4.2 AIR QUALITY

4.2.1 INTRODUCTION

This section of the Revised Draft EIR evaluates the potential impacts on air quality resulting from construction and operation of the proposed Student Housing West (SHW) project. This includes the potential for the proposed project to conflict with or obstruct implementation of the applicable air quality plan, violate an 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 nonattainment, expose sensitive receptors to substantial pollutant concentrations, or create objectionable odors affecting a substantial number of people.

The section also presents potential air quality from the anticipated construction and operation of the separate, but related, Porter and Rachel Carson Colleges dining facilities expansion project, which would serve residents of the SHW project and the existing colleges (see **Section 4.2.5,** below).

The analysis in this section is tiered from the air quality impact analysis contained in the 2005 LRDP EIR, supplemented by project-specific analysis. Data used to prepare this section were taken from various sources, including the Monterey Bay Air Pollution Control District's *CEQA Air Quality Guidelines,* dated September 2008; Monterey Bay Air Pollution Control District's *Guidelines for Implementing the California Environmental Quality Act,* dated February 2016; the *2012-2015 Air Quality Management Plan* (AQMP); and technical analyses conducted for the project by Illingworth & Rodkin (I&R). The technical memorandum documenting the I&R analysis is presented in **Appendix 4.2** of this EIR.

The project is located within the air basin that is under the jurisdiction of the Monterey Bay Air Resources District (MBARD), formerly known as the Monterey Bay Unified Air Pollution Control District (MBUAPCD). To avoid confusion the prior name of the District is not used in this section and the phrase "Air District" or the acronym "MBARD" is used to refer to the Air District. Similarly, although all of the Air District's CEQA guidance related to evaluating a project's air quality impacts was prepared when the Air District was known as MBUAPCD, the two guidelines are referred to as the MBARD 2008 guidelines and the MBARD 2016 guidelines.

The section is revised from the section in the Draft EIR due to project description changes, which include changes in the amount of building space to be constructed and construction schedule, although the project would not involve a substantial change in the number of beds to be built at each site. In addition, explanation has been included in this section to address the comments received on the Draft EIR concerning air quality impacts. In addition, comments received on the Draft EIR related to the air quality impact analysis were reviewed and the key issues raised in the comments are summarized below:

- The Draft EIR does not explain what a community health risk assessment is and where it might be found.
- The construction phase risk assessment does not take into account the presence of arsenic in Hagar site soils which might get entrained in fugitive dust generated during construction.
- The Draft EIR should clarify that the thresholds contained in Tables 4.2-13 and -14 are the thresholds adopted by MBARD in 2016.
- The EIR does not adequately address the impact from odors from the proposed wastewater treatment plant. The literature is packed with case studies of wastewater treatment plants that were promised not to result in odors but did over a vast area.
- Given the planned proximity of the childcare facility to Hagar Drive, the risk and possible harm from excessive pollutant emissions require further evaluation.
- The demolition of the existing FSH buildings while some of the units are still occupied by student families could expose the residents to harmful emissions, including emissions that involve lead-based paint.

These comments are addressed in the revised analysis presented in this section.

4.2.2 EXISTING CONDITIONS

4.2.2.1 Existing Regional Air Quality

Background

The project site is located in the North Central Coast Air Basin (NCCAB or Basin), which consists of Santa Cruz, Monterey, and San Benito Counties. The NCCAB is under the jurisdiction of MBARD.

Air quality is affected by both the rate and location of pollutant emissions. Meteorological conditions such as wind speed, wind direction, solar radiation, atmospheric stability, along with local topography heavily influence air quality by affecting the movement and dispersal of pollutants. Predominant meteorological conditions in the NCCAB vary depending on the time of year. In the summer, a high pressure system results in strong west and northwest winds along the coast, as the northwest-southeast ranging mountains restrict onshore air currents from moving further inland. During the warm season, air pollutants are trapped near ground level, as a layer of hot air forms over the cooler coastal air and prevents vertical mixing.

In the winter, the high pressure system moves away from the NCCAB, reducing winds overall but generating more frequent easterly winds. Such winds carry San Francisco Bay Area and Central Valley air pollutants to the area, however, the air quality remains better due to cooler weather and storms.

The climate within the NCCAB is fairly moderate, with mild, cooler temperatures occurring near the coast and more variable temperatures and drier weather in the more inland areas. January is the coldest month throughout the NCCAB, and the annual average minimum temperature is 45°F in the City of Santa Cruz. September is usually the warmest month in the NCCAB, and annual average maximum temperatures are 76°F in Santa Cruz. Coastal areas often experience heavy fog, especially during the mornings, but overall the area is fairly dry. The City of Santa Cruz gets, on average, over 29 inches of precipitation annually (Western Regional Climate Center 2017).

Regional Air Quality

Air pollutants of concern in the NCCAB are primarily generated by two categories of sources: mobile and stationary. Mobile sources refer to operational and evaporative emissions from motor vehicles. Stationary sources include "point sources," which have one or more emission sources at a single facility, and "area sources," which are distributed/spread over a larger geographic area, rather than a single stationary point." Point sources are usually associated with manufacturing and industrial uses and include sources such as refinery boilers or combustion equipment that produces electricity or process heat. Examples of area sources include residential water heaters, painting operations, lawn mowers, agricultural fields, landfills, and consumer products, such as lighter fluid or hair spray.

The criteria pollutants relevant to the proposed project and of concern in the air basin are briefly described below. While VOCs are not considered to be criteria pollutants, they are commonly emitted by sources associated with land use development projects and are involved in photochemical reactions in the atmosphere to form ozone (O_3); therefore, VOCs are relevant to the proposed project and are of concern in the NCCAB.

- **Ozone (O_3).** O_3 is a gas that is formed when VOCs and nitrogen oxides (NO_X), both byproducts of internal combustion engine exhaust and other sources, undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.

- **Volatile Organic Compounds (VOCs).** VOCs are compounds comprised primarily of atoms of hydrogen and carbon. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Adverse effects on human health are not caused directly by VOCs, but rather by reactions of VOCs to form secondary air pollutants, including ozone. VOCs are also referred to as reactive organic compounds (ROCs) or reactive organic gases (ROGs). VOCs themselves are not "criteria" pollutants; however, they contribute to formation of O_3.

- **Nitrogen Dioxide (NO_2).** NO_2 is a reddish-brown, highly reactive gas that is formed in the ambient air through the oxidation of nitric oxide (NO). NO_2 is also a byproduct of fuel combustion. The principle form of NO_2 produced by combustion is NO, but NO reacts quickly to form NO_2, creating the mixture of NO and NO_2 referred to as NO_X. NO_2 acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_X is only potentially irritating. NO_2 absorbs blue light, the result of which is a brownish-red cast to the atmosphere and reduced visibility.

- **Carbon Monoxide (CO).** CO is a colorless, odorless gas produced by the incomplete combustion of fuels. CO concentrations tend to be the highest during winter mornings, with little to no wind, when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines and motor vehicles operating at slow speeds are the primary source of CO in the Basin, the highest ambient CO concentrations are generally found near congested transportation corridors and intersections.

- **Sulfur dioxide (SO_2).** SO_2 is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high-sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When sulfur dioxide oxidizes in the atmosphere, it forms sulfates (SO_4).

- **Respirable Particulate Matter (PM_{10}).** PM_{10} consists of extremely small, suspended particles or droplets 10 micrometers or smaller in diameter. Some sources of PM_{10}, like pollen and windstorms, are naturally occurring. However, in populated areas, most PM_{10} is caused by road dust, diesel soot, and combustion products, abrasion of tires and brakes, and construction activities.

- **Fine Particulate Matter ($PM_{2.5}$).** $PM_{2.5}$ refers to particulate matter that is 2.5 micrometers or smaller in size. The sources of $PM_{2.5}$ include fuel combustion from automobiles, power plants, wood burning, industrial processes, and diesel-powered vehicles such as buses and trucks. These fine particles are also formed in the atmosphere when gases such as sulfur dioxide, NO_X, and VOCs are transformed in the air by chemical reactions.

- **Lead (Pb).** Pb occurs in the atmosphere as particulate matter. The combustion of leaded gasoline is the primary source of airborne lead in the Basin. The use of leaded gasoline is no longer permitted for on-road motor vehicles, so most such combustion emissions are associated with off-road vehicles such as racecars that use leaded gasoline. Other sources of Pb include the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters.

The U.S. Environmental Protection Agency (EPA) is the federal agency responsible for setting the National Ambient Air Quality Standards (NAAQS). The air quality of a region is considered to be in attainment of the NAAQS if the measured ambient criteria pollutant levels are not exceeded more than once per year, except for O_3, PM_{10}, and $PM_{2.5}$. The NAAQS for O_3, PM_{10}, and $PM_{2.5}$ are based on statistical calculations over one- to three-year periods, depending on the pollutant. The California Air Resources Board (CARB) is the state agency responsible for setting the California Ambient Air Quality Standards (CAAQS). The air quality of a region is considered to be in attainment of the CAAQS if the measured ambient air pollutant levels for O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead are not exceeded, and other standards are not equaled or exceeded at any time in any consecutive three-year period. The NAAQS and CAAQS for each of the monitored pollutants and their effects on health are summarized in **Table 4.2-1, Ambient Air Quality Standards**.

Table 4.2-1
Ambient Air Quality Standards

Air Pollutant	Averaging Time	California Standards	National Standards[a] Primary[b,c]	National Standards[a] Secondary[b,d]	Health and Other Effects
Ozone (O_3)	8-hour	0.070 ppm (137 μg/m³)	0.070 ppm (137 μg/m³)	Same as primary	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (e) Vegetation damage; and (f) Property damage
	1-hour	0.09 ppm (180 μg/m³)	--[e]	--	
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	--	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; and (d) Possible increased risk to fetuses
	1-hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)	--	
Nitrogen Dioxide (NO_2)	Annual	0.030 ppm (57 μg/m³)	0.053 ppm (100 μg/m³)	Same as primary	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; and (c) Contribution to atmospheric discoloration
	1-hour	0.18 ppm (339 μg/m³)	0.100 ppm[f] (188 μg/m³)	--	
	Annual	--	--[g]	--	
	24-hour	0.04 ppm (105 μg/m³)	--[g]	--	
	3-hour	--	--	0.5 ppm (1300 μg/m³)	
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm (655 μg/m³)	0.075 ppm[g] (196 μg/m³)	--	Bronchoconstriction accompanied by symptoms, which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Respirable Particulate Matter (PM10)	Annual	20 μg/m³	--	--	a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; and (c) Increased risk of premature death
	24-hour	50 μg/m³	150 μg/m³	Same as primary	

Air Pollutant	Averaging Time	California Standards	National Standards[a]		Health and Other Effects
			Primary[b,c]	Secondary[b,d]	
					from heart or lung diseases in the elderly
Fine Particulate Matter (PM2.5)	24-hour	No separate state standard	35 µg/m³	--	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; and (c) Increased risk of premature death from heart or lung diseases in the elderly
	Annual	12 µg/m³	12 µg/m³	--	
Lead	Calendar Quarter	--	1.5 µg/m³	Same as primary	(a) Increased body burden; and (b) Impairment of blood formation and nerve conduction
	30-day Average	1.5 µg/m3	--	--	

Source: CARB, Ambient Air Quality Standards, accessed January 9, 2018 (https://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm)
ppm = parts per million by volume; µg/m³ = microgram per cubic meter; mg/m³ = milligrams per cubic meter.
a. Standards, other than for ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
b. Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
c. Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the U.S. Environmental Protection Agency (US EPA).
d. Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
e. The national 1-hour ozone standard was revoked by US EPA on June 15, 2005. A new 8-hour standard was established in May 2008.
f. The form of the 1-hour NO_2 standard is the 3-year average of the 98th percentile of the daily maximum 1-hour average concentration.
g. On June 2, 2010 the US EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of the 1-hour daily maximum. The US EPA also revoked both the existing 24-hour and annual average SO_2 standards.

In addition to criteria pollutants, CARB periodically assesses levels of toxic air contaminants (TACs) in the NCCAB. TACs are defined by California Health and Safety Code Section 39655:

> *"Toxic air contaminant" means an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health. A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the federal act (42 U.S.C. Sec. 7412(b)) is a toxic air contaminant.*

Table 4.2-2 Attainment Status of the North Coast Central Air Basin below presents the current attainment status of the NCCAB with respect to State and federal air quality standards.

Table 4.2-2
Attainment Status of the North Coast Central Air Basin

Pollutant	State	Federal
Ozone (O_3)	Non-attainment	Attainment/Unclassified

Pollutant	State	Federal
Particulate Matter (PM_{10})	Non-attainment	Attainment
Particulate Matter ($PM_{2.5}$)	Attainment	Attainment/Unclassified
Carbon Monoxide (CO)	Monterey- Attainment San Benito- Unclassified Santa Cruz- Unclassified	Attainment/Unclassified
Nitrogen Dioxide (NO_2)	Attainment	Attainment/Unclassified
Sulfur Dioxide (SO_2)	Attainment	Attainment
Lead	Attainment	Attainment/Unclassified

Source: MBARD 2015. NCCAB Area Designations and Attainment Status- January 2015.

4.2.2.2 Existing Local Air Quality

The U.S. EPA requires all air pollution control districts to submit monitoring assessments every five years. In order to comply with federal requirements, the MBARD utilizes seven permanent air monitoring stations located in King City, Carmel Valley, Pinnacles, Hollister, Salinas, Santa Cruz, and San Lorenzo Valley. The closest air monitoring station to the project site is the Santa Cruz 2544 Soquel Avenue station. This station is located at 2544 Soquel Avenue, across the street from Harbor High School, approximately 3.25 miles east of the Hagar project site. Santa Cruz 2544 Soquel Avenue station monitors ozone and $PM_{2.5}$, but hasn't monitored PM_{10} since 2011.

Although the NCCAB is considered in attainment or unclassifiable for all federal ambient air quality standards, the air basin is considered non-attainment for ozone and PM_{10} with regards to standards established by the State of California. **Table 4.2-3, Ambient Pollutant Levels Near the Project Site**, illustrates the concentrations of ozone and particulate matter measured at the Santa Cruz 2544 Soquel Avenue monitoring station from 2015 to 2017. There were no ozone or $PM_{2.5}$ exceedances recorded at the monitoring station.

Table 4.2-3
Ambient Pollutant Levels Near the Project Site

Pollutant	Year		
	2015	**2016**	**2017**
Ozone (ppm), 1- Hour average	0.076	0.064	0.082
Number of days of State exceedances	0	0	0
Ozone (ppm), 8-Hour average	0.060	0.057	0.075
Number of days of State exceedances	0	0	1
Number of days of Federal exceedances	0	0	1
Particulate Matter < 10 microns, Worst 24 Hours	N/A	N/A	N/A

Pollutant	Year		
	2015	**2016**	**2017**
Number of days of State exceedances	-	-	-
Number of days of Federal exceedances	-	-	-
Particulate Matter < 2.5 microns, 24 – Hour average	20.5	12.7	47.3
Number of days of Federal exceedances	0	0	2

Source: CARB, Aerometric Data Analysis and Measurement System (ADAM), Available at https://www.arb.ca.gov/adam. Accessed January 9, 2018. Data from Santa Cruz-2544 Soquel Avenue air monitoring station. No stations in Santa Cruz during the 2015 to 2017 time period measured PM10. The last period when PM10 was measured was in 2011, in which there were no exceedances.

4.2.2.3 Sensitive Receptors

Some groups of people are considered more sensitive to adverse effects from air pollution than the general population. The California Air Resources Board, or CARB, has identified the following persons as most likely to be affected by air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks.

Sensitive receptors, which include residences, are located near the project sites. For the Heller site, these are student residences that do not include small children or infants. Although there is family student housing and a childcare center on the Heller site at the present time, both the student families and the childcare center would be relocated into the new housing and childcare center on the Hagar site before any construction on the Heller site is commenced.

With respect to the Hagar site, there is UC Santa Cruz employee housing within 350 feet of the site and there are off-campus residences to the east on Rockridge Lane and Spring Street, with the nearest homes within 650 feet of the Hagar site. All residences near the Hagar site are assumed to include infants or small children. For typical construction cancer risk assessments, only infants are considered sensitive receptors because of the high sensitivity to cancer causing contaminants, or TACs, whereas, children and adults are much less sensitive and the exposure periods are relatively short.

4.2.3 REGULATORY FRAMEWORK

Air quality within the air basin is addressed through the efforts of various federal, state, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies responsible for improving the air quality within the air basin are discussed below.

4.2.3.1 Federal and State

U.S. Environmental Protection Agency

The U.S. EPA is responsible for enforcing the federal Clean Air Act and the NAAQS. The U.S. EPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain locomotives. The U.S. EPA also maintains jurisdiction over emissions sources beyond State waters (outer continental shelf), and establishes various emissions standards for vehicles sold in states other than California. These standards identify levels of air quality for seven criteria pollutants: ozone (O_3), CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The thresholds are considered to be the maximum concentrations of ambient (background) air pollutants determined safe to protect the public health and welfare with an adequate margin of safety.

As part of its enforcement responsibilities, the U.S. EPA requires each state with areas that do not meet the federal standards to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain federal standards. The SIP must integrate federal, state, and local plan components and regulations to identify specific measures to reduce pollution, using a combination of performance standards and market-based programs within the time frame identified in the SIP. The MBARD *2012-2015 Air Quality Management Plan* (2012-2015 AQMP) is the regulatory mechanism by which the CARB demonstrates conformity to U.S. EPA regulations.

The 1990 Clean Air Act Amendments were enacted to better protect the public's health and create more efficient methods for lowering pollutant emissions. The major areas of improvement addressed in the amendments include NAAQS, air basin designations, automobile/heavy-duty engine emissions, and hazardous air pollutants. The U.S. EPA has designated air basins as being in attainment or nonattainment for each of the seven criteria pollutants. Nonattainment air basins for ozone are further ranked (marginal, moderate, serious, severe, or extreme) according to the degree of nonattainment. CARB is required to describe in its SIP how the State will achieve federal standards by specified dates for each air basin that has failed to attain a NAAQS for any criteria pollutant. The MBARD developed the *2012-2015 AQMP*, which demonstrates how the region will attain the air quality standards set forth in the Clean Air Act Amendments.

California Air Resources Board

CARB oversees air quality planning and control throughout California. It is primarily responsible for ensuring implementation of the California Clean Air Act, responding to the federal Clean Air Act planning requirements applicable to the State, and regulating emissions from motor vehicles and consumer products within the State. In addition, CARB sets health-based air quality standards and control measures for TACs. Much of CARB's research goes toward automobile emissions, as they are primary contributors to air pollution in California. Under the State Clean Air Act, CARB has the authority to establish more stringent standards for vehicles sold in California and for various types of equipment available commercially. It also sets fuel specifications to further reduce vehicular emissions.

The California Clean Air Act established a legal mandate for air basins to achieve the CAAQS by the earliest practical date. These standards apply to the same seven criteria pollutants as the federal Clean Air Act and also include sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. The State standards are generally more stringent than the federal standards.

CARB supervises and supports the regulatory activities of local air quality districts as well as monitors air quality itself. Health and Safety Code Section 39607(e) requires CARB to establish and periodically review area designation criteria. These designation criteria provide the basis for CARB to designate areas of the State as attainment, nonattainment, or unclassified according to State standards. CARB makes area designations for 10 criteria pollutants: O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, sulfates, lead, hydrogen sulfide, and visibility-reducing particles.[1] The air quality of a region is considered to be in attainment of the State standards if the measured ambient air pollutant levels for O_3, CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2 (1- and 24-hour), and lead are not exceeded, and all other standards are not equaled or exceeded at any time in any consecutive three-year period. As aforementioned, the NCCAB is classified by the state as a nonattainment area for the O_3 and PM_{10} standards.

Monterey Bay Air Resources District (MBARD)

The management of air quality in the NCCAB is the responsibility of the MBARD. Elected local governing bodies appoint the Board of Directors, which then appoints citizens to the District's Advisory Committee as well as the Hearing Board. The District is responsible for attainment planning related to

[1] California Air Resources Board, "Area Designations (Activities and Maps)," http://www.arb.ca.gov/desig/desig.htm. 2010. According to California Health and Safety Code, Section 39608, "State board, in consultation with the districts, shall identify, pursuant to subdivision (e) of Section 39607, and classify each air basin which is in attainment and each air basin which is in nonattainment for any State ambient air quality standard." Section 39607(e) States that the State shall "establish and periodically review criteria for designating an air basin attainment or nonattainment for any State ambient air quality standard set forth in Section 70200 of Title 17 of the California Code of Regulations. California Code of Regulations, Title 17, Section 70200 does not include vinyl chloride; therefore, CARB does not make area designations for vinyl chloride.

criteria air pollutants, as well as rule development and enforcement. The District manages air quality in the areas under its jurisdiction and strives to conform to federal and state air quality standards. Specifically, the MBARD is responsible for monitoring ambient air pollutant levels throughout the air basin and for developing and implementing attainment strategies to ensure that future emissions will be within federal and state standards.

The MBARD primarily regulates emissions from stationary sources such as manufacturing and power generation. Mobile sources such as buses, automotive vehicles, trains, and airplanes are largely out of the MBARD's jurisdiction and are up to CARB and the U.S. EPA to regulate. In order to achieve air quality standards, the MBARD adopts an Air Quality Management Plan that serves as a guideline to help the District meet its air quality goals.

MBARD CEQA Air Quality Guidelines

In 1995, the MBARD adopted its *California Environmental Quality Act (CEQA) Air Quality Guidelines* to assist local government agencies and consultants in preparing environmental documents for projects subject to CEQA. The most recent update to the MBARD CEQA Guidelines was in 2008. The document describes the criteria that MBARD uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds of significance in order to determine if a project will have a significant adverse environmental impact. Other important contents are methodologies for estimating project emissions and mitigation measures that can be used to avoid or reduce air quality impacts.

Subsequently in 2016, MBARD published revised *Guidelines for Implementing the California Environmental Quality Act*. The revised 2016 guidelines provide numeric thresholds for evaluating the significance of a project's construction and operational emissions.

MBARD 2012-2015 Air Quality Management Plan

The MBARD is required to produce Air Quality Management Plans describing how air quality will be improved. The California Clean Air Act (CCAA) requires that these plans be updated triennially in order to incorporate the most recent available technical information. In addition, the U.S. EPA requires establishment of transportation conformity budgets based on the most recent planning assumptions (i.e., within the last five years). Plan updates are necessary to ensure continued progress toward attainment of the NAAQS and to avoid a transportation conformity lapse and associated federal funding losses. A multi-level partnership of governmental agencies at the federal, State, regional, and local levels implement the programs contained in these plans. Agencies involved include the U.S. EPA, CARB, local governments, Association of Monterey Bay Area Governments (AMBAG), and the MBARD.

Since 1991, a number of AQMPs have been prepared in response to the CCAA. The MBARD adopted the most recent *2012-2015 AQMP* in March 2017. The AQMD demonstrates a long-term trend toward achieving ozone standards.

MBARD Rules and Regulations

The MBARD is responsible for limiting the amount of emissions that can be generated throughout the air basin by various stationary, area, and mobile sources. Specific rules and regulations adopted by the MBARD limit the emissions that can be generated by various uses/activities and that identify specific pollution reduction measures, which must be implemented in association with these uses and activities. These rules regulate the emissions of the federal and state criteria pollutants as well as toxic air contaminants and acutely hazardous materials.

Association of Monterey Bay Area Governments (AMBAG)

AMBAG is a council of governments for the Counties of Monterey, Santa Cruz, and San Benito. As a regional planning agency, AMBAG serves as a forum for regional issues relating to transportation, the economy, community development, and the environment. AMBAG also serves as the regional clearinghouse for projects requiring environmental documentation under federal and State law. In this role, AMBAG reviews projects to analyze their impacts on AMBAG's regional planning efforts.

Although AMBAG is not an air quality management agency, it is responsible for several air quality planning issues. Specifically, as the designated Metropolitan Planning Organization for the region, it is responsible, pursuant to Section 176(c) of the 1990 amendments to the Clean Air Act, for providing current population, employment, travel, and congestion projections for regional air quality planning efforts. It also manages transportation demand and is currently in the process of updating its 2035 Metropolitan Transportation Plan/ Sustainable Communities Strategy (MTP/SCS). AMBAG also maintains Jurisdictional Greenhouse Gas Emissions Inventories.

4.2.4 IMPACTS AND MITIGATION MEASURES

4.2.4.1 Significance Criteria

The impacts related to air quality from the proposed project would be considered significant if they would exceed the following significance criteria, in accordance with Appendix G of the State CEQA Guidelines and the 2005 LRDP EIR:

- 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 or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

The State CEQA Guidelines (Section 15064.7) provide that, when available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make determinations of significance. The potential air quality impacts of the proposed project are, therefore, evaluated utilizing the thresholds developed by the MBARD. As noted above, MBARD set forth significance thresholds and guidance in its *CEQA Air Quality Guidelines* adopted in 1995, and last revised in 2008 for use by lead agencies in the Air Basin. The MBARD 2008 guidelines set forth numeric thresholds for evaluating a project's operational emissions of criteria pollutants. With respect to construction emissions, the MBARD 2008 guidelines provided a numeric threshold only for evaluating PM_{10} emissions. Subsequently in 2016, MBARD published *Guidelines for Implementing the California Environmental Quality Act*. The updated MBARD 2016 guidelines provide numeric thresholds for evaluating the impacts of both construction and operational emissions. The thresholds address the checklist questions contained in Appendix G of the State CEQA Guidelines and are used in this EIR to evaluate project impacts. (Note that these thresholds are different from the thresholds used in the 2005 LRDP Final EIR which predates the 2016 guidelines.)

Construction Emissions

Impacts related to construction emissions associated with the proposed project would be considered significant if construction emissions from all sources including exhaust and fugitive, would exceed the MBARD construction emissions thresholds specified in **Table 4.2-4, MBARD Daily Construction Emission Thresholds.**

Table 4.2-4
MBARD Daily Construction Emissions Thresholds

Pollutant	Significance Threshold (pounds per day)
ROG	137
NO_x	137
CO	550

Pollutant	Significance Threshold (pounds per day)
PM_{10}	82
$PM_{2.5}$	55

Source: MBUAPCD 2016

Operational Emissions

Impacts related to operational emissions associated with the proposed project would be considered significant if its operational emissions exceed the thresholds set forth in **Table 4.2-5, MBARD Daily Operational Emission Thresholds**. The thresholds address both direct and indirect emissions. Direct emissions refer to emissions produced by sources located on the project site, such as boilers, generators and other stationary sources (whether or not they are permitted). Indirect emissions refer to project-related emissions that would occur off-site and typically include emissions generated by project-related vehicle trips. The thresholds address all sources including mobile, stationary and area sources.

Table 4.2-5
MBARD Daily Operational Emission Thresholds

Pollutant	Significance Threshold (pounds per day)
ROG	137 (direct & indirect)
NO_X	137 (direct & indirect)
CO	550 (direct)
PM_{10}	82 (direct)
$PM_{2.5}$	55 (direct)

Source: MBUAPCD 2008; MBUAPCD 2016

Carbon Monoxide

According to the MBARD 2008 guidelines, the numeric threshold for CO emissions in **Table 4.2-5** above is applicable only to direct emissions, i.e., CO emissions from sources located on the project site. For CO emissions associated with project related vehicles, the guidelines note that a potentially significant CO impact would occur if the addition of project traffic degrades the LOS of roadway segments and intersections from Level of Service (LOS) D to LOS E or F, or increase delay by more than 10 seconds at intersections already operating at LOS E or F; or increase the volume to capacity ration by more than 0.05

at intersections and roadway segments operating at LOS E or F; or decrease the capacity at an unsignalized intersection; or generate a substantial amount of truck traffic.

Toxic Air Contaminants

According to MBARD 2016 guidelines, a project would have a significant TAC impact if the project's TAC emissions resulted in an exceedance of the health risk public notification thresholds adopted by the District. The guidelines also set forth the following thresholds, which are the same as the public notification thresholds:

- The hazard index is greater than 1 for acute or chronic impacts; or
- The cancer risk is greater than 10 in one million.

Cumulative

According to MBARD, *"A consistency analysis and determination serve as the project's analysis of cumulative impacts on regional air quality. Project emissions which are not consistent with the AQMP are not accommodated in the AQMP and will have a significant cumulative impact unless offset."* MBARD's 2008 guidelines state that AMBAG provides consistency determinations for population related projects and the District provides a consistency determination for all other projects. Projects that are determined to be consistent would result in a less than significant cumulative air quality impact.

4.2.4.2 CEQA Checklist Items Adequately Addressed in the 2005 LRDP EIR or not Applicable to the Project

All of the CEQA checklist items listed above as significance criteria are addressed in the following analysis. However a CO analysis was not considered necessary for the project because the proposed project would not result in a net increase in traffic on the road network. In fact, as demonstrated by the analysis in **Section 4.10, Traffic and Transportation**, the provision of housing on the campus would reduce daily trips compared to the No Project scenario because students who would otherwise live off campus and make trips to the campus would instead live on campus and the trips to the campus would be avoided.

4.2.4.3 Methodology

The California Emissions Estimator Model (CalEEMod) Version 2016.3.2 was used to estimate emissions from construction and operation of the project assuming full build-out conditions. The project land use types and size, and anticipated construction schedule were input into CalEEMod. Separate modeling was conducted for the Heller and Hagar sites. The Heller site modeling was divided into two scenarios: Demolition and Construction. In addition, the Hagar site construction modeling was conducted separately for the residential and daycare portions.

Although the MBARD 2016 guidelines do not specify whether a project's average daily construction emissions should be estimated and used as the basis of impact evaluation, or whether the impact assessment should be based on the highest construction emissions that would occur on a summer day, both analyses were completed for this project. The average daily emissions of each pollutant were calculated by dividing the total annual emissions by the number of construction days in a given year. The maximum summer day emissions are based on the maximum summer day output for each site, and are provided by the CalEEMod outputs.

Heller Site

For the Heller site, the proposed project land uses input to CalEEMod included:

- 781 dwelling units to represent undergraduate housing,
- 220 dwelling units to represent graduate housing,
- 3,500 sf of "General Heavy Industry" to represent the wastewater treatment plant, and
- 200 spaces of "Parking Lot."

CalEEMod provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of grading and the use of construction equipment, while off-site activities include worker, hauling, and vendor traffic. The project was assumed to include 10,000 cubic yards (cy) of soil import and export during site grading.

Demolition of the Heller site would include the removal of 199 townhouses in 42 buildings. To estimate truck trips, each dwelling unit was estimated to be 1,200 sf (this includes amenity spaces). Demolition activity is assumed to occur for 4 months, beginning in 2020.

The construction schedule for the Heller site assumes that the project would be built out over a period of approximately 3 years, beginning in March 2020, or an estimated 845 construction workday.

Hagar Site

For the Hagar site, the proposed project land uses input to CalEEMod included:

Residential Construction:

- 140 dwelling units to represent Family Housing Units,
- 158 spaces of "Parking Lot."

Childcare Facility Construction:

- 13,500 sf of "Day-Care Center"
- 50 spaces of "Parking Lot."

The proposed apartments at the Hagar site would benefit from industrialized component manufacturing wherein components of the building will be manufactured off-site and delivered to the site for assembly. Therefore, the Hagar site construction of the housing units would be less intensive than conventional construction. However for purposes of this analysis and estimation of emissions, conventional construction is assumed. On-site activities would comprise grading and the use of construction equipment emissions, while off-site activities would include worker, hauling, and vendor traffic. The project at the Hagar site is expected to be balanced with respect to import/export, but 17,000 cy of soil/material import and export was assumed during site grading and was entered into the model to reflect the number of haul trips anticipated.

The construction schedule assumes that the residential project would be built out over a period of approximately 14 months or 290 days, beginning in April 2019, while the childcare facility would be constructed over a period of 10 months beginning in June 2019. In 2019, there would be an estimated 150 days of childcare facility construction and 195 days of residential construction. In 2020, there would be an estimated 65 days of childcare facility construction and 95 days of residential construction.

Community Health Risk Impacts

The methodology used to assess community health risk impacts from exposure to construction-phase TAC emissions is described under **SHW Impact AIR-3**.

4.2.4.4 LRDP EIR Mitigation Measures included in the Proposed Project

Table 4.2-6, 2005 LRDP EIR Mitigation Measures, presents the mitigation measures in the 2005 LRDP EIR that are applicable to the proposed project. Since these previously adopted mitigation measures are already being carried out as part of implementation of the 2005 LRDP, they are included in and are a part of the proposed project and will not be readopted. Implementation of these mitigation measures is assumed as part of the project impact analysis.

Table 4.2-6
2005 LRDP EIR Mitigation Measures

Mitigation Measure	Description
AIR-1	The Campus shall apply standard MBARD[a] recommended mitigation measures during construction of new facilities under the 2005 LRDP, as appropriate: • Water all active construction areas at least twice daily. • Prohibit all grading activities during periods of high wind (over 15 mph). • Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days). • Apply non-toxic binders (e.g., latex acrylic copolymer), as appropriate, to exposed areas after cut and fill operations and hydroseed area. • Require haul trucks to maintain at least 2 feet of freeboard. • Cover all trucks hauling dirt, sand, or loose materials. • Plant vegetative ground cover in disturbed areas as soon as possible. • Cover inactive storage piles. • Install wheel washers at the entrances to construction sites for all exiting trucks. • Pave all roads on construction sites. • Damp-sweep streets if visible soil material is carried out from the construction site. • Post a publicly visible sign that specifies the telephone number and person to contact regarding dust complaints. This person shall respond to complaints and take corrective action within 48 hours. The phone number of the Monterey Bay Unified Air Pollution Control District shall be visible to ensure compliance with Rule 402. • To the extent feasible, limit the area under construction at any one time.
AIR-2A	The Campus shall consider design and construction features that reduce natural gas dependence in the design of each new project, and incorporate those measures that are feasible and that would be effective for the site, such as: • Orientation of buildings to optimize solar heating and natural cooling • Use of solar or low-emission water heaters in new buildings • Install best available wall and attic insulation in new buildings
AIR-2B	The Campus shall implement LRDP Mitigation TRA-1B to reduce motor vehicle trips.
AIR-4A	The Campus will work with AMBAG to ensure that campus growth associated with the 2005 LRDP is accounted for in the regional population forecasts.
AIR-4B	The Campus will work with MBARD to ensure that the campus growth-related emissions are accounted for in the regional emissions inventory and mitigated in future regional air quality planning efforts.
AIR-5A	The Campus shall develop and implement an emergency generator maintenance-testing schedule consistent with Draft EIR Table 4.3-22.
AIR-6	The Campus will minimize construction emissions by implementing measures such as those listed below: • Require the use of cleaner fuels in construction equipment • Require that construction contractors use electrical equipment where possible • Require construction contractors to minimize the simultaneous operation of multiple pieces equipment at a construction site

Mitigation Measure	Description
	• Discourage idling of construction equipment and vehicles • Schedule operations of construction equipment to minimize exposure as much as possible
AIR-7	UC Santa Cruz will continue its efforts in the area of TAC emission reduction.

Source: UC Santa Cruz 2006
a. LRDP Mitigations AIR-1 and AIR-4B have been updated with minor changes. The original mitigation measures used the acronym MBUAPCD to refer to the Air District. That is updated to MBARD to reflect the revised name of the Air District.

4.2.4.5 Project Impacts and Mitigation Measures

SHW Impact AIR-1: Construction of the proposed project could result in construction emissions that violate an air quality standard or contribute substantially to an existing or projected air quality violation. (*Significant; Less than Significant with Mitigation*)

The proposed project would involve construction activities at both construction sites. At the Heller site, the project would require demolition, site preparation, grading, building construction, pavement and asphalt installation, landscaping and hardscaping, and architectural coatings. The Hagar site would involve the same construction activities but no demolition would be required. The Hagar site construction would occur first and once the student families and childcare center are relocated from the Heller site to the Hagar site, demolition of the existing housing on the Heller site would commence. Therefore, resident children and children in the existing childcare facility would not be exposed to air pollutants and toxic air contaminants, including lead-based paint.

Impact associated with Criteria Pollutant Emissions

As noted above, using project data for both sites as input, CalEEMod Version 2016.3.2 model was used to estimate annual, average daily, and maximum summer day construction emissions of criteria pollutants from 2019 to 2023. The results are shown in **Table 4.2-7, Estimated Unmitigated Construction Emissions (Average Daily)**. The estimated maximum summer day emissions are presented in **Table 4.2-8**. As the first table shows, based on average daily construction emissions, the MBARD significance thresholds for all pollutants would not be exceeded during construction. However, based on maximum summer day construction emissions, ROG and NOx emissions would exceed the significance threshold. Therefore, it is concluded that construction emissions would result in a significant impact on air quality.

Table 4.2-7
Estimated Unmitigated Construction Emissions (Average Daily)

Construction Year	Emissions in Pounds per Day				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
2019	9	45	34	4	2
2020	24	113	110	17	7
2021	8	60	74	9	4
2022	7	55	71	9	4
2023	101	19	26	3	1
Highest Emissions in Any Year	101	113	110	17	7
MBARD Threshold:	137	137	550	82	55
Exceeds Threshold?	**NO**	**NO**	**NO**	**NO**	**NO**

Source: Illingworth and Rodkin 2018
Note: The table presents and utilizes MBARD's 2016 thresholds.

Table 4.2-8
Estimated Unmitigated Construction Emissions (Maximum Summer Day)

Construction Year	Emissions in Pounds per Day				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
2019	17	131	78	12	6
2020[a]	18	47	45	7	3
2020[b]	15	**176**	99	22	12
2021	8	59	74	9	4
2022	7	54	72	9	4
2023	**172**	49	69	9	4
Highest Emissions in Any Year	**172**	**176**	99	22	12
MBARD Threshold:	137	137	550	82	55
Exceeds Threshold?	**YES**	**YES**	**NO**	**NO**	**NO**

Source: Illingworth and Rodkin 2018
a. Assumes maximum Hagar construction and Heller demolition occur simultaneously.
b. Only Heller Residential construction, which would not overlap with Hagar construction or Heller demolition.
c. The table presents and utilizes MBARD's 2016 thresholds.

As a project under the 2005 LRDP, the proposed project would be required to implement **LRDP Mitigation AIR-6** to minimize emissions during construction. In addition, **SHW Mitigations AIR-1A and AIR-1B** are proposed to provide more specific requirements for this project, which would reduce the project's ROG and NOx (and diesel particulate matter) emissions.

Impact Associated with Fugitive Dust Emissions

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust, including PM10 and PM2.5. Sources of fugitive dust would include disturbed soils at the construction site during grading and soil remediation and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. Fugitive dust emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Fugitive dust emissions would also depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. Although, as shown in **Tables 4.2-7** and **4.2-8** above, the project's construction-phase dust emissions would be below MBARD thresholds, measures listed in LRDP Mitigation AIR-1**,** which is included in the proposed project, would further reduce the impact from dust emissions.

Mitigation Measures:

SHW Mitigation AIR-1A: The P3 developer shall submit an equipment and phasing plan to the Campus for review and approval that will demonstrate the following to reduce exhaust emissions during construction:

- All diesel-powered off-road equipment larger than 25 horsepower and operating on the project construction sites for more than two days in a row shall meet, at a minimum, U.S. EPA standards for Tier 3 engines or equivalent.
- All diesel-powered off-road equipment larger than 25 horsepower and operating on the project construction sites for more than two days in a row shall be equipped with diesel particulate matter filters that meet CARB-certified Level 3 Diesel Particulate Filters or alternatively-fueled equipment (i.e., non-diesel) would meet this requirement.
- Signal boards shall be electrically powered.
- Provide electrical line power so that diesel-fueled generator use shall be limited to 100 hours total at the Hagar site.

- Minimize the use of diesel-fueled generators at the Heller site.
- Ensure intensive construction activities (grading and building erection) at the Hagar and Heller sites do not overlap (note that current schedule indicates these would occur at separate times).

SHW Mitigation AIR-1B: The project shall use low volatile organic compound or VOC (i.e., ROG) coatings, that are below current MBARD requirements (i.e., Rule 426: Architectural Coatings), for at least 50 percent of all residential interior paints. This includes all architectural coatings applied during construction. At least 50 percent of coatings applied to interior portions of the project must meet a "super-compliant"" VOC standard of less than 10 grams of VOC per liter of paint.

Significance after Mitigation: The project's maximum summer day emissions were recalculated after incorporating the mitigation measures listed above into the model. As shown in **Table 4.1-9** below, with the implementation of **SHW Mitigations AIR-1A** and **-1B**, the construction of the proposed project would not result in substantial emissions of ROG and NOx and the impact would be reduced to a less than significant level.

Table 4.2-9
Estimated Construction Emissions with Mitigation (Maximum Summer Day)

Construction Year	Emissions in Pounds per Day				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
2019	13	80	86	5	1
2020[a]	15	35	45	3	1
2020[b]	6	117	117	7	2
2021	5	47	72	7	2
2022	5	46	70	7	2
2023	95	44	67	7	2
Maximum Emissions in Any Year	95	117	117	7	2
MBARD Threshold:	137	137	550	82	55
Exceeds Threshold?	**NO**	**NO**	**NO**	**NO**	**NO**

Source: Illingworth and Rodkin, 2018
a. Assumes maximum Hagar construction and Heller demolition occur simultaneously.
b. Only Heller residential construction, which would not overlap with Hagar construction or Heller demolition.

SHW Impact AIR-2: Operation of the proposed project would not result in operational emissions that would violate an air quality standard or contribute substantially to an existing or projected air quality violation. (*Less than Significant*)

The primary sources of operational emissions associated with the proposed project include area (consumer products, architectural coatings, landscape equipment, etc.), energy (electricity use, although the proposed project includes on-site renewable energy sources), mobile source (motor vehicles), and, in the case of the Heller site, stationary source emissions (on-site emergency generators). The proposed project is not expected to result in substantial daily emissions from the use of automobiles. This is because students living in the proposed on-campus housing would walk, ride a bike or take a UC Santa Cruz shuttle to travel between the project site, classes, and other campus facilities. The student residents and their dependents would also make off-campus trips related to jobs, recreation, shopping and other activities. However the number of off-campus trips that this population would generate would be less than the number of trips that would be generated if these students lived off-campus and commuted to the campus. Note that the enrollment at UC Santa Cruz will increase between 2017 (baseline year for this EIR) and 2020 because students are not denied enrollment because of lack of housing on the campus, and therefore the number of vehicle trips to the campus would increase compared to 2017 conditions. However, the project would reduce this increase in trips. The above notwithstanding, the mobile source emissions were estimated for the project based on the trip generation rate for resident students.

Table 4.2-10, Estimated Unmitigated Operational Emissions (Maximum Summer Day), shows the predicted emissions in terms of maximum daily operational emissions in pounds per day.

Table 4.2-10
Estimated Unmitigated Operational Emissions (Maximum Summer Day)

	Emissions in Pounds per Day				
Site	**ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Hagar	6.3	9.6	29.3	3.2	1.0
Heller	26.3	12.3	100.7	4.9	2.0
Total	32.6	21.9	130.0	8.1	3
MBARD Threshold:	137	137	550	82	55
Exceeds Threshold?	**NO**	**NO**	**NO**	**NO**	**NO**

Source: Illingworth and Rodkin, 2018
a. Assumes maximum Hagar construction and Heller demolition occur simultaneously.
b. Only Heller residential construction, which would not overlap with Hagar construction or Heller demolition.

As shown in **Table 4.2-10**, the maximum summer day emissions of ROG, NOx, CO, PM10, or PM2.5 emissions associated with project operation would not exceed the significance thresholds. Thus, the impact from the project's operational emissions would be less than significant.

Mitigation Measures: No mitigation is required.

SHW Impact AIR-3: **Implementation of the proposed project would expose sensitive receptors to substantial concentrations of toxic air contaminants. (*Significant; Less than Significant with Mitigation*)**

The CEQA guidelines put forth by MBARD recommend that potential health impacts from TAC emissions associated with a proposed project be evaluated and disclosed in a CEQA document. The potential for project-related TACs to affect human health is typically assessed in terms of an increase in cancer risk and non-cancer health effects. The MBARD has established a threshold for evaluating human health risk impacts from TACs, which is based on an incremental increase in cancer risk. Potential non-cancer health effects are assessed by use of a "Hazard Index." Hazard indices are calculated for both long-term (chronic) and short-term (acute) health effects, and a separate hazard index is calculated for each target organ group affected by the TACs being assessed. The potential for project construction activities and operations to expose receptors to excessive TAC concentrations is evaluated below.

Operational TAC Impacts

The proposed project is a residential project which would add undergraduate and graduate student housing at the Heller site and family student housing and a childcare facility at the Hagar site. The project would not include any stationary sources of TACs on either site which could expose both on-site and nearby off-site receptors to substantial TAC emissions. The project includes a number of emergency generators that would be periodically tested and used during power outages. However, consistent with UC Santa Cruz policy, all emergency generators would operate on natural gas, and in the event that natural gas supply to the generator is interrupted, the generator would operate on propane. The testing of these generators would produce emissions periodically; however natural gas is not considered a TAC and any emissions that are produced would not result in human health impacts. There would be no impact as there would be no operational emissions of TACs due to the project.

Construction TAC Impacts

Construction activities at both project sites would generate emissions of diesel particulate matter (DPM) from the combustion of diesel in construction equipment and vehicles. DPM from diesel-fueled engines has been determined by CARB to be a TAC, as defined under Section 39655 of the Health and Safety Code. The potential for the project's construction-phase DPM emissions to result in human health impacts is evaluated below.

Heller Site

The MBARD guidelines do not provide guidance as to the conditions under which a health risk assessment must be prepared for a given construction project. However, the neighboring Bay Area Air Quality Management District's CEQA guidelines recommend analyzing the community health risk from a project's construction TAC emissions if sensitive receptors are present within 1,000 feet of a construction site. As noted earlier, sensitive receptors are defined as residences (which could harbor susceptible populations such as young children, elderly, and the sick), day care centers, schools and elderly care facilities. There are no residences, schools, daycare centers or elderly care facilities within 1,000 feet of the Heller site. The homes in Cave Gulch are more than 4,900 feet from the site. Although student housing is located within 400 feet to the east of the site, as explained in **Section 4.2.2.3** above, for construction risk assessments, university students are not considered sensitive receptors. Thus, there would be no health risk impacts associated with project construction activities at the Heller site.

Hagar Site

Project construction activities at the Hagar site would have the potential to expose sensitive receptors to substantial TAC concentrations. The closest sensitive receptors are employee residences south of the construction site, across Glenn Coolidge Drive at approximately 350 feet from the edge of the site. Additional residences are located to the east on Rockridge Lane and Spring Drive, with the closest home at 650 feet from the edge of the project site. Thus, a community health risk assessment, which is a study that estimates the potential cancer and non-cancer acute and chronic health risk from exposure to TAC concentrations, was conducted to evaluate the effect of DPM emissions during project construction on nearby receptors. The detailed risk assessment is included in **Appendix 4.2**. Comments received on the Draft EIR argue that the construction risk assessment does not take into account the presence of naturally arsenic in Hagar site soils which might get entrained in fugitive dust during construction. In general, concentrations of naturally occurring arsenic in soils tend to be low. As discussed above under **SHW Impact AIR-1**, the project's construction-phase dust emissions would be below MBARD thresholds, and measures listed in LRDP Mitigation AIR-1, which are included in the proposed project and are consistent with MBARD-recommended best management practices for dust control, would further reduce dust emissions during construction. Therefore nearby receptors would not be exposed to high concentrations of arsenic in fugitive dust.

Construction activity for the proposed project at the Hagar site would include site grading, placement of utilities, building construction, paving, application of architectural coatings, and interior finishing. Construction equipment and associated heavy-duty truck traffic generates exhaust which contains DPM. DPM emissions were estimated and dispersion modeling was conducted to predict the off-site concentrations resulting from project construction, so that lifetime excess cancer risks and non-cancer health effects could be predicted. Health risks were evaluated for a hypothetical maximally exposed individual (MEI) located in the nearby residential buildings. The hypothetical MEI is an individual assumed to be located where the highest concentrations of air pollutants are predicted to occur. Figure 1 in **Appendix 4.2** shows the project site, sensitive receptor locations (residences) used in the air quality dispersion modeling analysis where potential health impacts were evaluated, and the location of the MEI.

As a first step, on-site construction-phase DPM emissions were computed using the CalEEMod model. Inputs to the model are described under **Methodology**. The number and types of construction equipment and diesel vehicles, along with the anticipated length of their use, were based on a site-specific construction activity schedule (see **Appendix 4.2**). Emissions from truck traffic on or near the site were included in the modeling. The CalEEMod model was run with trip lengths of 1.0 mile to represent on-site truck emissions. Construction of the proposed project is anticipated to occur over an approximate 16 month period (starting in 2018). The projected construction schedule and the DPM emission calculations are provided in **Appendix 4.2**.

Next, the US EPA AERMOD dispersion model was used to predict concentrations of DPM at existing sensitive receptors surrounding the project site. The AERMOD modeling utilized an area source encompassing the different construction areas on the project site to represent the on-site DPM exhaust emissions. An emission release height of 6 meters was used for the exhaust emissions from construction equipment. The elevated source height reflects the height of the equipment exhaust pipes and buoyancy of the exhaust plume. Emissions from vehicle travel around the project site were included in the modeled area sources. The AERMOD model requires the use of hourly meteorological data that are representative of conditions in the vicinity of the site area being modeled. For this evaluation, since site-specific meteorological data was not available, a screening meteorological data set designed to produce conservatively high air concentrations was used. The screening meteorological data was created for the AERMOD model with the U.S. EPA MAKEMET program, which is designed to find the meteorological conditions that result in the highest pollutant concentrations for the area. DPM concentrations were calculated at nearby residential receptors at a receptor height of 1.5 meters.

A health risk assessment for exposure to TACs requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and

CARB developed recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015. These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by state law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods. This health risk assessment used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. Current MBARD regulations and guidelines (Rule 1000 – Permit Guidelines and Requirements for Sources Emitting Toxic Air Contaminants) specify use of the most recent OEHHA guidelines when conducting health risk assessments. The new OEHHA guidelines and CARB recommended exposure parameters were used in this analysis.

Potential increased cancer risk from inhalation of TACs was calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration over a 70-year lifetime period. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day. Parameters and formulas used to calculate cancer risk can be found in **Appendix 4.2**. Health risk parameters used in this evaluation are summarized in **Table 4.2-11**.

Table 4.2-11
Health Risk Parameters Used for Cancer Risk Calculations

Parameter	Exposure Type	Infant		Child	Adult
	Age Range	**3rd Trimester**	**0<2**	**2<16**	**16-30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)[a]		361	1,090	745	335
Inhalation Absorption Factor		1	1	1	1
Averaging Time (years)		70	70	70	70
Exposure Duration (years)		0.25	2	14	14

Parameter	Exposure Type	Infant		Child	Adult
	Age Range	3rd Trimester	0<2	2<16	16-30
Exposure Frequency (days/year)		350	350	350	350
Age Sensitivity Factor		10	10	3	1
Fraction of Time at Home		1.0	1.0	1.0	0.73

Source: Illingworth & Rodkin, Inc. 2018
a. 95th percentile breathing rates.

The maximum modeled DPM concentrations from construction activities occurred at a receptor east of the site, northeast of the intersection of Spring Court and Spring Street. The location of this receptor is identified in Figure 1 (in **Appendix 4.2**). Based on the maximum average annual modeled DPM concentration for each year of construction, the maximum increased cancer risk was calculated. Due to the short duration of project construction activities, infant exposures were assumed in calculating all cancer risks. Because an infant breathing rate is greater than for the 3rd trimester, the contribution to total cancer risk from an infant exposure is greater than if the initial exposure assumed a 3rd trimester exposure. In addition to infant exposures, adult exposures and increased cancer risks were calculated.

Results of this assessment, as shown in **Table 4.2-12, Maximum Community Risks from Hagar Site Construction,** indicate that without mitigation, the maximum residential lifetime excess cancer risk (LECR) would be 59.7 in 1 million for an infant exposure and 1.3 in one million for an adult exposure. While the residential adult LECR is below the MBARD's threshold of greater than 10 in 1 million, the LECR for a residential infant exposure is greater than the significance threshold and would be considered a significant impact unless mitigated.

Table 4.2-12
Maximum Community Risks from Hagar Site Construction
(Unmitigated and with Mitigation)

Location	Lifetime Excess Cancer Risk (per million)	Hazard Index
Maximum Unmitigated Residential (infant exposure)	59.7	0.05
Significance Threshold	10	1.0
Exceeds Threshold?	***Yes***	***No***
Maximum Residential with Mitigation	7.7	<0.01
Significance Threshold	10	-
Exceeds Threshold?	***No***	**-**

Source: Illingworth & Rodkin, Inc. 2018.

Potential non-cancer health effects due to chronic exposure to DPM were also evaluated. Evaluation of potential non-cancer health effects from exposure to short-term concentrations in the air was performed by comparing modeled concentrations in air with the reference exposure levels (RELs). A REL is a concentration in the air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in the air and the REL. This ratio is referred to as a hazard quotient/index (HI). The cancer potency factors, unit risk values, and RELs used to characterize health risks associated with modeled concentrations in the air were obtained from information set forth by the MBARD and OEHHA. As reported in **Table 4.2-12**, the maximum computed chronic HI is 0.05, which is much lower than the MBARD significance criterion of a hazard index greater than 1.0. Thus, the impact would be less than significant impact.

Exposure of Project Population to Substantial TAC Concentrations

A comment received on the Draft EIR stated that given the planned proximity of the childcare facility to Hagar Drive, the risk and possible harm from excessive pollutant emissions require further evaluation. Following the 2015 Supreme Court ruling in *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369, Case No. S213478, a lead agency is not required to evaluate the impacts of the environment on the project (also known as reverse CEQA). Therefore, this EIR does not include an evaluation of the effect of emissions from traffic on Hagar Drive or Coolidge Drive on receptors on the project site. However, regardless of the requirements of CEQA, an adverse impact on project site receptors, including the children at the childcare center, is not anticipated. According to a guidance put forth by CARB in 2005 regarding siting of sensitive land uses near sources of air pollution, sensitive receptors should not be sited within 500 feet of rural roads with an average daily traffic (ADT) of 50,000 vehicles (CARB 2005). According to the BAAQMD 2017 CEQA Guidelines, should a lead agency voluntarily decide to evaluate impacts of existing pollutant sources on project receptors, potential risk to sensitive receptors should be evaluated if the project would locate a sensitive receptor within 1,000 feet of a roadway with an ADT of 10,000 vehicles or more (BAAQMD 2017). The estimated 2020 plus project ADT at the intersection of Glenn Coolidge and Hagar Drives is about 15,000 vehicles. Based on health risk assessments conducted for other projects with even higher volumes of traffic, this volume of traffic would not result in a cancer risk on the project site that would exceed 10 in a million. Furthermore, the human health risk from high-volume roadways stems from the vehicle mix on such roadways, which includes a high percentage of vehicles that operate on diesel. Vehicles that operate on diesel do not form a high percentage of traffic on campus roadways.

In summary, project operation would not result in the exposure of sensitive receptors to substantial pollutant concentrations. Project construction at the Hagar site would, however, expose nearby sensitive receptors to substantial concentrations of TACs, resulting in a significant community health risk impact unless mitigated.

Mitigation Measures:

SHW Mitigation AIR-3: Implement **SHW Mitigation AIR-1A.**

Significance after Mitigation: SHW Mitigation AIR-1A, presented under **SHW Impact AIR-1** above, would be implemented to reduce DPM emissions. As shown in **Table 4.2-12,** with implementation of **SHW Mitigation AIR-1,** the computed maximum LECR from construction would be 7.7 in one million or less for an infant exposure. The project's impact related to DPM emissions would be reduced to a less than significant level.

SHW Impact AIR-4: Implementation of the proposed project would not create objectionable odors that could affect a substantial number of people. (*Less than Significant*)

Construction of the proposed project would require the use of diesel-fueled equipment, architectural coatings, and asphalt paving, all of which have an associated odor. However, these odors are not pervasive enough to cause objectionable odors affecting a substantial number of people. Consequently, construction of the proposed facilities would not cause substantial odors.

Typically, wastewater treatment plants, wastewater pumping facilities, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing, fiberglass manufacturing, painting/coating operations, rendering plant, coffee roaster, food processing facilities, feed lots and dairies, green waste and recycling operations, and metal smelting plants are considered odor emitting facilities. The campus does not contain any of these facilities. Therefore, the proposed project would not expose receptors to odors from existing sources.

The proposed project includes the construction and operation of a MBR wastewater treatment plant at both sites. As described in **Chapter 3.0, Project Description**, the facility would be a fully enclosed modular plant, located inside an enclosed concrete masonry unit (CMU) building in the case of the Hagar site plant and in an approximately 3,500 square foot single story building whose exterior construction will utilize materials similar to the surrounding residential buildings in the case of the Heller site plant. Additionally, the majority of equipment at the Hagar site would be below grade. Both MBR plants would not include any open channels or holding ponds that are typically the sources of odors at traditional wastewater treatment plants. As odors could result from the headworks room, equalization tank, and the room containing the MBR, all three spaces in the MBR plants would be under negative pressure with airflow ducted to an activated carbon odor control system that would scrub air of odors and compounds such as hydrogen sulfide. The exhaust from the odor control system would be located away from sensitive receptors such as occupied buildings and outdoor gathering spaces. Furthermore, both MBR plants would be operated and maintained in compliance with a permit from the Central Coast Regional Water Quality Control Board (RWQCB). Although the permit does not regulate odors, the permit includes O&M requirements to minimize "nuisance conditions." The permit requires that at all times, all facilities or systems must be operated as efficiently as possible in a manner that will prevent discharges, health hazards, and nuisance conditions. All screenings, grit, and sludge must be disposed of in a manner approved by the RWQCB to prevent any pollutant from the materials from reaching waters of the state, creating a public health hazard, or causing a nuisance condition. In addition to the operating permit from the RWQCB, the agreement between the University and the P3 developer for the operations of the proposed project will include requirements related to how odor issues, if any, would be resolved, and would set forth a key performance indicator or metric that would be used to demonstrate compliance. Therefore, the proposed MBR facility would not expose the project site residents and other receptors in buildings and housing near the project sites to odor impacts.

A larger MBR plant, with the same type of treatment technology as the proposed MBR plant for the Heller and Hagar sites, has been operating at the OHSU Center for Health & Healing (CHH) in Portland, Oregon for more than 10 years. That MBR plant is located inside the parking garage of the hospital and medical office building. The odor control system at that plant is also the same as is proposed for the SHW project, where air from the headworks and tanks is forced through a large activated carbon filtration system to eliminate odors. The operator has stated that there have been no odor complaints received in the 10 plus years that the plant has been operating.

For reasons presented above, the odor impact of the proposed project would be less than significant.

Mitigation Measures: No mitigation is required.

SHW Impact AIR-5: Implementation of the proposed project would not conflict with or obstruct implementation of the applicable air quality plan. (*Less than Significant*)

In compliance with the State CEQA Guidelines, this EIR evaluates whether the proposed project would conflict with or otherwise obstruct implementation of regional air quality plans. According to the MBARD 2008 *Guidelines for Implementing CEQA*, a project that is consistent with the Air Quality Management Plan (AQMP) is considered to be accommodated in the AQMP and therefore would not have a significant impact on regional air quality. AQMPs are developed for regions that do not meet ambient air quality standards. As shown above in **Table 4.2-2**, the region currently is not in attainment of the state ozone and PM_{10} standards. The AQMP for the MBARD is based on population and housing forecasts prepared by the Association of Monterey Bay Area Governments (AMBAG). The growth of the campus projected under the 2005 LRDP is accounted for in the current AMBAG forecasts and regional emissions inventory and thus mitigated in regional air quality planning efforts.

The proposed SHW project would not increase the campus population to exceed the population projected under the 2005 LRDP and included in the AMBAG projections and accounted for the regional air quality plan. Furthermore, as the analysis under **SHW Impact AIR-2** shows, the project's operations would not result in a significant increase in criteria air pollutant emissions. In general, projects that result in less than significant operational emissions are not expected to set back regional air quality planning efforts. Therefore, the project would not conflict with the applicable air quality plan, and the impact would be less than significant.

Mitigation Measures: No mitigation is required.

4.2.5 PORTER AND RACHEL CARSON DINING FACILITIES EXPANSION PROJECT IMPACTS AND MITIGATION MEASURES

Environmental Setting

The proposed dining facilities expansion project would add to existing facilities on the west side of Rachel Carson College and to the southern end of Porter College. In both instances, the facilities would be located above or adjacent to existing buildings, or would replace the existing buildings with larger buildings. Approximately 10,000 square feet of building space would be added to the two colleges.

Impacts and Mitigation Measures

DF Impact AIR-1: **The implementation of the proposed dining facilities project would not result in a significant impact on air quality during construction and operations. (*Less than Significant*)**

Construction Phase Emissions

The MBARD 2008 CEQA guidance provide that if a project involves grading and excavation on less than 2.2 acres per day, or the project involves minimal grading and excavation and the overall project site is less than 8.1 acres, it can be assumed that the project's construction phase impact would be less than significant. The dining facilities expansion project would involve minimal grading and excavation and the project site is well below 8.1 acres. Furthermore, the project would add only 10,000 square feet of new building space to existing facilities. Given the limited area that would be disturbed and the small amount of building construction involved, it is anticipated that the construction emissions of the project would result in a less than significant impact on air quality.

Operational Emissions

There would be a minimal increase in criteria pollutant emissions due to the dining facilities expansion project. This is because the project would expand dining areas and a kitchen, adding less than 10,000 square feet of building space. It would not increase the campus population and therefore would not generate vehicle trips that would increase indirect emissions. The impact on air quality from project operations would be less than significant.

Mitigation Measures: No mitigation is required.

4.2.6 CUMULATIVE IMPACTS AND MITIGATION MEASURES

SHW Impact C-AIR-1: Implementation of the proposed project would not result in a cumulatively considerable net increase of a criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard. (*Less than Significant*)

According to the MBARD 2008 Guidelines for Implementing CEQA, "*A consistency analysis and determination serve as the project's analysis of cumulative impacts on regional air quality. Project emissions which are not consistent with the AQMP are not accommodated in the AQMP and will have a significant cumulative impact unless offset.*" The analysis of consistency is performed by AMBAG for population-related projects and by the Air District for all others. A consistency analysis was performed for campus population growth under the 2005 LRDP and discussed under LRDP Impact AIR-4. The analysis concluded that given that campus growth under the LRDP was not accounted for in the regional population forecasts, the 2005 LRDP was not consistent with the AQMP, and would therefore result in a cumulatively considerable contribution of ozone precursors to the regional air basin. The 2005 LRDP EIR noted that the Campus would implement LRDP Mitigations AIR-2A through AIR-2C and LRDP Mitigations AIR-4A and AIR-4B to minimize operational emissions and address the emissions that would result from campus growth under the 2005 LRDP, but the cumulative impact would remain significant and unavoidable. The proposed SHW project and other near-term housing projects on the campus are within the scope of the 2005 LRDP and would not, in themselves, cause any enrollment increases. The student population at the campus in 2020-21 would remain below 19,500 FTE students and therefore there would be no change to the previously analyzed cumulative air quality impacts disclosed in the 2005 LRDP EIR. Although that impact was found to be significant and unavoidable, the proposed project would not make any contribution to the impact as it would not result in any enrollment increase.

With respect to emissions of localized pollutant CO, the 2005 LRDP EIR noted that LRDP Impact AIR-3 evaluated CO concentrations at study area intersections that would result under two scenarios: a 2020 Without LRDP Project scenario which estimated increase in CO concentrations as a result of the increase in background traffic volumes between 2005 and 2020, and a 2020 With LRDP Project scenario, which includes 2005 LRDP-related traffic volumes added to 2020 background volumes. Note that the 2020 background traffic volumes were derived from the AMBAG regional traffic model and reflect the increased traffic that would result from population and employment growth projected in the study area through 2020 by AMBAG. The analysis presented under LRDP Impact AIR-3, therefore, presented the cumulative CO impact of campus growth and found it to be less than significant. As stated in **Section 4.11, Transportation and Traffic,** the proposed SHW project (as well as other reasonably foreseeable campus housing projects) would reduce the increase in total daily and peak hour traffic to and from the campus that would occur between 2017 and 2020 due to enrollment growth, and therefore the proposed SHW project would not contribute to the cumulative CO impact analyzed for the 2005 LRDP growth.

Mitigation Measures: No mitigation is required.

4.2.5 REFERENCES

Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines.* May.

California Air Resources Board. 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*.

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