4.3 AIR QUALITY

This section discusses existing air quality, summarizes existing air quality regulations, and evaluates potential air quality impacts associated with the proposed Nakase Nursery/Toll Brothers Project (proposed Project). This section summarizes information provided in the *Air Quality Impact Analysis* (Urban Crossroads 2019a) and the *Nakase Elementary School Health Risk Assessment* (Placeworks 2019a) that were prepared for the proposed Project. The *Air Quality Impact Analysis* and *Nakase Elementary School Health Risk Assessment* are included in Appendix C of this Environmental Impact Report (EIR).

4.3.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Eight comment letters included comments related to air quality.

The letter from South Coast Air Quality Management District (SCAQMD) (August 15, 2018) recommended the use of the SCAQMD *CEQA Air Quality Handbook* (1993), use of CalEEMod, SCAQMD significance thresholds, and preparation of a Health Risk Assessment. Additionally, SCAQMD provided information about SCAQMD permits and data availability and suggested potential mitigation measures and consideration of potential alternatives to lessen impacts to air quality.

The letter from Saddleback Valley Unified School District (SVUSD) (July 25, 2018) expressed concern regarding the direct and indirect air quality impacts to SVUSD schools and suggested that a Health Risk Assessment be completed for the proposed Project. SVUSD also suggested that the Health Risk Assessment address potential health impacts related to emissions associated with State Route 241 (SR-241).

The letter from Loretta Herin (July 25, 2018) requests that a wall be constructed along Bake Parkway to reduce air pollution at adjacent residences. The letter from Richard Sullivan (July 25, 2018) expressed concerns with the worsening air quality in the neighborhoods of Barclay and Normandale. The letter from Sue Nath (July 30, 2018) expressed concern about additional vehicle emissions. The letter from Andrea Alexander (August 6, 2018) expressed concern with airborne matter resulting from traffic and its link to cancer risk. The letter from Judy Esposito (August 6, 2018) expressed concern about potential increases in air pollution. The letter from Robert and Melissa Leech (August 9, 2018) suggests that particulate matter (PM) and dust be sampled to determine health exposure risk.

4.3.2 Existing Environmental Setting

Lake Forest, which includes the Project site, is within the 6,745-square-mile (sq mi) South Coast Air Basin (Basin), which is under SCAQMD jurisdiction. The Basin includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Background information about regional climate and air quality conditions in the Basin and local air quality conditions in the vicinity of the Project site are provided below.

4.3.2.1 Regional Climate

The distinctive climate of the Basin is determined by its terrain and geographical location. The Basin is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant, with high mountains forming the remainder of the perimeter.

The annual average temperatures throughout the Basin vary from the low to middle 60s (degrees Fahrenheit [°F]). Due to a decreased marine influence, the eastern portion of the Basin shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the Basin, with average minimum temperatures ranging from 47°F in downtown Los Angeles to 36°F in San Bernardino. All portions of the Basin have recorded maximum temperatures above 100°F.

Although the climate of the Basin can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer (a shallow layer of sea air). The annual average relative humidity within the Basin is 71 percent along the coast and 59 percent inland. The marine layer is an important modifier of climate in the Basin. Humidity restricts visibility in the Basin, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the Basin's rainfall occurs from November through April. The annual average rainfall varies from approximately 9 inches in Riverside to 14 inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the Basin, with frequency being higher near the coast.

Due to its generally clear weather, approximately 75 percent of available sunshine is received in the Basin. The remaining approximately 25 percent is absorbed by clouds. On the shortest and longest days of the year, there are approximately 10 hours and 14.5 hours of possible sunshine, respectively. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions.

Wind patterns across the south coastal region of the Basin, which is where the Project site is located, are characterized by westerly and southwesterly onshore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

The direction and speed of the wind determines the horizontal dispersion and transport of air pollutants within the Basin. During the late autumn to early spring rainy season, winds blow from the northwest from storms moving through the region. During this time, 5 to 10 periods of strong, dry offshore winds, locally termed "Santa Ana Winds", occur each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, characterized by a daytime onshore sea breeze and a nighttime offshore wind. Summer

wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime offshore winds begin with the radiational cooling of the mountain slopes. Heavy, cool air descends down the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the Basin is the "Catalina Eddy", a low-level cyclonic (counterclockwise) flow centered over Santa Catalina Island that results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal areas.

In the Basin, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing, which effectively acts as an impervious lid to pollutants over the entire Basin. The mixing height for the inversion structure is normally around 1,000 to 1,500 feet (ft) above mean sea level (amsl).

A second inversion type forms in conjunction with cool air flowing from the surrounding mountains at night, followed by the seaward drift of this pool of cool air. The top of this cooler layer forms a sharp boundary with the warmer upper layer and creates nocturnal radiation inversions. The inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. The inversions typically occur only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as oxides of nitrogen (NO_X) and carbon monoxide (CO) from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

4.3.2.2 Criteria Pollutants

Certain air pollutants have been recognized as causing notable health problems and consequential damage to the environment either directly or in reaction with other pollutants due to their presence in elevated concentrations in the atmosphere. Criteria pollutants are regulated through the development of human health-based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and health effects are discussed below.

- **Carbon Monoxide (CO):** CO is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels (e.g., gasoline or wood). CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections. Health effects of CO exposure include chest pain with exercise and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin. Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. Individuals most at risk include fetuses,

patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

- **Sulfur Dioxide (SO_2):** SO_2 is a colorless, extremely irritating gas or liquid. It enters the atmosphere primarily from the burning of high-sulfur-content fuel oils and coal and from chemical processes at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms sulfates (SO_4). Collectively, these pollutants are referred to as oxides of sulfur (SO_X). A few minutes of exposure to low levels of SO_2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, an increase in resistance to air flow as well as a reduction in breathing capacity leading to severe breathing difficulties are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

- **Oxides of Nitrogen (NO_X):** NO_X consist of nitric oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (N_2O) and are formed when nitrogen (N_2) combines with oxygen (O_2). Their lifespan in the atmosphere ranges from 1 to 7 days for NO and NO_2 and to 170 years for N_2O. NO_X are typically created during combustion processes and are major contributors to smog formation and acid deposition. Of the seven types of NO_X compounds, NO_2 is the most abundant in the atmosphere. NO_2 absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Because ambient concentrations of NO_2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO_2 than those indicated by regional monitors. An increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO_2 at levels found in homes with gas stoves that are higher than ambient levels found in Southern California. An increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy individuals. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) because they are more susceptible to NO_2 effects than healthy individuals.

- **Ozone (O_3):** O_3 is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and NO_X, both of which are byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. O_3 concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant. Short-term exposure (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. Individuals exercising outdoors, children, and people with preexisting lung disease (e.g., asthma and chronic pulmonary lung disease) are the most susceptible to O_3 effects.

- **Particulate Matter Less Than 10 Microns in Size (PM_{10}):** PM_{10} consists of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inch or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. PM_{10} also causes visibility reduction. A consistent correlation between elevated ambient coarse particulate matter levels and an increase in

mortality rates, respiratory infections, number and severity of asthma attacks, and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. The elderly, people with pre-existing respiratory or cardiovascular disease, and children are more susceptible than adults to the effects of high levels of PM_{10}.

- **Particulate Matter Less Than 2.5 Microns in Size ($PM_{2.5}$):** $PM_{2.5}$ consists of tiny solid or liquid particles that are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO_2 release from power plants and industrial facilities and nitrates formed from NO_X release from power plants, automobiles, and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. In addition to the health effects of PM_{10}, discussed above, daily fluctuations in $PM_{2.5}$ concentration levels have been related to hospital admissions for acute respiratory conditions in children, school and kindergarten absences, decreased lung growth and respiratory volumes in children, and increased medication use in children and adults with asthma. The elderly, people with pre-existing respiratory or cardiovascular disease, and children are more susceptible to the effects of high levels of $PM_{2.5}$.

- **Lead (Pb):** Lead is a heavy metal that is highly persistent in the environment. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. Currently, emissions of lead are largely limited to stationary sources such as lead smelters. Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence. Lead can be stored in the bone from early-age environmental exposure, and elevated lead levels in blood can occur due to a breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of their mothers being previously exposed to lead. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures, and death; however, it appears that lead has no direct effect on the respiratory system.

- **Volatile Organic Compounds (VOCs) and Reactive Organic Gases (ROG):** VOCs are hydrocarbon compounds (i.e., any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity (i.e., they do not react at the same speed or do not form O_3 to the same extent when exposed to photochemical processes). VOCs often have an odor (e.g., gasoline, alcohol, and the solvents used in paints). Exceptions to the VOC designation include: CO, carbon dioxide (CO_2), carbonic acid, metallic carbides or carbonates, and ammonium carbonate. Similar to VOCs, ROGs are also precursors in forming O_3 and consist of compounds containing methane, ethane, propane, butane, and longer chain hydrocarbons, which are typically the result of some type of combustion/decomposition process. Smog is

formed when ROGs and NO_X react in the presence of sunlight. The SCAQMD uses the terms VOC and ROG interchangeably. VOCs and ROGs are considered criteria pollutants since they are a precursor to O_3, which is a criteria pollutant. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, the VOCs and ROGs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

4.3.2.3 Regional Air Quality

As discussed in further detail later in Section 4.3.3, Regulatory Setting, both the State of California and the federal government have established health-based ambient air quality standards (AAQS) for the criteria air pollutants. Areas that meet the AAQS are classified as attainment areas, while areas that do not meet these standards are classified as nonattainment areas.

The SCAQMD monitors levels of various criteria pollutants at 38 permanent monitoring stations and 5 single-pollutant-source lead (Pb) air monitoring sites throughout the air district. Data collected at these stations are used by the California Air Resources Board (CARB) and United States Environmental Protection Agency (EPA) to classify air basins as attainment, nonattainment, maintenance, or unclassified, based on air quality data for the most recent 3 calendar years compared with the AAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. The air quality data are also used to monitor progress in attaining air quality standards.

In 2015, the federal and State AAQS (national ambient air quality standards [NAAQS] and California ambient air quality standards [CAAQS], respectively) were exceeded on 1 or more days for O_3, PM_{10}, and $PM_{2.5}$ at most monitoring locations. No areas of the Basin exceeded federal or State standards for NO_2, SO_2, CO, sulfates, or lead. See Table 4.3.A for the status of criteria pollutants in the Basin. For the NAAQS, the Basin is in nonattainment for O_3 (1-hour and 8-hour), $PM_{2.5,}$ and partial nonattainment for lead (Los Angeles County only). For the CAAQS, the Basin is in nonattainment for O_3 (1 hour and 8 hour), $PM_{2.5}$, and PM_{10}.

Table 4.3.A: Attainment Status of Criteria Pollutants in the South Coast Air Basin

Criteria Pollutant	State Designations	Federal Designations
Ozone – 1 hour standard	Nonattainment	Nonattainment (Extreme)
Ozone – 8 hour standard	Nonattainment	Nonattainment (Extreme)
PM_{10}	Nonattainment	Attainment (Maintenance)
$PM_{2.5}$	Nonattainment	Nonattainment (Serious)
Carbon Monoxide	Attainment	Attainment (Maintenance)
Nitrogen Dioxide	Attainment	Unclassifiable/Attainment
Sulfur Dioxide	Attainment	Unclassifiable/Attainment
Lead	Attainment	Nonattainment (Partial)[1]

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).

[1] The partial nonattainment designation applies to the Los Angeles County portion of the South Coast Air Basin only for near-source monitors.

PM_{10} = particulate matter less than 10 microns in size

$PM_{2.5}$ = particulate matter less than 2.5 microns in size

4.3.2.4 Local Air Quality

Relative to the Project site, the nearest long-term air quality monitoring site for O_3, CO, PM_{10}, and $PM_{2.5}$ is the Saddleback Valley Monitoring Station (State Responsibility Area [SRA] 19), which is located approximately 2.05 miles (mi) south of the Project site in Lake Forest. The nearest long-term air quality monitoring site for NO_2 is the North Coastal Orange County Monitoring Station (SRA 18), which is located approximately 14.5 mi west of the Project site in Costa Mesa.

The most recent 3 years of data available (i.e., 2015, 2016, and 2017) at the monitoring stations is shown in Table 2-4 of the *Air Quality Impact Analysis* (Urban Crossroads 2019a). Table 2-4 of the *Air Quality Impact Analysis* also identifies the number of days AAQS were exceeded at the monitoring stations, which is considered to be representative of the local air quality at the Project site. Within the 3-year period monitored, O_3 concentrations exceeded the federal 1-hour standard on 10 days, the State 1-hour standard on 48 days, and the State 8-hour standard on 46 days. There were no exceedances of the federal 8-hour standard for O_3, for the State or federal 1-hour standards for NO_2, the federal 24-hour standard for PM_{10}, or the federal 24-hour standard for $PM_{2.5}$ during the 3-year period.

4.3.2.5 Sensitive Receivers

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, individuals with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as “sensitive receptors”. Sensitive receptors near the Project site include existing residential homes, hotels, and the existing Serrano Creek Trail area. The existing sensitive receptors in the vicinity of the project site are shown on Figure 4.12.1 and are described below.

- **Receptor R1:** Represents residential homes located approximately 197 ft north of the Project site across Bake Parkway.[1]
- **Receptor R2:** Represents the Staybridge Suites hotel, which is located approximately 264 ft north of the Project site across Bake Parkway.
- **Receptor R3:** Represents the Extended Stay America hotel, which is located approximately 216 ft southeast of the Project site on Lake Forest Drive.
- **Receptor R4:** Represents the Serrano Creek Trail, which is located approximately 80 ft southeast of and adjacent to the southern Project site boundary.

[1] The residential homes at R1 represent the nearest sensitive receivers to the Project site where an individual can remain for 24 hours.

4.3.2.6 Existing Project Site Emissions

The Project site is developed with a nursery. The estimated operation-source emissions generated by the existing nursery are summarized in Table 4.3.B. The existing operational emissions on the Project site from the nursery do not currently exceed SCAQMD maximum daily emissions thresholds (summarized later in Section 4.3.5, Thresholds of Significance).

Table 4.3.B: Existing Project Site Emissions

Existing Operational Activities	Maximum Daily Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Nursery	0.89	3.21	10.53	0.04	3.16	3.16

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_X = oxides of sulfur
VOC = volatile organic compounds

4.3.3 Regulatory Setting

4.3.3.1 Federal Regulations

National Ambient Air Quality Standards. The EPA is responsible for implementing the federal Clean Air Act (CAA). The federal CAA was first enacted in 1955, and has been amended numerous times in subsequent years (i.e., 1963, 1965, 1967, 1970, 1977, and 1990). The CAA authorizes the federal government to set federal air quality standards for pollutant emissions. The CAA also specifies future dates for achieving compliance with the NAAQS. Pursuant to the federal CAA, the EPA is responsible for setting and enforcing the NAAQS for six major pollutants (O_3, CO, NO_X, SO_2, PM_{10}, $PM_{2.5}$, and lead), which are termed "criteria" pollutants. Criteria pollutants are defined as those pollutants for which the federal and State governments have established AAQS, or criteria, for outdoor concentrations in order to protect public health.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the criteria pollutants. The NAAQS were amended in July 1997 to include an additional standard for O_3 and to adopt an NAAQS for $PM_{2.5}$. The NAAQS are summarized in Table 4.3.C. All air basins have been formally designated as attainment or non-attainment for each NAAQS. The NAAQS attainment status for the Basin was previously summarized in Table 4.3.A.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner-burning gasoline and other cleaner-burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and NO_X.

Table 4.3.C: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)[8]	1-Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM_{10})[9]	24-Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	—	—	35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³	15 µg/m³	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9.0 ppm (10 mg/m³)		9 ppm (10 mg/m³)	—	
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	
Nitrogen Dioxide (NO_2)[10]	1-Hour	0.18 ppm (339 µg/m³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m³)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)		53 ppb (100 µg/m³)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1-Hour	0.25 ppm (655 µg/m³)	Ultraviolet Fluorescence	75 ppb (196 µg/m³)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3-Hour	—		—	0.5 ppm (1300 µg/m³)	
	24-Hour	0.04 ppm (105 µg/m³)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30-Day Average	1.5 µg/m³	Atomic Absorption	—	—	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m³ (for certain areas)[13]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m³		
Visibility-Reducing Particles[14]	8-Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a)
The footnotes for this table are provided on the following page.

Footnotes:

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 per year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 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 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current national policies.

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

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

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

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

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

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

9 On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m³ to 12.0 µg/m³. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/³, as was the annual secondary standard of 15 µg/m³. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m³ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

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

11 On June 2, 2010, the 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.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

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

13 The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m³ 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 standards are approved.

14 In 1989, the 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.

°C = degrees Celsius
µg/m³ = micrograms per cubic meter
CARB = California Air Resources Board
EPA = United States Environmental Protection Agency
mg/m³ = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million

The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

4.3.3.2 State Regulations

California Ambient Air Quality Standards. Assembly Bill (AB) 2595, the California Clean Air Act (CCAA), was signed into law in 1988 and requires all areas of the State to achieve and maintain the CAAQS. The CCAA mandates achievement of the maximum degree of emission reductions possible from vehicular and other mobile sources in order to attain the CAAQS by the earliest practical date. The CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for ensuring implementation of the CCAA and federal CAA and for regulating emissions from consumer products and motor vehicles within California. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However, at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the Basin because they are not considered to be a regional air quality problem. The CAAQS are summarized in Table 4.3.C. Generally, the CAAQS are more stringent than the NAAQS. All air basins have been formally designated as attainment or non-attainment for each CAAQS. The CAAQS attainment status for the Basin were previously summarized in Table 4.3.A.

Non-attainment areas are required to prepare Air Quality Management Plans (AQMPs) that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g., motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emission vehicles by fleet operators; and
- Sufficient control strategies to achieve a 5 percent or more annual reduction in emissions or 15 percent or more in a period of 3 years for ROGs, NO_X, CO, and PM_{10}. However, air basins may use an alternative emission reduction strategy that achieves a reduction of less than 5 percent per year under certain circumstances.

4.3.3.3 Regional Regulations

Air Quality Management Planning. Together, the SCAQMD and CARB are responsible for ensuring compliance with all State and federal air quality standards within the Basin. In order to meet the CAAQS and NAAQS, the SCAQMD has adopted a series of AQMPs. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

In March 2017, SCAQMD released the Final 2016 AQMP. The 2016 AQMP evaluates current integrated strategies and control measures to meet the NAAQS, as well as exploring new and innovative methods to reach its goals. Some of these approaches include utilizing incentive programs, recognizing existing co-benefit programs from other sectors, and developing a strategy with fair-share reductions at the federal, State, and local levels. The 2016 AQMP incorporates scientific and technological information and planning assumptions, including the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and updated emission inventory methodologies for various source categories.

4.3.3.4 Local Regulations

City of Lake Forest General Plan. While air quality is not a State-mandated element of a general plan, the AQMP requires air quality to be addressed in general plans. Air quality is included as a sub-element of the Recreation and Resources Element of the City of Lake Forest General Plan (2015a) to fulfill AQMP requirements. The purpose of the air quality sub-element is to reduce pollutant levels through stationary source, mobile source, transportation and land use control measures, and energy conservation measures. The Recreation and Resources Element contains the following goals and policies aimed at improving air quality within the City through proper planning for land use, transportation, and energy use.

GOAL 7.0: Improvement of air quality.

Policy 7.1: Cooperate with the South Coast Air Quality Management District and Southern California Association of Governments in their efforts to implement the regional Air Quality Management Plan.

Policy 7.2: Cooperate and participate in regional air quality management planning, programs and enforcement measures.

Policy 7.3: Utilize transportation demand management to influence transportation choices related to mode and time of travel.

Policy 7.4: Implement Citywide traffic flow improvements

Policy 7.5: Implement land use policy aimed at achieving a greater balance between jobs and housing in Lake Forest.

Policy 7.6: Integrate air quality planning with land use and transportation planning.

Policy 7.7: Promote energy conservation and recycling by the public and private sector in Lake Forest.

4.3.4 Methodology

Evaluation of the Project's air quality impacts included the following:

- Determination of the short-term construction air quality impacts
- Determination of the long-term air quality impacts resulting from emissions from vehicular traffic and stationary sources
- Determination of regulatory compliance measures required to reduce short- and long-term air quality impacts from all sources
- Comparison of Project-related construction and operational emissions with applicable thresholds (summarized in Section 4.3.5, Significance Thresholds)
- Evaluation of health risk from vehicle emissions for students and staff at the proposed school

The evaluation of air quality impacts was prepared in conformance with appropriate standards, utilizing procedures and methodologies in the SCAQMD *CEQA Air Quality Handbook* (1993), *Final Localized Threshold Methodology* (2003), and the *Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (2006). The latest version of the CalEEMod (v2016.3.2), which was released by the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts on October 17, 2017, was used to determine construction and operational air quality emissions of the proposed Project. Please refer to the *Air Quality Impact Analysis* (Urban Crossroads 2019a) for additional details on the air quality modeling methodology and assumptions used to estimate construction and operation emissions of the proposed Project.

The Health Risk Assessment and dispersions modeling for evaluation of health risk impacts to students and staff at the proposed school was conducted in compliance with the procedures developed by the EPA (i.e., the 2005 *Guideline on Air Quality Models*) and the Office of Environmental Health Hazard Assessment (OEHHA) (i.e., 2015 *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*). The air quality dispersion modeling was performed using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). Because the proposed school would not be operational during construction of the proposed Project, the health risk assessment was only conducted for the operational phase of the proposed Project. Please refer to the *Nakase Elementary School Health Risk Assessment* (Placeworks 2019a) for additional details on the air quality modeling methodology and assumptions used to estimate health risk to students and staff at the proposed school.

4.3.5 Thresholds of Significance

4.3.5.1 CEQA Thresholds of Significance

The thresholds for air quality impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City of Lake Forest *CEQA Significance Thresholds Guide* (2009). The proposed Project may be deemed to have a significant air quality impact if it would:

Threshold 4.3.1: Conflict with or obstruct implementation of the applicable air quality plan;

Threshold 4.3.2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard;

Threshold 4.3.3: Expose sensitive receptors to substantial pollutant concentrations;

Threshold 4.3.4: Result in other emissions (such as those leading to odors adversely affecting a substantial number of people).

The Initial Study, included as Appendix A, substantiates that impacts associated with Threshold 4.3.4 (odors and other emission) would be less than significant because odors during construction would be temporary and the uses associated with the operation of the proposed Project would not generate objectionable odors. This threshold will not be addressed in the following analysis.

4.3.5.2 SCAQMD Emissions Thresholds

The SCAQMD has established regional and localized significance thresholds for regulated pollutants, which are discussed below.

- **Regional Significance Thresholds:** The SCAQMD regional significance thresholds for regulated pollutants are shown in Table 4.3.D. Pursuant to SCAQMD guidelines, these thresholds of significance are used to assess the impacts of project-related construction and operational emissions on regional and local ambient air quality. According to SCAQMD guidelines, any projects with daily emissions that exceed the regional thresholds of significance should be considered as having an individually and cumulatively significant air quality impact.

- **Localized Significance Thresholds (LSTs):** The SCAQMD has established LSTs to evaluate whether there is potential for a project to contribute to, or cause, localized exceedances of the NAAQS or CAAQS. LSTs are based on the ambient concentrations of that pollutant within the project area and the distance to the nearest sensitive receptor. The LSTs for the proposed Project are shown in Table 4.3.D.[1]

[1] Since development projects typically result in negligible construction and long-term operation SO_2 emissions, SCAQMD does not provide an LST for this pollutant. There is also no ambient standard or SCAQMD LST for VOCs, since VOCs are not a criteria pollutant. VOCs are classified as a precursor pollutant, and only a regional emissions threshold has been established.

Table 4.3.D: SCAQMD Maximum Daily Emissions Thresholds

Pollutant	Construction (lbs/day)	Operation (lbs/day)
Regional Threshold		
NO_X	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550
Pb	3	3
Local Threshold		
NO_X	96 (demolition); 150 (grading)	N/A
CO	914 (demolition); 1,626 (grading)	N/A
PM_{10}	14 (demolition); 27 (grading)	N/A
$PM_{2.5}$	5 (demolition); 9 (grading)	N/A

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).

CO = carbon monoxide
lbs/day = pounds per day
N/A = not applicable
NO_X = oxides of nitrogen
Pb = lead
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_X = oxides of sulfur
VOC = volatile organic compounds

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of a project site are above or below State standards. If ambient levels are below the standards, as in the case of CO and NO_2, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a State or federal standard, as in the case of $PM_{2.5}$ and PM_{10}, then project emissions are considered significant if they increase ambient concentrations by a measurable amount.

- **Health Risk Assessment Thresholds:** Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, would have some associated risk. The SCAQMD has established a maximum incremental cancer risk of 10 in 1 million ($1x10^5$) for CEQA projects and the OEHHA has established a typical risk management level of 10 in 1 million.

  The cumulative non-cancer chronic health impacts from vehicle emissions were determined by calculating the Hazard Index (HI), which is the sum of all hazard quotients from all the substances that affect the same organ system (e.g., respiratory system, cardiovascular system, reproductive system). An HI equal to or greater than 1.0 represents a significant chronic or acute health hazard.

4.3.6 Project Impacts

Threshold 4.3.1: Would the project conflict with or obstruct implementation of the applicable air quality plan?

Less than Significant Impact. Chapter 12, Sections 12.2 and 12.3 of the SCAQMD *CEQA Air Quality Handbook* (1993) outlines criteria for determining consistency with the SCAG 2016 AQMP. A project would be consistent with the AQMP if the project (1) would not increase the frequency or severity of an existing air quality violation or cause or contribute to new a new violation or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP, and (2) would not exceed the growth assumptions in the AQMP based on the year of Project build out.

As described further under Threshold 4.3.2 below, the short-term construction and long-term pollutant emissions from the proposed Project would not exceed the regional emissions thresholds established by the SCAQMD. Therefore, the proposed Project would not increase the frequency or severity of any air quality standard violation or cause a new air quality standard violation.

The City's General Plan designates the Project site as Business Park and Business Development Overlay (BDO). This land use designation provides opportunities for a mixture of all uses allowed under the Commercial, Professional Office, and Light Industrial land use designations. Such uses include a variety of retail, professional office, service-oriented business activities, administrative and corporate uses, and light industrial uses. Development of the proposed Project consists of approximately 675 single-family detached residential homes, 101 senior affordable housing residential units, an elementary school that could accommodate up to 1,000 students, and park/open space uses. The proposed Project would require approval of a General Plan amendment to change the General Plan land use designation of the Project site to Low-Medium Residential and Institutional. According to the *Nakase Property Trip Generation Evaluation* (Urban Crossroads 2018), the currently adopted General Plan land use for the Project site would generate 14,122 more trip-ends per day than the proposed Project. Therefore, as shown in Table 4.3.E, the Project would result in a net decrease in VOCs, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$ compared to the adopted General Plan land use designation, which was used for the growth assumption in the 2016 AQMP. Therefore, the proposed Project would result in fewer emissions, and consequently less air quality impacts, compared to the currently adopted general plan land use designation.

Table 4.3.E: Project and Current Permitted Land Uses – Operational Emissions

Proposed Use	Operational Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Currently Approved General Plan Land Use	73.62	156.96	424.24	1.82	166.26	45.63
Proposed Project	44.66	54.08	201.87	0.65	58.41	15.44
Net Change	**-28.96**	**-102.88**	**-222.37**	**-1.16**	**-107.85**	**-30.19**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_X = oxides of sulfur
VOC = volatile organic compounds

The proposed Project would not exceed the growth assumptions in the SCAG 2016 AQMP because (1) the Project's construction and operational emissions would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations, and (2) although the proposed Project is not consistent with the current General Plan land use designation on the Project site, the proposed Project is expected to generate a net decrease in emissions as compared to the uses allowed under the current land use designation, which was used for the growth assumption in the 2016 AQMP. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant, and no mitigation is required.

Threshold 4.3.2: Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Less than Significant Impact.

Construction. Construction activities that produce emissions include demolition, grading, infrastructure construction, building construction, paving, and architectural coating. Combustion emissions are produced from various sources, including construction equipment engines and motor vehicles transporting the construction crew and construction materials. Fugitive dust emissions are generally associated with land clearing and exposure of soils to the air and wind, as well as grading operations. Construction activities such as paving and painting can release VOCs. Construction emissions would vary daily as construction activity levels change; therefore, this analysis provides the worst-case construction emissions based on the construction schedule and construction equipment anticipated for Project construction.

As specified in Regulatory Compliance Measures RCM AQ-1 and RCM AQ-2, in Section 4.3.8, Regulatory Compliance Measures and Mitigation Measures, construction of the proposed Project would comply with SCAQMD standard conditions, including Rule 403 (Fugitive Dust) to control fugitive dust and Rule 1113 (Architectural Coatings) to control VOC emissions from paint. Compliance with SCAQMD standard conditions are regulatory requirements and were considered in the analysis of construction emissions. The maximum daily emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$ that would result from construction of the proposed Project are summarized in Table 4.3.F and compared to the SCAQMD regional significance thresholds. As shown in Table 4.3.F, construction emissions associated with the proposed Project would not exceed the significance thresholds established by the SCAQMD for any of the criteria pollutants.

As previously discussed, the portion of the Basin in which the Project site is located is in nonattainment of the NAAQS for O_3 (1-hour and 8-hour) and $PM_{2.5}$. The Basin is in nonattainment of the CAAQS for O_3 (1-hour and 8-hour), $PM_{2.5}$, and PM_{10}. As shown in Table 4.3.F, emissions from construction of the proposed Project would not exceed the significance thresholds for O_3, $PM_{2.5}$, or PM_{10}. Therefore, construction of the proposed Project would not exceed the significance thresholds of criteria pollutants for which the project region is nonattainment under the CAAQS or NAAQS.

Table 4.3.F: Construction Emissions

Year	Emissions (lbs/day)					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
2019	3.64	37.67	23.02	0.05	3.45	1.96
2020	50.8	69.66	37.66	0.12	12.53	6.09
2021	20.41	90.40	77.76	0.24	19.56	7.68
2022	19.19	79.16	73.84	0.24	15.92	6.06
2023	15.42	38.13	51.12	0.19	13.95	4.38
2024	15.11	36.60	49.17	0.19	13.84	4.28
2025	14.83	35.05	47.48	0.18	13.73	4.17
Maximum Daily Emissions	**20.41**	**90.40**	**77.76**	**0.24**	**19.56**	**7.68**
SCAQMD Regional Thresholds	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District
SO_X = oxides of sulfur
VOC = volatile organic compounds

According to SCAQMD guidance, projects that exceed the significance thresholds are considered by SCAQMD to result in cumulatively considerable air quality impacts. Conversely, projects that do not exceed the significance thresholds are generally not considered to result in cumulatively considerable air quality impacts. Therefore, based on the fact that emissions during construction of the proposed Project would not exceed any of the air quality significance thresholds for any criteria pollutants, the proposed Project would not have a cumulatively considerable air quality impact. Therefore, with compliance with regulatory requirements (as specified in RCM AQ-1 and RCM AQ-2), construction impacts related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under applicable NAAQS or CAAQS would be less than significant, and no mitigation is required.

Operation. Project operations would result in VOC, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$ emissions from three primary sources: area source emissions, energy source emissions, and mobile source emissions, as described further below.

Area source emissions would be generated from the following sources:

- **Architectural Coating**: Over a period of time, the buildings that are part of the proposed Project would generate emissions from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings used during maintenance activities.

- **Consumer Products**: Consumer products include but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. When released in the atmosphere, many of these products contain organic compounds that can react to form O_3 and other photochemically reactive pollutants.

- **Landscape Maintenance Equipment**: Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shredders/grinders, blowers, trimmers, chainsaws, and hedge trimmers used to maintain landscaping.

In compliance with RCM AQ-3, the proposed Project would comply with SCAQMD Rule 445, which prohibits the use of wood-burning stoves and fireplaces in new development. Therefore, the proposed Project would not generate area source emissions from hearths/fireplaces.

Energy source emissions include criteria pollutant emissions from the generation of electricity and consumption of natural gas. However, because electricity-generating facilities for the Project area are located either outside the region (State) or are offset through the use of pollution credits (Regional Clear Air Incentives Market [RECLAIM]) for generation within the Basin, criteria pollutant emissions from off-site electricity generation is generally excluded from the evaluation of significance, and only natural gas use is considered. As specified in RCM AQ-4, the project building components (e.g., windows, roof systems, electrical and lighting systems, and heating, ventilation, and air conditioning systems) would be designed in compliance with 2019 Title 24 standards. Title 24 requires projects to implement energy efficiency measures that promote conservation. The 2019 Title 24 standards anticipate 30 percent less energy use for non-residential buildings and 53 percent less energy use for residential use due to lighting upgrades. Additionally, to reduce water demands and associated energy use, developments within the Area Plan would be required to implement a Water Conservation Strategy, install water-efficient plumbing fixtures, and demonstrate a minimum 20 percent reduction in indoor and outdoor water usage compared to the development without water conservation measures.

Project vehicle trips to and from the Project site would generate mobile source emissions. Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust and tire wear particulates. Mobile source emissions are dependent on both overall daily vehicle trip generation and the effect of the Project on peak-hour traffic volumes and traffic operations in the vicinity of the Project site. The Project-related operational air quality emissions are primarily due to vehicle trips. According to the *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c), the proposed Project is anticipated to generate a total of 8,789 trip ends per day with 1,202 a.m. peak-hour trips and 879 p.m. peak-hour trips. The proposed Project design would facilitate pedestrian access and encourages people to walk instead of drive, which reduces vehicle trips. Pedestrian connections would be constructed at selected roads within the Project site, providing pedestrian access to the various uses and activity centers within the Project. Furthermore, the proximity of the residential uses within the Area Plan to the proposed on-site school and to the surrounding commercial uses would reduce travel distances and regional vehicle miles traveled (VMT) by consolidating trips and reducing requirements for multiple trips. The proposed Project would also provide Below Market Rate (BMR) housing through the construction of senior housing dwelling units. Senior housing units tend to be associated with lower levels of auto ownership.

Table 4.3.G summarizes the Project's maximum daily emissions from area, energy, and mobile sources during operation with implementation of RCM AQ-3 and RCM AQ-4 and consideration of the project design features discussed above. The existing emissions from the on-site nursery were subtracted from the Project operational emissions to determine the new emissions resulting from the proposed Project. As shown in Table 4.3.G, emissions during operation of the proposed Project would not exceed the thresholds of significance for any criteria pollutants.

Table 4.3.G: Operations Emissions

Year		Emissions (lbs/day)					
		VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Area Source	Residential	31.74	13.61	69.44	0.09	1.40	1.40
	Other Uses	2.26	0.00	0.10	0.00	0.00	0.00
Energy Source	Residential	0.33	2.79	1.19	0.02	0.23	0.23
	Other Uses	0.02	0.19	0.16	0.00	0.01	0.01
Mobile Source	Residential	8.04	28.62	103.75	0.43	44.07	11.98
	Other Uses	2.38	8.42	30.11	0.13	12.70	3.45
Maximum Daily Emissions		**44.76**	**53.64**	**204.75**	**0.66**	**58.41**	**17.07**
Existing Emissions		-0.89	-3.10	-10.53	-0.04	-3.16	-0.87
Net Maximum Daily Emissions (Project minus Existing)		**43.87**	**50.54**	**194.22**	**0.63**	**55.25**	**16.20**
SCAQMD Regional Thresholds		55	55	550	150	150	55
Threshold Exceeded?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
Note: Any discrepancies in the Maximum Daily Emissions, Existing Emissions, and Net Maximum Daily Emission rows are due to rounding.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District
SO_X = oxides of sulfur
VOC = volatile organic compounds

As previously discussed, the portion of the Basin in which the Project site is located is in nonattainment of the NAAQS for O_3 (1-hour and 8-hour) and $PM_{2.5}$. The Basin is in nonattainment of the CAAQS for O_3 (1-hour and 8-hour), $PM_{2.5}$, and PM_{10}. As shown in Table 4.3.G, emissions during operation of the proposed Project would not exceed the significance thresholds for O_3, $PM_{2.5}$, or PM_{10}. Therefore, operation of the proposed Project would not exceed the significance thresholds of criteria pollutants for which the project region is nonattainment under the CAAQS or NAAQS.

As discussed previously, according to SCAQMD guidance, projects that exceed the significance thresholds are considered by the SCAQMD to result in cumulatively considerable air quality impacts. Conversely, projects that do not exceed the significance thresholds are generally not considered to result in cumulatively considerable air quality impacts. Therefore, based on the fact that the emissions during operation of proposed Project would not exceed any of the air quality significance thresholds for any criteria pollutants, the proposed Project would not have a cumulatively considerable impact. Therefore, with compliance with regulatory requirements (as specified in RCM AQ-3 and RCM AQ-4), operational impacts related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable NAAQS or CAAQS would be less than significant, and no mitigation is required.

Threshold 4.3.3: Would the project expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact.

Construction. Construction activities (e.g., grading and the use of construction equipment on site) would result in localized exhaust emissions that have the potential to affect nearby sensitive receivers. The localized impacts from the daily emissions associated with on-site construction activities were evaluated at Receptor R1.[1]

As specified in RCM AQ-1, in Section 4.3.8, Regulatory Compliance Measures and Mitigation Measures, construction of the proposed Project would comply with SCAQMD standard conditions, including Rule 403 (Fugitive Dust) to control fugitive dust. Compliance with SCAQMD standard conditions are regulatory requirements and were considered in the analysis of construction emissions. Table 4.3.H identifies the localized impacts at the nearest receptor location to the Project site (R1) compared to the SCAQMD LSTs for NO_X, CO, PM_{10}, and $PM_{2.5}$. As shown in Table 4.3.H, construction emissions associated with the proposed Project would not exceed the LSTs established by SCAQMD. Because the project would not exceed the LSTs with compliance with regulatory requirements (as specified in RCM AQ-1), impacts related to exposure of sensitive receptors to substantial pollutant concentrations would be less than significant, and no mitigation is required.

Table 4.3.H: Localized Construction Emissions

	Emissions (lbs/day)			
	NO_X	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-Site Demolition Activities				
Maximum Daily Emissions	**35.78**	**22.06**	**3.12**	**1.87**
SCAQMD Localized Significance Threshold	96	914	14	5
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
On-Site Grading Activities				
Maximum Daily Emissions	50.20	31.96	10.91	5.61
SCAQMD Localized Significance Threshold	150	1,626	27	9
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District

Operation.

Localized Emissions. A project would generate localized exhaust emissions that have the potential to affect nearby sensitive receivers if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., warehouse or transfer facilities). Although the proposed Project does not include such uses,

[1] The residential homes at R1 represent the nearest sensitive receivers to the Project site where an individual can remain for 24 hours.

the Project is expected to produce periods of mobile queuing and idling at the school. The localized impacts from the daily emissions associated with trips to and from the proposed school and vehicle idling at the school were evaluated at Receptor R1.[1] Table 4.3.I shows the maximum daily emissions for the Project's operational activities compared with the SCAQMD LSTs for NO_X, CO, PM_{10} and $PM_{2.5}$. As shown in Table 4.3.I, project operational source emissions would not exceed LSTs established by the SCAQMD. Therefore, because the project would not exceed the LSTs established by the SCAQMD, localized emissions from operation of the proposed Project would not expose sensitive receptors to substantial pollutant concentrations, impacts would be less than significant, and no mitigation is required.

Table 4.3.I: Localized Operations Emissions

	Emissions (lbs/day)			
	NO_X	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-Site Demolition Activities				
Maximum Daily Emissions	**18.47**	**77.44**	**4.48**	**2.41**
SCAQMD Localized Significance Threshold	191	2,235	10	3
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District

CO Hot Spot. CO hot spots are caused by vehicular emissions, primarily when idling at congested intersections. Based on the analysis presented below, a CO "hot-spot" analysis is not needed to determine whether a change in the level of service (LOS) of an intersection in the vicinity of the Project site would have the potential to result in exceedance of either the CAAQS or NAAQS.

Vehicle emissions standards have become increasingly stringent in the last 20 years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the Basin is now designated as attainment. In addition, CO concentrations in the Project vicinity have steadily declined.

The analysis prepared for CO attainment in the Basin by SCAQMD can be used to assist in evaluating the potential for CO exceedances in the Basin. To establish a more accurate record of baseline CO concentrations affecting the Basin, a CO "hot-spot" analysis was conducted by SCAQMD in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This analysis did not predict any violation of CO

[1] The residential homes at R1 represent the nearest sensitive receivers to the Project site where an individual can remain for 24 hours.

standards. According to the *Air Quality Impact Analysis* (Urban Crossroads 2019a), based on the SCAQMD 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak CO concentrations in the Basin were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. Even if the traffic volumes of the proposed Project were double or triple that of the traffic volumes generated at the four busy intersections in Los Angeles, coupled with the ongoing improvements in ambient air quality, the Project would not be capable of resulting in a CO "hot spot" at any study area intersections. Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour (vph)—or 24,000 vph where vertical and/or horizontal air does not mix—in order to generate a significant CO impact.

The busiest Los Angeles intersection evaluated by the SCAQMD was at Wilshire Boulevard and Veteran Avenue, which has a daily traffic volume of approximately 100,000 vehicles per day and a.m. and p.m. traffic volumes of 8,062 vph and 7,719 vph, respectively. The 2003 AQMP CO "hot-spot" analysis estimated that the 1-hour concentration for this intersection was 4.6 parts per million (ppm), which indicates that, should the daily traffic volume increase four times to 400,000 vehicles per day, CO concentrations would be 18.4 ppm and would still not likely exceed the most stringent 1-hour CO standard of 20.0 ppm. At build out of the proposed Project, the highest average daily trips would be 88,000 daily trips on Bake Parkway between Rockfield Boulevard and the Interstate 5 (I-5) northbound ramp, which is lower than the highest daily traffic volumes of 100,000 vehicles per day at Wilshire Boulevard and Veteran Avenue. Additionally, the 2003 AQMP CO "hot-spot" analysis determined that the highest traffic volumes was 8,674 vph on La Cienega Boulevard and Century Boulevard. The highest trips on a segment of road for the "Without the Portola Extension" and "With the Portola Extension" scenarios are 8,350 vph and 8,310 vph, respectively, on Bake Parkway and Rockfield Boulevard. As such, Project-related traffic volumes are less than the traffic volumes identified in the 2003 AQMP CO "hot-spot" analysis. Because the proposed Project would not produce the volume of traffic required to generate a CO "hot spot", CO emissions from operation of the proposed Project would not expose sensitive receptors to substantial pollutant concentrations. Impacts related to CO hot spots would be less than significant, and no mitigation is required.

Health Risk Assessment. Although potential effects of the environment on the Project are typically not a subject of CEQA analysis, due to the proximity of SR-241 to the proposed school (300 ft northwest of the school site boundary), a Health Risk Assessment was conducted for informational purposes. The purpose of the Health Risk Assessment was to disclose the potential cancer risks to students and staff at the proposed school from diesel-fueled vehicles that use the freeway and emit carcinogenic compounds. Emissions of criteria pollutants and toxic air contaminants (TACs) from vehicles traveling on SR-241 were estimated and compared to the SCAQMD and OEHHA threshold of 10 in 1 million to determine if air quality at the proposed school would pose a short-term or long-term exposure risk to students and staff. It should be noted that the EPA and OEHHA recommend

that conservative assumptions be used in a Health Risk Assessment to ensure that the estimated risk does not underestimate the actual risk. Therefore, the estimated risks do not necessarily represent actual risks experienced by a population at or near a site.

An evaluation was also conducted using the HI approach for the potential non-cancer effects of chronic and acute exposures to non-carcinogenic impacts. The HI assumes that chronic and acute sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). A health hazard would be presumed to exist if the HI for the Project equals or exceeds 1.

The results of the Health Risk Assessment are provided in Table 4.3.J. Table 4.3.J shows the cancer risk and HI for students and staff at the proposed school compared to SCAQMD and OEHHA thresholds. Based on a comparison to the carcinogenic and non-carcinogenic thresholds established by OEHHA and SCAQMD, hazardous air emissions generated from the stationary and mobile sources within a 0.25 mi radius are not anticipated to pose an actual or potential health risk to students and staff at the proposed school because the cancer risk and HI for the proposed Project would not exceed the SCAQMD and OEHHA thresholds.

Table 4.3.J: Health Risk Assessment Results

Source	Cancer Risk (per million)		Chronic Hazard Index	Acute (1-Hour) Hazard Index	8-Hour Hazard Index
	Staff Exposure	Student Exposure			
Diesel-fueled Vehicles	0.05	0.08	0.001	0.002	0.001
SCAQMD and OEHHA Thresholds	10	10	1.0	1.0	1.0
Exceeds Threshold	**NO**	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a)
OEHHA = Office of Environmental Health Hazard Assessment
SCAQMD = South Coast Air Quality Management District

4.3.7 Cumulative Impacts

Air pollution is inherently a cumulative impact measured across an air basin. The discussion under Threshold 4.3.2, above, includes an analysis of the proposed Project's contribution to cumulative air impacts. To summarize the conclusion with respect to that analysis, the incremental effect of projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively considerable per SCAQMD guidelines. The proposed Project's construction- and operation-related regional daily emissions are less than the SCAQMD significance thresholds for all criteria pollutants. In addition, adherence to SCAQMD rules and regulations on a project-by-project basis would substantially reduce potential impacts associated with the related projects and basin-wide air pollutant emissions. Therefore, the proposed Project would not have a cumulatively considerable increase in emissions, and the proposed Project's cumulative air quality impacts would be less than significant.

4.3.8 Level of Significance Prior to Mitigation

Construction and operation of the proposed Project would result in less than significant air quality impacts with implementation of Regulatory Compliance Measures.

4.3.9 Regulatory Compliance Measures and Mitigation Measures

The proposed Project would not result in significant impacts related to air quality, and no mitigation is required.

The following Regulatory Compliance Measures are SCAQMD Rules that are applicable to the proposed Project and are considered in the analysis of potential impacts related to air quality. The City of Lake Forest considers these requirements to be mandatory; therefore, they are not mitigation measures.

RCM AQ-1 **South Coast Air Quality Management District (SCAQMD) Rule 403.** The Project Applicant shall ensure the Construction Contractor implements fugitive dust control measures in compliance with SCAQMD Rule 403. The Project Applicant shall include the following fugitive dust control measures for SCAQMD Rule 403 compliance in the Project plans and specifications:

- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 miles per hour (mph) per SCAQMD guidelines in order to limit fugitive dust emissions.
- The Construction Contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered, with complete coverage of disturbed areas, at least three (3) times daily during dry weather and preferably mid-morning, afternoon, and after work is done for the day.
- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 mph or less.

RCM AQ-2 **SCAQMD Rule 1113.** The Project Applicant shall ensure the Construction Contractor implements measures to control volatile organic compound (VOC) emissions from architectural coatings in compliance with SCAQMD Rule 1113. The Project Applicant shall include the following control measures for SCAQMD Rule 1113 compliance in the Project plans and specifications:

- Only “Low-Volatile Organic Compounds” paints (no more than 50 grams/liter of VOC) shall be used.

RCM AQ-3: **SCAQMD Rule 445.** Prior to the issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design does not include wood-burning stoves and fireplaces in new development in compliance with SCAQMD Rule 445.

RCM AQ-4: **Title 24 of the California Code of Regulations (CCR).** Prior to issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design complies with the 2019 Building Energy Efficiency Standards (CCR Title 24) energy conservation and the California Green Building Standards Code (CALGreen).

4.3.10 Level of Significance after Mitigation

Construction and operational air quality impacts would be less than significant.