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## 4.2 AIR QUALITY

### 4.2.1 Existing Conditions

#### Meteorological Setting

The proposed project is located in Santa Barbara County, and is part of the South Central Coast Air Basin (SCCAB). The SCCAB includes all of Ventura, Santa Barbara and San Luis Obispo Counties. The climate of the Santa Barbara coastal plain, as with all Southern California, is dominated by the strength and position of the semi-permanent high-pressure center over the Pacific Ocean near Hawaii. It creates cool summers, mild winters, and infrequent rainfall. It drives the cool daytime sea breeze, and it maintains comfortable humidities and ample sunshine after the frequent morning clouds dissipate. Unfortunately, the same atmospheric processes that create the desirable living climate combine to restrict the ability of the atmosphere to disperse the air pollution generated by the population attracted in part by the desirable climate.

Temperatures in the Santa Barbara area average 59 degrees annually. Daily and seasonal oscillations of mean temperature are small because of the moderating effects of the nearby oceanic thermal reservoir. In contrast to the steady temperature regime, rainfall is highly variable. Measurable precipitation occurs mainly from early November to mid-April, but total amounts are generally small. Santa Barbara averages 18 inches of rain annually with January as the wettest month.

Winds in the project vicinity display several characteristic regimes. During the day, especially in summer, winds are from the south in the morning and from the west in the afternoon. Daytime wind speeds are 5-10 miles per hour on average. At night, especially in winter, the land becomes cooler than the ocean, and an offshore wind of 3-5 miles per hour develops. Early morning winds are briefly from the south-east parallel to the coastline before the daytime on-shore flow becomes well established again. One other important wind regime results when a high pressure occurs over the western United States that creates hot, dry and gusty Santa Ana winds from the north and northeast across Santa Barbara County.

The net effect of the wind pattern on air pollution is that any locally generated emissions will be carried offshore at night, and toward inland Santa Barbara County by day. Dispersion of pollutants is limited when the wind velocity for nighttime breezes is low. The lack of significant development in inland Santa Barbara County, however, causes few air quality problems during nocturnal air stagnation. Daytime ventilation is usually much more vigorous. Both summer and winter air quality in the project area is generally very good.

In addition to winds that control the rate and direction of pollution dispersal, Southern California is notorious for strong temperature inversions that limit the vertical depth through which pollution can be mixed. In summer, coastal areas are characterized by a sharp discontinuity between the cool marine air at the surface and the warm, sinking air aloft within the high-pressure cell over the ocean to the west. This marine/subsidence inversion allows for good local mixing, but acts like a giant lid over the basin. Air starting onshore at the beach is relatively clean, but becomes progressively more polluted as sources continue to add pollution from below without any dilution from above. Because of Santa Barbara's location relative to the ocean, the incoming marine air during warm season onshore flow contains little air pollution. Local air quality is not substantially affected by the regional subsidence inversions.

A second inversion type forms on clear, winter nights when cold air off the mountains sinks to the surface while the air aloft remains warm. This process forms radiation inversions. These inversions, in conjunction with calm winds, trap pollutants such as automobile exhaust near their source. During the long nocturnal drainage flow from land to sea, the exhaust pollutants continually accumulate within the shallow, cool layer of air near the ground. Therefore, most areas of Santa Barbara County may experience stagnation of carbon monoxide and nitrogen oxides because of this winter radiation inversion condition. However, Santa Barbara County has not had any localized air pollution “hot spots” at any air monitoring location in over 15 years.

Both types of inversions occur throughout the year to some extent, but the marine inversions are very dominant during the day in summer, and radiation inversions are much stronger on winter nights when nights are long and air is cool. The governing role of these inversions in atmospheric dispersion leads to a substantially different air quality environment in summer in the South Central Coast Air Basin than in winter.

### **Ambient Air Quality Standards (AAQS)**

In order to gauge the significance of the air quality impacts of the proposed Santa Barbara Botanic Garden project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone (the primary ingredient in photochemical smog) may lead to adverse respiratory health even at concentrations close to the ambient standard.

National AAQS were established in 1971 for six pollutants with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended several times in air quality problem areas like Southern California. In 2003, the Environmental Protection Agency (EPA) adopted a rule that established a new attainment deadline for ozone for the year 2021. Because California had established AAQS several years before the Federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California (California Air Resources Board, November 2008) are shown in **Table 4.2-1**. Sources and health effects of criteria air pollutants are summarized in **Table 4.2-2**.

The Federal Clean Air Act Amendments (CAAA) of 1990 required that the EPA review all national AAQS in light of currently known health effects. The EPA was charged with modifying existing standards or promulgating new ones where appropriate. The EPA subsequently developed standards for chronic ozone exposure (8+ hours per day) and for very small diameter particulate matter (called "PM-2.5"). New national AAQS were adopted in 1997 for these pollutants.

**Table 4.2-1  
Ambient Air Quality Standards**

Pollutant	Averaging Time	California Standards		Federal Standards		
		Concentration	Method	Primary	Secondary	Method
Ozone (O <sub>3</sub> )	1 Hour	0.09 ppm (180 µg/m <sup>3</sup> )	Ultraviolet Photometry	-	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.07 ppm (137 µg/m <sup>3</sup> )		0.075 ppm (147 µg/m <sup>3</sup> )		
Respirable Particulate Matter (PM <sub>10</sub> )	24 Hour	50 µg/m <sup>3</sup>	Gravimetric or Beta Attenuation	150 µg/m <sup>3</sup>	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m <sup>3</sup>		-		
Fine Particulate Matter (PM <sub>2.5</sub> )	24 Hour	No Separate State Standard		35 µg/m <sup>3</sup>	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m <sup>3</sup>	Gravimetric or Beta Attenuation	15 µg/m <sup>3</sup>		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m <sup>3</sup> )	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m <sup>3</sup> )	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m <sup>3</sup> )		35 ppm (40 mg/m <sup>3</sup> )		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m <sup>3</sup> )		-		
Nitrogen Dioxide (NO <sub>2</sub> )	Annual Arithmetic Mean	0.03 ppm (57 µg/m <sup>3</sup> )	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m <sup>3</sup> )	Same as Primary Standard	Gas Phase Chemilumi- nescence
	1 Hour	0.18 ppm (339 µg/m <sup>3</sup> )		-		
Lead	30-Day average	1.5 µg/m <sup>3</sup>	Atomic Absorption	-	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Calendar Quarter	-		1.5 µg/m <sup>3</sup>		
	Rolling 3-month Average	-		0.15 µg/m <sup>3</sup>		
Sulfur Dioxide (SO <sub>2</sub> )	Annual Arithmetic Mean	-	Ultraviolet Fluorescence	0.030 ppm (80 µg/m <sup>3</sup> )	-  0.5 ppm (1,300 µg/m <sup>3</sup> )  -	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m <sup>3</sup> )		0.14 ppm (365 µg/m <sup>3</sup> )		
	3 Hour	-		-		
	1 Hour	0.25 ppm (655 µg/m <sup>3</sup> )		-		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer–visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		<b>No Federal Standards</b>		
Sulfates	24 Hour	25 µg/m <sup>3</sup>	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m <sup>3</sup> )	Ultraviolet Fluorescence			
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m <sup>3</sup> )	Gas Chromatography			

**Table 4.2-2**  
**Health Effects of Major Criteria Pollutants**

<b>Pollutants</b>	<b>Sources</b>	<b>Most Relevant Effects</b>
Carbon Monoxide (CO)	<ul style="list-style-type: none"> <li>• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust.</li> <li>• Natural events, such as decomposition of organic matter.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced tolerance for exercise.</li> <li>• Impairment of mental function.</li> <li>• Impairment of fetal development.</li> <li>• Death at high levels of exposure.</li> <li>• Aggravation of some heart diseases (angina).</li> </ul>
Nitrogen Dioxide (NO <sub>2</sub> )	<ul style="list-style-type: none"> <li>• Motor vehicle exhaust.</li> <li>• High temperature stationary combustion.</li> <li>• Atmospheric reactions.</li> </ul>	<ul style="list-style-type: none"> <li>• Aggravation of respiratory illness.</li> <li>• Reduced visibility.</li> <li>• Reduced plant growth.</li> <li>• Formation of acid rain.</li> </ul>
Ozone (O <sub>3</sub> )	<ul style="list-style-type: none"> <li>• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.</li> </ul>	<ul style="list-style-type: none"> <li>• Aggravation of respiratory and cardiovascular diseases.</li> <li>• Irritation of eyes.</li> <li>• Impairment of cardiopulmonary function.</li> <li>• Plant leaf injury.</li> </ul>
Lead (Pb)	<ul style="list-style-type: none"> <li>• Contaminated soil.</li> </ul>	<ul style="list-style-type: none"> <li>• Impairment of blood function and nerve construction.</li> <li>• Behavioral and hearing problems in children.</li> </ul>
Respirable Particulate Matter (PM-10)	<ul style="list-style-type: none"> <li>• Stationary combustion of solid fuels.</li> <li>• Construction activities.</li> <li>• Industrial processes.</li> <li>• Atmospheric chemical reactions.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced lung function.</li> <li>• Aggravation of the effects of gaseous pollutants.</li> <li>• Aggravation of respiratory and cardio respiratory diseases.</li> <li>• Increased cough and chest discomfort.</li> <li>• Soiling.</li> <li>• Reduced visibility.</li> </ul>
Fine Particulate Matter (PM-2.5)	<ul style="list-style-type: none"> <li>• Fuel combustion in motor vehicles, equipment, and industrial sources.</li> <li>• Residential and agricultural burning.</li> <li>• Industrial processes.</li> <li>• Also, formed from photochemical reactions of other pollutants, including NO<sub>x</sub>, sulfur oxides, and organics.</li> </ul>	<ul style="list-style-type: none"> <li>• Increases respiratory disease.</li> <li>• Lung damage.</li> <li>• Cancer and premature death.</li> <li>• Reduces visibility and results in surface soiling.</li> </ul>
Sulfur Dioxide (SO <sub>2</sub> )	<ul style="list-style-type: none"> <li>• Combustion of sulfur-containing fossil fuels.</li> <li>• Smelting of sulfur-bearing metal ores.</li> <li>• Industrial processes.</li> </ul>	<ul style="list-style-type: none"> <li>• Aggravation of respiratory diseases (asthma, emphysema).</li> <li>• Reduced lung function.</li> <li>• Irritation of eyes.</li> <li>• Reduced visibility.</li> <li>• Plant injury.</li> <li>• Deterioration of metals, textiles, leather,</li> </ul>

Pollutants	Sources	Most Relevant Effects
		finishes, coatings, etc.
Source: California Air Resources Board, 2002.		

Planning and enforcement of the Federal standards for PM-2.5 and for ozone (8-hour) were challenged by trucking and manufacturing organizations. In 2001, the U.S. Supreme Court ruled that the EPA did not require specific congressional authorization to adopt national clean air standards. The Court also ruled that health-based standards did not require preparation of a cost-benefit analysis. The Court did find, however, that there was some inconsistency between existing and "new" standards in their respective attainment schedules. These attainment planning schedule inconsistencies centered mainly on the 8-hour ozone standard. In November 2002, the EPA agreed to downgrade the attainment designation for a large number of communities to "non-attainment" for the 8-hour ozone standard. Santa Barbara County was a designated attainment area for the Federal one-hour ozone standard, and is now a designated attainment area for the eight-hour ozone standard (as of June 15, 2004). The County does meet the State one-hour ozone standard but does not meet the State standard for particulate matter less than ten microns in diameter (PM10). Although the State has not yet issued attainment designations for the recently adopted California 8-hour ozone standard, historical monitoring data suggests that Santa Barbara County will be designated as non-attainment for this standard. Air quality planning for meeting the State standard also serves as the plan for continuing to meet Federal ozone standards into the future.

Evaluation of the most current data on the health effects of inhalation of fine particulate matter prompted the California Air Resources Board to recommend adoption of the State PM-2.5 standard that is more stringent than the Federal standard. This standard was adopted on June 20, 2002, and went into effect in July, 2003. The State PM-2.5 standard does not have specific attainment planning requirements like a Federal clean air standard, rather it only requires continued progress towards attainment.

Because of the strong evidence that chronic ozone exposure is more harmful than short-term hourly levels, the ARB also adopted an 8-hour ozone exposure standard in April 2005. The new standard mirrors the Federal (8hour) exposure limit. The California 8-hour ozone standard is slightly more stringent (0.07 ppm) than the Federal standard (0.08 ppm). It does not have a specific attainment deadline, but only requires that continued progress toward attainment must be demonstrated. As part of the same re-evaluation process, the ARB adopted an annual state standard for NO<sub>2</sub> that is more stringent than the corresponding Federal standard and strengthened the state one-hour NO<sub>2</sub> standard.

As part of the EPA's 2002 consent decree on clean air standards, an additional review of airborne particulate matter (PM) and human health was initiated. A substantial modification of Federal clean air standards for PM was promulgated in 2006. Standards for PM-2.5 were strengthened, a new class of PM in the 2.5 to 10 micron size was created, some PM-10 standards were revoked, and a distinction between rural and urban air quality was adopted.

### Baseline Air Quality

As described above, Santa Barbara County is considered in attainment of the Federal eight-hour ozone standard and the State one-hour ozone standard but does not meet the State standard for PM10. There is not yet enough data to determine the County's attainment status for either the Federal standard for particulate matter less than 2.5 microns in diameter (PM2.5) or the State PM2.5 standard. The State adopted a new eight-hour ozone standard that became effective in May 2006. Although the State has not

yet issued attainment designations, data indicate that the County will be considered in non-attainment of this standard.

Existing and probable future levels of air quality at the project site in the Santa Barbara area can be best inferred from ambient air quality measurements conducted by the Santa Barbara Air Pollution Control District (APCD) at its Santa Barbara air monitoring station. This station measures regional pollution levels such as ozone, carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and ultrafine particulates (PM-2.5). There are no local respirable particulate matter (PM-10) measurements near the project site, but Santa Barbara County is designated as a non-attainment area for the State PM-10 standard based upon data from other County monitoring locations. **Table 4.2-3** summarizes the most recent four years (2002-2005) of available published data from the Santa Barbara station. Data for 2006 was not included because ozone is the only pollutant for which data is yet complete, however there were no 2006 ozone violations. The following conclusions can be drawn from the 2002-2005 data:

1. Photochemical smog (ozone) levels infrequently exceed standards. Both the State and Federal standard for ozone have each only been exceeded once in four years.
2. Annual maximum ozone levels tend to reflect some annual variations in dispersion patterns that cause concentrated airflow from more developed areas of the Los Angeles air basin to be carried into the Santa Barbara area during some years, while only the fringe of the basin-wide "urban plume" reaches the coastal corridor in others.
3. PM-2.5 measurements have not exceeded standards at any time since monitoring began in 2003, however the maximum 24-hour concentration has been slowly increasing since 2003.

**Table 4.2-3**  
**Project Area Air Quality Monitoring Summary (2002 - 2005)**  
**(Number of Days Standards Were Exceeded and Maximum Levels During Such Violations)**

Pollutant/Standard	2002	2003	2004	2005
<b>Ozone</b>				
1-Hour > 0.09 ppm (S)	0	0	1	0
8-Hour > 0.08 ppm (F)	0	0	1	0
Max. 1-Hour Conc. (ppm)	0.076	0.079	0.095	0.077
<b>Carbon Monoxide</b>				
1-Hour > 20. ppm (S)	-	0	0	0
8- Hour > 9. ppm (S, F)	-	0	0	0
Max 1-Hour Conc. (ppm)	-	5.9	4.7	4.0
Max 8-Hour Conc. (ppm)	-	2.3	1.9	1.7
<b>Nitrogen Dioxide</b>				
1-Hour > 0.25 ppm (S)	-	0	0	0
Max 1-Hour Conc. (ppm)	-	0.059	0.063	0.062
<b>PM-10</b>				
(No Local PM-10 data)	-	-	-	-
<b>Ultra-Fine Particulates (PM-2.5)</b>				
24-Hour > 65 µg/m <sup>3</sup> (F) <sup>1</sup>	-	0/57	0/55	0/52
Max. 24-Hour Conc. (µg/m <sup>3</sup> )	-	24.0	27.5	28.3
<sup>1</sup> Standard was downgraded to 35 g/m <sup>3</sup> for 24 hours in 2006. The more stringent standard would not				

Pollutant/Standard	2002	2003	2004	2005
have been exceeded in 2003-2005 had it been in effect. = No data available. S= State Standard. F=Federal Standard. Source: Santa Barbara Annual Summaries, 2002-2005.				

## Air Quality Planning

State and Federal laws require that jurisdictions which do not meet clean air standards must develop plans and programs that will bring those areas into compliance. These plans typically contain emission reduction measures and attainment schedules to meet specified deadlines. Once attainment is reached, a “maintenance plan” must be prepared and adopted.

In 2001, an ozone attainment plan was developed that was designed for Santa Barbara County to meet both Federal and State standards to be included in the State Implementation Plan (SIP). The 2001 CAP was updated in 2004. The 2004 CAP is the currently adopted County clean air plan for ultimately meeting the State ozone standard, and incorporates updated data for continued maintenance of Federal ozone standards. Triennial updates of the CAP are required by the California Clean Air Act. The Draft 2007 CAP is currently in public review. The required adoption date is June 15, 2007. The 2007 CAP continues the programs and policies of previous CAPs. The conclusion of the 2007 Draft CAP is that the Federal ozone standard will continue to be maintained in Santa Barbara County. The 2007 CAP also concludes that continued progress will be made toward meeting the State ozone standards (1-hour and 8-hour).

Specific growth such as the proposed project is not explicitly incorporated into the CAP. Air pollution effects of general growth are derived from emissions associated with population, housing and employment contained in the SBCAG 2002 Regional Growth Forecasts. The forecasts assume approximately a 1.1 percent increase per year in growth indicators in the next 10-15 years. If area wide growth is consistent with this assumption, general development will not impede attainment/maintenance of clean air standards. The CAP does contain transportation control measures (TCMs) designed to reduce dependency upon the single-passenger automobile. The SBBG can implement those TCMs that are applicable to the project.

## Global Climate Change/Greenhouse Gases

Emissions of greenhouse gases (GHGs) accumulate in the atmosphere, where these gases trap heat near the Earth’s surface by absorbing infrared radiation. This effect causes global warming and climate change, with adverse impacts on humans and the environment. These impacts stem from reduced water supplies in some areas, ecological changes that threaten some species, reduced agricultural productivity in some areas, increased coastal flooding, and other effects.

GHGs include water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofurocarbons, perfluorocarbons, and sulfur hexafluoride. Combustion of fossil fuels constitutes the primary source of GHGs. Projects can directly release GHGs, or indirectly increase GHGs by increasing combustion of fossil fuels via increased energy consumption or vehicular trips. Some projects can also exacerbate climate change by significantly reducing Albedo or sequestration of carbon dioxide (e.g., removal of many trees). California emitted 484 million metric tonnes of GHGs in 2004 (California Air Resources Board, *California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit*, November, 2007: p.7).

The California Global Warming Solutions Act of 2006 (Assembly Bill 32, Health and Safety Code, §§ 38500 *et. seq.*) requires reduction of California's GHG emissions to 1990 levels by 2020. While neither the California Air Resources Board (CARB) nor the Santa Barbara County Air Pollution Control District has estimated CEQA criteria or threshold for GHGS, CARB has established California's 1990 level at 427 million metric tons of CO<sub>2</sub> equivalent emissions.

## 4.2.2 Thresholds of Significance

### Construction Thresholds

According to the Santa Barbara County *Environmental Thresholds and Guidelines Manual*, no quantitative threshold has been established for short-term, construction-related PM-10; however, the effects of PM-10 should be discussed in all environmental documents for projects involving ground disturbance, and dust control measures are required for most projects following the County's Grading Ordinance. Additionally, the County violates the State standard for PM-10; therefore dust mitigation measures are required for all discretionary construction activities.

The short-term thresholds for NO<sub>x</sub> and ROG emissions from construction equipment are not established in the Santa Barbara County *Environmental Thresholds and Guidelines Manual*. NO<sub>x</sub> emissions from construction equipment in the County are estimated at 1,000 tons per year, and when compared to the total County NO<sub>x</sub> emission inventory of nearly 17,000 tons per year, construction emissions comprised approximately six percent of the 1990 County-wide NO<sub>x</sub> emission inventory. This amount is considered insignificant, as stated in the Santa Barbara County *Environmental Thresholds and Guidelines Manual*.

### Operational Thresholds

Many air quality impacts that derive from dispersed mobile sources, i.e., the dominant pollution generators in Santa Barbara and the basin, often occur hours later and miles away after photochemical processes have converted primary exhaust pollutants into secondary contaminants such as ozone. While the effects of ozone are felt region-wide, the incremental regional air quality impact of an individual project is generally very small and cannot be modeled.

A proposed project will not have a significant air quality effect on the environment, if operation of the project will:

- Emit (from all project sources, mobile and stationary) less than the daily trigger for offsets set in the APCD New Source Review (NSR) Rule, for any pollutant. For ozone precursor emissions the APCD NSR threshold is 55 pounds per day (stationary source and on-site mobile sources);
- Not cause or contribute to a violation of any California or National Ambient Air Quality Standard;
- Not exceed the APCD health risk public notification thresholds adopted by the APCD; or
- Be consistent with the adopted Federal and State Air Quality Plans.

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The following significance thresholds for mobile and operational emissions have been adopted by Santa Barbara County (*Environmental Thresholds and Guidelines Manual, Interim Revision to Air Quality Sub-Sections, October 2006*):

- 55 lbs per day of ROG or NOx from all project sources (both mobile and stationary).
- 25 pounds per day of ROG or NOx from mobile sources only.

Impacts relating to carbon monoxide concentrations are considered significant if the project would create a CO “hot spot” where the California 1-hour standard of 20 parts per million (ppm) or the 8-hour standard of 9 ppm is exceeded. However Santa Barbara County has been in attainment of the State CO standard for many years and ambient CO levels have declined significantly. Projects that generate fewer than 800 peak hour trips do not require a CO “hot spot” analysis.

### 4.2.3 Project Impacts

#### Construction Period Impacts

Temporary construction activity emissions would occur during project build-out. Such emissions include on-site generation of dust and equipment exhaust from demolition, grading and construction activities, and off-site emissions from construction employee commuting and/or trucks delivering building materials.

Construction activity emissions are difficult to quantify, since the exact type and amount of equipment that would be used or the acreage that may be disturbed on any given day in the future is not known with any reasonable certainty. The emphasis in environmental documents relative to construction activity emission impacts has therefore been to reduce the emissions to the maximum extent feasible through comprehensive mitigation even if the exact amount of emissions cannot be precisely quantified. Though no quantitative threshold has been established for short-term construction-related emissions in Santa Barbara County, an analysis is nevertheless provided below.

#### *PM-10 Airborne Dust (Impact AQ 1)*

Airborne dust is normally the primary concern during construction of new buildings and infrastructure. Because such emissions are not amenable to collection and discharge through a controlled source, they are called “fugitive emissions.” Emission rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). These parameters are not known with any reasonable certainty prior to project development and may change from day to day. Any assignment of specific parameters to an unknown future date is speculative and conjectural.

Because of the inherent uncertainty in the predictive factors for estimating fugitive dust generation, regulatory agencies typically use one universal “default” factor based on the area disturbed assuming that all other input parameters into emission rate prediction fall into mid-range average values. This assumption may or may not necessarily be applicable to site-specific conditions on the project site. As noted previously, emissions estimation for project-specific fugitive dust sources is therefore characterized by a considerable degree of imprecision.

Construction activity air quality impacts occur mainly in close proximity to the surface disturbance area. However, there may be some “spill-over” into the surrounding community. That spill-over may be physical as vehicles drop or carry dirt or silt is washed into public streets. Passing, non-project vehicles then pulverize the dirt to create off-site dust impacts. Spill-over may also occur through traffic congestion effects. Construction may entail roadway encroachment, detours, lane closures, and competition between construction vehicles (trucks and contractor employee commuting) and ambient traffic for available roadway capacity.

The newly acquired Cavalli Site to be added to the existing Santa Barbara Botanic Garden project is approximately 13.15 acres, which would bring the entire site to approximately 78 acres in size. No mass grading of large portions of the project site would occur as a result of the proposed project. The project involves demolition of six existing structures, remodeling some existing structures, construction of 16 new structures to the site, installation of pavers over existing dirt pathways, construction and paving of a new trail, and installation of sewer and water lines as described in Section 2.0 Project Description.

Structures proposed for demolition may contain hazardous building products such as asbestos-containing materials (ACM's) or lead-based paint (LCP). These materials may be released during demolition and construction of new facilities. Existing laws require that a pre-demolition survey be conducted, and that potential areas of concern be closely investigated, and that any identified toxic or hazardous conditions be remediated prior to or during construction. The APCD requires the filing of an Asbestos Notification form for each structure to be demolished at least 10 days prior to demolition.

While there are no County significance thresholds for PM-10 emissions, the County violates State standards for this pollutant. Grading and construction activities would produce PM-10 emissions. Construction is to occur over a 10 year period but there is no precise construction or grading schedule. For the proposed project, the Air Resource Board URBEMIS2007 computer model predicts that 0.55 acres could be under simultaneous disturbance at some point during the build-out lifetime of the project. The model predicts that clearing/grading will generate 5.5 pounds of PM-10 per day, with the use of “standard” dust control procedures.

In addition to dust (PM-10) emissions from clearing and grading for new structures and facilities, minor demolition of 4,240 square feet would also generate small amounts of PM-10 emissions. Not all demolition would occur concurrently with clearing/grading. The URBEMIS2007 computer model was used to estimate daily demolition PM-10 emissions assuming a daily demolition rate of 4,000 cubic feet of demolition debris per day. The model output included in Appendix B shows that demolition could add 1.69 pounds of fugitive dust. The addition of the 1.69 pounds of demolition PM-10 to the construction dust burden would result in a total of 7.2 pounds. Because these various projects are geographically separated, no single receptor would be exposed to any substantial levels of PM-10 for any extended period.

Grading associated with the project is expected to consist of approximately 13,200 cubic yards (cy) of cut and 5,400 cy of fill. After on-site balance, net export is estimated to be 7,800 cy. This export is over the entire life of the construction cycle and would not occur at one time. Construction is expected to occur in eight sequential phases over a period of approximately 10 years. Export of 7,800 cy of excess material would require approximately 780 truck trips over a 10-year span. Daily hauling activity would not likely exceed 10 trucks per day. Air quality impacts associated with this temporary and limited level of trucking activity is not considered significant.

Current research in particulate exposure health effects suggest that the most adverse effect derives from ultra-small diameter particulate matter comprised of chemically reactive pollutants such as sulfates, nitrates or organic material. Only a small fraction of PM-10 is comprised of PM-2.5. PM-2.5 is a potentially serious concern because carcinogenic diesel equipment exhaust particulates are primarily in the PM-2.5 size range. Fugitive dust is shown in State emissions inventories to comprise 10-20 percent of PM-10. Daily PM-10 emissions would include 1.2 pounds of PM-2.5 during grading. The limited level of PM-2.5 emissions, and the dispersed number of source locations, would minimize any localized PM-2.5 impacts.

In conjunction with fine particulate matter generated from soil disturbance, larger diameter particulates would settle out on parked cars, outdoor furniture, landscaping and other horizontal surfaces. However, the deposition distance for large diameter particulates is mostly within the first 100 feet of travel (USEPA, AP-42, 1995). The graded area setback from the edge of adjacent homes would be well in excess of 100 feet.

Dust generation associated with project construction would be temporary and the amount of grading and site disturbance phased over the buildout of the project would be relatively small. Therefore, dust impacts during project demolition, grading and construction activities are considered **adverse but less than significant**. Use of standard dust control measures, applied to all discretionary projects, would reduce the fugitive dust impacts during demolition and construction to the maximum extent feasible.

### ***Construction-Related Diesel Exhaust Emissions (Impact AQ 2)***

Exhaust emissions would result from on- and off-site heavy equipment during grading. There are no established short-term thresholds in Santa Barbara County for ROG and NOx emissions from construction equipment. However, 25 tons per year is used as a rule of thumb to gauge whether construction impacts would be considered significant. There may be localized instances when the characteristic diesel exhaust odor is noticeable from passing trucks or nearby heavy equipment. Truck exhaust impacts can be minimized through mitigation measures and by the controlling of construction routes to reduce interference with non-project traffic patterns and to preclude truck queuing or idling near sensitive receptor sites. Any exhaust odor nuisance impacts would be minimized by construction routing and management plans.

Construction equipment exhaust contains carcinogenic compounds within the diesel exhaust particulates. New diesel equipment is becoming progressively "cleaner" in response to statewide air quality rules on new off-road equipment. When feasible, priority should be given to contractors utilizing biodiesel-fueled or oxidation catalyst equipment.

Emissions of NOx from construction equipment in the County are estimated at 1,000 tons per year. When compared to the total NOx emission inventory for the County of approximately 17,000 tons per year, construction emissions comprise approximately six percent of the 1990 County-wide emission inventory for NOx (Santa Barbara County 1993 Rate-of-Progress Plan). In general, this amount is considered less than significant. Though there is an absence of pollutant significance thresholds, for full disclosure, construction impacts have been identified.

The types and numbers of equipment will vary among contractors such that such emissions cannot be quantified with certainty. During construction, the following equipment fleet has been assumed to be utilized as a basis for estimating maximum daily equipment exhaust emissions:

Demolition	Grading	Construction	Paving & Finish
1 Dozer	1 Grader	1 Grader	1 Paver
1 Tract./Loader/Backhoe	1 Dozer	1 Forklift	1 Roller
1 Concrete/Industrial Saw	1 Tract./Loader/Backhoe	1 Tract./Loader/Backhoe	1 Mixer
1 Water Truck	1 Water Truck	1 Rough Terrain Forklift	1 Tract./Loader/Backhoe

The CARB's URBEMIS2007 9.2.4 computer model was used to estimate daily emissions during various activities with the following results (pounds/day):

Activity	ROG	NOx	CO	SO <sub>2</sub>	PM-10 Total	PM-10 Equipment Exhaust	PM-10 Fugitive Dust	PM-2.5 Total	PM-2.5 Exhaust	PM-2.5 Dust
<b>Demolition*</b>	1.5	13.4	5.7	0.0	2.4	0.7	1.7	1.0	0.6	0.4
<b>Grading**</b>	3.2	26.9	13.4	0.0	6.8	1.3	5.5	2.4	1.2	1.2
<b>Construction</b>	2.1	14.6	9.5	0.0	1.1	1.1	0.0	1.0	1.0	0.0
<b>Paving</b>	1.7	10.1	6.6	0.0	0.9	0.9	0.0	0.8	0.8	0.0
<b>Architectural Coating</b>	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

\* includes a building volume daily of 4,000 cubic feet of demolition debris.  
\*\* includes the hauling of 7,800 cy of net exported dirt.

The County does not consider air quality impacts associated with short-term construction activities significant since impacts are temporary; standard conditions of approval are required to reduce dust, and construction emissions are such a small percentage of the County's total emissions. Therefore, impacts associated with construction-related diesel emissions are considered **adverse but less than significant (Impact AQ 2)**. However, mitigation is recommended to ensure that proper incorporation of mitigations is incorporated into the project to minimize diesel emission impacts.

## Operational Impacts

### *Project Specific Emissions (Impact AQ 3)*

As provided in Section 4.11 Traffic and Circulation the proposed project is predicted to generate 229 new vehicle trips per day, which includes traffic generated by three new residential units and additional Garden visitors and employees. Operational and area source emissions for the project were calculated using a computerized procedure developed by the California Air Resources Board (CARB) for urban growth mobile source emissions. The URBEMIS2007 version 9.2.4 model was run using the trip generation factors specified by the project traffic consultant for this specific project. The model was used

to calculate area source emissions from the increased operation of the proposed new buildings (e.g. heating, air conditioning) and the resulting vehicular operational emissions for the increase of daily trips to the site. The results are shown in Appendix B and summarized in **Table 4.2-4**.

There is no stationary equipment on site requiring an APCD permit. Electrical HVAC equipment is exempt from permit requirements. If any diesel engines 50 bhp and above were planned, an APCD permit would need to be obtained, but no such equipment is anticipated to be used on-site.

The project would not cause any threshold levels to be exceeded. Project-related emission levels for the two ozone precursor pollutants (ROG and NO<sub>x</sub>) would be below the significance threshold, respectively. Therefore, air quality impacts from operational and area source emissions would be considered **adverse but less than significant**.

**Table 4.2-4**  
**Project-Operations and Area Source Emissions (Pounds/Day)**

Source	ROG	NO <sub>x</sub>	CO	PM-10	PM-2.5	SO <sub>x</sub>
Area Source Emissions	0.5	0.2	1.8	0.0	0.0	0.0
Operational Emissions	1.5	1.8	15.4	2.3	0.4	0.0
<b>TOTAL</b>	2.0	2.0	17.2	2.3	0.4	0.0
Santa Barbara County Significance Threshold	55	55	N/A	N/A	N/A	N/A
Exceeds Threshold (?)	No	No	N/A	N/A	N/A	N/A
Source: URBEMIS2007 Air Quality Model; Output in Appendix B.						

#### ***Local Carbon Monoxide Concentrations (Impact AQ 4)***

Locally, changes in the location of any collection of automotive sources, or changes in the number of vehicles or travel speeds could have an impact on the micro-scale air quality (CO “hot spots”) around any given development site. Traffic increases not only contribute air pollutants in direct proportion to their cumulative percentage of traffic volume growth, but they may slow all existing traffic to slower, more inefficient travel speeds. The project’s traffic/air quality impact may be potentially compounded. The County of Santa Barbara *Environmental Thresholds and Guidelines Manual* specifically states “If a project contributes less than 800 peak hour trips, then CO modeling is not required.”

Micro-scale air quality impacts have traditionally been analyzed in environmental documents where the air basin was a non-attainment area for carbon monoxide (CO). Santa Barbara County has been in attainment for CO for many years. In addition, the proposed project generates only 229 daily trips, even fewer peak hour trips. As such, CO “hot-spot” potential is negligible and no CO modeling is required.

Therefore, micro-scale impacts associated with CO “hot spot” potential are considered **adverse but less than significant**.

#### 4.2.4 Cumulative Impacts

On a cumulative basis, related projects as described in Section 3.0 Related Projects, would add to the generation of air pollutants from construction activities, and long-term traffic generation from those projects adding new residential units. Mitigation measures must be considered and employed where applicable on a project-by-project basis. However, as discussed elsewhere in Section 4.2, short-term construction-related air quality impacts are considered less than significant. Regardless, all of the Section 3.0 Related Projects are rather small in scale and would not be expected to generate significant dust or emissions from construction activities and construction-related vehicular traffic. The past projects at the Garden involved minimal ground disturbance and were completed with small construction crews without large diesel-powered construction equipment; only the past paver installation required the use of small construction vehicles for moving the pavers and smoothing out the path surfaces. Impacts from these activities are not considered significant as they were short in duration and small in scale. Intensification of land uses in Santa Barbara potentially impacts ambient air quality on two scales of motion. As cars drive throughout the County, the small incremental contribution to the County air pollution burden from any single vehicle is added to that from thousands of other vehicles. The impact from the proposed project, even if it generates a significant number of new vehicle trips, is very small on a regional scale. County-wide air quality impacts are, therefore, addressed in terms of project compatibility with the County air quality plans. If any given project or plan has been properly incorporated (anticipated) into County-wide growth projections, which are the basis for regional air quality/transportation planning, then there would be no significant county-wide impact as a result of unanticipated growth. As shown in the 2001 and 2004 Clean Air Plan, the County is projected to reach attainment status even with continued growth (as permitted in adopted growth projection), based upon a menu of air pollution reduction strategies to be implemented on many levels, including development controls, stationary source emission controls, improved vehicle emission standards, and alternative transportation programs. Because this project does not create an increase in unanticipated growth on a regional scale (albeit the population on any given day in Mission Canyon may increase under the project), it is consistent with the Clean Air Plan. Regionally, air pollutant emission impacts would fall below the significance level with attainment of air quality planning goals. In the interim, the cumulative condition is significant. Since the project's air quality impacts are less than significant and the project is considered consistent with local air quality planning, the project is **not considered to result in a cumulatively considerable contribution** to cumulative emissions.

In 2004, California emitted 484 million metric tons of GHGs (California Air Resources Board 2007). The proposed project would contribute incrementally to cumulative greenhouse gas emissions through the release of carbon dioxide from vehicle use and indirectly through energy consumption for the new facilities and residences. According to the URBEMIS 2007 computer model, the proposed project would generate maximum daily carbon dioxide emissions of approximately 1,192 pounds per day (218 tons/year), driven primarily by vehicle emissions from future residents and visitors to the site. An average single family residence in Santa Barbara County generates approximately 4 tons of CO<sub>2</sub> per year from energy use. Assuming an average residence of 2,000 square feet, energy use resulting from the additional square footage associated with the proposed project would generate approximately 52 tons of CO<sub>2</sub> relative to existing conditions. Thus, the proposed project would generate a total of approximately 1,244 tons of CO<sub>2</sub> emissions per year. State agencies and local air pollution control districts are currently working to develop CEQA thresholds of significance that would guide classification of impacts associated with global climate change in CEQA documents. To date, the County lacks sufficient

information to classify projects with relatively small, incremental contributions to the state's GHG totals as cumulatively significant or less than significant. Until appropriate regulatory entities develop CEQA thresholds for GHGs, only relatively large GHG emitters will be considered to have cumulatively significant effects on the environment. These include projects that are estimated to emit the equivalent of 25,000 metric tons of CO<sub>2</sub> emissions or more from direct and indirect, long-term operational sources.<sup>1</sup> Projects below these levels remain unclassifiable until more evidence becomes available. The proposed project would emit a small fraction of this amount and would not be classified as a "relatively large GHG emitter" and therefore its contribution to cumulative GHG impacts would remain unclassifiable. Incorporation of Mitigation AQ 3-1 would help to further reduce the project's contribution to GHG emissions.

#### 4.2.5 Mitigation Measures

Because all construction projects can produce fugitive dust emissions, the County requires dust control mitigation measures for all discretionary construction activities. The following mitigation measures are recommended to minimize fugitive dust generation and equipment emissions to the maximum extent feasible. These measures would apply to all individual construction projects at the Botanic Garden.

#### PM-10 Airborne Dust Impacts During Construction (Impact AQ 1)

**AQ 1-1** The applicant shall prepare a Construction Management Plan to control PM-10 emissions. At minimum the Plan shall include the following dust control measures:

- During construction, water trucks or sprinkler systems should be used to keep all areas of vehicle movement damp enough to prevent dust from leaving the site. At a minimum, this should include wetting down such areas in the late morning and after work is completed for the day. Increased watering frequency should be required whenever the wind speed exceeds 15 mph. Reclaimed water should be used whenever possible.
- Minimize the amount of disturbed area and reduce onsite vehicle speeds to 15 mph per hour or less.
- Gravel pads must be installed at all access points to prevent tracking of mud on to public roads.
- If importation, exportation, and stockpiling of fill material are involved, soil stockpiled for more than two days shall be covered, kept moist or treated with soil binders to prevent dust generation. Trucks transporting fill material to and from the site shall be covered with a tarp from the point of origin.
- After clearing, grading, earthmoving, or excavation is completed, the disturbed area should be treated by watering, revegetating, or spreading soil binders until the area is paved or otherwise developed so that dust generation will not occur.
- The contractor or builder shall designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust off site. Their duties shall include holiday and weekend periods when work may

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<sup>1</sup> California Air Resources Board Resolution 07-54 establishes 25,000 metric tons of GHG emissions as the threshold for identifying the largest stationary emission sources in California for purposes of requiring the annual reporting of emissions. This threshold is just over 0.005% of California's total inventory of GHG emissions for 2004.

not be in progress. The name and telephone number of such persons shall be provided to the SBCAPCD prior to approval of Land Use Permits.

- All requirements shall be shown on grading and building plans.

**Plan Requirements/Timing:** These measures shall be noted on all construction plans and approved by the County Planning and Development department prior to approval of Land Use Permits.

**Monitoring:** The County building/grading inspector shall perform periodic site inspections throughout the construction period and respond to complaints.

### Construction-related Diesel Emissions (Impact AQ 2)

**AQ 2-1** The applicant shall prepare a Construction Management Plan to control diesel emissions during construction. At a minimum the Plan shall incorporate the following mitigation measures:

- Diesel catalytic converters, diesel oxidation catalysts, and diesel particulate filters, as certified and/or verified by EPA or California, shall be installed, if available.
- Diesel-powered equipment should be replaced by electric equipment whenever feasible.
- Idling of heavy-duty diesel trucks during loading and unloading should be limited to five minutes; auxiliary power units should be used whenever possible.
- Construction worker's trips should be minimized by requiring carpooling and by providing for lunch on site.
- Heavy-duty diesel-powered construction equipment manufactured after 1996 (with Federally mandated "clean" diesel engines) should be utilized wherever feasible.
- The engine size of construction equipment operating simultaneously shall be the minimum practical size.
- The amount of construction equipment operating simultaneously shall be minimized through efficient construction management practices to ensure that the smallest practical number is operating at any one time.
- Construction equipment shall be maintained per the manufacturer's specifications.
- Construction equipment operating on site shall be equipped with two or four degree engine timing retard or pre-combustion chamber engines.
- Catalytic converters shall be installed on gasoline-powered equipment, if feasible.

**Plan Requirements/Timing:** These measures shall be noted on all construction plans and approved by the County Planning and Development department prior to approval of Land Use Permits.

**Monitoring:** The County building/grading inspector shall perform periodic site inspections throughout the construction period. Permit compliance will respond to complaints.

### Long-term Emissions (Impact AQ 3)

#### AQ 3-1 Energy Conservation Measures

The applicant shall incorporate the following energy conservation measures into future building plans unless the applicant or future landowner proves to the satisfaction of P&D that incorporation of a specific measure is infeasible:

1. Meet or exceed the California Title 24 Energy Code for all relevant applications, including energy efficient appliances and lighting.
2. Install heat transfer modules for all furnaces.
3. Apply water based paint on all structures.
4. If feasible, incorporate the use of solar panels for water heating systems or water heater systems that heat water only on demand into the design of all habitable structures.
5. Include design elements that maximize the use of natural lighting and passive solar cooling/heating.
6. Construct parking areas with concrete or other non-polluting materials instead of asphalt.

**Plan Requirements and Timing:** The applicant shall incorporate the listed provisions into building and improvement plans or shall submit proof of unfeasibility prior to Zoning Clearance.

**MONITORING:** Building and Safety shall site inspect to ensure development is in accordance with approved plans prior to occupancy clearance.

#### 4.2.6 Residual Impacts

The County does not consider air quality impacts associated with short-term construction activities significant since impacts are temporary, standard conditions of approval are required to reduce dust, and construction emissions are such a small percentage of the County's total emissions. Therefore, construction-related air quality impacts are considered **Class III**, adverse but less than significant and no mitigation is required. However, because the County is a non-attainment area for the State PM10 standard, dust control measures must be implemented. Implementation of the recommended mitigation measures listed above would assure construction-related air quality impacts are reduced to the extent feasible. Air quality impacts related to operation of the Botanic Garden under buildout of the project are **Class III**, adverse but less than significant and no additional mitigation is required. The project's contribution to cumulative impacts is not cumulatively considerable (**Class III**).