3.2 Air Quality

Environmental Setting

PHYSICAL SETTING

The weather of the San Diego region, as in most of Southern California, is influenced by the Pacific Ocean and its semi-permanent high-pressure systems that result in dry, warm summers and mild, occasionally wet winters. The average temperature ranges (in degrees Fahrenheit (°F)) from the mid-40s to the high 90s. Most of the region's precipitation falls from November to April with infrequent (approximately 10%) precipitation during the summer. The average seasonal precipitation along the coast is approximately 10 inches; the amount increases with elevation as moist air is lifted over the mountains to the east.

The topography in the San Diego region varies greatly, from beaches on the west to mountains and desert on the east. Along with local meteorology, the topography influences the dispersal and movement of pollutants in the basin. The mountains to the east prohibit dispersal of pollutants in that direction and help trap them in inversion layers.

The interaction of ocean, land, and the Pacific High Pressure Zone maintains clear skies for much of the year and influences the direction of prevailing winds (westerly to northwesterly). Local terrain is often the dominant factor inland that affects wind patterns, and winds in inland mountainous areas tend to blow through the valleys during the day and down the hills and valleys at night.

Climate and Meteorology

Carlsbad is located within the San Diego Air Basin (SDAB or basin) and is subject to the San Diego Air Pollution Control District (SDAPCD) guidelines and regulations. The SDAB is one of 15 air basins that geographically divide the State of California. The SDAB is currently classified as a federal nonattainment area for ozone (O_3) and a state nonattainment area for particulate matter less than or equal to 10 microns (PM_{10}), particulate matter less than or equal to 2.5 microns ($PM_{2.5}$), and O_3.

The SDAB lies in the southwest corner of California and comprises the entire San Diego region, covering 4,260 square miles, and is an area of high air pollution potential. The basin experiences warm summers, mild winters, infrequent rainfalls, light winds, and moderate humidity. This usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds.

The SDAB experiences frequent temperature inversions. Subsidence inversions occur during the warmer months as descending air associated with the Pacific High Pressure Zone meets cool marine air. The boundary between the two layers of air creates a temperature inversion that traps pollutants. Another type of inversion, a radiation inversion, develops on winter nights when air near the ground cools by heat radiation and air aloft remains warm. The shallow inversion layer formed between these two air masses also can trap pollutants. As the pollutants become more concentrated in the atmosphere, photochemical reactions occur that produce O_3, commonly known as smog.

Light daytime winds, predominately from the west, further aggravate the condition by driving air pollutants inland, toward the mountains. During the fall and winter, air quality problems are created due to carbon monoxide (CO) and oxides of nitrogen (NO_x) emissions. CO concentrations are generally higher in the morning and late evening. In the morning, CO levels are elevated due to cold temperatures and the large number of motor vehicles traveling. Higher CO levels during the late evenings are a result of stagnant atmospheric conditions trapping CO in the area. Since CO is produced almost entirely from automobiles, the highest CO concentrations in the basin are associated with heavy traffic. Nitrogen dioxide (NO_2) levels are also generally higher during fall and winter days.

Under certain conditions, atmospheric oscillation results in the offshore transport of air from the Los Angeles region to San Diego County. This often produces high O_3 concentrations, as measured at air pollutant monitoring stations within the county. The transport of air pollutants from Los Angeles to San Diego has also occurred within the stable layer of the elevated subsidence inversion, where high levels of O_3 are transported.

Sensitive Receptors

Reduced visibility, eye irritation, and adverse health impacts upon those persons termed sensitive receptors are the most serious hazards of existing air quality conditions in the area. Some land uses are considered more sensitive to changes in air quality than others, depending on the population groups and the activities involved. People most likely to be affected by air pollution, as identified by the California Air Resources Board (CARB), include children, the elderly, athletes, and people with cardiovascular and chronic respiratory diseases. Sensitive receptors include residences, schools, playgrounds, child care centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Accordingly, the proposed planning area would house sensitive receptors.

Pollutants and Effects

Criteria air pollutants are defined as pollutants for which the federal and state governments have established ambient air quality standards, or criteria, for outdoor concentrations to protect public health. The federal and state standards have been set, with an adequate margin of safety, at levels above which concentrations could be harmful to human health and welfare. These standards are designed to protect the most sensitive persons from illness or discomfort. Pollutants of concern include O_3, NO_2, CO, sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$, and lead. These pollutants are discussed

below, based on the U.S. Environmental Protection Agency (EPA) Six Common Air Pollutants and the CARB Glossary of Air Pollutant Terms.[1] In California, sulfates, vinyl chloride, hydrogen sulfide, and visibility-reducing particles are also regulated as criteria air pollutants.

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

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

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

[1] EPA. 2010. "Six Common Air Pollutants." Air and Radiation. July 1, 2010. http://www.epa.gov/air/urbanair.
CARB (California Air Resources Board). "Glossary of Air Pollutant Terms." CARB website.
http://www.arb.ca.gov/html/gloss.htm.

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

Particulate Matter. Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter can form when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. $PM_{2.5}$ and PM_{10} represent fractions of particulate matter. Fine particulate matter, or $PM_{2.5}$, is roughly 1/28 the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (e.g., motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur oxides (SO_x), NO_x, and VOC. Inhalable or coarse particulate matter, or PM_{10}, is about 1/7 the thickness of a human hair. Major sources of PM_{10} include crushing or grinding operations; dust stirred up by vehicles traveling on roads; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions.

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

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

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

decrements in neurobehavioral performance including intelligence quotient performance, psychomotor performance, reaction time, and growth.

Toxic Air Contaminants. A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure, or acute and/or chronic noncancer health effects. A toxic substance released into the air is considered a toxic air contaminant (TAC). Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources such as automobiles; and area sources such as landfills. Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and noncarcinogenic effects. Noncarcinogenic effects typically affect one or more target organ systems and may be experienced either on short-term (acute) or long-term (chronic) exposure to a given TAC. CARB has identified diesel engine exhaust particulate matter as the predominant TAC in California. Diesel particulate matter is emitted into the air by diesel-powered mobile vehicles, including heavy-duty diesel trucks, construction equipment, and passenger vehicles. Certain ROGs may also be designated as TACs.

Local Air Quality

SDAB Attainment Designation

An area is designated in attainment when it is in compliance with the National Ambient Air Quality Standards (NAAQS) (federal) and/or California Ambient Air Quality Standards (CAAQS) (state). These standards are set by the EPA or CARB for the maximum level of a given air pollutant that can exist in the outdoor air without unacceptable effects on human health or the public welfare. Table 3.2-4 in the "Regulatory Setting" section, below, lists the current NAAQS and CAAQS.

The criteria pollutants of primary concern that are considered in this air quality assessment include O_3, NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$. Although there are no ambient standards for VOCs or NO_x, they are important as precursors to O_3.

The SDAB is designated by EPA as a marginal nonattainment area for the 2008 8-hour NAAQS for O_3.The SDAB is designated in attainment for all other criteria pollutants under the NAAQS with the exception of PM_{10}, which was determined to be unclassifiable. The SDAB is currently designated nonattainment for O_3 and particulate matter, PM_{10} and $PM_{2.5}$, under the CAAQS. It is designated attainment for the CAAQS for CO, NO_2, SO_2, lead, and sulfates. Table 3.2-1, SDAB Attainment Classification, summarizes the SDAB's federal and state attainment designations for each of the criteria pollutants.

Table 3.2-1: SDAB Attainment Classification

Pollutant	*Federal Designation*[a]	*State Designation*[b]
O_3 (1 hour)	Attainment[1]	Nonattainment
O_3(8-hour – 1997) (8-hour – 2008)	Attainment (Maintenance) Nonattainment (Marginal)	Nonattainment
CO	Unclassifiable/Attainment[2]	Attainment
PM_{10}	Unclassifiable[3]	Nonattainment
$PM_{2.5}$	Attainment	Nonattainment
NO_2	Unclassifiable/Attainment	Attainment
SO_2	Attainment	Attainment
Lead	Attainment	Attainment
Sulfates	(no federal standard)	Attainment
Hydrogen Sulfide	(no federal standard)	Unclassified
Visibility-Reducing Particles	(no federal standard)	Unclassified

1 The federal 1-hour standard of 0.12 ppm was in effect from 1979 through June 15, 2005. The revoked standard is referenced here because it was employed for such a long period and because this benchmark is addressed in state implementation plans.

2 The western and central portions of the SDAB are designated attainment (maintenance), while the eastern portion is designated unclassifiable/attainment.

3 At the time of designation, if the available data does not support a designation of attainment or nonattainment, the area is designated as unclassifiable.

Sources:
EPA. "Region 9: Air Programs, Air Quality Maps." Last updated April 8, 2013. http://www.epa.gov/region9/air/maps/maps_top.html.;
CARB. "Area Designations Maps/State and National." Last reviewed on April 22, 2013. http://www.arb.ca.gov/desig/adm/htm.

Air Quality Monitoring Data

The SDAPCD operates a network of ambient air monitoring stations throughout San Diego County, which measure ambient concentrations of pollutants and determine whether the ambient air quality meets the CAAQS and the NAAQS. The SDAPCD monitors air quality conditions at 10 locations throughout the basin. Due to its proximity to Carlsbad and similar geographic and climactic characteristics, the Del Mar–Mira Costa College monitoring station concentrations for 8-hour and 1-hour O_3 are considered most representative of O_3 in Carlsbad. The Escondido–East Valley Parkway monitoring station is the nearest location to Carlsbad where PM_{10}, $PM_{2.5}$, NO_2, and CO concentrations are monitored. The San Diego–1110 Beardsley Street monitoring station is the nearest location to Carlsbad where SO_2 concentrations are monitored. Ambient concentrations of pollutants from 2009 through 2012 are presented in Table 3.2-2. The number of days exceeding the ambient air quality standards (state and federal) is shown in Table 3.2-3. The state 8-hour O_3 standards were exceeded in 2009, 2010, 2011, and 2012; the state 1-hour standards were exceeded in 2009, while the federal 8-hour O_3 standard was exceeded in 2009 and 2012. The state 24-hour PM_{10} standard was exceeded in 2009; the state annual PM_{10} standard was exceeded in 2009 and 2010; and the federal 24-hour $PM_{2.5}$ standard was exceeded in 2009, 2010, 2011, and

2012. Air quality within the region was in compliance with both CAAQS and NAAQS for NO_2, CO, and SO_2 during this monitoring period.

Table 3.2-2: Ambient Air Quality Data (ppm unless otherwise indicated)

Pollutant	*Averaging Time*	*2009*	*2010*	*2011*	*2012*	*Most Stringent Ambient Air Quality Standard*	*Monitoring Station*
O_3	8-hour	0.084	0.072	0.075	0.079	0.070	Del Mar–Mira Costa College
	1-hour	0.97	0.85	0.091	0.088	0.090	
PM_{10}	Annual	24.6 µg/m³	21.0 µg/m³	18.8 µg/m³	18.1 µg/m³	20 µg/m³	Escondido–East Valley Parkway
	24-hour	74.0 µg/m³	43.0 µg/m³	40.0 µg/m³	33.0 µg/m³	50 µg/m³	
$PM_{2.5}$	Annual[1]	13.4 µg/m³	12.2 µg/m³	10.4 µg/m³	10.8 µg/m³	12 µg/m³	Escondido–East Valley Parkway
	24-hour	78.4 µg/m³	52.2 µg/m³	27.4 µg/m³	70.7 µg/m³	35 µg/m³	
NO_2	Annual	0.016	0.014	0.013	0.013	0.030	Escondido–East Valley Parkway
	1-hour	0.073	0.064	0.062	0.062	0.180	
CO	8-hour	3.54	2.46	2.30	3.70	9.0	Escondido–East Valley Parkway
	1-hour[2]	4.40	3.90	3.50	4.40	20	
SO_2	Annual	0.001	0.000	—	—	0.030	San Diego–1110 Beardsley Street
	24-hour	0.006	0.002	0.003	—	0.040	

µg/m³ = micrograms per cubic meter

Data represent maximum values

[1] Federal data reflected for 2009, 2010, and 2012; not determined for California method.

[2] Data were taken from EPA, "Monitor Values Report."

Sources:
CARB. "Air Quality Data Statistics." 2013. Available: http://arb.ca.gov/adam.
EPA. "Monitor Values Report." Last updated May 3, 2013. Available: http://www.epa.gov/airdata/ad_rep_mon.html.

Table 3.2-3: Frequency of Air Quality Standard Violations

		Number of Days Exceeding Standard				
Monitoring Site	*Year*	*State 1-Hour O_3*	*State 8-Hour O_3*	*Federal 8-Hour O_3*	*State 24-hour PM_{10}[1]*	*Federal 24-hour $PM_{2.5}$[1]*
Del Mar–Mira Costa College	2009	1	3	1	—	—
	2010	0	2	0	—	—
	2011	0	1	0	—	—
	2012	0	2	2	—	—
Escondido–East Valley Parkway	2009	—	—	—	5.6 (1)	2.0 (2)
	2010	—	—	—	0.0 (0)	2.0 (2)
	2011	—	—	—	0.0 (0)	3.0 (3)
	2012	—	—	—	0.0 (0)	1.0 (1)

[1] Measurements of PM_{10} and $PM_{2.5}$ are usually collected every 6 days and daily, respectively. "Number of days exceeding the standards" is a mathematical estimate of the number of days concentrations would have been greater than the level of the standard had each day been monitored. The numbers in parentheses are the measured number of samples that exceeded the standard.

Source:
CARB. "Air Quality Data Statistics." 2013. Available: http://arb.ca.gov/adam

REGULATORY SETTING

Federal Regulations

Clean Air Act

The Federal Clean Air Act, passed in 1970 and last amended in 1990, forms the basis for the national air pollution control effort. The EPA is responsible for implementing most aspects of the Clean Air Act, including the setting of NAAQS for major air pollutants, hazardous air pollutant standards, approval of state attainment plans, motor vehicle emission standards, stationary source emission standards and permits, acid rain control measures, stratospheric O_3 protection, and enforcement provisions. NAAQS are established for "criteria pollutants" under the Clean Air Act, which are O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead.

The NAAQS describe acceptable air quality conditions designed to protect the health and welfare of the citizens of the nation. The NAAQS (other than for O_3, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and those based on annual averages or arithmetic mean) are not to be exceeded more than once per year. NAAQS for O_3, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ are based on statistical calculations over 1- to 3-year periods, depending on the pollutant. The Clean Air Act requires the EPA to reassess the NAAQS at least every 5 years to determine whether adopted standards are adequate to protect public health based on current scientific evidence. States with areas that exceed the NAAQS must

prepare a state implementation plan (SIP) that demonstrates how those areas will attain the standards within mandated time frames.

State Regulations

The federal Clean Air Act delegates the regulation of air pollution control and the enforcement of the NAAQS to the states. In California, the task of air quality management and regulation has been legislatively granted to CARB, with subsidiary responsibilities assigned to air quality management districts (AQMDs) and air pollution control districts (APCDs) at the regional and county levels. CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for ensuring implementation of the California Clean Air Act of 1988, responding to the federal Clean Air Act, and regulating emissions from motor vehicles and consumer products.

CARB has established CAAQS, which are generally more restrictive than the NAAQS.[2] The CAAQS describe adverse conditions; that is, pollution levels must be below these standards before a basin can attain the standard. The CAAQS for O_3, CO, SO_2 (1-hour and 24-hour), NO_2, 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. The NAAQS and CAAQS are presented in Table 3.2-4, Ambient Air Quality Standards.

[2] CARB. 2013. "Ambient Air Quality Standards." http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

Table 3.2-4: Ambient Air Quality Standards

Pollutant	*Averaging Time*	*CAAQS*[1] *Concentration*[3]	*NAAQS Standards*[2] *Primary*[3,4]	*Secondary*[3,5]
O_3	1 hour	0.09 ppm (180 μg/m³)	—	Same as Primary Standard
	8 hour	0.070 ppm (137 μg/m³)	0.075 ppm (147 μg/m³)	
CO	1 hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)	—
	8 hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	
NO_2[6]	1 hour	0.18 ppm (339 μg/m³)	0.100 ppm (188 μg/m³)	Same as Primary Standard
	Annual Arithmetic Mean	0.030 ppm (57 μg/m³)	0.053 ppm (100 μg/m³)	
SO_2[7]	1 hour	0.25 ppm (655 μg/m³)	0.75 ppm (196 μg/m³)	—
	3 hour	—	—	0.5 ppm (1300 μg/m³)
	24 hour	0.04 ppm (105 μg/m³)	0.14 ppm (for certain areas)[7]	
	Annual Arithmetic Mean	—	0.030 ppm (for certain areas)[7]	—
PM_{10}[8]	24 hour	50 μg/m³	150 μg/m³	Same as Primary Standard
	Annual Arithmetic Mean	20 μg/m³	—	
$PM_{2.5}$[8]	24 hour	—	35 μg/m³	Same as Primary Standard
	Annual Arithmetic Mean	12 μg/m³	12.0 μg/m³	15.0 μg/m³
Lead[9,10]	30-day Average	1.5 μg/m³	—	—
	Calendar Quarter	—	1.5 μg/m³ (for certain areas)[10]	Same as Primary Standard
	Rolling 3-Month Average	—	0.15 μg/m³	
Hydrogen sulfide	1 hour	0.03 ppm (42 μg/m³)	—	—
Vinyl chloride[9]	24 hour	0.01 ppm (26 μg/m³)	—	—
Sulfates	24 hour	25 μg/m³	—	—
Visibility reducing particles[11]	8 hour (10:00 a.m. to 6:00 p.m. PST)	See footnote 11	—	—

Table 3.2-4: Ambient Air Quality Standards

		CAAQS[1]	*NAAQS Standards*[2]	
Pollutant	*Averaging Time*	*Concentration*[3]	*Primary*[3,4]	*Secondary*[3,5]

ppm= parts per million by volume $\mu g/m^3$ = micrograms per cubic meter mg/m^3= milligrams per cubic meter

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. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2 National standards (other than O_3, NO_2, SO_2, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For NO_2 and SO_2, the standard is attained when the 3-year average of the 98th and 99th percentile, respectively, of the daily maximum 1-hour average at each monitor within an area does not exceed 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% of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

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

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

6 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.

7 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 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 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.

8 On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 $\mu g/m^3$ to 12 $\mu g/m^3$. 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.

9 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.

10 The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until 1 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.

11 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.

Local Regulations

San Diego Air Pollution Control District

While CARB is responsible for the regulation of mobile emission sources within the state, local AQMDs and APCDs are responsible for enforcing standards and regulating stationary sources. Carlsbad is located within the SDAB and is subject to SDAPCD guidelines and regulations. In San Diego County, O_3 and particulate matter are the pollutants of main concern, since exceedances of state ambient air quality standards for those pollutants are experienced here in most years. For this reason and as shown in Table 3.2-1 above, the SDAB has been designated as a nonattainment area for the state PM_{10}, $PM_{2.5}$, and O_3 (1-hour and 8-hour) standards. Table 3.2-1, above, also shows that the SDAB is a federal O_3 marginal nonattainment area for the 2008 8-hour NAAQS for O_3 and a CO maintenance area.

The SDAPCD and the San Diego Association of Governments (SANDAG) are responsible for developing and implementing the clean air plan for attainment and maintenance of the ambient air quality standards in the SDAB. The San Diego County Regional Air Quality Strategy (RAQS) was initially adopted in 1991, and is updated on a triennial basis (most recently in 2009). The RAQS outlines SDAPCD's plans and control measures designed to attain the state air quality standards for O_3. The RAQS relies on information from CARB and SANDAG, including mobile and area source emissions, as well as information regarding projected growth in San Diego County and the cities in the county, to project future emissions and then determine from that the strategies necessary for the reduction of emissions through regulatory controls. CARB mobile source emission projections and SANDAG growth projections are based on population, vehicle trends, and land use plans developed by San Diego County and the cities in the county as part of the development of their general plans.

The *Eight-Hour Ozone Attainment Plan for San Diego County* indicates that local controls and state programs would allow the region to reach attainment of the federal 8-hour O_3 standard by 2009.[3] SDAPCD relies on the RAQS to demonstrate how the region will comply with the federal O_3 standard. The RAQS details how the region will manage and reduce O_3 precursors (NO_x and VOCs) by identifying measures and regulations intended to reduce these contaminants. The control measures identified in the RAQS generally focus on stationary sources; however, the emissions inventories and projections in the RAQS address all potential sources, including those under the authority of CARB and the EPA. Incentive programs for reduction of emissions from heavy-duty diesel vehicles, off-road equipment, and school buses are also established in the RAQS.

In December 2005, SDAPCD prepared a report titled "Measures to Reduce Particulate Matter in San Diego County" to address implementation of Senate Bill (SB) 656 in San Diego County (SB

[3] SDAPCD. *Eight-Hour Ozone Attainment Plan for San Diego County*. May 2007. http://www.sdapcd.org/planning/8-Hour-O3-Attain-Plan.pdf

656 required additional controls to reduce ambient concentrations of PM_{10} and $PM_{2.5}$).[4] In the report, SDAPCD evaluates the implementation of source-control measures that would reduce particulate matter emissions associated with residential wood combustion.

As stated above, the SDAPCD is responsible for planning, implementing, and enforcing federal and state ambient standards in the SDAB. The following rules and regulations would apply to construction that occurs pursuant to the proposed General Plan and some of the proposed stationary sources:

- **SDAPCD Regulation II: Permits; Rule 10: Permits Required.** Requires that any person building, erecting, altering, or replacing any article, machine, equipment or other contrivance, the use of which may cause the issuance of air contaminants, shall receive written authorization (Authority to Construction) and a Permit to Operate from the SDAPCD.[5]
- **SDAPCD Regulation II: Permits; Rule 20.1: New Source Review – General Provisions.** Establishes the general provisions, including exemptions, definitions, and emission calculations, that apply to any new or modified emission unit, any replacement emission unit, any relocated emission unit or any portable emission unit for which an Authority to Construct or Permit to Operate is required.[6]
- **SDAPCD Regulation II: Permits; Rule 20.2: New Source Review – Non-Major Sources.** Applies to any new or modified stationary source, to any new or modified emission unit and to any relocated emission unit that is not considered a major stationary source. As applied to new or modified sources, the rule requires (1) the use of Best Available Control Technology (BACT) where the emissions of PM_{10}, NO_x, VOC, or SO_x would increase by 10 pounds per day or more; (2) an air quality impact analysis if the emissions of PM_{10}, NO_x, VOC, SO_x, or lead exceed designated trigger levels; and (3) establishes public noticing requirements prior to issuance of a permit.[7]
- **SDAPCD Regulation IV: Prohibitions; Rule 50: Visible Emissions.** Prohibits any activity causing air contaminant emissions darker than 20% opacity for more than an aggregate of 3 minutes in any consecutive 60-minute time period. In addition, Rule 50

[4] SDAPCD. *Measures to Reduce Particulate Matter in San Diego County*. December 2005. http://www.sdapcd.org/planning/PM-Measures.pdf

[5] SDAPCD. *Rules and Regulations, Regulation II, Permits, Rule 10 Permits Required.* Amended April 27, 2000.

[6] SDAPCD. *Rules and Regulations, Regulation II, Rule 20.1, New Source Review – General Provisions.* Revised November 4, 1998, Effective December 17, 1998.

[7] SDAPCD. *Rules and Regulations, Regulation II, Rule 20.2, New Source Review – Non-Major Sources.* Revised November 4, 1998, Effective December 17, 1998.

prohibits any diesel pile-driving hammer activity causing air contaminant emissions for a period or periods aggregating more than 4 minutes during the driving of a single pile.[8]

- **SDAPCD Regulation IV: Prohibitions; Rule 51: Nuisance.** Prohibits the discharge, from any source, of such quantities of air contaminants or other materials that cause or have a tendency to cause injury, detriment, nuisance, annoyance to people and/or the public, or damage to any business or property.[9]
- **SDAPCD Regulation IV: Prohibitions; Rule 55: Fugitive Dust.** Regulates fugitive dust emissions from any commercial construction or demolition activity capable of generating fugitive dust emissions, including active operations, open storage piles, and inactive disturbed areas, as well as track-out and carry-out onto paved roads beyond a project site.[10]
- **SDAPCD Regulation IV: Prohibitions; Rule 67.0: Architectural Coatings.** Requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce VOC emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.[11]
- **SDAPCD Regulation IV: Prohibitions; Rule 69.2: Industrial and Commercial Boilers, Process Heaters and Steam Generators.** Prescribes NO_x and CO emission limits for existing and new boilers, process heaters, and steam generators rated at 5 million British thermal units (Btu) per hour or more. The rule also includes recordkeeping and source testing requirements.[12]
- **SDAPCD Regulation IV: Prohibitions; Rules 69.3 and 69.3.1: Stationary Gas Turbine Engines.** Prescribes NO_x emission limits for stationary gas turbine engines, corresponding to Reasonably Available Control Technology and Best Available Retrofit Technology, respectively, as well as monitoring and recordkeeping requirements. The rules apply to gas turbine engines rated at greater than 0.3 megawatts (300 kW).[13]

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[8] SDAPCD. *Rules and Regulations, Regulation IV, Prohibitions, Rule 50, Visible Emissions.* Amended August 13, 1997.

[9] SDAPCD. *Rules and Regulations, Regulation IV, Prohibitions, Rule 51, Nuisance*. Effective January 1, 1969.

[10] SDAPCD. *Rules and Regulations, Regulation IV, Prohibitions, Rule 55, Fugitive Dust.* Adopted June 24, 2009, Effective December 24, 2009.

[11] SDAPCD. *Rules and Regulations, Regulation IV, Prohibitions, Rule 67, Architectural Coatings.* Revised December 12, 2001.

[12] SDAPCD. *Rules and Regulations. Regulation IV, Prohibitions, Rule 69.2, Industrial and Commercial Boilers, Process Heaters and Steam Generators.* Adopted September 27, 1994.

[13] SDAPCD. *Rules and Regulations, Regulation IV, Prohibitions, Rule 69.3, Stationary Gas Turbine Engines – Reasonably Available Control Technology.* Revised, Effective December 16, 1998.

- **SDAPCD Regulation IV: Prohibitions; Rule 69.4.1: Stationary Reciprocating Internal Combustion Engines.** Prescribes NO_x, VOC, and CO emission limits for existing and new internal combustion engines as well as monitoring and recordkeeping requirements. The requirements are limited for new emergency standby engines that operate less than 52 hours per year for non-emergency purposes.[14]
- **SDAPCD Regulation XII: Prohibitions; Rule 1200: Toxic Air Contaminants – New Source Review.** Applies to any new, relocated, or modified emission unit which may increase emissions of one or more TACs that requires an Authority to Construct or Permit to Operate. The rule establishes acceptable risk levels and emission control requirements for new and modified facilities that may emit additional TACs. Under Rule 1200, permits to operate may not be issued when emissions of TACs result in an incremental cancer risk greater than 1 in 1 million without application of Toxics-BACT (T-BACT), or an incremental cancer risk greater than 10 in 1 million with application of T-BACT, or a health hazard index (chronic and acute) greater than one.[15]
- **SDAPCD Regulation XI: National Emission Standards for Hazardous Air Pollutants; Subpart M, Rule 361.145: Standard for Demolition and Renovation.** Requires owners and operators of a demolition or renovation activity to provide written notification of planned asbestos stripping or removal to the Control Officer no less than 10 days prior to demolition and/or asbestos removal. A Notification of Demolition and Renovation Form and fee is required with written notification. Procedures for asbestos emission control are provided under Rule 361.145 and must be followed in accordance with this regulation.[16]

[14] SDAPCD. *Rules and Regulations, Regulation IV, Prohibitions, Rule 69.4.1, Stationary Reciprocating Internal Combustion Engines.* Adopted November 15, 2000.

[15] SDAPCD. *Rules and Regulations, Regulation XII, Toxic Air Contaminants, Rule 1200, Toxic Air Contaminant – New Source Review*. Effective June 12, 1996.

[16] SDAPCD. *Rules and Regulations, Regulation XI, National Emission Standards for Hazardous Air Pollutants, Subpart M, Rule 361.145, Standard for Demolition and Renovation.* Adopted February 1, 1995.

Impact Analysis

SIGNIFICANCE CRITERIA

For the purposes of this Program EIR, a significant impact would occur if the proposed General Plan would:

- Conflict with or obstruct the implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for O_3 precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

SDAPCD

As part of its air quality permitting process, the SDAPCD has established thresholds in Rule 20.2 requiring the preparation of air quality impact assessments for permitted stationary sources. The SDAPCD sets forth quantitative emission thresholds below which a stationary source would not have a significant impact on ambient air quality. Project-related air quality impacts estimated in this environmental analysis would be considered significant if any of the applicable significance thresholds presented in Table 3.2-5, SDAPCD Air Quality Significance Thresholds, are exceeded.

Table 3.2-5: SDAPCD Air Quality Significance Thresholds

Construction Emissions	
Pollutant	*Total Emissions (Pounds per Day)*
Respirable Particulate Matter (PM_{10})	100
Fine Particulate Matter ($PM_{2.5}$)	55
Oxides of Nitrogen (NO_x)	250
Oxides of Sulfur (SO_x)	250
Carbon Monoxide (CO)	550
Volatile Organic Compounds (VOC)	137*

Operational Emissions			
Pollutant	*Total Emissions*		
	Pounds per Hour	*Pounds per Day*	*Tons per Year*
Respirable Particulate Matter (PM_{10})	—	100	15
Fine Particulate Matter ($PM_{2.5}$)	—	55	10
Oxides of Nitrogen (NO_x)	25	250	40
Sulfur Oxides (SO_x)	25	250	40
Carbon Monoxide (CO)	100	550	100
Lead and Lead Compounds	—	3.2	0.6
Volatile Organic Compounds (VOC)	—	137*	13.7

* VOC threshold based on the significance thresholds recommended by the Monterey Bay Unified Air Pollution Control District for the North Central Coast Air Basin, which has similar federal and state attainment status as the SDAB for O_3.

Sources:
City of San Diego. California Environmental Quality Act: Significance Determination Thresholds. http://www.sandiego.gov/development-services/pdf/news/sdtceqa.pdf
SDAPCD. Rules and Regulations, Regulation XV, Federal Conformity, Rule 1501, Conformity with General Federal Actions. Adopted March 7, 1995.
SDAPCD. Rules and Regulations, Regulation II, Rule 20.2, New Source Review – Non-Major Sources.

The thresholds listed in Table 3.2-5 represent screening-level thresholds that can be used for CEQA purposes to evaluate whether project-related emissions could cause a significant impact on air quality. Emissions below the screening-level thresholds would not cause a significant impact. In the event that emissions exceed these thresholds, modeling would be required to demonstrate that the project's total air quality impacts result in ground-level concentrations that are below the CAAQS and NAAQS, including appropriate background levels. For nonattainment pollutants, if emissions exceed the thresholds shown in Table 3.2-5, the project could have the potential to

result in a cumulatively considerable net increase in these pollutants and thus could have a significant impact on the ambient air quality.

SDAPCD Rule 51 (Public Nuisance) prohibits emission of any material that causes nuisance to a considerable number of persons or endangers the comfort, health, or safety of any person. A project that proposes a use that would produce objectionable odors would be deemed to have a significant odor impact if it would affect a considerable number of off-site receptors.

METHODOLOGY AND ASSUMPTIONS

Information and analysis have been compiled based on an understanding of the existing ambient air quality of the SDAB and review of existing technical data, aerial maps, and applicable laws, regulations, and guidelines. Traffic data and trip generation information was derived from the project's traffic impact analysis prepared by Fehr and Peers.[17] The URBEMIS 2007 model, Version 9.2.4, land use and air emissions model was then utilized to estimate daily emissions from proposed vehicular sources.[18] URBEMIS 2007 default data, including temperature, trip characteristics, variable start information, emissions factors, and trip distances, were conservatively used for the model inputs. General Plan-related traffic was assumed to be comprised of a mixture of vehicles in accordance with the model outputs for traffic. Emission factors representing the vehicle mix and emissions for 2035 (buildout year) were used to estimate emissions associated with the proposed General Plan. In addition to estimating mobile source emissions, the URBEMIS 2007 model was also used to estimate emissions from Carlsbad's area sources, which include other natural gas combustion, landscaping (which would not produce winter emissions), and architectural coatings for maintenance.

SUMMARY OF IMPACTS

Implementation of the proposed General Plan could result in substantial air quality impacts. These impacts could occur due to future construction activities such as grading and excavation associated with development, and due to increased vehicular traffic associated with future growth within the city. As described below, the proposed General Plan includes goals and policies that would help to reduce potential air quality impacts through reductions in construction and operational emissions. However, as described below, even with implementation of the proposed General Plan goals and policies, long-term operation air quality impacts would remain significant and unavoidable.

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[17] Fehr and Peers. Trip Generation Estimates worksheet. 2013.

[18] Jones & Stokes Associates. *Software User's Guide: URBEMIS2007 for Windows; Emissions Estimation for Land Use Development Projects*. Version 9.2. Prepared for the South Coast Air Quality Management District. November 2007. http://www.urbemis.com/support/manual.html.

IMPACTS

Impact 3.2-1 Development under the proposed General Plan will not conflict with or obstruct the implementation of the applicable air quality plan. (*Less than Significant*)

As mentioned earlier in this analysis, the SDAPCD and SANDAG are responsible for developing and implementing the clean air plan for attainment and maintenance of the NAAQS and CAAQS in the SDAB. The RAQS was initially adopted in 1991 and is updated on a triennial basis (most recently in 2009). The RAQS outlines SDAPCD's plans and control measures designed to attain the state air quality standards for O_3. The RAQS relies on information from CARB and SANDAG, including mobile and area source emissions, as well as information regarding projected growth in San Diego County and the cities in the county, to project future emissions and then determine from that the strategies necessary for the reduction of emissions through regulatory controls. CARB mobile source emission projections and SANDAG growth projections are based on population, vehicle trends, and land use plans developed by San Diego County and the cities in the county as part of the development of their general plans.

If a project proposes development that is greater than that anticipated in the local general plan and SANDAG's growth projections, the project might be in conflict with the RAQS and may contribute to a potentially significant cumulative impact on air quality. Future land uses and development projects that occur consistent with the proposed General Plan would generate vehicle miles traveled (VMT) that would result in ozone precursor emissions and particulate matter. However, individual projects under the proposed General Plan would be required to undergo subsequent environmental review pursuant to CEQA, and as part of this review effort, projects requiring discretionary approval would be required to demonstrate compliance with the RAQS and SIP. Individual projects would also be required to demonstrate compliance with SDAPCD rules and regulations governing air quality, specifically particulate matter. The City of Carlsbad will continue to coordinate with the SDAPCD and SANDAG to ensure city-wide growth projections, land use planning efforts, and local development patterns are accounted for in the regional planning and air quality planning processes. The proposed General Plan policies listed below would help to reduce potential impacts related to conflicts with an applicable air quality plan. For these reasons, and emission control measures established by the RAQS and SIP, the proposed General Plan would not conflict with or obstruct the implementation of the applicable air quality plan. Impacts would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Land Use and Community Design Element Policies

2-G.3 Promote infill development that makes efficient use of limited land supply, while ensuring compatibility and integration with existing uses. Ensure that infill properties develop with uses and development intensities supporting a cohesive development pattern.

2-G.6 Allow a range of mixed-use centers in strategic locations that maximize access to commercial services from transit and residential areas.

2-G.7 Ensure that neighborhood serving shopping and mixed-use centers include shopping as a pedestrian-oriented focus for the surrounding neighborhood, are physically integrated with the surroundings, and contain neighborhood-serving stores and small offices. Where appropriate, include in the centers high and medium density housing surrounding the retail core or integrated in mixed-use buildings.

2-G.11 Provide industrial lands that can accommodate a wide range of pollution-free industrial establishments, including those of relatively high intensity; research and development and related uses set in campus or park-like settings; as well as moderate to low intensity establishments capable of being located adjacent to residential areas with minimal buffering and attenuation measures.

2-P.5 Work with SANDAG through participation in its various standing committees on regional plans and initiatives. Adopt local implementing policies and programs when found to be consistent with the General Plan and in the best interests of Carlsbad's residents and businesses.

2-P.13 Encourage medium to higher density residential uses located in close proximity to commercial services, employment opportunities and major transportation corridors.

2-P.29 Regulate industrial land uses on the basis of performance standards, including, but not limited to noise, air quality, odor, and glare.

2-P.43 Evaluate each discretionary application for development of property with regard to the following specific criteria [only applicable criteria listed below]:

g. Compliance with the performance standards of the Growth Management Plan.

h. Development proposals which are designed to provide safe, easy pedestrian and bicycle linkages to nearby transportation corridors.

Open Space, Conservation, and Recreation Element Policies

4-G.11 Protect air quality within the city and support efforts for enhanced regional air quality.

4-P.25 Locate new parks, plazas, or alternative parks (such as greenways) in existing infill neighborhoods – the Village and Barrio – where new residential development is contemplated.

4-P.51 Participate in the implementation of transportation demand management programs on a regional basis.

4-P.52 To the extent practical and feasible, maintain a system of air quality alerts (such as through the city website, internet, email to city employees, and other tools)

based on San Diego Air Pollution Control District forecasts. Consider providing incentives to city employees to use alternative transportation modes during alert days.

4-P.53 Provide, whenever possible, incentives for carpooling, flex-time, shortened work weeks, and telecommunications and other means of reducing vehicular miles traveled.

4-P.54 Cooperate with the ongoing efforts of the U.S. Environmental Protection Agency, the San Diego Air Pollution Control District, and the State of California Air Resources Board in improving air quality in the regional air basin.

4-P.55 Ensure that construction and grading projects minimize short-term impacts to air quality.

a. Require grading projects to provide a storm water pollution prevention plan (SWPPP) in compliance with city requirements, which include standards for best management practices that control pollutants from dust generated by construction activities and those related to vehicle and equipment cleaning, fueling and maintenance;

b. Require grading projects to undertake measures to minimize mono-nitrogen oxide (NOx) emissions from vehicle and equipment operations; and

c. Monitor all construction to ensure that proper steps are implemented.

Mitigation Measures

None required.

Impact 3.2-2 Development under the proposed General Plan would violate air quality standards or contribute substantially to an existing or projected air quality violation. (*Significant and unavoidable*)

As stated previously, in San Diego County, O_3 and particulate matter are the pollutants of main concern, since exceedances of CAAQS for those pollutants are experienced here in most years. For this reason, the SDAB has been designated as a nonattainment area for the state PM_{10}, $PM_{2.5}$, and O_3 (1-hour and 8-hour) standards. The SDAB is also a federal O_3 marginal nonattainment area for the 2008 8-hour NAAQS and a CO maintenance area.

Construction

Construction activities under the proposed General Plan would occur during future residential, commercial, industrial, and open space development. Specific project development schedules under the proposed General Plan are not known at this time; however, buildout would occur over an extended period of time, depending on unknown factors such as local economic conditions, market demand, and other financing considerations.

Future construction allowed under the proposed General Plan would result in a temporary addition of pollutants to the local airshed caused by soil disturbance, fugitive dust emissions, and combustion pollutants from on-site construction equipment, as well as from off-site trucks hauling construction materials. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation and, for dust, the prevailing weather conditions. Therefore, such emission levels can only be approximately estimated with a corresponding uncertainty in precise ambient air quality impacts. Fugitive dust (PM_{10} and $PM_{2.5}$) emissions would primarily result from grading and site preparation activities. NO_x and CO emissions would primarily result from the use of construction equipment and motor vehicles.

The proposed General Plan is subject to SDAPCD Rule 55—Fugitive Dust Control. This rule requires that future projects take steps to restrict visible emissions of fugitive dust beyond their respective property lines. Compliance with Rule 55 would limit fugitive dust (PM_{10} and $PM_{2.5}$) that may be generated during grading and construction activities. The proposed General Plan is also subject to SDAPCD Rule 67.0—Architectural Coatings. This rule requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce VOC emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.

Although specific project construction schedules that would be implemented under the proposed General Plan are not known at this time, construction emissions generated during construction of future development would potentially exceed SDAPCD thresholds; therefore, impacts would be considered potentially significant. Proposed Plan Policy 4-P.55, listed below, would further aid in reducing emissions associated with construction activities; for example, the policy requires compliance with the city's storm water pollution prevention plan (SWPPP) requirements, which include implementation of best management practices (BMPs) such as dust control measures and other construction-related measures during grading and construction activities.[19] Additionally, Section 4.504 of the city's California Green Building Standards Code (adopted by reference as part of the city's building code) includes measures related to pollutant control for dust debris and architectural coating that would reduce fugitive dust and VOC content during coating applications for new projects.[20] Measures outlined in the city's SWPPP process and Green Building Standards Code would reduce impacts associated with construction activities; however, there is no guarantee emissions would be mitigated below SDAPCD thresholds. Therefore, impacts would remain significant and unavoidable during construction.

[19] City of Carlsbad. Construction SWPPP Standards and Requirements. June 2008. http://www.carlsbadca.gov/business/building/Documents/EngStandsw-stds-vol4-ch3.pdf.

[20] CBSC (California Building Standards Commission). 2010. California Green Building Standards Code (CalGreen). California Code of Regulations, Title 24, Part 11. June 2010.

Operation

Following the completion of construction activities over the course of buildout of the proposed General Plan, operational activities would generate VOC, NO_x, CO, SO_x, PM_{10}, and $PM_{2.5}$ emissions from mobile and stationary sources, including vehicular traffic, area sources (space heating, water heating, landscaping), and other larger stationary sources. For the purposes of this analysis, the proposed General Plan buildout in year 2035 is compared to the baseline scenario (existing conditions) in order to determine the net operational emissions associated with the proposed General Plan. Stationary sources, other than area sources, were not included in operational emissions estimate calculations as new stationary source projects under the proposed General Plan are not proposed at this time. Additionally, should any future stationary sources be constructed, these projects would be subject to permitting review by the SDAPCD to ensure violations of current air quality standards would not occur, as well as independent environmental review under CEQA. Therefore, because future stationary source projects that would occur under the proposed General Plan would be required to obtain permits issued by the SDAPCD, and would be subject to independent environmental review, stationary source emissions are not provided.

The proposed General Plan would allow for future residential, commercial, office, hotel, and industrial development; and increases in land use densities and development intensities. Operational emissions were estimated using the URBEMIS 2007, Version 9.2.4, land use and air emissions model.[21]

Mobile Emissions

Implementation of the proposed General Plan would impact air quality through the vehicular traffic generated by future development. According to the project's traffic analysis prepared by Fehr and Peers, the net change in trips that can be attributed to buildout of the proposed General Plan is 225,746 trips.

The URBEMIS 2007 model was utilized to estimate daily emissions from proposed vehicular sources (refer to Appendix B). URBEMIS 2007 default data, including temperature, trip characteristics, variable start information, emissions factors, and trip distances, were conservatively used for the model inputs.

Proposed General Plan-related traffic was assumed to be comprised of a mixture of vehicles in accordance with the model outputs for traffic. Emission factors representing the vehicle mix and emissions for 2035 (full buildout) were used to estimate emissions associated with development under the proposed General Plan.

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[21] Jones & Stokes Associates. *Software User's Guide: URBEMIS2007 for Windows; Emissions Estimation for Land Use Development Projects.*

Area Sources

In addition to estimating mobile source emissions, the URBEMIS 2007 model was also used to estimate emissions from the proposed General Plan's area sources, which include other natural gas combustion, landscaping (which would not produce winter emissions), and architectural coatings for maintenance. Refer to Appendix B for additional information.

Summary of Operational Emissions

Table 3.2-6, Estimated Daily Maximum Operational Emissions, presents the maximum daily emissions associated with the operation of the proposed General Plan at buildout. The values shown for motor vehicles and area sources are the maximum summer or winter daily emissions results from URBEMIS 2007. Complete details of the emissions calculations are provided in Appendix B.

Table 3.2-6: Estimated Daily Maximum Operational Emissions (pounds/day)

	General Plan Buildout (2035)					
Emission Source	*VOC*	*NO_x*	*CO*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
Motor Vehicles	622.27	747.84	6,498.67	15.43	3,052.29	582.33
Area Sources	1,784.83	212.35	7,011.10	21.73	1,121.56	1,079.54
Total	**2,407.10**	**960.19**	**13,509.77**	**37.16**	**4,173.85**	**1,661.87**
Emission Threshold	*75*	*250*	*550*	*250*	*100*	*55*
Threshold Exceeded?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Emissions represent maximum of summer and winter. "Summer" emissions are representative of the conditions that may occur during the ozone season (May 1 to October 31), and "winter" emissions are representative of the conditions that may occur during the balance of the year (November 1 to April 30).

Source: Appendix B.

Operational emissions would exceed the SDAPCD's significance threshold for VOC, NO_x, CO, PM_{10}, and $PM_{2.5}$ primarily due to motor vehicle emissions; therefore, impacts would be potentially significant. SO_x emissions would be below SDAPCD's significance thresholds. Measures outlined in the city's SWPPP and Green Building Standards Code would reduce impacts associated with operational emissions; however, there is no guarantee emissions would be mitigated below SDAPCD thresholds. Due to the substantial increase anticipated in average daily traffic (ADT) as a result of development under the proposed General Plan, no mitigation is available to reduce CO and PM_{10} impacts from motor vehicles to a level that is less than significant. A number of proposed General Plan policies, listed below, as well as measures outlined in the city's SWPPP and Green Building Standards Code, would reduce impacts associated with long-term operational criteria pollutant emissions; however, impacts would remain significant and unavoidable during operation.

Proposed General Plan Policies that Reduce the Impact

Land Use and Community Design Element

Goals 2-G.3, 2-G.6, 2-G.7, and 2-G.11, and policies 2-P.5, 2-P.13, 2-P.29, and 2-P.43, listed above, would help to reduce potential air quality impacts.

Open Space, Conservation, and Recreation Element

Goals 4-G.11 and policies 4-P.25, 4-P.51, 4-P.52, 4-P.53, 4-P.54, and 4-P.55 listed above, would help to reduce potential air quality impacts.

Mitigation Measures

No mitigation is available beyond measures identified in the city's SWPPP, Green Building Standards Code, and the goals and policies in the General Plan that would reduce impacts to a level that is less than significant.

Significance After Mitigation

Since no mitigation is available beyond the goals and policies provided in the General Plan to ensure that air quality impacts would be less than significant, impacts would remain significant and unavoidable.

Impact 3.2-3 Development under the proposed General Plan will not result in a cumulatively considerable net increase of any criteria pollutant for which the General Plan region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for O_3 precursors). (*Less than Significant*)

In analyzing cumulative impacts from the proposed General Plan, the analysis must specifically evaluate a project's contribution to the cumulative increase in pollutants for which the SDAB is designated as nonattainment for the CAAQS and NAAQS. If the proposed General Plan does not exceed thresholds and is determined to have less-than-significant impacts, it may still contribute to a significant cumulative impact on air quality if the emissions from the proposed General Plan, in combination with the emissions from other proposed or reasonably foreseeable future projects, are in excess of established thresholds. However, the proposed General Plan would only be considered to have a significant cumulative impact if its contribution accounts for a significant proportion of the cumulative total emissions (i.e., it represents a "cumulatively considerable contribution" to the cumulative air quality impact).

The SDAB has been designated as a federal nonattainment area for O_3, and a state nonattainment area for O_3, PM_{10}, and $PM_{2.5}$. PM_{10} and $PM_{2.5}$ emissions associated with construction generally result in localized impacts. The RAQS relies on SANDAG growth projections based on population, vehicle trends, and land use plans developed by the cities and by the county as part of the development of their general plans. As such, projects that propose development that is consistent with the growth anticipated by local general plans would be consistent with the RAQS.

As discussed previously in Impact 3.2-1, future development projects allowed under the proposed General Plan and associated land uses would generate VMT that would result in ozone precursor emissions and particulate matter. However, individual projects proposed under the proposed General Plan would be required to undergo subsequent environmental review pursuant to CEQA, and as part of this review effort, projects requiring discretionary approval would be required to demonstrate compliance with the RAQS and SIP. Individual projects would also be required to demonstrate compliance with SDAPCD rules and regulations governing air quality, specifically particulate matter. The City of Carlsbad will continue to coordinate with the SDAPCD and SANDAG to ensure city-wide growth projections, land use planning efforts, and local development patterns are accounted for in the regional planning and air quality planning processes. For these reasons, and emission control measures established by the RAQS and SIP, the proposed General Plan would not conflict with or obstruct the implementation of the applicable air quality plan. Impacts would be less than significant and would not result in a cumulatively considerable impact.

Proposed General Plan Policies that Reduce the Impact

Land Use and Community Design Element Policies

Goals 2-G.3, 2-G.6, 2-G.7, and 2-G.11, and policies 2-P.5, 2-P.13, 2-P.29, and 2-P.43, listed above, would help to reduce potential air quality impacts.

Open Space, Conservation, and Recreation Element Policies

Goals 4-G.11 and policies 4-P.25, 4-P.51, 4-P.52, 4-P.53, 4-P.54, and 4-P.55 listed above, would help to reduce potential air quality impacts.

Mitigation Measures

None required.

Impact 3.2-4 Development under the proposed General Plan will not expose sensitive receptors to substantial pollutant concentrations. (*Less than Significant*)

Construction

In addition to impacts from criteria pollutants, project impacts may include emissions of pollutants identified by the state and federal governments as toxic air contaminants (TACs) or hazardous air pollutants (HAPs). State law has established the framework for California's TAC identification and control program, which is generally more stringent than the federal program and is aimed at HAPs that are a problem in California. The state has formally identified more than 200 substances as TACs, including the federal HAPs, and is adopting appropriate control measures for sources of these TACs. As examples, TACs include acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and diesel particulate matter. Some of the TACs are groups of compounds that contain many individual substances (for example, copper compounds and polycyclic organic matter). The greatest potential for TAC emissions during construction would be diesel particulate emissions from heavy equipment operations and heavy-duty trucks and the associated health impacts to sensitive receptors. Sensitive receptors include residences,

schools, playgrounds, child care centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes.

Health effects from carcinogenic air toxics are usually described in terms of cancer risk. SDAPCD Rule 1210 indicates that an incremental cancer risk threshold of 10 in 1 million or greater warrants public notification.[22] "Incremental Cancer Risk" is the likelihood that a person continuously exposed to concentrations of TACs resulting from a project over a 70-year lifetime will contract cancer quantified using standard risk-assessment methodology. The proposed General Plan construction activities would be dispersed intermittently over a 22-year period.

Off-road diesel construction equipment and heavy-duty diesel trucks (e.g., concrete trucks, building materials delivery trucks), which are sources of diesel exhaust particulate matter, are regulated under three airborne toxic control measures (ATCMs) adopted by CARB. The ATCM for diesel construction equipment specifies particulate matter emission standards for equipment fleets, which become increasingly stringent over time. Furthermore, most newly-purchased construction equipment introduced into construction fleets after 2013–2015, depending on the engine horsepower rating, will be equipped with high-efficiency diesel particulate filters. One of ATCMs for heavy-duty diesel trucks specifies that commercial trucks with a gross vehicle weight rating over 10,000 pounds are prohibited from idling for more than 5 minutes unless the engines are idling while queuing or involved in operational activities. In addition, starting in model year 2008, new heavy-duty trucks must be equipped with an automatic shutoff device to prevent excessive idling or meet stringent NO_x requirements. Lastly, fleets of diesel trucks with a gross vehicle weight rating greater than 14,000 pounds are subject to another ATCM. This ATCM requires truck fleet operators to replace older vehicles and/or equip them with diesel particulate filters, depending on the age of the truck. Thus, over the life of the project, the diesel exhaust particulate matter emissions from off-road construction equipment and trucks will be controlled substantially. Accordingly, implementation of the proposed General Plan is not anticipated to result in a long-term exposure of sensitive receptors to substantial concentration of TACs. Impacts would be less than significant.

Operation

Following construction activities, stationary sources such as boilers, diesel generators, and dry cleaning establishments would result in TAC emissions. In San Diego County, SDAPCD Rule 1200 establishes acceptable risk levels and emission control requirements for new and modified stationary sources that may emit additional TACs. Some stationary sources would require permits from the SDAPCD under Rule 1200. Under Rule 1200, permits to operate may not be issued when emissions of TACs result in an incremental cancer risk greater than 1 in 1 million without application of T-BACT, or an incremental cancer risk greater than 10 in 1 million with

[22] SDAPCD. *Rules and Regulations, Regulation XII, Toxic Air Contaminants, Rule 1210, Toxic Air Contaminant Public Health Risks – Public Notification and Risk Reduction.* Effective June 12, 1996.

application of T-BACT, or a health hazard index (chronic and acute) greater than 1. The human health risk analysis is based on the time, duration, and exposures expected. T-BACT will be determined on a case-by-case basis; however, examples of T-BACT include diesel particulate filters, catalytic converters, and selective catalytic reduction technology. In accordance with SDAPCD Rule 20, the SDAPCD cannot issue a permit if compliance with Rule 1200 (Toxic Air Contaminants—New Source Review) and all other applicable air quality rules and regulations is not demonstrated. Accordingly, the cancer risk at nearby sensitive receptors would be at acceptable levels, and the impact to sensitive receptors would be less than significant. Additionally, the proposed General Plan includes policies that would reduce impacts to sensitive receptors as listed below. Therefore, impacts would be less than significant.

Proposed Plan Policies that Reduce the Impact

Land Use and Community Design Element Policies

See Goal 2-G.11 and Policy 2-P.29 above.

Open Space, Conservation and Recreation Element Policies

See Goal 4-G.11 and Policy 4-P.52 above.

Mitigation Measures

None required.

Impact 3.2-5 Development under the proposed General Plan will not create objectionable odors affecting a substantial number of people. (*Less than Significant*)

Odors would be generated from vehicles and/or equipment exhaust emissions during construction of future projects under the proposed General Plan. Odors produced during construction would be attributable to concentrations of unburned hydrocarbons from tailpipes of construction equipment and architectural coatings. Such odors are temporary and generally occur at magnitudes that would not affect substantial numbers of people. Therefore, impacts associated with odors during construction would be considered less than significant.

Land uses and industrial operations that are associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. Development under the proposed General Plan would be required to meet all local, state, and federal regulations related to odor control, including permit requirements. However, sensitive receptors would be potentially located near odor-generating land uses, including potential future residential development located adjacent to, and within the vicinity of, the existing Encina Water Pollution Control Facility located south of Palomar Airport Road off of Avenida Encinas. Future project-level analysis will demonstrate consistency with the General Plan and policies as listed below would ensure that odor impacts would be reduced to a level that is less than significant.

Proposed Plan Policies that Reduce the Impact

Land Use and Community Design Element Policies

See Policy 2-P.29 above.

Mitigation Measures

None required.

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