AIR QUALITY AND GREENHOUSE GAS ASSESSMENT
FOR
MISSION BOULEVARD CONDOS
COUNTY OF SAN BERNARDINO, CALIFORNIA

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July 2019

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1.0 INTRODUCTION

The Project Proponent has submitted an application to the County of San Bernardino for the development of an approximate 4.66-acre site with 40 two-story detached residential condominiums and two single-story single-family detached residential in unincorporated San Bernardino County within the Sphere of Influence (SOI) of the City of Montclair. The site is located at the northern terminus of Bel Air Avenue, south of Mission Boulevard, between Laurel Benson Avenue and Vernon Avenue (APN 1011-351-02). The Project Site is currently vacant with the exception of three billboard structures and dilapidated concrete foundations. Refer to Figures 1, 2, and 3 for a regional location map, project vicinity map, and site plan, respectively.

This report is a study of the potential impacts the Proposed Project may have on the local and regional air quality in the vicinity during construction and ultimate operational use. This assessment discusses the existing air quality in the vicinity/region and the potential air quality impacts associated with the Proposed Project. Background material, including air quality emissions data output, is included in Appendix A.

2.0 GENERAL SETTING

2.1 CLIMATE

The Proposed Project is located in western San Bernardino County. The study area has a Mediterranean climate with warm dry summers, mild winters with moderate rainfall. The climate is modified by the cold California Current in the Pacific Ocean, the mountain ranges that outline the Los Angeles Basin and San Bernardino Valley, and the deserts to the north and east.

The California Current causes a cold layer of air to form close to the surface. As the air above this layer is warm, air within it cannot rise normally, a phenomenon known as an inversion. The inversion traps pollutants close to the surface, causing higher than usual concentrations of ozone, suspended particles and other ingredients of smog. The mountains prevent cooler marine air from traveling very far inland, making the deserts drier and hotter than the coastal regions. The hot desert air rises, and cooler marine air from the west moves in the form of a sea breeze. A sea breeze is normal in all coastal regions, but in southern California it is exceptionally strong due to the great contrasts in temperature and the funneling effects of the mountains. In this region, the sea breeze brings higher quantities of pollutants from the Los Angeles metropolitan area to the inland valleys, exacerbating problems caused by local pollution sources.

The topographic and climatologic regional effects summarized above cause numerous days when air pollutants exceed federal and/or State air quality standards. This has led to aggressive air quality management measures being required by the federal, State, and local governments.

2.2 APPLICABLE POLICES, PLANS, AND REGULATIONS

A combination of climatic and geographic factors, and urbanization cause the interior valleys of Southern California to have higher air pollution levels than the coastal areas. The South Coast Air Quality Management District (SCAQMD) monitors and enforces the federal and state air quality standards in association with federal, state, local, and regional governmental agencies. These agencies work jointly as well as individually to reduce air pollution through legislation, regulation, policy making, education, and a variety of programs. These agencies include:

Environmental Protection Agency (EPA) - Responsible for setting and enforcing the national standards for atmospheric pollutants, including the Clean Air Act (CAA), as amended.

California Air Resources Board (CARB) - Part of the California Environmental Protection Agency (Cal-EPA) and responsible for assuring implementation of the California Clean Air Act (CCAA), responding to federal regulations, and regulating emission standards.

SCAQMD - Primarily responsible for comprehensive air pollution control in the South Coast Air Basin (SCAB), and the Riverside County portions of the Salton Sea Air Basin (SSAB) and Mojave Desert Air Basin (MDAB). SCAQMD implements the CAA and CCAA and works directly with federal, state, and local agencies.

Local Governments - Have the authority and responsibility to reduce air pollution through their local land use decision-making authority and the California Environmental Quality Act.

Air emissions from the Proposed Project are subject to federal, state, and local rules and regulations as implemented through provisions of the federal Clean Air Act, California Clean Air Act, and the 2016 Air Quality Management Plan (AQMP) adopted and updated regularly by SCAQMD. The following is an overview of current rules and regulations.

Federal Clean Air Act. The federal Clean Air Act was established in an effort to assure that acceptable levels of air quality are maintained in all areas of the United States. These levels are based upon health-related exposure limits and are referred to as National Ambient Air Quality Standards (NAAQS). The NAAQS establish maximum allowable concentrations of specific pollutants in the atmosphere and characterize the amount of exposure deemed safe of the public. The NAAQS set standards for Nitrogen dioxide (NO_2), Sulfur dioxide (SO_2), Particulate Matter less than 10 microns, aerodynamic diameter (PM_{10}), Particulate Matter less than 2.5 microns, aerodynamic diameter ($PM_{2.5}$), Ozone (O_3), Lead (Pb), and Carbon Monoxide (CO).

Primary and secondary NAAQS have been established and are shown in Table 1. Primary standards reflect levels of air quality deemed necessary by the EPA to provide an adequate margin of safety to protect public health. Areas found to be in violation of primary standards are termed “nonattainment areas”. Secondary standards reflect levels of air quality necessary to protect public welfare from the known or anticipated adverse effects of a pollutant.

Figure 1: Regional Location

Figure 2: Project Vicinity

Figure 3: Site Plan

Table 1
State and Federal
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]
Ozone (O_3)[8]	1-Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	---	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 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 Gravimetic Analysis
	Annual Arithmetic Mean	20 µg/m^3		---		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	---		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	---	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–		
Nitrogen Dioxide (NO_2)[10]	1-Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	---	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppb (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1-Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppd (196 µg/m^3)	–	Ultraviolet Flourescence, Spectrophotometry (Pararosaniline Method)
	3-Hour	---		--	0.5 ppm (1300 µg/m^3)	
	24-Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[10]	---	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[10]	–	
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	–		0.15 µg/m^3		
Visibility-Reducing Particles[14]	8-Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No Federal Standards**		
Sulfates	24-Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: ARB, May 4, 2016.

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, 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 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than one. For PM2.5, 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 national 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 ARB 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 U.S. 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 U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m3 to 12.0 µg/m3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m3, as was the annual secondary standard of 15 µg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m3 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 annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. 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 SO2 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 75 ppb. The 1971 SO2 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 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
12. The ARB 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 (1.5 µg/m3 as a quarterly average) 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.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

California Clean Air Act. Under the federal Clean Air Act, state and local authorities have primary responsibility for assuring that their respective regions are in attainment of, or have a verifiable plan to attain, the NAAQS. The federal Clean Air Act also provides state and local agencies authority to promulgate more stringent ambient air quality standards. The California Ambient Air Quality Standards (CAAQS) for the following pollutants are also included in Table 1.

Hydrogen sulfide (H_2S)
Vinyl chloride
Sulfates (SO_4)
Visibility-reducing particles

Under the provisions of the federal and California Clean Air Acts, air quality districts in areas not in attainment of the NAAQS or CAAQS are required to prepare an AQMP. An AQMP

establishes an area-specific program to control existing and proposed sources of air emissions so that the NAAQS or CAAQS may be attained by the applicable target date. CARB and EPA are required to designate areas of the state as “attainment”, “nonattainment”, or "unclassified" for state and federal ambient air quality standards. An attainment designation for an area signifies that pollutant concentrations did not violate the standard for that pollutant. A nonattainment designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an extraordinary event. An unclassified designation indicates a lack of adequate air quality data or other information on which to base an attainment or nonattainment designation.

2.3 EXISTING AIR QUALITY

Air quality is determined primarily by the types and amounts of contaminants emitted into the atmosphere, the size and topography of the local air basin, and the pollutant-dispersing properties of local weather patterns. When airborne pollutants are produced in such volume that they are not dispersed by local meteorological conditions, air quality problems result. Dispersion of pollutants in the SCAB is influenced by periodic temperature inversions, persistent meteorological conditions and the local topography. As pollutants become more concentrated in the atmosphere, photochemical reactions occur, producing ozone and other oxidants.

The federal Clean Air Act was established in an effort to assure that acceptable levels of air quality are maintained in all areas of the United States. These levels are based upon health-related exposure limits and are referred to as NAAQS. The NAAQS establish maximum allowable concentrations of specific pollutants in the atmosphere and characterize the amount of exposure deemed safe for the public.

NAAQS have been set for a number of criteria pollutants. The following is a brief description of health effects and whether the SCAB is or is not in attainment for these pollutants:

Ozone (O_3) is a toxic gas that irritates the lungs and damages materials and vegetation. Ozone is a secondary pollutant; it is not directly emitted. Ozone is the result of chemical reactions between other pollutants, most importantly hydrocarbons and NO_2, which occur only in the presence of bright sunlight. Pollutants emitted from areas cities react during transport downwind to produce the oxidant concentrations experienced in the area. Pollutants emitted in the Los Angeles area contribute to the ozone levels experienced in the SCAB.

Data summarized in Table 2 shows that the 1-hour State ozone standard was exceeded between 12 and 30 days per year between 2013 and 2017 at the Pomona (ARB #70075) air monitoring site, the closest monitoring station to the Project Site. The SCAB is designated as a nonattainment basin for ozone. The 8-hour Ozone standard has been exceeded between 22 to 56 days per year between 2013 and 2017.

Carbon Monoxide (CO) is a gas produced almost entirely from automobiles that interferes with the transfer of oxygen to the brain. Peak levels of CO occur in winter and are highest where there is very heavy and concentrated traffic (major cities and transportation congestion). CO levels are not a concern in the project area due to the low traffic volumes and are therefore not monitored.

Table 2
Ozone Data: Pomona Air Monitoring Site
2013 – 2017

Year	Days Exceeding 1-Hour State Standard	Days Exceeding 8-Hour State Standard	Maximum 1-Hour Reading (ppm)	Maximum 8-Hour Reading (ppm)
2013	12	22	0.125	0.100
2014	22	56	0.123	0.100
2015	30	55	0.136	0.099
2016	20	29	0.127	0.092
2017	18	38	0.147	0.114

Source: CARB, 2019

Nitrogen dioxide (NO_2) is a gas that can cause breathing difficulties at high levels. Peak readings of NO_2 occur in areas that have a high concentration of combustion sources (e.g., motor vehicle engines, power plants, refineries and other industrial operations). AAQS for NO_2 have not been exceeded since 2006.

Particulate Matter (PM_{10}) consists of extremely small-suspended particles or droplets 10 microns or smaller in diameter that can lodge in lungs contributing to respiratory problems. PM_{10} arises from such sources as road dust, diesel soot, combustion products, abrasion of tires and brakes, construction operations and windstorms. PM_{10} scatters light and significantly reduces visibility. PM_{10} poses a health hazard, alone or in combination with other pollutants.

Data summarized in Table 3 shows that PM_{10} levels at the Upland air monitoring site, the closest monitoring station to the Project Site, exceeded the Federal Standard an average of less than one day per year between 2013 and 2017, while insufficient data is available to determine a comparison with the State Standard during the same period.

Table 3
PM_{10} Data: Upland Air Monitoring Site
2013 – 2017

Year	Days Exceeding State Standard	Days Exceeding Federal Standard	Maximum 24-Hour Reading ($\mu g/m^3$)
2013	*	0	97
2014	*	0	81
2015	*	0	78
2016	*	1	184
2017	*	0	107

Source: CARB, 2019
State Standard – 50 $\mu g/m^3$ based on 24-hour average
Federal Standard – 150 $\mu g/m^3$ based on 24-hour average
$\mu g/m^3$ = micrograms per cubic meter
Measurements usually taken every 6 days.
* insufficient data available

Fine Particulate Matter ($PM_{2.5}$) consists of extremely small suspended particles 2.5 microns in diameter and arise primarily from combustion sources. The data summarized in Table 4 shows

that insufficient data is available to determine a comparison between $PM_{2.5}$ levels at the Upland air monitoring station with the Federal Standard between 2013 and 2017.

Table 4
$PM_{2.5}$ Data: Upland Air Monitoring Site
2013 – 2017

Year	Days Exceeding Federal Standard	Maximum 24-Hour Reading ($\mu g/m^3$)
2013	*	83
2014	*	40
2015	*	73
2016	*	45
2017	*	53

Source: CARB, 2019
Federal Standard – lowered to 35 $\mu g/m^3$ in 2006; based on 24 hour average.
$\mu g/m^3$ = micrograms per cubic meter
* insufficient data available

Sulfur dioxide (SO_2) is a gas produced when fossil fuels are burned. SO_2 is the main pollutant contributing to the formation of acid rain. No exceedances of this pollutant have occurred for decades and concentrations are well under Federal and State standards.

Lead (Pb) is a heavy metal used in industry and for years was a component in gasoline. Since the elimination of lead as a gasoline additive, lead in the atmosphere in southern California has been virtually eliminated.

Hydrogen Sulfide (H_2S) This pollutant is not commonly found in the ambient atmosphere but can originate from natural sources such as volcanoes, sulfur hot springs, or mineral brine associated with dry lakebeds. The CAAQS for H_2S is not health-based but rather an aesthetic one, because the compound smells like rotten eggs. This pollutant is not an issue in the project area.

Sulfates are produced by the reaction in the air of sulfur dioxide (SO_2), which is a component of acid rain. Sources for sulfur dioxide include coal burning power plants and diesel engines. California does not have any coal burning power plants and all diesel fuels sold in the state are now lower in sulfur. Sulfates are not an issue in the area.

Visibility-reducing particles are common in the SCAB due to the vast open desert area, especially during windy conditions. Particles reduce visibility, obscuring the desert scenery, including views of the mountains. Dust control measures reduce particulates in the area.

Reactive Organic Gases (ROG) is also considered in the air quality analysis of projects in the State. Ozone is a secondary pollutant that is the result of chemical reactions between other pollutants, most importantly reactive hydrocarbons (also referred to as ROG), and NO_2, which occurs only in the presence of bright sunlight. The result is the formation of smog. There are no federal or state air quality standards for hydrocarbons or ROG as there are for other pollutants,

however the SCAQMD does have thresholds for determining the severity of emissions of several criteria pollutants including ROG.

Air Quality Attainment Plans

The project area is under the jurisdiction of the SCAQMD, which implements and enforces the applicable AQMP. The 2016 AQMP was adopted by the SCAQMD on March 3, 2017. 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. The 2016 AQMP also includes transportation control measures developed by the Southern California Association of Governments (SCAG) from the 2016 Regional Transportation Plan/ Sustainable Communities Strategy. The 2016 AQMP includes the integrated strategies and measures needed to meet the NAAQS. The 2016 AQMP demonstrates attainment of the 1-hour and 8-hour ozone NAAQS as well as the latest 24-hour and annual $PM_{2.5}$ standards.

The 2016 AQMP is a comprehensive and integrated Plan primarily focused on addressing the ozone standards. The Plan is a regional and multi-agency effort (AQMD, California Air Resources Board, Southern California Association of Governments (SCAG) and U.S. EPA). State and federal planning requirements include developing control strategies, attainment demonstrations, reasonable further progress, and maintenance plans. The 2016 AQMP incorporate the latest scientific and technical information and planning assumptions, including the latest applicable growth assumptions, Regional Transportation Plan/Sustainable Communities Strategy, and updated emission inventory methodologies for various source categories.

The primary guidance for implementing the air quality standards in relation to the California Environmental Quality Act (CEQA) is the 1993 SCAQMD CEQA Air Quality Handbook. This handbook is being revised and updated, but until the new edition is published, the 1993 version as updated, is still the current reference and directive.

Climate Change and Greenhouse Gases

Gases that trap heat in the atmosphere are often called Greenhouse Gases (GHG); analogous to a greenhouse. GHGs are emitted by natural processes and human activities. The accumulation of GHGs in the atmosphere helps regulate the earth's temperature. Without these natural GHGs, the Earth's surface would be approximately 60°F cooler (EPA 2017). Emissions from human activities such as electricity production and vehicles have elevated the concentration of these gases in the atmosphere.

GHGs have varying global warming potential (GWP). A GWP is a "quantified measure of the globally averaged relative radiative forcing impacts of a particular greenhouse gas, defined as the accumulated radiative forcing within a specific time horizon caused by emitting one kilogram of the gas, relative to that of the reference gas" (EPA 2017). The reference gas for GWP is carbon dioxide; carbon dioxide has a GWP of one. For example, methane has a GWP of 21, which

means that it has a greater global warming effect than carbon dioxide on a molecule per molecule basis. One teragram of carbon dioxide equivalent (Tg CO2 Eq.) is the emissions of the gas multiplied by the GWP. One teragram is equal to one million metric tons. The carbon dioxide equivalent is a good way to assess emissions because it gives weight to the GWP of the gas. The lifetime and GWP of selected GHG are summarized in Table 5. As shown in the table, GWP for a 100-year time horizon ranges from one (carbon dioxide) to 23,500 (sulfur hexafluoride).

Table 5
Global Warming Potentials and Atmospheric Lifetimes of Select Greenhouse Gases

Gas	Lifetime (years)	Global Warming Potential (100-year time horizon)
Carbon Dioxide	*	1
Methane	12.4†	28
Nitrous Oxide	121†	265
HFC-23	222	12,400
HFC-134a	13.4	1,300
HFC-152a	1.5	138
PFC-14: Tetrafluoromethane (CF4)	50,000	6,630
PFC-116: Hexafluoroethane (C2F6)	10,000	11,100
Sulfur Hexafluoride (SF6)	3,200	23,500

Source: IPCC 2013
* No single lifetime can be given.
† Perturbation lifetime is used in calculation of metrics, not the lifetime of the atmospheric burden.

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

Carbon dioxide (CO_2) is an odorless, colorless natural GHG. Natural sources include the following: decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Carbon dioxide is the primary greenhouse gas emitted through human activities and anthropogenic sources of carbon dioxide are from burning coal, oil, natural gas, and wood. Concentrations are currently around 400 ppm; some say that concentrations may increase to 540 ppm by 2100 as a direct result of anthropogenic sources (IPCC 2001). Some predict that this will result in an average global temperature rise of at least 2° Celsius (IPCC 2001).

Methane is a flammable gas and is the main component of natural gas. When one molecule of methane is burned in the presence of oxygen, one molecule of carbon dioxide and two molecules of water are released. There are no health effects from methane. A natural source of methane is

from the anaerobic decay of organic matter. Geological deposits known as natural gas fields contain methane, which is extracted for fuel. Other sources are from landfills, fermentation of manure, and cattle.

Nitrous oxide (N_2O), also known as laughing gas, is a colorless GHG. Higher concentrations can cause dizziness, euphoria, and sometimes slight hallucinations. Nitrous oxide is produced by microbial processes in soil and water, including those reactions which 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 in rocket engines, as an aerosol spray propellant, and in race cars.

Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane 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). CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone; therefore, their production was stopped as required by the Montreal Protocol.

Hydrofluorocarbons (HFCs) are synthetic man-made chemicals that are used as a substitute for CFCs for automobile air conditioners and refrigerants.

Perfluorocarbons (PFCs) have stable molecular structures and do not break down though the chemical processes in the lower atmosphere. High-energy ultraviolet rays about 60 kilometers above Earth's surface are able to destroy the compounds. PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane and hexafluoroethane. Concentrations of tetrafluoromethane in the atmosphere are over 79 ppt (IPCC 2013). The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur hexafluoride (SF6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated, 23,500. Concentrations in the 2011 were about 7.3 ppt, while concentrations in 2005 were about 5.6 ppt (EPA 2013). 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.

Ozone found in the troposphere is considered a GHG; however, unlike the other GHG, ozone in the troposphere is relatively short-lived and therefore is not global in nature. Ozone is not directly emitted into the air but is formed through chemical reactions between precursor emissions of reactive organic gases (ROG) and nitrogen oxides (NO_X) in the presence of sunlight. It is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides and volatile organic compounds) to climate change (CARB 2004).

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. Sulfate aerosols

are emitted when fuel with sulfur in it is burned. Black carbon (or soot) is emitted during biomass burning incomplete combustion of fossil fuels. Particulate matter regulation has been lowering aerosol concentrations in the United States; however, global concentrations are likely increasing.

Assembly Bill 32

In 2006, the California State Legislature adopted Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006. AB 32 requires CARB, to adopt rules and regulations that would achieve GHG emissions equivalent to statewide levels in 1990 by 2020 through an enforceable statewide emission cap which was phased in starting in 2012. On January 1, 2017 AB 32 was revised to include a statewide GHG emission reduction of 40 percent below the state GHG emissions limit no later than December 31, 2020.

County of San Bernardino General Plan

The County of San Bernardino General Plan Conservation (CO) Element provides direction regarding the conservation, development, and utilization of the County of San Bernardino's natural resources. Resources include, but are not limited to, water, energy, land, biodiversity, minerals, natural materials, recyclables, view sheds and air. Air quality within the region is affected by the amount of air pollution generated from stationary, mobile, area, and natural sources. As such, the CO Element outlines the County's Goal CO 4 to ensure good air quality for residents, businesses, and visitors to reduce impacts on human health and the economy through implementation of the following policies:

CO 4.1: Because developments can add to the wind hazard (due to increased dust, the removal of wind breaks, and other factors), the County will require either as mitigation measures in the appropriate environmental analysis required by the County for the development proposal or as conditions of approval if no environmental document is required, that developments in areas identified as susceptible to wind hazards to address site-specific analysis of:

a. Grading restrictions and/or controls on the basis of soil types, topography or season.
b. Landscaping methods, plant varieties, and scheduling to maximize successful revegetation.
c. Dust-control measures during grading, heavy truck travel, and other dust generating activities.

CO 4.2: Coordinate improvement technologies with the South Coast Air Quality Management District (SCAQMD) and the Mojave Air Quality Management District (MAQMD) to improve air quality through reductions in pollutants from the region.

CO 4.3: The County will continue to ensure through coordination and cooperation with all airport operators a diverse and efficient ground and air transportation system, which generates the minimum feasible pollutants.

CO 4.4: Because congestion resulting from growth is expected to result in a significant increase in the air quality degradation, the County may manage growth by ensuring the timely provision of infrastructure to serve new development.

CO 4.5: Reduce emissions through reduced energy consumption.

CO 4.6: Provide incentives such as preferential parking for alternative-fuel vehicles.

CO 4.7: Encourage special event center operators to provide discounted transit passes with event tickets or offer discounted on-site parking for carpooling patrons (four or more persons per vehicle.

CO 4.8: Replace existing vehicles in the County fleet with the cleanest vehicles commercially available that are cost-effective and meet the vehicle use needs.

CO 4.9: Manage the County's transportation fleet fueling standards to improve the number of alternative fuel vehicles in the County fleet.

CO 4.10: Support the development of alternative fuel infrastructure that is publicly accessible.

CO 4.11: Establish programs for priority of free parking on County streets or in County parking lots for alternative fuel vehicles.

CO 4.12: Provide incentives to promote siting or use of clean air technologies (e.g., fuel cell technologies, renewable energy sources, UV coatings, and hydrogen fuel).

CO 4.13: Reduce Greenhouse Gas (GHG) emissions within the County boundaries.

Health and Other Effects

The potential health effects from global climate change may arise from temperature increases, climate-sensitive diseases, extreme events, and 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 (i.e., heat rash and heat stroke). In addition, climate sensitive diseases may increase, such as those spread by mosquitoes and other disease carrying insects. Those diseases include malaria, dengue fever, yellow fever, and encephalitis. Extreme events such as flooding and hurricanes can displace people and agriculture, which would have negative consequences. Drought in some areas may increase, which would decrease water and food availability. Global climate change may also contribute to air quality problems from increased frequency of smog and particulate air pollution (EPA 2006).

3.0 AIR QUALITY IMPACT EVALUATION

3.1 STANDARDS OF SIGNIFICANCE

Air quality analyses for the Proposed Project have been conducted in accordance with the CEQA Air Quality Handbook prepared by the SCAQMD (1993 as updated). SCAQMD has established the following emissions criteria for determining whether the impacts from a project would be considered significant under CEQA (http://www.aqmd.gov/ceqa/hdbk.html):

Thresholds of Significance for Construction:

- 75 pounds per day of ROG
- 100 pounds per day of NO_x
- 550 pounds per day of CO
- 150 pounds per day of SO_2
- 150 pounds per day of PM_{10}
- 55 pounds per day of $PM_{2.5}$

Thresholds of Significance for Operations:

- 55 pounds per day of ROG
- 55 pounds per day of NO_x
- 550 pounds per day of CO
- 150 pounds per day of SO_2
- 150 pounds per day of PM_{10}
- 55 pounds per day of $PM_{2.5}$

Greenhouse Gas Emissions

- 3,000 metric tons of CO_2 equivalent ($MTCO_2e$)

3.2 CONSTRUCTION AIR QUALITY EVALUATION

The proposed development would occur on approximately 4.66 acres of land. The County of San Bernardino currently designates the Project Site as Single Residential (RS-20M), which has minimum lot size of 20,000 square feet, and General Commercial (CG). The Proposed Project includes a General Plan Amendment (GPA) which would change the land use designation of the Project Site to Multiple Residential (RM) allowing for attached, detached, and/or mixed residential development with a wide range of densities and housing types. As such, construction of the proposed 40 two-story detached residential condominiums and two single-story single-family detached residential houses would be acceptable uses within the RM land use category with implementation of the GPA.

Construction-related emissions generated by the Proposed Project would be from short-term construction activities. Construction emissions were screened using the CalEEMod version 2016.3.2 defaults for residential uses within the Condo/Townhouse and Single-Family Housing

subcategories. The criteria pollutants and Greenhouse Gas (GHGs) analyzed include reactive organic gases (ROG), nitrous oxides (NO_x), carbon monoxide (CO), particulates (PM_{10} and $PM_{2.5}$), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Construction emissions are screened and quantified to document the effectiveness of control measures.

The CalEEMod model allows the user to set certain defaults and run the model to incorporate SCAQMD required rules and regulations. Therefore, per SCAQMD Rules 403, the mitigation requiring that exposed surfaces during construction be watered twice per day was "turned on". The developer and its contractor will be required to comply with mandated SCAQMD rules and regulations, including but not limited to Rule 403. Therefore, the following dust control conditions applicable to the site activities as recommended by Rule 403 shall also be implemented:

1. The Project Proponent shall ensure that any portion of the site to be graded shall be pre-watered prior to the onset of grading activities.

    (a) The Project Proponent shall ensure that watering of the site or other soil stabilization method shall be employed on an on-going basis after the initiation of any grading activity on the site at least twice daily. Portions of the site that are actively being graded shall be watered regularly to ensure that a crust is formed on the ground surface and shall be watered at the end of each workday.

    (b) The Project Proponent shall ensure that all disturbed areas are treated to prevent erosion until the site is constructed upon.

    (c) The Project Proponent shall ensure that landscaped areas are installed as soon as possible to reduce the potential for wind erosion.

    (d) The Project Proponent shall ensure that all grading activities are suspended during first and second stage ozone episodes or when winds exceed 25 miles per hour.

During construction, exhaust emissions from construction vehicles and equipment and fugitive dust generated by equipment traveling over exposed surfaces, would increase NO_X and PM_{10} levels in the area. The following Best Management Practices shall be implemented to reduce emissions.

2. To reduce emissions, all equipment used in grading and construction must be tuned and maintained to the manufacturer's specification to maximize efficient burning of vehicle fuel. Site development will be limited to one acre disturbed per day.
3. The contractor shall utilize (as much as possible) pre-coated building materials and coating transfer or spray equipment with high transfer efficiency, such as high volume, low pressure (HVLP) spray method, or manual coatings application such as paint brush, hand roller, trowel, dauber, rag, or sponge.
4. The contractor shall utilize water-based or low VOC coating per SCAQMD Rule 1113. The following measures shall also be implemented:
    - Use Super-Compliant VOC paints whenever possible.

- If feasible, avoid painting during peak smog season: July, August, and September.
- Recycle leftover paint. Take any left-over paint to a household hazardous waste center; do not mix leftover water-based and oil-based paints.
- Keep lids closed on all paint containers when not in use to prevent VOC emissions and excessive odors.
- For water-based paints, clean up with water only. Whenever possible, do not rinse the clean-up water down the drain or pour it directly into the ground or the storm drain. Set aside the can of clean-up water and take it to a hazardous waste center (www.cleanup.org).
- Recycle the empty paint can.
- Look for non-solvent containing stripping products.
- Use Compliant Low-VOC cleaning solvents to clean paint application equipment.
- Keep all paint and solvent laden rags in sealed containers to prevent VOC emissions.

5. The Project Proponent shall ensure that existing power sources are utilized where feasible via temporary power poles to avoid on-site diesel power generation.
6. The Project Proponent shall ensure that construction personnel are informed of ride sharing and transit opportunities.
7. All buildings on the project site shall conform to energy use guidelines in Title 24 of the California Administrative Code as updated to reduce energy consumption and reduce GHG emissions.
8. The operator shall maintain and effectively utilize and schedule on site equipment and delivery trucks in order to minimize exhaust emissions from truck idling.

Modeled Analysis

The emissions calculations for the construction phase of the Proposed Project includes fugitive dust from grading and exhaust emissions from on-site equipment and worker travel and are summarized in Table 6 and Table 7, which represent summer and winter construction emissions, respectively. The fugitive dust emissions are based on earthwork activities per day. The proposed construction activities will include implementation of the "best available fugitive dust control requirements" listed above and the developer will comply with SCAQMD rules and regulations (particularly Rule 403) that require controls for fugitive dust. These standard conditions will reduce emissions to the lowest amounts feasible. Construction emissions were screened and quantified to document the effectiveness of control measures. For additional information, refer to Appendix A for the CalEEMod emissions model output data.

Table 6
Summer Construction Emissions
(Pounds Per Day)

Source/Phase	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Demolition	3.7	38.2	23.2	0.05	4.1	2.1
Site Preparation	4.4	45.6	23.0	0.04	20.7	12.2
Grading	22.7	28.4	17.0	0.03	8.1	4.7
Building Construction	3.0	24.7	22.3	0.05	2.5	1.6
Paving	1.5	11.9	13.2	0.02	0.9	0.7
Architectural Coating	23.2	1.7	2.6	0.01	0.3	0.2
Highest Value (lbs/day)	**23.2**	**45.6**	**23.2**	**0.05**	**20.7**	**12.2**
SCAQMD Threshold	75	100	550	150	150	55
Significant	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2016.3.2, Summer Emissions
Phases don't overlap and represent the highest concentration.

Table 7
Winter Construction Emissions
(Pounds Per Day)

Source/Phase	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Demolition	3.7	38.3	23.1	0.05	4.1	2.1
Site Preparation	4.4	45.6	22.8	0.04	20.7	12.2
Grading	2.7	28.4	16.9	0.03	8.1	4.7
Building Construction	3.0	24.7	21.6	0.04	2.5	1.6
Paving	1.2	11.9	13.0	0.02	0.9	0.7
Architectural Coating	23.2	1.8	2.5	0.00	0.3	0.2
Highest Value (lbs/day)	**23.2**	**45.6**	**23.1**	**0.05**	**20.7**	**12.2**
SCAQMD Threshold	75	100	550	150	150	55
Significant	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2016.3.2, Winter Emissions
Phases don't overlap and represent the highest concentration.

As shown in Table 6 and Table 7, construction emissions during either summer or winter seasonal conditions would not exceed SCAQMD thresholds. Impacts would be less than significant, and no mitigation measures are required.

Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are cumulative in nature, in that, no one single project can measurably contribute to climate change and its affects (global average change in temperature, rising sea levels etc.). The direct or indirect GHG impacts are therefore not evaluated on a local level, but whether or not the GHG emissions resulting from the project are cumulative; that is, they add considerably to an increase in GHGs as compared to the existing environmental setting based on: 1) an established significance threshold(s); or 2) 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.

AB 32 defines seven (7) major GHGs that are emitted into the atmosphere, the first three are both biogenic (occur naturally in the environment) and anthropogenic (are man-made), through the burning of fossil fuels, the decay of organic waste in landfills etc. and they include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The other four, known as Fluorinated gases (Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride) are synthetic (made artificially by chemical processes). The Proposed Project would not generate Fluorinated gases as defined by AB 32, only the GHGs (CO_2, CH_4, and N_2O) that are emitted by construction equipment. Therefore, GHG emissions from CO_2, CH_4, and N_2O are modeled.

SCAQMD provides guidance methods and/or Emission Factors that are used for evaluating a project's emissions in relation to the thresholds. A threshold of 3,000 $MTCO_2e$ per year has been adopted by SCAQMD for non-industrial uses. Additionally, in September 2011, San Bernardino County adopted the Emissions Reduction Plan, which outlines a strategy to use energy more efficiently, harness renewable energy to power buildings, enhance access to sustainable transportation modes, and recycle waste. It has the following specific goals:

- Reduce emissions from activities over which the County has jurisdictional and operational control to 15% below 2007 levels by 2020, consistent with the target reductions of the AB 32 Scoping Plan.
- Provide estimated GHG reductions associated with the County's existing sustainability efforts and integrate the County's sustainability efforts into the discrete actions of the Emissions Reduction Plan.
- Provide a list of discrete actions that would reduce GHG emissions.
- Approve a GHG reduction plan that satisfies the requirements of Section 15183.5 of the CEQA Guidelines, so that compliance with the GHG reduction plan can be used in appropriate situations to determine the significance of a project's effects related to GHG emissions, thus providing streamlined CEQA analysis of future projects that are consistent with the approved GHG reduction plan.

As part of the implementation of the Emissions Reduction Plan, a uniform set of County performance standards are applied to development projects as described by the following:

> "All development projects, including those otherwise determined to be exempt from CEQA will be subject to applicable Development Code provisions, including the GHG performance, and state requirements, such as the California Building Code requirements for energy efficiency. With the application of the GHG performance standards, projects that are exempt from CEQA and small project that do not exceed 3,000 $MTCO_2e$ per year will be considered to be consistent with the Emissions Reduction Plan and determined to have a less than significant individual and cumulative impact for GHG emissions".

As such, a threshold of 3,000 $MTCO_2e$ per year has been adopted by SCAQMD and the County of San Bernardino GHG Emissions Reduction Plan for non-industrial uses. The results for GHG emissions related to construction of the Proposed Project are shown in Table 8.

Table 8
Greenhouse Gas Construction Emissions
(Metric Tons Per Year)

Source/Phase	CO_2	CH_4	N_20
Site Preparation	43.0	0.0	0.0
Grading	9.0	0.0	0.0
Building Construction	11.2	0.0	0.0
Paving	250.1	0.0	0.0
Architectural Coating	16.4	0.0	0.0
Total ($MTCO_2e$)	**335.0**		
SCAQMD and County of San Bernardino GHG Emissions Reduction Plan Threshold	3,000		
Significant	**No**		

Source: CalEEMod 2016.3.2, Annual Emissions

Model results for GHG emissions related to construction of the Proposed Project as shown in Table 8 do not exceed the County of San Bernardino GHG Emissions Reduction Plan's 3,000 $MTCO_2e$ threshold and therefore would not result in a significant impact. No mitigation measures are required.

3.3 OPERATIONAL AIR QUALITY EVALUATION

Operational emissions are categorized as energy (generation and distribution of energy to the end use), area (operational use of the project), mobile (vehicle trips), water (generation and distribution of water to the land use), and waste (collecting and hauling waste to the landfill). Operational emissions were estimated using the CalEEMod version 2016.3.2 defaults for residential uses within the Condo/Townhouse and Single-Family Housing subcategories. Emissions associated with the operational activities are listed in Tables 9 through 11.

Table 9
Summer Operational Emissions
(Pounds Per Day)

Source	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Area	12.45	0.9	24.8	0.1	3.2	3.2
Energy	0.0	0.2	0.1	0.0	0.0	0.0
Mobile	0.6	3.6	6.9	0.0	1.9	0.5
Total Value (lbs/day)	**13.1**	**4.8**	**31.8**	**0.1**	**5.1**	**3.8**
SCAQMD Threshold	55	55	550	150	150	55
Significant	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2016.3.2, Summer Emissions

Table 10
Winter Operational Emissions
(Pounds Per Day)

Source	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Area	12.5	0.9	24.8	0.1	3.2	3.2
Energy	0.0	0.2	0.1	0.0	0.0	0.0
Mobile	0.5	3.7	6.0	0.0	1.9	0.5
Total Value (lbs/day)	**13.0**	**4.8**	**31.0**	**0.1**	**5.1**	**3.8**
SCAQMD Threshold	55	55	550	150	150	55
Significant	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod 2016.3.2, Winter Emissions

Table 11
Greenhouse Gas Operational Emissions
(Metric Tons Per Year)

Source	CO_2	CH_4	N_2O
Area	13.7	0.0	0.0
Energy	136.4	0.0	0.0
Mobile	392.7	0.0	0.0
Waste	4.2	0.3	0.0
Water	118.3	0.1	0.0
Total ($MTCO_2e$)	**576.2**		
SCAQMD and County of San Bernardino GHG Emissions Reduction Plan Threshold	3,000		
Significant	**No**		

Source: CalEEMod 2016.3.2, Annual Emissions

As shown in Tables 9 through 11, operational emissions produced from the Proposed Project would not exceed the SCAQMD's and the Count of San Bernardino GHG Emissions Reduction Plan's thresholds and therefore would not result in a significant impact. No mitigation measures are required.

3.4 LOCALIZED SIGNIFICANCE THRESHOLD

SCAQMD has developed a methodology to assess the localized impacts of emissions from a proposed project as outlined within the Final Localized Significance Threshold (LST) Methodology report; completed in June 2003 and revised in July 2008. The use of LSTs is voluntary, to be implemented at the discretion of local public agencies acting as a lead agency pursuant to CEQA. According to SCAQMD LST methodology, LSTs would apply if the proposed project includes stationary sources or attracts mobile sources (such as heavy-duty trucks) that may spend long periods queuing and idling at the site; such as industrial warehouse/transfer facilities. The Proposed Project includes residential development and does not include such uses. Therefore, due to the lack of stationary source emissions, no long-term localized significant threshold analysis is warranted.

3.5 PROJECT CUMULATIVE IMPACT

Development of the Proposed Project will be conditioned to comply with current SCAQMD rules and regulations to minimize impacts to air quality as discussed herein. Development of the 4.66-acre site is not anticipated to generate significant impacts or generate significant operational mobile emissions. Therefore, cumulative impacts are anticipated to be less than significant.

4.0 REPORT SUMMARY

Construction emissions from the Proposed Project will not exceed the CEQA thresholds of significance. Construction emissions are considered short-term. Potential dust emissions would be further reduced by implementation of standard dust control measures (water exposed surfaces twice per day, etc.) as required for all projects within the SCAB. Therefore, potential impacts from construction activities are determined to be less than significant and no further analysis is required.

The operational emissions from the Proposed Project would not exceed SCAQMD thresholds of significance. No impacts to local or regional air quality are anticipated during project operations. The Proposed Project as well as all projects within the SCAB will be required to comply with current SCAQMD rules and regulations as applicable. Therefore, potential impacts from operational activities are determined to be less than significant and no further analysis is required.

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