4.3 AIR QUALITY

This section discusses the existing air quality conditions, regulatory framework, goals and policies of the general plan, and significance criteria and thresholds used to evaluate potential air quality impacts due to the proposed Project. It is based on the *Air Quality Impact Assessment Report Lake Herman Quarry Expansion Project* (Sierra Research 2013) which is included in this EIR as Appendix E.

IMPACTS EVALUATED IN OTHER SECTIONS

The following subjects are related to Air Quality, but are evaluated in another section of this document:

- Impacts to greenhouse gas emissions are discussed in Section 4.7, Greenhouse Gases.

SETTING

The air quality setting for the Project consists of the local geography and topography, which, combined with the long-term climate of the area, affects the existing ambient air quality to which Project emissions will be added.

Geography and Topography

The proposed Project would expand the existing quarry located approximately one mile northwest of Lake Herman in the transition topography between the City of Vallejo to the west, and Sulphur Springs Mountain to the east. The terrain is increasingly complex towards the mountains to the east, and the site entrance is at an elevation of approximately 400 feet above sea level. The more general area containing the Project site is bounded by San Pablo Bay to the west, Sacramento River to the south, and the low mountain range that stretches from Benicia to the south through Napa to the north.

Climate and Meteorology

The overall climate in this area of California is dominated by the semi-permanent eastern Pacific high-pressure system centered off the coast of California, which oscillates in a north-south direction. In summer the high moves to its northernmost position, resulting in strong northwesterly flow and negligible precipitation. A thermal low pressure area from the Sonoran-Mojave Desert also causes air to flow onshore over the San Francisco Bay area much of the summer. In winter, the high moves southwestward toward Hawaii, allowing storms originating in the Gulf of Alaska to reach northern California, bringing wind and rain to the region.

During the winter rainy periods, inversions are weak or nonexistent, winds are often moderate, and the air pollution potential is low. These periods are often characterized by winds that flow out of the Central Valley into the Bay Area and often include morning and evening fog. During summer and fall, when the Pacific high becomes dominant, inversions become strong and often are surface-based; winds are light and the pollution potential is high. Winds in California generally are strongest in the spring. Precipitation and temperature data have been recorded at the meteorological monitoring station located in Vallejo, approximately three miles west-southwest of the project site, at 304 Tuolumne Street, in Vallejo, CA. About 97 percent of nearby Mare Island's annual rainfall of approximately 20 inches occurs between October and April. In summer (July, August, and September), monthly average high and low temperatures in the project area average 76.9 degrees Fahrenheit (°F) and 52.4°F, respectively. In winter (December, January, and February), monthly average high and low temperatures are about 56.2°F and 38.3°F, respectively (Desert Research Institute 2008).

The main air quality-related problem in this mild Mediterranean climate is the frequent presence of a temperature inversion over the region that traps air pollution below. Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the topography of the air basin, and local meteorological conditions. In the Project area, stable atmospheric conditions and light winds can provide conditions for pollutants to accumulate in the air basin when emissions are produced.

Overview of Air Quality Standards

The U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) for ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (with aerodynamic diameter less than or equal to a nominal 10 micrometers, PM_{10}), fine particulate matter (with aerodynamic diameter less than or equal to a nominal 2.5 micrometers, $PM_{2.5}$), and airborne lead. Areas with air pollution levels above these standards can be designated by the USEPA as "nonattainment areas" subject to stringent planning and pollution control requirements. Similarly, the California Air Resources Board (CARB) has established California ambient air quality standards (CAAQS) for ozone, CO, NO_2, SO_2, sulfates, PM_{10}, $PM_{2.5}$, airborne lead, hydrogen sulfide, and vinyl chloride at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases. Those air pollutants for which ambient air quality standards have been established are termed criteria air pollutants.

Both State and national ambient air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. Allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops, and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant can occur during exposures to a high concentration for a short time (1, 3, 8, or 24 hours), or to a relatively lower average concentration over a longer period (one month or one year), or both. For some pollutants there are at least two air quality standards established to address health effects that occur over either short-term or long-term periods or both. California standards are generally set at concentrations lower than the federal standards and in some cases have shorter averaging periods (i.e., are more difficult to attain).

Criteria Air Pollutants and Effects

Air quality impact studies generally address the five criteria pollutants that are most commonly measured and regulated: carbon monoxide, ozone, nitrogen oxides, sulfur oxides, and suspended particulate matter (i.e., PM_{10} and $PM_{2.5}$). In Solano County, ozone and particulate matter are the pollutants of greatest concern because measured air pollutant levels exceed these concentrations at times.

Carbon Monoxide

Carbon monoxide, a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue, and can impair central nervous system functions. Carbon monoxide is emitted almost exclusively from the incomplete combustion of fossil fuels. Automobile exhaust releases a majority of the carbon monoxide in the Bay Area. About 8% comes from residential fuel combustion, including burning wood in fireplaces and wood stoves (CARB 2008). Carbon monoxide is a non-reactive air pollutant that dissipates relatively quickly, so ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. The highest carbon monoxide concentrations measured in the Bay Area are typically recorded during the winter.

Ozone

Ozone, a colorless toxic gas, is the chief component of urban smog. Ozone is not directly emitted; it forms in the atmosphere through a chemical reaction between reactive organic gases (ROG) and nitrogen oxides (NO_X) that is energized by sunlight. ROG and NO_x are primarily emitted from automobiles and industrial sources. Ozone is present in relatively high concentrations within the Bay Area, and the damaging effects of photochemical smog are generally related to the concentration of ozone. Highest ozone concentrations occur during summer and early autumn, on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies.

Nitrogen Dioxide

Nitrogen dioxide (NO_2), a reddish-brown gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like ozone, nitrogen dioxide is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. Nitric oxide and nitrogen dioxide are

collectively referred to as nitrogen oxides (NO_x) and are major contributors to ozone formation. Nitrogen oxides also contribute to the formation of PM_{10} through secondary particulate nitrate formation in the presence of a stable atmospheric and high relative humidity. Monitored nitrogen dioxide levels in the Bay Area are well below ambient air quality standards.

Sulfur Dioxide

Sulfur oxides, primarily SO_2, are a product of high-sulfur fuel combustion. The main sources of SO_2 are coal and oil used in power stations, in industries, and for domestic heating. SO_2 is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. SO_2 concentrations have been reduced to levels well below the State and national standards, but further reductions in emissions are needed to attain compliance with standards for PM_{10}, of which SO_2 is a contributor. Monitored sulfur dioxide levels in the Bay Area are well below ambient air quality standards.

Suspended Particulate Matter

Particulate matter pollution consists of tiny particles suspended in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when industry and gaseous pollutants undergo chemical reactions in the atmosphere. Major sources of $PM_{2.5}$ result primarily from fossil fuel combustion (e.g., gasoline and Diesel fuel from motor vehicles, natural gas, oil and coal in power generation, industrial facilities, etc.), residential fireplaces, and wood stoves. PM_{10} includes all $PM_{2.5}$ sources as well as emissions from dust generated by construction, landfills, and agriculture; wildfires and brush/waste burning, industrial sources, windblown dust from open lands, and atmospheric chemical and photochemical reactions. PM_{10} and $PM_{2.5}$ are also formed in the atmosphere through reactions of ammonia with nitrogen oxides from motor vehicles and other combustion sources, which produce ammonium nitrate.

PM_{10} and $PM_{2.5}$ pose a greater health risk than larger-size particles because these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract increasing the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Whereas larger particles tend to collect in the upper portion of the respiratory system, $PM_{2.5}$ are so tiny that they can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, as well as produce haze and reduce regional visibility. USEPA recently adopted a new more stringent standard of 35 $\mu g/m^3$ for 24-hour exposures, based on a review of the latest new scientific evidence. At the same time, USEPA revoked the annual PM_{10} standard due to a lack of scientific evidence correlating long-term exposures of ambient PM_{10} with adverse health effects.

Toxic Air Contaminants

CARB monitors 10 important toxic air contaminants[1] (TACs) in a network of 17 monitoring stations located throughout the State, of which three are located in the Bay Area. TACs are a broad class of chemical compounds known to cause morbidity or mortality (usually through cancer), including the ten monitored by the state. TACs are found in ambient air, especially in urban areas, and are emitted by transportation, industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., benzene near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the local air district, State, and federal level.

DPM is the predominant TAC in urban air and is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to the CARB approach to regulating diesel exhaust, which is a complex mixture of gases, vapors and fine particles, this complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. CARB elected to make DPM the surrogate appropriate for regulation. Some of the chemicals in diesel exhaust, such as benzene and

[1] Benzene, formaldehyde, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, methylene chloride, perchlorolene, and Diesel particulate matter (DPM).

formaldehyde, have been previously identified as TACs by CARB, and are listed as carcinogens either under the State's Proposition 65 or under the federal Hazardous Air Pollutants programs.

CARB reports that air pollution studies have shown an association between DPM and other cancer-causing TACs emitted from vehicles and overall cancer risk from TACs in California. DPM was found to make up most of that risk. DPM is of particular concern since it can be distributed over large regions, thus leading to widespread public exposure. Diesel engines emit particulate matter at a rate about 20 times greater than comparable gasoline engines. The vast majority of DPM (over 90 percent) consists of $PM_{2.5}$, which are the fine particles that can be inhaled deep into the lung. California has adopted a comprehensive diesel risk reduction program to reduce DPM emissions 85 percent by 2020. The USEPA and CARB adopted low sulfur diesel fuel standards in 2006 which should reduce DPM substantially. In 2007 CARB adopted regulations that require the retrofit or replacement of diesel construction equipment and large on-road trucks and buses to reduce DPM (and $PM_{2.5}$) and NO_x emissions. In December 2010 CARB amended the regulation to, among other things; delay the compliance deadline by four years for all fleets (January 1, 2014, for large fleets (over 5,000 hp); January 1, 2017, for medium fleets (2,501 to 5,000hp); and January 1, 2019, for small fleets (2,500 hp or less).

Sensitive Receptors

In general, some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include age and pre-existing health problems. Land uses such as schools, hospitals, and convalescent homes are considered to be sensitive to poor air quality. This is because infants and young children, the elderly, and people with health afflictions, especially respiratory ailments, are more susceptible to respiratory disease and other air-quality-related health problems than the general public. Residential areas are also considered to be sensitive to air pollution, because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present.

Existing Air Quality

CARB monitors air quality conditions throughout California at numerous monitoring stations located throughout the State. The closest monitoring station to the Project site is located in Vallejo at 304 Tuolumne Street; readings from this monitoring station were utilized to characterize air quality in the area of the Project site. In general, the selected station records area-wide ambient conditions rather than the localized impacts of any particular facility. Monitored criteria pollutants include O_3, CO, NO_2, PM_{10}, and $PM_{2.5}$. The gaseous pollutants (i.e., ozone, carbon monoxide and nitrogen dioxide) are monitored continuously while average particulate matter (i.e., PM_{10} and $PM_{2.5}$) concentrations are measured over 24 hours every sixth day. A summary of the number of days exceeding either national or California standards recorded at this station is shown in Table 4.3-1 for the period 2005 through 2009 (CARB 2010).

TABLE 4.3-1
Air Pollutant Exceedances in Vallejo, California

Pollutant	Number of Days Exceeding Standards[a]				
	2005	2006	2007	2008	2009
Ozone (O_3)	0	0	0	4	3
Carbon Monoxide (CO)	0	0	0	0	0
Nitrogen Dioxide (NO_2)	0	0	0	0	0
Fine Particulate Matter ($PM_{2.5}$)	9	6	12	7	5
Respirable Particulate Matter (PM_{10})	0	0	12.5	NA[b]	NA

a. Estimates include both national and California standards for various averaging times (CARB 2010).
b. PM_{10} measures after 2007 are not available.

Exceedances of the national or State ambient air quality standards for ozone, $PM_{2.5}$, and PM_{10} have occurred in Solano County during the past five years. There occurred three days of exceedance for the 1-hour ozone California standard (one in 2008 and two in 2009) and four days of exceedance of the 8-hour California standard (three in 2008 and one in 2009). No exceedances of the national 8-hour ozone standard occurred. Measured concentrations of carbon monoxide and nitrogen dioxide were well below ambient air quality standards. The national 24-hour $PM_{2.5}$ standard was exceeded nine days in 2005, six days in 2006, twelve days in 2007, seven days in 2008, and five days in 2009. The State 24-hour PM_{10} standard was exceeded twelve days in 2007. The national annual average for PM_{10} was not exceeded between 2005 and 2009.

Air Quality Attainment Status

Areas that do not violate ambient air quality standards are considered to be in attainment of the standard. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. The Bay Area as a whole does not meet State or national ambient air quality standards for ground level ozone and State standards for PM_{10} and $PM_{2.5}$.

Under the federal Clean Air Act (CAA), the USEPA has classified the region as marginally nonattainment for the 8-hour ozone standard. The EPA required the region to attain the standard by 2007. Monitoring data indicate that the region had met the standard. However, EPA revised the standard in 2008 and again in 2010. The region is currently in non-attainment status for both 8-hour and 1-hour ozone of according to the 2010 California and national Standards. At the State level, the Bay Area as a whole is considered in non-attainment for ground level ozone. Since ozone is a regional air pollutant, resulting from emissions basin-wide, attainment designations apply to the Bay Area as a whole. The net result is that based upon ambient air measurements at stations throughout the area, the San Francisco Bay Area Air Basin is classified as a nonattainment area for both state and federal ozone standards. The region is required to adopt plans on a triennial basis that show progress towards meeting the State ozone standard.

The Bay Area has met the carbon monoxide standards for over a decade and is classified as being in attainment by the USEPA. Nitrogen dioxide and sulfur dioxide are designated as being in attainment except for the 1-hour national standard for nitrogen dioxide which is unclassified. The Bay Area is considered non-attainment for PM_{10} and $PM_{2.5}$, which is both a local and regional air pollutant, with the exception of the national annual arithmetic mean standard for $PM_{2.5}$ which is designated as unclassified. In December 2008, the USEPA designated the entire Bay Area as nonattainment for the 24-hour $PM_{2.5}$ NAAQS due to violations of the standard measured in Vallejo and San Jose. The USEPA grades the region unclassified for PM_{10} according to national standards.

REGULATORY FRAMEWORK

The CAA governs regulation of air quality in the U.S. In addition to being subject to federal requirements, air quality in California also is regulated by more stringent requirements under the California Clean Air Act. At the federal level, the USEPA administers the federal CAA. The California Clean Air Act is administered by CARB at the State level and by 35 Air Quality Management and Air Pollution Control Districts at the regional and local levels. The BAAQMD regulates air quality at the regional level, covering the nine-county Bay Area including southwestern Solano County.

U.S. Environmental Protection Agency

The USEPA is responsible for enforcing the 1977 federal CAA, as amended, and the NAAQS set forth therein. California is under the jurisdiction of USEPA Region 9. The USEPA's activities relative to the California air pollution control program focus principally on reviewing California's submittals for its State Implementation Plan (SIP). The SIP is required by the CAA to demonstrate how all areas of the state will meet the NAAQS within the federally specified deadlines. The agency also has jurisdiction over emission sources and establishes various emission standards. However, automobiles sold or operated in California must meet the stricter emission standards established by CARB.

California Air Resources Board

As part of the California Environmental Protection Agency, the CARB is responsible for meeting the State requirements of the federal CAA, administering the California Clean Air Act, and establishing CAAQS. The California Clean Air Act requires all air districts in the State to promulgate rules and regulations designed to achieve and maintain the CAAQS. CARB regulates mobile air pollution sources, such as motor vehicles. The agency is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB has established fuel specifications for both on- and off-road vehicles. CARB oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level.

Bay Area Air Quality Management District

The BAAQMD is primarily responsible for assuring that the national and State ambient air quality standards are attained and maintained in the Bay Area. The BAAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, conducting public education campaigns, and other activities related to air pollution control.

National and State Ambient Air Quality Standards (NAAQS and CAAQS)

As required by the federal CAA, the NAAQS have been established for six major air pollutants: carbon monoxide, nitrogen oxides, ozone, respirable particulate matter, fine particulate matter, sulfur oxides, and lead. Pursuant to the California Clean Air Act, the State of California has also established ambient air quality standards. These standards are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride and visibility reducing particles.

Both State and federal standards are summarized in Table 4.3-2 (CARB 2012). The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare. The CAAQS are more stringent than the NAAQS. Thus, the CAAQS are used as the comparative standard in this analysis.

TABLE 4.3-2
Relevant California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	Primary National Standards[b]	Secondary National Standards[c]
Ozone (O_3)[a]	8-hour	0.070 ppm	0.075 ppm	—
	1-hour	0.090 ppm	—[d]	Same as primary
Carbon monoxide (CO)	8-hour	9.0 ppm	9 ppm	—
	1-hour	20 ppm	35 ppm	—
Nitrogen dioxide (NO_2)	Annual	0.030 ppm	0.053 ppm	Same as primary
	1-hour	0.180 ppm	0.100 ppm	—
Sulfur dioxide (SO_2)	Annual	—	0.03 ppm	—
	24-hour	0.04 ppm	—	—
	3-hour	—	—	0.5 ppm

Pollutant	Averaging Time	California Standards	Primary National Standards[b]	Secondary National Standards[c]
PM_{10}	Annual	20 µg/m3	—	Same as primary
	24-hour	50 µg/m3	150 µg/m3	Same as primary
$PM_{2.5}$	Annual	12 µg/m3	15 µg/m3	
	24-hour	—	35 µg/m3	
Lead	Calendar quarter	—	1.5 µg/m3	Same as primary
	30-day average	1.5 µg/m3	—	—

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. 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 USEPA.
c. Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
d. The national 1-hour ozone standard was revoked by USEPA on June 15, 2005.

Air Quality Plans

As stated above, the BAAQMD prepares plans to attain ambient air quality standards in the San Francisco Bay Area Air Basin (SFBAAB). A region (i.e., SFBAAB) is classified as either being in attainment or non-attainment for each pollutant listed in Table 4.3-1 for both California and national Standards. There are instances when pollutant attainment status has yet to be determined and is listed as unclassified. The BAAQMD prepares ozone attainment plans (OAP) for the national ozone standard and clean air plans (CAP) for the California standard both in coordination with the Metropolitan Transportation Commission and the Association of Bay Area Governments (ABAG). With respect to applicable air quality plans, the BAAQMD prepared and adopted the *2010 Clean Air Plan* to address nonattainment of the State 1-hour ozone standard in the SFBAAB. The purpose of the 2010 Clean Air Plan is to:

- Update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone;
- Consider the impacts of ozone control measures on particulate matter (PM), air toxics, and greenhouse gases in a single, integrated plan;
- Review progress in improving air quality in recent years;
- Establish emission control measures to be adopted or implemented in the 2009-2012 timeframe. Similarly, the BAAQMD prepared the 2010 Clean Air Plan to address nonattainment of the CAAQS.

The 2010 Clean Air Plan includes 55 Control Measures in five categories: stationary and area source, mobile source, transportation control, land use and local impact, and energy and climate. In addition there are 18 "Further Study Measures" that have been identified as having merit but require further study to be included as formal control measures.

The 2010 CAP is not a SIP document and does not respond to federal requirements for $PM_{2.5}$ or ozone planning.

Goals and Policies of the Solano County General Plan

The following are the air quality-related goals, policies, and implementation programs from the Solano County General Plan that are applicable to this Project.

RS.G-1 **Manage and preserve the diverse land, water, and air resources of the county for the use and enrichment of the lives of present and future generations.**

HS.G-2 **Improve air quality in Solano County, and by doing so, contribute to improved air quality in the region.**

HS.P-44 Minimize health impacts from sources of toxic air contaminants, both stationary (e.g., refineries, manufacturing plants) as well as mobile sources (e.g., freeways, rail yards, commercial trucking operations).

HS.I-54 Require that when development proposals introduce new significant sources of toxic air pollutants, they prepare a health risk assessment as required under the Air Toxics "Hot Spots" Act (AB 2588, 1987) and, based on the results of the assessment, establish appropriate land use buffer zones around those areas posing substantial health risks.

HS.I-59 Require the implementation of best management practices to reduce air pollutant emissions associated with the construction of all development and infrastructure projects.

HS.I-63 Use the guidelines presented in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*, or the applicable Air Quality Management District guidelines and recommendations available at the time, when establishing buffers around sources of toxic air contaminants or odorous emissions.

HS.I-64 Assess air quality impacts using the latest version of the California Environmental Quality Act Guidelines and guidelines prepared by the applicable Air Quality Management District.

EVALUATION CRITERIA WITH THRESHOLDS OF SIGNIFICANCE

Table 4.3-3 summarizes both the evaluation criteria and significance thresholds used to address potential impacts to air quality.

TABLE 4.3-3
Evaluation Criteria with Significance Threshold – Air Quality

Evaluation Criteria	As Measured by	Significance Threshold	Sources of Criteria
AQ – 1. Will construction or operation of the Project conflict with or obstruct implementation of the applicable air quality plan?	Emissions of criteria pollutants Number of conflicts.	Exceedance of thresholds established by BAAQMD. Greater than 0 appropriate Air Quality Plan control measures disrupted or not implemented.	CEQA Guidelines Appendix G, Checklist Item III (a) Bay Area 2010 Clean Air Plan
AQ - 2. Will construction or operation of the Project violate any air quality standard or contribute substantially to an existing or projected air quality violation?	Emissions of criteria pollutants. Size of construction and operation area, duration of construction, and traffic impacts.	Construction: Generate average daily criteria air pollutants emissions of ROG, NO_x, or $PM_{2.5}$ (exhaust only) in excess of 54 pounds per day or PM_{10} (exhaust only) of 82 pounds per day. For $PM_{10}/PM_{2.5}$ (fugitive dust) best management practices should be implemented. Operation: Generate average daily criteria air pollutants emissions of ROG, NO_x, or $PM_{2.5}$ in excess of 54 pounds per day or 10 tons per year or PM_{10} of 82 pounds per day or 15 tons per year. Contribute to CO concentrations exceeding the State ambient air quality standards of 9.0 ppm averaged over 8 hours and 20 ppm for 1 hour.	CEQA Guidelines Appendix G, Checklist Item III (b, c) May 2011 BAAQMD CEQA Air Quality Guidelines

Evaluation Criteria	As Measured by	Significance Threshold	Sources of Criteria
AQ - 3. Will the Project expose sensitive receptors to substantial levels of toxic air contaminants?	Emissions of toxic air contaminants.	An increased cancer risk of more than 10 in one million chances, or non-cancer risk greater than 1.0 hazard index from a single source, or an incremental increase of greater than 0.3 µg/m^3 annual average $PM_{2.5}$ from a single source.	CEQA Guidelines Appendix G, Checklist Item III (d) May 2011 BAAQMD CEQA Air Quality Guidelines
AQ - 4. Will the Project cause objectionable odors affecting a substantial number people?	Distance to sensitive receptor. Odor complaints.	1 to 2 miles depending on source. Five or more odor complaints per year.	CEQA Guidelines Appendix G, Checklist Item III (e) May 2011 BAAQMD CEQA Air Quality Guidelines

METHODOLOGY

The BAAQMD's May 2011 CEQA Air Quality Guidelines are the source of the air quality significance criteria and quantitative significance thresholds. The May 2011 BAAQMD CEQA thresholds were recently invalidated by a trial court because BAAQMD did not itself do a CEQA evaluation of the environmental impact of using the thresholds before their adoption. The court, however, did not rule on or question the adequacy of the BAAQMD CEQA *Air Quality Guidelines*, including the impact assessment methodologies, or the evidentiary basis supporting the thresholds, which are included in the Guidelines (updated in May 2011). Solano County, as Lead Agency for the proposed project, has the discretion to use the May 2011 BAAQMD CEQA *Air Quality Guidelines* and methodology for analyzing air quality impacts under CEQA based on the evidence and technical studies supporting the Guidelines. The following analysis utilizes the impact assessment methodologies presented in the BAAQMD CEQA *Air Quality Guidelines* (BAAQMD 2010b and 2011), including BAAQMD's *Revised Draft Options and Justification Report CEQA Thresholds of Significance* (BAAQMD 2009). The applicable thresholds are summarized above in Table 4.3-3.

Construction

Construction emissions are conservatively assumed to occur in 2014, which is also assumed to be the first Project year[2]. Construction would include the replacement of the Sulphur Springs Creek Bridge and the Lake Herman Road improvements.

In approximately the fifth year (2018) of the proposed Project, installation of recycled asphalt pavement (RAP) handling equipment would occur at Permit Source 80. Total on-road and off-road heavy-duty equipment would be required for approximately 267 hours to construct the bridge while approximately 217 hours use of total on-road and off-road heavy-duty equipment would be required to construct/install the recycled asphalt pavement (RAP) handling equipment. Because the construction emissions during the first year are expected to exceed those during the fifth year, the comparison of construction emissions against the significance thresholds is only conducted for the larger (first year) construction emissions.

The ability of the *California Emissions Estimator Model*, CalEEMod (Version 2011.1.1) to estimate construction emissions associated with paving projects was used to compute emissions associated with

[2] Construction emissions for a fixed usage of off-road equipment would be maximized in the earliest year that is feasible because later years would tend to have lower emitting engines in the same equipment to comply with future stricter off-road equipment regulations.

construction of the Lake Herman Road improvements. Because CalEEMod is unable to estimate emissions from the construction of a bridge, a detailed analysis of the amount of use of off-road and on-road equipment used to construct a bridge was conducted to calculate the bridge replacement emissions.

Operation

The Project would not increase the amount of aggregate product produced and sold. The operational air quality analysis, however, considers potential emission changes that could accompany the following equipment and operation changes:

- Operation of the oil storage tank containing oil at a temperature of 325^0F in place of operating the storage tank at the baseline temperature of 310^0F (Permit Source 84).
- Operation of RAP handling equipment at the asphalt concrete batch plant (Permit Source 23).
- Operation of RAP handling equipment beginning at about the fifth year of the Project to allow RAP to replace some of the virgin rock aggregate fed to the asphalt concrete drum mix plant (Permit Source 80).
- Expansion of the quarry pit, therefore increasing the travel distance between the excavation area and the processing area.

Any changes from the oil storage tank heater related to the small temperature increase (1.9%) are considered to be negligible and not considered further in this analysis.

The emissions associated with the operation of the RAP handling equipment would be offset by the decrease in handling virgin material at each stationary source. Therefore, operation of the RAP system is not considered further in this analysis.

At completion, the expansion of the quarry pit would have a two-dimensional center located approximately 300 feet northwest of the center of the existing quarry. When adding in the 200-foot maximum deepening of the quarry pit, the combined maximum lateral and vertical movement of the pit would potentially increase average rock hauling distances by approximately 500 feet, or approximately 12.5% more than the baseline rock hauling emissions generated along the more than 4,000-foot length of the baseline haul road.

To determine the Project emissions from the increase in haul distance, the baseline mobile emissions for the existing quarry were calculated. Emission factors for the haul trucks were taken from USEPA's report Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition and from EMFAC2011.

CARBs Standard Emission Tool, CEPAM – 2009 Almanac, was used to estimate quarry operation off-road equipment emission changes that are expected to occur in Solano County between one of the baseline years, 2008, and 2020 (i.e., years further in the future than 2020 are not projected with the tool, but nevertheless are expected to continue to decrease in response to additional regulations that will be necessary for the Bay Area Air Basin to achieve attainment of ozone and all PM_{10} and $PM_{2.5}$ ambient air quality standards (BAAQMD 2010a)). This tool was applied to derive net criteria pollutant engine emission changes expected from off-road equipment between 2008 and 2020 (expressed as the ratio of 2020 to 2008 emissions). Although the CEPAM tool only projects to 2020, it provided the following information to conservatively estimate criteria pollutant emission changes from Project off-road equipment.

- NOx: 48.1% decrease from 2008 to 2020
- CO: 8% increase from 2008 to 2020
- ROG: 35.3% decrease from 2008 to 2020
- SOx: 19.4% increase from 2008 to 2020
- PM_{10}: 55.9% decrease from 2008 to 2020
- $PM_{2.5}$: 57.2% decrease from 2008 to 2020

IMPACTS AND MITIGATION MEASURES

Impact: **AQ-1. Will construction or operation of the Project conflict with or obstruct implementation of the applicable air quality plan?**

Analysis: *No Impact*

The BAAQMD has established guidelines for determining consistency with the Bay Area 2010 Clean Air Plan. The Guidelines state that if it can be concluded that a project supports the primary goals of the 2010 Clean Air Plan, includes applicable control measures from the Clean Air Plan, does not disrupt or hinder implementation of any Clean Air Plan control measure, and projected vehicle miles travelled or vehicle trips are less than or equal to its projected population increase (applies to plans, not projects), then the BAAQMD considers the project consistent with the Clean Air Plan.

As noted in the Regulatory Setting above, the 2010 Clean Air Plan includes 55 Control Measures in five categories: stationary source, mobile source, transportation control, land use and local impact, and energy and climate. Some control measures would be implemented via amending existing regulation. These measures could indirectly affect the Project in that the changed regulations would apply to new or modified permits under jurisdiction of the BAAQMD. As they relate to the Project, this would include Stationary Source Measure (SSM) 6 - General Particulate Matter Weight Rate Limitation, SSM 15 - GHG in Permitting, and SSM 16 - New Source Review Addressing $PM_{2.5}$. The Quarry has an existing Permit to Operate with the BAAQMD. Per BAAQMD policy the permit is reviewed annually, which includes a determination on whether the Quarry is operating within the parameters of the existing permit or whether the permit requires modification. If a new or modified permit was ever needed, the Quarry would comply with the new regulations. None of the 55 control measures are currently directly applicable to the Project but could apply to new or modified permits, as discussed above.

The primary goals of the 2010 Clean Air Plan are to protect air quality, public health, and the climate. Through compliance with the applicable Control Measures the Project is in support of the primary goals of the 2010 Clean Air Plan. The Project is not considered to conflict with or obstruct implementation of the 2010 Clean Air Plan. Therefore, there is no impact.

Mitigation: No mitigation is necessary.

Impact: **AQ-2. Will construction or operation of the Project violate any air quality standard or contribute substantially to an existing or projected air quality violation?**

Analysis: *Significant*

Construction Emissions

Construction emissions from the replacement of the Sulphur Springs Creek Bridge and Lake Herman Road improvements were compared to the construction significance thresholds presented in Table 4.3-3. The analysis conservatively assumes that the bridge and road improvements would be constructed simultaneously. Emissions estimates included an assessment of emissions from on-road vehicle and off-road equipment exhaust. Average daily emissions resulting from Project construction are presented below in Table 4.3-4.

TABLE 4.3-4
Project Construction Daily Emissions (Annual Average, lbs/day)

Source	NO_x	CO	ROG	SO_x	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)	CO_2
Lake Herman Road Improvements	12.2	10	40	0.00	1.1	1.1	1,522
Sulphur Springs Creek Bridge Replacement	7.9	4.7	0.60	0.015	4.2	0.62	1,742
Total Daily Construction Emissions:	*20.1*	*14.7*	*40.6*	*0.015*	*5.3*	*1.7*	*3,264*
Significance Threshold	**54**	**None**	**54**	**None**	**82**	**54**	**None**
Significant?	**No**	**N/A**	**No**	**N/A**	**No**	**No**	**N/A**

As shown in the table above, Project construction would not exceed applicable BAAQMD thresholds for criteria pollutants, and therefore, potential construction impacts from NO_x, ROG, SO_x, and PM_{10} and $PM_{2.5}$ (exhaust) are less than significant. However, according to the BAAQMD CEQA Air Quality Guidelines, fugitive dust impacts from construction are considered less than significant only with inclusion of Basic Construction Mitigation Measures. Therefore, impacts from construction-generated PM_{10} and $PM_{2.5}$ (fugitive dust) are considered significant.

Operational Emissions

As described in Chapter 2 Project Description, the proposed Project would extend the operations of the existing Lake Herman Quarry for an additional 35 years, and expand the quarry pit from its baseline size of 113 acres to a total area of 211 acres, while maintaining the baseline level of annual saleable aggregate at 3.0 million tons. According to the Revised Mining and Reclamation Plan, quarrying activities to excavate rock in the pit would shift to the east, north and west from the current location, and the pit would deepen from its baseline elevation of 200 feet above mean sea level (amsl) to the proposed 0 feet amsl. The expansion (and deepening) of the existing quarry pit would gradually increase the average rock hauling distances by approximately 500 feet over the 35-year life of the Project.

The increase in hauling distance would increase emissions as shown in Table 4.3-5. However, these emissions would be below the BAAQMD thresholds and are therefore considered less than significant. In addition, off-road equipment emissions related to NO_x, ROG, and PM are expected to go down according to state projections for Solano County.

TABLE 4.3-5
Project Operation Annual Emissions (tons per year)

Source	NO_x	CO	ROG	SO_x	PM_{10}	$PM_{2.5}$
Project Off-road Equipment (Hauling Distance Increase[a])	0.75	0.17	0.045	0.001	0.018	0.017
Significance Threshold	**10**	**None**	**10**	**None**	**15**	**10**
Significant?	**No**	**N/A**	**No**	**N/A**	**No**	**No**

a. Resulting from expansion of existing quarry pit.

Changes to the on-site aggregate hauling emissions also could occur as a result of implementation of the RAP handling equipment. RAP would replace a certain percentage of virgin material at the existing asphalt concrete batch plant and asphalt concrete drum mix plant. Currently, the Quarry hauls RAP from off-site construction projects to the on-site storage area. This would remain the same under the Project. The on-site storage area is located approximately 1,500 feet south of the processing area and at approximately the same elevation, thus providing a shorter and more direct haul route than is provided from the quarry pit. In addition, for every ton of RAP used in the processing, one ton of virgin material is eliminated, thus reducing the emissions associated with excavation of raw material. The potential emission decrease is not quantified herein because of the uncertain magnitude by which the RAP would replace the raw material. Emissions associated with use of the RAP material would be less than significant, and would possibly be beneficial.

According to the BAAQMD Guidelines a project's construction impacts are considered significant unless all Basic Construction Mitigation Measures are incorporated into the project. The BAAQMD has not established a quantitative threshold for fugitive dust. The quarry operations would continue to generate fugitive dust in a similar manner as construction of a large-scale land-use development (excavation involving earthmoving equipment, loaders, etc). Therefore, it is appropriate to apply the BAAQMD construction mitigation measures for dust control, as adjusted to the specifics of this project. The impact of fugitive dust from construction activities and quarry operations on air quality would be potentially significant.

Mitigation: **AQ-2a Basic Measures for Construction**

The Applicant shall implement the following measures during construction of the Sulphur Springs Creek Bridge and Lake Herman Road improvements:

1. All exposed surfaces (e.g., staging areas, soil piles, graded areas, and unpaved access roads) shall be watered at least two times per construction day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto Lake Herman Road shall be removed using wet power vacuum street sweepers at least once per construction day.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
5. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes. Clear signage shall be provided for construction workers at all access points.
6. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running proper condition, at least once per year, prior to operation.

AQ-2b Fugitive Dust Reduction during Operation

The Applicant shall implement the following:

1. All exposed surfaces (e.g., unpaved roadways, extraction, and overburden areas) actively used shall be watered a minimum of two times per day.
2. A water spray system shall be used in the rock processing plant.
3. A water spray bar shall be used to moisten materials on loaded trucks prior to leaving the site.
4. All visible mud or dirt track-out onto Lake Herman Road at the Quarry entrances shall be removed using wet power vacuum street sweepers at least once per day, seven days per week, excluding the days the Quarry is closed.

5. All vehicle speeds on unpaved roads shall be limited to 15 mph.
6. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air Districts phone number shall also be visible to ensure compliance.

After Mitigation: *Less than Significant*

Mitigation Measures AQ-2a and AQ-2b would meet the intent of the BAAQMD Guidelines for incorporation of Best Management Practices to control $PM_{2.5}$ and PM_{10} (fugitive dust) and therefore the impact is less than significant after mitigation.

Impact: AQ-3. Will the Project expose sensitive receptors to substantial levels of toxic air contaminants?

Analysis: *Less than Significant*

There are no sensitive receptors within 1,000 feet of the Project boundary to the north, east, or south. There are two residential homes immediately to the west of the Project site. These residences are about 450 feet to the west of the equipment maintenance area and about 900 feet from the rock processing area and the asphalt plant. The Lake Herman Road Improvements would occur approximately 300 feet to the south of the residences. There are no sensitive receptors within 1,000 feet of the Sulphur Creek Bridge improvements.

Construction

Construction activities are expected to take up to four months. The dominant TAC from construction is DPM. Because the DPM from construction would be emitted for less than six months and DPM only has potential long-term (rather than short-term) health impacts, potential health impacts from construction-related emissions of DPM would be less than significant. Moreover, construction-related TAC emissions are considered to be less than significant because the Lake Herman Road improvements are more than 100 feet away from the two residences, which are the nearest sensitive receptors, and the Sulphur Springs Creek bridge replacement is more than 2,000 feet from a residence or any other sensitive receptor.

Operation

Continuation of quarry operation from an expanded and deepened pit would gradually increase emissions from haul equipment, as described in Impact AQ-2. However, the increase is below the significance threshold and the net movement of the horizontally expanded pit would move the average center of quarry operation northeast, away from sensitive receptors located on the west side of the property. The potential to expose sensitive receptors to substantial levels of toxic air contaminants would be less than significant.

Mitigation: No mitigation is necessary.

Impact: AQ-4. Will the Project cause objectionable odors affecting a substantial number people?

Analysis: *Less than Significant*

Two asphalt plants, one asphalt concrete batch plant and one asphalt concrete drum mix plant, currently operate at the Quarry. The BAAQMD considers an asphalt batch plant a potential odor source. There would be no modifications to the asphalt plants as a result of the Project; however, operation could be extended to 24 hours per day during peak construction periods to accommodate night construction. An odor source is considered significant if five or more odor complaints are received per year averaged over three years.

The screening distance for asphalt plants is two miles. While there are sensitive receptors, such as residences, within the two-mile screening distance, the Quarry has not received any odor complaints in recent years (Pers. Comm., Jennifer Gomez, Syar Industries, 2013). In addition, the Solano County Environmental Health Division has no record of receiving an odor complaint regarding the Quarry (Pers. Comm., Karen Avery, Solano County, 2011). This is likely due to distance, intervening topography, and prevailing winds from the west-southwest, all of which favorably reduce the potential for odor detection by receptors in the communities located from the northwest through south of the quarry. Given that the asphalt plants would not be a new odor source at the Project site and that no odor complaints have been received, this impact is considered less than significant.

Mitigation: No mitigation is necessary.

CUMULATIVE IMPACTS

Impact: AQ-C1. Will the Project plus cumulative projects create impacts to air quality and toxic air contaminants based on evaluation criteria 1 and 3?

Analysis: *Less than Significant*

As discussed under AQ-1, the Project would not conflict with or obstruct implementation of the 2010 Clean Air Plan. Given that the Project does not conflict with the CAP, the Project would not contribute to a cumulative impact.

BAAQMD CEQA Air Quality Guidelines define cumulative cancer risk to include that of the Project plus all local stationary sources and high-volume roadways within 1,000 feet beyond the Project boundary. There are no permitted stationary sources nor high-volume roadways within 1,000 feet of the Project Boundary. However, cumulative impacts could occur from the existing quarry. Table 4.3-6 below, shows the off-road emissions from the existing quarry, as well as the Project emissions. In addition, the table shows anticipated changes in emissions that would result from implementation of State and federal regulations. As shown, emissions from the Quarry as a whole would decrease due to these regulations.

Using CEPAM to estimate off-road equipment emissions, the following net criteria pollutant engine emission changes are expected from off-road equipment due to changes in State and federal regulations between 2008 and 2020 (expressed as the ratio of 2020 to 2008 emissions):

- NO_x: 48.1% decrease
- ROG: 35.3% decrease
- SO_x: 19.4% increase
- PM_{10}: 55.9% decrease
- $PM_{2.5}$: 57.2% decrease

Overall, operational emissions at the quarry from the off-road mobile equipment would decrease over the 35-year life of the Project, including NO_x which is the dominant air pollutant and PM which is the dominant air contaminant emitted at the Quarry. The overall reduction would more than off-set the Project impact, except for SO_x, where the increase would be small. The Project's incremental contribution to toxic air contaminants is not considerable and therefore not significant.

TABLE 4.3-6
Cumulative Annual Emissions (tons per year)

Source	NO_x	ROG	SO_x	PM_{10}	$PM_{2.5}$
Existing Quarry Off-road Equipment	16.1	1.0	0.026	0.84	0.77
Project Off-road Equipment (Hauling Distance Increase[a])	0.75	0.045	0.001	0.018	0.017
Subtotal Off-road Equipment	*17*	*1.1*	*0.027*	*0.85*	*0.79*
Percent Change due to Regulations[b]	48.1 decrease	35.3 decrease	19.4 increase	55.9 decrease	57.2 decrease
Change due to Regulations	-8.1	-0.39	0.0052	-0.48	-0.45
2020 Total Off-road Equipment Emissions[c]	*8.7*	*0.69*	*0.032*	*0.38*	*0.34*

Notes:
a. Resulting from expansion of existing quarry pit.
b. For Solano County between 2008 and 2020; CARB CEPAM: 2009 Almanac – Standard Emissions Tool.
c. Equals product of maximum potential emissions and the Solano County off-road equipment change ratio 2020/2008, applied when quarry pit completes expansion.
d. Potential off-road equipment emissions change minus maximum Project off-road equipment potential

Mitigation: No mitigation is necessary.

Impact: AQ-C2. Will the Project plus cumulative projects cause objectionable odors affecting a substantial number people?

Analysis: *No Impact*

There are no known proposed projects, near the Project site and within the County, which would be considered to be a potential odor source. Therefore, significant cumulative odor impacts are not expected. The Water Stone Development, a residential development, does not include facilities that would be considered a potential odor source by the BAAQMD.

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