APPENDIX 2

Air Quality Analysis

OCTOBER 2018

AIR QUALITY ANALYSIS

Placentia General Plan Update

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AIR QUALITY AND GREENHOUSE GAS ANALYSIS

for the

Placentia General Plan Update

Placentia, California

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SYMBOLS, ABBREVIATIONS, AND ACRONYMS

AB	Assembly Bill
ADT	Average Daily Traffic
APN	Assessor's Parcel Number
AQMP	Air Quality Management Plan
ATCM	Air Toxic Control Measures
BACT	Best Available Control Technology
Basin	South Coast Air Basin
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CALARP	California Accidental Release Prevention Law
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
DPM	Diesel Particulate Matter
EPA	U.S. Environmental Protection Agency
F°	Fahrenheit
FCAA	Federal Clean Air Act
HAPS	Hazardous Air Pollutants
HRA	Health Risk Assessment
HVAC	heating, ventilation, and air conditioning
I-210	Interstate 210
I-4	Environmental Justice Enhancement Initiative
LASP-CL	Lincoln Avenue Specific Plan Limited Commercial
lbs	pounds
LSTs	Localized Significance Thresholds
MACT	Maximum Achievable Control Technologies
MEIR	Maximally Exposed Individual Resident

NAAQS	National Ambient Air Quality Standards
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
O_3	ozone
OEHHA	Office of Environmental Health Hazard Assessment
Pb	Lead
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PMI	Point of Maximum Impact
ppb	parts per billion
ppm	parts per million
PST	Pacific Standard Time
RCP	Regional Comprehensive Plan
RH	relative humidity
ROG	Reactive Organic Gasses
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Community Strategy
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SRA	Source Receptor Area
TACs	Toxic Air Contaminants
$\mu g/m^3$	micrograms per cubic meter
VMT	vehicle miles traveled
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The purpose of this Air Quality and Greenhouse Gas Analysis is to describe the existing regulatory environment and existing emissions, as well as projected air quality and greenhouse gas (GHG) conditions in the City of Placentia from the General Plan Update.

Air pollutants within the City of Placentia are generated by stationary and mobile sources. Typical stationary sources include buildings, power plants, mines, smokestacks, vents, incinerators, and other facilities using industrial combustion processes. Mobile sources of emissions include cars, trucks, busses, planes, trains, motorcycles, and gasoline-powered landscaping equipment.

An emissions inventory was prepared for the City of Placentia based on existing land use information and traffic volumes. According to the emissions inventory, mobile sources are generally the largest contributor to the estimated annual average air pollutant levels. An emissions inventory was also prepared for the Placentia 2040 General Plan forecast conditions. The emissions inventory is based on the planned 2040 land use information and anticipated traffic volumes. According to the emissions inventory, mobile sources are generally the largest contributor to the estimated annual average air pollutant levels in the forecast scenario.

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1.0 INTRODUCTION

The purpose of this Air Quality and Greenhouse Gas Analysis is to describe the existing regulatory environment and emissions, as well as projected air quality conditions associated with the City of Placentia General Plan Update. The proposed Placentia General Plan 2040 scenario has revised housing, commercial square footage, and population estimates, with allowances for mixed-use developments based on the recent land use information provided by the City. Many land use decisions that involve siting, zoning and permitting actions provide opportunities to complement local and state air regulations and prevent or minimize adverse health impacts. In local planning and policy development, sensitive land uses should be given special consideration to best protect those individuals that are especially vulnerable to the effects of air pollution.

The South Coast Air Basin exceeds federal standards for ozone, coarse particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). This Air Quality and Greenhouse Gas Analysis is intended to provide a basis to establish policy direction and implementation measures that allow the Basin to attain Federal and State air quality standards, as well as to protect Placentia residents and businesses from the harmful effects of poor air quality and climate change.

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2.0 EXISTING SETTING

2.1 SOUTH COAST AIR BASIN

GEOGRAPHY

The City of Placentia is located in the South Coast Air Basin (Basin), a 6,600-square mile area bound by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Basin includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, in addition to the San Gorgonio Pass area of Riverside County. The Basin's terrain and geographical location (i.e., a coastal plain with connecting broad valleys and low hills) determine its distinctive climate.

The general region lies in the semi-permanent high-pressure zone of the eastern Pacific. The climate is mild and tempered by cool sea breezes. The usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds. The extent and severity of the air pollution problem in the Basin is a function of the area's natural physical characteristics (weather and topography), as well as man-made influences (development patterns and lifestyle). Factors such as wind, sunlight, temperature, humidity, rainfall, and topography all affect the accumulation and/or dispersion of pollutants throughout the Basin.

CLIMATE

The climate in the Basin is characterized by moderate temperatures and comfortable humidity, with precipitation limited to a few storms during the winter season (November through April). The average annual temperature varies little throughout the Basin, averaging 75 degrees Fahrenheit (°F). However, with a less pronounced oceanic influence, the eastern inland portions of the Basin show greater variability in annual minimum and maximum temperatures. January is usually the coldest month at all locations, while July and August are usually the hottest months of the year. Although the Basin has a semi-arid climate, the air near the surface is moist due to the presence of a shallow marine layer. Except for infrequent periods when dry, continental air is brought into the Basin by offshore winds, the ocean effect is dominant. Periods with heavy fog are frequent, and low stratus clouds, occasionally referred to as "high fog," are a characteristic climate feature.

Annual average relative humidity is 70 percent at the coast and 57 percent in the eastern part of the Basin. Precipitation in the Basin is typically 9 to 14 inches annually and is rarely in the form of snow or hail due to typically warm weather. The frequency and amount of rainfall is greater in the coastal areas of the Basin.

In the City of Placentia, the climate is typically warm during summer when temperatures tend to be in the 70's and cool during winter when temperatures tend to be in the 50's. The warmest month of the year is August with an average maximum temperature of 89°F, while the coldest

month of the year is December with an average minimum temperature of 47°F. Temperature variations between night and day tend to be moderate during summer with a difference that can reach 24°F, and moderate during winter with an average difference of 23°F. The annual average precipitation in Placentia is 13.53 inches. Rainfall is evenly distributed throughout the year. The wettest month of the year is February with an average rainfall of 3.18 inches.[1]

2.2 AMBIENT AIR QUALITY

The monitoring stations in the State are operated by the California Air Resources Board (CARB), local Air Pollution Control Districts or Air Quality Management Districts, by private contractors, and by the National Park Service. These entities operate more than 250 air monitoring stations in California. Air quality monitoring stations usually measure pollutant concentrations ten feet above ground level. In the Basin, each monitoring station is located within a Source Receptor Area (SRA). The communities within a SRA are expected to have similar climatology and ambient air pollutant concentrations. The City of Placentia is in SRA 16 (North Orange County).

POLLUTANTS MEASURED

The following air quality information briefly describes the various types of pollutants monitored at the Anaheim Monitoring Station. The Anaheim Monitoring Station is the nearest to the City within SRA 16. Air quality data from 2015 through 2017 is provided in Table 1, *Local Air Quality Levels*.

Carbon Monoxide (CO). CO is an odorless, colorless toxic gas that is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. In cities, automobile exhaust can cause as much as 95 percent of all CO emissions.

CO replaces oxygen in the body's red blood cells. Individuals with a deficient blood supply to the heart, patients with diseases involving heart and blood vessels, fetuses, and patients with chronic hypoxemia (oxygen deficiency, as seen in high altitudes) are most susceptible to the adverse effects of CO exposure. People with heart disease are also more susceptible to developing chest pains when exposed to low levels of CO. Exposure to high levels of CO can slow reflexes and cause drowsiness, as well as result in death in confined spaces at very high concentrations.

[1] The Weather Channel, *Average Weather for Placentia, CA*, Accessed October 9, 2018. https://weather.com/weather/monthly/l/USCA0875:1:US.

Table 1
Local Air Quality Levels

Pollutant	California Standard	Federal Standard	Year	Maximum[1] Concentration	Days (Samples) State/Federal Std. Exceeded
Ozone (O_3) (1-Hour)[2]	0.09 ppm for 1 hour	NA[5]	2015 2016 2017	0.100 ppm 0.103 0.090	1/0 2/0 0/0
Ozone (O_3) (8-Hour)[2]	0.07 ppm for 8 hours	0.07 ppm for 8 hours	2015 2016 2017	0.080 ppm 0.074 0.076	1/1 4/4 4/4
Carbon Monoxide (CO) (1-Hour)[2]	20.0 ppm for 1 hour	35.0 ppm for 1 hour	2015 2016 2017	3.07 ppm 2.61 2.45	0/0 0/0 0/0
Carbon Monoxide (CO) (8-Hour)[2]	9.0 ppm for 8 hours	9.0 ppm for 8 hours	2015 2016 2017	8.0 ppm 8.0 8.0	0/0 0/0 0/0
Nitrogen Dioxide (NO_2) (1-Hour)[2]	0.18 ppm for 1 hour	0.100 ppm for 1 hour	2015 2016 2017	0.0591 ppm 0.0643 0.0812	0/0 0/0 0/0
Particulate Matter (PM_{10})[2, 3,4]	50 µg/m³ for 24 hours	150 µg/m³ for 24 hours	2015 2016 2017	59.0 µg/m³ 74.0 95.7.0	2/0 NA/0 NA/0
Fine Particulate Matter ($PM_{2.5}$)[2,4]	No Separate State Standard	35 µg/m³ for 24 hours	2015 2016 2017	45.8 µg/m³ 44.4 53.9	NA/3 NA/1 NA/7

ppm = parts per million; PM_{10} = particulate matter 10 microns in diameter or less; NM = not measured; µg/m³ = micrograms per cubic meter; $PM_{2.5}$ = particulate matter 2.5 microns in diameter or less; NA = not available.

Notes:
1. Maximum concentration is measured over the same period as the California Standards.
2. Anaheim Monitoring Station located at 1630 Pampas Lane, California 92802.
3. PM_{10} exceedances are based on State thresholds established prior to amendments adopted on June 20, 2002.
4. PM_{10} and $PM_{2.5}$ exceedances are derived from the number of samples exceeded, not days.
5. The Federal standard was revoked in June 2005.

Sources: Aerometric Data Analysis and Measurement System (ADAM), summaries from 2015 to 2017, http://www.arb.ca.gov/adam.
Quality Assurance Air Monitoring Sites, https://www.arb.ca.gov/qaweb/site.php?s_arb_code=30031.
Air Data, Tables of 8-Hour Average Data, https://aqs.epa.gov/aqsweb/airdata/download_files.html#eighthour.

Nitrogen Dioxide (NO_X). NO_X are a family of highly reactive gases that are a primary precursor to the formation of ground-level O_3, and react in the atmosphere to form acid rain. Nitrogen dioxide (NO_2) (often used interchangeably with NO_X) is a reddish-brown 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).

NO_2 can irritate and damage the lungs, and lower resistance to respiratory infections such as influenza. The health effects of short-term exposure are still unclear. However, continued or frequent exposure to NO_2 concentrations that are typically much higher than those normally found in the ambient air, may increase acute respiratory illnesses in children and increase the

incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may aggravate eyes and mucus membranes as well as cause pulmonary dysfunction.

Ozone (O_3). O_3 occurs in two layers of the atmosphere. The layer surrounding the earth's surface is the troposphere. The troposphere extends approximately 10 miles above ground level, where it meets the second layer, the stratosphere. The stratospheric (the "good" O_3 layer) extends upward from about 10 to 30 miles and protects life on earth from the sun's harmful ultraviolet rays.

The "Bad" O_3 is a photochemical pollutant, and needs reactive organic compounds (ROGs), NO_X, and sunlight to form; therefore, ROGs and NO_X are O_3 precursors. Precursors are a group of pollutants that combine to create other pollutants. In this case ROG and NO_X combine with sunlight to create ground-level O_3. To reduce O_3 concentrations, it is necessary to control the emissions of these O_3 precursors. Significant O_3 formation generally requires an adequate amount of precursors in the atmosphere and a period of several hours in a stable atmosphere with strong sunlight. High O_3 concentrations can form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins.

While O_3 in the upper atmosphere (stratosphere) protects the earth from harmful ultraviolet radiation, high concentrations of ground-level O_3 (in the troposphere) can adversely affect the human respiratory system and other tissues. O_3 is a strong irritant that can constrict the airways, forcing the respiratory system to work hard to deliver oxygen. Individuals exercising outdoors, children, and people with pre-existing lung disease such as asthma and chronic pulmonary lung disease are considered to be the most susceptible to the health effects of O_3. Short-term exposure (lasting for a few hours) to O_3 at levels typically observed in Southern California can result in aggravated respiratory diseases such as emphysema, bronchitis and asthma, shortness of breath, increased susceptibility to infections, inflammation of the lung tissue, increased fatigue, as well as chest pain, dry throat, headache, and nausea.

Coarse Particulate Matter (PM_{10}). PM_{10} refers to suspended particulate matter which is smaller than 10 microns (or ten one-millionths) of a meter. PM_{10} arises from sources such as road dust, diesel soot, combustion products, construction operations, and dust storms. PM_{10} scatters light and significantly reduces visibility. In addition, these particulates penetrate in the lungs and can potentially damage the respiratory tract. On June 19, 2003, CARB adopted amendments to the statewide 24-hour particulate matter standards based upon requirements set forth in the Children's Environmental Health Protection Act (Senate Bill 25).

Fine Particulate Matter ($PM_{2.5}$). Due to recent increased concerns over health impacts related to $PM_{2.5}$, both State and Federal $PM_{2.5}$ standards have been created. Particulate matter impacts primarily affect infants, children, the elderly, and those with pre-existing cardiopulmonary disease. In 1997, the U.S. Environmental Protection Agency (EPA) announced new $PM_{2.5}$ standards. Industry groups challenged the new standard in court and the implementation of the

standard was blocked. However, upon appeal by the EPA, the U.S. Supreme Court reversed this decision and upheld the EPA's new standards.

On January 5, 2005, the EPA published a Final Rule in the Federal Register that designates the Orange County portion of the Basin as a nonattainment area for Federal $PM_{2.5}$ standards. On June 20, 2002, CARB adopted amendments for statewide annual ambient particulate matter air quality standards. These standards were revised/established due to increasing concerns by CARB that previous standards were inadequate, as almost everyone in California is exposed to levels at or above the current State standards during some parts of the year, and the statewide potential for significant health impacts associated with particulate matter exposure was determined to be large and wide-ranging.

Sulfur Dioxide (SO_2). SO_2 is a colorless, irritating gas with a rotten egg smell. It is formed primarily by the combustion of sulfur-containing fossil fuels, such as gasoline and diesel fuel. Sulfur is a natural component in crude oil that ends up in gasoline and diesel unless removed. Sulfur dioxide is often used interchangeably with sulfur oxides (SO_X) and lead (Pb). Exposure of a few minutes to low levels of SO_2 can result in airway constriction in some asthmatics. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO_2.

Reactive Organic Gases (ROG) and Volatile Organic Compounds (VOC). Hydrocarbons are organic gases that are formed solely of hydrogen and carbon that exist in the ambient air. There are several subsets of organic gases including ROGs and VOCs. ROGs contribute to the formation of smog and/or may be toxic themselves. ROGs often have an odor; some examples include gasoline, alcohol, and the solvents used in paints. The major sources of hydrocarbons are combustion engine exhaust, oil refineries, and oil-fueled power plants; other common sources are petroleum fuels, solvents, dry cleaning solutions, and paint (via evaporation). Although ROGs and VOCs they represent slightly different subsets of organic gases, they are used interchangeably for the purposes of this analysis. On a regional emissions level, adverse effects on human health are not caused directly by VOCs, but rather by reactions of VOC to form secondary pollutants such as O_3.

2.3 PRIMARY SOURCES OF AIR POLLUTANT EMISSIONS

Air pollutants within the City of Placentia are generated by stationary and mobile sources. These emission sources are described below.

STATIONARY AND POINT SOURCES

Stationary source emissions refer to those that originate from a single place or object that does not move around. Typical stationary sources include buildings, power plants, mines, smokestacks, vents, incinerators, and other facilities using industrial combustion processes. Stationary point sources have one or more emission sources at a facility with an identified location and are usually associated with manufacturing and industrial projects.

The City of Placentia also contains several point sources, a single identifiable source of air pollution. A variety of pollutants, including reactive hydrocarbons from activities such as spray painting, are generated by smaller commercial and industrial uses. Industrial uses are generally located in the southern portion of the City adjacent to the Burlington Northern Santa Fe (BNSF) rail line. While each use might not represent a significant source of air pollution, the cumulative effects of development within the City could be significant. For example, the combination of several point sources could represent a substantial amount of emissions. Although the number and nature of future additional air pollutant point sources is presently unknown, each individual source would be required to comply with rules and regulations established by the SCAQMD. These regulations require that sources of hazardous materials or criteria pollutants above threshold levels obtain permits prior to operation of the facility.

MOBILE SOURCES

Mobile sources of emissions refer to those moving objects that release pollution and include cars, trucks, busses, planes, trains, motorcycles, and gasoline-powered lawn mowers. Mobile source emissions may be classified as on- or off-road sources. Increased traffic volumes within the City of Placentia could contribute to regional incremental emissions of NO_X, VOC, CO, SO_X, and PM_{10}. The following is a listing of emissions that typically emanate from vehicular sources:

- Vehicle running exhaust (VOC, CO, NO_X, SO_X, and PM_{10});
- Vehicle tire wear particulates (PM_{10});
- Vehicle brake wear particulates (PM_{10});
- Vehicle variable starts (VOC, CO, NO_X) – starting a vehicle and the first few minutes of driving generate higher emissions because the emissions-control equipment has not yet reached its optimal operating temperature;
- Vehicle hot soaks [cooling down] (VOC) – the engine remains hot for a period of time after the vehicle is turned off, and gasoline evaporates when the car is parked while cooling down;
- Vehicle diurnal [while parked and engine is cool] (VOC) – even when the vehicle is parked for long periods of time, gasoline evaporation occurs as the temperature rises during the day;
- Vehicle resting losses (VOC) – includes the escape of fuel vapor from the fuel system while the vehicle is inoperative; and
- Vehicle evaporative running losses (VOC) – the hot engine and exhaust system can vaporize gasoline while the vehicle is running.

On-Road Sources. These sources are considered to be a combination of emissions from automobiles, trucks, and indirect sources. Major sources of mobile emissions in the City of Placentia include the local and regional roadway network. State Route 57 (SR-57) passes through the southwest portion of the City in a north-south direction and State Route 90 (Imperial Highway) passes through northeast portion of the City. State Route 91 (SR-91) is located outside the City boundary to the south, traversing in an east-west direction. Additionally, major and primary arterials that serve the City are Orangethorpe Avenue, Yorba Linda Boulevard, Chapman Avenue, Placentia Avenue, Kraemer Boulevard, Rose Drive/Tustin Avenue, Lakeview Avenue, and Bastanchury Road.

Indirect on-road sources of emissions are those that by themselves may not emit air contaminants; however, they indirectly cause the generation of air pollutants by attracting vehicle trips or by consuming energy. Examples of these indirect sources include an office complex or commercial center that generates trips and consumes energy resources.

Off-Road Sources. Off-road sources include aircraft, trains, construction equipment, and landscape equipment. The Fullerton Municipal Airport, approximately five miles to the west of the City, is one of the primary sources of air traffic from a nearby city. The nearest common-carrier airport is John Wayne Airport in the City of Santa Ana, approximately 15 miles south of the City. Additionally, the BNSF railroad crosses the City. The railroad serves BNSF freight trains as well as the Metrolink 91 Line. The BNSF operates a major double-track freight rail line known as the Orange County Gateway along the Orangethorpe Corridor. This rail line connects the Port of Los Angeles with the Inland Empire and Midwest United States. The nearest Metrolink train station is currently located in Fullerton, approximately 4 miles west of the City, which provides commuter train service from Oceanside to Los Angeles Union Station. The nearest Amtrak train station is also located in Fullerton. Plans are underway to begin construction of a Metrolink commuter train station in 2019, to be located at the intersection of Melrose Avenue and Crowther Avenue.[2] Construction activities are typically temporary and intermittent and can be located at various locations within the City. Landscape equipment emissions would occur more regularly and would occur throughout the City, especially within residential areas.

Emissions from off-road sources include NO_x and diesel particulate matter, which contribute to public health problems. The EPA has set emission standards for the engines used in most construction, agricultural, and industrial equipment. The EPA has adopted off-road diesel fuel requirements to decrease the allowable levels of sulfur, which can damage advanced emission control technologies. Additionally in 2007, CARB adopted the In-Use Off-Road Diesel Vehicle to reduce diesel particulate matter and NO_x emissions from in-use off-road heavy-duty diesel vehicles in California.[3]

[2] KOA Corporation, *City of Placentia General Plan Mobility Element Update Technical Traffic Study*, August 2018.

[3] California Air Resources Board, *In-Use Off-Road Diesel Vehicle Regulation*, October 1, 2018, http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm, accessed October 9, 2018.

2.4 AIR POLLUTANT EMISSIONS INVENTORY

ORANGE COUNTY EMISSIONS INVENTORY

Table 2, *2015 Estimated Emissions Inventory for Orange County*, summarizes the emissions of criteria air pollutants within Orange County for various source categories in 2015. According to the emissions inventory, mobile sources are generally the largest contributor to air pollutant levels.

Table 2
2015 Estimated Emissions Inventory for Orange County

Source Type/Category	Estimated Annual Average Emissions (Tons/Day)[2]					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Stationary Sources						
Fuel Combustion	0.6	5.7	5.3	0.7	0.6	0.6
Waste Disposal	2.5	0.3	0.4	0.1	0.1	0.1
Cleaning and Surface Coating	9.6	0.0	0.0	-	0.1	0.1
Petroleum Production Marketing	6.0	0.0	0.2	0.0	0.0	0.0
Industrial Processes	3.7	0.1	0.1	0.0	2.2	1.1
Subtotal (Stationary Sources)[1]	*22.4*	*6.1*	*6.0*	*0.7*	*3.0*	*1.9*
Areawide Sources						
Solvent Evaporation	26.5	-	-	-	0.0	0.0
Miscellaneous Processes	1.6	14.7	4.3	0.1	44.6	10.0
Subtotal (Areawide Sources)[1]	*28.1*	*14.7*	*4.3*	*0.1*	*44.6*	*10.1*
Mobile Sources						
On-Road Mobile Sources	27.9	256.7	45.8	0.4	4.4	3.0
Other Mobile Sources	28.0	239.4	53.7	5.9	3.9	3.4
Subtotal (Mobile Sources)[1]	*55.9*	*496.2*	*99.5*	*6.3*	*8.3*	*6.4*
Total for Orange County	**106.4**	**517.0**	**109.7**	**7.2**	**55.8**	**18.3**

Notes:
1. Totals may be slightly off due to rounding. Totals are derived from the inventory model, and are not specifically added by category.
2. This total excludes emissions from natural sources (i.e., biogenic, geogenic, and wildfire sources).

Source: California Air Resources Board, *2015 Almanac Emission Projection Data*, accessed at: http://www.arb.ca.gov/app/emsinv/emssumcat.php.

CITY OF PLACENTIA EMISSIONS INVENTORY

Table 3, *Summary of Estimated Existing Emissions Inventory for the City of Placentia*, summarizes the emissions of criteria air pollutants within the City for area, energy, mobile, waste, and water categories. The emissions inventory is based on existing land use information and traffic behavior. The data used to calculate the emissions inventory for criteria pollutants is based on the City's existing land use inventory provided by City of Placentia. According to the emissions inventory, mobile sources are generally the largest contributor to air pollutant levels.

Table 3
Summary of Estimated Existing Emissions Inventory for the City of Placentia

Source Type/Category[2]	Estimated Annual Average Emissions (Tons/Year)[1]					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area (hearths, consumer products, architectural coatings, and landscape equipment)	351.52	11.06	399.59	0.57	34.07	34.07
Energy (building electricity and natural gas use)	4.72	41.82	28.28	0.26	3.26	3.26
Mobile (vehicle emissions)	298.20	1,342.56	4,117.18	14.86	1,310.91	361.12
Waste (emissions associated with landfill disposal)	--	--	--	--	0.00	0.00
Water (electricity associated with transport and treatment of water)	--	--	--	--	0.00	0.00
Total for the City of Placentia[3]	**654.44**	**1,395.44**	**4,545.05**	**15.68**	**1,348.24**	**398.45**

Notes:
1. Emissions estimates calculated using CalEEMod version 2016.3.2.
2. Emissions estimates calculated using the Existing Land Use Distribution table depicted in Chapter 2, *Land Use Element*.
3. Totals may be slightly off due to rounding.

Table 4, *Summary of Estimated Proposed 2040 General Plan Emissions Inventory for the City of Placentia*, summarizes the emissions of criteria air pollutants within the City for area, energy, mobile, waste, and water categories in 2040. The emissions inventory is based on the planned 2040 land use information and anticipated traffic behavior. The data used to calculate the emissions inventory for criteria pollutants is based on the 2040 General Plan land use inventory provided by the City of Placentia, August 2018. According to the emissions inventory, mobile sources are generally the largest contributor to the estimated annual average air pollutant levels.

Table 4
Summary of Estimated Proposed 2040 General Plan Emissions Inventory for the City of Placentia

Source Type/Category[2]	Estimated Annual Average Emissions (Tons/Year)[1]					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area (hearths, consumer products, architectural coatings, and landscape equipment)	482.87	19.26	654.27	1.03	61.53	61.53
Energy (building electricity and natural gas use)[3]	0.65[3]	6.08[3]	3.90[3]	0.04[3]	0.48[3]	0.48[3]
Mobile (vehicle emissions)	133.35	689.91	1,872.00	10.38	1,308.54	353.34
Waste (emissions associated with landfill disposal)	--	--	--	--	0.00	0.00
Water (electricity associated with transport and treatment of water)	--	--	--	--	0.00	0.00
Total for the City of Placentia[4]	**621.52**	**755.93**	**2,556.27**	**11.71**	**1,373.73**	**418.54**

Notes:
1. Emissions estimates calculated using CalEEMod version 2016.3.2.
2. Emissions estimates calculated using the 2040 General Plan Land Use Designation Potential Development Buildout table depicted in Chapter 2, *Land Use Element*.
3. Assumes that 87% of electricity will be generated by renewable sources in 2040, results show 13% of pollutants estimated by CalEEMod.
4. Totals may be slightly off due to rounding.

2.5 SENSITIVE RECEPTORS

Sensitive populations are more susceptible to the effects of air pollution than are the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and CO are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, churches, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The majority of land uses located within the City that are sensitive to air pollution include residential uses (particularly those in the vicinity of SR-57), schools, hospitals, churches, and parks. There is a total of 16 schools located within the City of Placentia. Of those 16 schools, ten are elementary schools, two are middle schools, three are high schools, and there is one District Education Center. Additionally, there is one hospital, several parks and a golf course located within the City.

2.6 REGULATORY FRAMEWORK

This section discusses the Federal, State, and regional air quality policies and requirements applicable to the City of Placentia.

FEDERAL

Air quality is protected by the Federal Clean Air Act (FCAA) and its amendments. Under the FCAA, the EPA developed the primary and secondary National Ambient Air Quality Standards (NAAQS) for the criteria air pollutants including O_3, NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$, and Pb; refer to Table 5, *National and California Ambient Air Quality Standards and Attainment Status*. A nonattainment area is an area where pollutant concentrations do not meet the National Ambient Air Quality Standards and/or California Ambient Air Quality Standards. Proposed projects in or near nonattainment areas could be subject to more stringent air-permitting requirements. The FCAA requires each state to prepare a State Implementation Plan (SIP) to demonstrate how it will attain the NAAQS within the federally imposed deadlines.

The EPA can withhold certain transportation funds from states that fail to comply with the planning requirements of the FCAA. If a state fails to correct these planning deficiencies within two years of Federal notification, the EPA is required to develop a Federal implementation plan for the identified nonattainment area or areas. The provisions of 40 *Code of Federal Regulations* (*CFR*) Parts 51 and 93 apply in all nonattainment and maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan. The EPA has designated enforcement of air pollution control regulations to the individual states.

Table 5
National and California Ambient Air Quality Standards and Attainment Status

Pollutant	Averaging Time	California[1]		Federal[2]	
		Standard[3]	Attainment Status	Standards[3,4]	Attainment Status
Ozone (O_3)	1 Hour	0.09 ppm (180 μg/m³)	**Nonattainment**	N/A	N/A[5]
	8 Hours	0.070 ppm (137 μg/m³)	**Nonattainment**	0.070 ppm (137 μg/m³)	**Nonattainment**
Particulate Matter (PM_{10})	24 Hours	50 μg/m³	**Nonattainment**	150 μg/m³	Attainment/Maintenance
	Annual Arithmetic Mean	20 μg/m³	**Nonattainment**	N/A	N/A
Fine Particulate Matter ($PM_{2.5}$)	24 Hours	No Separate State Standard		35 μg/m³	**Nonattainment**
	Annual Arithmetic Mean	12 μg/m³	**Nonattainment**	12.0 μg/m³	**Nonattainment**
Carbon Monoxide (CO)	8 Hours	9.0 ppm (10 mg/m³)	Attainment	9 ppm (10 mg/m³)	Attainment/Maintenance
	1 Hour	20 ppm (23 mg/m³)	Attainment	35 ppm (40 mg/m³)	Attainment/Maintenance
Nitrogen Dioxide (NO_2)[5]	Annual Arithmetic Mean	0.030 ppm (57 μg/m³)	N/A	53 ppb (100 μg/m³)	Attainment/Maintenance
	1 Hour	0.18 ppm (339 μg/m³)	Attainment	100 ppb (188 μg/m³)	Attainment/Maintenance
Lead (Pb)[7,8]	30 days Average	1.5 μg/m³	Attainment	N/A	N/A
	Calendar Quarter	N/A	N/A	1.5 μg/m³	**Nonattainment**
	Rolling 3-Month Average	N/A	N/A	0.15 μg/m³	**Nonattainment**
Sulfur Dioxide (SO_2)[6]	24 Hours	0.04 ppm (105 μg/m³)	Attainment	0.14 ppm (for certain areas)	Unclassified/Attainment
	3 Hours	N/A	N/A	N/A	N/A
	1 Hour	0.25 ppm (655 μg/m³)	Attainment	75 ppb (196 μg/m³)	N/A
	Annual Arithmetic Mean	N/A	N/A	0.30 ppm (for certain areas)	Unclassified/Attainment
Visibility-Reducing Particles[9]	8 Hours (10 a.m. to 6 p.m., PST)	Extinction coefficient = 0.23 km@<70% RH	Unclassified	**No Federal Standards**	
Sulfates	24 Hour	25 μg/m³	Attainment		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m³)	Unclassified		
Vinyl Chloride[7]	24 Hour	0.01 ppm (26 μg/m³)	N/A		

μg/m³ = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion; km = kilometer(s); RH = relative humidity; PST = Pacific Standard Time; N/A = Not Applicable

Notes:

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
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. 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.
6. 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 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 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.
7. 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.
8. 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.
9. In 1989, CARB 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.

Source: California Air Resources Board and U.S. Environmental Protection Agency, *Ambient Air Quality Standards chart,* http://www.arb.ca.gov/research/aaqs/aaqs2.pdf, May 4, 2016.

STATE

In 1988, the California Clean Air Act (CCAA) was adopted and led to the establishment of the California Ambient Air Quality Standards (CAAQS) for the same major pollutants, as the NAAQS and to standards for visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. There are currently no NAAQS for these latter pollutants. CARB is responsible for enforcing air pollution regulations in California. The CCAA requires all air pollution control districts in California to endeavor to achieve and maintain state ambient air-quality standards by the earliest practicable date and to develop plans and regulations specifying how they will meet this goal. Table 5 also depicts the FCAA and CCAA attainment status for the South Coast Air Basin, wherein the City of Placentia is located.

REGIONAL

South Coast Air Quality Management District

The *2016 Air Quality Management Plan* (2016 AQMP), which was adopted by the SCAQMD in March 2017, proposes policies and measures to achieve Federal and State air quality standards in the South Coast Air Basin (Basin) and those portions of the Salton Sea Air Basin (formerly named the Southeast Desert Air Basin) that are under the SCAQMD's jurisdiction. The 2016 AQMP relies on a regional and multi-level partnership of governmental agencies at the Federal, State, regional, and local level. These agencies (EPA, CARB, local governments, Southern California Association of Governments [SCAG] and the SCAQMD) are the primary agencies that implement the 2016 AQMP programs. The 2016 AQMP incorporates the latest scientific and technical information and planning assumptions, including the *2016-2040 Regional Transportation Plan/Sustainable Communities Strategy* (2016-2040 RTP/SCS), updated emission inventory methodologies for various source categories, and SCAG's latest growth forecasts.

The 2016 AQMP addresses several state and federal planning requirements, incorporating new scientific information, primarily in the form of updated emissions inventories, ambient measurements, and new meteorological air quality models. The 2016 AQMP highlights the reductions and the interagency planning necessary to identify additional strategies, especially in the area of mobile sources, to meet all federal criteria pollutant standards within the timeframes allowed under federal Clean Air Act. The primary task of the 2016 AQMP is to bring the Basin into attainment with federal health-based standards.

Southern California Association of Governments

SCAG is the regional planning agency for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties and serves as a forum for regional issues relating to transportation, the economy, community development, and the environment. SCAG serves as the Federally-designated metropolitan planning organization (MPO) for the Southern California region and is the largest metropolitan planning organization in the United States. With respect

to air quality planning, SCAG has prepared the *Regional Comprehensive Plan: Helping Communities Achieve a Sustainable Future* for the region, which includes Growth Management and Regional Mobility chapters that form the basis for the land use and transportation control portions of the 2016 AQMP. SCAG is responsible under the FCAA for determining conformity of projects, plans, and programs within the SCAQMD.

3.0 GREENHOUSE GASES AND GLOBAL CLIMATE CHANGE

3.1 CLIMATE CHANGE

Climate change is a distinct change in average meteorological conditions with respect to temperature, precipitation, and storms. Climate change can result from both natural processes and/or from human activities. Natural changes in the climate result from very small variations in the Earth's orbit which changes the amount of solar energy the planet receives. Human activities can affect the climate by emitting heat absorbing gases into the atmosphere and by making changes to the planet's surface, such as deforestation and agriculture. The following impacts to California from climate change have been identified:

- Higher temperatures, particularly in the summer and in inland areas,
- More frequent and more sever extreme heat events,
- Reduced precipitation, and a greater proportion of precipitation falling as rain rather than snow,
- Increased frequency of drought conditions,
- Rising sea levels,
- Ocean water becoming more acidic, harming shellfish and other ocean species, and
- Changes in wind patterns.

These direct effects of climate change may in turn have a number of other impacts, including increases in wildfires, coastal erosion, reduced water supplies, threats to agriculture, and the spread of insect-borne diseases.

3.2 GREENHOUSE GASES

Greenhouse gases (GHGs) are naturally present in the Earth's atmosphere and play a critical role in maintaining the planet's temperature. The natural process through which heat is retained in the troposphere is called the "greenhouse effect." The greenhouse effect traps heat in the troposphere through a threefold process as follows: short wave radiation emitted by the Sun is absorbed by the Earth; the Earth emits a portion of this energy in the form of long wave radiation; and GHGs in the upper atmosphere absorb this long wave radiation and re-emit this long wave radiation in all directions, with some radiation heading out into space and some heading back toward the Earth. This "trapping" of the long wave (thermal) radiation emitted back toward the Earth is the underlying process of the greenhouse effect. Without the presence of GHGs, the Earth's average temperature would be approximately zero degrees Fahrenheit.

The most abundant GHGs are water vapor and carbon dioxide (CO_2). Many other trace gases have greater ability to absorb and re-radiate long wave radiation; however, these gases are not as plentiful. For this reason, and to gauge the potency of GHGs, scientists have established a Global Warming Potential (GWP) for each GHG based on its ability to absorb and re-radiate long wave radiation.

GHGs include, but are not limited to, the following:[4]

- *Water Vapor (H_2O).* Although water vapor has not received the scrutiny of other GHGs, it is the primary contributor to the greenhouse effect. Natural processes, such as evaporation from oceans and rivers, and transpiration from plants, contribute 90 percent and 10 percent of the water vapor in our atmosphere, respectively.

  The primary human related source of water vapor comes from fuel combustion in motor vehicles; however, this is not believed to contribute a significant amount (less than one percent) to atmospheric concentrations of water vapor. The Intergovernmental Panel on Climate Change (IPCC) has not determined a GWP for water vapor.

- *Carbon Dioxide (CO_2).* Carbon Dioxide is primarily generated by fossil fuel combustion in stationary and mobile sources. Due to the emergence of industrial facilities and mobile sources in the past 250 years, the concentration of CO_2 in the atmosphere has increased 44 percent.[5] Carbon dioxide is the most widely emitted GHG and is the reference gas (GWP of 1) for determining GWPs for other GHGs.

- *Methane (CH_4).* Methane is emitted from biogenic sources, incomplete combustion in forest fires, landfills, manure management, and leaks in natural gas pipelines. In the United States, the top three sources of methane are landfills, natural gas systems, and enteric fermentation (the digestive process in animals with a rumen, typically cattle, causing methane gas). Methane is the primary component of natural gas, which is used for space and water heating, steam production, and power generation. The GWP of methane is 25.

- *Nitrous Oxide (N_2O).* Nitrous oxide is produced by both natural and human related sources. Primary human related sources include agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production (for the industrial production of nylon), and nitric acid production (for rocket fuel, woodworking, and as a chemical reagent). The GWP of nitrous oxide is 300.

- *Hydrofluorocarbons (HFCs).* HFCs are typically used as refrigerants, aerosol propellants, solvents and fire retardants. The major emissions source of HFCs is from their use as refrigerants in air conditioning systems in both vehicles and buildings. HFCs were developed as a replacement for chlorofluorocarbons (CFCs) and hydrochloro-

[4] All Global Warming Potentials are given as 100-year Global Warming Potential. Unless noted otherwise, all Global Warming Potentials were obtained from the IPCC. (Intergovernmental Panel on Climate Change, *Climate Change, The Science of Climate Change – Contribution of Working Group I to the Second Assessment Report of the IPCC*, 1996).

[5] U.S. Environmental Protection Agency, *Inventory of United States Greenhouse Gas Emissions and Sinks 1990 to 2016*, April 2018.

fluorocarbons (HCFCs). The GWP of HFCs range from 124 for HFC-152a to 14,800 for HFC-23.[6]

- *Perfluorocarbons (PFCs)*. PFCs are compounds produced as a by-product of various industrial processes associated with aluminum production and the manufacturing of semiconductors. Like HFCs, PFCs generally have long atmospheric lifetimes and high Global Warming Potentials of approximately 6,500 and 9,200.[7]

- *Sulfur hexafluoride (SF_6)*. SF_6 is used in magnesium processing and semiconductor manufacturing, electrical transmission equipment, including circuit breakers, as well as a tracer gas for leak detection. SF_6 is the most potent GHG that has been evaluated by the Intergovernmental Panel on Climate Change with a GWP of 22,800. However, its global warming contribution is not as high as the GWP would indicate due to its low mixing ratio compared to carbon dioxide (4 parts per trillion [ppt] in 1990 versus 365 parts per million [ppm], respectively).[8]

In addition to the six major GHGs discussed above (excluding water vapor), many other compounds have the potential to contribute to the greenhouse effect. Some of these substances were previously identified as stratospheric ozone depletors; therefore, their gradual phase out is currently in effect. The following is a listing of these compounds:

- *Hydrochlorofluorocarbons (HCFCs)*. HCFCs are solvents, similar in use and chemical composition to CFCs. The main uses of HCFCs are for refrigerant products and air conditioning systems. As part of the Montreal Protocol, all developed countries that adhere to the Montreal Protocol are subject to a consumption cap and gradual phase out of HCFCs. The United States is scheduled to achieve a 100 percent reduction to the cap by 2030. The GWPs of HCFCs range from 79 for HCFC-123 to 1,980 for HCFC-142b.[9]

- *1,1,1 trichloroethane*. 1,1,1 trichloroethane or methyl chloroform is a solvent and degreasing agent commonly used by manufacturers.

- *Chlorofluorocarbons (CFCs)*. CFCs are used as refrigerants, cleaning solvents, and aerosols spray propellants. CFCs were also part of the EPA's Final Rule (57 FR 3374) for the phase out of O_3 depleting substances. Currently, CFCs have been replaced by HFCs in cooling systems and a variety of alternatives for cleaning solvents. Nevertheless, CFCs remain suspended in the atmosphere contributing to the greenhouse effect. CFCs are potent GHGs with GWPs ranging from 4,660 for CFC 11 to 13,900 for CFC 13.[10]

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[6] California Air Resources Board, *California Greenhouse Gas Emission Inventory – 2018 Edition*, https://www.arb.ca.gov/cc/inventory/data/data.htm, accessed on October 16, 2018.

[7] Ibid.

[8] Ibid.

[9] U.S. Environmental Protection Agency, *Class II Ozone Depleting Substances* https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances, accessed on October 16, 2018.

[10] U.S. Environmental Protection Agency, *Class I Ozone Depleting Substances* https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances, accessed on October 16, 2018.

3.3 GREENHOUSE GAS EMISSIONS INVENTORY

UNITED STATES GHG EMISSIONS

The United States is the second largest emitter of GHGs globally (behind China), and emitted approximately 6.5 billion metric tons of CO_2 equivalent ($MTCO_2e$) in 2016, not including GHG absorbed by forests and agricultural land. The largest source of GHG in the United States (28.5 percent) comes from burning fossil fuels for transportation. Electrical power generation accounted for the second largest portion (28.4 percent) and industrial emissions accounted for the third largest portion (21.6 percent) of U.S. GHG emissions. The remaining 21.5 percent of U.S. GHG emissions were contributed by the agriculture, commercial, and residential sectors, plus emissions generated by U.S. Territories. Agriculture accounted for 9.4 percent of the U.S. emission, commercial accounted for 6.4 percent, and residential accounted for 5.1 percent with U.S. territories accounting for 0.6 percent of emissions.[11]

CALIFORNIA GHG EMISSIONS

In 2016, California emitted 429.4 million $MTCO_2e$ of GHG[12], more than any other state except Texas.[13] According to the *California Greenhouse Gas Emission Inventory 2017 Edition* by the California Air Resources Board (CARB), transportation was the single largest source of the state's GHG emissions and accounted for 39 percent of the state wide total. The California's industrial sector generated 23 percent of the state's GHG and electricity generation (including electricity generated out-of-state but used in California) was responsible for 19 percent of the GHG total. The agricultural sector at 8 percent, residential sector at 6 percent, and commercial sector at 5 percent accounted for the remaining GHG emissions.

City of Placentia GHG Emissions

Table 6, *Summary of Estimated Existing Greenhouse Gas Emissions for the City of Placentia*, summarizes the GHG emissions within the City for area, energy, mobile, waste, and water categories. The emissions inventory is based on existing land use information and traffic behavior. The data used to calculate the GHG emissions is based on the City's existing land use inventory provided by City of Placentia, August 2018. According to Table 6, mobile sources are generally the largest contributor to GHG levels.

[11] U.S. Environmental Protection Agency, *Inventory of United States Greenhouse Gas Emissions and Sinks 1990 to 2016*, April 2018.

[12] California Air Resources Board, *California Greenhouse Gas Emission Inventory – 2018 Edition*, https://www.arb.ca.gov/cc/inventory/data/data.htm, accessed on October 16, 2018

[13] U.S. Energy Information Administration, *Energy-Related Carbon Dioxide Emissions by State, 2000-2015*, January 2018.

Table 6
Summary of Estimated Existing Greenhouse Gas Emissions for the City of Placentia

Source Type/Category[2]	CO_2	CH_4		N_2O		Total Metric Tons of CO_2e[1]
	Metric Tons/yr[1]	Metric Tons/yr[1]	Metric Tons of CO_2e	Metric Tons/yr[1]	Metric Tons of CO_2eq	
Area (hearths, consumer products, architectural coatings, and landscape equipment)	11,044.62	11.26	281.5	0.25	74.5	11,400.59
Energy (building electricity and natural gas use)	177,192.32	6.28	157.0	1.97	587.06	177,936.61
Mobile (vehicle emissions)	1,366,913.78	58.43	1,460.75	0	0	1,368,374.48
Waste (emissions associated with landfill disposal)	9,970.62	589.25	14,731.25	0	0	24,701.78
Water (electricity associated with transport and treatment of water)	33,467.58	195.07	4,876.75	4.84	1,442.32	39,788.03
Total for the City of Placentia[3]	**1,598,588.91**	**860.29**	**21,507.25**	**7.07**	**2,103.88**	**1,622,201.50**

Notes:
1. Emissions estimates calculated using CalEEMod version 2016.3.2.
2. Emissions estimates calculated using the Existing Land Use Distribution table depicted in Chapter 2, *Land Use Element*.
3. Totals may be slightly off due to rounding.

Table 7, *Summary of Estimated 2040 Proposed General Plan GHG Emissions for the City of Placentia*, summarizes the emissions of criteria air pollutants within the City for area, energy, mobile, waste, and water categories in 2040. The emissions inventory is based on the planned 2040 land use information and anticipated traffic behavior. The data used to calculate the emissions inventory for criteria pollutants is based on the 2040 General Plan land use inventory provided by the City of Placentia, August 2018. According to Table 7, mobile sources are generally the largest contributor to the estimated annual average GHG emissions.

Table 7
Summary of Estimated 2040 Proposed General Plan GHG Emissions for the City of Placentia

Source	CO_2	CH_4		N_2O		Total Metric Tons of CO_2e
	Metric Tons/yr	Metric Tons/yr	Metric Tons of CO_2e	Metric Tons/yr	Metric Tons of CO_2eq	
Area (hearths, consumer products, architectural coatings, and landscape equipment)	19,956.25	20.34	508.50	0.45	134.10	20,600.08
Energy (building electricity and natural gas use) [3]	25,034.25	0.88	22.07	0.28	83.68	25,139.94
Mobile (vehicle emissions)	968,487.57	35.03	875.75	0	0	969,363.39
Waste (emissions associated with landfill disposal)	11.927.71	704.91	17,622.75	0	0	29,550.47
Water (electricity associated with transport and treatment of water)[3]	5,099.50	28.77	719.26	0.72	213.46	6,032.09
Total for the City of Placentia[4]	**1,018,577.57**	**789.93**	**19,748.33**	**1.45**	**431.24**	**1,050,685.97**

Notes:
1. Emissions estimates calculated using CalEEMod version 2016.3.2.
2. Emissions estimates calculated using the Existing Land Use Distribution table depicted in Chapter 2, *Land Use Element*.
3. Assumes that 87% of electricity will be generated by renewable sources in 2040, results show 13% of GHG estimated by CalEEMod.
4. Totals may be slightly off due to rounding.

3.4 REGULATORY PROGRAMS

FEDERAL

To date, no national standards have been established for nationwide GHG reduction targets, nor have any regulations or legislation been enacted specifically to address climate change and GHG emissions reduction at the project level. Various efforts have been promulgated at the federal level to improve fuel economy and energy efficiency to address climate change and its associated effects.

Energy Independence and Security Act of 2007. The Energy Independence and Security Act of 2007 (December 2007), among other key measures, requires the following, which would aid in the reduction of national GHG emissions:

- Increase the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard requiring fuel producers to use at least 36 billion gallons of biofuel in 2022.

- Set a target of 35 miles per gallon for the combined fleet of cars and light trucks by model year 2020 and direct the National Highway Traffic Safety Administration (NHTSA) to establish a fuel economy program for medium- and heavy-duty trucks and create a separate fuel economy standard for work trucks.

- Prescribe or revise standards affecting regional efficiency for heating and cooling products and procedures for new or amended standards, energy conservation, energy efficiency labeling for consumer electronic products, residential boiler efficiency, electric motor efficiency, and home appliances.

U.S. Environmental Protection Agency Endangerment Finding. The EPA authority to regulate GHG emissions stems from the U.S. Supreme Court decision in *Massachusetts v. EPA* (2007). The Supreme Court ruled that GHGs meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. Responding to the Court's ruling, the EPA finalized an endangerment finding in December 2009. Based on scientific evidence it found that six GHGs (carbon dioxide [CO_2], methane [CH_4], nitrous oxide [N_2O], hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF_6]) constitute a threat to public health and welfare. Thus, it is the Supreme Court's interpretation of the existing Act and the EPA's assessment of the scientific evidence that form the basis for the EPA's regulatory actions.

Federal Vehicle Standards. In response to the U.S. Supreme Court ruling discussed above, the George W. Bush Administration issued Executive Order 13432 in 2007 directing the EPA, the Department of Transportation, and the Department of Energy to establish regulations that reduce GHG emissions from motor vehicles, non-road vehicles, and non-road engines by 2008. In 2009, the NHTSA issued a final rule regulating fuel efficiency and GHG emissions from cars and light-

duty trucks for model year 2011, and in 2010, the EPA and NHTSA issued a final rule regulating cars and light-duty trucks for model years 2012–2016.

In 2010, President Barack Obama issued a memorandum directing the Department of Transportation, Department of Energy, EPA, and NHTSA to establish additional standards regarding fuel efficiency and GHG reduction, clean fuels, and advanced vehicle infrastructure. In response to this directive, the EPA and NHTSA proposed stringent, coordinated federal GHG and fuel economy standards for model years 2017–2025 light-duty vehicles. The proposed standards projected to achieve 163 grams per mile of CO_2 in model year 2025, on an average industry fleet-wide basis, which is equivalent to 54.5 miles per gallon if this level were achieved solely through fuel efficiency. The final rule was adopted in 2012 for model years 2017–2021, and NHTSA intends to set standards for model years 2022–2025 in a future rulemaking. On January 12, 2017, the EPA finalized its decision to maintain the current GHG emissions standards for model years 2022–2025 cars and light trucks.

In addition to the regulations applicable to cars and light-duty trucks described above, in 2011, the EPA and NHTSA announced fuel economy and GHG standards for medium- and heavy-duty trucks for model years 2014–2018. The standards for CO_2 emissions and fuel consumption are tailored to three main vehicle categories: combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. According to the EPA, this regulatory program will reduce GHG emissions and fuel consumption for the affected vehicles by 6 to 23 percent over the 2010 baselines.

In August 2016, the EPA and NHTSA announced the adoption of the phase two program related to the fuel economy and GHG standards for medium- and heavy-duty trucks. The phase two program will apply to vehicles with model year 2018 through 2027 for certain trailers, and model years 2021 through 2027 for semi-trucks, large pickup trucks, vans, and all types and sizes of buses and work trucks. The final standards are expected to lower CO_2 emissions by approximately 1.1 billion metric tons and reduce oil consumption by up to 2 billion barrels over the lifetime of the vehicles sold under the program.

Clean Power Plan and New Source Performance Standards for Electric Generating Units. On October 23, 2015, the EPA published a final rule (effective December 22, 2015) establishing the carbon pollution emission guidelines for existing stationary sources: electric utility generating units (80 FR 64510–64660), also known as the Clean Power Plan. These guidelines prescribe how states must develop plans to reduce GHG emissions from existing fossil-fuel-fired electric generating units. The guidelines establish CO_2 emission performance rates representing the best system of emission reduction for two subcategories of existing fossil-fuel-fired electric generating units: (1) fossil-fuel-fired electric utility steam-generating units and (2) stationary combustion turbines. Concurrently, the EPA published a final rule (effective October 23, 2015) establishing standards of performance for GHG emissions from new, modified, and reconstructed stationary sources: electric utility generating units (80 FR 64661–65120). The rule prescribes CO_2 emission standards for newly constructed, modified, and reconstructed affected fossil-fuel-fired electric

utility generating units. The U.S. Supreme Court stayed implementation of the Clean Power Plan pending resolution of several lawsuits. Additionally, in March 2017, President Trump directed the EPA Administrator to review the Clean Power Plan in order to determine whether it is consistent with current executive policies concerning GHG emissions, climate change, and energy.

Presidential Executive Order 13783. Presidential Executive Order 13783, Promoting Energy Independence and Economic Growth (March 28, 2017), orders all federal agencies to apply cost-benefit analyses to regulations of GHG emissions and evaluations of the social cost of carbon, nitrous oxide, and methane.

STATE

Various statewide and local initiatives to reduce California's contribution to GHG emissions have raised awareness that, even though the various contributors to and consequences of global climate change are not yet fully understood, global climate change is occurring, and that there is a real potential for severe adverse environmental, social, and economic effects in the long term. Every nation emits GHGs and as a result makes an incremental cumulative contribution to global climate change; therefore, global cooperation will be required to reduce the rate of GHG emissions enough to slow or stop the human-caused increase in average global temperatures and associated changes in climatic conditions.

Executive Order S-1-07. Executive Order S-1-07 proclaims that the transportation sector is the main source of GHG emissions in California, generating more than 40 percent of statewide emissions. It establishes a goal to reduce the carbon intensity of transportation fuels sold in California by at least ten percent by 2020. This order also directs CARB to determine whether this Low Carbon Fuel Standard (LCFS) could be adopted as a discrete early-action measure as part of the effort to meet the mandates in AB 32.

Executive Order S-3-05. Executive Order S-3-05 set forth a series of target dates by which statewide emissions of GHGs would be progressively reduced, as follows:

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

The Executive Order directed the secretary of the California Environmental Protection Agency (Cal/EPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The secretary will also submit biannual reports to the governor and California Legislature describing the progress made toward the emissions targets, the impacts of global climate change on California's resources, and mitigation and adaptation plans to combat these impacts. To comply with the executive order, the secretary of Cal/EPA created the California Climate Action Team (CAT), made up of members from various State agencies and commissions. The team released

its first report in March 2006. The report proposed to achieve the targets by building on the voluntary actions of California businesses, local governments, and communities and through State incentive and regulatory programs.

Executive Order S-13-08. Executive Order S-13-08 seeks to enhance the State's management of climate impacts including sea level rise, increased temperatures, shifting precipitation, and extreme weather events by facilitating the development of State's first climate adaptation strategy. This will result in consistent guidance from experts on how to address climate change impacts in the State of California.

Executive Order S-14-08. Executive Order S-14-08 expands the State's Renewable Energy Standard to 33 percent renewable power by 2020. Additionally, Executive Order S-21-09 (signed on September 15, 2009) directs CARB to adopt regulations requiring 33 percent of electricity sold in the State come from renewable energy by 2020. CARB adopted the "Renewable Electricity Standard" on September 23, 2010, which requires 33 percent renewable energy by 2020 for most publicly owned electricity retailers.

Executive Order S-20-04. Executive Order S-20-04, the California Green Building Initiative, (signed into law on December 14, 2004), establishes a goal of reducing energy use in State-owned buildings by 20 percent from a 2003 baseline by 2015. It also encourages the private commercial sector to set the same goal. The initiative places the California Energy Commission (CEC) in charge of developing a building efficiency benchmarking system, commissioning and retro-commissioning (commissioning for existing commercial buildings) guidelines and developing and refining building energy efficiency standards under Title 24 to meet this goal.

Executive Order S-21-09. Executive Order S-21-09, 33 percent Renewable Energy for California, directs CARB to adopt regulations to increase California's Renewable Portfolio Standard (RPS) to 33 percent by 2020. This builds upon SB 1078 (2002) which established the California RPS program, requiring 20 percent renewable energy by 2017, and SB 107 (2006) which advanced the 20 percent deadline to 2010, a goal which was expanded to 33 percent by 2020 in the 2005 Energy Action Plan II.

Assembly Bill 32 (California Global Warming Solutions Act of 2006). California passed the California Global Warming Solutions Act of 2006 (AB 32; *California Health and Safety Code* Division 25.5, Sections 38500 - 38599). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

Assembly Bill 1493. AB 1493 (also known as the Pavley Bill) requires that CARB develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of GHG emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State."

To meet the requirements of AB 1493, CARB approved amendments to the California Code of Regulations (CCR) in 2004 by adding GHG emissions standards to California's existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 and adoption of 13 CCR Section 1961.1 require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty weight classes for passenger vehicles (i.e., any medium-duty vehicle with a gross vehicle weight rating less than 10,000 pounds that is designed primarily to transport people), beginning with the 2009 model year. Emissions limits are reduced further in each model year through 2016. When fully phased in, the near-term standards will result in a reduction of about 22 percent in GHG emissions compared to the emissions from the 2002 fleet, while the mid-term standards will result in a reduction of about 30 percent.

Assembly Bill 3018. AB 3018 established the Green Collar Jobs Council (GCJC) under the California Workforce Investment Board (CWIB). The GCJC will develop a comprehensive approach to address California's emerging workforce needs associated with the emerging green economy. This bill will ignite the development of job training programs in the clean and green technology sectors.

Senate Bill 97. SB 97, signed in August 2007 (Chapter 185, Statutes of 2007; PRC Sections 21083.05 and 21097), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directs the Governor's Office of Planning and Research (OPR), which is part of the State Natural Resources Agency, to prepare, develop, and transmit to CARB guidelines for the feasible mitigation of GHG emissions (or the effects of GHG emissions), as required by CEQA.

OPR published a technical advisory recommending that CEQA lead agencies make a good-faith effort to estimate the quantity of GHG emissions that would be generated by a proposed project. Specifically, based on available information, CEQA lead agencies should estimate the emissions associated with project-related vehicular traffic, energy consumption, water usage, and construction activities to determine whether project-level or cumulative impacts could occur, and should mitigate the impacts where feasible. OPR requested CARB technical staff to recommend a method for setting CEQA thresholds of significance as described in CEQA Guidelines Section 15064.7 that will encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the State.

The Natural Resources Agency adopted the CEQA Guidelines Amendments prepared by OPR, as directed by SB 97. On February 16, 2010, the Office of Administration Law approved the CEQA Guidelines Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The CEQA Guidelines Amendments became effective on March 18, 2010.

Senate Bill 375. SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will prescribe land use allocation in that MPOs regional transportation plan. CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects may not be eligible for funding programmed after January 1, 2012.

Senate Bills 1078 and 107. SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010.

Senate Bill 1368. SB 1368 (Chapter 598, Statutes of 2006) is the companion bill of AB 32 and was signed into law in September 2006. SB 1368 required the California Public Utilities Commission (CPUC) to establish a performance standard for baseload generation of GHG emissions by investor-owned utilities by February 1, 2007. SB 1368 also required the California Energy Commission (CEC) to establish a similar standard for local publicly owned utilities by June 30, 2007. These standards could not exceed the GHG emissions rate from a baseload combined-cycle, natural gas fired plant. Furthermore, the legislation states that all electricity provided to California, including imported electricity, must be generated by plants that meet the standards set by CPUC and CEC.

Senate Bill 32 (SB 32). Signed into law in September 2016, SB 32 codifies the 2030 GHG reduction target in Executive Order B-30-15 (40 percent below 1990 levels by 2030). The bill authorizes CARB to adopt an interim GHG emissions level target to be achieved by 2030. CARB also must adopt rules and regulations in an open public process to achieve the maximum, technologically feasible, and cost-effective GHG reductions.

Senate Bill 100 (SB 100). SB 100 (Chapter 312, Statutes of 2018) requires that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt-hours(kWh) of those products sold to their retail end-use customers achieve 44 percent of retail sales by December 31, 2024, 52 percent by December 31, 2027, 60 percent by December 31, 2030, and 100 percent by December 31, 2045. The bill would require the CPUC, CEC, state board, and all other state agencies to incorporate that policy into all relevant planning. In addition, SB 100 would require the PUC, Energy Commission, and state board to utilize programs authorized under existing statutes to achieve that policy and, as part of a public process, issue a joint report to the Legislature by January 1, 2021, and every 4 years thereafter, that includes specified information relating to the implementation of the policy.

CARB Scoping Plan

The CARB Scoping Plan Update functions as a roadmap to achieve the 2030 GHG reduction goal of reducing greenhouse gas emissions in California to 40 percent of their 1990 levels. On December 11, 2008, CARB adopted its original Scoping Plan, as required by AB 32, to reach 1990 levels of greenhouse gases by 2020. The Plan was later updated in 2014 to include the most recent science related to climate change and identify actions California has taken to reduce GHG emissions. The 2017 Scoping Plan Update builds on those actions and takes aim at the 2030 target established by SB32.

CARB's 2017 Scoping Plan Update contains the following goals:

1. SB 350
   - Achieve 50 percent Renewables Portfolio Standard (RPS) by 2030.
   - Doubling of energy efficiency savings by 2030.

2. Low Carbon Fuel Standard (LCFS)
   - Increased stringency (reducing carbon intensity 18 percent by 2030, up from 10 percent in 2020).

3. Mobile Source Strategy (Cleaner Technology and Fuels Scenario)
   - Maintaining existing GHG standards for light- and heavy-duty vehicles.
   - Put 4.2 million zero-emission vehicles (ZEVs) on the roads.
   - Increase ZEV buses, delivery and other trucks.

4. Sustainable Freight Action Plan
   - Improve freight system efficiency.
   - Maximize use of near-zero emission vehicles and equipment powered by renewable energy.
   - Deploy over 100,000 zero-emission trucks and equipment by 2030.

5. Short-Lived Climate Pollutant (SLCP) Reduction Strategy
   - Reduce emissions of methane and hydrofluorocarbons 40 percent below 2013 levels by 2030.
   - Reduce emissions of black carbon 50 percent below 2013 levels by 2030.

6. SB 375 Sustainable Communities Strategies
   - Increased stringency of 2035 targets.

7. Post-2020 Cap-and-Trade Program
   - Declining caps, continued linkage with Québec, and linkage to Ontario, Canada.
   - CARB will look for opportunities to strengthen the program to support more air quality co-benefits, including specific program design elements.

8. 20 percent reduction in greenhouse gas emissions from the refinery sector.

9. By 2018, develop Integrated Natural and Working Lands Action Plan to secure California's land base as a net carbon sink.

REGIONAL

The Southern California region has begun to address climate change through its regional planning process, as described in this section.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the designated metropolitan planning organization for all jurisdictions in Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties, including Placentia. SCAG is required to prepare a Sustainable Communities Strategy as part of its Regional Transportation Plan (RTP) to reduce vehicle travel emissions to 13 percent below 2005 per capita emissions by 2035. The most recent update to the SCAG RTP, 2016-2040 RTP/SCS was approved in 2016.

SCAG's first Sustainable Communities Strategy was incorporated into the Regional Transportation Plan in 2012, providing broad guidance to support focused development in key areas, improvements to enable more walking and biking, a mix of housing types, and transportation investments (including public transit). Two SCAG subregions, including the Orange County Council of Governments, have prepared their own subregional Sustainable Communities Strategies. The underlying land use, transportation, and socioeconomic data in the Orange County Council of Governments' subregional Sustainable Communities Strategy has been incorporated into the regional Sustainable Communities Strategy prepared by SCAG.

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