4.10 AIR QUALITY

This section has been prepared using methodologies and assumptions recommended in the air quality impact assessment guidelines of the Bay Area Air Quality Management District (BAAQMD).[1] In keeping with these guidelines, this section describes existing air quality, impacts of the proposed project on local carbon monoxide (CO) levels, impacts of vehicular emissions that have regional effects, and exposure of sensitive receptors to toxic air contaminants (TACs). Mitigation measures to reduce or eliminate potentially significant air quality impacts are identified, where appropriate.

In addition to the references listed in this section, an Air Quality and Greenhouse Gas Emissions Technical Report[2] (AQ/GHG Technical Report) was prepared for the proposed project by the project sponsor's consultant. The AQ/GHG Technical Report was peer reviewed by LSA[3] and finalized by the project sponsor. The final report was utilized in the analysis provided in this section, and is provided in Appendix I.

4.10.1 Setting

The following discussion provides an overview of existing air quality conditions in the region and in the San Rafael area. Ambient Air Quality Standards (AAQS) and the regulatory framework are summarized and climate, air quality conditions, and typical air pollutant types and sources are also described.

4.10.1.1 Air Pollutants and Health Effects

Both State and federal governments have established health-based AAQS for six criteria air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter. In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. Two criteria pollutants, O_3 and NO_2, are considered regional pollutants because they (or their precursors) affect air quality on a regional scale. Pollutants such as CO, SO_2, and Pb are considered local pollutants that tend to accumulate in the air locally.

The primary pollutants of concern in the project area are O_3 and suspended particulate matter. Significance thresholds established by an air district are used to manage total regional and local emissions within an air basin based on the air basin's attainment status for criteria pollutants. These emission thresholds were established for individual development projects that would contribute to regional and local emissions and could adversely affect or delay the air basin's projected attainment target goals for nonattainment criteria pollutants.

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1 Bay Area Air Quality Management District (BAAQMD). 2023. *2022 California Environmental Quality Act Air Quality Guidelines*. April.

2 Dudek. 2023. *Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report.* August.

3 LSA Associates, Inc. 2023. *Peer Review of the Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report and Energy Analysis Memorandum.* March.

Because of the conservative nature of the significance thresholds, and the basin-wide context of individual development project emissions, there is no direct correlation between a single project and localized air quality-related health effects. One individual project that generates emissions exceeding a threshold does not necessarily result in adverse health effects for residents in the project vicinity. This condition is especially true when the criteria pollutants exceeding thresholds are those with regional effects, such as ozone precursors like nitrogen oxides (NO_X) and reactive organic gases (ROGs).

Further, by its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size to individually result in nonattainment of AAQS. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant. In developing thresholds of significance for air pollutants, the air districts have considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions.

Occupants of facilities such as schools, daycare centers, parks and playgrounds, hospitals, and nursing and convalescent homes are considered to be more sensitive than the general public to air pollutants because these population groups have increased susceptibility to respiratory disease. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions, compared to commercial and industrial areas, because people generally spend longer periods of time at their residences, with greater associated exposure to ambient air quality conditions. These populations are referred to as sensitive receptors.

Air pollutants and their health effects, and other air pollution-related considerations are summarized in Table 4.10.A and are described in more detail below.

Ozone. Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving ROGs and NO_X. The main sources of ROGs and NO_X, often referred to as ozone precursors, are combustion processes (including combustion in motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the San Francisco Bay Area (Bay Area), automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Carbon Monoxide. CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles. CO transport is limited; it disperses with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations near congested roadways or intersections may reach unhealthful levels that adversely affect local sensitive receptors

Table 4.10.A: Sources and Health Effects of Air Pollutants

Pollutants	Sources	Primary Effects
Ozone (O_3)	• Precursor sources:[1] motor vehicles, industrial emissions, and consumer products.	• Respiratory symptoms. • Worsening of lung disease leading to premature death. • Damage to lung tissue. • Crop, forest, and ecosystem damage. • Damage to a variety of materials, including rubber, plastics, fabrics, paints, and metals.
Particulate Matter Less than 2.5 Microns in Aerodynamic Diameter ($PM_{2.5}$)	• Cars and trucks (especially diesels). • Fireplaces, woodstoves. • Windblown dust from roadways, agriculture, and construction.	• Premature death. • Hospitalization for worsening of cardiovascular disease. • Hospitalization for respiratory disease. • Asthma-related emergency room visits. • Increased symptoms, increased inhaler usage.
Particulate Matter Less than 10 Microns in Aerodynamic Diameter (PM_{10})	• Cars and trucks (especially diesels). • Fireplaces, woodstoves. • Windblown dust from roadways, agriculture, and construction.	• Premature death and hospitalization, primarily for worsening of respiratory disease. • Reduced visibility and material soiling.
Nitrogen Oxides (NO_x)	• Any source that burns fuels such as cars, trucks, construction and farming equipment, and residential heaters and stoves.	• Lung irritation. • Enhanced allergic responses.
Carbon Monoxide (CO)	• Any source that burns fuels such as cars, trucks, construction and farming equipment, and residential heaters and stoves.	• Chest pain in patients with heart disease. • Headache. • Light-headedness. • Reduced mental alertness.
Sulfur Oxides (SO_X)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Worsening of asthma: increased symptoms, increased medication usage, and emergency room visits.
Lead (Pb)	• Contaminated soil.	• Impaired mental functioning in children. • Learning disabilities in children. • Brain and kidney damage.
Toxic Air Contaminants (TACs)	• Cars and trucks (especially diesels). • Industrial sources, such as chrome platers. • Neighborhood businesses, such as dry cleaners and service stations. • Building materials and products.	• Cancer. • Reproductive and developmental effects. • Neurological effects.

Source: Common Air Pollutants (California Air Resources Board (2023).

[1] Ozone is not generated directly by these sources. Rather, chemicals emitted by these precursor sources react with sunlight to form ozone in the atmosphere.

(e.g., residents, schoolchildren, the elderly, and hospital patients). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service (LOS) or with extremely high traffic volumes. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue, impair central nervous system function, and induce angina (chest pain) in persons with serious heart disease. Extremely high levels of CO, such as those generated when a vehicle is running in an unventilated garage, can be fatal.

Particulate Matter. Particulate matter is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from manmade and natural sources. Particulate matter is categorized in two size ranges: PM_{10} for particles less than 10 microns in size and $PM_{2.5}$ for particles less than 2.5 microns in diameter. In the Bay Area, motor vehicles generate about half of the air basin's particulates through tailpipe emissions as well as brake pad, tire wear, and entrained road dust. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction are other sources of such fine particulates. These fine particulates are small enough to be inhaled into the deepest parts of the human lung and can cause adverse health effects. According to the California Air Resources Board (CARB), studies in the United States and elsewhere have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks, and studies of children's health in California have demonstrated that particle pollution may significantly reduce lung function growth in children.[4] Statewide attainment of particulate matter standards could reduce premature deaths, hospital admissions for cardiovascular and respiratory disease and asthma-related emergency room visits, and episodes of respiratory illness in California.

Nitrogen Dioxide. NO_2 is a reddish-brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 also contributes to other pollution problems, including a high concentration of fine particulate matter, poor visibility, and acid deposition. NO_2 may be visible as a coloring component on high-pollution days, especially in conjunction with high ozone levels. NO_2 decreases lung function and may reduce resistance to infection.

Sulfur Dioxide. SO_2 is a colorless acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease. SO_2 also reduces visibility and the level of sunlight at the ground surface.

Lead. Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery factories.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the United States Environmental Protection Agency (EPA) established national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of EPA regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.

[4] California Air Resources Board (CARB). 2020. *Inhalable Particulate Matter and Health ($PM_{2.5}$ and PM_{10})*. Website: ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health (accessed August 2023).

Toxic Air Contaminants. In addition to the criteria pollutants discussed above, TACs are another group of pollutants of concern. Some examples of TACs include benzene, butadiene, formaldehyde, and hydrogen sulfide. Potential human health effects of TACs include birth defects, neurological damage, cancer, and death. There are hundreds of different types of TACs with varying degrees of toxicity. Individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

TACs do not have AAQS, but are regulated by the EPA and CARB. In 1998, the CARB identified particulate matter from diesel-fueled engines as a TAC. The CARB has completed a risk management process that identified potential cancer risks for a range of activities and land uses that are characterized by the use of diesel-fueled engines.[5] High-volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (distribution centers, truck stops) were identified as posing the highest risk to adjacent receptors. Other facilities associated with increased risk include warehouse distribution centers, large retail or industrial facilities, high-volume transit centers, and schools with a high volume of bus traffic. Health risks from TACs are a function of both concentration and duration of exposure.

The BAAQMD regulates TACs using a risk-based approach. This approach uses a Health Risk Assessment (HRA) to determine what sources and pollutants to control as well as the degree of control. An HRA is an analysis in which human health exposure to toxic substances is estimated and considered together with information regarding the toxic potency of the substances in order to provide a quantitative estimate of health risks.[6] As part of ongoing efforts to identify and assess potential health risks to the public, the BAAQMD has collected and compiled air toxic emissions data from industrial and commercial sources of air pollution throughout the Bay Area. Monitoring data and emissions inventories of TACs help the BAAQMD determine the health risk to Bay Area residents.

Ambient monitoring concentrations of TACs indicate that pollutants emitted primarily from motor vehicles (1,3-butadiene and benzene) account for a substantial portion of the ambient background risk in the Bay Area.[7] According to the BAAQMD, ambient benzene levels declined dramatically in 1996 with the advent of Phase 2 reformulated gasoline. Due to this reduction, the calculated average cancer risk based on monitoring results has also been reduced.

Unlike TACs emitted from industrial and other stationary sources noted above, most diesel particulate matter (DPM) is emitted from mobile sources—primarily "off-road" sources such as

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5 California Air Resources Board (CARB) and California Air Pollution Control Officers Association (CAPCOA). 2015. *Risk Management Guidance for Stationary Sources of Air Toxics.* July 23. Website: https://ww2.arb.ca.gov/sites/default/files/classic/toxics/rma/rmgssat.pdf (accessed August 2023).

6 In general, a health risk assessment is required if the BAAQMD concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggests a potential public health risk. Such an assessment generally evaluates chronic, long-term effects, including the increased risk of cancer as a result of exposure to one or more TACs.

7 Bay Area Air Quality Management District (BAAQMD). 2014. *Improving Air Quality & Health in Bay Area Communities, Community Air Risk Evaluation Program Retrospective & Path Forward (2004–2013).* April. Website: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CARE%20Program/Documents/CARE_Retrospective_April2014.ashx?la=en (accessed August 2023).

construction and mining equipment, agricultural equipment, and truck-mounted refrigeration units, as well as trucks and buses traveling on freeways and local roadways. Agricultural and mining equipment is not commonly used in urban parts of the Bay Area, while construction equipment typically operates for a limited time at various locations. As a result, the readily identifiable locations where DPM is emitted in the Bay Area include high-traffic roadways and other areas with substantial truck traffic.

The CARB Diesel Risk Reduction Plan is intended to substantially reduce DPM emissions and associated health risks through introduction of ultra-low-sulfur diesel fuel—a step already implemented—and cleaner-burning diesel engines.[8] The technology for reducing DPM emissions from heavy-duty trucks is well established, and both State and federal agencies are moving aggressively to regulate engines and emission control systems to reduce and remediate diesel emissions. The CARB anticipates that by 2020, average Statewide DPM concentrations will decrease by 85 percent from levels in 2000 with full implementation of the Diesel Risk Reduction Plan, meaning that the Statewide health risk from DPM is expected to decrease from 540 cancer cases in 1,000,000 to 21.5 cancer cases in 1,000,000. It is likely that the Bay Area cancer risk from DPM decreased by a similar factor.

High-Volume Roadways. Air pollutant exposures and their associated health burdens vary considerably within places in relation to sources of air pollution. Motor vehicle traffic is perhaps the most important source of intra-urban spatial variation in air pollution concentrations. Air quality research consistently demonstrates that pollutant levels are substantially higher near freeways and busy roadways, and human health studies have consistently demonstrated that children living within 100 to 200 meters (328 to 656 feet) of freeways or busy roadways have reduced lung function and higher rates of respiratory disease. At present, it is not possible to attribute the effects of roadway proximity on non-cancer health effects to one or more specific vehicle types or vehicle pollutants. Engine exhaust, from diesel, gasoline, and other combustion engines, is a complex mixture of particles and gases, with collective and individual toxicological characteristics.

4.10.1.2 National and State Ambient Air Quality Standards

Both the EPA and CARB have established AAQS for the following common pollutants: CO, O_3, NO_2, SO_2, Pb, and suspended particulate matter. In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. These ambient air quality standards are levels of contaminants that avoid specific adverse health effects associated with each pollutant.

Federal standards include both primary and secondary standards. Primary standards establish limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection

[8] California Air Resources Board (CARB). 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. October. Prepared by the Stationary Source Division and Mobile Source Control Division. Website: https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/rrpfinal.pdf (accessed August 2023).

against decreased visibility, and damage to animals, crops, vegetation, and buildings.[9] State and federal standards for the criteria air pollutants are listed in Table 4.10.B.

4.10.1.3 Existing Climate and Air Quality

The following provides a discussion of the local and regional air quality and climate in the San Rafael area.

Regional and Local Air Quality. San Rafael is located in the northwestern region of the San Francisco Bay Area Air Basin (Air Basin), which is a large shallow air basin ringed by hills that taper into a number of sheltered valleys around the perimeter. Two primary atmospheric outlets exist. One is through the strait known as the Golden Gate, which is a direct outlet to the Pacific Ocean. The second extends to the northeast, along the west delta region of the Sacramento and San Joaquin Rivers.

San Rafael is within the jurisdiction of the BAAQMD, which regulates air quality in the Bay Area. Air quality conditions in the Bay Area have improved significantly since the BAAQMD was created in 1955. Ambient concentrations of air pollutants and the number of days during which the region exceeds air quality standards have fallen dramatically. Neither State nor national AAQS of the following chemicals have been violated in recent decades: NO_2, SO_2, sulfates, Pb, hydrogen sulfide, and vinyl chloride. Those exceedances of air quality standards that do occur primarily happen during meteorological conditions conducive to high pollution levels, such as cold, windless nights or hot, sunny summer afternoons.

Ozone levels, measured by peak concentrations and the number of days over the State 1-hour standard, have declined substantially as a result of aggressive programs by the BAAQMD and other regional, State, and federal agencies. The reduction of peak concentrations represents progress in improving public health; however, the Bay Area still exceeds the State standard for 1-hour ozone as well as the State and federal 8-hour standards. Levels of PM_{10} have exceeded State standards 2 of the last 3 years, and the area is considered a nonattainment area for this pollutant relative to the State standards. The Bay Area is an unclassified area for the federal PM_{10} standard.

No exceedances of the State or federal CO standards have been recorded at any of the region's monitoring stations since 1991. The Bay Area is currently considered a maintenance area for State and federal CO standards.

Local Climate and Air Quality. Air quality is a function of both local climate and local sources of air pollution. Air quality is the balance of the natural dispersal capacity of the atmosphere and emissions of air pollutants from human uses of the environment. Two meteorological factors affect air quality in San Rafael: wind and temperature. Winds affect the direction of transport of any air pollution emissions and wind also controls the volume of air into which pollution is mixed in a given period of time. While winds govern horizontal mixing processes, temperature inversions determine the vertical mixing depth of air pollutants.

[9] United States Environmental Protection Agency (EPA). 2017. Criteria Air Pollutants. October. Website: https://www.epa.gov/criteria-air-pollutants (accessed August 2023).

Table 4.10.B: National and State 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	0.07 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 Chemi-luminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)		0.053 ppm (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)[k]	–	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)
	3-Hour	–		–	0.5 ppm (1300 µg/m³)	
	24-Hour	0.04 ppm (105 µg/m³)		0.14 ppm (for certain areas)	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[k]	–	
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) [12]	Same as Primary Standard	
	Rolling 3-Month Average [i]	–		0.15 µg/m³		
Visibility-Reducing Particles [14]	8-Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No Federal Standards		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride [12]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Source: Ambient Air Quality Standards (California Air Resources Board 2016).

Table notes continued on the following page

[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 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/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact EPA for further clarification and current national policies.

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

[4] Any equivalent measurement method which can be shown to the satisfaction of the 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/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

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

[11] On June 2, 2010, a new 1-hour 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/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[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/m^3 = micrograms per cubic meter
CARB = California Air Resources Board
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million
EPA = United States Environmental Protection Agency

San Rafael is located in Marin County, which is bounded on the west by the Pacific Ocean, on the east by San Pablo Bay, on the south by the Golden Gate, and on the north by the Petaluma Gap. Most of Marin's population lives in small, sheltered valleys in the eastern part of the county. These valleys act like a series of miniature air basins.

Although there are a few mountains above 1,500 feet, most of the terrain varies between 800 feet and 1,000 feet in elevation, which usually is not high enough to block the marine layer. Because of the wedge shape of Marin County, northeast Marin County is farther from the ocean than the southeastern section is. This extra distance from the ocean allows the marine air to be moderated by bayside conditions as it travels to northeastern Marin County. In southern Marin County, the distance to the ocean is short and elevations are lower, thereby resulting in higher incidence of maritime air in that area.

Wind speeds are highest along the west coast of Marin County, averaging about 8 to 10 miles per hour (mph). The complex terrain in central Marin creates sufficient friction to slow the air flow. At Hamilton Air Force Base, in Novato, the annual average wind speeds are only 5 mph. The prevailing wind directions throughout Marin County are generally from the northwest.

In the summer months, areas along the coast are usually subject to onshore movement of cool marine air. In the winter, proximity to the ocean keeps the coastal regions relatively warm, with temperatures varying little throughout the year. Coastal temperatures are usually in the high 50s in the winter and the low 60s in the summer. The warmest months are September and October. The eastern side of Marin County has warmer weather than the western side because of its distance from the ocean and because the hills that separate eastern Marin from western Marin occasionally block the flow of the marine air. The temperatures of cities next to San Francisco Bay, such as San Rafael, are moderated by the cooling effect of the Bay in the summer and the warming effect of the Bay in the winter.

Air pollution potential is highest in eastern Marin County, where most of the population is located in semi-sheltered valleys. In the southeast, the influence of marine air keeps pollution levels low. As development moves farther north, there is greater potential for air pollution to build up because the valleys are more sheltered from the sea breeze. While Marin County does not have many polluting industries, the air quality on its eastern side—especially along the United States Route 101 (US-101) corridor—may be affected by emissions from increasing motor vehicle use within and through Marin County.

Ozone and fine particle pollution (i.e., $PM_{2.5}$) are the major regional air pollutants of concern in the Bay Area. Ozone is primarily a problem in the summer, and $PM_{2.5}$ in the winter.[10] In Marin County, ozone rarely exceeds health standards, and $PM_{2.5}$ exceeds the national standard only about 1 day each year. Marin County frequently receives fresh marine air from the Pacific Ocean, which passes over the coastal hills. In winter, $PM_{2.5}$ may be transported into Marin County from other parts of the

[10] Bay Area Air Quality Management District (BAAQMD). 2023. Marin County. Website: https://www.baaqmd.gov/about-the-air-district/in-your-community/marin-county (accessed August 2023).

Bay Area, adding to wood smoke, which may lead to elevated concentrations, but these are rarely high enough to exceed health standards.[11]

Air Quality Monitoring Results. Air quality monitoring stations are located throughout the nation and maintained by the local Air Pollution Control District (APCD) and State air quality regulating agencies. Ambient air data collected at permanent monitoring stations are used by the EPA to identify regions as attainment or nonattainment depending on whether the regions met the requirements stated in the primary National Ambient Air Quality Standards (NAAQS). Attainment areas are required to maintain their status through moderate, yet effective, air quality maintenance plans. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of attainment such as marginal, moderate, serious, severe, and extreme are used to classify each air basin in the State on a pollutant-by-pollutant basis. Different classifications have different mandated attainment dates and are used as guidelines to create air quality management strategies to improve air quality and comply with the NAAQS by the attainment date. A region is determined to be unclassified when the data collected from the air quality monitoring stations do not support a designation of attainment or nonattainment due to lack of information or a conclusion cannot be made with the available data. The San Francisco Bay Area Air Basin's attainment status for each criteria pollutant is listed in Table 4.10.C.

The CARB and EPA maintain ambient air quality monitoring stations within California.[12] BAAQMD's San Rafael monitoring station, located at 534 Fourth Street, San Rafael, California, approximately 2.4 miles southeast of the proposed project site, is the nearest air quality monitoring station to the proposed project site. The air quality trends from this station are used to represent the ambient air quality in the project area. Ambient air quality in the project area from 2019 to 2021 (the most recent available period), including the number of days exceeding the AAQS, is shown in Table 4.10.D. The data collected at this station is considered generally representative of the air quality experienced in the project vicinity. No SO_2 values are available for Marin County because SO_2 concentrations are historically low and not commonly monitored.

Pollutant monitoring results indicate that air quality in San Rafael has generally been good. As indicated in the monitoring results, 1-hour and 8-hour ozone concentrations exceeded the State standard once in 2019. The State PM_{10} standard was exceeded once and the federal 24-hour $PM_{2.5}$ standard was exceeded nine times in 2020. No SO_2 values are available for Marin County because SO_2 concentrations are historically low and are not commonly monitored. The CO and NO_2 standards were not exceeded in this area during the 3-year period.

11 Bay Area Air Quality Management District (BAAQMD). 2023. Marin County. Website: https://www.baaqmd.gov/about-the-air-district/in-your-community/marin-county (accessed August 2023).

12 CARB gathers ambient air quality data for the State of California and ensures the quality of these data. CARB provides ambient air quality monitoring sites throughout California's counties and air basins.

Table 4.10.C: San Francisco Bay Area Basin Attainment Status

Pollutant	Averaging Time	California Standards [1]		National Standards [2]	
		Concentration	Attainment Status	Concentration [3]	Attainment Status
Ozone (O_3)	8-Hour	0.070 ppm (137 µg/m³)	Nonattainment [9]	0.070 ppm	Nonattainment [4]
	1-Hour	0.09 ppm (180 µg/m³)	Nonattainment	Not Applicable	See Footnote 5.
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m³)	Attainment	9 ppm (10 mg/m³)	Attainment [6]
	1-Hour	20 ppm (23 mg/m³)	Attainment	35 ppm (40 mg/m³)	Attainment
Nitrogen Dioxide (NO_2)	1-Hour	0.18 ppm (339 µg/m³)	Attainment	0.100 ppm [11]	See Footnote 11.
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)	Not Applicable	0.053 ppm (100 µg/m³)	Attainment
Sulfur Dioxide (SO_2) [12]	24-Hour	0.04 ppm (105 µg/m³)	Attainment	0.14 ppm (365 µg/m³)	See Footnote 12.
	1-Hour	0.25 ppm (655 µg/m³)	Attainment	0.075 ppm (196 µg/m³)	See Footnote 12.
	Annual Arithmetic Mean	Not Applicable	Not Applicable	0.030 ppm (80 µg/m³)	See Footnote 12.
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m³	Nonattainment [7]	Not Applicable	Not Applicable
	24-Hour	50 µg/m³	Nonattainment	150 µg/m³	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m³	Nonattainment [7]	12 µg/m³ [15]	Unclassified/ Attainment
	24-Hour	Not Applicable	Not Applicable	35 µg/m³ [10]	Nonattainment
Sulfates	24-Hour	25 µg/m³	Attainment	Not Applicable	Not Applicable
Lead (Pb) [13]	30-Day Average	1.5 µg/m³	Not Applicable	Not Applicable	Attainment
	Calendar Quarter	Not Applicable	Not Applicable	1.5 µg/m³	Attainment
	Rolling 3-Month Average [14]	Not Applicable	Not Applicable	0.15 µg/m³	See Footnote 14.
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Unclassified	Not Applicable	Not Applicable
Vinyl Chloride (chloroethene)	24-Hour	0.010 ppm (26 µg/m³)	No Information Available	Not Applicable	Not Applicable
Visibility Reducing Particles	8-Hour (10:00 to 18:00 PST)	See Footnote 8.	Unclassified	Not Applicable	Not Applicable

Source: Air Quality Standards and Attainment Status (Bay Area Air Quality Management District 2017).

Table notes continued on the following page

[1] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM_{10}, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that CARB determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the State standard.

[2] National standards shown are the "primary standards" designed to protect public health. National standards other than for ozone, particulates and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than 1. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.070 ppm (70 ppb) or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 $\mu g/m^3$. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentiles is less than 35 $\mu g/m^3$.

Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM_{10} is met if the three-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the three-year average of annual averages spatially-averaged across officially designed clusters of sites falls below the standard.

[3] National air quality standards are set by the EPA at levels determined to be protective of public health with an adequate margin of safety.

[4] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm. An area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over 3 years, is equal to or less than 0.070 ppm. The EPA will make recommendations on attainment designations by October 1, 2016, and issue final designations October 1, 2017. Nonattainment areas will have until 2020 to late 2037 to meet the health standard, with attainment dates varying based on the ozone level in the area.

[5] The national 1-hour ozone standard was revoked by the EPA on June 15, 2005.

[6] In April 1998, the Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard.

[7] In June 2002, CARB established new annual standards for $PM_{2.5}$ and PM_{10}.

[8] Statewide VRP Standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

[9] The 8-hour CA ozone standard was approved by the Air Resources Board on April 28, 2005, and became effective on May 17, 2006.

[10] On January 9, 2013, the EPA issued a final rule to determine that the Bay Area attains the 24-hour $PM_{2.5}$ national standard. This EPA rule suspends key SIP requirements as long as monitoring data continue to show that the Bay Area attains the standard. Despite this EPA action, the Bay Area will continue to be designated as “non-attainment” for the national 24-hour $PM_{2.5}$ standard until such time as the Air District submits a “redesignation request” and a “maintenance plan” to the EPA and the EPA approves the proposed redesignation.

[11] To attain this standard, the three-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). The EPA expects to make a designation for the Bay Area by the end of 2017.

[12] On June 2, 2010, the EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the three-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The existing 0.030-ppm annual and 0.14-ppm 24-hour SO_2 NAAQS, however, must continue to be used until 1 year following EPA initial designations of the new 1-hour SO_2 NAAQS. The EPA expects to make designation for the Bay Area by the end of 2017.

[13] The CARB has identified lead and vinyl chloride as ‘toxic air contaminants’ with no threshold level of exposure below which there are no adverse health effects determined.

[14] National lead standard, rolling 3-month average: final rule signed October 15, 2008. Final designations effective December 31, 2011.

[15] In December 2012, the EPA strengthened the annual $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) from 15.0 to 12.0 micrograms per cubic meter ($\mu g/m^3$). In December 2014, the EPA issued final area designations for the 2012 primary annual $PM_{2.5}$ NAAQS. Areas designated “unclassifiable/attainment” must continue to take steps to prevent their air quality from deteriorating to unhealthy levels. The effective date of this standard is April 15, 2015.

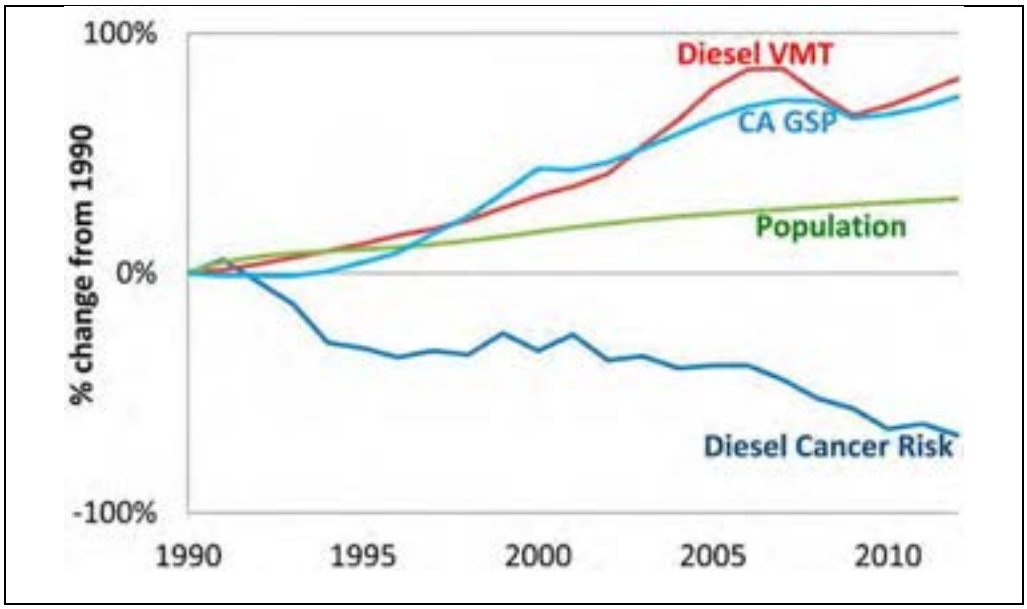
$\mu g/m^3$ = micrograms per cubic meter
CARB = California Air Resources Board
mg/m^3 = milligrams per cubic meter
ppm = parts per million
EPA = United States Environmental Protection Agency

Table 4.10.D: Ambient Air Quality at the 534 Fourth Street, San Rafael Monitoring Station

Pollutant	Standard	2019	2020	2021
Carbon Monoxide (CO)				
Maximum 1-hour concentration (ppm)		1.4	2.1	1.2
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8-hour concentration (ppm)		0.9	1.6	0.8
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1-hour concentration (ppm)		0.096	0.086	0.082
Number of days exceeded:	State: > 0.09 ppm	1	0	0
Maximum 8-hour concentration (ppm)		0.081	0.064	0.066
Number of days exceeded:	State: > 0.07 ppm	1	0	0
	Federal: > 0.07 ppm	1	0	0
Coarse Particulates (PM_{10})				
Maximum 24-hour concentration (µg/m³)		33.0	118.0	30.0
Number of days exceeded:	State: > 50 µg/m³	ND	1	0
	Federal: > 150 µg/m³	0	0	0
Annual arithmetic average concentration (µg/m³)		ND	16.6	14.7
Exceeded for the year:	State: > 20 µg/m³	ND	No	No
	Federal: > 50 µg/m³	ND	No	No
Fine Particulates ($PM_{2.5}$)				
Maximum 24-hour concentration (µg/m³)		19.5	155.5	29.1
Number of days exceeded:	Federal: > 35 µg/m³	0	9	0
Annual arithmetic average concentration (µg/m³)		6.3	8.7	7.0
Exceeded for the year:	State: > 12 µg/m³	No	No	No
	Federal: > 15 µg/m³	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1-hour concentration (ppm)		0.049	0.042	0.037
Number of days exceeded:	State: > 0.250 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.008	0.007	0.006
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No

Source 1: *Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report* (Dudek 2023).
Source 2: iADAM: Air Quality Data Statistics (CARB 2022).
Source 3: Outdoor Air Quality Data (EPA 2023).
Notes: All data measured at the San Rafael monitoring station, located at 534 Fourth Street, San Rafael, California.
µg/m³ = micrograms per cubic meter
CARB = California Air Resources Board
EPA = United States Environmental Protection Agency
ND = No data. There were insufficient (or no) data results to determine the value.
ppm = parts per million

Toxic Air Contaminant Trends. In 1984, the CARB adopted regulations to reduce TAC emissions from mobile and stationary sources as well as consumer products. A CARB study showed that ambient concentrations and emissions of the seven TACs responsible for the most cancer risk from airborne exposure declined by 76 percent between 1990 and 2012.[13] Concentrations of DPM, a key TAC, declined by 68 percent between 1990 and 2012, despite a 31 percent increase in State population and an 81 percent increase in diesel vehicle miles traveled (VMT), as shown on **Error! Reference s ource not found.**. The study also found that the significant reductions in cancer risk to California residents from the implementation of air toxics controls are likely to continue.



Source: Ambient and Emission Trends of Toxic Air Contaminants in California (Propper, Ralph, et al. 2015).

Figure 4.10-1: California Population, Gross State Product (GSP), Diesel Cancer Risk, and Diesel Vehicle Miles Traveled (VMT) Regulatory Context

The EPA and CARB regulate direct emissions from motor vehicles. The BAAQMD is the regional agency primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development) as well as monitoring ambient pollutant concentrations.

4.10.1.4 Regulatory Framework

The BAAQMD is primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development), as well as for monitoring ambient pollutant concentrations. BAAQMD jurisdiction encompasses seven counties

[13] Propper, Ralph, et al. 2015. Ambient and Emission Trends of Toxic Air Contaminants in California. *American Chemical Society: Environmental Science & Technology*. Website: pubs.acs.org/doi/full/10.1021/acs.est.5b02766 (accessed August 2023).

(i.e., Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa) and portions of Solano and Sonoma Counties. The EPA and CARB regulate direct emissions from motor vehicles.

The applicable federal, State, regional, and local regulatory framework is discussed below.

Federal Regulations. At the federal level, the EPA has been charged with implementing national air quality programs. EPA air quality mandates are drawn primarily from the Federal Clean Air Act (FCAA), which was enacted in 1963. The FCAA was amended in 1970, 1977, and 1990.

The FCAA required the EPA to establish primary and secondary NAAQS and required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The FCAA Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. The EPA has responsibility to review all state SIPs to determine conformity with the mandates of the FCAA and determine whether implementation will achieve air quality goals. If the EPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area, which imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may result in sanctions on transportation funding and stationary air pollution sources in the air basin.

The EPA is also required to develop National Emission Standards for Hazardous Air Pollutants, which are defined as those which may reasonably be anticipated to result in increased deaths or serious illness, and which are not already regulated. An independent science advisory board reviews the health and exposure analyses conducted by the EPA on suspected hazardous pollutants prior to regulatory development.

State Regulations. The CARB is the agency responsible for the coordination and oversight of State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA), adopted in 1988. The CCAA requires that all air districts in the State achieve and maintain the California Ambient Air Quality Standards (CAAQS) by the earliest practical date. The CCAA specifies that districts should focus on reducing the emissions from transportation and air-wide emission sources and provides districts with the authority to regulate indirect sources.

The CARB is also primarily responsible for developing and implementing air pollution control plans to achieve and maintain the NAAQS. The CARB is primarily responsible for Statewide pollution sources and produces a major part of the SIP. Local air districts provide additional strategies for sources under their jurisdiction. The CARB combines the data and submits the completed SIP to the EPA.

Other CARB duties include monitoring air quality (in conjunction with air monitoring networks maintained by APCDs and Air Quality Management Districts [AQMDs]), establishing CAAQS (which are more stringent than the NAAQS), determining and updating area designations and maps, and setting emissions standards for mobile sources, consumer products, small utility engines, and off-road vehicles. The CARB Diesel Risk Reduction Plan is intended to substantially reduce DPM

emissions and associated health risks through the introduction of ultra-low-sulfur diesel fuel—a step that has already been implemented—and cleaner-burning diesel engines.[14]

Because of the robust evidence relating proximity to roadways and a range of non-cancer and cancer health effects, the CARB also created guidance for avoiding air quality conflicts in land use planning in its *Air Quality and Land Use Handbook: A Community Health Perspective*.[15] In its guidance, the CARB advises that new sensitive uses (e.g., residences, schools, day care centers, playgrounds, and hospitals) not be located within 500 feet of a freeway or urban roads carrying 100,000 vehicles per day, or within 1,000 feet of a distribution center (warehouse) that accommodates more than 100 trucks or more than 90 refrigerator trucks per day.

The CARB guidance suggests that the use of these guidelines be customized for individual land use decisions and take into account the context of proposed development projects. The *Air Quality and Land Use Handbook* specifically states that these recommendations are advisory and acknowledges that land use agencies must balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.

Regional Regulations. The BAAQMD seeks to attain and maintain air quality conditions in the San Francisco Bay Area Air Basin through a comprehensive program of planning, regulation, enforcement, technical innovation, and education. The clean air strategy includes the preparation of plans for the attainment of AAQS, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. The BAAQMD also inspects stationary sources and responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by law.

Clean Air Plan. The Clean Air Plan guides the region's air quality planning efforts to attain the CAAQS.[16] The BAAQMD 2017 Clean Air Plan, which was adopted on April 19, 2017, by the BAAQMD Board of Directors, is the current Clean Air Plan that contains district-wide control measures to reduce ozone precursor emissions (e.g., ROGs and NO_X), particulate matter and greenhouse gas (GHG) emissions.

The Bay Area 2017 Clean Air Plan:

- Describes the BAAQMD plan towards attaining all State and federal air quality standards and eliminating health risk disparities from exposure to air pollution among Bay Area communities;

14 California Air Resources Board (CARB). 2000. *Diesel Risk Reduction Plan.* September.

15 California Environmental Protection Agency (CalEPA) and California Air Resources Board (CARB). 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*. April. Website: https://www.aqmd.gov/docs/default-source/ceqa/handbook/california-air-resources-board-air-quality-and-land-use-handbook-a-community-health-perspective.pdf (accessed August 2023).

16 Bay Area Air Quality Management District (BAAQMD). 2017. *Final 2017 Clean Air Plan*. April 19. Website: www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en (accessed August 2023).

- Defines a vision for transitioning the region to a post-carbon economy needed to achieve ambitious GHG reduction targets for 2030 and 2050;

- Provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve GHG reduction targets; and

- Includes a wide range of control measures designed to decrease emissions of air pollutants that are most harmful to Bay Area residents (e.g., particulate matter, O_3, and TACs); to reduce emissions of methane and other "Super-GHGs" that are potent climate pollutants in the near term; and to decrease emissions of carbon dioxide (CO_2) by reducing fossil fuel combustion.

BAAQMD Regulations. A program of rules and regulations are administered by the BAAQMD to attain and maintain the CAAQS, NAAQS, and regulations related to TACs. Rules and regulations that would apply to the proposed project would include the following:

- **Regulation 2, Rule 1 – Permits:** This rule specifies the requirements for authorities to construct and permits.

- **Regulation 6, Rule 1 – General Requirements:** This rule limits the quantity of particulate matter in the atmosphere through the establishment of limitations on emission rates, concentration, visible emissions, and opacity.

- **Regulation 6, Rule 3 – Wood-Burning Devices:** This rule limits the emissions of particulate matter and visible emissions from wood-burning devices used for primary heat, supplemental heat, or ambiance.

- **Regulation 6, Rule 6 – Prohibition of Trackout:** This rule addresses fugitive road dust emissions associated with trackout of solid materials onto paved public roads outside the boundaries of large bulk material sites, large construction sites, and large disturbed surface sites (sites of 1 acre or more).

- **Regulation 8, Rule 1 – General Provisions:** This rule limits the emission of organic compounds into the atmosphere.

- **Regulation 8, Rule 3 – Architectural Coatings:** This rule limits the quantity of volatile organic compounds (VOCs) in architectural coatings supplied, sold, offered for sale, applied, solicited for application, or manufactured for use within the BAAQMD.

- **Regulation 8, Rule 15 – Emulsified and Liquid Asphalts:** This rule limits the emissions of VOCs caused by the use of emulsified and liquid asphalt in paving materials and paving and maintenance operations.

- **Regulation 11, Rule 2 – Asbestos Demolition, Renovation, and Manufacturing:** This rule controls emissions of asbestos during demolition, renovation, and manufacturing and establishes waste disposal procedures.

BAAQMD CARE Program. The Community Air Risk Evaluation (CARE) program was initiated in 2004 to evaluate and reduce health risks associated with exposures to outdoor TACs in the Bay Area. The program examines TAC emissions from point sources, area sources, and on-road and off-road mobile sources with an emphasis on diesel exhaust, which is a major contributor to airborne health risk in California. The CARE program is an ongoing program that encourages community involvement and input. The technical analysis portion of the CARE program is being implemented in three phases that include an assessment of the sources of TAC emissions, modeling and measurement programs to estimate concentrations of TACs, and an assessment of exposures and health risks. Throughout the program, information derived from the technical analyses will be used to focus emission reduction measures in areas with high TAC exposures and a high density of sensitive populations. Risk reduction activities associated with the CARE program are focused on the most at-risk communities in the Bay Area.

For commercial and industrial sources, the BAAQMD regulates TACs using a risk-based approach. This approach uses an HRA to determine what sources and pollutants to control as well as the degree of control. An HRA is an analysis in which human health exposure to toxic substances is estimated and considered together with information regarding the toxic potency of the substances in order to provide a quantitative estimate of health risks.[17] As part of ongoing efforts to identify and assess potential health risks to the public, the BAAQMD has collected and compiled air toxics emissions data from industrial and commercial sources of air pollution throughout the Bay Area. The BAAQMD has identified seven impacted communities;[18] San Rafael has not been identified as an affected community.[19]

BAAQMD CEQA Air Quality Guidelines. The BAAQMD CEQA Air Quality Guidelines were prepared to assist in the evaluation of air quality impacts of projects and plans proposed within the Bay Area. The guidelines provide recommended procedures for evaluating potential air impacts during the environmental review process, consistent with CEQA requirements, and include recommended thresholds of significance, mitigation measures, and background air quality information. They also include recommended assessment methodologies for air toxics, odors, and GHG emissions.

In April 2023, the BAAQMD published an updated version of the CEQA Air Quality Guidelines. The BAAQMD CEQA Air Quality Guidelines include thresholds to evaluate project impacts in order to protectively evaluate the potential effects of the project on air quality. These protective

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17 In general, a health risk assessment is required if the BAAQMD concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggests a potential public health risk. Such an assessment generally evaluates chronic, long-term effects, including the increased risk of cancer as a result of exposure to one or more TACs.

18 The seven impacted communities include Richmond/San Pablo and eastern San Francisco, including Treasure Island, San Jose, western Alameda County, Concord, Vallejo, and Pittsburg/Antioch.

19 Bay Area Air Quality Management District (BAAQMD). 2014. *Identifying Areas with Cumulative Impacts from Air Pollution in the San Francisco Bay Area Version 2*. March. Website: www.baaqmd.gov/~/media/Files/Planning% 20and%20Research/CARE%20Program/Documents/ImpactCommunities_2_Methodology.ashx?la=en (accessed August 2023).

thresholds are appropriate in the context of the size, scale, and location of the proposed project.[20]

City of San Rafael. The City of San Rafael addresses air quality in multiple chapters of the General Plan 2040,[21] which was adopted in 2021. The Conservation and Climate Change Element is the most applicable chapter of the City's General Plan, with additional goals and policies that affect air quality contained in the Land Use Element and the Mobility Element. The following policies are applicable to the proposed project:

> **Policy C-2.1: State and Federal Air Quality Standards.** Continue to comply with state and federal air quality standards.
>
> **Policy C-2.2: Land Use Compatibility and Building Standards.** Consider air quality conditions and the potential for adverse health impacts when making land use and development decisions. Buffering, landscaping, setback standards, filters, insulation and sealing, home HVAC measures, and similar measures should be used to minimize future health hazards.
>
> **Policy C-2.3: Improving Air Quality Through Land Use and Transportation Choices.** Recognize the air quality benefits of reducing dependency on gasoline-powered vehicles. Implement land use and transportation policies, supportable by objective data, to reduce the number and length of car trips, improve alternatives to driving, reduce vehicle idling, and support the shift to electric and cleaner-fuel vehicles.
>
> **Policy C-2.4: Particulate Matter Pollution Reduction.** Promote the reduction of particulate matter from roads, parking lots, construction sites, agricultural lands, wildfires, and other sources.
>
> **Policy C-2.5: Indoor Air Pollutants.** Reduce exposure to indoor air pollutants such as mold, lead, and asbestos through the application of state building standards, code enforcement activities, education, and remediation measures.
>
> **Policy C-2.6: Education and Outreach.** Support public education regarding air pollution prevention and mitigation.
>
> **Policy M-3.1: VMT Reduction.** Achieve State-mandated reductions in Vehicle Miles Traveled [VMT] by requiring development and transportation projects to meet specific VMT metrics and implement VMT reduction measures.
>
> **Policy M-3.3: Transportation Demand Management.** Encourage, and where appropriate require, transportation demand measures that reduce VMT and peak period travel demand. These measures include, but are not limited to, transit passes and flextime, flexible work

[20] Bay Area Air Quality Management District (BAAQMD). 2023. *2022 CEQA Guidelines.* Website: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines (accessed August 2023).

[21] City of San Rafael. 2021. *General Plan 2040.* August. Website: https://www.cityofsanrafael.org/gp-2040-document-library/ (accessed August 2023).

schedules, pedestrian and bicycle improvements, ridesharing, and changes to project design to reduce trip lengths and encourage cleaner modes of travel.

Policy M-3.4: Reducing Commute Lengths. Support reduced commute lengths and frequency by encouraging a) hiring of local residents by San Rafael employers; b) opportunities for persons who work in San Rafael to live in San Rafael; c) telecommuting and flexible work arrangements; and d) local-serving shopping, restaurants, and services that reduce the need to drive elsewhere.

Policy M-3.5: Alternative Transportation Modes. Support efforts to create convenient, cost-effective alternatives to single passenger auto travel. Ensure that public health, sanitation, and user safety is addressed in the design and operation of alternative travel modes.

Policy M-3.6: Low-Carbon Transportation. Encourage electric and other low-carbon emission vehicles, as well as the infrastructure needed to support these vehicles.

Policy M-3.7: Design Features that Support Transit. For projects located in or near transit hubs such as Downtown San Rafael, incorporate design features that facilitate walking, cycling, and easy access to transit.

Policy M-3.8: Land Use and VMT. Encourage higher-density employment and residential uses near major transit hubs such as Downtown San Rafael, recognizing the potential for VMT reduction in areas where there are attractive alternatives to driving, concentrations of complementary activities, and opportunities for shorter trips between different uses.

Policy M-5.1: Traffic Calming. Protect residential areas from the effects of speeding traffic or traffic from outside the neighborhood through appropriate traffic calming solutions such as speed humps, bulb-outs, speed limits, stop signs, and chicanes. Traffic calming measures shall not conflict with emergency response capabilities.

Policy M-5.3: Connected Neighborhoods. Identify opportunities to better connect San Rafael neighborhoods to one another and to improve access to local destinations such as schools, shopping, and workplaces. Consider such connections as part of emergency response and evacuation planning.

Policy M-5.6: Truck Impacts. Manage truck traffic and deliveries in residential areas to avoid conflicts with local auto traffic, pedestrian and bicycle safety, parking, and adjacent uses, and to minimize air pollution in residential areas.

Policy M-6.1: Encouraging Walking and Cycling. Wherever feasible, encourage walking and cycling as the travel mode of choice for short trips, such as trips to school, parks, transit stops, and neighborhood services. Safe, walkable neighborhoods with pleasant, attractive streets, bike lanes, public stairways, paths, and sidewalks should be part of San Rafael's identity.

Policy M-6.3: Connectivity. Develop pedestrian and bicycle networks that connect residents and visitors to major activity and shopping centers, existing and planned transit, schools, and other neighborhoods. Work to close gaps between existing facilities. Funding and prioritization for projects should consider relative costs and benefits, including such factors as safety, number of potential users, and impacts on parking.

Policy M-7.8: Parking for Alternative Modes of Transportation. Designate parking spaces to incentivize and encourage carpooling, electric vehicles, and other more sustainable modes of travel.

Policy M-7.9: Parking for Transit Users. Support regional efforts to fund and construct commuter parking along transit routes, near commuter bus pads, and near inter-modal commuter hubs in order to support use of transit. Parking areas should include secure parking for carpools, bicycles and other alternative modes and should minimize neighborhood impacts.

Policy LU-2.13: Odor Impacts. Consider odor impacts when evaluating land uses and development projects near wastewater treatment plants, treatment plant expansion projects, waste transfer stations, and other odor potential sources.

4.10.2 Impacts and Mitigation Measures

This section provides an assessment of the potential impacts related to air quality that could result from implementation of the proposed project. The section begins with the criteria of significance, which establish the thresholds for determining whether an impact is significant. The latter part of this section presents potential impacts associated with implementation of the proposed project and identifies mitigation measures, as appropriate.

4.10.2.1 Significance Criteria

Implementation of the proposed project would have a significant impact related to air quality if it would:

Threshold 4.10.1: Conflict with or obstruct implementation of the San Francisco Bay Area Clean Air Plan by:

- Not supporting the primary goals of the plan by resulting in a significant unavoidable air quality impact;
- Failure to include applicable control measures from the plan; or
- Disrupting or hindering implementation of any applicable control measure outlined in the plan.

Threshold 4.10.2: Result in a cumulatively considerable impact related to the net increase of a criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard.

- According to the BAAQMD CEQA Guidelines, to meet air quality standards for criteria air pollutant and air precursor impacts, the proposed project must not:
    - Generate average daily construction emissions of ROGs, NO_X or $PM_{2.5}$ (exhaust) greater than 54 lbs/day or PM_{10} exhaust emissions greater than 82 lbs/day; or

- Generate operational emissions of ROGs, NO_X or $PM_{2.5}$ of greater than 10 tons/yr or 54 lbs/day or PM_{10} emissions greater than 15 tons/yr or 82 lbs/day.

Threshold 4.10.3: Expose sensitive receptors to substantial pollutant concentrations as follows:

- Carbon Monoxide (CO) Hot Spot:
  - Create a new or contribute to an existing CO hot spot (9.0 ppm [8-hour average], 20.0 ppm [1-hour average]);
- Local Community Risk:
  - Be subject to but not comply with a qualified risk reduction plan;
  - Result in an excess cancer risk level of more than 10 in 1 million, or a non-cancer (i.e., chronic or acute) hazard index greater than 1.0 within a 1,000-foot radius; or
  - Result in an incremental increase of greater than 0.3 µg/m^3 annual average $PM_{2.5}$ within a 1,000-foot radius.

Threshold 4.10.4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

4.10.2.2 Project Impacts

The following section discusses the potential air quality impacts associated with implementation of the proposed project.

As discussed in Chapter 3.0, Project Description, the proposed project includes demolition of most buildings in the existing Northgate Mall, and the construction and operation of a mix of commercial and residential land uses at the proposed project site. The proposed development would occur in two phases. The buildout of Phase 1 would include the demolition of approximately 308,946 square feet of existing commercial space, construction of approximately 44,380 square feet of new commercial space and up to 922 residential units, and would be completed by 2025. Buildout of Phase 2 is expected to occur by 2040, and would include the demolition of approximately 339,861 square feet of existing commercial space, and construction of up to 55,440 square feet of commercial space and up to 500 additional residential units. At full buildout, the proposed project would include a total of up to approximately 217,520 square feet of commercial space and up to

1,422 residential units in six buildings (1,746,936 square feet of residential area).[22] The potential impacts that would occur with implementation of Phase 1 (2025 Master Plan) and Phase 2 (2040 Vision Plan) are differentiated by phase in this section.

Threshold 4.10.1: Conflict with the Air Quality Plan. The applicable air quality plan is the BAAQMD's 2017 Bay Area Clean Air Plan (Clean Air Plan).[23] The Clean Air Plan is a comprehensive plan to improve Bay Area air quality and protect public health. The Clean Air Plan defines control strategies to reduce emissions and ambient concentrations of air pollutants; safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily affected by air pollution; and reduce GHG emissions to protect the climate. Consistency with the Clean Air Plan can be determined if a project: (1) supports the goals of the Clean Air Plan; (2) includes applicable control measures from the Clean Air Plan; and (3) would not disrupt or hinder implementation of any control measures from the Clean Air Plan. The following is an evaluation of the proposed project's consistency with each of these criteria. As discussed below, the proposed project could conflict with the Clean Air Plan control measures or the Clean Air Plan goals for attainment. Therefore, this impact would be potentially significant.

Impact AIR-1 The proposed project could conflict with implementation of the San Francisco Bay Area Clean Air Plan. (S)

Clean Air Plan Goals. The primary goals of the Clean Air Plan are to: (a) attain air quality standards, (b) reduce population exposure and protect public health in the Bay Area, and (c) reduce GHG emissions and protect the climate.

The BAAQMD has established significance thresholds for project construction and operational impacts at a level at which the cumulative impact of exceeding these thresholds would have an adverse impact on the region's attainment of air quality standards. The health and hazards thresholds were established to help protect public health. As discussed in more detail in the analysis below, with implementation of Mitigation Measure AIR-2, the project would result in less than significant construction-period emissions. Operation of Phase 1 of the project would increase ROG and NO_x emissions compared to existing conditions but these impacts would be reduced to a less than significant level with implementation of Mitigation Measures AIR 3a and 3b. Upon completion of Phase 2, the project's ROG emissions, like all other emissions, would be reduced compared to existing conditions, and the operational emissions would be below

[22] Since completion of the AQ/GHG Technical Report, the project plans have been refined from 498,661 square feet of commercial area during Phase 1 and a total of 225,100 square feet of commercial area at project buildout (implementation through Phase 2). This minor increase in Phase 1 square footage and decrease in buildout square footage would be negligible and would not substantially change the analysis or conclusions presented in the AQ/GHG Technical Report. Furthermore, the modeling in the AQ/GHG Technical Report assumed that 2,167 cubic yards of soil would be imported to the site during construction; however, this import is no longer required. Therefore, the estimated construction emissions for the proposed project would be reduced compared to what is shown in this EIR due to the reduced number of truck haul trips.

[23] Bay Area Air Quality Management District (BAAQMD). 2017. *Final 2017 Clean Air Plan*. April 19. Website: www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en (accessed August 2023).

applicable BAAQMD thresholds of significance. Therefore, the project would not conflict with the Clean Air Plan goals.

Clean Air Plan Control Measures. The control strategies of the Clean Air Plan include measures in the following categories: Stationary Source Measures, Transportation Control Measures, Energy Control Measures, Building Control Measures, Agriculture Control Measures, Natural and Working Lands Control Measures, Waste Management Control Measures, Water Control Measures, and Super GHG Control Measures. The proposed project's consistency with each of these strategies is discussed below.

- **Stationary Source Control Measures:** The Stationary Source Control Measures, which are designed to reduce emissions from stationary sources such as metal melting facilities, cement kilns, refineries, and glass furnaces, are incorporated into rules adopted by the BAAQMD and then enforced by BAAQMD Permit and Inspection programs. The proposed project would comply with the rules and regulations promulgated by the BAAQMD with regard to stationary sources, as applicable. This includes the control of asbestos being potentially released into the atmosphere through compliance with BAAQMD Regulation 11-2, as further discussed in Section 4.8, Hazards and Hazardous Materials, of this Environmental Impact Report (EIR). Therefore, the proposed project would be consistent with these control measures.

- **Transportation Control Measures:** The BAAQMD identifies Transportation Control Measures as part of the Clean Air Plan to decrease emissions of criteria pollutants, TACs, and GHGs by reducing demand for motor vehicle travel, promoting efficient vehicles and transit service, decarbonizing transportation fuels, and electrifying motor vehicles and equipment. The proposed project would result in the development of uses and growth that are consistent with the City of San Rafael's (City's) General Plan and zoning designations. The proposed project includes multiple improvements and site-related features that would result in a reduction in vehicle trips and associated emissions, including new multimodal pathways that would be integrated throughout the interior of the site; bike lanes and enhanced gateway features that would invite community members into the site; a locally inspired Cycle Center that is programmed for Marin County bicycle enthusiasts as well as the broader community; and contributions to access to and from the nearby Civic Center Sonoma-Marin Area Rail Transit (SMART) station from the new Northgate Town Square, which would serve as an amenity for the public. As part of its application, the project sponsor proposes to contribute financially to the City's implementation of these off-site improvements to finalize the connection to Northgate and other adjacent properties. The proposed project would achieve compliance with off-street electric vehicle requirements in the most recently adopted version of CALGreen Tier 2 Voluntary Standards. Currently, these standards require that a project with 201 or more parking spaces provide 45 percent of total parking spaces as EV-capable spaces, and 33 percent of the EV-capable spaces (meaning 15 percent of total parking spaces) as EV charging stations. Through the implementation of these project design features, the proposed project would be consistent with the BAAQMD Transportation Control Measures.

- **Energy Control Measures:** The Clean Air Plan also includes Energy Control Measures that are designed to reduce emissions of criteria air pollutants, TACs, and GHGs by decreasing the amount of electricity consumed in the Bay Area, as well as decreasing the carbon intensity of the electricity used by switching to less GHG-intensive fuel sources for electricity generation. Since these measures apply to electrical utility providers and local government agencies (and not individual projects), the Energy Control Measures of the Clean Air Plan are not applicable to the proposed project. However, the proposed project would incorporate energy measures such as energy efficient windows, additional insulation, external and internal shade structures, light emitting diode (LED) lighting, daylighting and occupancy controls, efficient space heating and cooling systems, and on-site renewable energy (solar panels) and battery storage of solar energy. In addition, the proposed project would reduce the demand for utilities and infrastructure by incorporating drought-tolerant, non-invasive plants, efficient irrigation, and low-flow fixtures. Therefore, the proposed project would comply with applicable Energy Control Measures.

- **Building Control Measures:** The BAAQMD has authority to regulate emissions from certain sources in buildings such as boilers and water heaters, but has limited authority to regulate buildings themselves. Therefore, the strategies in the control measures for this sector focus on working with local governments that do have authority over local building codes to facilitate adoption of the best GHG control practices and policies. Therefore, the Building Control Measures of the Clean Air Plan are not applicable to the proposed project. However, as discussed above, the project would incorporate energy measures such as energy-efficient windows, additional insulation, external and internal shade structures, LED lighting, daylighting and occupancy controls, efficient space heating and cooling systems, and on-site renewable energy and energy storage. As such, the proposed project would not conflict with the goals of these measures.

- **Agriculture Control Measures:** The Agriculture Control Measures are designed to primarily reduce emissions of methane. Since the project does not include any agricultural activities, the Agriculture Control Measures of the Clean Air Plan are not applicable to the project.

- **Natural and Working Lands Control Measures:** The Natural and Working Lands Control Measures focus on increasing carbon sequestration on rangelands and wetlands, as well as encouraging local governments to adopt ordinances that promote urban tree plantings. Since the proposed project does not include the disturbance of any rangelands or wetlands, the Natural and Working Lands Control Measures of the Clean Air Plan are not applicable to the project.

- **Waste Management Control Measures:** The Waste Management Control Measures focus on reducing or capturing methane emissions from landfills and composting facilities, diverting organic materials away from landfills, and increasing waste diversion rates through efforts to reduce, reuse, and recycle. The proposed project would comply with local requirements for waste management (e.g., recycling and composting services). Therefore, the project would be consistent with the Waste Management Control Measures of the Clean Air Plan.

- **Water Control Measures:** The Water Control Measures focus on reducing emissions of criteria pollutants, TACs, and GHGs by encouraging water conservation, limiting GHG emissions from publicly owned treatment works (POTWs), and promoting the use of biogas recovery systems. Since these measures apply to POTWs and local government agencies (and not individual projects), the Water Control Measures are not applicable to the proposed project.

- **Super GHG Control Measures:** Super GHGs include GHGs with very high global warming potential, such as methane, black carbon, and fluorinated gases. The Super GHG Control Measures are designed to facilitate the adoption of best GHG control practices and policies through the BAAQMD and local government agencies. Since these measures do not apply to individual projects, the Super GHG Control Measures are not applicable to the proposed project.

Clean Air Plan Implementation. As discussed above, the proposed project would generally implement the applicable measures outlined in the Clean Air Plan, including Transportation Control Measures. The project would also not disrupt or hinder implementation of any of the Clean Air Plan measures. As described under Threshold 4.10.2 below, construction of the proposed project would generate potentially significant emissions of NO_x and ROG, which would be less than significant after the implementation of standard mitigation required by the BAAQMD (Mitigation Measure AIR-2a and 2b). Operation of the project would result in a less than significant air quality impact. Therefore, the proposed project would not conflict with or obstruct implementation of the applicable air quality plan, and this impact would be **less than significant with mitigation.**

Threshold 4.10.2: Net Increase of Criteria Pollutants. The Air Basin is currently designated as a nonattainment area for State and national ozone standards and national particulate matter AAQS. The nonattainment status is attributed to the region's development history. Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size to individually result in nonattainment of AAQS. Instead, a project's individual emissions contribute to existing or projected cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant.

In developing thresholds of significance for air pollutants, the BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. The following sections describe the proposed project's construction- and operation-related air quality impacts.

Construction Emissions. During construction of the proposed project, short-term degradation of air quality may occur due to the release of particulate matter emissions (e.g., fugitive dust) generated by demolition, grading, hauling, and other activities. Emissions from construction

equipment are also anticipated and would include CO, NO_X, ROGs, directly-emitted particulate matter ($PM_{2.5}$ and PM_{10}), and TACs such as DPM. This is a potentially significant impact.

Impact AIR-2 Construction of the proposed project would generate fugitive dust ($PM_{2.5}$ and PM_{10}) emissions. (S)

Site preparation and project construction would involve demolition, grading, paving, and other activities. Construction-related effects on air quality from the proposed project would be greatest during the site preparation phase due to the disturbance of soils. If not properly controlled, these activities would temporarily generate particulate emissions. Sources of fugitive dust would include demolition activities and disturbed soils at the construction site. Unless properly controlled, vehicles leaving the site would deposit dirt and mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of operating equipment. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Water or other soil stabilizers can be used to control dust, resulting in emission reductions of 50 percent or more. The BAAQMD has established standard measures for reducing fugitive dust emissions (PM_{10}). With the implementation of these Basic Construction Mitigation Measures, fugitive dust emissions from construction activities would not result in adverse air quality impacts. Therefore, in order to reduce construction $PM_{2.5}$ and PM_{10} fugitive dust impacts to a less than significant level, the BAAQMD requires the implementation of BAAQMD Basic Construction Mitigation Measures. Mitigation Measure AIR-2, below, would be required for all phases of project construction and would require implementation of dust controls during project construction. This measure would reduce construction-related air quality impacts of PM_{10} and $PM_{2.5}$ and fugitive dust emissions, consistent with BAAQMD Basic Construction Mitigation Measures.

Mitigation Measure AIR-2 **BAAQMD Basic Construction Mitigation Measures.** In order to meet the Bay Area Air Quality Management District (BAAQMD) fugitive dust threshold, the following BAAQMD Basic Construction (Best Management Practice) Mitigation Measures shall be implemented for all phases of construction:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off site shall be covered.
- All visible mud or dirt tracked-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

- All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by California Code of Regulations [CCR] Title 13, Section 2485, the California Airborne Toxic Control Measure). Clear signage shall be provided for construction workers at all access points.
- All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign shall be posted with the telephone number and person to contact at the City of San Rafael regarding dust complaints, and the City staff person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations. (LTS)

The measures described under Mitigation Measure AIR-2 would implement the BAAQMD's Best Management Practices (BMPs) for construction-related fugitive dust emissions that are applicable to all construction projects throughout the Air Basin. These measures would ensure that short-term impacts associated with the generation of particulate matter and fugitive dust would be reduced to the extent feasible and would ensure that this impact would be **less than significant with mitigation**.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_X, ROGs, and some soot particulate ($PM_{2.5}$ and PM_{10}) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site.

In the analysis presented in the AQ/GHG Technical Report prepared for the proposed project, construction emissions were estimated for the project using the California Emissions Estimator Model (CalEEMod) Version 2022.1.1.16, consistent with BAAQMD recommendations. As stated in Chapter 3.0, Project Description, the proposed project would include demolition of a cumulative total of approximately 648,807 square feet of commercial space and the construction of a combined total of 1,964,456 square feet of commercial and new residential use, which would occur in two phases. For emissions modeling purposes, in the AQ/GHG Technical Report, the construction of Phase 1 and Phase 2 was modeled at the parcel/area level to reflect anticipated construction activities. The assumptions included in the emissions modeling for each phase is further detailed in the AQ/GHG Technical Report (Appendix I of this EIR).

For purposes of estimating project emissions, and based on information provided by the project sponsor, the analysis included in the AQ/GHG Technical Report assumed that construction of Phase 1 would commence in January 2024 and would last approximately 19 months, ending in July 2025, with simultaneous demolition of the residential and retail land uses assumed in the modeling. As shown in the AQ/GHG Technical Report, phasing for project construction, including phase type, duration, sequencing, and equipment, were primarily based on default CalEEMod values (please see Table 5-12 of the AQ/GHG Technical Report, included in Appendix I, for the assumed project construction schedule for Phase 1 buildout).

To provide a conservative analysis, it was assumed that construction of Phase 2 would commence in January 2030 and would last approximately 16 months, ending in April 2031 at the earliest, although buildout of this phase could occur over a longer period and extend to 2040. It should be noted that this is a conservative schedule, and that if construction was to occur over a longer period, the emissions impact would be reduced given that generation of construction emissions would be less concentrated and spread over a longer duration. Furthermore, if construction was to occur at a later date than the time frames included in this analysis, emissions would similarly decrease due to advances in technology and regulatory requirements that would reduce emissions from construction equipment and truck fleets.

The AQ/GHG Technical Report notes that the construction scenario assumptions, including phasing, equipment mix, and vehicle trips, were based on CalEEMod default values, and information provided by the project sponsor where project specifics were known. The City has reviewed the proposed project information provided by the project sponsor and accepted the assumptions as reasonable. Construction-related emissions are presented in Table 4.19.E. CalEEMod output sheets are included as Appendix A to the AQ/GHG Technical Report. As discussed below, construction of the proposed project would generate emissions that could violate air quality standards without the implementation of mitigation measures. The estimated emissions related to the construction of each residential and retail component of the proposed project, including all anticipated construction activity phases (demolition, site preparation, grading, building constriction, paving, and architectural coating), are provided in Table 4.10.E for Phases 1 and 2.

Table 4.10.E: Project Construction Emissions By Project Phase (lbs/day)

Project Construction Phase	ROGs	NO_X	Exhaust PM_{10}	Exhaust $PM_{2.5}$
Phase 1				
Residential 1	7.09	9.76	0.36	0.33
Residential 2	8.39	14.02	0.58	0.54
Residential 3	18.58	13.82	0.50	0.46
Residential 4	27.30	16.07	0.56	0.51
Retail	5.29	26.04	1.06	0.98
Total	**66.66**	**79.70**	**3.06**	**2.82**
BAAQMD Thresholds	54.0	54.0	82.0	54.0
Exceed Threshold?	**Yes**	**Yes**	**No**	**No**
Phase 2				
Residential 5	15.50	12.03	0.34	0.32
Residential 6	19.41	11.13	0.26	0.25
Retail	1.64	8.69	0.25	0.23
Total	**36.56**	**31.85**	**0.85**	**0.79**
BAAQMD Thresholds	54.0	54.0	82.0	54.0
Exceed Threshold?	**No**	**No**	**No**	**No**

Source: Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report (Dudek 2023).
Note: The values shown are average daily emissions based on total overall tons of construction emissions, converted to pounds, and divided by the estimated active workdays. Please reference Tables 5 through 12 of the Technical Report for construction schedule assumptions by phase.
BAAQMD = Bay Area Air Quality Management District
lbs/day = pounds per day
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ROGs = reactive organic gases

Phase 1 Impacts. As shown in Table 4.10.E, construction of the project under Phase 1 would not exceed BAAQMD significance thresholds for PM_{10} exhaust and $PM_{2.5}$ exhaust; however, construction of the project would exceed BAAQMD significance thresholds for ROGs and NO_X.

Impact AIR-3 Construction of Phase 1 would generate ROG and NO_X emissions in excess of thresholds established by the BAAQMD, resulting in a violation of air quality standards. (S)

As shown in Table 4.10.E, without mitigation, construction of Phase 1 of the proposed project would exceed the BAAQMD's established significance thresholds for ROGs and NO_X by 12.66 and 25.7 pounds per day (lbs/day), respectively. Mitigation would be required to reduce these emission levels to below the established thresholds of 54 lbs/day.

Mitigation Measure AIR-3a: **Phase 1 Construction Equipment Requirements.** Prior to the commencement of Phase 1 construction activities, the project sponsor shall require its construction contractor to demonstrate that all 75 HP or greater diesel-powered equipment are powered with California Air Resources Board (CARB)-certified Tier 4 Final engines.

An exemption from this requirement may be granted by the City of San Rafael (City) if: (1) the project sponsor documents that equipment with Tier 4 Final engines are not reasonably available; and (2) the required corresponding reductions in criteria air pollutant emissions can be achieved for the project from other combinations of construction equipment.

Before an exemption may be granted, the project sponsor's construction contractor shall (1) demonstrate that at least two construction fleet owners/operators in Marin County were contacted and that those owners/operators confirmed Tier 4 Final equipment could not be located within Marin County during the desired construction schedule; and (2) the proposed replacement equipment has been evaluated using the California Emissions Estimator Model (CalEEMod) or another industry-standard emission estimation method and the documentation provided to the City to confirm that necessary project-generated emissions reductions are achieved.

Mitigation Measure AIR-3b: **Phase 1 Architectural Coatings and Interior Paints.** To address the impact relative to reactive organic gas (ROG) emissions during Phase 1 construction, all interior paints and other architectural coatings shall be limited to 50 grams per liter or less of volatile organic compounds (VOCs). The project sponsor's construction contractor shall procure architectural coatings from a supplier in compliance with the requirements of BAAQMD Regulation 8, Rule 3 (Architectural Coatings). (LTS)

Mitigation Measure AIR-3a requires the use of Tier 4 Final engines to be utilized during operation of construction equipment and would be required to reduce NO_X emissions from construction activities to a less than significant level. Additionally, Mitigation Measure AIR-3b requires that interior paints and other architectural coatings be low-VOC coatings, limited to 50 grams per liter or less of VOCs, and this measure would be required to reduce the impact of ROG emissions (which are primarily generated by architectural coating activities) during Phase 1 construction.

Table 4.10.F presents estimated mitigated average daily construction emissions for Phase 1, with implementation of Mitigation Measure AIR-3a, which requires Tier 4 Final engines in equipment over 75 HP to reduce NO_X emissions, and implementation of Mitigation Measure AIR-3b, which requires limits on architectural coatings to reduce ROG emissions.

Table 4.10.F: Mitigated Project Construction Emissions for Phase 1 Construction (lbs/day)

Project Construction	ROGs	NO_X	Exhaust PM_{10}	Exhaust $PM_{2.5}$
Phase 1				
Residential 1	4.83	5.73	0.18	0.17
Residential 2	5.22	3.91	0.11	0.11
Residential 3	10.47	5.03	0.11	0.10
Residential 4	17.15	6.68	0.13	0.12
Retail	2.09	5.19	0.15	0.14
Total	**39.76**	**26.54**	**0.68**	**0.64**
BAAQMD Thresholds	54.0	54.0	82.0	54.0
Exceed Threshold?	**No**	**No**	**No**	**No**

Source: *Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report* (Dudek 2023).
Note: The values shown are average daily emissions based on total overall tons of construction emissions, converted to pounds, and divided by the estimated active workdays. Please reference Tables 5 through 12 of the Technical Report for construction schedule assumptions by phase.
BAAQMD = Bay Area Air Quality Management District
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ROGs = reactive organic gases

As shown in Table 4.10.F, with implementation of Mitigation Measures AIR-3a and AIR-3b, construction of the proposed project would reduce ROG and NO_X emissions to below the established thresholds. Therefore, with implementation of these mitigation measures, Phase 1 impacts related to a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or State ambient air quality standard would be **less than significant with mitigation**. In addition, as shown in Table 4.10.E, construction-period PM_{10} and $PM_{2.5}$ exhaust emissions would be below established thresholds; however, implementation of Mitigation Measure AIR-2 is required for compliance with the Clean Air Plan but would also reduce these emissions by ensuring that construction vehicle idling times are limited and that construction equipment is properly maintained so as not to generate excess emissions.

Phase 2 Impacts. As shown in Table 4.10.E, construction of the project under Phase 2 would not exceed BAAQMD significance thresholds for ROGs, NO_X, PM_{10} exhaust, or $PM_{2.5}$ exhaust. Therefore, mitigation is not required to address an air quality violation during this phase of the project. Therefore, Phase 2 impacts related to a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under applicable NAAQS or CAAQS would be **less than significant**. Similar to Phase 1, implementation of Mitigation Measure AIR-2 would reduce construction-period PM_{10} and $PM_{2.5}$ exhaust emissions by ensuring that construction vehicle idling times are limited and that construction equipment is properly maintained so as not to generate excess emissions.

Operational Emissions. Long-term air pollutant emission impacts that would result from the proposed project are those associated with mobile sources (e.g., vehicle trips), energy sources (e.g., natural gas), and area sources (e.g., architectural coatings and the use of landscape maintenance equipment).

PM_{10} emissions result from running exhaust, tire and brake wear, and the entrainment of dust into the atmosphere from vehicles traveling on paved roadways. Entrainment of PM_{10} occurs when vehicle tires pulverize small rocks and pavement, and the vehicle wakes generate airborne dust. The contribution of tire and brake wear is small compared to the other particulate matter emission processes. Gasoline-powered engines have small rates of particulate matter emissions compared with diesel-powered vehicles.

Energy source emissions result from activities in buildings for which electricity and natural gas are used. The quantity of emissions is the product of usage intensity (i.e., the amount of electricity or natural gas) and the emission factor of the fuel source. Major sources of energy demand include building mechanical systems (e.g., heating and air conditioning, lighting) and plug-in electronics (e.g., refrigerators or computers). Greater building or appliance efficiency reduces the amount of energy for a given activity and thus lowers the resultant emissions. The emission factor is determined by the fuel source, with cleaner energy sources, like renewable energy, producing fewer emissions than conventional sources.

Typically, area source emissions consist of direct sources of air emissions located at the project site, including architectural coatings and the use of landscape maintenance equipment. Area source emissions associated with the project would include emissions from the use of landscaping equipment and the use of consumer products.

Long-term operational emissions associated with the proposed project were calculated using CalEEMod. As further discussed in the AQ/GHG Technical Report (Appendix I), trip generation rates used in CalEEMod for the project were based on the project's trip generation estimates included in Section 4.9, Transportation. It should be noted that the emissions modeling was conducted before the proposed project site plan was finalized, and so there are some slight differences between the model inputs and the project described in Chapter 3.0, Project Description. However, these discrepancies are generally overestimating the potential emissions that may occur from the proposed project and therefore present a conservative impact analysis. When project-specific data were not available, default assumptions from CalEEMod were used to estimate project emissions. Model results are shown in Tables 4.10.G and 4.10.H. CalEEMod output sheets are included as an appendix to the AQ/GHG Technical Report (provided in Appendix I of this EIR).

Table 4.10.G: Project Average Daily Operational Emissions (lbs/day)

Source	ROGs	NO_X	PM_{10}	$PM_{2.5}$
Existing Scenario				
Area Source Emissions	22.12	0.17	0.04	0.03
Energy Source Emissions	0.13	2.43	0.19	0.19
Mobile Source Emissions	93.03	69.58	110.60	28.67
Total Emissions	**115.29**	**72.19**	**110.82**	**28.88**
Proposed Project Phase 1 Operations				
Area Source Emissions	46.97	0.47	0.06	0.04
Energy Source Emissions	0.06	1.07	0.08	0.08
Mobile Source Emissions	72.44	51.82	98.07	25.36
Total Phase 1 Emissions	**119.47**	**53.35**	**98.21**	**25.49**
Proposed Project Phase 2 Operations				
Area Source Emissions	57.28	0.60	0.06	0.05
Energy Source Emissions	0.09	1.60	0.12	0.12
Mobile Source Emissions	46.84	35.09	68.19	17.63
Total Phase 2 Emissions	**104.22**	**37.29**	**68.37**	**17.80**
Net Emissions				
Year 2025 Net Change in Emissions (Phase 1 – Existing)	**4.18**	**(18.83)**	**(12.61)**	**(3.40)**
Year 2040 Full Project Buildout Emissions (Full Project Buildout – Existing)	**(11.07)**	**(34.89)**	**(42.45)**	**(11.08)**
BAAQMD Thresholds	*54.0*	*54.0*	*82.0*	*54.0*
Exceed Threshold?	**No**	**No**	**No**	**No**

Source: *Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report* (Dudek 2023).
Note 1: Numbers in parentheses represent negative numbers.
Note 2: The values shown are from the CalEEMod average daily emissions output which calculates the emissions based on annual tons of operational emissions, converted to pounds, and divided by the estimated days per year (365 days).
Note 3: Totals may not sum due to rounding.
Note 4: Existing data is based on full occupancy of the mall.
BAAQMD = Bay Area Air Quality Management District
lbs/day = pounds per day
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROGs = reactive organic gases

Table 4.10.H: Project Annual Operational Emissions (tons/yr)

Source	ROG	NO_X	PM_{10}	$PM_{2.5}$
Existing Scenario				
Area Source Emissions	4.04	0.03	0.01	0.00
Energy Source Emissions	0.02	0.44	0.03	0.03
Mobile Source Emissions	16.98	12.70	20.18	5.23
Total Emissions	**21.04**	**13.17**	**20.22**	**5.27**
Proposed Project Phase 1 Operations				
Area Source Emissions	8.57	0.09	0.01	0.01
Energy Source Emissions	0.01	0.19	0.01	0.01
Mobile Source Emissions	13.22	9.46	17.90	4.63
Total Emissions	**21.80**	**9.74**	**17.92**	**4.65**
Proposed Project Phase 2 Operations				
Area Source Emissions	10.45	0.11	0.01	0.01
Energy Source Emissions	0.02	0.29	0.02	0.02
Mobile Source Emissions	8.55	6.40	12.44	3.22
Total Emissions	**19.02**	**6.81**	**12.48**	**3.25**
Net Emissions				
Year 2025 Net Change in Emissions (Phase 1 – Existing)	**0.76**	**(3.44)**	**(2.30)**	**(0.62)**
Year 2040 Full Project Buildout Emissions (Full Project Buildout – Existing)	**(2.02)**	**(6.37)**	**(7.75)**	**(2.02)**
BAAQMD Thresholds	*10.0*	*10.0*	*15.0*	*10.0*
Exceed Threshold?	**No**	**No**	**No**	**No**

Source: *Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report* (Dudek 2023).
Note 1: Numbers in parentheses represent negative numbers.
Note 2: Totals may not sum due to rounding.
Note 3: Existing data is based on full occupancy of the mall.
BAAQMD = Bay Area Air Quality Management District
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases
tons/yr = tons per year

The primary emissions associated with the project are regional in nature, meaning that air pollutants are rapidly dispersed on release or, in the case of vehicle emissions associated with the project, emissions are released in other areas of the Air Basin. The daily and annual emissions associated with project operational trip generation, energy, and area sources are identified in Tables 4.10.G and 4.10.H. There would be a slight increase in ROG emissions, primarily associated with an increase of consumer products (e.g., hairsprays and cleaning products) that are assumed to occur with the proposed residential land uses at the project site when compared to the existing land uses, but there would be a net emission decrease for estimated emissions of other criteria pollutants. The results shown indicate the operational emissions from the project would not exceed the significance criteria for ROGs, NO_X, PM_{10}, or $PM_{2.5}$ emissions; therefore, operational impacts related to a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable NAAQS or CAAQS would be **less than significant.**

Threshold 4.10.3: Substantial Pollutant Concentrations. In addition to impacts from criteria pollutants, project impacts may include emissions of pollutants identified by the State and federal government as TACs or hazardous air pollutants.

TACs emitted during construction activities would be DPM emitted from heavy-duty construction equipment and heavy-duty trucks. Heavy-duty construction equipment and diesel trucks are subject to CARB Airborne Toxic Control Measures to reduce DPM emissions. A construction HRA was performed for the project to evaluate the risk from diesel exhaust emissions on existing proximate off-site sensitive receptors, as well as future on-site Phase 1 residents during Phase 2 construction.

Sensitive receptors are defined as residential uses, schools and school yards, daycare centers and preschools, nursing homes, parks and playgrounds, and medical centers. Individuals particularly vulnerable to DPM are children, whose lung tissue is still developing, and the elderly, who may have serious health problems that can be aggravated by exposure to DPM. Exposure to diesel exhaust associated with construction activity contributes to both cancer and chronic non-cancer health risks.

According to the BAAQMD, a project would result in a significant impact if it would: individually expose sensitive receptors to TACs resulting in an increased cancer risk greater than 10 in 1 million, increased non-cancer risk of greater than 1.0 on the Hazard Index (chronic or acute), or an annual average ambient $PM_{2.5}$ increase greater than 0.3 micrograms per cubic meter ($\mu g/m^3$). A significant cumulative impact would occur if the project in combination with other projects located within a 1,000-foot radius of the project site would expose sensitive receptors to TACs, resulting in an increased cancer risk greater than 100 in 1 million, an increased non-cancer risk of greater than 10.0 on the Hazard Index (chronic), or an ambient $PM_{2.5}$ increase greater than 0.8 $\mu g/m^3$ on an annual average basis. Impacts from substantial pollutant concentrations are discussed below.

The project site is located in an urban area in close proximity to existing residential and school uses that could be exposed to diesel emission exhaust during the construction period. The closest sensitive receptors include:

- AlmaVia of San Rafael, which is an assisted living facility located approximately 95 feet south of the proposed project site;

- Single-family homes on Sao Augustine Way and Nova Albion Way (the nearest being approximately 90 feet south of the proposed project site);
- Quail Hill Townhouses on El Faisan Drive (the nearest being approximately 210 feet southwest of the proposed project site);
- Villa Marin on Thorndale Drive, located approximately 690 feet to the west of the proposed project site;
- Marin County Emergency Medical Services, located approximately 90 feet to the west of the proposed project site; and
- Multifamily residential apartment complexes along Las Gallinas Avenue and Nova Albion Way (the nearest being approximately 310 feet west of the proposed project site).

In addition to the existing proximate sensitive receptors described above, the proposed project would also introduce new sensitive residential receptors. During Phase 1, 922 residential units would be constructed that would introduce residential receptors as well as proposed open spaces that would introduce potential recreational receptors at parks/playgrounds as part of the proposed Town Square. These would be on-site sensitive receptors, which could potentially be exposed to adverse health risks due to the construction of Phase 2 of the proposed project, as further discussed below.

Construction Health Risk Assessment. As detailed in the AQ/GHG Technical Report prepared for the proposed project, to estimate the potential cancer risk from project construction equipment exhaust (including DPM), a dispersion model was used to translate an emission rate from the source location to a concentration at the receptor location (i.e., a nearby residential land use). Dispersion modeling varies from a simpler, more conservative screening-level analysis to a more complex and refined detailed analysis. This refined assessment was conducted using the CARB exposure methodology, with the air dispersion modeling performed using AERMOD, the EPA dispersion model. AERMOD provides a detailed estimate of exhaust concentrations based on site and source geometry, source emissions strength, distance from the source to the receptor, and site-specific meteorological data. Table 4.10.I identifies the results of the analysis utilizing the CalEEMod default of Tier 0 construction equipment. The full methodology for the HRA along with model snapshots are provided in the AQ/GHG Technical Report, which is included as Appendix I.

Table 4.10.I: Unmitigated Inhalation Health Risks from Project Construction

	Carcinogenic Inhalation Health Risk in 1 Million	Chronic Inhalation Hazard Index	Acute Inhalation Hazard Index	Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)
Maximally Exposed Individual (MEI) Off Site	11.58	0.0061	0	0.072
Phase 2 MEI On Site	7.09	0.0073	0	0.11
Threshold	**10**	**1**	**1**	**0.3**

Source: Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report (Dudek 2023).
$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than 2.5 microns in size

As shown in Table 4.10.I, the risk associated with project construction for the maximally exposed individual (MEI) off site would be 11.58 in 1 million, which would exceed the BAAQMD cancer risk of 10 in 1 million. The total chronic Hazard Index would be 0.0061, which would not exceed the threshold of 1.0. In addition, the total acute Hazard Index would be 0.000, which would also not exceed the threshold of 1.0. The results of the analysis indicate that the total $PM_{2.5}$ concentration would be 0.072 µg/m^3, which would also not exceed the BAAQMD significance threshold of 0.30 µg/m^3.

For future on-site sensitive receptors, the risk associated with project construction at the on-site MEI would be 7.09 in 1 million, which would not exceed the BAAQMD cancer risk of 10 in 1 million. The total chronic hazard index would be 0.0073, which would not exceed the threshold of 1.0. In addition, the total acute Hazard Index would be 0.000, which would also not exceed the threshold of 1.0. The results of the analysis indicate that the total $PM_{2.5}$ concentration would be 0.11 µg/m^3, which would also not exceed the BAAQMD significance threshold of 0.30 µg/m^3. Therefore, there would be a less than significant risk to future (Phase 2) sensitive receptors on the project site.

Impact AIR-4 Construction of the proposed project would expose sensitive receptors to substantial pollutant concentrations through exceeding the carcinogenic inhalation health risk threshold. (S)

As indicated above, the cancer risk of 11.58 in 1 million would exceed BAAQMD thresholds. Therefore, implementation of Mitigation Measure AIR-4 would be required to reduce substantial pollutant concentrations during project construction.

Mitigation Measure AIR-4: **Construction Equipment Standards.** During construction of the proposed project, the project contractor shall ensure all off-road diesel-powered construction equipment of 50 horsepower or more used for the project construction at a minimum meets the California Air Resources Board (CARB) Tier 2 with level 3 diesel particulate filters emissions standards or equivalent, including Tier 4 Final engines.

Mitigation Measure AIR-4, which requires the use of (at a minimum) level 3 diesel particulate filters emissions standards or equivalent (including Tier 4 Final) engines on construction equipment, shall be implemented to reduce DPM during construction. Table 4.10.J summarizes the results of the HRA for project construction after mitigation.

As shown in Table 4.10.J, the mitigated cancer risk at the MEI would be 4.85 in 1 million, which would not exceed the BAAQMD cancer risk of 10 in 1 million. Therefore, with implementation of Mitigation Measure AIR-4, construction of the proposed project would not exceed BAAQMD thresholds and would not expose nearby sensitive receptors to substantial pollutant concentrations. This impact would be **less than significant with mitigation.**

Table 4.10.J: Mitigated Inhalation Health Risks from Project Construction to Off-Site Receptors

	Carcinogenic Inhalation Health Risk in 1 Million	Chronic Inhalation Hazard Index	Acute Inhalation Hazard Index	Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)
Maximally Exposed Individual	4.85	0.0026	0.000	0.056
Threshold	**10.0**	**1.0**	**1.0**	**0.30**

Source: Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report (Dudek 2023).
$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than 2.5 microns in size

Operational Emissions. Regarding long-term operations, based on the proposed land uses, the proposed project would not result in any long-term sources of TACs. Further, the proposed project would result in the demolition of existing uses on site that have permitted stationary sources (i.e., emergency diesel generators at the existing main mall building, Sears, Macy's, and Kohl's), which would reduce the generation and exposure of TACs in the vicinity of the proposed project site. Potential health risk impacts associated with operations of the proposed project would be **less than significant.**

Localized CO Impacts. Mobile source impacts occur on two scales of motion. Regionally, project-related travel would add to regional trip generation and increase the total VMT within the local airshed and the Air Basin. Locally, project-generated traffic would be added to San Rafael's roadway system near the project site. If such traffic occurs during periods of poor atmospheric ventilation, is composed of a large number of vehicles that were cold started and operating at pollution-inefficient speeds, and operating on roadways already crowded with non-project traffic, there is a potential for the formation of microscale CO hotspots in the area immediately around points of congested traffic. Because of continued improvement in vehicular emissions at a rate faster than the rate of vehicle growth and/or congestion, the potential for CO hotspots in the Air Basin is steadily decreasing.

Emissions and ambient concentrations of CO have decreased dramatically in the Bay Area with the introduction of the catalytic converter in 1975. No exceedances of the State or federal CO standards have been recorded at Bay Area monitoring stations since 1991. The BAAQMD CEQA Guidelines include recommended methodologies for quantifying concentrations of localized CO levels for proposed development projects.

A screening level analysis using guidance from the BAAQMD CEQA Guidelines was performed to determine the potential impacts of the project. The screening methodology provides a conservative indication of whether the implementation of a proposed project would result in significant CO emissions. According to the BAAQMD CEQA Guidelines, a proposed project would result in a less than significant impact to localized CO concentrations if the following screening criteria are met:

- The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, and the regional transportation plan and local congestion management agency plans.

- Project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.

- The project would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, or below-grade roadway).

Implementation of the proposed project would not conflict with the Transportation Authority of Marin (TAM) Congestion Management Program (CMP) for designated roads or highways, a Regional Transportation Plan (RTP), or other agency plans. The maximum estimated peak-hour traffic of 3,704 vehicles would be at the Manual T. Freitas Parkway and Del Presidio Boulevard intersection under the buildout scenario assessed in the traffic study for the proposed project.[24] As such, the project's contribution to peak-hour traffic volumes at intersections in the vicinity of the project site would be well below 44,000 vehicles per hour (vph). Therefore, the proposed project would not result in localized CO concentrations that exceed State or federal standards, and this impact would be less than significant.

Local Community Risk. Certain community members are more susceptible to poor air quality. These individuals, who are referred to as sensitive receptors, are typically children, the elderly, and those with pre-existing serious health problems. Per BAAQMD guidance, the risk and hazards thresholds of significance apply in determining whether a new source of pollution will result in unacceptable risks to the community. In some instances, they may also be applied to determine if there will be unacceptable risks to new receptors of air pollution (i.e., future users of a project, including future residents and workers).

As a part of the proposed project, new sensitive receptors (residences) would be located at the project site; therefore, a cumulative HRA was performed as a part of this analysis. As detailed in the AQ/GHG Technical Report for the proposed project, the cumulative HRA evaluated the potential risk to sensitive receptors due to exposure to TACs resulting from the proposed project, as well as from existing sources of emissions in the community. Unlike for a project-level assessment, for the cumulative assessment, the risks from all sources within 1,000 feet of future on-site sensitive receptors are summed and compared to a cumulative significance threshold.

The cumulative health risk for each proposed residential parcel was estimated based on proximity of the nearest parcel boundary with the existing sources of TACs. Maximum health risk levels from project construction were also summed with the health risk from existing sources of TACs for Residentials 1 through 4, since these parcels would be operating concurrently with the construction of Phase 2. The potential cumulative health risk levels for

[24] W-Trans. 2023. *Transportation Impact Study for the Northgate Town Square Project.* February.

each residential parcel are included in the AQ/GHG Technical Report (see Appendix I). Based on this analysis, the maximally exposed future residential receptors would be at Residential 4 (which is located on the eastern edge of the proposed project site) based primarily on proximity to the existing Macy's (emergency generator), US-101, and Phase 2 construction. As shown in Table 4.10.K, health impacts at these proposed sensitive receptors from all proximate sources would be below the BAAQMD cumulative thresholds for cancer risk, chronic health hazards, and $PM_{2.5}$ concentrations.

Table 4.10.K: Maximum Cumulative Health Impacts – On-Site Receptors

Source[1]	Carcinogenic Inhalation Health Risk in 1 Million	Chronic Inhalation Hazard Index	Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)
Macy's West Stores Inc.	8.87	0.0046	0.012
Villa Marin Homeowners' Association	0.43	0.00067	0.00055
AlmaVia of San Rafael	0.29	0.00041	0.00037
Kohl's Department Store	0.076	0.000020	0.00019
Guide Dogs for the Blind Inc.	8.74	0.0023	0.011
The Pasha Group	0.011	0.000042	0.000013
Chevron Station	0.81	0.0036	—
Fuel 24:7 at Northgate	0.50	0.0022	—
Terra Linda 76	0.31	0.0013	—
Northgate Shell	0.44	0.0019	—
Gateway Gas One	0.36	0.0016	—
US-101	7.58	—[2]	0.17
Major Roadways	0.62	—[2]	0.01
Railroad	0.33	—[2]	0.0004
Future on-site residents during Phase 2 Construction	7.09	0.0073	0.1067
Total Cumulative Health Risk	**36.46**	**0.026**	**0.31**
BAAQMD Cumulative Significance Criteria	*100*	*10*	*0.8*
Exceed Threshold?	**No**	**No**	**No**

Source: *Northgate Town Square Project Air Quality and Greenhouse Gas Emissions Technical Report* (Dudek 2023).

[1] Screening health risk levels for all stationary sources, US-101, major roadways, and railroad were obtained from the BAAQMD. Per BAAQMD recommendations, the BAAQMD Distance Adjustment Multiplier Tools for Gasoline Dispensing Facilities and for Diesel Internal Combustion Engines were used to estimate the risk from the stationary sources based on distance to the proposed residential parcels.

[2] According to BAAQMD, chronic health risk from these sources was not included in the raster files because risk was found to be low and exceedances were not likely.

$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
BAAQMD = Bay Area Air Quality Management District
US-101 = United States Route 101

As shown in Table 4.10.K, the cumulative cancer risk from all sources within 1,000 feet of the proposed project boundary would be approximately 36.46 in 1 million, which would be below the BAAQMD cumulative threshold of 100 in 1 million, and therefore less than significant. The cumulative Hazard Index from all such sources would be approximately 0.026, which would be below the significance threshold of 10, and would therefore be less than significant. The cumulative $PM_{2.5}$ concentration would be approximately 0.31 $\mu g/m^3$, which would be below the significance threshold of 0.8 $\mu g/m^3$ and hence would be less than significant. Since receptors on Residential 4 would be exposed to the maximum health risk, the health risk impacts at the other proposed residential receptors on site would also be **less than significant.**

Assessment of Project-Related Health Impacts. Emissions from project operations would not exceed the BAAQMD's numeric regional mass daily emission thresholds, and would not constitute a significant health impact to residents in the project vicinity and within the Air Basin.

The BAAQMD's numeric regional mass daily emission thresholds are based in part on Section 180(i) of the FCAA. The numeric regional mass daily emission thresholds are intended to provide a means of consistency in significance determination within the environmental review process.

Notwithstanding, an exceedance of the BAAQMD's numeric regional mass daily emission thresholds would not constitute a particular health impact to an individual nearby. The reason for this is that the mass daily emission thresholds are in lbs/day emitted into the air, whereas health effects are determined based on the concentration of a pollutant in the air at a particular location (e.g., parts per million [ppm] by volume of air or $\mu g/m^3$ of air). The CAAQS and NAAQS were developed to protect the most susceptible population groups from adverse health effects and were established in terms of ppm or $\mu g/m^3$ for the applicable emissions.

Furthermore, as described in Section 4.10.1, Setting, air quality trends for emissions of CO, NO_X, ROGs, and O_3 (which is a byproduct of NO_X and ROGs) have been trending downward within the Air Basin even as development has increased over the last several years.

Known health effects related to ozone include worsening of bronchitis, asthma, and emphysema and a decrease in lung function. Health effects associated with particulate matter include premature death of people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, decreased lung function, and increased respiratory symptoms. Because of the relatively small amount of emissions from the project relative to regional-wide emissions, it would be speculative to assess whether or the extent to which the proposed project would contribute to adverse health effects. Even though the BAAQMD's air quality modeling and health impact evaluation capabilities are among the most sophisticated of any of the air districts in the State, BAAQMD has not provided methodology and modeling does not currently exist to assess the specific correlation between mass emissions generated, cumulative increases from individual projects, and the effect on health or even to determine how exceeding the regional thresholds by small amounts would affect the number of days the region is in nonattainment. Air district staff do not currently know of a way to accurately quantify O_3-related health impacts caused by NO_X or VOC emissions from relatively small projects due to photochemistry and regional model limitations. Similarly, CARB methodology has reported that a $PM_{2.5}$ methodology is not suited for small projects and may yield unreliable results. For these reasons, mass emissions are not correlated with concentrations of emissions or how many additional individuals in the Air Basin would be affected by the health effects cited above. In contrast, for extremely large regional projects, the BAAQMD has only been able to correlate potential health outcomes for very large emissions sources. As part of its rulemaking activity, specifically 6,620 lbs/day of NO_X and 89,180 lbs/day of ROGs were expected to result in approximately 20 premature deaths per year, and 89,947 school absences due to O_3.

The proposed project does not generate anywhere near 6,620 lbs/day of NO_X or 89,190 lbs/day of ROG emissions. As shown in Table 4.10.G, the proposed project would generate a maximum of 37.29 lbs/day of NO_X, and a maximum of 104.22 lbs/day of ROG emissions. Taking into

account the existing land uses at the project site, the proposed project would have net negative emissions, actually decreasing emissions from what is estimated to be generated by the current land uses.

Therefore, the project's emissions are not high enough to use a regional modeling program to correlate health effects on a basin-wide level. Accordingly, current scientific, technological, and modeling limitations do not allow for the relation of expected adverse air quality impacts to specific health consequences.

Notwithstanding, as previously noted, this air quality analysis does include a site-specific localized impact analysis that correlates potential project health impacts on a local level to immediately adjacent land uses as outlined above.

Threshold 4.10.4: Other Emissions. Odors produced during construction would be attributable to architectural coatings, asphalt pavement application, and concentrations of unburned hydrocarbons from tailpipes of construction equipment. Such odors would disperse rapidly from the proposed project site and generally occur at magnitudes that would not affect substantial numbers of people. Therefore, impacts associated with odors during construction would be **less than significant.**

Odor impacts could result from siting a new odor source near existing sensitive receptors or siting a new sensitive receptor near an existing odor source. The BAAQMD considers a significant odor impact as a substantial number of odor complaints, specifically more than five confirmed complaints per year averaged over the past 3 years. Examples of land uses that have the potential to generate considerable odors include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants. The proposed project does not include any of these sources. As a mixed-use redevelopment, the proposed project includes commercial and residential land uses that would not be expected to generate objectionable odors. Furthermore, facilities that are common sources of odors are not located in the vicinity of the proposed project; therefore, future sensitive receptors associated with the operations of the proposed project would not be exposed to significant odors from existing sources.

Overall, the proposed project would have a less than significant odor impact because it would not create substantial objectionable odors affecting a substantial number of people. Therefore, project operations would result in an odor impact that is **less than significant.**

4.10.2.3 Cumulative Impacts

As observed by the BAAQMD, regional air pollution is largely a cumulative impact. No single project is sufficient in size to independently create regional nonattainment of AAQS. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts.

The Air Basin is currently designated as a nonattainment area for State and national ozone standards and national particulate matter AAQS. This nonattainment status is attributed to the region's development history. Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size to, by itself, result in nonattainment of

AAQS. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant.

In developing thresholds of significance for air pollutants, the BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions.

Therefore, if the proposed project's daily average or annual emissions of construction- or operations-related criteria air pollutants exceed any applicable threshold established by the BAAQMD, the proposed project would result in a considerable contribution to a cumulatively significant impact. As shown in Table 4.10.F, implementation of the proposed project would not generate significant construction emissions after the implementation of mitigation. As illustrated in Table 4.10.G, the operational emissions of the proposed project would also be below significance thresholds. The proposed project is consistent with the Clean Air Plan in the region, would implement all feasible control measures recommended by the BAAQMD, and is below the BAAQMD recommended thresholds of significance. Therefore, the proposed project would have a **less than significant** cumulative impact.