422	1,896
R-066	RC	6.15	28,167	15,006	34,502	11,808	1,845	77,675	14
RC-001	SF	1,251.00	1,190,539	7,701,118	2,012,659	30,719,744	7,543,530	10,904,316	38,263
RC-002	SF	2,000.00	1,903,340	12,311,940	3,217,680	49,112,300	12,060,000	17,432,960	61,172
RC-003	SF	3,412.00	3,247,098	21,004,170	5,489,362	83,785,584	20,574,360	29,740,630	104,360
RC-005	SF	750.00	713,753	4,616,978	1,206,630	18,417,113	4,522,500	6,537,360	22,940

World Logistic Center
Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	**nduse_Co**	**Landuse_qty**	**kWh**	**kWh**	**kWh**	**kBTU**	**kBTU**	**Electricity (kWh)**	**NG (MMBtu)**
RC-006	BP	600.00	1,842,000	1,560,000	2,544,000	1,752,000	0	5,946,000	1,752
RC-007	WH	1,586.65	587,059	1,301,049	1,856,375	3,173,290	47,599	3,744,482	3,221
RC-009	OG	34.00	104,380	94,860	124,440	117,980	0	323,680	118
RC-009	HI	1,172.71	2,579,962	5,887,004	3,436,040	18,012,826	20,088,522	11,903,007	38,101
RC-010	LI	6,200.00	13,640,000	31,124,000	18,166,000	95,232,000	106,206,000	62,930,000	201,438
RC-011	WH	814.00	301,180	667,480	952,380	1,628,000	24,420	1,921,040	1,652
RC-012	LI	423.67	932,063	2,126,798	1,241,338	6,507,494	7,257,381	4,300,200	13,765
RC-013	SF	497.00	472,980	3,059,517	799,593	12,204,407	2,996,910	4,332,091	15,201
RC-014	MF	320.00	247,094	977,312	237,261	2,804,506	1,929,600	1,461,667	4,734
RC-015	SF	142.00	135,137	874,148	228,455	3,486,973	856,260	1,237,740	4,343
RC-017	RC	9.28	42,502	22,643	52,061	17,818	2,784	117,206	21
RC-018	SF	15.00	14,275	92,340	24,133	368,342	90,450	130,747	459
RC-019	RC	52.80	241,815	128,827	296,197	101,372	15,839	666,839	117
RC-020	RC	2.80	12,824	6,832	15,708	5,376	840	35,364	6
RC-021	WH	8.00	2,960	6,560	9,360	16,000	240	18,880	16
RC-022	SF	131.00	124,669	806,432	210,758	3,216,856	789,930	1,141,859	4,007
RC-023	LI	52.45	115,390	263,299	153,679	805,632	898,469	532,368	1,704
RC-024	LI	190.80	419,764	957,826	559,050	2,930,719	3,268,438	1,936,640	6,199
RC-025	LI	85.00	187,000	426,700	249,050	1,305,600	1,456,050	862,750	2,762
RC-026	SF	2.00	1,903	12,312	3,218	49,112	12,060	17,433	61
RC-027	LI	188.70	415,144	947,284	552,897	2,898,461	3,232,464	1,915,324	6,131
RC-028	RC	5.60	25,648	13,664	31,416	10,752	1,680	70,728	12
RC-029	RC	8.14	37,290	19,866	45,677	15,633	2,443	102,833	18
RC-030	WH	1,259.05	465,849	1,032,421	1,473,089	2,518,100	37,772	2,971,358	2,556
RC-031	LI	180.60	397,320	906,612	529,158	2,774,016	3,093,678	1,833,090	5,868
RC-032	SF	726.00	690,912	4,469,234	1,168,018	17,827,765	4,377,780	6,328,164	22,206
RC-033	SF	384.00	365,441	2,363,892	617,795	9,429,562	2,315,520	3,347,128	11,745
RC-034	SF	432.00	411,121	2,659,379	695,019	10,608,257	2,604,960	3,765,519	13,213
RC-035	SF	2,775.00	2,640,884	17,082,817	4,464,531	68,143,316	16,733,250	24,188,232	84,877
RC-035	OG	80.00	245,600	223,200	292,800	277,600	0	761,600	278
RC-035	MF	102.00	78,761	311,518	75,627	893,936	615,060	465,906	1,509
RC-036	SF	468.00	445,382	2,880,994	752,937	11,492,278	2,822,040	4,079,313	14,314
RC-037	SF	562.00	534,839	3,459,655	904,168	13,800,556	3,388,860	4,898,662	17,189
RC-038	WH	1,823.76	674,791	1,495,483	2,133,799	3,647,520	54,713	4,304,074	3,702
RC-039	SF	39.00	37,115	240,083	62,745	957,690	235,170	339,943	1,193
RD-001	SF	82.00	78,037	504,790	131,925	2,013,604	494,460	714,751	2,508
RD-002	SF	55.00	52,342	338,578	88,486	1,350,588	331,650	479,406	1,682
RD-003	SF	103.00	98,022	634,065	165,711	2,529,283	621,090	897,797	3,150
RD-004	SF	67.00	63,762	412,450	107,792	1,645,262	404,010	584,004	2,049
RD-005	WH	500.60	185,223	410,494	585,704	1,001,204	15,018	1,181,421	1,016
RD-006	RC	48.22	220,866	117,667	270,537	92,590	14,467	609,069	107

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Consumption - Electricity & Natural Gas

		9,037,829	Electricity			Natural Gas		Total	
Project ID	nduse_Co	Landuse_qty	kWh	kWh	kWh	kBTU	kBTU	Electricity (kWh)	NG (MMBtu)
RD-007	RC	127.75	585,077	311,700	716,655	245,272	38,324	1,613,432	284
RD-008	MF	80.00	61,774	244,328	59,315	701,126	482,400	365,417	1,184
RD-009	RC	43.80	200,613	106,877	245,729	84,100	13,141	553,219	97
RD-010	LI	145.26	319,561	729,180	425,597	2,231,117	2,488,218	1,474,338	4,719
RD-011	RC	55.47	254,030	135,335	311,159	106,493	16,640	700,523	123
RD-012	WH	601.29	222,476	493,055	703,506	1,202,574	18,039	1,419,037	1,221
RD-013	WH	1,013.00	374,810	830,660	1,185,210	2,026,000	30,390	2,390,680	2,056
RD-014	WH	772.00	285,640	633,040	903,240	1,544,000	23,160	1,821,920	1,567
RD-015	WH	423.00	156,510	346,860	494,910	846,000	12,690	998,280	859
RD-016	WH	714.73	264,451	586,081	836,238	1,429,466	21,442	1,686,770	1,451
SB-001	WH	614.33	227,301	503,749	718,764	1,228,656	18,430	1,449,814	1,247
SB-002	WH	313.47	115,984	257,045	366,760	626,940	9,404	739,789	636
SB-003	WH	593.56	219,618	486,722	694,469	1,187,126	17,807	1,400,809	1,205
SB-004	WH	777.62	287,719	637,648	909,815	1,555,240	23,329	1,835,183	1,579
SB-005	WH	282.00	104,340	231,240	329,940	564,000	8,460	665,520	572
SB-006	WH	542.98	200,901	445,241	635,283	1,085,954	16,289	1,281,426	1,102
SB-007	SF	34.00	32,356,780	209,302,980	54,700,560	834,909	205,020	296,360,320	1,040
SB-008	SF	40.00	38,067	246,239	64,354	982,246	241,200	348,659	1,223
SJ-001	RC	1,678.24	7,686,361	4,094,917	9,414,954	3,222	503	21,196,232	4
SJ-002	SF	321.00	305,486	1,976,066	516,438	7,882,524	1,935,630	2,797,990	9,818
SJ-003	SF	580.00	551,969	3,570,463	933,127	14,242,567	3,497,400	5,055,558	17,740
SJ-004	SF	613.00	583,374	3,773,610	986,219	15,052,920	3,696,390	5,343,202	18,749
WLC-001	SF	60.00	57,100	369,358	96,530	1,473,369	361,800	522,989	1,835

World Logistic Center
Cumulative Energy - Electricity Natural Gas

		Water Usage (gal/ unit)	
		Indoor	Outdoor
BP	Office Park	177,734	108,937
HI	Heavy Industrial	231,250	0
LI	Light Industrial	231,250	0
MF	Multi-Family - Mid Rise Apartment	65,154	41,075
MO	Medical Office	125,481	23,901
OG	General Office	177,734	108,934
RC	Retail Commercial	74,073	45,399
SF	Single Family Residential	65,154	41,075
SR	Senior Residential	65,154	41,075
WH	Warehouse - Unrefrigerated No Rail	231,250	0

Electricity Intensity Rates (kWhr/Million Gallons)

Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
9727	111	1272	1911

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
B-001	215,008,200	135,547,500	350.5557	215.0082	3,409,855	38,912	445,907	410,881
B-002	37,202,934	23,453,825	60.656759	37.202934	590,008	6,733	77,155	71,095
B-003	60,071,988	37,871,150	97.943138	60.071988	952,693	10,872	124,584	114,798
B-004	400,987,500	0	400.9875	400.9875	3,900,405	44,510	510,056	766,287
B-005	593,314,425	0	593.314425	593.314425	5,771,169	65,858	754,696	1,133,824
B-006	329,385,800	201,887,657	531.2734573	329.3858	5,167,697	58,971	675,780	629,456
B-007	26,257,062	16,553,225	42.810287	26.257062	416,416	4,752	54,455	50,177
B-008	42,219,792	26,616,600	68.836392	42.219792	669,572	7,641	87,560	80,682
B-009	289,935,300	182,783,750	472.71905	289.9353	4,598,138	52,472	601,299	554,066
B-010	6,189,630	3,902,125	10.091755	6.18963	98,163	1,120	12,837	11,828
B-011	16,666,425	10,214,775	26.8812	16.666425	261,473	2,984	34,193	31,850
B-012	18,177,966	11,459,925	29.637891	18.177966	288,288	3,290	37,699	34,738
B-013	123,141,060	77,631,750	200.77281	123.14106	1,952,917	22,286	255,383	235,323
B-014	45,607,800	28,752,500	74.3603	45.6078	723,303	8,254	94,586	87,157
C-001	14,814,600	9,079,800	23.8944	14.8146	232,421	2,652	30,394	28,311
C-002	74,073,000	45,399,000	119.472	74.073	1,162,104	13,261	151,968	141,554
C-002	280,641,986	172,011,523	452.653509	280.641986	4,402,961	50,245	575,775	536,307
C-003	5,385,107	3,300,507	8.6856144	5.3851071	84,485	964	11,048	10,291
H-001	38,310,552	24,152,100	62.462652	38.310552	607,574	6,933	79,452	73,211
H-002	28,667,760	18,073,000	46.74076	28.66776	454,647	5,188	59,454	54,784
H-003	60,658,374	38,240,825	98.899199	60.658374	961,993	10,978	125,800	115,918
H-004	169,965,050	0	169.96505	169.96505	1,653,250	18,866	216,196	324,803
H-004	176,872,523	108,408,982	285.2815057	176.8725233	2,774,933	31,666	362,878	338,003

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	**Indoors (gal)**	**Outdoors (gal)**	**Water (M gal)**	**Wastewater (M gal)**	**Water Supply**	**Water Treatment**	**Water Distribution**	**Wastewater Treatment**
H-005	1,548,778	949,239	2.498016154	1.548777542	24,298	277	3,177	2,960
H-006	50,428,010	30,907,094	81.33510394	50.42800952	791,147	9,028	103,458	96,368
H-007	23,325,132	14,704,850	38.029982	23.325132	369,918	4,221	48,374	44,574
H-008	28,667,760	18,073,000	46.74076	28.66776	454,647	5,188	59,454	54,784
H-008	9,447,330	5,955,875	15.403205	9.44733	149,827	1,710	19,593	18,054
H-009	39,027,246	24,603,925	63.631171	39.027246	618,940	7,063	80,939	74,581
M-001	740,730	453,990	1.19472	0.74073	11,621	133	1,520	1,416
M-001	45,873,501	28,116,083	73.98958414	45.87350087	719,697	8,213	94,115	87,664
M-001	9,763,838	0	9.7638375	9.7638375	94,973	1,084	12,420	18,659
M-001	94,653,400	0	94.6534	94.6534	920,694	10,507	120,399	180,883
M-002	1,046,406,250	0	1046.40625	1046.40625	10,178,394	116,151	1,331,029	1,999,682
M-002	83,357,246	51,090,046	134.447292	83.357246	1,307,769	14,924	171,017	159,296
M-002	112,803,750	0	112.80375	112.80375	1,097,242	12,521	143,486	215,568
M-003	670,625,000	0	670.625	670.625	6,523,169	74,439	853,035	1,281,564
M-004	8,066,550	4,943,951	13.0105008	8.0665497	126,553	1,444	16,549	15,415
M-005	708,044,719	0	708.0447188	708.0447188	6,887,151	78,593	900,633	1,353,073
M-005	41,368,477	25,354,933	66.72341034	41.36847717	649,019	7,406	84,872	79,055
M-005	245,455,456	0	245.4554563	245.4554563	2,387,545	27,246	312,219	469,065
M-006	38,985,567	23,895,094	62.88066065	38.98556652	611,640	6,980	79,984	74,501
M-007	156,209,375	0	156.209375	156.209375	1,519,449	17,339	198,698	298,516
M-008	46,295,625	28,374,375	74.67	46.295625	726,315	8,288	94,980	88,471
M-008	367,659,330	70,029,930	437.68926	367.65933	4,257,403	48,584	556,741	702,597
M-009	8,795,790	5,545,125	14.340915	8.79579	139,494	1,592	18,242	16,809
M-010	129,268,750	0	129.26875	129.26875	1,257,397	14,349	164,430	247,033
M-011	4,962,891	3,041,733	8.004624	4.962891	77,861	889	10,182	9,484
MV-001	22,555,229	13,823,996	36.379224	22.5552285	353,861	4,038	46,274	43,103
MV-002	17,070,348	10,761,650	27.831998	17.070348	270,722	3,089	35,402	32,621
MV-002	14,073,264	8,872,200	22.945464	14.073264	223,191	2,547	29,187	26,894
MV-003	439,606,250	0	439.60625	439.60625	4,276,050	48,796	559,179	840,088
MV-003	84,868,750	0	84.86875	84.86875	825,518	9,420	107,953	162,184
MV-004	216,741,375	0	216.741375	216.741375	2,108,243	24,058	275,695	414,193
MV-005	8,619,134	5,282,628	13.90176192	8.61913428	135,222	1,543	17,683	16,471
MV-006	173,437,500	0	173.4375	173.4375	1,687,027	19,252	220,613	331,439
MV-007	2,019,774	1,273,325	3.293099	2.019774	32,032	366	4,189	3,860
MV-008	3,778,932	2,382,350	6.161282	3.778932	59,931	684	7,837	7,222
MV-009	716,694	451,825	1.168519	0.716694	11,366	130	1,486	1,370
MV-010	3,062,238	1,930,525	4.992763	3.062238	48,565	554	6,351	5,852
MV-011	1,563,696	985,800	2.549496	1.563696	24,799	283	3,243	2,988
MV-012	10,038,480	1,912,080	11.95056	10.03848	116,243	1,327	15,201	19,184
MV-013	5,332,020	3,268,020	8.60004	5.33202	83,653	955	10,939	10,189
MV-014	6,971,478	4,395,025	11.366503	6.971478	110,562	1,262	14,458	13,322

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
MV-015	4,104,702	2,587,725	6.692427	4.104702	65,097	743	8,513	7,844
MV-016	2,084,928	1,314,400	3.399328	2.084928	33,065	377	4,324	3,984
MV-017	6,254,784	3,943,200	10.197984	6.254784	99,196	1,132	12,972	11,953
MV-018	407,402	249,695	0.657096	0.4074015	6,392	73	836	779
MV-019	9,056,406	5,709,425	14.765831	9.056406	143,627	1,639	18,782	17,307
MV-020	6,947,159	4,257,881	11.20503994	6.947158524	108,991	1,244	14,253	13,276
MV-021	10,038,480	1,912,080	11.95056	10.03848	116,243	1,327	15,201	19,184
MV-022	2,606,160	1,643,000	4.24916	2.60616	41,332	472	5,405	4,980
MV-023	27,169,218	17,128,275	44.297493	27.169218	430,882	4,917	56,346	51,920
MV-024	10,359,486	6,530,925	16.890411	10.359486	164,293	1,875	21,485	19,797
MV-025	5,277,474	3,327,075	8.604549	5.277474	83,696	955	10,945	10,085
MV-026	6,515,400	4,107,500	10.6229	6.5154	103,329	1,179	13,512	12,451
MV-027	3,518,316	2,218,050	5.736366	3.518316	55,798	637	7,297	6,724
MV-028	5,863,860	3,696,750	9.56061	5.86386	92,996	1,061	12,161	11,206
MV-029	17,917,350	11,295,625	29.212975	17.91735	284,155	3,243	37,159	34,240
MV-030	5,407,782	3,409,225	8.817007	5.407782	85,763	979	11,215	10,334
MV-031	3,453,162	2,176,975	5.630137	3.453162	54,764	625	7,162	6,599
MV-032	7,492,710	4,723,625	12.216335	7.49271	118,828	1,356	15,539	14,319
MV-033	3,518,316	2,218,050	5.736366	3.518316	55,798	637	7,297	6,724
MV-034	3,388,008	2,135,900	5.523908	3.388008	53,731	613	7,026	6,474
MV-035	1,628,850	1,026,875	2.655725	1.62885	25,832	295	3,378	3,113
MV-036	3,648,624	2,300,200	5.948824	3.648624	57,864	660	7,567	6,973
MV-037	373,730,756	0	373.7307563	373.7307563	3,635,279	41,484	475,386	714,199
MV-038	100,362,500	0	100.3625	100.3625	976,226	11,140	127,661	191,793
MV-039	370,000,000	0	370	370	3,598,990	41,070	470,640	707,070
MV-040	22,753,844	0	22.75384375	22.75384375	221,327	2,526	28,943	43,483
MV-041	335,312,500	0	335.3125	335.3125	3,261,585	37,220	426,518	640,782
MV-042	103,218,438	0	103.2184375	103.2184375	1,004,006	11,457	131,294	197,250
MV-043	128,498,688	0	128.4986875	128.4986875	1,249,907	14,263	163,450	245,561
MV-044	256,543,663	0	256.5436625	256.5436625	2,495,400	28,476	326,324	490,255
MV-045	6,453,240	3,955,161	10.40840064	6.45323976	101,243	1,155	13,239	12,332
MV-046	88,402,250	0	88.40225	88.40225	859,889	9,813	112,448	168,937
MV-047	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992
MV-048	263,845,590	161,716,650	425.5622395	263.8455898	4,139,444	47,237	541,315	504,209
MV-049	277,273,216	169,946,731	447.2199469	277.2732158	4,350,108	49,641	568,864	529,869
MV-050	82,049,813	0	82.0498125	82.0498125	798,099	9,108	104,367	156,797
MV-051	177,905,250	0	177.90525	177.90525	1,730,484	19,747	226,295	339,977
MV-052	203,259,500	0	203.2595	203.2595	1,977,105	22,562	258,546	388,429
MV-053	289,062,500	0	289.0625	289.0625	2,811,711	32,086	367,688	552,398
MV-054	401,912,500	0	401.9125	401.9125	3,909,403	44,612	511,233	768,055
MV-056	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
MV-057	2,410,698	1,519,775	3.930473	2.410698	38,232	436	5,000	4,607
MV-058	521,232	328,600	0.849832	0.521232	8,266	94	1,081	996
MV-059	4,104,702	2,587,725	6.692427	4.104702	65,097	743	8,513	7,844
MV-060	5,994,168	3,778,900	9.773068	5.994168	95,063	1,085	12,431	11,455
MV-061	13,333,140	8,171,820	21.50496	13.33314	209,179	2,387	27,354	25,480
MV-062	35,378,622	22,303,725	57.682347	35.378622	561,076	6,403	73,372	67,609
MV-063	14,399,034	9,077,575	23.476609	14.399034	228,357	2,606	29,862	27,517
MV-064	5,668,398	3,573,525	9.241923	5.668398	89,896	1,026	11,756	10,832
MV-065	3,388,008	2,135,900	5.523908	3.388008	53,731	613	7,026	6,474
MV-066	16,353,654	10,309,825	26.663479	16.353654	259,356	2,960	33,916	31,252
MV-067	10,489,794	6,613,075	17.102869	10.489794	166,360	1,898	21,755	20,046
MV-068	47,888,638	0	47.8886375	47.8886375	465,813	5,316	60,914	91,515
MV-069	94,719,538	0	94.7195375	94.7195375	921,337	10,514	120,483	181,009
MV-070	15,702,114	9,899,075	25.601189	15.702114	249,023	2,842	32,565	30,007
MV-071	3,192,546	2,012,675	5.205221	3.192546	50,631	578	6,621	6,101
MV-072	1,563,696	985,800	2.549496	1.563696	24,799	283	3,243	2,988
MV-073	6,254,784	3,943,200	10.197984	6.254784	99,196	1,132	12,972	11,953
MV-074	12,314,106	7,763,175	20.077281	12.314106	195,292	2,229	25,538	23,532
MV-075	95,189,994	60,010,575	155.200569	95.189994	1,509,636	17,227	197,415	181,908
MV-076	23,083,591	14,147,827	37.23141778	23.08359121	362,150	4,133	47,358	44,113
MV-077	123,256,250	0	123.25625	123.25625	1,198,914	13,681	156,782	235,543
MV-078	120,250,000	0	120.25	120.25	1,169,672	13,348	152,958	229,798
MV-079	84,868,750	0	84.86875	84.86875	825,518	9,420	107,953	162,184
MV-080	3,281,434	2,011,176	5.2926096	3.2814339	51,481	587	6,732	6,271
MV-081	161,875,000	0	161.875	161.875	1,574,558	17,968	205,905	309,343
MV-082	115,625,000	0	115.625	115.625	1,124,684	12,834	147,075	220,959
MV-083	82,325,000	0	82.325	82.325	800,775	9,138	104,717	157,323
MV-084	23,119,913	0	23.1199125	23.1199125	224,887	2,566	29,409	44,182
MV-085	10,370,220	6,355,860	16.72608	10.37022	162,695	1,857	21,276	19,817
MV-086	4,625,934	2,916,325	7.542259	4.625934	73,364	837	9,594	8,840
MV-087	3,909,240	2,464,500	6.37374	3.90924	61,997	707	8,107	7,471
MV-088	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-089	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-090	541,474	331,867	0.87334032	0.54147363	8,495	97	1,111	1,035
MV-091	5,668,398	3,573,525	9.241923	5.668398	89,896	1,026	11,756	10,832
MV-093	7,297,248	4,600,400	11.897648	7.297248	115,728	1,321	15,134	13,945
MV-094	17,330,964	10,925,950	28.256914	17.330964	274,855	3,137	35,943	33,119
MV-095	12,962,775	7,944,825	20.9076	12.962775	203,368	2,321	26,594	24,772
MV-096	5,082,012	3,203,850	8.285862	5.082012	80,597	920	10,540	9,712
MV-097	13,942,956	8,790,050	22.733006	13.942956	221,124	2,523	28,916	26,645
MV-098	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
MV-099	6,254,784	3,943,200	10.197984	6.254784	99,196	1,132	12,972	11,953
MV-100	12,639,876	7,968,550	20.608426	12.639876	200,458	2,288	26,214	24,155
MV-101	666,657	408,591	1.075248	0.666657	10,459	119	1,368	1,274
MV-102	14,929,656	9,150,456	24.080112	14.929656	234,227	2,673	30,630	28,531
MV-103	42,550,000	0	42.55	42.55	413,884	4,723	54,124	81,313
MV-104	86,263,188	0	86.2631875	86.2631875	839,082	9,575	109,727	164,849
MV-105	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-106	781,848	492,900	1.274748	0.781848	12,399	141	1,621	1,494
MV-107	586,386	369,675	0.956061	0.586386	9,300	106	1,216	1,121
MV-108	220,219	134,971	0.355190256	0.220219029	3,455	39	452	421
MV-109	71,995,170	45,387,875	117.383045	71.99517	1,141,785	13,030	149,311	137,583
MV-110	3,909,240	2,464,500	6.37374	3.90924	61,997	707	8,107	7,471
MV-111	1,042,464	657,200	1.699664	1.042464	16,533	189	2,162	1,992
MV-112	977,310	616,125	1.593435	0.97731	15,499	177	2,027	1,868
MV-113	9,382,176	5,914,800	15.296976	9.382176	148,794	1,698	19,458	17,929
MV-114	422,216	258,774	0.6809904	0.4222161	6,624	76	866	807
MV-115	4,088	2,505	0.006593364	0.004087882	64	1	8	8
MV-116	1,628,850	1,026,875	2.655725	1.62885	25,832	295	3,378	3,113
MV-117	9,242,168	5,664,568	14.906736	9.242168	144,998	1,655	18,961	17,662
MV-118	586,386	369,675	0.956061	0.586386	9,300	106	1,216	1,121
MV-119	2,280,390	1,437,625	3.718015	2.28039	36,165	413	4,729	4,358
MV-120	14,038,315	8,604,018	22.64233344	14.03831496	220,242	2,513	28,801	26,827
MV-121	322,292	197,531	0.519822672	0.322291623	5,056	58	661	616
MV-123	1,037,022	635,586	1.672608	1.037022	16,269	186	2,128	1,982
MV-124	10,370,220	6,355,860	16.72608	10.37022	162,695	1,857	21,276	19,817
MV-125	1,563,696	985,800	2.549496	1.563696	24,799	283	3,243	2,988
MV-126	15,311,190	9,652,625	24.963815	15.31119	242,823	2,771	31,754	29,260
MV-127	78,627,313	0	78.6273125	78.6273125	764,808	8,728	100,014	150,257
MV-129	365,375,000	0	365.375	365.375	3,554,003	40,557	464,757	698,232
MV-130	51,304,894	0	51.30489375	51.30489375	499,043	5,695	65,260	98,044
MV-131	346,875,000	0	346.875	346.875	3,374,053	38,503	441,225	662,878
MV-132	254,375,000	0	254.375	254.375	2,474,306	28,236	323,565	486,111
P-001	8,926,098	5,627,275	14.553373	8.926098	141,561	1,615	18,512	17,058
P-002	138,750,000	0	138.75	138.75	1,349,621	15,401	176,490	265,151
P-003	106,906,875	0	106.906875	106.906875	1,039,883	11,867	135,986	204,299
P-004	39,775,000	0	39.775	39.775	386,891	4,415	50,594	76,010
P-005	106,375,000	0	106.375	106.375	1,034,710	11,808	135,309	203,283
P-006	138,750,000	0	138.75	138.75	1,349,621	15,401	176,490	265,151
P-007	275,155,125	0	275.155125	275.155125	2,676,434	30,542	349,997	525,821
P-008	55,731,250	0	55.73125	55.73125	542,098	6,186	70,890	106,502
P-009	148,462,500	0	148.4625	148.4625	1,444,095	16,479	188,844	283,712

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water			Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)		Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
P-010	393,125,000	0	393.125	393.125		3,823,927	43,637	500,055	751,262
P-011	283,279,631	0	283.2796313	283.2796313		2,755,461	31,444	360,332	541,347
P-012	105,007,850	0	105.00785	105.00785		1,021,411	11,656	133,570	200,670
P-014	277,500,000	0	277.5	277.5		2,699,243	30,803	352,980	530,303
P-015	180,563,469	0	180.5634688	180.5634688		1,756,341	20,043	229,677	345,057
P-016	302,937,500	0	302.9375	302.9375		2,946,673	33,626	385,337	578,914
P-017	134,125,000	0	134.125	134.125		1,304,634	14,888	170,607	256,313
P-018	357,743,750	0	357.74375	357.74375		3,479,773	39,710	455,050	683,648
P-019	161,320,000	0	161.32	161.32		1,569,160	17,907	205,199	308,283
P-020	201,534,375	0	201.534375	201.534375		1,960,325	22,370	256,352	385,132
P-021	39,312,500	0	39.3125	39.3125		382,393	4,364	50,006	75,126
P-022	87,875,000	0	87.875	87.875		854,760	9,754	111,777	167,929
P-023	41,625,000	0	41.625	41.625		404,886	4,620	52,947	79,545
P-024	338,550,000	0	338.55	338.55		3,293,076	37,579	430,636	646,969
P-025	240,037,500	0	240.0375	240.0375		2,334,845	26,644	305,328	458,712
P-026	187,687,125	0	187.687125	187.687125		1,825,633	20,833	238,738	358,670
P-027	199,800,000	0	199.8	199.8		1,943,455	22,178	254,146	381,818
P-028	154,937,500	0	154.9375	154.9375		1,507,077	17,198	197,081	296,086
P-030	32,055,768	20,208,900	52.264668	32.055768		508,378	5,801	66,481	61,259
P-031	4,886,550	3,080,625	7.967175	4.88655		77,497	884	10,134	9,338
P-032	47,628,939	29,191,557	76.820496	47.628939		747,233	8,527	97,716	91,019
P-033	121,186,440	76,399,500	197.58594	121.18644		1,921,918	21,932	251,329	231,587
P-034	732,335,681	0	732.3356813	732.3356813		7,123,429	81,289	931,531	1,399,493
P-035	2,606,160	1,643,000	4.24916	2.60616		41,332	472	5,405	4,980
P-036	797,519,738	0	797.5197375	797.5197375		7,757,474	88,525	1,014,445	1,524,060
P-036	3,703,650	2,269,950	5.9736	3.70365		58,105	663	7,598	7,078
P-037	11,923,182	7,516,725	19.439907	11.923182		189,092	2,158	24,728	22,785
P-038	14,529,342	9,159,725	23.689067	14.529342		230,424	2,629	30,132	27,766
P-039	181,230,625	0	181.230625	181.230625		1,762,830	20,117	230,525	346,332
P-040	7,948,788	5,011,150	12.959938	7.948788		126,061	1,439	16,485	15,190
P-041	34,626,913	0	34.6269125	34.6269125		336,816	3,844	44,045	66,172
P-042	3,974,394	2,505,575	6.479969	3.974394		63,031	719	8,243	7,595
P-043	3,713,778	2,341,275	6.055053	3.713778		58,898	672	7,702	7,097
P-044	6,124,476	3,861,050	9.985526	6.124476		97,129	1,108	12,702	11,704
P-045	4,886,550	3,080,625	7.967175	4.88655		77,497	884	10,134	9,338
P-046	27,951,066	17,621,175	45.572241	27.951066		443,281	5,059	57,968	53,414
P-047	33,945,234	21,400,075	55.345309	33.945234		538,344	6,143	70,399	64,869
P-048	4,886,550	3,080,625	7.967175	4.88655		77,497	884	10,134	9,338
P-049	7,427,556	4,682,550	12.110106	7.427556		117,795	1,344	15,404	14,194
P-050	5,925,840	3,631,920	9.55776	5.92584		92,968	1,061	12,157	11,324
P-051	2,280,390	1,437,625	3.718015	2.28039		36,165	413	4,729	4,358

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	**Indoors (gal)**	**Outdoors (gal)**	**Water (M gal)**	**Wastewater (M gal)**	**Water Supply**	**Water Treatment**	**Water Distribution**	**Wastewater Treatment**
P-052	5,342,628	3,368,150	8.710778	5.342628	84,730	967	11,080	10,210
P-053	10,489,794	6,613,075	17.102869	10.489794	166,360	1,898	21,755	20,046
P-054	15,506,652	9,775,850	25.282502	15.506652	245,923	2,806	32,159	29,633
P-055	33,332,850	20,429,550	53.7624	33.33285	522,947	5,968	68,386	63,699
P-056	2,278,738	0	2.2787375	2.2787375	22,165	253	2,899	4,355
P-057	9,631,563	0	9.6315625	9.6315625	93,686	1,069	12,251	18,406
P-058	87,412,500	0	87.4125	87.4125	850,261	9,703	111,189	167,045
P-059	15,832,422	9,981,225	25.813647	15.832422	251,089	2,865	32,835	30,256
P-060	333,329	204,296	0.537624	0.3333285	5,229	60	684	637
P-061	80,937,500	0	80.9375	80.9375	787,279	8,984	102,953	154,672
R-001	244,414,287	149,806,785	394.2210724	244.414287	3,834,588	43,759	501,449	467,076
R-002	134,766,025	0	134.766025	134.766025	1,310,869	14,959	171,422	257,538
R-003	150,779,163	0	150.7791625	150.7791625	1,466,629	16,736	191,791	288,139
R-004	14,073,264	8,872,200	22.945464	14.073264	223,191	2,547	29,187	26,894
R-005	62,740,500	11,950,500	74.691	62.7405	726,519	8,291	95,007	119,897
R-006	5,016,858	3,162,775	8.179633	5.016858	79,563	908	10,404	9,587
R-007	4,155,569	2,546,929	6.702498672	4.155569373	65,195	744	8,526	7,941
R-008	2,410,698	1,519,775	3.930473	2.410698	38,232	436	5,000	4,607
R-009	650,184,556	398,495,115	1048.679671	650.1845562	10,200,507	116,403	1,333,921	1,242,503
R-010	1,745,530	1,069,827	2.81535768	1.745530245	27,385	313	3,581	3,336
R-011	60,546,264	37,110,111	97.65637506	60.54626441	949,904	10,840	124,219	115,704
R-012	4,546,436	2,786,490	7.332926419	4.546436476	71,327	814	9,327	8,688
R-013	195,462	123,225	0.318687	0.195462	3,100	35	405	374
R-014	285,774	175,149	0.460922976	0.285773634	4,483	51	586	546
R-015	11,186,681	7,052,413	18.23909438	11.18668118	177,412	2,025	23,200	21,378
R-016	99,405	62,668	0.162073585	0.099405458	1,576	18	206	190
R-017	17,917,350	11,295,625	29.212975	17.91735	284,155	3,243	37,159	34,240
R-018	2,089,997,910	0	2089.99791	2089.99791	20,329,410	231,990	2,658,477	3,993,986
R-019	3,583,470	2,259,125	5.842595	3.58347	56,831	649	7,432	6,848
R-020	337,960,081	0	337.9600813	337.9600813	3,287,338	37,514	429,885	645,842
R-021	977,310	616,125	1.593435	0.97731	15,499	177	2,027	1,868
R-022	586,386	369,675	0.956061	0.586386	9,300	106	1,216	1,121
R-023	595,473	364,963	0.960435408	0.595472847	9,342	107	1,222	1,138
R-024	325,770,000	205,375,000	531.145	325.77	5,166,447	58,957	675,616	622,546
R-025	13,552,032	8,543,600	22.095632	13.552032	214,924	2,453	28,106	25,898
R-026	22,070,080	13,526,650	35.59673019	22.07007998	346,249	3,951	45,279	42,176
R-026	218,186,595	0	218.186595	218.186595	2,122,301	24,219	277,533	416,955
R-026	61,781,902	37,867,460	99.6493623	61.78190246	969,289	11,061	126,754	118,065
R-027	267,996	164,254	0.432249696	0.267996114	4,204	48	550	512
R-028	8,730,636	5,504,050	14.234686	8.730636	138,461	1,580	18,107	16,684
R-029	281,107	172,289	0.45339624	0.281107035	4,410	50	577	537

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
R-030	15,449,056	9,468,655	24.91771113	15.44905599	242,375	2,766	31,695	29,523
R-031	2,345,544	1,478,700	3.824244	2.345544	37,198	424	4,864	4,482
R-032	1,649,754	1,011,127	2.660880384	1.649753856	25,882	295	3,385	3,153
R-033	1,954,620	1,232,250	3.18687	1.95462	30,999	354	4,054	3,735
R-034	2,162,312	1,325,291	3.487602888	2.162311844	33,924	387	4,436	4,132
R-035	6,645,708	4,189,650	10.835358	6.645708	105,396	1,203	13,783	12,700
R-036	4,039,548	2,546,650	6.586198	4.039548	64,064	731	8,378	7,720
R-037	444,438	272,394	0.716832	0.444438	6,973	80	912	849
R-038	259,256	158,897	0.418152	0.2592555	4,067	46	532	495
R-039	26,191,908	16,512,150	42.704058	26.191908	415,382	4,740	54,320	50,053
R-040	177,775	108,958	0.2867328	0.1777752	2,789	32	365	340
R-041	4,109,921	2,518,990	6.628910832	4.109921016	64,479	736	8,432	7,854
R-042	38,962,092	24,562,850	63.524942	38.962092	617,907	7,051	80,804	74,457
R-043	3,257,700	2,053,750	5.31145	3.2577	51,664	590	6,756	6,225
R-044	296,292	181,596	0.477888	0.296292	4,648	53	608	566
R-045	6,743,050	4,132,847	10.87589725	6.743050226	105,790	1,207	13,834	12,886
R-046	2,335,315	1,472,251	3.807566047	2.335314822	37,036	423	4,843	4,463
R-047	24,913,025	0	24.913025	24.913025	242,329	2,765	31,689	47,609
R-048	5,577,697	3,418,545	8.9962416	5.5776969	87,506	999	11,443	10,659
R-049	20,197,740	12,733,250	32.93099	20.19774	320,320	3,655	41,888	38,598
R-050	249,703	157,420	0.407122643	0.249702705	3,960	45	518	477
R-051	174,886	107,187	0.282073392	0.174886353	2,744	31	359	334
R-052	2,084,928	1,314,400	3.399328	2.084928	33,065	377	4,324	3,984
R-053	1,889,466	1,191,175	3.080641	1.889466	29,965	342	3,919	3,611
R-054	1,628,850	1,026,875	2.655725	1.62885	25,832	295	3,378	3,113
R-055	1,303,080	821,500	2.12458	1.30308	20,666	236	2,702	2,490
R-056	23,283,154	14,270,354	37.553508	23.283154	365,283	4,168	47,768	44,494
R-057	39,686,200	0	39.6862	39.6862	386,028	4,405	50,481	75,840
R-058	203,404	124,666	0.328070112	0.203404458	3,191	36	417	389
R-059	299,996	183,866	0.4838616	0.29999565	4,707	54	615	573
R-060	18,054,220	11,065,820	29.12004018	18.05421972	283,251	3,232	37,041	34,502
R-061	31,514,136	19,314,868	50.82900398	31.51413563	494,414	5,642	64,654	60,224
R-062	135,628	83,126	0.218753232	0.135627663	2,128	24	278	259
R-063	1,368,234	862,575	2.230809	1.368234	21,699	248	2,838	2,615
R-064	325,770	205,375	0.531145	0.32577	5,166	59	676	623
R-065	4,039,548	2,546,650	6.586198	4.039548	64,064	731	8,378	7,720
R-066	455,549	279,204	0.7347528	0.45554895	7,147	82	935	871
RC-001	81,507,654	51,384,825	132.892479	81.507654	1,292,645	14,751	169,039	155,761
RC-002	130,308,000	82,150,000	212.458	130.308	2,066,579	23,583	270,247	249,019
RC-003	222,305,448	140,147,900	362.453348	222.305448	3,525,584	40,232	461,041	424,826
RC-005	48,865,500	30,806,250	79.67175	48.8655	774,967	8,844	101,342	93,382

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy ConsEnergy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
RC-006	106,640,400	65,362,200	172.0026	106.6404	1,673,069	19,092	218,787	203,790
RC-007	366,911,656	0	366.9116563	366.9116563	3,568,950	40,727	466,712	701,168
RC-009	6,042,956	3,703,756	9.746712	6.042956	94,806	1,082	12,398	11,548
RC-009	271,189,188	0	271.1891875	271.1891875	2,637,857	30,102	344,953	518,243
RC-010	1,433,750,000	0	1433.75	1433.75	13,946,086	159,146	1,823,730	2,739,896
RC-011	188,237,500	0	188.2375	188.2375	1,830,986	20,894	239,438	359,722
RC-012	97,972,531	0	97.97253125	97.97253125	952,979	10,875	124,621	187,226
RC-013	32,381,538	20,414,275	52.795813	32.381538	513,545	5,860	67,156	61,881
RC-014	20,849,280	13,144,000	33.99328	20.84928	330,653	3,773	43,239	39,843
RC-015	9,251,868	5,832,650	15.084518	9.251868	146,727	1,674	19,188	17,680
RC-017	687,397	421,303	1.10870016	0.68739744	10,784	123	1,410	1,314
RC-018	977,310	616,125	1.593435	0.97731	15,499	177	2,027	1,868
RC-019	3,910,906	2,396,976	6.307882656	3.910906254	61,357	700	8,024	7,474
RC-020	207,404	127,117	0.3345216	0.2074044	3,254	37	426	396
RC-021	1,850,000	0	1.85	1.85	17,995	205	2,353	3,535
RC-022	8,535,174	5,380,825	13.915999	8.535174	135,361	1,545	17,701	16,311
RC-023	12,129,063	0	12.1290625	12.1290625	117,979	1,346	15,428	23,179
RC-024	44,122,963	0	44.1229625	44.1229625	429,184	4,898	56,124	84,319
RC-025	19,656,250	0	19.65625	19.65625	191,196	2,182	25,003	37,563
RC-026	130,308	82,150	0.212458	0.130308	2,067	24	270	249
RC-027	43,637,319	0	43.637319	43.637319	424,460	4,844	55,507	83,391
RC-028	414,809	254,234	0.6690432	0.4148088	6,508	74	851	793
RC-029	603,102	369,639	0.972741024	0.603102366	9,462	108	1,237	1,153
RC-030	291,155,313	0	291.1553125	291.1553125	2,832,068	32,318	370,350	556,398
RC-031	41,763,750	0	41.76375	41.76375	406,236	4,636	53,123	79,811
RC-032	47,301,804	29,820,450	77.122254	47.301804	750,168	8,561	98,100	90,394
RC-033	25,019,136	15,772,800	40.791936	25.019136	396,783	4,528	51,887	47,812
RC-034	28,146,528	17,744,400	45.890928	28.146528	446,381	5,094	58,373	53,788
RC-035	180,802,350	113,983,125	294.785475	180.80235	2,867,378	32,721	374,967	345,513
RC-035	14,218,720	8,714,720	22.93344	14.21872	223,074	2,546	29,171	27,172
RC-035	6,645,708	4,189,650	10.835358	6.645708	105,396	1,203	13,783	12,700
RC-036	30,492,072	19,223,100	49.715172	30.492072	483,579	5,518	63,238	58,270
RC-037	36,616,548	23,084,150	59.700698	36.616548	580,709	6,627	75,939	69,974
RC-038	421,744,500	0	421.7445	421.7445	4,102,309	46,814	536,459	805,954
RC-039	2,541,006	1,601,925	4.142931	2.541006	40,298	460	5,270	4,856
RD-001	5,342,628	3,368,150	8.710778	5.342628	84,730	967	11,080	10,210
RD-002	3,583,470	2,259,125	5.842595	3.58347	56,831	649	7,432	6,848
RD-003	6,710,862	4,230,725	10.941587	6.710862	106,429	1,215	13,918	12,824
RD-004	4,365,318	2,752,025	7.117343	4.365318	69,230	790	9,053	8,342
RD-005	115,764,213	0	115.7642125	115.7642125	1,126,038	12,850	147,252	221,225
RD-006	3,572,096	2,189,321	5.761417728	3.572096352	56,041	640	7,329	6,826

World Logistic Center

Cumulative Energy - Electricity Natural Gas

Energy Cons Energy Consumption - Electricity from Potable Water Use

	Water		Water		Electricity from Water (kWh)			
Project ID	Indoors (gal)	Outdoors (gal)	Water (M gal)	Wastewater (M gal)	Water Supply	Water Treatment	Water Distribution	Wastewater Treatment
RD-007	9,462,529	5,799,541	15.26207011	9.462529458	148,454	1,694	19,413	18,083
RD-008	5,212,320	3,286,000	8.49832	5.21232	82,663	943	10,810	9,961
RD-009	3,244,546	1,988,567	5.233112544	3.244545546	50,902	581	6,657	6,200
RD-010	33,590,219	0	33.59021875	33.59021875	326,732	3,729	42,727	64,191
RD-011	4,108,459	2,518,056	6.62651448	4.108458945	64,456	736	8,429	7,851
RD-012	139,047,619	0	139.0476188	139.0476188	1,352,516	15,434	176,869	265,720
RD-013	234,256,250	0	234.25625	234.25625	2,278,611	26,002	297,974	447,664
RD-014	178,525,000	0	178.525	178.525	1,736,513	19,816	227,084	341,161
RD-015	97,818,750	0	97.81875	97.81875	951,483	10,858	124,425	186,932
RD-016	165,282,006	0	165.2820063	165.2820063	1,607,698	18,346	210,239	315,854
SB-001	142,063,350	0	142.06335	142.06335	1,381,850	15,769	180,705	271,483
SB-002	72,489,938	0	72.4899375	72.4899375	705,110	8,046	92,207	138,528
SB-003	137,261,444	0	137.2614438	137.2614438	1,335,142	15,236	174,597	262,307
SB-004	179,824,625	0	179.824625	179.824625	1,749,154	19,961	228,737	343,645
SB-005	65,212,500	0	65.2125	65.2125	634,322	7,239	82,950	124,621
SB-006	125,563,431	0	125.5634313	125.5634313	1,221,355	13,938	159,717	239,952
SB-007	2,215,236	1,396,550	3.611786	2.215236	35,132	401	4,594	4,233
SB-008	2,606,160	1,643,000	4.24916	2.60616	41,332	472	5,405	4,980
SJ-001	124,312,630	76,190,637	200.5032673	124.3126299	1,950,295	22,256	255,040	237,561
SJ-002	20,914,434	13,185,075	34.099509	20.914434	331,686	3,785	43,375	39,967
SJ-003	37,789,320	23,823,500	61.61282	37.78932	599,308	6,839	78,372	72,215
SJ-004	39,939,402	25,178,975	65.118377	39.939402	633,406	7,228	82,831	76,324
WLC-001	3,909,240	2,464,500	6.37374	3.90924	61,997	707	8,107	7,471

3 Transportation Fuels

World Logistic Center

Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
B-001	811,945	886,209	1,993,672	17,519,159	1,625
B-002			267,495	2,350,577	218
B-003	136,884	83,203	557,020	4,894,747	454
B-004	120,158	90,274	711,650	6,253,541	580
B-005			834,317	7,331,468	680
B-006	134,044	96,431	1,458,987	12,820,679	1,189
B-007	54,788	18,615	243,470	2,139,461	198
B-008	121,463	58,888	391,485	3,440,126	319
B-009	1,343,552	1,592,304	2,688,436	23,624,320	2,192
B-010	50,691	4,861	57,394	504,339	47
B-011	45,372	9,446	305,089	2,680,936	249
B-012			130,702	1,148,531	107
B-013	382,424	339,379	1,141,830	10,033,700	931
B-014	124,123	63,361	422,900	3,716,185	345
C-001	43,602	8,938	271,190	2,383,054	221
C-002	163,552	123,557	2,599,032	22,838,694	2,119
C-003	33,981	3,590	98,578	866,240	80
H-001	59,841	26,798	355,236	3,121,596	290
H-002	55,851	20,221	265,823	2,335,888	217
H-003	137,416	84,199	562,457	4,942,526	459
H-004	129,039	90,032	1,085,086	9,535,072	885
H-005	15,668	1,173	28,351	249,134	23
H-006	83,134	27,853	923,116	8,111,773	753
H-007	55,570	32,744	84,772	744,924	69
H-008	60,183	46,385	191,790	1,685,330	156
H-009			141,839	1,246,395	116
M-001	101,761	38,543	315,755	2,774,658	257
M-002			2,647,578	23,265,282	2,158
M-003	172,547	152,814	1,391,747	12,229,816	1,135
M-004	35,832	5,164	147,663	1,297,573	120
M-005	232,896	227,504	2,041,886	17,942,835	1,665
M-006	45,116	12,072	172,683	1,517,435	141
M-007	78,878	36,132	324,181	2,848,704	264
M-008	205,511	178,369	5,816,670	51,113,311	4,742
M-009	46,928	6,545	81,559	716,693	66
M-010	70,532	29,978	268,271	2,357,402	219
M-011	32,882	3,305	90,849	798,323	74
MV-001	51,273	12,703	412,887	3,628,200	337
MV-002	61,451	31,634	259,474	2,280,100	212
MV-003	143,133	119,796	1,062,934	9,340,413	867
MV-004			384,660	3,380,158	314
MV-005	36,448	5,596	157,779	1,386,461	129

World Logistic Center
Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
MV-006	82,104	40,030	359,935	3,162,883	293
MV-007	36,444	1,929	18,728	164,574	15
MV-008	47,680	3,129	35,040	307,912	29
MV-009	32,920	868	6,646	58,397	5
MV-010	47,410	2,625	28,395	249,515	23
MV-011	36,176	1,549	14,499	127,412	12
MV-012			135,678	1,192,253	111
MV-013	15,979	2,032	17,640	155,011	14
MV-014	51,404	5,319	64,643	568,045	53
MV-015	50,266	3,424	38,061	334,457	31
MV-016	46,873	1,998	19,333	169,883	16
MV-017	50,691	4,861	57,998	509,648	47
MV-018			7,458	65,534	6
MV-019			32,914	289,230	27
MV-020			127,172	1,117,509	104
MV-021	34,602	5,021	135,678	1,192,253	111
MV-022			24,166	212,353	20
MV-023	60,143	37,050	195,351	1,716,621	159
MV-024	47,781	7,746	96,059	844,105	78
MV-025	50,727	4,177	48,936	430,016	40
MV-026	50,691	4,994	60,414	530,884	49
MV-027	34,085	5,571	25,297	222,296	21
MV-028	38,070	8,557	42,162	370,494	34
MV-029	51,067	12,781	166,139	1,459,930	135
MV-030	50,727	4,177	50,144	440,633	41
MV-031	47,412	2,996	32,020	281,368	26
MV-032	51,667	5,692	69,476	610,516	57
MV-033	47,412	2,996	32,624	286,677	27
MV-034	47,411	2,872	31,415	276,059	26
MV-035	36,176	1,549	15,104	132,721	12
MV-036			26,234	230,529	21
MV-037			525,539	4,618,116	428
MV-038			178,118	1,565,188	145
MV-039			656,655	5,770,280	535
MV-040	34,737	6,168	47,221	414,949	38
MV-041	108,981	76,567	695,873	6,114,908	567
MV-042	65,692	24,084	214,209	1,882,337	175
MV-043			180,695	1,587,833	147
MV-044	98,367	57,085	532,405	4,678,444	434
MV-045	34,906	4,164	118,131	1,038,058	96
MV-046			183,461	1,612,143	150
MV-047	35,907	1,179	9,666	84,941	8

World Logistic Center
Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
MV-048			1,168,682	10,269,659	953
MV-049			1,228,159	10,792,302	1,001
MV-050			145,617	1,279,596	119
MV-051			315,736	2,774,495	257
MV-052			360,733	3,169,903	294
MV-053			599,891	5,271,472	489
MV-054	120,158	90,395	834,088	7,329,455	680
MV-056	35,907	1,179	9,666	84,941	8
MV-057	46,874	2,245	22,353	196,427	18
MV-058			4,833	42,471	4
MV-059	50,266	3,424	38,061	334,457	31
MV-060	50,987	4,665	55,581	488,413	45
MV-061	42,739	8,133	244,071	2,144,749	199
MV-062	58,776	24,816	328,050	2,882,698	267
MV-063	49,658	10,493	133,516	1,173,253	109
MV-064	50,986	4,427	52,560	461,869	43
MV-065	34,085	5,439	24,360	214,063	20
MV-066	53,112	23,199	117,585	1,033,266	96
MV-067	48,047	7,746	97,267	854,723	79
MV-068	43,801	12,032	67,341	591,750	55
MV-069			133,194	1,170,430	109
MV-070	52,840	22,315	112,900	992,100	92
MV-071	34,084	5,174	22,955	201,713	19
MV-072	30,418	2,729	11,243	98,798	9
MV-073	38,339	9,183	44,973	395,193	37
MV-074	48,543	17,378	44,754	393,270	36
MV-075	168,241	261,706	345,955	3,040,040	282
MV-076	51,807	12,950	422,559	3,713,191	345
MV-077	72,693	28,602	218,748	1,922,224	178
MV-078			213,413	1,875,341	174
MV-079	51,814	19,833	176,128	1,547,704	144
MV-080	31,956	2,299	60,069	527,846	49
MV-081			335,939	2,952,024	274
MV-082			239,956	2,108,589	196
MV-083			146,106	1,283,887	119
MV-084			41,032	360,563	33
MV-085	40,724	6,380	189,833	1,668,138	155
MV-086			42,894	376,927	35
MV-087	34,375	6,243	28,108	246,996	23
MV-088	15,044	1,456	5,622	49,399	5
MV-089	15,044	1,456	5,622	49,399	5
MV-090	15,041	597	9,912	87,101	8

World Logistic Center

Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
MV-091	50,986	4,427	52,560	461,869	43
MV-093			52,468	461,059	43
MV-094	56,890	24,579	124,612	1,095,015	102
MV-095	42,451	7,868	237,292	2,085,172	193
MV-096	50,823	4,199	47,123	414,089	38
MV-097	49,390	10,247	129,287	1,136,091	105
MV-098	35,907	1,179	9,666	84,941	8
MV-099	38,339	9,183	44,973	395,193	37
MV-100	51,486	18,048	90,883	798,620	74
MV-101	15,041	597	12,204	107,237	10
MV-102	34,603	5,311	49,392	434,031	40
MV-103	42,935	10,820	75,515	663,582	62
MV-104	52,082	20,090	179,022	1,573,134	146
MV-105	15,044	1,456	5,622	49,399	5
MV-106	15,044	1,456	5,622	49,399	5
MV-107	29,796	725	5,437	47,780	4
MV-108	14,732	313	4,031	35,424	3
MV-109	147,517	99,569	667,578	5,866,264	544
MV-110	34,375	6,243	28,108	246,996	23
MV-111	30,107	1,872	7,495	65,866	6
MV-112	15,055	1,747	7,027	61,749	6
MV-113	47,191	6,919	86,997	764,472	71
MV-114	14,732	455	7,729	67,917	6
MV-115	14,732	313	14	119	0
MV-116	36,176	1,549	15,104	132,721	12
MV-117	32,267	3,304	30,576	268,686	25
MV-118	29,796	725	5,437	47,780	4
MV-119	46,873	2,121	21,145	185,809	17
MV-120	43,314	8,541	256,980	2,258,182	210
MV-121	14,732	455	5,900	51,843	5
MV-123	15,359	881	18,983	166,814	15
MV-124	40,724	6,380	189,833	1,668,138	155
MV-125	30,418	2,729	11,243	98,798	9
MV-126	50,003	11,043	141,974	1,247,576	116
MV-127	50,475	18,335	163,175	1,433,883	133
MV-129	113,312	82,271	648,447	5,698,151	529
MV-130	45,286	12,195	106,473	935,619	87
MV-131	107,750	78,093	719,869	6,325,767	587
MV-132	95,297	56,598	527,904	4,638,896	430
P-001			82,768	727,311	67
P-002			287,948	2,530,307	235
P-003			221,864	1,949,601	181

World Logistic Center

Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
P-004	42,359	10,148	70,590	620,305	58
P-005	66,230	24,835	220,760	1,939,902	180
P-006	77,321	32,120	246,246	2,163,855	201
P-007	99,537	61,196	488,330	4,291,141	398
P-008	46,187	13,201	98,909	869,148	81
P-009	79,203	34,373	208,768	1,834,521	170
P-010			815,852	7,169,202	665
P-011			398,347	3,500,430	325
P-012	65,961	24,464	186,362	1,637,634	152
P-014	102,254	61,689	575,895	5,060,613	470
P-015			374,723	3,292,836	306
P-016			628,686	5,524,503	513
P-017			278,349	2,445,963	227
P-018			742,425	6,523,974	605
P-019			334,787	2,941,903	273
P-020			418,244	3,675,270	341
P-021			81,585	716,920	67
P-022	52,350	20,460	182,367	1,602,528	149
P-023	42,648	10,555	86,384	759,092	70
P-024	109,516	77,315	702,592	6,173,948	573
P-025	97,333	56,895	498,149	4,377,431	406
P-026	90,377	43,292	333,096	2,927,047	272
P-027			414,645	3,643,642	338
P-028	80,280	35,885	274,974	2,416,305	224
P-030	57,182	22,579	297,238	2,611,947	242
P-031	36,614	7,588	35,135	308,745	29
P-032	77,768	26,351	871,877	7,661,519	711
P-033	284,116	250,456	1,123,706	9,874,435	916
P-034	184,333	166,949	1,519,815	13,355,199	1,239
P-035	31,042	4,302	18,739	164,664	15
P-036	199,973	182,238	1,722,889	15,139,688	1,405
P-037			110,558	971,517	90
P-038			134,724	1,183,870	110
P-039	83,717	41,903	376,108	3,305,002	307
P-040	51,931	5,934	73,705	647,678	60
P-041	41,207	8,803	61,454	540,019	50
P-042	47,680	3,253	36,853	323,839	30
P-043	47,680	3,129	34,436	302,604	28
P-044	38,338	8,937	44,036	386,960	36
P-045	36,614	7,588	35,135	308,745	29
P-046	55,398	38,815	101,584	892,661	83
P-047	57,979	23,819	314,758	2,765,904	257

World Logistic Center

Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
P-048	50,822	3,944	45,311	398,163	37
P-049	51,667	5,692	68,872	605,207	56
P-050	34,597	3,880	108,476	953,222	88
P-051	46,873	2,121	21,145	185,809	17
P-052	50,727	4,177	49,540	435,325	40
P-053	48,047	7,746	97,267	854,723	79
P-054	50,003	11,175	143,786	1,263,503	117
P-055	70,577	18,567	610,178	5,361,871	497
P-056	15,042	881	4,044	35,538	3
P-057	16,598	2,750	19,988	175,645	16
P-058	52,083	20,336	122,919	1,080,139	100
P-059	50,004	11,419	146,807	1,290,047	120
P-060	14,732	455	6,102	53,619	5
P-061			167,969	1,476,012	137
R-001			1,082,613	9,513,334	883
R-002			279,680	2,457,653	228
R-003			267,594	2,351,454	218
R-004	52,296	20,063	101,189	889,185	82
R-005	76,397	26,843	847,986	7,451,581	691
R-006	36,615	7,863	36,072	316,978	29
R-007	32,572	2,731	76,070	668,459	62
R-008	36,451	3,806	8,761	76,989	7
R-009	854,784	698,839	11,902,028	104,587,698	9,703
R-010	15,669	1,315	31,953	280,783	26
R-011	52,896	18,460	268,185	2,356,641	219
R-012	32,881	3,015	83,225	731,333	68
R-013	14,732	455	1,812	15,927	1
R-014	14,732	455	5,231	45,969	4
R-015	48,316	8,248	103,729	911,506	85
R-016	14,732	313	922	8,100	1
R-017	57,160	25,330	128,828	1,132,064	105
R-018	871,072	942,530	3,709,210	32,594,251	3,024
R-019	34,086	5,703	25,766	226,413	21
R-020	109,516	77,192	701,368	6,163,190	572
R-021	32,921	1,143	9,062	79,633	7
R-022	29,796	725	5,437	47,780	4
R-023	15,041	597	10,900	95,787	9
R-024	1,469,035	1,788,690	3,020,715	26,544,180	2,463
R-025	52,026	19,302	97,441	856,252	79
R-026	116,224	79,217	1,064,889	9,357,592	868
R-027	14,732	455	4,906	43,109	4
R-028	52,307	12,308	31,730	278,826	26

World Logistic Center
Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
R-029	14,732	455	5,146	45,218	4
R-030	44,177	9,345	282,804	2,485,112	231
R-031	30,730	3,877	16,865	148,198	14
R-032	15,669	1,315	30,200	265,377	25
R-033	30,728	3,303	14,054	123,498	11
R-034	15,042	1,030	7,154	62,862	6
R-035	38,341	9,686	47,784	419,893	39
R-036	34,375	6,375	29,045	255,229	24
R-037	14,732	455	8,136	71,492	7
R-038	14,732	455	4,746	41,703	4
R-039	54,524	18,483	242,865	2,134,152	198
R-040	14,732	313	3,254	28,597	3
R-041	15,670	1,599	13,597	119,482	11
R-042	60,107	27,296	361,277	3,174,684	295
R-043	47,411	2,749	30,207	265,442	25
R-044	14,732	455	5,424	47,661	4
R-045	16,597	2,466	22,308	196,032	18
R-046	46,873	2,121	21,654	190,285	18
R-047	35,047	6,742	51,702	454,325	42
R-048	34,289	3,732	102,103	897,220	83
R-049	52,395	28,492	73,406	645,046	60
R-050	29,794	441	2,315	20,346	2
R-051	14,732	313	3,201	28,132	3
R-052	46,873	1,998	19,333	169,883	16
R-053	36,443	1,806	17,520	153,956	14
R-054	36,176	1,549	15,104	132,721	12
R-055	36,175	1,426	12,083	106,177	10
R-056	40,343	7,866	77,029	676,881	63
R-057	42,359	10,148	70,433	618,920	57
R-058	14,732	313	3,723	32,719	3
R-059	14,732	455	5,492	48,257	4
R-060	35,529	6,310	79,970	702,724	65
R-061	57,297	17,591	576,886	5,069,316	470
R-062	14,732	313	2,483	21,817	2
R-063	30,417	2,446	9,838	86,449	8
R-064	29,794	441	3,021	26,544	2
R-065	47,681	3,376	37,457	329,148	31
R-066	15,040	455	8,339	73,279	7
RC-001	232,273	169,005	755,783	6,641,354	616
RC-002	394,126	358,691	1,208,286	10,617,672	985
RC-003	831,089	916,704	2,061,336	18,113,748	1,681
RC-005	127,311	67,813	453,107	3,981,627	369

World Logistic Center

Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
RC-006	75,918	32,116	472,355	4,150,763	385
RC-007	111,699	82,645	761,451	6,691,164	621
RC-009	100,314	62,171	401,338	3,526,710	327
RC-010	314,831	323,833	2,544,538	22,359,835	2,074
RC-011	85,061	43,415	390,649	3,432,783	318
RC-012	54,226	22,718	173,876	1,527,916	142
RC-013	57,446	22,701	300,259	2,638,491	245
RC-014	58,125	30,342	149,909	1,317,311	122
RC-015	47,191	6,919	85,788	753,855	70
RC-017	15,041	597	12,583	110,574	10
RC-018	32,921	1,143	9,062	79,633	7
RC-019	32,264	2,589	71,592	629,102	58
RC-020	14,732	313	3,797	33,363	3
RC-021	15,041	739	3,839	33,737	3
RC-022	46,927	6,424	79,143	695,458	65
RC-023	32,265	3,446	21,526	189,157	18
RC-024	43,224	11,228	78,307	688,113	64
RC-025	33,812	5,310	34,885	306,546	28
RC-026	14,732	313	1,208	10,618	1
RC-027	42,936	11,085	77,445	680,539	63
RC-028	14,732	455	7,593	66,726	6
RC-029	15,041	597	11,040	97,014	9
RC-030	104,845	64,722	604,234	5,309,638	493
RC-031	42,648	10,555	74,120	651,320	60
RC-032	125,718	65,841	438,608	3,854,215	358
RC-033	54,256	17,741	231,991	2,038,593	189
RC-034	55,586	19,855	260,990	2,293,417	213
RC-035	635,794	688,311	1,771,321	15,565,275	1,444
RC-036	56,649	21,461	282,739	2,484,535	231
RC-037	59,308	25,680	339,528	2,983,566	277
RC-038	123,845	94,836	875,246	7,691,120	714
RC-039	47,142	2,368	23,562	207,045	19
RD-001			49,540	435,325	40
RD-002			33,228	291,986	27
RD-003	50,958	5,240	62,227	546,810	51
RD-004	50,544	3,680	40,478	355,692	33
RD-005			240,245	2,111,128	196
RD-006	31,956	2,447	65,389	574,602	53
RD-007	36,757	6,028	173,217	1,522,128	141
RD-008	37,800	7,685	37,477	329,328	31
RD-009	31,956	2,299	59,393	521,913	48
RD-010	40,919	8,671	59,614	523,851	49

World Logistic Center

Cumulative Energy - Transportation Fuel

Cumulative Transportation Fuel Consumption (Annual Average) - Summary

Project ID	Construction		Operational		
	Diesel Gallons	Gasoline Gallons	Diesel Gallons	Gasoline Gallons	Natural Gas (MMBTU)
RD-011	32,572	2,731	75,208	660,880	61
RD-012			288,565	2,535,734	235
RD-013			486,152	4,272,001	396
RD-014			370,493	3,255,661	302
RD-015			203,003	1,783,866	166
RD-016			343,009	3,014,156	280
SB-001			294,824	2,590,730	240
SB-002			150,438	1,321,959	123
SB-003			284,858	2,503,161	232
SB-004			373,190	3,279,362	304
SB-005			135,335	1,189,244	110
SB-006			260,582	2,289,831	212
SB-007	46,873	2,121	20,541	180,500	17
SB-008	47,142	2,368	24,166	212,353	20
SJ-001	126,588	66,774	2,275,619	19,996,740	1,855
SJ-002	52,396	14,895	193,930	1,704,136	158
SJ-003	59,839	26,422	350,403	3,079,125	286
SJ-004	60,638	27,916	370,340	3,254,316	302
WLC-001	47,680	3,253	36,249	318,530	30
Total Cum.	23,204,429	14,744,142	118,674,194	1,042,835,763	96,752
Net Project	1,553,812	54,103	45,345	30,327	1,094
Total	24,758,241	14,798,245	118,719,539	1,042,866,090	97,846
County/ SoCalGas	275,000,000	1,052,000,000	275,000,000	1,052,000,000	873,793,575
%County/ SoCalGas	9%	1%	43.17%	99%	0.01%

Source: ESA, 2019

World Logistic Center
Cumulative Energy - Transportation Fuel

10.21 $kGCO_2$/gal https://www.eia.gov/environment/emissions/co2_vol_mass.php
2204.623 lbs/Metric Ton

Total Diesel Consumption:	54,828,262	gallons
Max Annual Consumption:	331,154	gallons
Min Annual Consumption:	14,423	gallons
Average Annual Consumption:	42,431	gallons
Straigth Average Annual Consumption:	70,313	gallons

Off-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E_TOT (lbs)	MT CO2e	Gallons	Gallons/year
B-001	3401	11.22	62,872,528.69	28,518.49	2,793,192	248,850
B-003	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
B-004	859	2.83	2,878,599.99	1,305.71	127,885	45,110
B-006	1105	3.65	4,432,085.14	2,010.36	196,901	53,992
B-007	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
B-008	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
B-009	3401	11.22	83,666,867.38	37,950.65	3,717,007	331,154
B-010	545	1.80	1,730,946.09	785.14	76,899	42,753
B-011	305	1.01	750,479.21	340.41	33,341	33,122
B-013	3401	11.22	42,078,190.00	19,086.34	1,869,377	166,546
B-014	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
C-001	301	0.99	738,143.44	334.82	32,793	33,011
C-002	1453	4.80	5,428,618.95	2,462.38	241,173	50,293
C-003	270	0.89	590,329.73	267.77	26,226	29,432
H-001	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
H-002	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
H-003	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
H-004	1105	3.65	4,432,085.14	2,010.36	196,901	53,992
H-005	119	0.39	127,583.54	57.87	5,668	14,432
H-006	422	1.39	1,663,183.38	754.41	73,889	53,053
H-007	1264	4.17	4,229,448.94	1,918.45	187,899	45,042
H-008	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
M-001	382	1.26	1,398,993.43	634.57	62,152	49,299
M-003	1264	4.17	4,229,448.94	1,918.45	187,899	45,042
M-004	270	0.89	590,329.73	267.77	26,226	29,432
M-005	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
M-006	305	1.01	750,479.21	340.41	33,341	33,122
M-007	329	1.09	1,074,950.42	487.59	47,756	43,982
M-008	1890	6.24	7,089,835.09	3,215.89	314,975	50,496
M-009	819	2.70	2,614,410.05	1,185.88	116,149	42,971
M-010	325	1.07	1,044,678.29	473.86	46,411	43,269
M-011	253	0.83	554,218.69	251.39	24,622	29,488
MV-001	309	1.02	762,062.06	345.67	33,856	33,198
MV-002	1890	6.24	6,644,047.35	3,013.69	295,170	47,321
MV-003	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
MV-005	270	0.89	590,329.73	267.77	26,226	29,432
MV-006	329	1.09	1,074,950.42	487.59	47,756	43,982
MV-007	300	0.99	736,000.66	333.84	32,698	33,025
MV-008	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-009	279	0.92	670,341.87	304.06	29,781	32,343
MV-010	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-011	300	0.99	736,000.66	333.84	32,698	33,025
MV-013	119	0.39	127,583.54	57.87	5,668	14,432
MV-014	819	2.70	2,614,410.05	1,185.88	116,149	42,971
MV-015	387	1.28	1,253,155.71	568.42	55,673	43,589
MV-016	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-017	545	1.80	1,730,946.09	785.14	76,899	42,753
MV-021	270	0.89	590,329.73	267.77	26,226	29,432

World Logistic Center
Cumulative Energy - Transportation Fuel

Off-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E_TOT (lbs)	MT CO2e	Gallons	Gallons/year
MV-023	495	1.63	1,577,358.30	715.48	70,076	42,895
MV-024	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
MV-025	495	1.63	1,577,358.30	715.48	70,076	42,895
MV-026	545	1.80	1,730,946.09	785.14	76,899	42,753
MV-027	279	0.92	670,341.87	304.06	29,781	32,343
MV-028	300	0.99	736,000.66	333.84	32,698	33,025
MV-029	1701	5.61	5,444,877.33	2,469.75	241,896	43,089
MV-030	495	1.63	1,577,358.30	715.48	70,076	42,895
MV-031	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-032	819	2.70	2,614,410.05	1,185.88	116,149	42,971
MV-033	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-034	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-035	300	0.99	736,000.66	333.84	32,698	33,025
MV-040	253	0.83	554,218.69	251.39	24,622	29,488
MV-041	579	1.91	1,949,727.84	884.38	86,619	45,329
MV-042	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-044	529	1.75	1,796,140.04	814.72	79,796	45,705
MV-045	270	0.89	590,329.73	267.77	26,226	29,432
MV-047	300	0.99	736,000.66	333.84	32,698	33,025
MV-054	859	2.83	2,878,599.99	1,305.71	127,885	45,110
MV-056	300	0.99	736,000.66	333.84	32,698	33,025
MV-057	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-059	387	1.28	1,253,155.71	568.42	55,673	43,589
MV-060	495	1.63	1,577,358.30	715.48	70,076	42,895
MV-061	301	0.99	738,143.44	334.82	32,793	33,011
MV-062	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
MV-063	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
MV-064	495	1.63	1,577,358.30	715.48	70,076	42,895
MV-065	279	0.92	670,341.87	304.06	29,781	32,343
MV-066	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-067	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
MV-068	296	0.98	723,664.89	328.25	32,150	32,910
MV-070	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-071	279	0.92	670,341.87	304.06	29,781	32,343
MV-072	249	0.82	545,409.41	247.39	24,231	29,485
MV-073	300	0.99	736,000.66	333.84	32,698	33,025
MV-074	819	2.70	2,614,410.05	1,185.88	116,149	42,971
MV-075	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
MV-076	309	1.02	762,062.06	345.67	33,856	33,198
MV-077	329	1.09	1,074,950.42	487.59	47,756	43,982
MV-079	305	1.01	750,479.21	340.41	33,341	33,122
MV-080	253	0.83	554,218.69	251.39	24,622	29,488
MV-085	301	0.99	738,143.44	334.82	32,793	33,011
MV-087	279	0.92	670,341.87	304.06	29,781	32,343
MV-088	113	0.37	121,070.68	54.92	5,379	14,423
MV-089	113	0.37	121,070.68	54.92	5,379	14,423
MV-090	113	0.37	121,070.68	54.92	5,379	14,423
MV-091	495	1.63	1,577,358.30	715.48	70,076	42,895
MV-094	329	1.09	1,074,950.42	487.59	47,756	43,982
MV-095	301	0.99	738,143.44	334.82	32,793	33,011
MV-096	387	1.28	1,253,155.71	568.42	55,673	43,589
MV-097	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
MV-098	300	0.99	736,000.66	333.84	32,698	33,025
MV-099	300	0.99	736,000.66	333.84	32,698	33,025
MV-100	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-101	113	0.37	121,070.68	54.92	5,379	14,423
MV-102	270	0.89	590,329.73	267.77	26,226	29,432
MV-103	296	0.98	723,664.89	328.25	32,150	32,910

World Logistic Center
Cumulative Energy - Transportation Fuel

Off-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E_TOT (lbs)	MT CO2e	Gallons	Gallons/year
MV-104	305	1.01	750,479.21	340.41	33,341	33,122
MV-105	113	0.37	121,070.68	54.92	5,379	14,423
MV-106	113	0.37	121,070.68	54.92	5,379	14,423
MV-107	249	0.82	545,409.41	247.39	24,231	29,485
MV-108	113	0.37	121,070.68	54.92	5,379	14,423
MV-109	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
MV-110	279	0.92	670,341.87	304.06	29,781	32,343
MV-111	249	0.82	545,409.41	247.39	24,231	29,485
MV-112	119	0.39	127,583.54	57.87	5,668	14,432
MV-113	819	2.70	2,614,410.05	1,185.88	116,149	42,971
MV-114	113	0.37	121,070.68	54.92	5,379	14,423
MV-115	113	0.37	121,070.68	54.92	5,379	14,423
MV-116	300	0.99	736,000.66	333.84	32,698	33,025
MV-117	253	0.83	554,218.69	251.39	24,622	29,488
MV-118	249	0.82	545,409.41	247.39	24,231	29,485
MV-119	325	1.07	1,044,678.29	473.86	46,411	43,269
MV-120	301	0.99	738,143.44	334.82	32,793	33,011
MV-121	113	0.37	121,070.68	54.92	5,379	14,423
MV-123	119	0.39	127,583.54	57.87	5,668	14,432
MV-124	301	0.99	738,143.44	334.82	32,793	33,011
MV-125	249	0.82	545,409.41	247.39	24,231	29,485
MV-126	1701	5.61	5,444,877.33	2,469.75	241,896	43,089
MV-127	305	1.01	750,479.21	340.41	33,341	33,122
MV-129	859	2.83	2,878,599.99	1,305.71	127,885	45,110
MV-130	300	0.99	736,000.66	333.84	32,698	33,025
MV-131	819	2.70	2,614,410.05	1,185.88	116,149	42,971
MV-132	495	1.63	1,577,358.30	715.48	70,076	42,895
P-004	296	0.98	723,664.89	328.25	32,150	32,910
P-005	325	1.07	1,044,678.29	473.86	46,411	43,269
P-006	348	1.15	1,180,211.69	535.33	52,432	45,652
P-007	569	1.88	2,060,329.98	934.55	91,533	48,742
P-008	305	1.01	750,479.21	340.41	33,341	33,122
P-009	348	1.15	1,180,211.69	535.33	52,432	45,652
P-012	325	1.07	1,044,678.29	473.86	46,411	43,269
P-014	529	1.75	1,796,140.04	814.72	79,796	45,705
P-022	305	1.01	750,479.21	340.41	33,341	33,122
P-023	296	0.98	723,664.89	328.25	32,150	32,910
P-024	579	1.91	1,949,727.84	884.38	86,619	45,329
P-025	406	1.34	1,358,416.97	616.17	60,349	45,039
P-026	382	1.26	1,398,993.43	634.57	62,152	49,299
P-028	348	1.15	1,180,211.69	535.33	52,432	45,652
P-030	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
P-031	296	0.98	723,664.89	328.25	32,150	32,910
P-032	382	1.26	1,398,993.43	634.57	62,152	49,299
P-033	3401	11.22	31,681,020.65	14,370.27	1,407,470	125,394
P-034	1264	4.17	4,229,448.94	1,918.45	187,899	45,042
P-035	253	0.83	554,218.69	251.39	24,622	29,488
P-036	1890	6.24	6,644,047.35	3,013.69	295,170	47,321
P-039	329	1.09	1,074,950.42	487.59	47,756	43,982
P-040	819	2.70	2,614,410.05	1,185.88	116,149	42,971
P-041	296	0.98	723,664.89	328.25	32,150	32,910
P-042	325	1.07	1,044,678.29	473.86	46,411	43,269
P-043	325	1.07	1,044,678.29	473.86	46,411	43,269
P-044	300	0.99	736,000.66	333.84	32,698	33,025
P-045	296	0.98	723,664.89	328.25	32,150	32,910
P-046	1701	5.61	5,444,877.33	2,469.75	241,896	43,089
P-047	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
P-048	387	1.28	1,253,155.71	568.42	55,673	43,589

World Logistic Center
Cumulative Energy - Transportation Fuel

Off-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E_TOT (lbs)	MT CO2e	Gallons	Gallons/year
P-049	819	2.70	2,614,410.05	1,185.88	116,149	42,971
P-050	270	0.89	590,329.73	267.77	26,226	29,432
P-051	325	1.07	1,044,678.29	473.86	46,411	43,269
P-052	495	1.63	1,577,358.30	715.48	70,076	42,895
P-053	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
P-054	1701	5.61	5,444,877.33	2,469.75	241,896	43,089
P-055	348	1.15	1,180,211.69	535.33	52,432	45,652
P-056	113	0.37	121,070.68	54.92	5,379	14,423
P-057	119	0.39	127,583.54	57.87	5,668	14,432
P-058	305	1.01	750,479.21	340.41	33,341	33,122
P-059	1701	5.61	5,444,877.33	2,469.75	241,896	43,089
P-060	113	0.37	121,070.68	54.92	5,379	14,423
R-004	325	1.07	1,044,678.29	473.86	46,411	43,269
R-005	382	1.26	1,398,993.43	634.57	62,152	49,299
R-006	296	0.98	723,664.89	328.25	32,150	32,910
R-007	253	0.83	554,218.69	251.39	24,622	29,488
R-008	300	0.99	736,000.66	333.84	32,698	33,025
R-009	3401	11.22	23,154,451.98	10,502.68	1,028,666	91,645
R-010	119	0.39	127,583.54	57.87	5,668	14,432
R-011	309	1.02	762,062.06	345.67	33,856	33,198
R-012	253	0.83	554,218.69	251.39	24,622	29,488
R-013	113	0.37	121,070.68	54.92	5,379	14,423
R-014	113	0.37	121,070.68	54.92	5,379	14,423
R-015	1207	3.98	3,875,133.79	1,757.73	172,158	43,218
R-016	113	0.37	121,070.68	54.92	5,379	14,423
R-017	329	1.09	1,074,950.42	487.59	47,756	43,982
R-018	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
R-019	279	0.92	670,341.87	304.06	29,781	32,343
R-020	579	1.91	1,949,727.84	884.38	86,619	45,329
R-021	279	0.92	670,341.87	304.06	29,781	32,343
R-022	249	0.82	545,409.41	247.39	24,231	29,485
R-023	113	0.37	121,070.68	54.92	5,379	14,423
R-024	3401	11.22	83,666,867.38	37,950.65	3,717,007	331,154
R-025	325	1.07	1,044,678.29	473.86	46,411	43,269
R-026	916	3.02	3,232,915.14	1,466.43	143,626	47,510
R-027	113	0.37	121,070.68	54.92	5,379	14,423
R-028	495	1.63	1,577,358.30	715.48	70,076	42,895
R-029	113	0.37	121,070.68	54.92	5,379	14,423
R-030	301	0.99	738,143.44	334.82	32,793	33,011
R-031	249	0.82	545,409.41	247.39	24,231	29,485
R-032	119	0.39	127,583.54	57.87	5,668	14,432
R-033	249	0.82	545,409.41	247.39	24,231	29,485
R-034	113	0.37	121,070.68	54.92	5,379	14,423
R-035	300	0.99	736,000.66	333.84	32,698	33,025
R-036	279	0.92	670,341.87	304.06	29,781	32,343
R-037	113	0.37	121,070.68	54.92	5,379	14,423
R-038	113	0.37	121,070.68	54.92	5,379	14,423
R-039	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
R-040	113	0.37	121,070.68	54.92	5,379	14,423
R-041	119	0.39	127,583.54	57.87	5,668	14,432
R-042	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
R-043	325	1.07	1,044,678.29	473.86	46,411	43,269
R-044	113	0.37	121,070.68	54.92	5,379	14,423
R-045	119	0.39	127,583.54	57.87	5,668	14,432
R-046	325	1.07	1,044,678.29	473.86	46,411	43,269
R-047	253	0.83	554,218.69	251.39	24,622	29,488
R-048	270	0.89	590,329.73	267.77	26,226	29,432
R-049	1207	3.98	3,875,133.79	1,757.73	172,158	43,218

World Logistic Center
Cumulative Energy - Transportation Fuel

Off-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E_TOT (lbs)	MT CO2e	Gallons	Gallons/year
R-050	249	0.82	545,409.41	247.39	24,231	29,485
R-051	113	0.37	121,070.68	54.92	5,379	14,423
R-052	325	1.07	1,044,678.29	473.86	46,411	43,269
R-053	300	0.99	736,000.66	333.84	32,698	33,025
R-054	300	0.99	736,000.66	333.84	32,698	33,025
R-055	300	0.99	736,000.66	333.84	32,698	33,025
R-056	296	0.98	723,664.89	328.25	32,150	32,910
R-057	296	0.98	723,664.89	328.25	32,150	32,910
R-058	113	0.37	121,070.68	54.92	5,379	14,423
R-059	113	0.37	121,070.68	54.92	5,379	14,423
R-060	270	0.89	590,329.73	267.77	26,226	29,432
R-061	328	1.08	825,272.43	374.34	36,664	33,869
R-062	113	0.37	121,070.68	54.92	5,379	14,423
R-063	249	0.82	545,409.41	247.39	24,231	29,485
R-064	249	0.82	545,409.41	247.39	24,231	29,485
R-065	325	1.07	1,044,678.29	473.86	46,411	43,269
R-066	113	0.37	121,070.68	54.92	5,379	14,423
RC-001	3401	11.22	31,681,020.65	14,370.27	1,407,470	125,394
RC-002	3401	11.22	42,078,190.00	19,086.34	1,869,377	166,546
RC-003	3401	11.22	62,872,528.69	28,518.49	2,793,192	248,850
RC-005	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
RC-006	382	1.26	1,398,993.43	634.57	62,152	49,299
RC-007	819	2.70	2,614,410.05	1,185.88	116,149	42,971
RC-009	569	1.88	2,060,329.98	934.55	91,533	48,742
RC-010	3401	11.22	11,332,469.69	5,140.32	503,459	44,854
RC-011	329	1.09	1,074,950.42	487.59	47,756	43,982
RC-012	305	1.01	750,479.21	340.41	33,341	33,122
RC-013	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
RC-014	387	1.28	1,253,155.71	568.42	55,673	43,589
RC-015	819	2.70	2,614,410.05	1,185.88	116,149	42,971
RC-017	113	0.37	121,070.68	54.92	5,379	14,423
RC-018	279	0.92	670,341.87	304.06	29,781	32,343
RC-019	253	0.83	554,218.69	251.39	24,622	29,488
RC-020	113	0.37	121,070.68	54.92	5,379	14,423
RC-021	113	0.37	121,070.68	54.92	5,379	14,423
RC-022	819	2.70	2,614,410.05	1,185.88	116,149	42,971
RC-023	249	0.82	545,409.41	247.39	24,231	29,485
RC-024	296	0.98	723,664.89	328.25	32,150	32,910
RC-025	253	0.83	554,218.69	251.39	24,622	29,488
RC-026	113	0.37	121,070.68	54.92	5,379	14,423
RC-027	296	0.98	723,664.89	328.25	32,150	32,910
RC-028	113	0.37	121,070.68	54.92	5,379	14,423
RC-029	113	0.37	121,070.68	54.92	5,379	14,423
RC-030	529	1.75	1,796,140.04	814.72	79,796	45,705
RC-031	296	0.98	723,664.89	328.25	32,150	32,910
RC-032	3401	11.22	21,283,851.30	9,654.19	945,562	84,242
RC-033	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
RC-034	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
RC-035	3401	11.22	52,475,359.34	23,802.42	2,331,285	207,698
RC-036	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
RC-037	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
RC-038	859	2.83	2,878,599.99	1,305.71	127,885	45,110
RC-039	325	1.07	1,044,678.29	473.86	46,411	43,269
RD-003	545	1.80	1,730,946.09	785.14	76,899	42,753
RD-004	387	1.28	1,253,155.71	568.42	55,673	43,589
RD-006	253	0.83	554,218.69	251.39	24,622	29,488
RD-007	270	0.89	590,329.73	267.77	26,226	29,432
RD-008	300	0.99	736,000.66	333.84	32,698	33,025

World Logistic Center
Cumulative Energy - Transportation Fuel

Off-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E_TOT (lbs)	MT CO2e	Gallons	Gallons/year
RD-009	253	0.83	554,218.69	251.39	24,622	29,488
RD-010	296	0.98	723,664.89	328.25	32,150	32,910
RD-011	253	0.83	554,218.69	251.39	24,622	29,488
SB-007	325	1.07	1,044,678.29	473.86	46,411	43,269
SB-008	325	1.07	1,044,678.29	473.86	46,411	43,269
SJ-001	1105	3.65	4,432,085.14	2,010.36	196,901	53,992
SJ-002	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
SJ-003	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
SJ-004	3401	11.22	10,886,681.95	4,938.12	483,655	43,090
WLC-001	325	1.07	1,044,678.29	473.86	46,411	43,269

World Logistic Center
Cumulative Energy -Transportation Fuel

10.21 $kGCO_2$/gal https://www.eia.gov/environment/emissions/co2_vol_mass.php
2204.623 lbs/Metric Ton

Total Diesel Consumption:	88,547,190	gallons
Max Annual Consumption:	1,137,881	gallons
Min Annual Consumption:	309	gallons
Average Annual Consumption:	37,584	gallons
Straigth Average Annual Consumption:	115,400	gallons

On-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
B-001	3401	11.22	142,267,719.23	64,531.54	6,320,425	563,096
B-003	3401	11.22	13,300,173.35	6,032.86	590,877	52,642
B-004	819	2.70	4,566,054.59	2,071.13	202,853	75,048
B-006	819	2.70	4,870,491.67	2,209.22	216,378	80,052
B-007	3401	11.22	2,955,720.52	1,340.69	131,312	11,699
B-008	3401	11.22	9,404,221.31	4,265.68	417,795	37,222
B-009	3401	11.22	255,785,305.76	116,022.24	11,363,589	1,012,399
B-010	545	1.80	321,356.05	145.76	14,277	7,937
B-011	300	0.99	273,004.10	123.83	12,129	12,250
B-013	3401	11.22	54,542,297.76	24,739.97	2,423,111	215,878
B-014	3401	11.22	10,076,219.23	4,570.50	447,649	39,882
C-001	279	0.92	219,520.22	99.57	9,752	10,591
C-002	1207	3.98	10,155,438.97	4,606.43	451,168	113,259
C-003	249	0.82	84,162.40	38.18	3,739	4,550
H-001	3401	11.22	4,232,199.39	1,919.69	188,021	16,751
H-002	3401	11.22	3,224,335.54	1,462.53	143,245	12,762
H-003	3401	11.22	13,434,675.18	6,093.87	596,853	53,174
H-004	819	2.70	4,565,996.02	2,071.10	202,850	75,047
H-005	113	0.37	10,375.99	4.71	461	1,236
H-006	325	1.07	726,253.46	329.42	32,265	30,081
H-007	1207	3.98	943,939.46	428.16	41,936	10,527
H-008	3401	11.22	4,318,651.85	1,958.91	191,862	17,093
M-001	325	1.07	1,266,636.33	574.54	56,272	52,463
M-003	1207	3.98	11,432,787.35	5,185.82	507,916	127,505
M-004	249	0.82	118,389.77	53.70	5,260	6,400
M-005	3401	11.22	47,955,023.08	21,752.03	2,130,463	189,806
M-006	300	0.99	267,293.43	121.24	11,875	11,994
M-007	325	1.07	842,506.61	382.15	37,429	34,896
M-008	1701	5.61	19,588,252.75	8,885.08	870,233	155,015
M-009	819	2.70	240,753.14	109.20	10,696	3,957
M-010	325	1.07	658,206.65	298.56	29,242	27,262
M-011	249	0.82	62,781.05	28.48	2,789	3,394
MV-001	300	0.99	402,811.20	182.71	17,895	18,074
MV-002	1701	5.61	1,785,471.92	809.88	79,322	14,130
MV-003	1207	3.98	8,958,903.64	4,063.69	398,011	99,915
MV-005	249	0.82	129,792.09	58.87	5,766	7,017
MV-006	325	1.07	920,407.34	417.49	40,890	38,122
MV-007	300	0.99	76,196.27	34.56	3,385	3,419
MV-008	325	1.07	106,483.22	48.30	4,731	4,410
MV-009	279	0.92	11,958.93	5.42	531	577
MV-010	325	1.07	99,974.29	45.35	4,441	4,141
MV-011	300	0.99	70,218.89	31.85	3,120	3,151
MV-013	113	0.37	12,988.91	5.89	577	1,547
MV-014	819	2.70	513,092.28	232.73	22,795	8,433
MV-015	387	1.28	191,958.60	87.07	8,528	6,677
MV-016	325	1.07	86,992.97	39.46	3,865	3,603
MV-017	545	1.80	321,356.05	145.76	14,277	7,937

World Logistic Center
Cumulative Energy -Transportation Fuel

On-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
MV-021	249	0.82	95,638.28	43.38	4,249	5,170
MV-023	495	1.63	634,240.16	287.69	28,177	17,248
MV-024	1207	3.98	409,130.69	185.58	18,176	4,563
MV-025	495	1.63	288,003.00	130.64	12,795	7,832
MV-026	545	1.80	321,377.50	145.77	14,278	7,938
MV-027	279	0.92	36,121.68	16.38	1,605	1,743
MV-028	300	0.99	112,446.37	51.00	4,996	5,046
MV-029	1701	5.61	1,008,066.35	457.25	44,785	7,978
MV-030	495	1.63	288,003.00	130.64	12,795	7,832
MV-031	325	1.07	100,009.88	45.36	4,443	4,142
MV-032	819	2.70	529,127.31	240.01	23,507	8,697
MV-033	325	1.07	100,009.88	45.36	4,443	4,142
MV-034	325	1.07	99,998.02	45.36	4,443	4,142
MV-035	300	0.99	70,218.89	31.85	3,120	3,151
MV-040	249	0.82	97,103.33	44.05	4,314	5,249
MV-041	545	1.80	2,577,057.60	1,168.93	114,489	63,652
MV-042	325	1.07	541,351.04	245.55	24,050	22,422
MV-044	495	1.63	1,936,483.62	878.37	86,031	52,661
MV-045	249	0.82	101,260.42	45.93	4,499	5,474
MV-047	300	0.99	64,242.46	29.14	2,854	2,883
MV-054	819	2.70	4,566,083.87	2,071.14	202,854	75,049
MV-056	300	0.99	64,242.46	29.14	2,854	2,883
MV-057	325	1.07	87,016.70	39.47	3,866	3,604
MV-059	387	1.28	191,958.60	87.07	8,528	6,677
MV-060	495	1.63	297,558.38	134.97	13,219	8,092
MV-061	279	0.92	201,622.83	91.45	8,957	9,728
MV-062	3401	11.22	3,963,206.18	1,797.68	176,070	15,686
MV-063	1207	3.98	577,438.28	261.92	25,653	6,440
MV-064	495	1.63	297,523.54	134.95	13,218	8,091
MV-065	279	0.92	36,110.76	16.38	1,604	1,742
MV-066	325	1.07	237,622.39	107.78	10,557	9,842
MV-067	1207	3.98	433,034.63	196.42	19,238	4,829
MV-068	279	0.92	225,719.23	102.38	10,028	10,890
MV-070	325	1.07	231,076.92	104.81	10,266	9,571
MV-071	279	0.92	36,088.93	16.37	1,603	1,741
MV-072	249	0.82	17,256.72	7.83	767	933
MV-073	300	0.99	118,445.57	53.73	5,262	5,315
MV-074	819	2.70	339,044.34	153.79	15,062	5,573
MV-075	3401	11.22	21,222,716.73	9,626.46	942,846	84,000
MV-076	300	0.99	414,720.40	188.11	18,424	18,609
MV-077	325	1.07	693,191.29	314.43	30,796	28,711
MV-079	300	0.99	416,573.63	188.95	18,507	18,692
MV-080	249	0.82	45,651.23	20.71	2,028	2,468
MV-085	279	0.92	159,872.59	72.52	7,103	7,714
MV-087	279	0.92	42,120.79	19.11	1,871	2,032
MV-088	113	0.37	5,217.06	2.37	232	621
MV-089	113	0.37	5,217.06	2.37	232	621
MV-090	113	0.37	5,188.35	2.35	230	618
MV-091	495	1.63	297,523.54	134.95	13,218	8,091
MV-094	325	1.07	311,634.99	141.36	13,845	12,908
MV-095	279	0.92	195,657.32	88.75	8,692	9,440
MV-096	387	1.28	207,965.98	94.33	9,239	7,234
MV-097	1207	3.98	553,446.54	251.04	24,588	6,172
MV-098	300	0.99	64,242.46	29.14	2,854	2,883
MV-099	300	0.99	118,445.57	53.73	5,262	5,315
MV-100	325	1.07	198,364.26	89.98	8,813	8,216
MV-101	113	0.37	5,188.35	2.35	230	618

World Logistic Center
Cumulative Energy -Transportation Fuel

On-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
MV-102	249	0.82	95,659.64	43.39	4,250	5,171
MV-103	279	0.92	207,788.23	94.25	9,231	10,025
MV-104	300	0.99	422,540.10	191.66	18,772	18,960
MV-105	113	0.37	5,217.06	2.37	232	621
MV-106	113	0.37	5,217.06	2.37	232	621
MV-107	249	0.82	5,738.60	2.60	255	310
MV-108	113	0.37	2,594.65	1.18	115	309
MV-109	3401	11.22	15,986,631.38	7,251.41	710,227	63,275
MV-110	279	0.92	42,120.79	19.11	1,871	2,032
MV-111	249	0.82	11,508.34	5.22	511	622
MV-112	113	0.37	5,226.79	2.37	232	623
MV-113	819	2.70	256,788.17	116.48	11,408	4,221
MV-114	113	0.37	2,599.40	1.18	115	310
MV-115	113	0.37	2,594.65	1.18	115	309
MV-116	300	0.99	70,218.89	31.85	3,120	3,151
MV-117	249	0.82	51,410.53	23.32	2,284	2,779
MV-118	249	0.82	5,738.60	2.60	255	310
MV-119	325	1.07	87,004.83	39.46	3,865	3,604
MV-120	279	0.92	213,543.79	96.86	9,487	10,303
MV-121	113	0.37	2,599.40	1.18	115	310
MV-123	113	0.37	7,782.05	3.53	346	927
MV-124	279	0.92	159,872.59	72.52	7,103	7,714
MV-125	249	0.82	17,256.72	7.83	767	933
MV-126	1701	5.61	873,640.31	396.28	38,813	6,914
MV-127	300	0.99	386,722.34	175.41	17,181	17,352
MV-129	819	2.70	4,149,558.43	1,882.21	184,349	68,203
MV-130	300	0.99	273,248.03	123.94	12,139	12,261
MV-131	819	2.70	3,941,267.73	1,787.73	175,096	64,779
MV-132	495	1.63	1,926,928.24	874.04	85,606	52,401
P-004	279	0.92	195,845.44	88.83	8,701	9,449
P-005	325	1.07	554,344.23	251.45	24,627	22,960
P-006	325	1.07	764,594.96	346.81	33,968	31,669
P-007	495	1.63	1,867,826.46	847.23	82,981	50,794
P-008	300	0.99	291,168.30	132.07	12,936	13,065
P-009	325	1.07	810,035.03	367.43	35,987	33,551
P-012	325	1.07	547,848.11	248.50	24,339	22,691
P-014	495	1.63	2,079,417.84	943.21	92,381	56,548
P-022	300	0.99	428,516.52	194.37	19,037	19,228
P-023	279	0.92	201,822.72	91.55	8,966	9,738
P-024	545	1.80	2,598,730.31	1,178.76	115,452	64,187
P-025	387	1.28	1,503,410.25	681.94	66,791	52,294
P-026	325	1.07	991,786.33	449.87	44,061	41,079
P-028	325	1.07	836,022.35	379.21	37,141	34,627
P-030	3401	11.22	3,560,457.08	1,615.00	158,178	14,092
P-031	279	0.92	76,760.98	34.82	3,410	3,704
P-032	325	1.07	687,346.04	311.77	30,536	28,469
P-033	3401	11.22	40,101,621.58	18,189.79	1,781,566	158,722
P-034	1207	3.98	12,489,603.12	5,665.19	554,867	139,291
P-035	249	0.82	28,743.04	13.04	1,277	1,554
P-036	1701	5.61	19,289,708.41	8,749.66	856,970	152,652
P-039	325	1.07	959,350.35	435.15	42,620	39,735
P-040	819	2.70	545,130.45	247.27	24,218	8,960
P-041	279	0.92	171,959.85	78.00	7,640	8,297
P-042	325	1.07	106,495.08	48.31	4,731	4,411
P-043	325	1.07	106,483.22	48.30	4,731	4,410
P-044	300	0.99	118,423.74	53.72	5,261	5,314
P-045	279	0.92	76,760.98	34.82	3,410	3,704

World Logistic Center
Cumulative Energy -Transportation Fuel

On-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
P-046	1701	5.61	1,555,369.71	705.50	69,099	12,309
P-047	3401	11.22	3,761,954.21	1,706.39	167,130	14,890
P-048	387	1.28	207,936.75	94.32	9,238	7,233
P-049	819	2.70	529,127.31	240.01	23,507	8,697
P-050	249	0.82	95,554.28	43.34	4,245	5,166
P-051	325	1.07	87,004.83	39.46	3,865	3,604
P-052	495	1.63	288,003.00	130.64	12,795	7,832
P-053	1207	3.98	433,034.63	196.42	19,238	4,829
P-054	1701	5.61	873,706.85	396.31	38,816	6,914
P-055	325	1.07	601,779.60	272.96	26,735	24,925
P-056	113	0.37	5,197.84	2.36	231	619
P-057	113	0.37	18,181.30	8.25	808	2,166
P-058	300	0.99	422,561.93	191.67	18,773	18,961
P-059	1701	5.61	873,829.48	396.36	38,821	6,915
P-060	113	0.37	2,599.40	1.18	115	310
R-004	325	1.07	217,939.46	98.86	9,682	9,027
R-005	325	1.07	654,259.19	296.77	29,066	27,099
R-006	279	0.92	76,783.67	34.83	3,411	3,705
R-007	249	0.82	57,053.55	25.88	2,535	3,084
R-008	300	0.99	76,362.85	34.64	3,393	3,426
R-009	3401	11.22	192,809,167.53	87,456.75	8,565,794	763,139
R-010	113	0.37	10,380.74	4.71	461	1,237
R-011	300	0.99	438,983.95	199.12	19,502	19,697
R-012	249	0.82	62,759.69	28.47	2,788	3,393
R-013	113	0.37	2,599.40	1.18	115	310
R-014	113	0.37	2,599.40	1.18	115	310
R-015	1207	3.98	457,117.73	207.35	20,308	5,098
R-016	113	0.37	2,594.65	1.18	115	309
R-017	325	1.07	318,167.65	144.32	14,135	13,178
R-018	3401	11.22	198,794,786.00	90,171.78	8,831,712	786,830
R-019	279	0.92	36,132.59	16.39	1,605	1,743
R-020	545	1.80	2,598,710.52	1,178.76	115,451	64,187
R-021	279	0.92	11,981.62	5.43	532	578
R-022	249	0.82	5,738.60	2.60	255	310
R-023	113	0.37	5,188.35	2.35	230	618
R-024	3401	11.22	287,488,800.99	130,402.70	12,772,057	1,137,881
R-025	325	1.07	211,405.85	95.89	9,392	8,756
R-026	819	2.70	4,180,707.71	1,896.34	185,733	68,715
R-027	113	0.37	2,599.40	1.18	115	310
R-028	495	1.63	346,097.49	156.99	15,376	9,412
R-029	113	0.37	2,599.40	1.18	115	310
R-030	279	0.92	231,441.19	104.98	10,282	11,167
R-031	249	0.82	23,026.46	10.44	1,023	1,245
R-032	113	0.37	10,380.74	4.71	461	1,237
R-033	249	0.82	22,984.22	10.43	1,021	1,243
R-034	113	0.37	5,202.83	2.36	231	620
R-035	300	0.99	118,490.18	53.75	5,264	5,317
R-036	279	0.92	42,131.71	19.11	1,872	2,033
R-037	113	0.37	2,599.40	1.18	115	310
R-038	113	0.37	2,599.40	1.18	115	310
R-039	3401	11.22	2,888,837.35	1,310.35	128,340	11,434
R-040	113	0.37	2,594.65	1.18	115	309
R-041	113	0.37	10,390.23	4.71	462	1,238
R-042	3401	11.22	4,299,450.31	1,950.20	191,009	17,017
R-043	325	1.07	99,986.15	45.35	4,442	4,141
R-044	113	0.37	2,599.40	1.18	115	310
R-045	113	0.37	18,171.81	8.24	807	2,165

World Logistic Center
Cumulative Energy -Transportation Fuel

On-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
R-046	325	1.07	87,004.83	39.46	3,865	3,604
R-047	249	0.82	102,830.83	46.64	4,568	5,559
R-048	249	0.82	89,858.10	40.76	3,992	4,858
R-049	1207	3.98	822,902.29	373.26	36,558	9,177
R-050	249	0.82	5,717.72	2.59	254	309
R-051	113	0.37	2,594.65	1.18	115	309
R-052	325	1.07	86,992.97	39.46	3,865	3,603
R-053	300	0.99	76,185.35	34.56	3,385	3,418
R-054	300	0.99	70,218.89	31.85	3,120	3,151
R-055	300	0.99	70,207.98	31.85	3,119	3,150
R-056	279	0.92	154,051.54	69.88	6,844	7,433
R-057	279	0.92	195,845.44	88.83	8,701	9,449
R-058	113	0.37	2,594.65	1.18	115	309
R-059	113	0.37	2,599.40	1.18	115	310
R-060	249	0.82	112,788.98	51.16	5,011	6,097
R-061	300	0.99	522,118.14	236.83	23,196	23,428
R-062	113	0.37	2,594.65	1.18	115	309
R-063	249	0.82	17,235.84	7.82	766	932
R-064	249	0.82	5,717.72	2.59	254	309
R-065	325	1.07	106,506.95	48.31	4,732	4,411
R-066	113	0.37	5,183.61	2.35	230	617
RC-001	3401	11.22	27,003,460.33	12,248.56	1,199,663	106,880
RC-002	3401	11.22	57,498,719.23	26,080.98	2,554,454	227,580
RC-003	3401	11.22	147,104,385.91	66,725.42	6,535,300	582,239
RC-005	3401	11.22	10,881,696.55	4,935.85	483,433	43,070
RC-006	325	1.07	642,676.68	291.51	28,552	26,619
RC-007	819	2.70	4,181,538.03	1,896.71	185,770	68,728
RC-009	495	1.63	1,896,421.26	860.20	84,251	51,572
RC-010	3401	11.22	68,210,389.39	30,939.71	3,030,334	269,977
RC-011	325	1.07	991,798.20	449.87	44,062	41,079
RC-012	300	0.99	470,322.57	213.33	20,895	21,104
RC-013	3401	11.22	3,627,329.80	1,645.33	161,149	14,357
RC-014	387	1.28	417,901.05	189.56	18,566	14,536
RC-015	819	2.70	256,788.17	116.48	11,408	4,221
RC-017	113	0.37	5,188.35	2.35	230	618
RC-018	279	0.92	11,981.62	5.43	532	578
RC-019	249	0.82	51,357.85	23.30	2,282	2,776
RC-020	113	0.37	2,594.65	1.18	115	309
RC-021	113	0.37	5,193.10	2.36	231	619
RC-022	819	2.70	240,723.86	109.19	10,694	3,957
RC-023	249	0.82	51,420.97	23.32	2,284	2,780
RC-024	279	0.92	213,765.52	96.96	9,497	10,314
RC-025	249	0.82	79,984.43	36.28	3,553	4,324
RC-026	113	0.37	2,594.65	1.18	115	309
RC-027	279	0.92	207,810.07	94.26	9,232	10,026
RC-028	113	0.37	2,599.40	1.18	115	310
RC-029	113	0.37	5,188.35	2.35	230	618
RC-030	495	1.63	2,174,702.07	986.43	96,614	59,139
RC-031	279	0.92	201,822.72	91.55	8,966	9,738
RC-032	3401	11.22	10,479,213.50	4,753.29	465,552	41,477
RC-033	3401	11.22	2,821,341.27	1,279.74	125,342	11,167
RC-034	3401	11.22	3,157,217.65	1,432.09	140,263	12,496
RC-035	3401	11.22	108,159,705.74	49,060.41	4,805,133	428,096
RC-036	3401	11.22	3,425,832.67	1,553.93	152,197	13,559
RC-037	3401	11.22	4,097,574.98	1,858.63	182,040	16,218
RC-038	819	2.70	4,790,382.92	2,172.88	212,819	78,735
RC-039	325	1.07	93,489.08	42.41	4,153	3,872

World Logistic Center
Cumulative Energy -Transportation Fuel

On-Road Construction Diesel Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
RD-003	545	1.80	332,193.23	150.68	14,758	8,205
RD-004	387	1.28	199,947.20	90.69	8,883	6,955
RD-006	249	0.82	45,662.15	20.71	2,029	2,469
RD-007	249	0.82	135,509.14	61.47	6,020	7,326
RD-008	300	0.99	106,425.33	48.27	4,728	4,775
RD-009	249	0.82	45,651.23	20.71	2,028	2,468
RD-010	279	0.92	166,005.25	75.30	7,375	8,009
RD-011	249	0.82	57,053.55	25.88	2,535	3,084
SB-007	325	1.07	87,004.83	39.46	3,865	3,604
SB-008	325	1.07	93,489.08	42.41	4,153	3,872
SJ-001	819	2.70	4,416,861.47	2,003.45	196,225	72,596
SJ-002	3401	11.22	2,351,229.12	1,066.50	104,456	9,306
SJ-003	3401	11.22	4,231,821.20	1,919.52	188,004	16,750
SJ-004	3401	11.22	4,433,573.94	2,011.03	196,967	17,548
WLC-001	325	1.07	106,495.08	48.31	4,731	4,411

World Logistic Center
Cumulative Energy - Transportation Fuels

8.89 $kGCO_2$/gal https://www.eia.gov/environment/emissions/co2_vol_mass.php
2204.623 lbs/Metric Ton

Total Gasoline Consumption:	127,085,549	gallons
Max Annual Consumption:	1,788,690	gallons
Min Annual Consumption:	313	gallons
Average Annual Consumption:	50,842	gallons
Straigth Average Annual Consumption:	165,626	gallons

On-Road Construction Gasoline Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
B-001	3401	11.22	194,955,919.05	88,430.50	9,947,188	886,209
B-003	3401	11.22	18,303,688.08	8,302.41	933,905	83,203
B-004	819	2.70	4,782,346.36	2,169.24	244,008	90,274
B-006	819	2.70	5,108,484.58	2,317.17	260,649	96,431
B-007	3401	11.22	4,095,138.22	1,857.52	208,945	18,615
B-008	3401	11.22	12,954,760.09	5,876.18	660,988	58,888
B-009	3401	11.22	350,288,766.12	158,888.28	17,872,698	1,592,304
B-010	545	1.80	171,353.74	77.72	8,743	4,861
B-011	300	0.99	183,300.16	83.14	9,352	9,446
B-013	3401	11.22	74,659,559.82	33,865.00	3,809,336	339,379
B-014	3401	11.22	13,938,673.27	6,322.47	711,190	63,361
C-001	279	0.92	161,295.67	73.16	8,230	8,938
C-002	1207	3.98	9,646,492.25	4,375.57	492,191	123,557
C-003	249	0.82	57,814.90	26.22	2,950	3,590
H-001	3401	11.22	5,895,208.29	2,674.02	300,790	26,798
H-002	3401	11.22	4,448,430.87	2,017.77	226,971	20,221
H-003	3401	11.22	18,522,831.24	8,401.81	945,086	84,199
H-004	819	2.70	4,769,538.67	2,163.43	243,355	90,032
H-005	113	0.37	8,570.78	3.89	437	1,173
H-006	325	1.07	585,527.87	265.59	29,875	27,853
H-007	1207	3.98	2,556,405.10	1,159.57	130,435	32,744
H-008	3401	11.22	10,204,146.27	4,628.52	520,644	46,385
M-001	325	1.07	810,251.97	367.52	41,341	38,543
M-003	1207	3.98	11,930,606.95	5,411.63	608,732	152,814
M-004	249	0.82	83,166.41	37.72	4,243	5,164
M-005	3401	11.22	50,048,333.19	22,701.54	2,553,604	227,504
M-006	300	0.99	234,256.42	106.26	11,952	12,072
M-007	325	1.07	759,573.26	344.54	38,756	36,132
M-008	1701	5.61	19,625,292.39	8,901.88	1,001,336	178,369
M-009	819	2.70	346,721.69	157.27	17,691	6,545
M-010	325	1.07	630,209.27	285.86	32,155	29,978
M-011	249	0.82	53,231.04	24.15	2,716	3,305
MV-001	300	0.99	246,507.21	111.81	12,577	12,703
MV-002	1701	5.61	3,480,554.13	1,578.75	177,587	31,634
MV-003	1207	3.98	9,352,867.53	4,242.39	477,209	119,796
MV-005	249	0.82	90,129.25	40.88	4,599	5,596
MV-006	325	1.07	841,524.38	381.71	42,937	40,030
MV-007	300	0.99	37,425.19	16.98	1,910	1,929
MV-008	325	1.07	65,783.71	29.84	3,356	3,129
MV-009	279	0.92	15,660.86	7.10	799	868
MV-010	325	1.07	55,192.06	25.03	2,816	2,625
MV-011	300	0.99	30,051.44	13.63	1,533	1,549
MV-013	113	0.37	14,852.11	6.74	758	2,032
MV-014	819	2.70	281,762.49	127.81	14,376	5,319
MV-015	387	1.28	85,717.75	38.88	4,374	3,424
MV-016	325	1.07	42,000.60	19.05	2,143	1,998
MV-017	545	1.80	171,353.74	77.72	8,743	4,861

World Logistic Center
Cumulative Energy - Transportation Fuels

On-Road Construction Gasoline Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
MV-021	249	0.82	80,865.20	36.68	4,126	5,021
MV-023	495	1.63	1,186,267.68	538.08	60,527	37,050
MV-024	1207	3.98	604,739.88	274.31	30,855	7,746
MV-025	495	1.63	133,755.74	60.67	6,825	4,177
MV-026	545	1.80	176,045.06	79.85	8,982	4,994
MV-027	279	0.92	100,538.24	45.60	5,130	5,571
MV-028	300	0.99	166,049.02	75.32	8,472	8,557
MV-029	1701	5.61	1,406,289.22	637.88	71,753	12,781
MV-030	495	1.63	133,755.74	60.67	6,825	4,177
MV-031	325	1.07	62,976.32	28.57	3,213	2,996
MV-032	819	2.70	301,557.37	136.78	15,386	5,692
MV-033	325	1.07	62,976.32	28.57	3,213	2,996
MV-034	325	1.07	60,381.56	27.39	3,081	2,872
MV-035	300	0.99	30,051.44	13.63	1,533	1,549
MV-040	249	0.82	99,340.56	45.06	5,069	6,168
MV-041	545	1.80	2,699,181.56	1,224.33	137,720	76,567
MV-042	325	1.07	506,296.59	229.65	25,833	24,084
MV-044	495	1.63	1,827,774.47	829.06	93,258	57,085
MV-045	249	0.82	67,065.58	30.42	3,422	4,164
MV-047	300	0.99	22,885.27	10.38	1,168	1,179
MV-054	819	2.70	4,788,750.21	2,172.14	244,335	90,395
MV-056	300	0.99	22,885.27	10.38	1,168	1,179
MV-057	325	1.07	47,190.10	21.41	2,408	2,245
MV-059	387	1.28	85,717.75	38.88	4,374	3,424
MV-060	495	1.63	149,362.82	67.75	7,621	4,665
MV-061	279	0.92	146,771.85	66.57	7,489	8,133
MV-062	3401	11.22	5,459,205.34	2,476.25	278,544	24,816
MV-063	1207	3.98	819,197.50	371.58	41,798	10,493
MV-064	495	1.63	141,744.63	64.29	7,232	4,427
MV-065	279	0.92	98,151.07	44.52	5,008	5,439
MV-066	325	1.07	487,687.77	221.21	24,883	23,199
MV-067	1207	3.98	604,758.62	274.31	30,856	7,746
MV-068	279	0.92	217,139.38	98.49	11,079	12,032
MV-070	325	1.07	469,104.28	212.78	23,935	22,315
MV-071	279	0.92	93,376.73	42.35	4,764	5,174
MV-072	249	0.82	43,958.08	19.94	2,243	2,729
MV-073	300	0.99	178,197.12	80.83	9,092	9,183
MV-074	819	2.70	920,610.37	417.58	46,972	17,378
MV-075	3401	11.22	57,572,289.27	26,114.35	2,937,497	261,706
MV-076	300	0.99	251,290.87	113.98	12,822	12,950
MV-077	325	1.07	601,280.75	272.74	30,679	28,602
MV-079	300	0.99	384,868.46	174.57	19,637	19,833
MV-080	249	0.82	37,026.42	16.79	1,889	2,299
MV-085	279	0.92	115,145.54	52.23	5,875	6,380
MV-087	279	0.92	112,665.58	51.10	5,749	6,243
MV-088	113	0.37	10,642.53	4.83	543	1,456
MV-089	113	0.37	10,642.53	4.83	543	1,456
MV-090	113	0.37	4,363.23	1.98	223	597
MV-091	495	1.63	141,744.63	64.29	7,232	4,427
MV-094	325	1.07	516,704.48	234.37	26,364	24,579
MV-095	279	0.92	141,992.84	64.41	7,245	7,868
MV-096	387	1.28	105,118.21	47.68	5,363	4,199
MV-097	1207	3.98	799,977.60	362.86	40,817	10,247
MV-098	300	0.99	22,885.27	10.38	1,168	1,179
MV-099	300	0.99	178,197.12	80.83	9,092	9,183
MV-100	325	1.07	379,404.36	172.09	19,358	18,048
MV-101	113	0.37	4,363.23	1.98	223	597

World Logistic Center
Cumulative Energy - Transportation Fuels

On-Road Construction Gasoline Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
MV-102	249	0.82	85,535.76	38.80	4,364	5,311
MV-103	279	0.92	195,267.22	88.57	9,963	10,820
MV-104	300	0.99	389,855.04	176.84	19,891	20,090
MV-105	113	0.37	10,642.53	4.83	543	1,456
MV-106	113	0.37	10,642.53	4.83	543	1,456
MV-107	249	0.82	11,670.46	5.29	595	725
MV-108	113	0.37	2,285.41	1.04	117	313
MV-109	3401	11.22	21,903,932.86	9,935.46	1,117,599	99,569
MV-110	279	0.92	112,665.58	51.10	5,749	6,243
MV-111	249	0.82	30,149.54	13.68	1,538	1,872
MV-112	113	0.37	12,770.23	5.79	652	1,747
MV-113	819	2.70	366,516.57	166.25	18,701	6,919
MV-114	113	0.37	3,323.31	1.51	170	455
MV-115	113	0.37	2,285.41	1.04	117	313
MV-116	300	0.99	30,051.44	13.63	1,533	1,549
MV-117	249	0.82	53,222.13	24.14	2,716	3,304
MV-118	249	0.82	11,670.46	5.29	595	725
MV-119	325	1.07	44,595.35	20.23	2,275	2,121
MV-120	279	0.92	154,129.50	69.91	7,864	8,541
MV-121	113	0.37	3,323.31	1.51	170	455
MV-123	113	0.37	6,441.06	2.92	329	881
MV-124	279	0.92	115,145.54	52.23	5,875	6,380
MV-125	249	0.82	43,958.08	19.94	2,243	2,729
MV-126	1701	5.61	1,215,024.03	551.13	61,994	11,043
MV-127	300	0.99	355,783.95	161.38	18,153	18,335
MV-129	819	2.70	4,358,350.44	1,976.91	222,375	82,271
MV-130	300	0.99	236,648.25	107.34	12,074	12,195
MV-131	819	2.70	4,137,032.13	1,876.53	211,083	78,093
MV-132	495	1.63	1,812,167.39	821.99	92,462	56,598
P-004	279	0.92	183,135.22	83.07	9,344	10,148
P-005	325	1.07	522,082.81	236.81	26,638	24,835
P-006	325	1.07	675,234.97	306.28	34,452	32,120
P-007	495	1.63	1,959,404.43	888.77	99,974	61,196
P-008	300	0.99	256,174.75	116.20	13,071	13,201
P-009	325	1.07	722,598.68	327.77	36,869	34,373
P-012	325	1.07	514,293.49	233.28	26,241	24,464
P-014	495	1.63	1,975,174.44	895.92	100,779	61,689
P-022	300	0.99	397,021.21	180.09	20,257	20,460
P-023	279	0.92	190,488.22	86.40	9,719	10,555
P-024	545	1.80	2,725,529.99	1,236.28	139,064	77,315
P-025	387	1.28	1,424,221.00	646.02	72,668	56,895
P-026	325	1.07	910,081.51	412.81	46,435	43,292
P-028	325	1.07	754,378.69	342.18	38,490	35,885
P-030	3401	11.22	4,967,196.43	2,253.08	253,440	22,579
P-031	279	0.92	136,938.51	62.11	6,987	7,588
P-032	325	1.07	553,945.31	251.27	28,264	26,351
P-033	3401	11.22	55,097,358.26	24,991.74	2,811,219	250,456
P-034	1207	3.98	13,034,200.64	5,912.21	665,041	166,949
P-035	249	0.82	69,291.76	31.43	3,535	4,302
P-036	1701	5.61	20,050,990.51	9,094.97	1,023,057	182,238
P-039	325	1.07	880,891.19	399.57	44,945	41,903
P-040	819	2.70	314,377.56	142.60	16,040	5,934
P-041	279	0.92	158,871.23	72.06	8,106	8,803
P-042	325	1.07	68,378.46	31.02	3,489	3,253
P-043	325	1.07	65,783.71	29.84	3,356	3,129
P-044	300	0.99	173,422.77	78.66	8,849	8,937
P-045	279	0.92	136,938.51	62.11	6,987	7,588

World Logistic Center
Cumulative Energy - Transportation Fuels

On-Road Construction Gasoline Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
P-046	1701	5.61	4,270,690.71	1,937.15	217,902	38,815
P-047	3401	11.22	5,240,009.86	2,376.83	267,360	23,819
P-048	387	1.28	98,724.74	44.78	5,037	3,944
P-049	819	2.70	301,557.37	136.78	15,386	5,692
P-050	249	0.82	62,494.36	28.35	3,189	3,880
P-051	325	1.07	44,595.35	20.23	2,275	2,121
P-052	495	1.63	133,755.74	60.67	6,825	4,177
P-053	1207	3.98	604,758.62	274.31	30,856	7,746
P-054	1701	5.61	1,229,575.39	557.73	62,736	11,175
P-055	325	1.07	390,308.47	177.04	19,915	18,567
P-056	113	0.37	6,439.03	2.92	329	881
P-057	113	0.37	20,097.55	9.12	1,025	2,750
P-058	300	0.99	394,629.38	179.00	20,135	20,336
P-059	1701	5.61	1,256,394.74	569.89	64,105	11,419
P-060	113	0.37	3,323.31	1.51	170	455
R-004	325	1.07	421,765.89	191.31	21,520	20,063
R-005	325	1.07	564,301.11	255.96	28,792	26,843
R-006	279	0.92	141,899.68	64.36	7,240	7,863
R-007	249	0.82	43,989.27	19.95	2,244	2,731
R-008	300	0.99	73,855.50	33.50	3,768	3,806
R-009	3401	11.22	153,736,537.92	69,733.71	7,844,062	698,839
R-010	113	0.37	9,608.68	4.36	490	1,315
R-011	300	0.99	358,213.26	162.48	18,277	18,460
R-012	249	0.82	48,560.49	22.03	2,478	3,015
R-013	113	0.37	3,323.31	1.51	170	455
R-014	113	0.37	3,323.31	1.51	170	455
R-015	1207	3.98	643,958.10	292.09	32,857	8,248
R-016	113	0.37	2,285.41	1.04	117	313
R-017	325	1.07	532,485.63	241.53	27,169	25,330
R-018	3401	11.22	207,345,715.38	94,050.42	10,579,350	942,530
R-019	279	0.92	102,925.41	46.69	5,252	5,703
R-020	545	1.80	2,721,201.94	1,234.32	138,843	77,192
R-021	279	0.92	20,622.02	9.35	1,052	1,143
R-022	249	0.82	11,670.46	5.29	595	725
R-023	113	0.37	4,363.23	1.98	223	597
R-024	3401	11.22	393,491,285.04	178,484.61	20,077,009	1,788,690
R-025	325	1.07	405,777.16	184.06	20,704	19,302
R-026	819	2.70	4,196,566.74	1,903.53	214,120	79,217
R-027	113	0.37	3,323.31	1.51	170	455
R-028	495	1.63	394,095.42	178.76	20,108	12,308
R-029	113	0.37	3,323.31	1.51	170	455
R-030	279	0.92	168,653.32	76.50	8,605	9,345
R-031	249	0.82	62,437.16	28.32	3,186	3,877
R-032	113	0.37	9,608.68	4.36	490	1,315
R-033	249	0.82	53,199.85	24.13	2,714	3,303
R-034	113	0.37	7,528.83	3.42	384	1,030
R-035	300	0.99	187,953.38	85.25	9,590	9,686
R-036	279	0.92	115,052.75	52.19	5,870	6,375
R-037	113	0.37	3,323.31	1.51	170	455
R-038	113	0.37	3,323.31	1.51	170	455
R-039	3401	11.22	4,065,993.55	1,844.30	207,458	18,483
R-040	113	0.37	2,285.41	1.04	117	313
R-041	113	0.37	11,684.48	5.30	596	1,599
R-042	3401	11.22	6,004,779.88	2,723.72	306,380	27,296
R-043	325	1.07	57,786.81	26.21	2,948	2,749
R-044	113	0.37	3,323.31	1.51	170	455
R-045	113	0.37	18,021.75	8.17	920	2,466

World Logistic Center
Cumulative Energy - Transportation Fuels

On-Road Construction Gasoline Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
R-046	325	1.07	44,595.35	20.23	2,275	2,121
R-047	249	0.82	108,582.33	49.25	5,540	6,742
R-048	249	0.82	60,102.74	27.26	3,067	3,732
R-049	1207	3.98	2,224,442.72	1,008.99	113,497	28,492
R-050	249	0.82	7,103.70	3.22	362	441
R-051	113	0.37	2,285.41	1.04	117	313
R-052	325	1.07	42,000.60	19.05	2,143	1,998
R-053	300	0.99	35,038.02	15.89	1,788	1,806
R-054	300	0.99	30,051.44	13.63	1,533	1,549
R-055	300	0.99	27,664.27	12.55	1,412	1,426
R-056	279	0.92	141,960.24	64.39	7,243	7,866
R-057	279	0.92	183,135.22	83.07	9,344	10,148
R-058	113	0.37	2,285.41	1.04	117	313
R-059	113	0.37	3,323.31	1.51	170	455
R-060	249	0.82	101,636.58	46.10	5,186	6,310
R-061	300	0.99	341,360.70	154.84	17,417	17,591
R-062	113	0.37	2,285.41	1.04	117	313
R-063	249	0.82	39,391.31	17.87	2,010	2,446
R-064	249	0.82	7,103.70	3.22	362	441
R-065	325	1.07	70,973.21	32.19	3,621	3,376
R-066	113	0.37	3,325.33	1.51	170	455
RC-001	3401	11.22	37,179,106.20	16,864.16	1,896,980	169,005
RC-002	3401	11.22	78,907,995.95	35,792.06	4,026,103	358,691
RC-003	3401	11.22	201,664,295.08	91,473.37	10,289,468	916,704
RC-005	3401	11.22	14,918,124.33	6,766.75	761,164	67,813
RC-006	325	1.07	675,136.65	306.24	34,447	32,116
RC-007	819	2.70	4,378,157.82	1,985.90	223,386	82,645
RC-009	495	1.63	1,990,626.02	902.93	101,567	62,171
RC-010	3401	11.22	71,239,608.24	32,313.74	3,634,841	323,833
RC-011	325	1.07	912,676.26	413.98	46,567	43,415
RC-012	300	0.99	440,853.23	199.97	22,494	22,718
RC-013	3401	11.22	4,994,057.72	2,265.27	254,811	22,701
RC-014	387	1.28	759,531.40	344.52	38,753	30,342
RC-015	819	2.70	366,516.57	166.25	18,701	6,919
RC-017	113	0.37	4,363.23	1.98	223	597
RC-018	279	0.92	20,622.02	9.35	1,052	1,143
RC-019	249	0.82	41,701.43	18.92	2,128	2,589
RC-020	113	0.37	2,285.41	1.04	117	313
RC-021	113	0.37	5,401.13	2.45	276	739
RC-022	819	2.70	340,317.84	154.37	17,364	6,424
RC-023	249	0.82	55,505.51	25.18	2,832	3,446
RC-024	279	0.92	202,620.21	91.91	10,338	11,228
RC-025	249	0.82	85,523.11	38.79	4,364	5,310
RC-026	113	0.37	2,285.41	1.04	117	313
RC-027	279	0.92	200,041.56	90.74	10,207	11,085
RC-028	113	0.37	3,323.31	1.51	170	455
RC-029	113	0.37	4,363.23	1.98	223	597
RC-030	495	1.63	2,072,292.47	939.98	105,734	64,722
RC-031	279	0.92	190,488.22	86.40	9,719	10,555
RC-032	3401	11.22	14,484,300.12	6,569.97	739,029	65,841
RC-033	3401	11.22	3,902,804.02	1,770.28	199,132	17,741
RC-034	3401	11.22	4,367,951.64	1,981.27	222,865	19,855
RC-035	3401	11.22	151,420,561.37	68,683.20	7,725,894	688,311
RC-036	3401	11.22	4,721,244.30	2,141.52	240,891	21,461
RC-037	3401	11.22	5,649,256.16	2,562.46	288,241	25,680
RC-038	819	2.70	5,024,030.40	2,278.86	256,340	94,836
RC-039	325	1.07	49,789.91	22.58	2,540	2,368

World Logistic Center
Cumulative Energy - Transportation Fuels

On-Road Construction Gasoline Fuel Usage

Project ID	ConDays	ConYrs	CO2E	MT CO2e	Gallons	Gallons/year
RD-003	545	1.80	184,709.59	83.78	9,424	5,240
RD-004	387	1.28	92,117.45	41.78	4,700	3,680
RD-006	249	0.82	39,413.59	17.88	2,011	2,447
RD-007	249	0.82	97,087.64	44.04	4,954	6,028
RD-008	300	0.99	149,126.58	67.64	7,609	7,685
RD-009	249	0.82	37,026.42	16.79	1,889	2,299
RD-010	279	0.92	156,479.40	70.98	7,984	8,671
RD-011	249	0.82	43,989.27	19.95	2,244	2,731
SB-007	325	1.07	44,595.35	20.23	2,275	2,121
SB-008	325	1.07	49,789.91	22.58	2,540	2,368
SJ-001	819	2.70	3,537,407.10	1,604.54	180,488	66,774
SJ-002	3401	11.22	3,276,697.94	1,486.28	167,186	14,895
SJ-003	3401	11.22	5,812,498.00	2,636.50	296,570	26,422
SJ-004	3401	11.22	6,141,212.75	2,785.61	313,342	27,916
WLC-001	325	1.07	68,378.46	31.02	3,489	3,253

World Logistic Center

Cumulative Energy - Transportation Fuel

Assumptions

8.89 kg CO_2/gallon gasoline
10.16 kg CO_2/gallon diesel
53.12 kg CO_2/ thousand cubic feet
1036 btu/cubic foot

88.45% emissions from Gasoline
11.50% emissions from Diesel
0.05% emissions from Natural Gas

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
B-001	176,084.36	155,745,319.62	17,519,159		20255703.3	1,993,672		83340.33772	1568.90696	1,625
B-002	23,625.56	20,896,630.31	2,350,577		2717744.228	267,495		11181.92336	210.5030752	218
B-003	49,196.90	43,514,298.39	4,894,747		5659320.74	557,020		23284.78527	438.3430961	454
B-004	62,854.09	55,593,978.13	6,253,541		7230362.551	711,650		29748.70079	560.0282528	580
B-005	73,688.29	65,176,749.65	7,331,468		8476665.022	834,317		34876.50442	656.5607006	680
B-006	128,860.14	113,975,838.78	12,820,679		14823307.56	1,458,987		60989.21572	1148.140356	1,189
B-007	21,503.64	19,019,807.21	2,139,461		2473651.039	243,470		10177.62306	191.5968197	198
B-008	34,576.57	30,582,717.31	3,440,126		3977483.557	391,485		16365.01177	308.0762758	319
B-009	237,447.10	210,020,203.73	23,624,320		27314509	2,688,436		112383.1827	2115.647264	2,192
B-010	5,069.10	4,483,577.38	504,339		583118.7314	57,394		2399.19154	45.1655034	47
B-011	26,945.98	23,833,518.79	2,680,936		3099705.895	305,089		12753.47157	240.0879436	249
B-012	11,543.84	10,210,437.58	1,148,531		1327934.57	130,702		5463.671832	102.8552679	107
B-013	100,848.32	89,199,592.14	10,033,700		11600993.71	1,141,830		47731.28433	898.5558044	931
B-014	37,351.23	33,036,885.98	3,716,185		4296664.337	422,900		17678.25346	332.7984461	345
C-001	23,951.98	21,185,350.04	2,383,054		2755294.129	271,190		11336.41917	213.4115055	221
C-002	229,550.81	203,035,993.39	22,838,694		26406166.5	2,599,032		108645.8861	2045.291531	2,119
C-003	8,706.54	7,700,874.74	866,240		1001549.416	98,578		4120.788368	77.57508224	80
H-001	31,375.03	27,750,984.22	3,121,596		3609198.043	355,236		14849.7329	279.5506947	290
H-002	23,477.92	20,766,042.62	2,335,888		2700760.44	265,823		11112.04503	209.1875947	217
H-003	49,677.13	43,939,058.35	4,942,526		5714563.568	562,457		23512.0771	442.6219333	459
H-004	95,836.62	84,766,786.44	9,535,072		11024478.17	1,085,086		45359.26104	853.9017516	885
H-005	2,504.04	2,214,801.23	249,134		288049.4694	28,351		1185.154606	22.31089243	23
H-006	81,531.10	72,113,660.41	8,111,773		9378855.897	923,116		38588.49067	726.4399599	753
H-007	7,487.20	6,622,375.78	744,924		861283.5321	84,772		3543.676533	66.7107781	69
H-008	16,939.19	14,982,587.76	1,685,330		1948584.093	191,790		8017.280562	150.9277214	156
H-009	12,527.47	11,080,455.57	1,246,395		1441086.133	141,839		5929.224142	111.6194304	116
M-001	27,887.97	24,666,707.79	2,774,658		3208067.604	315,755		13199.31644	248.4811077	257
M-002	233,838.42	206,828,354.89	23,265,282		26899388.06	2,647,578		110675.2035	2083.494042	2,158
M-003	122,921.39	108,723,059.93	12,229,816		14140149.12	1,391,747		58178.41945	1095.22627	1,135
M-004	13,041.85	11,535,423.10	1,297,573		1500257.653	147,663		6172.680238	116.2025647	120
M-005	180,342.72	159,511,801.64	17,942,835		20745559.06	2,041,886		85355.80685	1606.848773	1,665
M-006	15,251.68	13,489,994.54	1,517,435		1754462.527	172,683		7218.584186	135.8920216	141
M-007	28,632.21	25,324,974.82	2,848,704		3293679.562	324,181		13551.55943	255.112188	264
M-008	513,737.85	454,397,333.89	51,113,311		59097362.28	5,816,670		243150.9811	4577.390457	4,742

World Logistic Center

Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
M-009	7,203.45	6,371,399.44	716,693		828642.4078	81,559		3409.377452	64.18255746	66
M-010	23,694.16	20,957,307.07	2,357,402		2725635.64	268,271		11214.39189	211.1143051	219
M-011	8,023.91	7,097,092.26	798,323		923023.5332	90,849		3797.700422	71.49285433	74
MV-001	36,466.89	32,254,695.44	3,628,200		4194935.311	412,887		17259.69819	324.9190171	337
MV-002	22,917.19	20,270,089.36	2,280,100		2636258.457	259,474		10846.6572	204.1915889	212
MV-003	93,880.12	83,036,270.52	9,340,413		10799413.19	1,062,934		44433.25068	836.4693275	867
MV-004	33,973.83	30,049,603.20	3,380,158		3908148.561	384,660		16079.73893	302.7059286	314
MV-005	13,935.26	12,325,636.65	1,386,461		1603030.124	157,779		6595.528673	124.1628139	129
MV-006	31,790.01	28,118,032.74	3,162,883		3656935.117	359,935		15046.14296	283.2481732	293
MV-007	1,654.13	1,463,062.09	164,574		190280.8492	18,728		782.8940816	14.7382169	15
MV-008	3,094.82	2,737,341.98	307,912		356009.3307	35,040		1464.769572	27.57472839	29
MV-009	586.95	519,151.07	58,397		67519.011	6,646		277.8011257	5.229689867	5
MV-010	2,507.87	2,218,190.92	249,515		288490.3197	28,395		1186.968446	22.34503852	23
MV-011	1,280.61	1,132,693.23	127,412		147314.2058	14,499		606.111547	11.41023244	12
MV-012	11,983.29	10,599,129.42	1,192,253		1378486.502	135,678		5671.663377	106.7707714	111
MV-013	1,558.01	1,378,047.60	155,011		179224.155	17,640		737.4022705	13.88181985	14
MV-014	5,709.40	5,049,924.00	568,045		656775.8343	64,643		2702.247314	50.87061961	53
MV-015	3,361.61	2,973,319.74	334,457		386699.7903	38,061		1591.042811	29.95186015	31
MV-016	1,707.48	1,510,257.64	169,883		196418.9411	19,333		808.1487294	15.21364325	16
MV-017	5,122.45	4,530,772.93	509,648		589256.8233	57,998		2424.446188	45.64092975	47
MV-018	658.68	582,597.13	65,534		75770.58854	7,458		311.7515272	5.8688164	6
MV-019	2,907.04	2,571,257.64	289,230		334408.9692	32,914		1375.896754	25.90167083	27
MV-020	11,232.04	9,934,658.05	1,117,509		1292067.629	127,172		5316.100406	100.0771914	104
MV-021	11,983.29	10,599,129.42	1,192,253		1378486.502	135,678		5671.663377	106.7707714	111
MV-022	2,134.36	1,887,822.06	212,353		245523.6764	24,166		1010.185912	19.01705406	20
MV-023	17,253.69	15,260,761.54	1,716,621		1984762.422	195,351		8166.133168	153.7299166	159
MV-024	8,484.06	7,504,092.67	844,105		975956.6136	96,059		4015.488999	75.59278989	78
MV-025	4,322.07	3,822,839.66	430,016		497185.4447	48,936		2045.626471	38.50953447	40
MV-026	5,335.89	4,719,555.14	530,884		613809.1909	60,414		2525.464779	47.54263515	49
MV-027	2,234.29	1,976,213.72	222,296		257019.5943	25,297		1057.484871	19.90747121	21
MV-028	3,723.82	3,293,689.54	370,494		428365.9905	42,162		1762.474785	33.17911869	34
MV-029	14,673.70	12,978,776.63	1,459,930		1687975.275	166,139		6945.028143	130.7422467	135
MV-030	4,428.79	3,917,230.77	440,633		509461.6285	50,144		2096.135767	39.46038718	41
MV-031	2,828.02	2,501,364.22	281,368		325318.8712	32,020		1338.496333	25.19759663	26
MV-032	6,136.27	5,427,488.41	610,516		705880.5696	69,476		2904.284496	54.67403043	57
MV-033	2,881.38	2,548,559.78	286,677		331456.9631	32,624		1363.750981	25.67302298	27
MV-034	2,774.66	2,454,168.67	276,059		319180.7793	31,415		1313.241685	24.72217028	26
MV-035	1,333.97	1,179,888.78	132,721		153452.2977	15,104		631.3661948	11.88565879	12
MV-036	2,317.04	2,049,406.83	230,529		266538.8385	26,234		1096.650977	20.64478496	21
MV-037	46,416.50	41,055,054.31	4,618,116		5339479.87	525,539		21968.82769	413.5697985	428
MV-038	15,731.65	13,914,525.09	1,565,188		1809675.517	178,118		7445.753254	140.1685477	145
MV-039	57,996.85	51,297,788.36	5,770,280		6671614.81	656,655		27449.78158	516.7504063	535
MV-040	4,170.64	3,688,898.44	414,949		479765.5078	47,221		1973.953649	37.160272	38

World Logistic Center

Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
MV-041	61,460.69	54,361,529.96	6,114,908		7070074.559	695,873		29089.20972	547.6131349	567
MV-042	18,919.30	16,733,978.55	1,882,337		2176363.986	214,209		8954.461214	168.5704295	175
MV-043	15,959.24	14,115,832.07	1,587,833		1835856.814	180,695		7553.473931	142.1964219	147
MV-044	47,022.86	41,591,369.23	4,678,444		5409231.155	532,405		22255.81331	418.9723892	434
MV-045	10,433.48	9,228,338.48	1,038,058		1200206.123	118,131		4938.144191	92.96205178	96
MV-046	16,203.58	14,331,948.74	1,612,143		1863964.209	183,461		7669.119375	144.3734822	150
MV-047	853.74	755,128.82	84,941		98209.47055	9,666		404.0743647	7.606821624	8
MV-048	103,219.93	91,297,264.21	10,269,659		11873809.76	1,168,682		48853.76235	919.6867912	953
MV-049	108,472.99	95,943,563.27	10,792,302		12478091.51	1,228,159		51340.02732	966.4914782	1,001
MV-050	12,861.16	11,375,605.18	1,279,596		1479472.282	145,617		6087.160627	114.5926323	119
MV-051	27,886.34	24,665,259.09	2,774,495		3207879.191	315,736		13198.54123	248.4665141	257
MV-052	31,860.57	28,180,440.03	3,169,903		3665051.596	360,733		15079.53751	283.8768357	294
MV-053	52,983.36	46,863,387.90	5,271,472		6094891.861	599,891		25076.90494	472.0802887	489
MV-054	73,668.06	65,158,854.54	7,329,455		8474337.644	834,088		34866.92862	656.3804334	680
MV-056	853.74	755,128.82	84,941		98209.47055	9,666		404.0743647	7.606821624	8
MV-057	1,974.28	1,746,235.40	196,427		227109.4006	22,353		934.4219683	17.59077501	18
MV-058	426.87	377,564.41	42,471		49104.73528	4,833		202.0371823	3.803410812	4
MV-059	3,361.61	2,973,319.74	334,457		386699.7903	38,061		1591.042811	29.95186015	31
MV-060	4,909.02	4,341,990.73	488,413		564704.4557	55,581		2323.427597	43.73922434	45
MV-061	21,556.78	19,066,815.04	2,144,749		2479764.716	244,071		10202.77725	192.0703549	199
MV-062	28,973.88	25,627,184.41	2,882,698		3332983.907	328,050		13713.27375	258.1565089	267
MV-063	11,792.32	10,430,216.86	1,173,253		1356518.312	133,516		5581.277162	105.0692237	109
MV-064	4,642.22	4,106,012.97	461,869		534013.9961	52,560		2197.154358	41.36209258	43
MV-065	2,151.54	1,903,020.62	214,063		247500.35	24,360		1018.318764	19.17015746	20
MV-066	10,385.31	9,185,734.16	1,033,266		1194665.151	117,585		4915.346344	92.53287544	96
MV-067	8,590.78	7,598,483.78	854,723		988232.7974	97,267		4065.998295	76.5436426	79
MV-068	5,947.66	5,260,660.46	591,750		684183.4976	67,341		2815.013772	52.99348215	55
MV-069	11,763.95	10,405,126.39	1,170,430		1353255.132	133,194		5567.85109	104.8164738	109
MV-070	9,971.56	8,819,768.66	992,100		1147068.93	112,900		4719.515812	88.8463067	92
MV-071	2,027.41	1,793,230.97	201,713		233221.4837	22,955		959.5696049	18.06418684	19
MV-072	993.02	878,317.21	98,798		114230.9308	11,243		469.9932759	8.847764983	9
MV-073	3,972.07	3,513,268.84	395,193		456923.7232	44,973		1879.973104	35.39105993	37
MV-074	3,952.74	3,496,170.45	393,270		454699.9653	44,754		1870.823644	35.2188186	36
MV-075	30,555.32	27,025,952.56	3,040,040		3514902.906	345,955		14461.76373	272.2470581	282
MV-076	37,321.14	33,010,270.94	3,713,191		4293202.876	422,559		17664.01158	332.5303384	345
MV-077	19,320.20	17,088,575.75	1,922,224		2222481.684	218,748		9144.208489	172.1424791	178
MV-078	18,848.98	16,671,781.22	1,875,341		2168274.813	213,413		8921.179014	167.943882	174
MV-079	15,555.91	13,759,090.69	1,547,704		1789460.25	176,128		7362.579289	138.6027728	144
MV-080	5,305.36	4,692,555.03	527,846		610297.6495	60,069		2511.016846	47.27064846	49
MV-081	29,670.68	26,243,497.22	2,952,024		3413139.442	335,939		14043.06676	264.3649617	274
MV-082	21,193.34	18,745,355.16	2,108,589		2437956.745	239,956		10030.76197	188.8321155	196
MV-083	12,904.30	11,413,757.91	1,283,887		1484434.295	146,106		6107.576402	114.9769654	119
MV-084	3,624.01	3,205,406.43	360,563		416884.1909	41,032		1715.233914	32.28979507	33

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
MV-085	16,766.39	14,829,745.03	1,668,138		1928705.89	189,833		7935.493419	149.3880538	155
MV-086	3,788.48	3,350,884.15	376,927		435804.5256	42,894		1793.079993	33.75527096	35
MV-087	2,482.55	2,195,793.03	246,996		285577.327	28,108		1174.98319	22.11941246	23
MV-088	496.51	439,158.61	49,399		57115.46539	5,622		234.9966379	4.423882491	5
MV-089	496.51	439,158.61	49,399		57115.46539	5,622		234.9966379	4.423882491	5
MV-090	875.44	774,324.54	87,101		100706.0004	9,912		414.3461207	7.800190525	8
MV-091	4,642.22	4,106,012.97	461,869		534013.9961	52,560		2197.154358	41.36209258	43
MV-093	4,634.08	4,098,813.65	461,059		533077.677	52,468		2193.301954	41.28956992	43
MV-094	11,005.95	9,734,682.42	1,095,015		1266059.483	124,612		5209.092141	98.06272856	102
MV-095	20,957.98	18,537,181.28	2,085,172		2410882.363	237,292		9919.366774	186.7350673	193
MV-096	4,161.99	3,681,253.01	414,089		478771.1689	47,123		1969.862528	37.08325542	38
MV-097	11,418.80	10,099,848.00	1,136,091		1313551.669	129,287		5404.494628	101.7412392	105
MV-098	853.74	755,128.82	84,941		98209.47055	9,666		404.0743647	7.606821624	8
MV-099	3,972.07	3,513,268.84	395,193		456923.7232	44,973		1879.973104	35.39105993	37
MV-100	8,026.90	7,099,730.79	798,620		923366.6905	90,883		3799.112313	71.51943361	74
MV-101	1,077.84	953,340.75	107,237		123988.2358	12,204		510.1388627	9.603517746	10
MV-102	4,362.43	3,858,533.28	434,031		501827.634	49,392		2064.726357	38.86909558	40
MV-103	6,669.64	5,899,245.66	663,582		767235.7032	75,515		3156.724882	59.42629672	62
MV-104	15,811.51	13,985,159.67	1,573,134		1818862.009	179,022		7483.550278	140.8800881	146
MV-105	496.51	439,158.61	49,399		57115.46539	5,622		234.9966379	4.423882491	5
MV-106	496.51	439,158.61	49,399		57115.46539	5,622		234.9966379	4.423882491	5
MV-107	480.23	424,759.96	47,780		55242.82718	5,437		227.2918301	4.278837164	4
MV-108	356.05	314,920.23	35,424		40957.44723	4,031		168.515871	3.172362029	3
MV-109	58,961.58	52,151,084.30	5,866,264		6782591.56	667,578		27906.38581	525.3461184	544
MV-110	2,482.55	2,195,793.03	246,996		285577.327	28,108		1174.98319	22.11941246	23
MV-111	662.01	585,544.81	65,866		76153.95386	7,495		313.3288506	5.898509988	6
MV-112	620.64	548,948.26	61,749		71394.33174	7,027		293.7457974	5.529853114	6
MV-113	7,683.68	6,796,159.40	764,472		883885.235	86,997		3636.669282	68.46139462	71
MV-114	682.63	603,782.48	67,917		78525.88267	7,729		323.0879464	6.082227906	6
MV-115	1.19	1,056.50	119		137.4051855	14		0.565341741	0.010642729	0
MV-116	1,333.97	1,179,888.78	132,721		153452.2977	15,104		631.3661948	11.88565879	12
MV-117	2,700.55	2,388,615.84	268,686		310655.202	30,576		1278.163936	24.06182108	25
MV-118	480.23	424,759.96	47,780		55242.82718	5,437		227.2918301	4.278837164	4
MV-119	1,867.56	1,651,844.30	185,809		214833.2168	21,145		883.9126728	16.6399223	17
MV-120	22,696.90	20,075,237.70	2,258,182		2610916.716	256,980		10742.39081	202.2287426	210
MV-121	521.08	460,887.29	51,843		59941.42377	5,900		246.623799	4.642767301	5
MV-123	1,676.64	1,482,974.50	166,814		192870.589	18,983		793.5493419	14.93880538	15
MV-124	16,766.39	14,829,745.03	1,668,138		1928705.89	189,833		7935.493419	149.3880538	155
MV-125	993.02	878,317.21	98,798		114230.9308	11,243		469.9932759	8.847764983	9
MV-126	12,539.34	11,090,954.58	1,247,576		1442451.599	141,974		5934.842231	111.7251926	116
MV-127	14,411.90	12,747,216.42	1,433,883		1657859.345	163,175		6821.118758	128.4096152	133
MV-129	57,271.89	50,656,566.00	5,698,151		6588219.625	648,447		27106.65931	510.2910262	529
MV-130	9,403.87	8,317,651.50	935,619		1081765.291	106,473		4450.829642	83.78820861	87

World Logistic Center
Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
MV-131	63,580.03	56,236,065.48	6,325,767		7313870.234	719,869		30092.28592	566.4963464	587
MV-132	46,625.35	41,239,781.35	4,638,896		5363504.838	527,904		22067.67634	415.430654	430
P-001	7,310.17	6,465,790.54	727,311		840918.5916	82,768		3459.886748	65.13341016	67
P-002	25,432.01	22,494,426.19	2,530,307		2925548.093	287,948		12036.91437	226.5985386	235
P-003	19,595.36	17,331,955.38	1,949,601		2254134.806	221,864		9274.442521	174.594174	181
P-004	6,234.66	5,514,512.25	620,305		717198.5921	70,590		2950.85152	55.55066868	58
P-005	19,497.88	17,245,726.75	1,939,902		2242920.205	220,760		9228.301016	173.7255462	180
P-006	21,748.82	19,236,670.63	2,163,855		2501855.554	246,246		10293.66809	193.7814024	201
P-007	43,130.08	38,148,241.53	4,291,141		4961429.749	488,330		20413.3732	384.287899	398
P-008	8,735.78	7,726,729.37	869,148		1004911.981	98,909		4134.623351	77.83552995	81
P-009	18,438.70	16,308,895.90	1,834,521		2121079.191	208,768		8726.996713	164.2883417	170
P-010	72,057.37	63,734,207.54	7,169,202		8289052.931	815,852		34104.59071	642.0291926	665
P-011	35,182.68	31,118,821.37	3,500,430		4047207.417	398,347		16651.88456	313.4767424	325
P-012	16,459.80	14,558,568.82	1,637,634		1893437.641	186,362		7790.385262	146.6563491	152
P-014	50,864.02	44,988,852.38	5,060,613		5851096.187	575,895		24073.82874	453.1970771	470
P-015	33,096.16	29,273,308.98	3,292,836		3807186.391	374,723		15664.33882	294.8858965	306
P-016	55,526.56	49,112,830.52	5,524,503		6387446.671	628,686		26280.59637	494.7401425	513
P-017	24,584.28	21,744,611.99	2,445,963		2828029.824	278,349		11635.68389	219.045254	227
P-018	65,572.20	57,998,128.86	6,523,974		7543038.168	742,425		31035.17755	584.2465653	605
P-019	29,568.95	26,153,519.52	2,941,903		3401437.25	334,787		13994.91911	263.4585675	273
P-020	36,940.00	32,673,154.04	3,675,270		4249358.606	418,244		17483.61812	329.1343773	341
P-021	7,205.74	6,373,420.75	716,920		828905.2931	81,585		3410.459071	64.20291926	67
P-022	16,106.94	14,246,469.92	1,602,528		1852847.126	182,367		7623.3791	143.5124078	149
P-023	7,629.60	6,748,327.86	759,092		877664.428	86,384		3611.074311	67.97956157	70
P-024	62,054.11	54,886,399.91	6,173,948		7138337.348	702,592		29370.07106	552.9004341	573
P-025	43,997.38	38,915,357.31	4,377,431		5061198.202	498,149		20823.86186	392.0154717	406
P-026	29,419.63	26,021,444.37	2,927,047		3384260.008	333,096		13924.24483	262.128103	272
P-027	36,622.10	32,391,973.72	3,643,642		4212789.255	414,645		17333.15669	326.3018955	338
P-028	24,286.18	21,480,948.87	2,416,305		2793738.702	274,974		11494.59604	216.3892326	224
P-030	26,252.58	23,220,211.29	2,611,947		3019941.219	297,238		12425.28671	233.909765	242
P-031	3,103.18	2,744,741.28	308,745		356971.6587	35,135		1468.728987	27.64926557	29
P-032	77,005.62	68,110,900.38	7,661,519		8858270.624	871,877		36446.58763	686.1179901	711
P-033	99,247.55	87,783,725.60	9,874,435		11416850.95	1,123,706		46973.6449	884.2930138	916
P-034	134,232.57	118,727,718.41	13,355,199		15441320.76	1,519,815		63531.97755	1196.008613	1,239
P-035	1,655.03	1,463,862.02	164,664		190384.8846	18,739		783.3221265	14.74627497	15
P-036	152,168.40	134,591,824.87	15,139,688		17504552.16	1,722,889		72020.96452	1355.81635	1,405
P-037	9,764.68	8,636,785.91	971,517		1123270.819	110,558		4621.600546	87.00302233	90
P-038	11,899.03	10,524,607.96	1,183,870		1368794.496	134,724		5631.786458	106.0200764	110
P-039	33,218.45	29,381,469.68	3,305,002		3821253.401	376,108		15722.21632	295.9754578	307
P-040	6,509.79	5,757,857.27	647,678		748847.2129	73,705		3081.067031	58.00201489	60
P-041	5,427.71	4,800,767.65	540,019		624371.4115	61,454		2568.922122	48.36073271	50
P-042	3,254.89	2,878,928.64	323,839		374423.6065	36,853		1540.533515	29.00100744	30
P-043	3,041.46	2,690,146.43	302,604		349871.2388	34,436		1439.514924	27.09930204	28

World Logistic Center

Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
P-044	3,889.32	3,440,075.74	386,960		447404.4789	44,036		1840.806997	34.65374618	36
P-045	3,103.18	2,744,741.28	308,745		356971.6587	35,135		1468.728987	27.64926557	29
P-046	8,972.10	7,935,751.98	892,661		1032096.747	101,584		4246.472716	79.94112794	83
P-047	27,799.99	24,588,882.28	2,765,904		3197945.885	314,758		13157.6715	247.6971291	257
P-048	4,001.92	3,539,666.35	398,163		460356.8932	45,311		1894.098584	35.65697636	37
P-049	6,082.91	5,380,292.86	605,207		699742.4777	68,872		2879.029848	54.19860407	56
P-050	9,580.79	8,474,140.02	953,222		1102117.652	108,476		4534.567668	85.36460219	88
P-051	1,867.56	1,651,844.30	185,809		214833.2168	21,145		883.9126728	16.6399223	17
P-052	4,375.43	3,870,035.21	435,325		503323.5366	49,540		2070.881119	38.98496083	40
P-053	8,590.78	7,598,483.78	854,723		988232.7974	97,267		4065.998295	76.5436426	79
P-054	12,699.42	11,232,541.23	1,263,503		1460865.874	143,786		6010.606175	113.1514717	117
P-055	53,891.96	47,667,037.59	5,361,871		6199411.79	610,178		25506.94313	480.1758873	497
P-056	357.19	315,930.25	35,538		41088.80771	4,044		169.0563423	3.182536565	3
P-057	1,765.41	1,561,488.08	175,645		203081.7968	19,988		835.5624724	15.72971522	16
P-058	10,856.43	9,602,434.04	1,080,139		1248859.711	122,919		5138.325168	96.73051897	100
P-059	12,966.21	11,468,518.99	1,290,047		1491556.334	146,807		6136.879414	115.5286034	120
P-060	538.92	476,670.38	53,619		61994.1179	6,102		255.0694313	4.801758873	5
P-061	14,835.34	13,121,748.61	1,476,012		1706569.721	167,969		7021.533382	132.1824808	137
R-001	95,618.14	84,573,540.75	9,513,334		10999345.3	1,082,613		45255.85401	851.9550831	883
R-002	24,701.77	21,848,536.23	2,457,653		2841545.856	279,680		11691.29443	220.0921392	228
R-003	23,634.37	20,904,425.86	2,351,454		2718758.091	267,594		11186.0948	210.581604	218
R-004	8,937.16	7,904,854.90	889,185		1028078.377	101,189		4229.939483	79.62988484	82
R-005	74,895.55	66,244,558.88	7,451,581		8615540.635	847,986		35447.89611	667.3173213	691
R-006	3,185.93	2,817,934.38	316,978		366490.9029	36,072		1507.895093	28.38657932	29
R-007	6,718.65	5,942,596.61	668,459		772873.7796	76,070		3179.922259	59.86299434	62
R-008	773.82	684,435.49	76,989		89015.33712	8,761		366.2458986	6.894689356	7
R-009	1,051,206.77	929,784,632.27	104,587,698		120924607.5	11,902,028		497533.8293	9366.224195	9,703
R-010	2,822.14	2,496,163.87	280,783		324642.5307	31,953		1335.713589	25.14521063	26
R-011	23,686.51	20,950,542.71	2,356,641		2724755.891	268,185		11210.77224	211.0461641	219
R-012	7,350.60	6,501,549.02	731,333		845569.2174	83,225		3479.021345	65.49362472	68
R-013	160.08	141,586.65	15,927		18414.27573	1,812		75.76394338	1.426279055	1
R-014	462.03	408,665.40	45,969		53149.62375	5,231		218.6795258	4.11670794	4
R-015	9,161.51	8,103,287.39	911,506		1053885.828	103,729		4336.122008	81.62880285	85
R-016	81.41	72,006.25	8,100		9364.886826	922		38.53101614	0.725357985	1
R-017	11,378.33	10,064,051.37	1,132,064		1308896.082	128,828		5385.339619	101.3806404	105
R-018	327,603.52	289,762,893.12	32,594,251		37685570.3	3,709,210		155054.0166	2918.938565	3,024
R-019	2,275.67	2,012,810.27	226,413		261779.2164	25,766		1077.067924	20.27612809	21
R-020	61,945.98	54,790,761.11	6,163,190		7125898.893	701,368		29318.89411	551.9370127	572
R-021	800.38	707,933.27	79,633		92071.37864	9,062		378.8197169	7.131395273	7
R-022	480.23	424,759.96	47,780		55242.82718	5,437		227.2918301	4.278837164	4
R-023	962.75	851,545.14	95,787		110749.0475	10,900		455.6673685	8.578075462	9
R-024	266,794.49	235,977,757.00	26,544,180		30690459.55	3,020,715		126273.239	2377.131758	2,463
R-025	8,606.16	7,612,082.49	856,252		990001.4002	97,441		4073.275058	76.68062985	79

World Logistic Center

Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
R-026	94,052.79	83,188,994.76	9,357,592		10819275.98	1,064,889		44514.97441	838.0078014	868
R-027	433.29	383,242.98	43,109		49843.27079	4,906		205.0758228	3.860614134	4
R-028	2,802.47	2,478,766.35	278,826		322379.8696	31,730		1326.404065	24.96995605	26
R-029	454.49	401,992.02	45,218		52281.70609	5,146		215.1085538	4.049483316	4
R-030	24,977.76	22,092,642.31	2,485,112		2873293.457	282,804		11821.91719	222.551152	231
R-031	1,489.53	1,317,475.82	148,198		171346.3962	16,865		704.9899138	13.27164747	14
R-032	2,667.29	2,359,200.58	265,377		306829.5542	30,200		1262.423639	23.76550525	25
R-033	1,241.27	1,097,896.51	123,498		142788.6635	14,054		587.4915949	11.05970623	11
R-034	631.82	558,844.24	62,862		72681.36899	7,154		299.0412008	5.629540677	6
R-035	4,220.33	3,732,848.15	419,893		485481.4559	47,784		1997.471422	37.60300118	39
R-036	2,565.30	2,268,986.13	255,229		295096.5712	29,045		1214.149296	22.85672621	24
R-037	718.56	635,560.50	71,492		82658.82386	8,136		340.0925751	6.402345164	7
R-038	419.16	370,743.63	41,703		48217.64725	4,746		198.3873355	3.734701346	4
R-039	21,450.28	18,972,611.66	2,134,152		2467512.948	242,865		10152.36841	191.1213933	198
R-040	287.42	254,224.20	28,597		33063.52955	3,254		136.03703	2.560938066	3
R-041	1,200.91	1,062,199.09	119,482		138145.9787	13,597		568.3896701	10.70010674	11
R-042	31,908.62	28,222,939.74	3,174,684		3670578.962	361,277		15102.27938	284.3049582	295
R-043	2,667.94	2,359,777.57	265,442		306904.5955	30,207		1262.73239	23.77131758	25
R-044	479.04	423,707.00	47,661		55105.88258	5,424		226.7283834	4.268230109	4
R-045	1,970.31	1,742,724.93	196,032		226652.8406	22,308		932.5434914	17.55541211	18
R-046	1,912.54	1,691,630.15	190,285		220007.6283	21,654		905.2023409	17.04070672	18
R-047	4,566.40	4,038,949.20	454,325		525291.912	51,702		2161.268098	40.68652293	42
R-048	9,017.92	7,976,284.29	897,220		1037368.24	102,103		4268.161818	80.34943181	83
R-049	6,483.33	5,734,459.48	645,046		745804.1759	73,406		3068.546718	57.76631623	60
R-050	204.50	180,876.95	20,346		23524.23724	2,315		96.78843767	1.822071492	2
R-051	282.75	250,093.06	28,132		32526.24719	3,201		133.8264283	2.519322822	3
R-052	1,707.48	1,510,257.64	169,883		196418.9411	19,333		808.1487294	15.21364325	16
R-053	1,547.41	1,368,670.99	153,956		178004.6654	17,520		732.384786	13.78736419	14
R-054	1,333.97	1,179,888.78	132,721		153452.2977	15,104		631.3661948	11.88565879	12
R-055	1,067.18	943,911.03	106,177		122761.8382	12,083		505.0929559	9.508527031	10
R-056	6,803.31	6,017,474.52	676,881		782612.1435	77,029		3219.989915	60.61728002	63
R-057	6,220.74	5,502,200.78	618,920		715597.4045	70,433		2944.263572	55.42664858	57
R-058	328.86	290,874.86	32,719		37830.18839	3,723		155.6490352	2.93013997	3
R-059	485.03	429,003.34	48,257		55794.70611	5,492		229.5624882	4.321582986	4
R-060	7,063.05	6,247,217.81	702,724		812491.7702	79,970		3342.927052	62.93160865	65
R-061	50,951.49	45,066,218.09	5,069,316		5861158.106	576,886		24115.22763	453.9764238	470
R-062	219.28	193,951.88	21,817		25224.71775	2,483		103.7849175	1.953782333	2
R-063	868.89	768,527.56	86,449		99952.06444	9,838		411.2441164	7.74179436	8
R-064	266.79	235,977.76	26,544		30690.45955	3,021		126.273239	2.377131758	2
R-065	3,308.25	2,926,124.19	329,148		380561.6984	37,457		1565.788163	29.47643379	31
R-066	736.52	651,449.51	73,279		84725.29446	8,339		348.5948895	6.562403793	7
RC-001	66,751.98	59,041,634.80	6,641,354		7678752.979	755,783		31593.56439	594.7583658	616
RC-002	106,717.80	94,391,102.80	10,617,672		12276183.82	1,208,286		50509.29559	950.8527031	985

World Logistic Center

Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
RC-003	182,060.56	161,031,221.37	18,113,748		20943169.59	2,061,336		86168.85827	1622.154711	1,681
RC-005	40,019.17	35,396,663.55	3,981,627		4603568.932	453,107		18940.98584	356.5697636	369
RC-006	41,719.15	36,900,282.40	4,150,763		4799124.455	472,355		19745.58211	371.7165307	385
RC-007	67,252.62	59,484,448.07	6,691,164		7736343.758	761,451		31830.51666	599.2190637	621
RC-009	35,446.82	31,352,449.76	3,526,710		4077592.327	401,338		16776.90064	315.8302077	327
RC-010	224,737.81	198,778,929.89	22,359,835		25852507.39	2,544,538		106367.9036	2002.407824	2,074
RC-011	34,502.76	30,517,438.20	3,432,783		3968993.58	390,649		16330.08049	307.418684	318
RC-012	15,357.02	13,583,173.44	1,527,916		1766581.055	173,876		7268.444821	136.830663	142
RC-013	26,519.37	23,456,189.05	2,638,491		3050631.679	300,259		12551.55995	236.2868967	245
RC-014	13,240.24	11,710,896.14	1,317,311		1523079.077	149,909		6266.577012	117.9701998	122
RC-015	7,576.96	6,701,768.30	753,855		871609.0511	85,788		3586.159987	67.51054192	70
RC-017	1,111.37	983,000.24	110,574		127845.6476	12,583		526.0098495	9.902293853	10
RC-018	800.38	707,933.27	79,633		92071.37864	9,062		378.8197169	7.131395273	7
RC-019	6,323.08	5,592,720.56	629,102		727370.0971	71,592		2992.701297	56.33850333	58
RC-020	335.33	296,594.90	33,363		38574.1178	3,797		158.7098684	2.987761076	3
RC-021	339.09	299,925.68	33,737		39007.30791	3,839		160.4921916	3.021313848	3
RC-022	6,990.02	6,182,617.23	695,458		804090.0401	79,143		3308.358861	62.28085205	65
RC-023	1,901.21	1,681,605.62	189,157		218703.873	21,526		899.8381525	16.93972426	18
RC-024	6,916.20	6,117,325.38	688,113		795598.4056	78,307		3273.420766	61.62313189	64
RC-025	3,081.08	2,725,195.01	306,546		354429.5368	34,885		1458.269647	27.45236533	28
RC-026	106.72	94,391.10	10,618		12276.18382	1,208		50.50929559	0.950852703	1
RC-027	6,840.07	6,049,994.47	680,539		786841.5776	77,445		3237.391555	60.94487114	63
RC-028	670.66	593,189.80	66,726		77148.23561	7,593		317.4197368	5.975522153	6
RC-029	975.09	862,455.60	97,014		112168.024	11,040		461.5056244	8.687982387	9
RC-030	53,366.96	47,202,678.83	5,309,638		6139018.878	604,234		25258.46173	475.49815	493
RC-031	6,546.39	5,790,237.86	651,320		753058.5217	74,120		3098.394096	58.32820211	60
RC-032	38,738.56	34,263,970.32	3,854,215		4456254.726	438,608		18334.8743	345.1595312	358
RC-033	20,489.82	18,123,091.74	2,038,593		2357027.293	231,991		9697.784753	182.563719	189
RC-034	23,051.04	20,388,478.20	2,293,417		2651655.705	260,990		10910.00785	205.3841839	213
RC-035	156,445.96	138,375,296.88	15,565,275		17996617.58	1,771,321		74045.5251	1393.929313	1,444
RC-036	24,971.96	22,087,518.05	2,484,535		2872627.014	282,739		11819.17517	222.4995325	231
RC-037	29,987.70	26,523,899.89	2,983,566		3449607.653	339,528		14193.11206	267.1896096	277
RC-038	77,303.14	68,374,057.85	7,691,120		8892495.985	875,246		36587.40492	688.7689178	714
RC-039	2,081.00	1,840,626.50	207,045		239385.5845	23,562		984.9312639	18.54162771	19
RD-001	4,375.43	3,870,035.21	435,325		503323.5366	49,540		2070.881119	38.98496083	40
RD-002	2,934.74	2,595,755.33	291,986		337595.055	33,228		1389.005629	26.14844933	27
RD-003	5,495.97	4,861,141.79	546,810		632223.4667	62,227		2601.228723	48.96891421	51
RD-004	3,575.05	3,162,101.94	355,692		411252.1579	40,478		1692.061402	31.85356555	33
RD-005	21,218.86	18,767,924.57	2,111,128		2440892.044	240,245		10042.83901	189.0594693	196
RD-006	5,775.30	5,108,211.60	574,602		664356.5203	65,389		2733.43739	51.4577822	53
RD-007	15,298.85	13,531,718.63	1,522,128		1759889.019	173,217		7240.911017	136.3123309	141
RD-008	3,310.06	2,927,724.04	329,328		380769.7693	37,477		1566.644253	29.49254994	31
RD-009	5,245.72	4,639,803.51	521,913		603436.9672	59,393		2482.789162	46.73925381	48

World Logistic Center

Cumulative Energy - Transportation Fuel

On-Road Operational Transportation Fuel Calculations

Project ID	CO2E (MT)	CO2e Gas (kg)	Gasoline (gal)		CO2e Dsl (kg)	Dsl (gal)		CO2e NG (kg)	MCF	MMBtu
RD-010	5,265.21	4,657,037.65	523,851		605678.3808	59,614		2492.011265	46.91286267	49
RD-011	6,642.48	5,875,227.20	660,880		764111.9443	75,208		3143.872446	59.18434575	61
RD-012	25,486.56	22,542,676.74	2,535,734		2931823.394	288,565		12062.73355	227.0845924	235
RD-013	42,937.71	37,978,089.55	4,272,001		4939300.364	486,152		20322.32376	382.573866	396
RD-014	32,722.52	28,942,828.37	3,255,661		3764205.214	370,493		15487.49649	291.5567863	302
RD-015	17,929.57	15,858,570.47	1,783,866		2062511.406	203,003		8486.02463	159.7519697	166
RD-016	30,295.16	26,795,847.86	3,014,156		3484976.276	343,009		14338.6332	269.9290888	280
SB-001	26,039.33	23,031,593.09	2,590,730		2995410.182	294,824		12324.35588	232.0097117	240
SB-002	13,286.95	11,752,212.96	1,321,959		1528452.601	150,438		6288.685912	118.3864065	123
SB-003	25,159.17	22,253,098.49	2,503,161		2894161.838	284,858		11907.77834	224.1675139	232
SB-004	32,960.73	29,153,526.16	3,279,362		3791607.847	373,190		15600.24225	293.6792593	304
SB-005	11,953.05	10,572,380.31	1,189,244		1375007.604	135,335		5657.349753	106.5013131	110
SB-006	23,015.00	20,356,593.42	2,289,831		2647508.879	260,582		10892.94609	205.0629911	212
SB-007	1,814.20	1,604,648.75	180,500		208695.1249	20,541		858.658025	16.16449595	17
SB-008	2,134.36	1,887,822.06	212,353		245523.6764	24,166		1010.185912	19.01705406	20
SJ-001	200,986.44	177,771,021.77	19,996,740		23120290.75	2,275,619		95126.43479	1790.783787	1,855
SJ-002	17,128.21	15,149,772.00	1,704,136		1970327.503	193,930		8106.741942	152.6118588	158
SJ-003	30,948.16	27,373,419.81	3,079,125		3560093.307	350,403		14647.69572	275.7472839	286
SJ-004	32,709.00	28,930,873.01	3,254,316		3762650.34	370,340		15481.0991	291.4363535	302
WLC-001	3,201.53	2,831,733.08	318,530		368285.5146	36,249		1515.278868	28.52558109	30

4 EMFAC2017 Output

EMFAC2017 (v1.0.2) Emission Rates
Region Type: County
Region: RIVERSIDE
Calendar Year: 2035
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

	Region	Calendar Y	Vehicle Cat	Model Yea	Speed	Fuel	Population	% Fleet Mix	VMT	Trips	CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
HHDTGAS	RIVERSIDE	2035	HHDT	Aggregated	Aggregated	GAS	11.25743	0.0021%	1362.518	225.2387	1586.73452	0	37.26037428	0.065129128	0	0.000229589	0.128897699	0	0.00027986
HHDTDSL	RIVERSIDE	2035	HHDT	Aggregated	Aggregated	DSL	32047.38	7.2135%	4793615	376234.1	987.0145677	13331.11395	0	0.000827977	0.312160187	0	0.155144945	2.095465466	0
HHDTNG	RIVERSIDE	2035	HHDT	Aggregated	Aggregated	NG	771.7684	0.0473%	31452.33	3009.897	2714.207766	3174.530747	0	4.062575476	1.169985888	0	0.553309009	0.64714886	0
LDAGAS	RIVERSIDE	2035	LDA	Aggregated	Aggregated	GAS	1026177	52.6986%	35020112	4821114	202.4034979	0	41.27083008	0.000801877	0	0.022777982	0.002933451	0	0.018812593
LDADSL	RIVERSIDE	2035	LDA	Aggregated	Aggregated	DSL	12272.66	0.6445%	428289.8	58176.99	154.6038399	0	0	0.000208084	0	0	0.024301571	0	0
LDAELEC	RIVERSIDE	2035	LDA	Aggregated	Aggregated	ELEC	57077.13		1978520	275511.7	0	0	0	0	0	0	0	0	0
LDT1GAS	RIVERSIDE	2035	LDT1	Aggregated	Aggregated	GAS	113196	5.6691%	3767315	521643.5	238.9849513	0	48.88482736	0.001367474	0	0.027431304	0.00354225	0	0.020456959
LDT1DSL	RIVERSIDE	2035	LDT1	Aggregated	Aggregated	DSL	14.31294	0.0007%	492.3036	67.07345	295.4050304	0	0	0.000649011	0	0	0.046433557	0	0
LDT1ELEC	RIVERSIDE	2035	LDT1	Aggregated	Aggregated	ELEC	3465.608		120930.7	16754.53	0	0	0	0	0	0	0	0	0
LDT2GAS	RIVERSIDE	2035	LDT2	Aggregated	Aggregated	GAS	339088.6	17.3331%	11518451	1579591	237.2422535	0	49.66649578	0.00132571	0	0.031275129	0.003315134	0	0.020527303
LDT2DSL	RIVERSIDE	2035	LDT2	Aggregated	Aggregated	DSL	3254.042	0.1719%	114262.6	15447.74	206.4704	0	0	0.000596777	0	0	0.032454272	0	0
LDT2ELEC	RIVERSIDE	2035	LDT2	Aggregated	Aggregated	ELEC	12891.58		309954.7	62226.35	0	0	0	0	0	0	0	0	0
LHDT1GAS	RIVERSIDE	2035	LHDT1	Aggregated	Aggregated	GAS	20955.52	0.9951%	661305.6	312206	661.4861766	104.9596334	16.4592231	0.001267662	0.095162438	0.01235915	0.004078523	0.002679073	0.030854246
LHDT1DSL	RIVERSIDE	2035	LHDT1	Aggregated	Aggregated	DSL	22345.02	1.0374%	689370.8	281072.3	398.9689362	115.5686394	0	0.001744319	0.005098128	0	0.062712361	0.018165781	0
LHDT2GAS	RIVERSIDE	2035	LHDT2	Aggregated	Aggregated	GAS	3380.417	0.1555%	103349.9	50363.18	762.3995063	121.6684155	18.82195286	0.001127969	0.096729654	0.012247464	0.004506229	0.002660779	0.031406874
LHDT2DSL	RIVERSIDE	2035	LHDT2	Aggregated	Aggregated	DSL	9178.708	0.4102%	272579.8	115456.6	437.009078	187.6016974	0	0.001785213	0.005098128	0	0.068691741	0.029488374	0
MCYGAS	RIVERSIDE	2035	MCY	Aggregated	Aggregated	GAS	43796.89		281780.6	87593.78	208.732552	0	57.41393517	0.313610059	0	0.230491682	0.064206248	0	0.01494368
MDVGAS	RIVERSIDE	2035	MDV	Aggregated	Aggregated	GAS	230649.6	11.3656%	7552836	1059811	291.7169927	0	61.81923646	0.001504112	0	0.035387376	0.003594324	0	0.021957275
MDVDSL	RIVERSIDE	2035	MDV	Aggregated	Aggregated	DSL	7697.93	0.3955%	262831.4	36182.69	272.565321	0	0	0.000249843	0	0	0.042843473	0	0
MDVELEC	RIVERSIDE	2035	MDV	Aggregated	Aggregated	ELEC	9378.102		226957.7	45374.87	0	0	0	0	0	0	0	0	0
MHGAS	RIVERSIDE	2035	MH	Aggregated	Aggregated	GAS	4107.681		34638.88	410.9324	1385.171447	0	21.94738977	0.003428156	0	0.028884691	0.012915734	0	0.043411309
MHDSL	RIVERSIDE	2035	MH	Aggregated	Aggregated	DSL	2387.596		16996.27	238.7596	823.1610404	0	0	0.002276371	0	0	0.129389452	0	0
MHDTGAS	RIVERSIDE	2035	MHDT	Aggregated	Aggregated	GAS	3103.367	0.2302%	152965.2	62092.18	1359.260719	465.4649771	31.43081093	0.002658021	0.275613995	0.031220376	0.008768056	0.008544812	0.029778459
MHDTDSL	RIVERSIDE	2035	MHDT	Aggregated	Aggregated	DSL	19033.83	1.6297%	1082985	189748	730.94652	640.270784	0	0.000330644	0.002747403	0	0.114894614	0.100641651	0
OBUSGAS	RIVERSIDE	2035	OBUS	Aggregated	Aggregated	GAS	630.9891		25215.57	12624.83	1353.01178	328.2707739	22.38481767	0.003355668	0.201094345	0.025395366	0.010142377	0.005828255	0.025334442
OBUSDSL	RIVERSIDE	2035	OBUS	Aggregated	Aggregated	DSL	527.6401		34295.76	4947.738	881.9809888	1895.303384	0	0.000460792	0.031173099	0	0.138635129	0.297915298	0
SBUSGAS	RIVERSIDE	2035	SBUS	Aggregated	Aggregated	GAS	651.9289		24179.42	2607.716	803.4340821	2430.954073	42.91993954	0.002965648	2.393602081	0.05328052	0.015113079	0.087151971	0.058376722
SBUSDSL	RIVERSIDE	2035	SBUS	Aggregated	Aggregated	DSL	1384.753		44206.81	15979.86	1001.896198	3113.087544	0	0.002388178	0.012509341	0	0.15748413	0.48933401	0
UBUSGAS	RIVERSIDE	2035	UBUS	Aggregated	Aggregated	GAS	177.0694		24930.46	708.2777	1104.471064	0	43.09236624	0.003498079	0	0.051347057	0.013301445	0	0.049770268
UBUSDSL	RIVERSIDE	2035	UBUS	Aggregated	Aggregated	DSL	0		0	0	0	0	0	0	0	0	0	0	0
UBUSELEC																			
UBUSNG	RIVERSIDE	2035	UBUS	Aggregated	Aggregated	NG	338.7765		45825.53	1355.106	1740.489106	0	0	5.230572906	0	0	0.35481009	0	0

* Vehicle Types used = HHDT, LDA, LDT1, LDT2,LHDT1,LHDT2,MDV, MHDT 100.0000% 66453575

% Gasoline	88.4493%
% Dsl	11.5034%
% NG	0.0473%
	100.0000%
% Electric	0.0000%
	100.0000%