4.3 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section evaluates the expected emission of air pollutants and greenhouse gases (GHG) generated during the construction and operation of the project. The discussion describes existing air quality, construction-related impacts, indirect operational impacts, the impact of these emissions on both the local and regional scale, and mitigation measures to reduce or eliminate any identified significant impacts.

The methodologies and assumptions used in preparation of this section follow the CEQA Guidelines of the Bay Area Air Quality Management District (BAAQMD), as revised in May 2011. Information on existing conditions, federal and State ambient air quality standards, and pollutants of concern was obtained from the U.S. Environmental Protection Agency (US EPA), California Air Resources Board (CARB), and BAAQMD.

4.3.1 Environmental Setting

Air quality is a function of pollutant emissions and topographic and meteorological influences. The physical features and atmospheric conditions of a landscape interact to affect the movement and dispersion of pollutants and determine its air quality. The US EPA and CARB are the federal and state agencies charged with maintaining air quality in the nation and state, respectively. The US EPA delegates much of its authority over air quality to CARB. CARB has geographically divided the state into 15 air basins for the purposes of managing air quality on a regional basis. An air basin is a CARB-designated management unit with similar meteorological and geographic conditions. There are 15 air basins in the state. The proposed CSUS middle school is located in the City of Belmont, in San Mateo County, within the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB covers all of Alameda, Contra Costa, Marin Napa, Santa Clara, San Mateo, and San Francisco counties, and portions of Solano and Sonoma counties. The City of Belmont is located in the central to southern portion of the SFBAAB, within the Santa Clara Valley.

The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) for six common air pollutants: ozone (O_3), particulate matter (PM), which consists of “inhalable coarse” PM (particles between 2.5 and 10 microns in diameter, or PM_{10}) and “fine” PM (particles 2.5 microns in diameter and smaller, or $PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. The U.S. EPA refers to these six common pollutants as “criteria” pollutants because the agency regulates the pollutants on the basis of human health and/or environmentally-based criteria.

CARB has established California Ambient Air Quality Standards (CAAQS) for the six common air pollutants regulated by the federal Clean Air Act (the CAAQS are more stringent than the NAAQS), plus the following pollutants: hydrogen sulfide (H_2S), sulfates (SO_X), vinyl chloride, and visibility reducing particles.

A description of the potential common air pollutants that may be associated with existing sources of emissions within the vicinity of the proposed CSUS middle school, as well as the construction and operation of the school itself, is provided below. Air pollutants not commonly associated with school construction and operation, or with existing sources of emissions in the vicinity of the project, such as lead and visibility reducing particles, are not described below.

- **Ground-level Ozone**, or smog, is not emitted directly into the atmosphere. It is created from chemical reactions between oxides of nitrogen (NO_X) and volatile organic compounds (VOCs), also called reactive organic gases (ROG), in the presence of sunlight.[1] Thus, ozone formation is typically highest on hot sunny days in urban areas with NO_X and ROG pollution. Ozone irritates the nose, throat, and air pathways and can cause or aggravate shortness of breath, coughing, asthma attacks, and lung diseases such as emphysema and bronchitis.
- **Particulate Matter**, also known as particle pollution, is a mixture of extremely small particles and liquid droplets made up of a variety of components such as organic chemicals, metals, and soil and dust particles.[2]
    - PM_{10}, also known as inhalable coarse, respirable, or suspended PM10, consists of particles less than or equal to 10 micrometers in diameter (approximately 1/7th the thickness of a human hair). These particles can be inhaled deep into the lungs and possibly enter the blood stream, causing health effects that include, but are not limited to, increased respiratory symptoms (e.g., irritation, coughing), decreased lung capacity, aggravated asthma, irregular heartbeats, heart attacks, and premature death in people with heart or lung disease.
    - $PM_{2.5}$, also known as fine PM, consists of particles less than or equal to 2.5 micrometers in diameter (approximately 1/30th the thickness of a human hair). These particles pose an increased risk because they can penetrate the deepest parts of the lung, leading to and exacerbating cardiopulmonary health effects.
- **Carbon Monoxide** is an odorless, colorless gas that is formed by the incomplete combustion of fuels. Motor vehicles are the single largest source of carbon monoxide in the Bay Area. At high concentrations, CO reduces the oxygen-carrying capacity of the blood and can aggravate cardiovascular disease and cause headaches, dizziness, unconsciousness, and even death.
- **Nitrogen Dioxide (NO_2)** is a by-product of combustion. NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as NO_X and are major contributors to ozone formation. NO_2 also contributes to the formation of particulate matter. NO_2 can cause breathing difficulties at high concentrations.
- **Sulfur Dioxide (SO_2)** is one of a group of highly reactive gases known as oxides of sulfur (SO_X). Fossil fuel combustion in power plants and industrial facilities are the largest emitters of SO_2. Short-term effects of SO_2 exposure can include adverse respiratory effects such as asthma symptoms. SO_2 and other SO_X can react to form PM.[3]

In addition to criteria air pollutants, the U.S. EPA and CARB have classified certain pollutants as hazardous air pollutants or toxic air contaminants, respectively. These pollutants can cause severe health effects at very low concentrations, and many are suspected or confirmed

[1] U.S.EPA, 2014a.

[2] U.S. EPA 2013, 2014b.

[3] U.S. EPA, 2015.

carcinogens. The U.S. EPA has identified 187 HAPs, including such substances as benzene and formaldehyde; CARB also considers particulate emissions from diesel-fueled engines (diesel PM) to be a toxic air contaminant (TAC).

- **Diesel PM.** The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. Many of the toxic compounds adhere to the particles, and because diesel particles are very small (less than 2.5 microns in diameter), they penetrate deeply into the lungs. The CARB has identified diesel PM as a human carcinogen. Mobile sources, including trucks, buses, automobiles, trains, ships and farm equipment, are the largest source of diesel emissions in the Bay Area.

Certain common air pollutants, such as ozone precursors, SO_2, and particulate matter, are emitted by a large number of sources and have effects on a regional basis (i.e., through the SFBAAB); other pollutants, such as HAPs, TACS, and fugitive dust, are generally not as prevalent and/or emitted by fewer and more specific sources. As such, these pollutants have much greater effects on local air quality conditions.

4.3.1.1 Regional Emissions Levels

CARB's estimate of the amount of emissions generated within the SFBAAB in 2012 is summarized in Table 4.3-1.

Table 4.3-1: San Francisco Bay Area Air Basin Emissions Summary

	2012 Pollutant Emissions (tons per day)						
Source	ROG	NO_X	PM	PM_{10}	$PM_{2.5}$	CO	SO_X
Stationary (A)	59	40	10	6	3	33	20
Areawide (B)	70	15	120	65	22	91	0
Mobile (C)	132	291	20	19	13	1105	9
Total (D)	**262**	**347**	**149**	**90**	**38**	**1229**	**30**
	2012 Pollutant Emissions (tons per year)						
Source	ROG	NO_X	PM	PM_{10}	$PM_{2.5}$	CO	SO_X
Stationary (A)	21,659	14,713	3,573	2,146	1,029	11,917	7,242
Areawide (B)	25,597	5,621	43,734	23,725	8,096	33,255	153
Mobile (C)	48,220	106,189	7,136	7,030	4,592	403,299	3,376
Total (D)	**95,477**	**126,524**	**54,443**	**32,901**	**13,717**	**448,472**	**10,771**

Source: CARB 2013, modified by MIG

Table Notes:

(A) Stationary sources include fuel combustion in stationary equipment or a specific type of facility such as laundering, printing, and metals processing facilities.

(B) Mobile sources include automobiles, trucks, and other vehicles intended for "on-road" travel and other self-propelled machines such as construction equipment, boats, and all-terrain vehicles intended for "off-road" travel.

(C) Areawide sources include solvent evaporation (e.g., consumer products, painting, and asphalt paving) and miscellaneous processes such as residential space heating, fugitive windblown dust, and cooking.

(D) Totals may not equal due to rounding.

4.3.1.2 Topography and Meteorology

The topography and meteorology of the SFBAAB are characterized by the coast mountain ranges and the seasonal migration of the Pacific high-pressure cell. Regionally, basin airflow is affected by the coast mountain ranges, which create complex terrains consisting of mountains, valleys, and bays. The Golden Gate to the west and the Carquinez Strait to the east are gaps in the mountain ranges that allow air to flow into and out of the SFBAAB. In the summer, winds from the northwest are channeled through the Golden Gate and other narrow openings, resulting in localized areas of high wind speeds. Air flowing from the coast inland is called the sea breeze and begins developing in the late morning or early afternoon; air flowing from the inland regions back to the coast, or drainage, occurs at night.

Wind patterns in the southern Santa Clara Valley are influenced by local terrain, resulting in a prevailing wind flow that is generally parallel to the valley's northwest-southeast orientation. During the day time, winds generally flow from the ocean into the Bay Area and southward into the Santa Clara Valley, while at night winds generally flow northward out of the valley.[4]

Basin climate is influenced by the Pacific high-pressure cell, a semi-permanent area of high pressure located over the Pacific Ocean. In the summer, the cell is centered over the northeastern Pacific Ocean, pushing storms to the north and resulting in generally stable conditions within the Bay Area. In the winter the cell weakens and migrates south, bringing cooler temperatures and stormy conditions. Wintertime inversions are weaker and more localized and are the result of rapid heat radiation from the earth's surface.

Bay area summers are generally hot and dry. Daytime summer temperatures can vary by as much as 35 degrees Fahrenheit between the coast and inland regions as a result of daytime temperature differences between land and water surfaces. Winters are cooler and wetter, with winter rains accounting for 75 percent of average annual rainfall. In the winter, temperature differences between the coast and inland regions are more pronounced at night.

The SFBAAB is most susceptible to high levels of air pollution during the summer when cool marine air flowing through the Golden Gate can become trapped under a layer of warmer air (known as an inversion) and prevented from escaping the valleys and bays created by the Coast Ranges.

4.3.1.3 Regional Air Quality Conditions and Attainment Status

As described in Section 4.3.1, the federal and state governments have established emissions standards and limits for certain air pollutants which may reasonably be anticipated to endanger public health or welfare. These standards typically take one of two forms: standards or requirements that are applicable to specific types of facilities or equipment (e.g., petroleum refining, metal smelting), or concentration-based standards that are applicable to overall ambient air quality. Air quality conditions are best described and understood in the context of these standards; areas that meet, or attain, concentration-based ambient air quality standards are considered to have levels of pollutants in the ambient air that, based on the latest scientific knowledge, do not endanger public health or welfare.

[4] BAAQMD, 2013.

The US EPA, CARB, and regional air agencies such as the BAAQMD assess the air quality of an area by measuring and monitoring the amount of pollutants in the ambient air and comparing pollutant levels against NAAQS and CAAQS. Based on these comparisons, regions are classified into one of the following categories:

- **Attainment.** A region is "in attainment" if monitoring shows ambient concentrations of a specific pollutant are less than or equal to NAAQS or CAAQS. In addition, an area that has been re-designated from nonattainment to attainment is classified as a "maintenance area" for 10 years to ensure that the air quality improvements are sustained.
- **Nonattainment.** If the NAAQS or CAAQS are exceeded for a pollutant, the region is designated as nonattainment for that pollutant. It is important to note that some NAAQS and CAAQS require multiple exceedances of the standard in order for a region to be classified as nonattainment. Federal and state laws require nonattainment areas to develop strategies, plans, and control measures to reduce pollutant concentrations to levels that meet, or attain, standards
- **Unclassified.** An area is unclassified if the ambient air monitoring data are incomplete and do not support a designation of attainment or nonattainment.

Table 4.3-2 lists the NAAQS and CAAQS for common air pollutants and summarizes the SFBAAB attainment status.

Table 4.3-2: Ambient Air Quality Standards and SFBAAB Attainment Status

Pollutant	Averaging Time	California AAQS (A)		National AAQS (B)	
		Standard (C)	Attainment Status (D)	Standard (C)	Attainment Status (D)
Ozone	1-Hour	180 µg/m^3	**N**	--	--
	8-Hour	137 µg/m^3	**N**	147 µg/m^3	**N**
PM10	24-Hour	50 µg/m^3	**N**	150 µg/m^3	U
	Annual Average	20 µg/m^3	**N**	--	--
PM2.5	24-Hour	--	--	35 µg/m^3	**N** (E)
	Annual Average	12 µg/m^3	**N**	15 µg/m^3	A
Carbon Monoxide	1-Hour	23,000 µg/m^3	A	40,000 µg/m^3	A
	8-Hour	10,000 µg/m^3	A	10,000 µg/m^3	A
Nitrogen Dioxide	1-Hour	339 µg/m^3	A	188 µg/m^3	U[7]
	Annual Average	57 µg/m^3	--	100 µg/m^3	A
Sulfur Dioxide	1-Hour	655 µg/m^3	A	196 µg/m^3	U[8]
	24-Hour	105 µg/m^3	A	--	--
Sulfates	24-Hour	25 µg/m^3	A	--	--

Pollutant	Averaging Time	California AAQS (A)		National AAQS (B)	
		Standard (C)	Attainment Status (D)	Standard (C)	Attainment Status (D)
Hydrogen Sulfide	1-Hour	42 µg/m^3	U	--	--
Vinyl Chloride	24-Hour	26 µg/m^3	--	--	--

Notes:

(A) Table does not list CAAQS for lead and visibility reducing particles. California standards for ozone, carbon monoxide, sulfur dioxide (1 and 24-hour), nitrogen dioxide, suspended PM10 and PM2.5 are values that are not to be exceeded. The standards for sulfates, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded.

(B) Standards shown are the primary NAAQS designed to protect public health.

(C) All standards shown in terms of micrograms per cubic meter (µg/m^3) for comparison purposes.

(D) A= Attainment, N= Nonattainment, U=Unclassifiable.

(E) In January 2013, the U.S. EPA issued a final rule to determine the Bay Area attains the 24-hour PM2.5 NAAQS; however, the region will continue to be designated as "non-attainment" for the national 24-hour PM2.5 NAAQS until the BAAQMD submits a re-designation request and a maintenance plan to EPA for EPA review and approval.

Source: BAAQMD 2015a, modified by MIG.

4.3.1.4 Greenhouse Gases

Gases that trap heat in the atmosphere and affect regulation of the earth's temperature are known as "greenhouse" gases (GHG). Many chemical compounds found in the earth's atmosphere exhibit the GHG property. GHG allow sunlight to enter the atmosphere freely. When sunlight strikes the earth's surface, some of it is reflected back towards space as infrared radiation (heat). GHG absorb this infrared radiation and trap the heat in the earth's atmosphere.

GHG that contribute to climate regulation are a different type of pollutant than criteria or hazardous air pollutants because climate regulation is global in scale, both in terms of causes and effects. Some GHG are emitted to the atmosphere naturally by biological and geological processes such as evaporation (water vapor), aerobic respiration (carbon dioxide), and off-gassing from low oxygen environments such as swamps or exposed permafrost (methane); however, GHG emissions from human activities such as fuel combustion (e.g., carbon dioxide) and refrigerants use (e.g., hydrofluorocarbons) significantly contribute to overall GHG concentrations in the atmosphere, climate regulation, and global climate change. Human production of GHG has increased steadily since pre-industrial times (approximately pre-1880) and atmospheric carbon dioxide concentrations have increased from a pre-industrial value of 280 ppm in the early 1800's to 401 ppm in March 2015.[5] The effects of increased GHG concentrations in the atmosphere include climate change (increasing temperature and shifts in precipitation patterns and amounts), reduced ice and snow cover, sea level rise, and acidification of oceans. These effects in turn will impact food and water supplies, infrastructure, ecosystems, and overall public health and welfare.

The 1997 United Nations' Kyoto Protocol international treaty set targets for reductions in emissions of four specific greenhouse gases – carbon dioxide, methane, nitrous oxide, and sulfur hexafluoride -and two groups of gases – hydrofluorocarbons and perfluorocarbons. These GHG

[5] NOAA, 2015.

are the primary GHG emitted into the atmosphere by human activities. Water vapor is also a common GHG that regulates the earth's temperature; however, the amount of water vapor in the atmosphere can change substantially from day to day, whereas other GHG emissions remain in the atmosphere for longer periods of time. Black carbon consists of particles emitted during combustion; although a particle and not a gas, black carbon also acts to trap heat in the Earth's atmosphere. The six common GHG are described below.

- **Carbon Dioxide (CO_2)**. CO_2 is released to the atmosphere when fossil fuels (oil, gasoline, diesel, natural gas, and coal), solid waste, and wood or wood products are burned.
- **Methane (CH_4)**. CH_4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from the decomposition of organic waste in municipal solid waste landfills and the raising of livestock.
- **Nitrous oxide (N_2O)**. N_2O is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels.
- **Sulfur hexafluoride (SF_6)**. SF_6 is commonly used as an electrical insulator in high voltage electrical transmission and distribution equipment such as circuit breakers, substations, and transmission switchgear. Releases of SF_6 occur during maintenance and servicing as well as from leaks of electrical equipment.
- **Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs)**. HFCs and PFCs are generated in a variety of industrial processes. Although the amount of these gases emitted into the atmosphere is small in terms of their absolute mass, they are potent agents of climate change due to their high global warming potential.

GHG can remain in the atmosphere long after they are emitted. The potential for a particular greenhouse gas to absorb and trap heat in the atmosphere is considered its global warming potential (GWP). The reference gas for measuring GWP is CO_2, which has a GWP of one. By comparison, CH_4 has a GWP of 21, which means that one molecule of CH_4 has 21 times the effect on global warming as one molecule of CO_2. Multiplying the estimated emissions for non-CO_2 GHG by their GWP determines their carbon dioxide equivalent (CO_2e), which enables a project's combined global warming potential to be expressed in terms of mass CO_2 emissions. The GWPs and estimated atmospheric lifetimes of the common GHG are shown in Table 4.3-3.

Table 4.3-3: Global Warming Potential of Common Greenhouse Gases

GHG	GWP	GHG	GWP
Carbon Dioxide (CO_2)	1	Perfluorocarbons (PFCs)	
Methane (CH_4)	25	CF_4	6,500
Nitrous Oxide (N_2O)	298	C_2F_6	9,200
Hydrofluorocarbons (HFCs)		C_4F_{10}	7,000
HFC-23	14,800	C_6F_{14}	7,400
HFC-134a	1,430	Sulfur Hexafluoride (SF_6)	22,800
HFC-152a	140		

GHG	GWP	GHG	GWP
HCFC-22	1,700		

Source: CARB 2014

According to the Bay Area Air Quality Management District's *Source Inventory of Bay Area Greenhouse Gas Emissions*, GHG emissions in San Mateo County and the Bay Area totaled 8.5 and 95.8 million metric tons CO_2e ($MTCO_2e$), respectively, in 2007 (BAAQMD 2010a). Transportation sources accounted for more than 50% of the GHG emissions in San Mateo County during this time.

4.3.1.5 Sensitive Receptors

Some people are more affected by air pollution than others. The BAAQMD defines sensitive receptors as "facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly and people with illnesses. Examples include schools, hospitals and residential areas." Heightened sensitivity may be caused by health problems, proximity to the emissions source, and duration of exposure to air pollutants.

Sensitive receptors within 1,000 feet of the proposed CSUS middle school site include Ralston Middle School (directly west of the proposed site), residential receptors on Arroyo View Circle (approximately 700 feet east of the site boundary), Belmont Canyon Road (approximately 700 feet north of the site boundary), San Juan Boulevard (approximately 800 feet northeast of the site boundary), Tahoe Drive (approximately 950 feet west of the site boundary), and Wakefield Drive (approximately 875 feet south of the site boundary), and trail users in Water Dog Lake Park.

4.3.2 Regulatory Setting

This section discusses the federal, state, and local laws, and regulations that pertain to air quality and GHG emissions in the project area.

4.3.2.1 Federal

Federal Clean Air Act

The federal Clean Air Act, as amended, provides the overarching basis for both federal and state air pollution prevention, control, and regulation. The Act establishes the U.S. EPA's responsibilities for protecting and improving the nation's air quality. The U.S. EPA oversees federal programs for setting air quality standards and designating attainment status, permitting new and modified stationary sources of pollutants, controlling emissions of hazardous air pollutants, and reducing emissions from motor vehicles and other mobile sources. The U.S. EPA also requires that each state prepare and submit a State Implementation Plan (SIP) that consists of background information, rules, technical documentation, and agreements that an individual state will use to attain compliance with the NAAQS within federally-imposed deadlines. State and local agencies implement the plans and rules associated with the SIP, but the rules are also federally enforceable.

Climate Change

The United States Supreme Court ruled that greenhouse gases (GHGs) are air pollutants that were covered under the Clean Air Act for the first time in 2007, in *Massachusetts v. The Environmental Protection Agency.* The Court found that the US EPA has a mandatory duty to enact rules regulating mobile GHG emissions pursuant to the Federal Clean Air Act. The Court held that GHGs fit the definition of an air pollutant that causes and contributes to air pollution and may reasonably be anticipated to endanger public health or welfare. In 2009, the US EPA Administrator found that the current and projected concentrations of GHGs threaten public health and welfare of current and future generations and that combined emissions from new motor vehicles contribute to GHG pollution.

On August 9, 2011, the US EPA and the National Highway Traffic Safety Administration (NHTSA) announced standards to reduce GHG emissions and improve fuel efficiency for heavy-duty trucks and buses. On October 15, 2012, the US EPA and the NHTSA established a program to reduce GHG emissions and improve fuel economy standards for new cars and light trucks through 2025.

In 2014, the U.S. Supreme Court held that large stationary source GHG emitters are not be subject to the U.S. EPA's Prevention of Significant Deterioration and Title V Operating Permit programs based solely on their GHG emissions; however, projects subject to these permit programs due to emissions of criteria air pollutants (e.g., particulate matter) may also be required to implement best available control technologies to control GHG emissions. The U.S. EPA's Mandatory Reporting of Greenhouse Gases Rule requires facilities that emit 25,000 MTCO2e or more of GHG to report their GHG emissions to the U.S. EPA.

4.3.2.2 State

California Clean Air Act

In addition to being subject to federal requirements, air quality in California is also governed by more stringent regulations under the California Clean Air Act. In California, both the federal and state Clean Air acts are administered by CARB. It sets all air quality standards including emission standards for vehicles, fuels, and consumer goods as well as monitors air quality and sets control measures for toxic air contaminants. CARB oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional level.

California Air Resources Board

CARB, a part of the California Environmental Protection Agency, is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, the CARB conducts research, sets CAAQS, compiles emission inventories, develops suggested control measures, provides oversight of local programs, and prepares the SIP. For example, the CARB establishes emissions standards for motor vehicles sold in California, consumer products (e.g., hair spray, aerosol paints, and barbecue lighter fluid) and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. To address diesel particulate and other TAC emissions, the CARB published the Air Quality and Land Use Handbook: A Community Health Perspective (CARB

2005) as an "informational guide" to prioritize the important sources of TACs and reduce exposures to proximate populations. Furthermore, the CARB also oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level.

In-Use Off-Road Diesel Vehicle Regulation

CARB's In-Use Off-Road Diesel Equipment regulation is intended to reduce emissions of NO_x and PM from off-road diesel vehicles, including construction equipment, operating within California. The regulation imposes limits on idling; requires reporting equipment and engine information and labeling all vehicles reported; restricts adding older vehicles to fleets; and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines or installing exhaust retrofits for PM. The requirements and compliance dates of the off-road regulation vary by fleet size, and large fleets (fleets with more than 5,000 hp) must meet average targets or comply with Best Available Control Technology (BACT) requirements beginning in 2014. CARB has off-road anti-idling regulations affecting self-propelled diesel-fueled vehicles 25 hp and up. The off-road anti-idling regulations limit idling on applicable equipment to no more than five minutes, unless exempted due to safety, operation, or maintenance requirements.

California Global Warming Solutions Act (AB 32)

The CARB is the lead agency for implementing Assembly Bill (AB) 32, the California Global Warming Solutions Act adopted by the Legislature in 2006. AB 32 requires the CARB to prepare a Scoping Plan containing the main strategies that will be used to achieve reductions in GHG emissions in California.

In 2007, CARB approved a statewide 1990 emissions level and corresponding 2020 GHG emissions limit of 427 million metric tons of carbon dioxide equivalents ($MTCO_2e$) (CARB 2007). In 2008, CARB adopted its *Climate Change Scoping Plan*, which projects, absent regulation or under a "business as usual" (BAU) scenario, 2020 statewide GHG emissions levels of 596 million $MTCO_2e$ and identifies the numerous measures (i.e., mandatory rules and regulations and voluntary measures) that will achieve at least 174 million $MTCO_2e$ of reductions and reduce statewide GHG emissions to 1990 levels by 2020 (CARB 2009). In 2011, CARB released a supplement to the 2008 *Scoping Plan Functional Equivalent Document* (FED) that included an updated 2020 BAU statewide GHG emissions level projection of 507 million $MTCO_2e$,[6] and in 2014 CARB adopted its First Update to the Climate Change Scoping Plan.[7]

Executive Order B-30-15, 2030 Carbon Target and Adaptation, issued by Governor Brown in April 2015, sets a target of reducing GHG emissions by 40 percent below 1990 levels in 2030. By directing state agencies to take measures consistent with their existing authority to reduce GHG emissions, this order establishes coherence between the 2020 and 2050 GHG reduction goals set by AB 32 and seeks to align California with the scientifically established GHG emissions levels needed to limit global warming below two degrees celsius. There are five key goals for reducing GHG emissions in California through 2030: (1) increase renewable electricity to 50 percent; (2) double energy efficiency savings achieved in existing buildings and make

[6] CARB, 2011.

[7] CARB, 2014.

heating fuels cleaner; (3) reduce petroleum use in cars and trucks by up to 50 percent; (4) reduce emissions of short-lived climate pollutants, and (5) manage farms, rangelands, forests and wetlands to increasingly store carbon. In addition, the order requires CARB to work closely with other state agencies and the public to update the State's climate change Scoping Plan, scheduled for completion and adoption in 2016.

Under the Scoping Plan, approximately 85 percent of the state's emissions are subject to a cap-and-trade program where covered sectors are placed under a declining emissions cap. Emissions reductions will be achieved through regulatory requirements and the option to reduce emissions further or purchase allowances to cover compliance obligations. It is expected that emission reduction from this cap-and trade program will account for a large portion of the reductions required by AB 32.

CARB Mandatory Reporting of GHG Emissions

CARB has adopted the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (Title 17, CCR, Section 95100 – 95133 (17 CCR §95100 – 95133)), which requires facilities that emit greater than or equal to 10,000 metric tons of CO_2e from combustion annually to report their GHG emissions to the CARB.

Senate Bill 375

The Sustainable Communities and Climate Protection Act of 2008 (SB 375) was adopted to connect the GHG emissions reductions targets established in the Scoping Plan for the transportation sector to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excludes emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce vehicle miles travelled (VMT) and vehicle trips.

Specifically, SB 375 required CARB to establish GHG emissions reduction targets for each of the 18 regions in California managed by a metropolitan planning organization (MPO). The Metropolitan Transportation Association and the Association of Bay Area Governments adopted a sustainable communities strategy to meet state GHG reduction goals, Plan Bay Area. Plan Bay Area sets forth two required and eight voluntary performance standards covering a wide array of topics and issues, including a seven percent reduction in per capita GHG emissions from cars and light duty trucks by 2020, and a 15 percent per capita reduction by 2035.

Assembly Bill 1493

With the passage of Assembly Bill (AB) 1493 in 2002, California launched an innovative and pro-active approach for dealing with GHG emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards apply to automobiles and light trucks beginning with the 2009 model year. Although litigation was filed challenging these regulations and USEPA initially denied California's related request for a waiver, a waiver has since been granted.[8]

[8] CARB, 2013b.

California Green Building Standards Code

The project would be subject to the California 2010 Green Building Standards Code (CALGreen) for non-residential siting, design, and construction. The CALGreen code is the 11th of 12 parts to Title 24 of the California Code of Regulations, also known as the California Building Standards Code. The purpose of the CALGreen code is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts with a positive environmental impact and to encourage sustainable construction practices related to planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. The CALGreen code is typically implemented at the local level and may be augmented by local building standards.

4.3.2.3 Regional

Bay Area Air Quality Management District

The BAAQMD is the regional agency responsible for air quality regulation within the Bay Area Air Basin. The agency is primarily responsible for assuring that the National and State ambient air quality standards are attained and maintained in the Bay Area. The BAAQMD regulates air quality through its planning and review activities. The district has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits; it can also impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The BAAQMD regulates new or expanding stationary sources of toxic air contaminants in its Regional Clean Air Plans.

The BAAQMD has developed CEQA guidelines to assist local jurisdictions in evaluating potentially adverse impacts on air quality. BAAQMD's guidelines include procedures for evaluating whether a project's construction and operational criteria pollutant emissions would result in a significant air quality impact, along with mitigation to reduce or eliminate any significant air impacts. BAAQMD's guidelines also include procedures for evaluating toxic air contaminant (TAC) impacts resulting from project construction and operation. These procedures consist of a step-by-step approach for determining whether a project's TAC emissions would result in significant acute, chronic, or carcinogenic health risks.

BAAQMD Rules and Regulations

The BAAQMD currently has 12 regulations containing more than 100 rules that control and limit emissions from sources of pollutants. Table 4.3-4 summarizes the major BAAQMD rules and regulations that may apply to the proposed project.

Table 4.3-4: Potentially Applicable BAAQMD Rules and Regulations

Regulation	Rule	Description
2 – Permits	1 – General Requirements	Includes criteria for issuance or denial of permits, exemptions, appeals against decisions of the District actions on applications.
2 – Permits	2 – New Source Review	Provides for the review of new and modified sources of pollutants; requires use of Best Available Control Technology and emissions offsets to achieve no net increase in nonattainment pollutants; implements Prevention of Significant Deterioration review for attainment pollutants.
6 – Particulate Matter	1 – General Requirements	Limits visible particulate matter emissions.
9 – Inorganic Gaseous Pollutants	7 – NOx Emission and CO from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters	Larger boilers are required to have a District-issued Permit to Operate and subject to subsequent review.
9 – Inorganic Gaseous Pollutants	8 – NOx and CO from Stationary Internal Combustion Engines	Limits emissions of NOX and CO from stationary internal gas combustion engines more than 50 brake horsepower.
11 – Hazardous Pollutants	2 – Asbestos Demolition, Renovation, and Manufacturing	Controls emissions of asbestos to the atmosphere during demolition.

Source: BAAQMD 2014a

2010 Clear Air Plan

On September 15, 2010 the BAAQMD adopted its Bay Area 2010 Clean Air Plan. This plan updates the District's 2005 Ozone Strategy, addresses ozone, PM, toxic air contaminants, and greenhouse gas emissions in a single, integrated document, and contains 55 control strategies that describe specific measures and actions that the District and its partners will implement to improve air quality, protect public health, and protect the climate. These measures focus on stationary and area sources, mobile sources, transportation control measures, land use, and energy and climate measures (BAAQMD 2010b). The BAAQMD has since initiated the process to update its 2010 Clean Air Plan (BAAQMD 2014b).

4.3.2.4 Local – City of Belmont

City of Belmont General Plan

The Conservation Element of the City of Belmont General Plan sets forth two goals related to air quality and GHG:

- Goal 5: As appropriate, to comply and encourage compliance with regulations designed to achieve state and federal air quality standards.
- Goal 6: To provide for the efficient use of energy resources in activities carried out or approved by the City.

The following policies from the Conservation Element are relevant to the proposed project:

- Policy 7: The City will support public and private efforts to conserve energy and to explore alternative energy sources giving careful consideration to impacts on safety, aesthetics, and noise.
- Policy 10: Private and public resource recycling and recovery efforts shall be encouraged by the City

Construction and Demolition Waste Recycling Program

The Belmont Construction and Demolition Waste Recycling Program implements the provisions of California Solid Waste Recycling Act of 1989, which requires all cities to divert 50% of its solid waste from landfills. The city's recycling program requires sufficient space for material recycling containers at work sites, as well as other provisions related to making a good faith effort to recycle construction debris.

4.3.3 Impacts and Mitigation Measures

This subsection analyzes impacts related to air quality and GHG emissions that could result from implementation of the project. It begins with criteria of significance, which establish the thresholds for determining whether an impact is significant, and concludes with air quality impacts associated with the project.

4.3.3.1 Criteria of Significance

The proposed project would have significant air quality and GHG impacts if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal, state, or regional ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people;
- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

In May 2011, the BAAQMD published new *CEQA Air Quality Guidelines* that contain the BAAQMD's recommendations to Lead Agencies for evaluating and assessing the significance of a project's potential air quality impacts.[9, 10]

The District's guidelines contain screening criteria to provide lead agencies with a conservative indication of whether a proposed project could result in potentially significant air quality impacts. However, the BAAQMD Guidelines state that if a project includes emissions from stationary source engines and industrial sources subject to District rules and regulations, the screening criteria should not be used and the lead agency should evaluate potential air quality impacts using the emissions quantification guidance and thresholds of significance outlined in the District's *CEQA Air Quality Guidelines.*

The BAAQMD's construction- and operational-related thresholds of significance for criteria pollutants and toxic air contaminants are summarized in Table 4.3-5.

Table 4.3-5: BAAQMD Thresholds of Significance[(A)]

Pollutant	BAAQMD Thresholds of Significance		
	Construction Emissions	Operational Emissions	
	Daily Emissions (lb/day)	Daily Emissions (lb/day)	Annual Emissions (tons per year)
ROG	54	54	10
NO_X	54	54	10
Exhaust PM10	82	82	15
Exhaust PM2.5	54	54	10
Fugitive Dust $PM_{10}/PM_{2.5}$	Best Management Practices	*None*	
Local CO	*None*	9.0 ppm (8-hr. avg.), 20.0 ppm (1-hr. avg.)	
Risks and Hazards – New Source/Receptor (Individual)	Compliance with Qualified Community Risk Reduction Plan; or Increased cancer risk of >10.0 in a million; and Increased non-cancer risk of >1.0 Hazard Index (chronic or acute); and Ambient $PM_{2.5}$ increase: >0.3µg/m^3 annual average		

[9] The BAAQMD Board of Director's adopted new CEQA guidelines in June 2010, delaying implementation of some of the new significance thresholds until 2011. In March 2012, the Alameda County Superior Court ruled the BAAQMD had failed to comply with CEQA when it adopted its new thresholds of significance and ordered the Air District to set aside the thresholds and cease dissemination of them until the Air District had complied with CEQA. Thus, the BAAQMD is no longer recommending that the thresholds adopted in 2010 be used as a generally applicable measure of a project's significant air quality impacts. The case has been appealed and is under limited review by the California Supreme Court. The Alameda County Superior Court did not address the merits of the thresholds themselves, which are supported by substantial evidence contained in the BAAQMD's Proposed Thresholds of Significance Report (BAAQMD 2010c). In light of this evidence, the City of San José is applying the thresholds of significance adopted by the BAAQMD to the proposed project despite the ongoing legal action.

[10] BAAQMD, 2011b.

Pollutant	BAAQMD Thresholds of Significance	
	Construction Emissions	Operational Emissions
Risks and Hazards – New Source/Receptor (Cumulative)	Compliance with Qualified Community Risk Reduction Plan; or Increased cancer risk of >100 in a million (from all local sources); and Increased non-cancer risk of >10.0 Hazard Index (from all local sources) (chronic); and Ambient $PM_{2.5}$ increase: >0.8μg/m^3 annual average (from all local sources)	
Accidental Release of Acutely Hazardous Pollutants	*None*	Storage or use of acutely hazardous materials locating near receptors or receptors locating near stored or used acutely hazardous materials considered significant
Odors	*None*	Complaint History – 5 confirmed complaints per year averaged over three years

Source: BAAQMD 2011

4.3.3.2 Methodology

Construction and Operational Emissions of Criteria Air Pollutants and GHGs

Emissions of criteria air pollutants and their precursors and GHGs were estimated using the California Emissions Estimator Model (CalEEMod), version 2013.2.2. Table 4.2-5 presents a summary of the construction phase, duration, and equipment inputs used in the model. Construction would occur from approximately April 2016 to August 2017, a 16-month period that would include approximately 350 active construction work days. Project operation would generate emissions from vehicle trips, landscaping equipment, utility and other small sources such as cleaning products and painting. According to the BAAQMD CEQA Guidelines (BAAQMD 2011), project emissions would be considered significant if they would exceed any applicable threshold of significance listed in Table 4.3-5.

Table 4.3-6: Duration and Equipment for Construction-Related Activities

Construction Phase	Duration (days)(A)	Typical Equipment Used(B)
Existing Building Demolition	55	Excavator, Dozer, Concrete Saw
Existing Landscape / Hardscape Removal	55	Loader, Scraper
New Building Foundations	135	Excavator, Loader/Backhoe, Grader
New Building Slab / Steel Work	47	Crane, Dozer, Welder, Forklifts
New Building Walls / Exterior Finishing	66	Crane, Loader, Material Handlers
Site Paving and Utilities	65	Paver, Roller, Trencher
New Building Coatings	19	Compressors

(A) Days refers to total work days in the construction phase. Due to phase overlap, the total days do not sum to 350. See Appendix C for complete schedule input details.

(B) The typical equipment list does not reflect all equipment that would be used during the construction phase. Not all equipment would operate eight hours per day each work day. See Appendix C for complete CalEEMod inputs for construction equipment type and operating assumptions.

The BAAQMD CEQA Guidelines contain screening criteria to determine whether there would be less than significant CO impacts:

1. Project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.
2. The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
3. The project traffic 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, below-grade roadway).

The screening criteria are designed to provide lead agencies with a conservative indication of whether a project could result in potentially significant air quality impacts. If a project meets all of the screening criteria then it would not result in a potentially significant air quality impact.

Toxic Air Contaminants (TACs)

The proposed project is considered a sensitive land use; therefore, the potential risks and hazards from existing sources of TACs within 1,000 feet of the proposed project were evaluated using publicly available information from the BAAQMD.

Additionally, construction of the proposed project would emit diesel particulate matter (DPM), a TAC, which could pose risks and hazards to nearby sensitive receptors, including Ralston Middle School and residences within approximately 1,000 feet of the site. Therefore, a quantitative health risk assessment (HRA) was conducted to estimate the potential health risks to residents during project construction. The project's operational emissions were not evaluated since project operation would not involve heavy equipment use or other activities that would emit substantial amounts of TACs.

Health Risk Assessment

In order to evaluate the impacts of DPM on nearby sensitive receptors, a HRA was conducted consistent with OEHHA[11] and BAAQMD guidelines[12] for determining local community risks and hazards. The HRA is a process followed to evaluate the health risks associated with the project. The HRA evaluated project emissions associated with diesel construction equipment. Gasoline-fueled vehicles emit various TACs in much smaller quantities and health toxicity compared to DPM. Thus, gasoline fueled emission sources were not included in the health risk assessment. Detailed information on the methodology and data used to conduct the HRA since air dispersion modeling was required is summarized below.

As described above, CalEEMod was used to calculate annual emissions from the proposed construction activities. For the purposes of the health risk assessment, the total annual PM_{10} exhaust emissions for off-road construction equipment and exhaust emissions from on-road

[11] OEHHA, 2015.

[12] BAAQMD, 2011.

vehicles (haul trucks, vendor trucks and worker vehicles) was considered. Although only a fraction of the emissions from off-site vehicle travel would occur near the areas where health risks were evaluated, the total emissions from the entire trip lengths associated with construction activities at each site were used in the health risk assessment. The US EPA's AERMOD dispersion model was used to predict DPM concentrations at existing sensitive receptors near the project site. The AERMOD dispersion model is a US EPA-approved and BAAQMD-recommended model for simulating the dispersion of emissions.

Meteorological Data: AERMOD requires meteorological data as an input into the model. This is typically processed using AERMET, a pre-processor to AERMOD. AERMET requires surface meteorological data, upper air meteorological data and surface parameter data. For this project the data for San Francisco Airport was utilized since it is one of the closest surface meteorological stations with hourly data available[13]. Upper air data was obtained from Oakland International Airport since this is the closest upper air meteorological station with data available. Two complete years of meteorological data from October 2010 through September 2012 were utilized.

Terrain: Terrain was incorporated by using AERMAP to import the elevation of the project vicinity using data from the National Elevation Dataset (NED) with a resolution of 1/3 arcsecond. Receptors were modeled using a Cartesian grid with 25 meter by 25 meter spacing as well as several discrete receptors. Receptors were modeled at a height of 1.5 meters (4.9 feet).

Source Parameters: The dispersion modeling utilized area sources to represent emissions from construction activities occurring at the project site. An emission release height of six meters was assumed for construction equipment exhaust emissions; this elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. An initial vertical plume dimension of 2.8 meters was also used in the dispersion modeling. Construction emissions were modeled as occurring daily from 7 a.m. to 6 p.m., when the majority of construction activity would occur.

Exposure Factors:

Potential sensitive receptors were characterized as residents or students. The maximally exposed residential and student receptor located near the project site is reported.

The exposure parameters used for estimating excess lifetime cancer risks and chronic non-cancer Hazard Index (HI) for all potentially exposed populations were obtained using risk assessment guidelines from OEHHA.

The inhalation dose is a function of the concentration of a chemical and the intake of that chemical. The dose can be calculated as follows:

$$Dose = Conc * DBR * A * \left(\frac{EF}{365}\right) * \ 10^{-6}$$

[13] Aermod-compatible met data was processed and provided by Lakes Environmental.

Where:

Dose	=	Dose of chemical (mg/kg-day)
Conc	=	Chemical concentration in air ($\mu g/m^3$)
DBR	=	Daily Breathing Rate (L/kg-day)
A	=	Inhalation Adsorption Factor (1)
EF	=	Exposure Frequency (days/year)
10^{-6}	=	Conversion Factor (m^3/L and mg/µg)

The DBR was set to the 95 percentile for students and residential receptors as recommended by OEHHA. The exposure frequency for residential receptors was 350 days per year, consistent with a resident being present at the home except for a two week vacation. The exposure frequency for student receptors was 180 days per year consistent with the highest exposure that is reasonably expected to occur for a student; the fraction of time each spent at school was assumed to be eight hours. The averaging time for lifetime cancer risks is based on 70-years for residential receptors and nine years for student receptors.

Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories: cancer and non-cancer endpoints. Toxicity values used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

In this HRA, diesel exhaust, a complex mixture that includes hundreds of individual constituents and is identified by the State as a known carcinogen is the only chemical of potential concern quantified. Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole.

The estimated excess lifetime cancer risk for resident was adjusted cancer risk adjustment factors (CRAF) recommended by BAAQMD and OEHHA.[14] This approach accounts for an "anticipated special sensitivity to carcinogens" of children such as students. Cancer risk estimates are weighted by an adjustment factor (ASF) of 3 for school receptors by a factor of 1.7 for lifetime residential receptor.

Risk Characterization

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

[14] OEHHA, 2015.

$$Cancer\ Risk\ (per\ million\ population) = CPF * Dose * CRAF * \left(\frac{ED}{AT}\right) * FAH * 10^6$$

Where:

Risk	=	Excess cancer risks from inhalation exposure to a particular potential carcinogen (unitless)
Dose	=	Dose of chemical (mg/kg-day)
CPF	=	Cancer Potency Factor for DPM (1.1 mg chemical/kg body weight-day)$^{-1}$
CRAF	=	Cancer Risk Adjustment Factor (unitless)
ED	=	Exposure Duration (years)
AT	=	Averaging time for cancer risks
FAH	=	Fraction of time spent each day at home / school

The potential for exposure to result in chronic non-cancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the chemical-specific non-cancer chronic reference exposure levels (RELs). When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the potential for adverse chronic non-cancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI. For evaluation of the Project, DPM is the only pollutant evaluated for chronic non-cancer risks; therefore the HQ for DPM is the same as the overall HI.

The equations used to calculate the chemical-specific HQs and the overall HI are:

$$Chronic\ HQ_i = C_i/REL_i$$

$$Chronic\ HI = \sum HQ_i$$

Where:

Chronic HQ_i	=	Chronic Hazard Quotient for $Chemical_i$ (unitless)
Chronic HI	=	Hazard Index (unitless)
Ci	=	Annual Average Air Concentration for $Chemical_i$ (µg/m^3)
REL_i	=	Chronic Non-cancer Reference Exposure Level for $Chemical_i$ (µg/m^3)

The chronic inhalation REL for DPM is 5 µg/m^3. No acute non-cancer impacts were estimated since there is no acute reference exposure level for DPM.

Odors

Odors would be considered significant if the project would result in a frequent exposure of members of the public to objectionable odors or five or more confirmed complaints per year averaged over three years. According to the BAAQMD, typical uses that may result in significant odor impacts include wastewater treatment plant, sanitary landfill, transfer station, composting facility, petroleum refinery, asphalt batch plant, chemical manufacturing, fiberglass manufacturing, painting/coating operations, rendering plant, and coffee roasters.

4.3.3.3 Less Than Significant Impacts

Project implementation would result in the following less than significant air quality and GHG impacts.

Impact AQ/GHG-1: Construction and operation of the project would not conflict with or obstruct implementation of the 2010 Bay Area Clean Air Plan. (LTS)

Construction and operation of the proposed project would not conflict with or obstruct implementation of the BAAQMD's 2010 Clean Air Plan. The 2010 Clean Air Plan includes criteria air pollutant emissions from construction and mobile sources in its emission inventories and plans for achieving attainment of air quality standards. The BAAQMD's 2010 Clean Air Plan also contains 55 control strategies grouped into five categories: Stationary Source Measures, Transportation Control Measures, Mobile Source Measures, Land Use and Local Impact Measures, and Energy and Climate Measures.

Most of these control strategies either do not directly apply to the project (e.g., stationary source measures) or are implemented at the local and regional level by municipal government and the BAAQMD (e.g., provide incentives for vehicle fleet improvements); however, some are relevant to the proposed project. Table 4.3-7 lists the Clean Air Plan measures that are relevant to the project.

Table 4.3-7: Project Consistency with BAAQMD 2010 Clean Air Plan

2010 Clean Air Plan Control Strategy	Project Consistency
Transportation Control Measures	
C-1: Voluntary Employer-Based Trip Reduction C-2: Safe Routes to Schools and Safe Routes to Transit C-3: Ridesharing Services and Incentives C-4: Public Outreach and Education C-5: Promote Smart Driving D-1: Bicycle Access and Facilities Improvements	The project includes the use of van shuttles and busses to transport students and reduce vehicle trips. In addition, the project design includes bicycle storage and changing rooms. CSUS would provide information to help reduce single occupancy vehicle trips (e.g. 511 Rideshare) and promote use of alternative modes of transportation (e.g., bicycle, carpool, transit).
Energy and Climate Measures	
1 – Energy Efficiency 2 – Renewable Energy 3 – Urban Heat Island Mitigation 4 – Tree Planting	The project is designed to achieve the equivalent of a Leadership in Energy and Environmental Design Silver rating, and may include the following design strategies: optimized energy performance, on-site renewable energy, construction waste management, low-emitting construction materials (i.e., adhesives, paints), cool roofs, and tree preservation / relocation as feasible.

As shown in Table 4.3-7, the project would be consistent with relevant strategies from the BAAQMD's 2010 Clean Air Plan. Therefore, this impact would be ***less than significant***.

Impact AQ/GHG-2: Construction and operation of the project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. (LTS)

The proposed project would generate short- and long-term criteria air pollutant emissions from construction equipment, vehicle trips, water and space heating, and landscaping equipment. However, as described below, the short- and long-term emissions generated by the project would be consistent with and/or below all applicable BAAQMD CEQA thresholds of significance and would, therefore, not cause or substantially contribute to violations of air quality standards.

Short-Term Construction Emissions

Project construction is planned to begin in April 2016 and last approximately 16 months. Project construction activities would include demolition of the existing buildings (totaling 84,500 square feet), removal of existing landscaping and hardscapes (approximately 80,000 square feet), and construction of the new school facilities, including paving operations for parking on approximately 0.5 acres of the site. These activities would generate fugitive dust and exhaust emissions from off-and on-road construction related activities. Cut and fill at the site would be balanced for all facilities except the proposed pool, which require approximately 1,400 cubic yards of soil off-hauling..

For all projects, the BAAQMD recommends implementation of eight "Basic Construction Mitigation Measures" (BAAQMD 2011, pg. 8-3) to reduce construction fugitive dust emissions levels. These basic measures are also used use to meet the BAAQMD's best management practices (BMPs) threshold of significance for construction fugitive dust emissions (i.e., the implementation of all basic construction measures renders fugitive dust impacts a less than significant impact).

Accordingly, the City would require CSUS construction contractors to incorporate the following BMPs into all construction related bid, design, and engineering documents:

- 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 track-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 shall be prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 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 the California airborne toxics control

measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.

- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
- A publicly visible sign shall be posted with the telephone number and person to contact at the Town of Belmont and CSUS regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Project construction activity emissions were modeled using CalEEMOD, Version 2013.2.2. The modeled emissions estimates are show in Table 4.3-8, and incorporate the use of the dust control measures listed above.

Table 4.3-8: CSUS Belmont Middle School Construction Emissions

Timeframe	Pollutant Emissions (Tons Per Year)						
	ROG	NOx	CO	PM10		PM2.5	
				Dust	Exhaust	Dust	Exhaust
April 2016 – December 2016	0.4	4.1	2.7	0.5	0.2	0.7	0.2
January 2017 – August 2017	0.9	2.0	1.6	0.0	0.1	0.1	0.0
Total Construction Emissions	1.3	6.1	4.3	0.5	0.3	0.8	0.2
	Pollutant Emissions (Average Pounds per Day)(A)						
Timeframe	**ROG**	**NOx**	**CO**	**PM10**		**PM2.5**	
				Dust(B)	**Exhaust**	**Dust(B)**	**Exhaust**
April 2016 – August 2017	7.5	34.5	24.5	2.8	1.9	4.7	1.4
BAAQMD Threshold	54	54	--	BMPs	82	BMPs	82
Potential Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**	**No**

See Appendix C for CalEEMod emissions estimates.

(A) Average daily emissions assume 352 total active construction days (16 months x 22 days per month).

(B) For all projects, the BAAQMD recommends implementing eight basic construction best management practices (BMPs) to control fugitive dust from construction activities. These BMPS are included in the project and are not mitigation measures.

As shown in Table 4.3-8, the proposed project's emissions during construction activities would not exceed BAAQMD construction-related significance thresholds. Therefore, the project's short-term construction impacts would be ***less than significant***.

Long-Term Operational Emissions

Project operation would emit air pollutants from vehicle trips to and from the site, space heating, landscaping equipment, consumer products (i.e., cleaning solvents), and the re-application of paints and other building coatings. Long-term operational emissions were modeled using CalEEMOD, Version 2013.2.2.

For the purposes of estimating vehicle trip emissions, the CalEEMod default trip rate associated with the "junior high school" land use type was used. This trip rate is 13.78 weekday trips per 1,000 square feet of building space. At 60,000 square feet of building space, this trip rate equates to approximately 827 total trips per week day. The use of the default trip rate in the emissions modeling likely overestimates mobile source emissions because the traffic impact analysis prepared for the project estimates the project would result in a net increase of 578 new daily AM, school PM, and PM peak hour trips; it is unlikely the project would generate an additional 250 daily vehicle trips during the weekday. The project's Saturday trip rate was assumed to be 50 percent of the weekday trip rate (equivalent to 415 total trips); Sunday trips were assumed to be equal to zero. The modeled emissions estimates are show in Table 4.3-9.

Table 4.3-9: CSUS Belmont Middle School Operational Emissions

Pollutant Source	Pollutant Emissions (Tons Per Year)				
	ROG	NOx	CO	Total PM10	Total PM2.5
Area Sources (e.g., Landscaping, Painting)	0.34	0.00	0.00	0.00	0.00
Energy	0.00	0.05	0.04	0.00	0.00
Mobile Sources (i.e., vehicle trips)	0.44	1.20	5.0	0.78	0.22
TOTAL	0.79	1.24	5.04	0.78	0.22
BAAQMD Threshold	10	10	--(A)	15	15
Potential Significant Impact?	**No**	**No**	**No**	**No**	**No**

See Appendix C for CalEEMod emissions estimates

(A) BAAQMD CO significance thresholds are based ambient air quality standards (see Table 4.3-5). According to BAAQMD screening criteria, a project does not result in significant CO impacts if it would be consistent with the congestion management program and not increase traffic volumes to more than 44,000 vehicles per hour at impacted intersections. The CSUS Belmont middle school would be consistent with these criteria and would not result in a significant CO impact.

As shown in Table 4.3-9, the proposed project's long-term, operational emissions would not exceed BAAQMD operational-related significance thresholds. Therefore, the project's long-term operational emissions impacts would be ***less than significant***.

Impact AQ/GHG-3: Construction and operation of the project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal, state, or regional ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). (LTS)

As discussed in impacts AQ/GHG-1 and AQ/GHG-2 above, the project would not result in construction or operational emissions that exceed BAAQMD thresholds of significance. In developing its CEQA significance thresholds, the BAAQMD first considers the emission levels at which a project's individual emissions are considerable. The BAAQMD then considers projects that result in emissions that exceed its CEQA significance thresholds to result in individual impacts that are cumulatively considerable and significant. The proposed project would not exceed any BAAQMD CEQA significance thresholds. Therefore, this impact would be ***less than significant***.

Impact AQ/GHG-4: Operation of the project would not expose sensitive receptors to substantial pollutant concentrations resulting in cancer and noncancer risks. (LTS)

Risk and Hazards to Existing Receptors

Project-related construction activities would emit $PM_{2.5}$ and PM_{10} from equipment exhaust. Nearly all the project's $PM_{2.5}$ emissions from equipment exhaust would be diesel particulate matter (diesel PM), a TAC (please see impact AQ/GHG-8 for a discussion of pollutant concentrations and corresponding health risks).

Project operation would emit pollutants primarily from gasoline-powered vehicle trips along local roadways (see Table 4.3-9). These emissions would be substantially below all BAAQMD CEQA significance thresholds, spread over a large area, and intermittent. Therefore, project operation not result in or substantially contribute to substantial pollutant concentrations at existing sensitive receptors, including Ralston Middle School and residences within 1,000 feet of the proposed site.

The project would be consistent with the San Mateo County Congestion Management Program and would not cause traffic volumes at any study intersection to increase to more than 44,000 vehicles per hour. The project, therefore, would be consistent with BAAQMD screening criteria for CO and would not result in substantial CO concentrations. For these reasons, the potential risks and hazards to existing sensitive receptors from project operation would be ***less than significant.***

Risk and Hazards to New Sensitive Receptors

The proposed CSUS middle school project would result in the placement of new receptors sensitive to local air quality conditions (i.e., middle school students). According to publicly available BAAQMD data, existing sources of TAC emissions within 1,000 feet of the proposed school site include Ralston Avenue and one stationary source of emissions, a generator operated by the Mid-Peninsula Water District approximately 590 feet east of the project site.[15]

The health risks and hazards posed by these emission sources to project receptors are shown in Table 4.3-10. Non-carcinogenic risk level expressed in terms of the sum of all hazard quotients for all chemicals a receptor is exposed to, or Hazard Index (HI).

As shown in Table 4.3-10, the risk and hazards from existing sources within 1,000 feet of the proposed CSUS Belmont middle school site would not exceed BAAQMD risk thresholds for new sensitive receptors. Therefore, this impact would be ***less than significant***.

[15] BAAQMD, Facility ID 777.

Table 4.3-10: CSUS Belmont Middle School Receptor Risks and Hazards

Source	PM2.5 (µg/m³)(A)	Increased Cancer Risk Per Million Population(B)	Non-Cancer Hazard Index(c)	
			Chronic	Acute
Stationary Source Facility ID 777	<0.01	2.55	<0.01	<0.01
Ralston Avenue	0.12	5.01	<0.02	<0.02
Total Existing Risk	0.12	7.56	<0.02	<0.02
BAAQMD Threshold (Individual)	0.3	10	1	1
BAAQMD Threshold (Cumulative)	0.8	100	10	10

Source: BAAQMD 2012 and 2015.

Table Notes:

(A) BAAQMD threshold represents the annual average PM2.5 receptor exposure that should not be exceeded.

(B) Increased cancer risk level expressed in terms of excess cancer cases per million population. BAAQMD threshold represents the cancer burden or number of excess cancer cases that could occur in a general population such as community or city based on a lifetime of exposure (70 years) to carcinogens.

Impact AQ/GHG-5: Construction and operation of the project would not create objectionable odors affecting a substantial number of people. (LTS)

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. Major sources of odor typically are 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.

Construction related activities may result in odors associated with the intermittent operation of diesel-powered equipment, and asphalt surfacing and paving activities may also generate odors. The effects of these odor sources would be temporary and short in duration. Similarly, indirect operational activities would not result in objectionable odors. Therefore, the impact would be ***less than significant***.

Impact AQ/GHG-6: Construction and operation of the project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. (LTS)

The proposed project would generate GHG emissions from construction equipment, vehicle trips, water and space heating, landscaping equipment, and the conveyance and use of water, wastewater, electric, natural gas, and solid waste; however, as described below, project GHG emissions would be below BAAQMD CEQA thresholds of significance and would, therefore, not have a significant impact on the environment.

As described under Impact AQ/GHG-2, project construction activities are expected to occur over an approximately 16-month period beginning in April 2016. As estimated using CalEEMod, Version 2013.2.2 (see Appendix C), project construction activities would emit a total of approximately 570 MTCO2e over the approximately 16-month construction period. The BAAQMD does not have an adopted GHG significance threshold for construction activities. However, as reference, the project's total construction-related GHG emissions (570 MTCO2e)

would not exceed the BAAQMD's GHG operational significance threshold for land use projects of 1,100 MTCO2e per year.[16] When amortized over a typical 30-year project lifetime, the project's construction GHG emissions would average 19 MTCO2 per year. The project's amortized construction emissions can be added to the estimated long-term annual GHG emissions that the project would produce and appropriately compared to the BAAQMD's thresholds of significance for long-term operational GHG emissions.

Project operation would emit GHGs from vehicle trips to and from the site (approximately 2,049,200 total vehicle miles travelled per year), natural gas consumption (approximately 450 Million British Thermal Units (MMBTU) per year), electricity consumption (approximately 400 megawatt-hours (MW-hrs) per year), indoor water use and conveyance (approximately 600,000 gallons per year, including pool), outdoor water use and conveyance (approximately 50,000 gallons per year), and solid waste generation (approximately 15 tons per year).

The project would also involve approximately 100 pounds of refrigerant charging for freezers and air conditioning systems, as well as the use landscaping equipment. Operational GHG emissions were modeled using CalEEMOD, Version 2013.2.2. For the purposes of estimating GHG emissions, CalEEMod default trip rate associated with the "junior high school" land use type was used. As described under Impact AQ/GHG-2, the use of this value likely overestimates potential GHG emissions. Natural gas, electricity, water use, solid waste, and refrigerant charges for the project were provided by CSUS; natural gas and electricity usage was scaled up by 15% to account for usage associated with the proposed pool. The modeled emissions estimates are shown in Table 4.3-11.

As shown in Table 4.3-11, the proposed project's GHG emissions would not exceed BAAQMD CEQA significance thresholds for land use projects. It should be noted that the emissions estimates presented in Table 4.3-11 are considered very conservative (i.e., worst-case) because they likely overestimate vehicle trip emissions and do not take into account that the project would be designed to achieve the equivalent of a Leadership in Energy and Environmental Design Silver, which would reduce emissions associated with the project's energy consumption.

Therefore, the project's GHG emissions would be ***less than significant***.

[16] This operational threshold is not an appropriate benchmark for considering the significance of construction GHG emissions since construction GHG emissions would occur over a 16 month year period only.

Table 4.3-11: CSUS Belmont Middle School GHG Emissions

Emissions Source	GHG Emissions (Tons MTCO2e Per Year)
Amortized Construction Emissions	19(A)
Area Sources (e.g., Landscaping, Painting)	< 0.0
Energy (Natural Gas, Electricity)	190
Mobile Sources (i.e., vehicle trips)	835
Refrigerant Leaks	7(B)
Waste	7
Water	2
TOTAL	1,060
BAAQMD Threshold	1,100
Potential Significant Impact?	**No**

See Appendix C for CalEEMod emissions estimates.

(A) Construction emissions based on 570 total MTCO2e and a 30-year amortization period.

(B) Refrigerant leaks assume 100 lbs of total refrigerant charge, a 10% leak rate, and use of the refrigerant HFC-134a, which has a GWP of 1,430.

Impact AQ/GHG-7: Construction and operational emissions associated with the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. (LTS)

The proposed project would not conflict with any plan, policy, or regulation adopted for the purposes of reducing GHG emissions. The project would not be subject to any GHG permitting or reporting regulation. As discussed under Impact AQ/GHG-6, the proposed project's GHG emissions would be below BAAQMD CEQA significance thresholds for land use projects, which were set at a level that would enable growth in the Bay Area without conflicting with the state's goal to reduce GHG emissions to 1990 levels by 2020, as established by AB32 and CARB's Scoping Plan.

The proposed project would not conflict with the performance standards of Plan Bay Area. As discussed in the Traffic Impact Analysis prepared for the project, a recent commute survey of CSUS middle school parents determined that nearly 30 percent of middle school students currently carpool to campus and that approximately 35 percent of them travel to campus by train/shuttle and bus. Notwithstanding this high level of voluntary participation, CSUS intends to require as a condition of admission that all middle school families commit to support and participate in the trip reduction plan, and estimates that this trip reduction program would result in nearly 100 of the 240 students using van shuttles or buses to commute to the school. Thus, the project would not conflict with Plan Bay Area, which sets a seven percent reduction in per capita GHG emissions from cars and light duty trucks by 2020, and a 15 percent per capita reduction by 2035.

The proposed project would be designed to achieve the equivalent of a Leadership in Energy and Environmental Design Silver rating; however, no certification would be sought by CSUS. Nonetheless, the project would also be subject to the California 2013 Green Building Standards Code (CALGreen) for non-residential siting, design, and construction, which would ensure sustainable construction practices related to planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality are incorporated into the project. In addition, CSUS estimates that up to 90 percent of construction debris would be recycled. Thus, the project would comply with the requirements of the City of Belmont's Construction and Demolition Waste Recycling Program

For these reasons, the project would not conflict with any plan, policy, or regulation adopted for the purpose of reducing GHG emissions. This impact would be ***less than significant***.

4.3.3.4 Significant Impacts

Impact AQ/GHG-8: Construction of the project would expose sensitive receptors to substantial pollutant concentrations resulting in cancer and noncancer risks. (S)

Construction-related activities could result in the generation of TACs, specifically diesel PM, from on-road haul trucks and off-road equipment exhaust emissions. The potential carcinogenic risks and non-carcinogenic health hazards associated with the proposed construction activities and estimated construction emissions were quantified using BAAQMD and recent OEHHA risk assessment guidelines for daily breathing rates (OEHHA 2015).

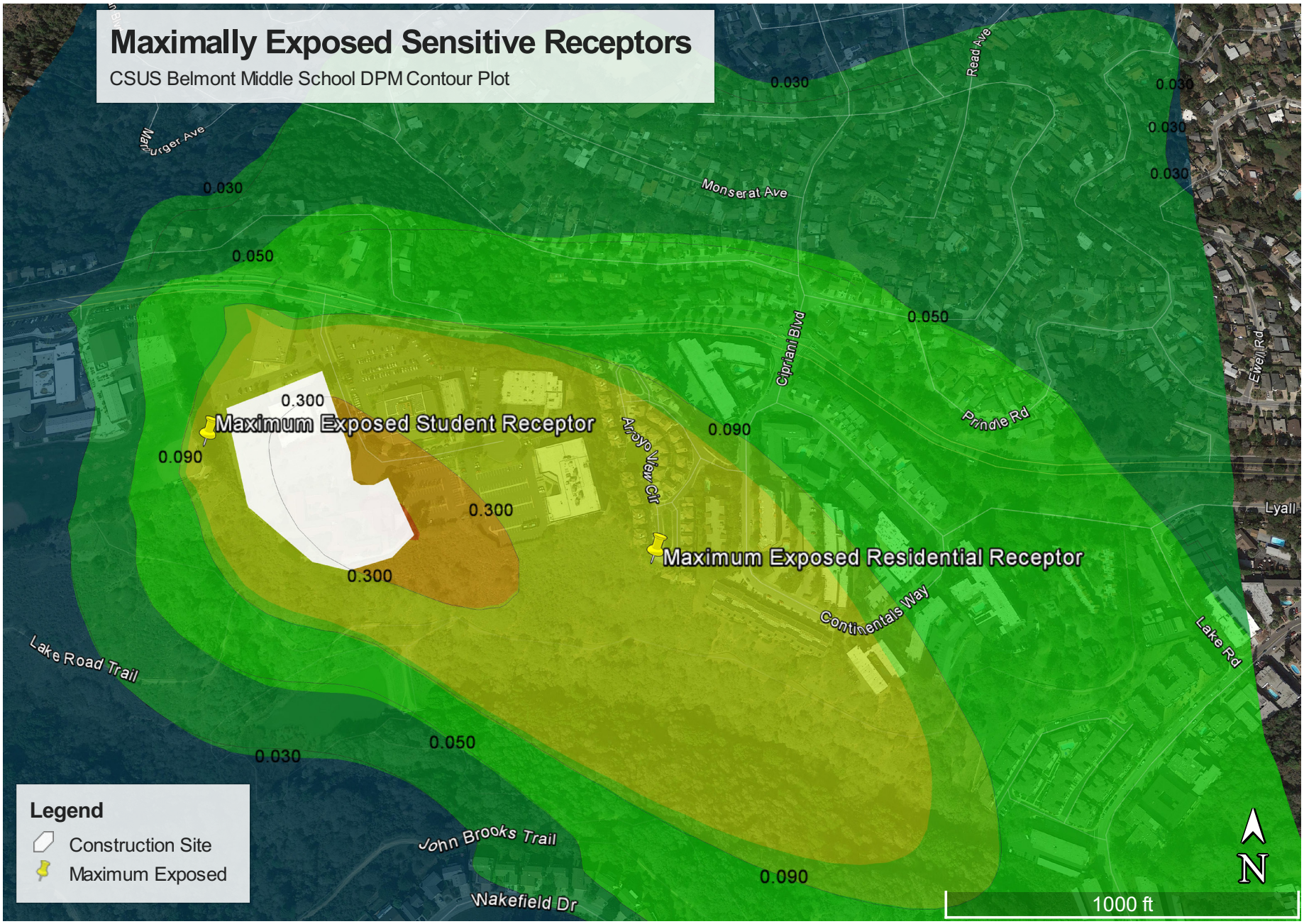
The analysis considered health impacts to both residential and student receptors. The location of the maximum exposed residential and student receptor is shown in Figure 4.3-1; concentrations of DPM at student receptors would result in health impacts greater than the BAAQMD's significance threshold of 10 in a million excess cancer risks, as listed in Table 4.3-12.

Table 4.3-12: Project Construction DPM Emissions Maximum Increased Cancer Risk

Risk Exposure Type	Residential Receptor (Arroyo View Circle)[(A)]	Student Receptor (Ralston Middle School)[(A)]
2016 Unmitigated Increased Cancer Risk	2.17	8.98
2017 Unmitigated Increased Cancer Risk	1.25	5.20
Total Unmitigated Lifetime Increased Cancer Risk	3.42	14.18
BAAQMD Significance Threshold	10	10
Significant Impact?	**No**	**Yes**
Mitigated Increased Cancer Risk (Lifetime)	2.36	9.79
BAAQMD Significance Thresholds	10	10
Significant Impact?	**No**	**No**

(A) Maximum exposed residential receptor located at 37°30'36.76" north latitude, 122°18'20.56" west longitude. The maximum exposed student receptor is located at 37°30'40.15" north latitude 122°18'37.66" west longitude

Mitigation Measure AQ-1 would decrease the health impacts to below the significance threshold of 10 in a million excess cancer risks.



Belmont Crystal Springs School
Belmont, CA

Figure 4.3-1
Maximally Exposed Sensitive Receptor Locations

Mitigation Measure AQ/GHG-8: A minimum of 50 percent of the diesel fueled off-road construction equipment used during project construction shall have engines certified to meet US EPA Tier 2 emission standards (or cleaner). This may be achieved through the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available.

With mitigation, DPM exhaust emissions would be reduced by approximately 38% in 2016 and 20% in 2017 and risks at the maximally exposed student receptor can be reduced to 9.8 in one million, which is less than the BAAQMD's significance threshold of 10 in one million. Therefore the impact on sensitive receptors would be ***less than significant*** after mitigation. ***(LTS)***

Non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). BAAQMD also has a threshold for $PM_{2.5}$ concentration from emissions associated with the project. The maximum modeled annual DPM concentrations and corresponding Hazard Indices at the maximally exposed student and residential receptor, as well as the maximum modeled $PM_{2.5}$ concentrations, are shown in Table 4.3-13.

Table 4.3-13: Maximum Chronic Hazard Indices and PM2.5 Concentrations from Project Construction

Risk Exposure Type	Residential Receptor (Arroyo View Circle)(A)	Student Receptor (Ralston Middle School)(A)
Maximum Average Annual DPM Concentration	0.28	0.2
Hazard Index	0.06	0.04
BAAQMD Significance Threshold	1	1
Potential Significant Impact?	**No**	**No**
Maximum Average Annual PM2.5 Concentration	0.28	0.20
BAAQMD Significance Threshold	0.3	0.3
Significant Impact?	**No**	**No**

(A) Maximum exposed residential receptor located at 37°30'36.76" north latitude, 122°18'20.56" west longitude. The maximum exposed student receptor is located at 37°30'40.15" north latitude 122°18'37.66" west longitude.

As shown in Table 4.3-13 and 4.3-14, the proposed project construction activities would not result in significant non-cancer health risks to sensitive receptors. Therefore, this impact would be ***less than significant***.

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