4.5 AIR QUALITY

This Section describes the air quality within the air basin that would be affected by the proposed San Francisco Bay and Delta Sand Mining Project (Project), identifies the applicable air district's significance thresholds, assesses potential impacts of the Project, and recommends measures to mitigate significant adverse impacts. The Project would extend existing sand mining operations by Hanson Marine Operations (Hanson) and Jerico Products, Inc./Morris Tug & Barge (Jerico) (the applicants) for another 10 years.

4.5.1 Environmental Setting

Air quality is a function of both the rate and location of pollutant emissions under meteorological conditions and topographic features that influence pollutant movement and dispersal. Atmospheric conditions such as wind speed, wind direction, atmospheric stability, and air temperature gradients interact with physical features of the landscape to determine the movement and dispersal of air pollutants, which affects air quality.

Climate and Meteorology

The Project includes sand mining activities on parcels within the Central Bay, Middle Ground Shoal, and the area north of the Federal navigation channels of the Western Delta as well as offloading of mined materials at several facilities around the Bay and Delta (see Figure 2-10 for offloading locations). These parcels and offloading facilities are within the boundaries of the Bay Area Air Quality Management District (BAAQMD) and San Francisco Bay Area Air Basin (Basin). The Basin encompasses a nine-county region including all of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin, and Napa Counties, and the southern portions of Solano and Sonoma Counties.

Summertime temperatures in the Basin are determined in large part by the effect of differential heating between land and water surfaces. The temperature gradient near the ocean tends to be exaggerated, especially during the summer, which can result in temperatures at the coast up to 35 degrees Fahrenheit (°F) cooler than temperatures 15 to 20 miles inland. During the summer, winds typically flow from the northwest. Winds channeled through the Golden Gate channel produce a jet that sweeps eastward and splits off to the northwest toward Richmond and to the southwest toward San Jose where it meets the East Bay Hills. Wind speeds may be strong locally in areas where air is channeled through a narrow opening, such as the Carquinez Strait or the Golden

Gate channel. During winter months, the Basin experiences stormy conditions with moderate to strong winds, as well as periods of light winds (BAAQMD 1999).

Between late spring and early fall, a layer of warm air often overlays a layer of cool air influenced by San Francisco Bay, resulting in air temperature gradients that cause stagnation of air referred to as an inversion. Typical winter inversions are formed when the sun heats the upper layers of air, trapping air below that has been cooled by contact with the colder surface of the earth during the night. Although each inversion type predominates at certain times of the year, both types can occur at any time of the year. Because inversions inhibit the vertical mixing of air in the atmosphere, they can prevent air pollution from dispersing, contributing to higher ground surface pollutant concentrations.

Existing Air Quality

The BAAQMD operates a regional air quality monitoring network that regularly measures the concentrations of criteria air pollutants. Table 4.5-1 presents recent Basin air quality data for ozone (chemical formula O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), and particulate matter 10 microns and 2.5 microns or less in diameter (PM_{10} and $PM_{2.5}$, respectively). Measured concentrations are compared with California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). As shown in the table, the ozone, PM_{10}, and $PM_{2.5}$ standards were exceeded multiple times whereas the CO and NO_2 standards were not exceeded during the time period presented.

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can damage vegetation and other materials. Ozone is not emitted directly into the atmosphere, but rather is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and oxides of nitrogen (gaseous nitrogen compounds commonly referred to as NO_x). ROG and NO_x are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours.

CO is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter when light winds combine with the formation of ground level temperature inversions (typically from evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

Table 4.5-1. San Francisco Bay Area Air Basin Ambient Air Quality Summary (2008 – 2010)

Pollutant	Standard	Monitoring Data by Year		
		2008	2009	2010
Ozone				
Highest 1 Hour Average (ppm)		0.141	0.113	0.150
Days over State Standard	0.09	9	11	8
Highest 8 Hour Average (ppm)[1]		0.111	0.095	0.098
Days over National Standard	0.075	12	8	9
Days over State Standard	0.070	20	13	11
Carbon Monoxide (CO)				
Highest 8 Hour Average (ppm)		2.48	2.86	2.19
Days over State Standard	9.0	0	0	0
Nitrogen Dioxide (NO_2)				
Highest 1 Hour Average (ppm)		0.080	0.069	0.093
Days over State Standard	0.18	0	0	0
Basin-wide Annual Average (ppm)	0.053[2]	0.012	0.012	0.011
Particulate Matter (PM_{10})				
Highest 24 Hour Average ($\mu g/m^3$) [1]		77.0	55.4	69.6
Estimated Days over State Standard[3]	50	18.3	6.5	6.1
Estimated Days over National Standard[3]	150	0	0	0
Annual Average ($\mu g/m^3$)[1]	20	24.1	20.3	19.5
Particulate Matter ($PM_{2.5}$)				
Highest 24 Hour Average ($\mu g/m^3$)[1]		74.9	49.8	41.5
Measured Days over National Standard	35[2]	12	11	6
Annual Average ($\mu g/m^3$)[1]	12	13.7	10.1	9.0

Notes: ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

--- indicates there was insufficient (or no) data available to determine the value.

[1] Averages represent State statistics (may differ from national statistics).

[2] Federal standard.

[3] PM_{10} and $PM_{2.5}$ data are usually collected every six days; estimated days mathematically estimates how many days concentrations would have been greater than the level of the standard had each day been monitored.

Source: CARB 2011

When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia.

NO_2 is a pollutant of concern because it acts as a respiratory irritant. NO_x is a precursor to ozone formation and is produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircrafts, and rail transit. Typically, NO_x emitted from fuel combustion is in the form of nitric oxide (NO) and NO_2. NO is often converted to NO_2 when it reacts with ozone or undergoes photochemical reactions in the atmosphere. Therefore, emissions of NO_2 from combustion sources are typically evaluated based on the amount of NO_x emitted from the source.

PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates can also damage materials and reduce visibility.

Sensitive Receptors

For the purposes of air quality and public health and safety, sensitive receptors are generally defined as land uses with population concentrations that would be particularly susceptible to disturbance from dust and air pollutant concentrations associated with project construction and/or operation. Sensitive receptor land uses generally include schools, day care centers, hospitals, residential areas, and parks. Some sensitive receptors are considered to be more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions sources, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be sensitive to poor air quality because children and elderly people are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, with greater exposure to ambient air quality. Recreational uses are also considered sensitive due to greater exposure to ambient air quality conditions and because vigorous exercise associated with recreation places a high demand on the human respiratory system.

In some areas, especially near California State Lands Commission (CSLC) Lease PRC 709 South (see Figure 2-1a in Section 2.0, Project Description), data on historical sand mining events show that mining activities have occurred as close as 1,500 feet north of residents located along the shoreline. In addition, a number of residential receptors are located approximately 400 to 500 feet west of the Hanson Oakland Tidewater Offloading site (see Figure 2-10 in Section 2.0, Project Description). The other offloading facilities associated with the proposed Project are generally surrounded by industrial uses.

4.5.2 Regulatory Setting

Air quality is addressed through the efforts of various Federal, State, and local government agencies. These agencies work jointly and individually to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The air pollutants of concern and agencies primarily responsible for improving air quality in the Basin are discussed below.

Criteria Air Pollutants

Regulation of air pollution is achieved through both national and State ambient air quality standards and emission limits for individual sources of air pollutants. As required by the Federal Clean Air Act (CAA), the U.S. Environmental Protection Agency (U.S. EPA) has identified criteria pollutants and has established NAAQS to protect public health and welfare. NAAQS have been established for ozone, CO, NO_2, sulfur dioxide (SO_2), PM_{10} and $PM_{2.5}$, and lead (Pb). These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria.

To protect human health and the environment, the U.S. EPA has set "primary" and "secondary" maximum ambient thresholds for each criteria pollutant. Primary thresholds were set to protect human health, particularly sensitive receptors such as children, the elderly, and individuals suffering from chronic lung conditions such as asthma and emphysema. Secondary standards were set to protect the natural environment and prevent further deterioration of animals, crops, vegetation, and buildings.

The NAAQS are defined as the maximum acceptable concentrations that may be reached, but not exceeded more than once per year. California has adopted ambient air quality standards for most of the criteria air pollutants (i.e., CAAQS); these standards are generally more stringent than the U.S. EPA primary standards. Table 4.5-2 presents both sets of ambient air quality standards (i.e., national and State). California has also established State ambient air quality standards for sulfates, hydrogen sulfide (H_2S), and vinyl chloride; however, air emissions of these pollutants are not expected under the proposed Project and thus, there is no further discussion of these pollutants in this Environmental Impact Report (EIR).

Table 4.5-2. State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 Hour 8 Hour	0.09 ppm 0.070 ppm	--- 0.075 ppm	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when ROG and NO_X react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/ industrial mobile equipment.
Carbon Monoxide (CO)	1 Hour 8 Hour	20 ppm 9.0 ppm	35 ppm 9 ppm	A chemical asphyxiant, CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
Nitrogen Dioxide (NO_2)	1 Hour Annual	0.18 ppm 0.03 ppm	0.100 ppm 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
Sulfur Dioxide (SO_2)	1 Hour 3 Hour 24 Hour Annual	0.25 ppm – 0.04 ppm –	0.075 ppm 0.5 ppm 0.14 ppm 0.03 ppm	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility, reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
Respirable Particulate Matter (PM_{10})	24 Hour Annual	50 µg/m^3 20 µg/m^3	150 µg/m^3 –	May irritate eyes and respiratory tract, decreases lung capacity, can cause cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g. wind-raised dust and ocean sprays).
Fine Particulate Matter ($PM_{2.5}$)	24 Hour Annual	– 12 µg/m^3	35 µg/m^3 15.0 µg/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning. Also formed from photochemical reactions of other pollutants, including NO_x, SO_2, and organics.

Notes: ppm = parts per million; µg/m^3 = micrograms per cubic meter.

Source: CARB 2010a

Table 4.5-3 shows the Basin's attainment status for the standards described above. As shown, the Basin is currently classified as non-attainment for the one-hour State ozone standard as well as the Federal and State eight-hour ozone standards. Additionally, the Basin is classified as non-attainment for the State 24-hour and annual arithmetic mean PM_{10} standards as well as the State annual arithmetic mean and the national 24-hour $PM_{2.5}$ standards. The Basin is unclassified or classified as attainment for all other pollutants standards (BAAQMD 2011).

Table 4.5-3. San Francisco Bay Area Air Basin Attainment Status

Pollutant	Federal Status	State Status
Ozone – 1 Hour	N/A	Non-attainment
Ozone – 8 Hour	Non-attainment	Non-attainment
Carbon Monoxide (CO)– 1 Hour	Attainment	Attainment
Carbon Monoxide (CO) – 8 Hour	Attainment	Attainment
Nitrogen Dioxide (NO_2) – 1 Hour	N/A	Attainment
Nitrogen Dioxide (NO_2)– Annual Arithmetic Mean	Attainment	N/A
Sulfur Dioxide – 1 Hour	N/A	Attainment
Sulfur Dioxide – 24 Hour	Attainment	Attainment
Sulfur Dioxide – Annual Arithmetic Mean	Attainment	N/A
PM_{10} – 24 Hour	Unclassified	Non-attainment
PM_{10} – Annual Arithmetic Mean	N/A	Non-attainment
$PM_{2.5}$ – 24 Hour	Non-attainment	N/A
$PM_{2.5}$ – Annual Arithmetic Mean	Attainment	Non-attainment

Note: N/A = not applicable.
Source: BAAQMD 2011

Toxic Air Contaminants (TACs)

TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines.

Greenhouse Gas Emissions and Climate Change

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). What GHGs have in common is that they allow sunlight to enter the atmosphere, but trap a portion of the outward-bound infrared radiation which warms the air. The process is similar to the effect greenhouses have in raising their internal temperature, hence the name GHGs. Both natural processes and human activities emit GHGs. The accumulation of GHGs in the atmosphere regulates the earth's temperature; however, emissions from human activities such as power generation and the use of motor vehicles have increased the concentration of GHGs in the atmosphere and contributed to an increase in the temperature of the earth's atmosphere. The major concern with GHGs is that such increases cause global climate change. Global climate change is a change in the average weather on earth that can be measured by wind patterns, storms, precipitation, and temperature. Although there is uncertainty as to the speed of global warming and the extent of the impacts attributable to human activities, the global scientific community is in agreement that there is a direct link between increased emissions of GHGs and long-term global temperature increases.

The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). CO_2 is the most common reference gas for climate change. To account for the warming potential of GHGs, GHG emissions are often quantified and reported as CO_2 equivalents (CO_2e). Large emission sources are reported in million metric tons of CO_2e ($MMTCO_2e$). The California Air Resources Board (CARB) estimated that in 2008, California produced 478 $MMTCO_2e$ of GHG emissions (CARB 2010b). CARB found that transportation is the source of 37 percent of the State's GHG emissions, followed by electricity generation at 24 percent, and industrial sources at 19 percent.

Some of the potential effects in California of global warming include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CARB 2009). Globally, climate change has the potential to impact numerous environmental resources through potential, though uncertain, impacts related to future air temperatures and precipitation patterns. The projected effects of global warming on weather and climate are likely to vary regionally, but are expected to include the following direct effects (Intergovernmental Panel of Climate Change [IPCC] 2007): higher maximum temperatures and more hot days over nearly all land areas; higher minimum temperatures, fewer cold days and frost days over nearly all land areas; reduced diurnal temperature range over most land areas; increase of heat index over land areas; and more intense precipitation events.

Many secondary effects are also projected to result from global warming, including global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the possible outcomes and the feedback mechanisms involved are not fully understood, and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long term may be great.

Federal Regulation

The U.S. EPA is responsible for implementing the programs established under the Federal CAA, such as establishing and reviewing the NAAQS and judging the adequacy of State Implementation Plans (SIPs), but has delegated the authority to implement many of the Federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

State Regulation

The CARB is responsible for establishing and reviewing the State standards, compiling the California SIP, securing approval of that plan from U.S. EPA, and identifying TACs. CARB also regulates mobile sources of emissions in California such as construction equipment, trucks, and automobiles, and oversees the activities of California's air quality management districts, which are organized at the county or regional level. County or regional air quality management districts are primarily responsible for regulating stationary sources at industrial and commercial facilities within their geographic areas and for preparing the air quality plans that are required under the Federal CAA and the California CAA. CARB has adopted the following regulations.

- Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline (Cal. Code Regs., tit. 13, § 2299.2). This regulation was adopted by CARB in 2008 and requires the use of low sulfur marine distillate fuels to reduce emissions of PM, NO_x, and sulfur oxides (SO_x) from the use of auxiliary diesel and diesel-electric engines, main propulsion diesel engines, and auxiliary boilers on ocean-going vessels within "Regulated California Waters."

- Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in a California Port (Cal. Code Regs., tit. 17, § 93118.3). The purpose of this regulation is to reduce hoteling (or at-berth) emissions and associated health impacts from diesel-fueled auxiliary engines onboard ships docked at California ports. Operators of container ship fleets, refrigerated cargo ship fleets, and passenger ship fleets are required to comply with this regulation in addition to the ports and terminals that receive them; the Ports of Los Angeles, Long Beach, Oakland, San Francisco, San Diego, and Hueneme are subject to this regulation. All other ocean-going fleets, terminals, and ports are not affected by the regulation.

- Airborne Toxic Control Measures for Diesel Engines on Commercial Harbor Craft Operated within California Waters and 24 Nautical Miles of the California Baseline (Cal. Code Regs., tit. 17, § 93118.5). This regulation was adopted by CARB in 2008. The purpose of the regulation is to reduce diesel particulate matter (DPM) emissions and NO_X emissions from diesel propulsion and auxiliary engines on harbor craft that operate in California Regulated Waters. To comply with regulations, commercial harbor craft owners/operators must do the following:
    - Beginning January 1, 2009, all commercial harbor craft operators were required to (1) install a non-resettable hour meter on each engine of their vessel and keep records of engine and vessel operations, and (2) submit an initial report to CARB by February 28, 2009, providing vessel and engine information.
    - Beginning January 1, 2009, all diesel engines on commercial harbor craft must be fueled with CARB diesel fuel (sulfur content less than or equal to 15 parts per million), an alternative diesel fuel (such as biodiesel, water emulsions in diesel, etc.), or diesel fuels and/or additives that have received CARB verification.
    - Engines on all new commercial harbor craft vessels will be required to meet the U.S. EPA marine engine standards in effect at the time of vessel acquisition.
    - All owners/operators replacing an engine on their existing harbor craft vessel will be required to install an engine that meets U.S. EPA standards in effect at the time of acquisition; and
    - Owners/operators of ferries, excursion boats, tugboats, and towboats must comply with additional in-use engine requirements per the compliance schedule shown below in Table 4.5-4.

Barge vessels are considered commercial harbor craft and are therefore subject to this regulation. In-use Tier 1 and earlier propulsion and auxiliary diesel engines must meet emission limits equal to or cleaner than U.S. EPA standards (Tier 2 or Tier 3) that are in effect at the time the engine is brought into compliance. Engines that operate less than 300 hours annually are exempt from this requirement.

Executive Order S-3-05

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which set forth the following target dates by which statewide emissions of GHGs would be progressively reduced: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.

Table 4.5-4. Compliance Dates for Vessels with Homeports Outside of the South Coast Air Quality Management District

Engine Model Year	Total Annual Hours of Operation	Compliance Date
1975 and earlier	≥1500	12/31/2009
	≥300 and <1500	12/31/2010
1976 – 1985	≥1500	12/31/2011
	≥300 and <1500	12/31/2012
1986 - 1995	≥1500	12/31/2013
	≥300 and <1500	12/31/2014
Ferries only 1996 - 1999	≥300	12/31/2014
Vessels Other Than Ferries 1996 - 1999	≥1500	12/31/2015
	≥300 and <1500	12/31/2016
2000	≥1500	12/31/2015
	≥300 and <1500	12/31/2016
2001-2002	≥300	12/31/2017
2003	≥300	12/31/2018
2004	≥300	12/31/2019
2005	≥300	12/31/2020
2006	≥300	12/31/2021
2007	≥300	12/31/2022

Source: CARB 2008a

California Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006

AB 32, enacted as legislation in 2006, requires CARB to establish a statewide GHG emission cap for 2020 based on 1990 emission levels. AB 32 required CARB to adopt:

- By January 1, 2008, regulations that identify and require selected sectors or categories of GHG emitters to report and verify their statewide GHG emissions;
- By January 1, 2008, a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990 (which must be achieved by 2020); and
- By January 1, 2011 (which shall become operative January 1, 2012), rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

AB 32 permits the use of market-based compliance mechanisms to achieve those reductions. AB 32 also requires CARB to monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism that it adopts.

In June 2007, CARB directed staff to pursue 37 early actions for reducing GHG emissions under AB 32. The broad spectrum of strategies to be developed – including a low carbon fuel standard, regulations for refrigerants with high global warming potentials, guidance and protocols for local governments to facilitate GHG reductions, and green ports – reflects that the serious threat of climate change requires action as soon as possible (CARB 2007a). In addition to approving the 37 GHG reduction strategies, CARB directed staff to further evaluate early action recommendations made at the June 2007 meeting, and to report back to CARB within six months. The general sentiment of CARB suggested a desire to pursue greater GHG emissions reductions in California in the near-term. Since the June 2007 CARB hearing, CARB staff evaluated all 48 recommendations submitted by stakeholders as well as several internally generated staff ideas and published the *Expanded List of Early Action Measures To Reduce Greenhouse Gas Emissions In California Recommended For Board Consideration* in October 2007 (CARB 2007b).

Climate Change Scoping Plan

The Climate Change Scoping Plan was approved by the CARB Board in December 2008, outlining the State's strategy to achieve the 2020 GHG emissions limit (CARB 2009). This Scoping Plan, developed by CARB in coordination with the Climate Action Team (CAT), proposes a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify energy sources, save energy, create new jobs, and enhance public health. The measures in the Scoping Plan will continue to be developed over the next year and are scheduled to be in place by 2012. The Scoping Plan expands the list of nine Early Action Measures into a list of 39 Recommended Actions contained in Appendices C and E of the Plan. These measures are presented in Table 4.5-5.

Local

The BAAQMD is the regional agency with jurisdiction over the nine-county region located in the Basin. The Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC), county transportation agencies, cities and counties, and various non-governmental organizations have also joined in the efforts to improve air quality through a variety of programs. These programs include the adoption of regulations and policies, as well as implementation of extensive education and public outreach programs.

Table 4.5-5. Recommended Actions of Climate Change Scoping Plan

Sector	ID #	Strategy Name
Transportation	T-1	Pavley I and II – Light-Duty Vehicle GHG Standards
	T-2	Low Carbon Fuel Standard (Discrete Early Action)
	T-3	Regional Transportation-Related GHG Targets
	T-4	Vehicle Efficiency Measures
	T-5	Ship Electrification at Ports (Discrete Early Action)
	T-6	Goods-movement Efficiency Measures
	T-7	Heavy Duty Vehicle Greenhouse Emission Reduction Measure – Aerodynamic Efficiency (Discrete Early Action)
	T-8	Medium and Heavy-Duty Vehicle Hybridization
	T-9	High Speed Rail
Electricity and Natural Gas	E-1	Increased Utility Energy Efficiency programs; More Stringent Building and Appliance Standards
	E-2	Increase Combined Heat and Power Use by 30,000 GWh
	E-3	Renewables Portfolio Standard
	E-4	Million Solar Roofs
	CR-1	Energy Efficiency
	CR-2	Solar Water Heating
Green Buildings	GB-1	Green Buildings
Water	W-1	Water Use Efficiency
	W-2	Water Recycling
	W-3	Water System Energy Efficiency
	W-4	Reuse Urban Runoff
	W-5	Increase Renewable Energy Production
	W-6	Public Goods Charge (Water)
Industry	I-1	Energy Efficiency and Co-benefits Audits for Large Industrial Sources
	I-2	Oil and Gas Extraction GHG Emission Reduction
	I-3	GHG Leak Reduction from Oil and Gas Transmission
	I-4	Refinery Flare Recovery Process Improvements
	I-5	Removal of Methane Exemption from Existing Refinery Regulations
Recycling and Waste Management	RW-1	Landfill Methane Control (Discrete Early Action)
	RW-2	Additional Reductions in Landfill Methane – Capture Improvements
	RW-3	High Recycling/Zero Waste
Forestry	F-1	Sustainable Forest Target
High Global Warming Potential Gases	H-1	Motor Vehicle Air Conditioning Systems (Discrete Early Action)
	H-2	SF_6 Limits in Non-Utility and Non-Semiconductor Applications (Discrete Early Action)
	H-3	Reduction in Perflourocarbons in Semiconductor Manufacturing (Discrete Early Action)
	H-4	Limit High Global Warming Potential (GWP) Use in Consumer Products (Discrete Early Action, Adopted June 2008)
	H-5	High GWP Reductions from Mobile Sources
	H-6	High GWP Reductions from Stationary Sources
	H-7	Mitigation Fee on High GWP Gases
Agriculture	A-1	Methane Capture at Large Dairies

Source: CARB 2009

The BAAQMD is responsible for attaining and/or maintaining Federal and State air quality standards within the Basin. Specifically, the BAAQMD has the responsibility to monitor ambient air pollutant levels throughout the Basin and to develop and implement strategies to attain the applicable Federal and State standards.

In 1999, the BAAQMD released its *California Environmental Quality Act (CEQA) Guidelines – Assessing the Air Quality Impacts of Projects and Plans* (BAAQMD 1999). The BAAQMD *CEQA Guidelines* provide uniform procedures for assessing air quality impacts and preparing the air quality sections of environmental documents for projects subject to CEQA. In 2010, the BAAQMD adopted a revised CEQA advisory document called *CEQA Air Quality Guidelines* (BAAQMD 2010a) that include recommended procedures for assessing air quality and GHG impacts for projects subject to CEQA. Although the *Guidelines* describe the criteria that the BAAQMD uses when reviewing and commenting on the adequacy of environmental documents, lead agencies are not required to use the methodologies outlined therein. They recommend thresholds for use in determining whether projects would have significant adverse environmental impacts, identify methodologies for predicting project emissions and impacts, and identify measures that can be used to avoid or reduce air quality impacts. The updated *Guidelines* include a GHG threshold for operational emissions for projects other than stationary sources. This threshold is 1,100 $MTCO_2e$/year. Alternatively, if a project is consistent with a Climate Action Plan that meets certain District requirements, its GHG emissions are considered less than significant. The District *Guidelines* also include new, lower thresholds for criteria pollutants and new thresholds for cancer and non-cancer risk from cumulative exposure to toxic air contaminants.

It is the BAAQMD's policy that the adopted thresholds apply to projects for which a Notice of Preparation (NOP) is published, or environmental analysis begins, on or after the applicable effective date. The effective date of the new thresholds was June 2, 2010; the NOP for this Project was published on July 10, 2007. Therefore, the BAAQMD's 1999 *CEQA Guidelines* (BAAQMD 1999) are used for the impact analysis below.

The Federal CAA and the California CAA require plans to be developed for areas designated as nonattainment (with the exception of areas designated as nonattainment for the State PM_{10} standard).

The BAAQMD recently adopted the Bay Area 2010 Clean Air Plan, which replaced the Bay Area 2005 Ozone Strategy as the applicable air quality plan for the Project area and also serves as a multi-pollutant air quality plan to protect public health and the climate. The Bay Area 2010 Clean Air Plan control strategy includes revised, updated, and new measures in the three traditional control measure categories (stationary sources, mobile sources, and transportation control) and identifies two new categories of control measures, including land use and local impact measures and energy and climate measures. In other words, the Bay Area 2010 Clean Air Plan defines a control strategy that the BAAQMD and its partners will implement to: (1) reduce emissions and decrease ambient concentrations of harmful pollutants; (2) safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily impacted by air pollution; and (3) reduce GHG emissions to protect the climate (BAAQMD 2010b).

4.5.3 Significance Criteria

An adverse impact on air quality is considered significant and would require mitigation if the Project would:

- Conflict with or obstruct implementation of an applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds of ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

An adverse impact on human health from exposure to toxic air contaminants is considered significant and would require mitigation if the Project would:

- Expose people to an increase risk of cancer of 10 new cases per million exposed individuals;
- Result in an acute or chronic non-cancer Hazard Index greater than 1.0

In addition, the Project would be considered to have a significant impact on climate change if it were to:

- Result in GHG emissions above the baseline level, where the baseline level is included in the State's inventory of GHG emissions; or

- Result in any GHG emissions not included in the State's inventory of GHG emissions; or
- Conflict with any applicable plan, policy or program intended to reduce GHG emissions adopted by the State pursuant to AB 32.

BAAQMD (1999) thresholds of significance, which were in effect when the Project NOP was issued, are used as the thresholds for criteria pollutants and toxic air contaminants.

4.5.4 Impact Analysis and Mitigation

Baseline for the Air Quality Impact Analysis

The baseline for this air quality analysis is the level of emissions associated with the average annual level of mining activity that occurred over the five years that preceded the issuance of the NOP (i.e., July 2002 through June 2007). These emissions have been quantified and are presented in Table 4.5-7 (under Impact AIR-1, below; detailed calculations are presented in Appendix D). This analysis examines whether any increase in air emissions would occur due to the proposed changes in mining location, intensity, or duration. The analysis also considers the potential for increased human health risk associated with an additional 10 years of exposure to toxic air contaminants, and the potential for increased global warming effects due to an additional 10 years of GHG emissions.

The proposed Project would not include construction activities; therefore, construction emissions are not analyzed below. Table 4.5-10, located at the end of Section 4.5.4, summarizes air quality impacts associated with the proposed Project.

Impact AIR-1: Emissions of criteria pollutants

Sand mining activities would result in emissions of criteria air pollutants that may conflict with or obstruct implementation of an applicable air quality plan or may violate an air quality standard or contribute significantly to an existing violation (Less than Significant, Class III).

Tugboat engines, barge engines, and auxiliary engines/generators used during mining and offloading events would generate emissions of criteria pollutants. Criteria pollutants from these sources were evaluated based on emission factors derived from CARB's OFFROAD model, CARB's recommended methodologies for estimating emissions for commercial harbor craft (CARB 2007c), and detailed operational information provided by the Applicants. Pursuant to Title 17 of the California Code of Regulations, section 93118.5, both Hanson and Jerico would be required to upgrade their marine vessel engines according to CARB's compliance schedule, as shown in Table 4.5-6.

Table 4.5-6. Sand Mining Equipment Replacement Compliance Dates as Required by CARB

Equipment (Applicant)	Model Year/Tier	CARB Compliance Date
Hanson		
American River Tug	2003/Tier 1	12/31/2018
San Joaquin River Tug	2001/Tier 1	12/31/2017
TS&G Dredge Barge – Main Engine	1983/Tier 0	12/31/2013
TS&G Dredge Barge – Generator	1984/Tier 0	12/31/2013
TS&G Dredge Barge – Thruster Pump	1984/Tier 0	12/31/2013
DS-10 Dredge – Main Engine	2001/Tier 0	12/31/2017
DS-10 Dredge – Monitor Pump (Hanson)	2002/Tier 1	12/31/2017
DS-10 Dredge – Flood Pump	2002/Tier 1	12/31/2017
DS-10 Dredge – Main Generator	1984/Tier 0	12/31/2013
Jerico		
Tug – Main Engine	2001/Tier 1	12/31/2017
Tug – Generator	2000/Tier 1	12/31/2015
Dredge Barge – Generator	2004/Tier 2	Not Applicable
Dredge Barge – Pump	2001/Tier 1	12/31/2017

Hanson has withdrawn its proposal to install the CleanAIR Systems E-POD technology (CleanAIR Systems 2011a) that would be supplied by Caterpillar. ~~Hanson has committed to installing new emission reduction retrofits on the San Joaquin River Tug and TS&G Barge propulsion engines by the third quarter of 2012, which would be in advance of the applicable replacement compliance dates.~~

~~The planned retrofits would include the CleanAIR Systems E-POD technology (CleanAIR Systems 2011a) that would be supplied by Caterpillar. E-POD combines a selective catalytic reduction system with either oxidation catalysts, diesel particulate filters, or diesel oxidation catalysts. The technology uses an ammonia based reductant that reacts over a catalyst to convert NO_x to N_2 and H_2O. CleanAIR Systems estimates that the E-POD emission control system would reduce Hanson's Tier 0 vessel propulsion engine NO_x emissions by approximately 80 percent (CleanAir Systems 2011b). Hanson's planned engine retrofits are considered "Applicant Proposed Measures" (see Section 4.0, Environmental Analysis) and are considered a part of the Project design.~~

Based on the Applicants' proposal (as revised in Applicants' comments on the RDEIR), ~~T~~this emissions analysis assumes that the mining levels will not exceed the annual baseline level of 1,426,650 cubic yards per year (cy/yr) until 2014, when upgrades to the TS&G barge engines are scheduled to be completed, as indicated in Table 4.5-6. Beginning in 2014, the mining volume could increase to the full amount proposed by the Applicants, that is, 2,040,000 cy/yr if approved by the CSLC and other regulatory agencies. ~~includes several scenarios for comparison, including the future (2012) with no new emission controls (for informational purposes only), future (2012) with Hanson's planned retrofits for half the year only, future (2013) with Hanson's planned retrofits for the entire year, and future (2014) with required regulatory minimum upgrades only, but without Hanson's planned engine retrofits (for informational purposes only). To determine the net change in emissions that would result from the proposed Project, b~~ Baseline emissions were calculated based on the annual average level of mining that occurred during the five-year period between July 2002 and June 2007 (approximately 1,426,650 ~~cubic yards per year [~~cy/yr~~]~~). Project emissions were based on ~~and~~ the proposed mining volume of 2,040,000 cy/yr beginning in 2014.

Based on ~~these data and~~ the assumption that approximately 2,000 cubic yards of sand ~~would be~~ are mined during a single mining event, the annual average baseline is approximately 713 mining events and there could eventually be as many as 1,021 mining events under the proposed Project beginning in 2014. Therefore, the proposed Project could eventually result in a net increase of 308 mining events per year above baseline conditions. To determine offloading emissions that would be associated with a single mining event, it was assumed that offloading would take between four and 12 hours per event.

Emission estimates are presented in Table 4.5-7 below. Because, as proposed by the Applicants, the mining volume would not exceed the baseline level until 2014, emissions before 2014 would not exceed baseline levels. ~~Assuming the Project would commence operations in 2012, increases in NO_x emissions would violate the BAAQMD threshold in effect at the time of the Project NOP (15 tons per year) (BAAQMD 1999) if the planned emission control retrofits were not implemented. However, with Hanson's planned emission retrofits that would be installed on the engines of the San Joaquin River Tug and the TS&G Barge by the third quarter of 2012, emissions of NO_x would be reduced substantially. Even with only one half year of the planned retrofit emission reductions, annual increases in NO_x emissions in 2012 would be 11.7 tons per year (below the threshold of 15 tons per year), and starting in 2013, the planned retrofits would result in net NO_x reductions of approximately 35 tons per year compared to the annual average baseline. At these levels, the emissions would be less than significant and no additional mitigation would be required.~~

Table 4.5-7. Estimated Annual Project Criteria Pollutant Emissions

Scenario	Annual Emissions (tons per year)			
	NO_x	PM	ROG	CO
Annual Average (2002 – 2007) Baseline				
Hanson (TS&G)	42.7	1.5	3.7	11.7
Hanson (DS-10)	32.6	1.3	3.3	10.4
Suisun Assoc. (TS&G)	1.8	0.1	0.2	0.5
Suisun Assoc. (DS-10)	0.7	0.0	0.1	0.2
Suisun Assoc. (Jerico)	0.4	0.0	0.1	0.2
Jerico	1.9	0.1	0.3	0.9
Cemex	4.8	0.2	0.4	1.4
TOTAL	*84.8*	*3.1*	*8.0*	*25.3*
~~**Future (2012) – No New Emission Controls**~~				
~~Hanson (TS&G)~~	~~128.1~~	~~4.4~~	~~11.2~~	~~35.1~~
~~Hanson (DS-10)~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~
~~Suisun Assoc. (TS&G)~~	~~12.1~~	~~0.4~~	~~1.1~~	~~3.3~~
~~Suisun Assoc. (DS-10)~~	~~0.0~~	~~0.0~~	~~0.0~~	~~0.0~~
~~Suisun Assoc. (Jerico)~~	~~1.4~~	~~0.1~~	~~0.2~~	~~0.7~~
~~Jerico~~	~~1.4~~	~~0.1~~	~~0.2~~	~~0.7~~
~~*TOTAL*~~	~~143.1~~	~~4.9~~	~~12.6~~	~~39.9~~
~~*Change from Existing*~~	~~*58.3*~~	~~*1.8*~~	~~*4.6*~~	~~*14.5*~~
~~**Future (2012) - With Hanson Proposed Retrofits for Half Year Only**~~				
~~*TOTAL*~~	~~96.4~~	~~--~~	~~--~~	~~--~~
~~*Change from Existing*~~	~~*11.7*~~	~~*Further Reductions*~~		~~N.A.~~
~~BAAQMD Threshold~~	~~15~~	~~15~~	~~15~~	~~N.A.~~
~~Significant?~~	~~No~~	~~No~~	~~No~~	~~No~~
~~**Future (2013) - With Hanson Proposed Retrofits for All Year**~~				
~~*TOTAL*~~	~~*49.7*~~	~~--~~	~~--~~	~~--~~
~~*Change from Existing*~~	~~*-35.0*~~	~~*Further Reductions*~~		~~N.A.~~
~~Significant?~~	~~No~~	~~No~~	~~No~~	~~No~~
Future (2014) – With Required Regulatory Minimum Upgrades Only				
Hanson (TS&G)	85.7	4.4	11.2	35.1
Hanson (DS-10)	0.0	0.0	0.0	0.0
Suisun Assoc. (TS&G)	8.1	0.4	1.1	3.3
Suisun Assoc. (DS-10)	0.0	0.0	0.0	0.0
Suisun Assoc. (Jerico)	1.4	0.1	0.2	0.7
Jerico	1.4	0.1	0.2	0.7
TOTAL	*96.7*	*4.9*	*12.6*	*39.9*
Change from Existing	***12.0***	***1.8***	***4.6***	***14.5***
BAAQMD Significance Threshold	15	15	15	N.A.
Significant?	No	No	No	No

Notes: see Appendix D for all emissions factors and other assumptions used to estimate emissions.
N.A.: Not applicable.

By December 31, 2013, all engines manufactured in or prior to the year 1985 would have to be upgraded to meet U.S. EPA Tier 2 standards as required by CARB and shown in Table 4.5-6. ~~For informational purposes only,~~ Table 4.5-7 ~~also~~ shows the maximum ~~NOx~~ emissions that would occur in 2014~~, without Hanson's planned engine retrofits, but~~ with the required upgrade to Tier 2 standards, and the increase in mining volume to the full amount proposed by the Applicants, 2,040,000 cy/yr if approved by the Commission. ~~With the upgrade~~ With the upgrade to Tier 2 standards, and even with the potential increase in mining volume, NO_x emissions would be a maximum of 12 tons per year higher than the baseline, which is less than the BAAQMD significance threshold of 15 tons per year. As shown in Table 4.5-7, increases in emissions of other criteria pollutants would also be below the BAAQMD significance threshold. Future engine upgrades, according to the schedule shown in table 4.5-6, would further reduce Project emissions. The impact is therefore less than significant. ~~Therefore, without Hanson's planned installation of the CleanAIR Systems retrofits, emissions would be considered significant until 2014, when mandatory engine upgrades would be in place.~~

Impact AIR-2: Potential impacts on climate change

Sand mining activities would result in emissions of GHGs that may have a significant impact on climate change, or would conflict with an applicable plan, policy, or program adopted by the State for the purpose of reducing GHGs (Potentially Significant, Class II).

Tugboat engines, barge engines, and auxiliary engines/generators used during mining and offloading events emit GHGs. GHG emissions from these sources were evaluated based on emission factors derived from CARB's OFFROAD model and CARB's recommended methodologies for estimating emissions for commercial harbor craft (CARB 2007c). The emissions analysis incorporates methods identified in the California Climate Action Registry (CCAR) General Reporting Protocol version 3.1 (CCAR 2009) and Intergovernmental Panel of Climate Change (IPCC)'s Fourth Assessment Report (IPCC 2007) with detailed operational information provided by the Applicants. Table 4.5-8 shows estimated GHG emissions for baseline conditions as well as proposed Project conditions. As shown, the proposed Project could result in a maximum net increase of 2,847 metric tons of ~~MT~~CO_2e emissions per year compared to the baseline.

As stated in the discussion of significance thresholds for GHG emissions and climate change, above, any increase in GHG emissions above the baseline would be considered to have a significant effect on climate change. Where baseline emissions

Table 4.5-8. Estimated Annual Project GHG Emissions

Activity	GHG Emissions (Metric Tons CO_2e per Year)
Annual Average (2002 – 2007) Baseline	5,400
Proposed Project Emissions	8,247
Net Change from Existing	*2,847*
Proposed Project Emissions – 10 Year Lifecycle of Project	82,470

Note: See Appendix D for all emissions factors and other assumptions used to estimate emissions.

were not included in the Statewide GHG inventory prepared by the California Energy Commission, any GHG emissions would be considered significant. A review of the Statewide GHG inventory indicates that it did include a survey of commercial harbor vessels, and so can be assumed to have taken into account GHG emissions associated with sand mining. Therefore, because the Project could increase GHG emissions above the baseline by 2,847 metric tons of ~~MT~~CO_2e per year, and up to 28,470 metric tons for the 10-year life of the project, the impact is considered significant. Implementation of Mitigation Measure (MM) AIR-2 would reduce impacts to less than significant.

MM for Impact AIR-2: Potential impacts on climate change

MM AIR-2. Prepare and Implement a Greenhouse Gas (GHG) Reduction Plan. Prior to startup of any new sand mining operations, the Project Applicants shall prepare and submit to the California State Lands Commission (CSLC) staff for approval a GHG Reduction Plan that demonstrates how the Applicants will lower and/or offset Project-related GHG emissions, such that GHG emissions will not exceed 5,400 metric tons of CO_2e in any calendar year during the 10-year lease period, or a total of 54,000 metric tons for the 10-year life of the Project. The GHG Reduction Plan shall include:

- A detailed baseline inventory that identifies and calculates all sources of GHG emissions during the last full calendar year of mining operations. This inventory shall be verified by an accredited third-party verification body, and reported to The Climate Registry.
- A description of the strategies that the Applicants will employ to reduce and/or offset GHG emissions. Examples of such strategies include:
  - “Cold ironing” of vessels, where power from the electrical grid is substituted for diesel power during off-loading and while vessels are docked.
  - Use of biofuels or biofuel blends as a substitute or partial substitute for fossil fuels used to power tugs and barges.

  - o Purchase of carbon offset credits verified by the Climate Action Registry.

- Detailed calculations showing the expected reduction in GHG emissions that will result from the implementation of each strategy.

Each year during the 10-year lease period, the Applicants shall conduct another inventory of GHG emissions that shall be verified and reported to The Climate Registry. The Applicants shall provide the verified results of this inventory to the CSLC along with a description of how the GHG Reduction Plan is being implemented and documentation showing GHG offsets or reductions.

Rationale for Mitigation

MM AIR-2 would lower or offset GHG emissions from the Project to baseline levels, thereby mitigating the Project's contribution to global warming.

Impact AIR-3: Potential health risk from diesel particulate matter

Sand mining activities would result in emissions of diesel particulate matter (DPM), a toxic air contaminant (TAC), associated with use of diesel equipment, potentially exposing nearby sensitive receptors to health risks (Less than Significant, Class III).

The proposed Project would contribute to exposure of people to TACs contained in emissions from diesel equipment used in mining activities. Sources of DPM would include emissions from diesel equipment used to mine sand.

Health risks at offsite receptors were determined by conducting dispersion modeling of the DPM emissions associated with mining activities (see Appendix C for details on modeling methodology and assumptions). Mining does not occur uniformly within the region, but is clustered in specific areas. The Project encompasses a large area; therefore, a number of sites were selected to determine the maximum health risk from operation of the proposed Project. One mining site located in the PRC 709 South parcel was selected to represent the worst case risk from actual mining activities. This site was chosen as it would be located near the greatest number of residential receptors. Risk was also modeled at each of Hanson's four offloading locations (Oakland Tidewater; Pier 92 – San Francisco; San Rafael Rock Quarry; and Marina Vista – Martinez). Risk was not modeled at the Jerico offloading facilities as Jerico has indicated that they would plug into shore electricity and would therefore not emit large amounts of DPM during offloading activities.

The maximum incremental cancer risk from exposure to DPM was calculated following the guidelines established by the California Office of Environmental Health Hazard Assessment (OEHHA 2003). Since the proposed Project duration is 10 years, cancer risk was estimated based on the 95th percentile (high-end) child breathing rate of 581 liters per kilogram body weight per day (L/kg-day) as well as the 80th percentile adult breathing rate of 302 L/kg-day.

Table 4.5-9 presents maximum DPM concentrations at nearby residential and worker receptors as well as the high-end and average residential risk and worker risk. Risk presented represents chances per million of developing cancer; if a project would result in an increase in the probability of contracting cancer by 10 in one million or greater at the maximum exposed receptor, the impact is considered significant. As shown in the table, the proposed Project would not increase the probability of contracting cancer by greater than 10 in one million; therefore, impacts would be less than significant.

Table 4.5-9. Cancer Risk at Maximum Exposed Receptors

Location	Annual Average DPM Concentration (µg/m³)		Residential Risk [1] (chances per million)		Worker Risk (chances per million)
	Resident	Worker	Child	Adult	
Mining (PRC 709 (South)	0.05	0.05	4.4	2.3	0.8
Oakland (Tidewater)	0.04	0.14	3.5	1.8	2.2
San Francisco (Pier 92)	0.01	0.06	0.9	0.5	0.9
San Rafael (Rock Quarry)	0.01	0.10	0.9	0.5	1.6
Martinez (Marina Vista)	NA	0.21	NA	NA	3.3

Note: Cancer risk is expressed in increased chances per million of contracting cancer.
[1] Child risk assumes the 95th percentile child breathing rate of 581 L/kg-day while the adult risk assumes the 80th percentile adult breathing rate of 302 L/kg-day.

The cancer risks identified in Table 4.5-9 do not reflect Hanson's planned engine retrofits. Hanson has withdrawn its proposal to install the CleanAIR Systems E-POD technology (CleanAIR Systems 2011a) that would be supplied by Caterpillar.~~ that would be installed on the San Joaquin River Tug and the TS&G Barge by the third quarter of 2012.~~ The planned engine retrofits would result in lower DPM emission concentrations than presented in Table 4.5-9, and so would further reduce the health risk associated with sand mining.

Impact AIR-4: Potential odor impacts

Sand mining activities could generate objectionable odors (Less than Significant, Class III).

The proposed Project would not create a new substantial source of odors. The only notable source of odors from sand mining operations is from combustion of diesel fuel to operate the vessels. Since the proposed Project would reduce permitted mining volumes (and subsequent emissions) and would not require the creation of new offloading facilities, odor impacts would be less than significant.

Table 4.5-10. Summary of Air Quality Impacts and Mitigation Measures

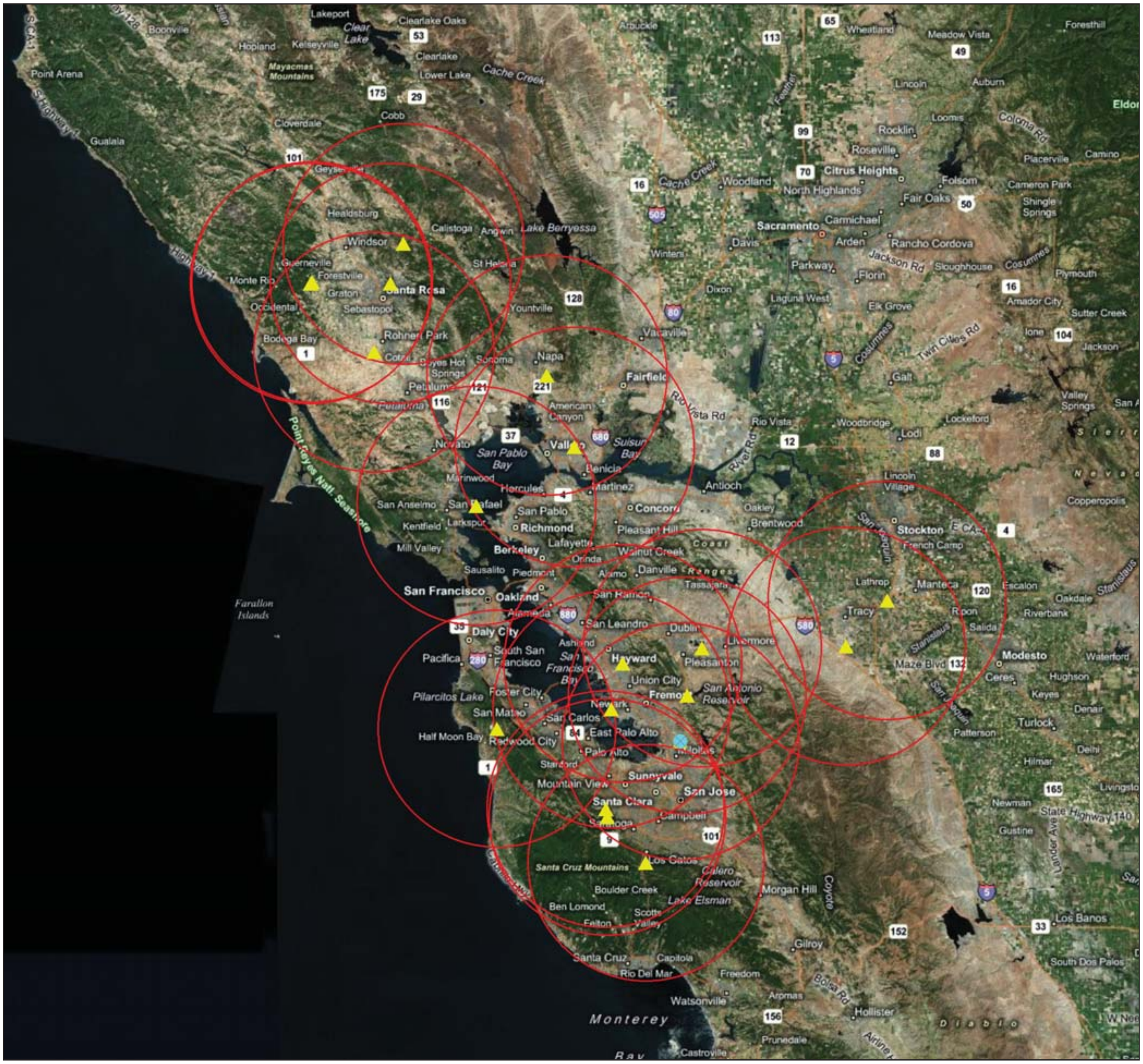
Impact	Mitigation Measures
AIR-1: Emissions of criteria pollutants.	Less than Significant impact; no mitigation necessary.
AIR-2: Potential impacts on climate change.	**MM AIR-2:** Prepare and implement a Greenhouse Gas Reduction Plan.
AIR-3: Potential health risk from diesel particulate matter.	Less than Significant impact; no mitigation necessary.
AIR-4: Potential odor impacts.	Less than Significant impact; no mitigation necessary

4.5.5 Impacts of Alternatives

No Project Alternative

Under the No Project Alternative the Applicants would not continue to mine sand from the Bay-Delta estuary for the next 10 years. Therefore, no direct adverse air quality impacts would occur. However, under this Alternative, sand would need to be supplied by other mining operations. If demand could not be met by local sources such as quarries and aggregate material recycling facilities, sand would be imported from more distant sources such as British Columbia or Mexico. Transport of materials from British Columbia or Mexico would involve greater consumption of fossil fuels than sand mined locally. Most of the resulting emissions would occur off the coast and would therefore result in a lesser impact with regard to criteria pollutant emissions generated within the Bay Area Air Basin. Since climate change is a global problem, however, import of material from British Columbia or Mexico would have a greater impact with regard to GHG emissions and climate change than the proposed Project.

ESA conducted a brief survey of existing aggregate quarries in the greater Bay Area that produce, or appear to produce, sand. The location of these quarries is shown in Figure 4.5-1. The figure also shows the 18-mile radius around each of these quarries, which approximates a 25-mile trip on the road network, to represent the likely market area for each identified quarry. The figure demonstrates that most areas of the greater Bay Area are within an 18-mile radius of a quarry that produces sand.



▲ Quarries that Produce Sand

◯ 18-Mile Radius Around Quarries

SOURCE: ESA

Figure 4.5-1
Bay Area Quarries that Produce Sand

ESA compared the calculated air emissions associated with producing and delivering sand to market under the proposed Project with estimated emissions from producing and delivering sand to market from Bay Area quarries, and with sand imported from British Columbia. For each source of sand, emissions associated with the mining of the material itself, and then delivery to the point of use, were calculated. The results, expressed as emissions per 1,000 cubic yards of sand delivered to its final destination, are shown in Table 4.5-11. The calculations, assumptions, and sources of information underlying this table are found in Appendix D, Tables D15 through D20.

Table 4.5-11. Comparison of Life Cycle Emissions for Mining and Delivery to Market of Sand from Various Sources

Figures are per 1,000 Cubic Yards of Sand[1]	NO_x (lbs)	PM_{10} (lbs)	CO_2e (metric tons)
Bay Area Quarry			
Material extraction and processing	34	100	3.0
Ground Transportation (40 mile average round trip)	76	3	3.8
TOTAL	110	103	6.8
Sand Mining (2014 ~~2012~~) With Regulatory Upgrades ~~Hanson Proposed Retrofits for Half Year Only~~			
Mining and delivery to off-loading location	95	5	4.0
Ground Transportation (10 mile average round trip)	20	1	1.0
TOTAL	115	6	5.1
Import from Canada			
Material extraction and processing	34	100	3.0
Ocean Transportation, British Columbia - Bay Area	414	12	9.2
Ground Transportation (10 mile average round trip)	20	1	1.0
TOTAL	468	113	13.3

Note: see Appendix D for all emissions factors and other assumptions used to estimate emissions.
[1] Sand assumed to have a bulk density of 1.25 short tons/cubic yard.

Source: ESA

The calculations for Table 4.5-11 assume an average round trip for trucks from Bay Area quarries of 40 miles (20 miles one-way), and also assume a round trip for trucks from the Bay and Delta sand mining offloading facilities of 10 miles, since a portion of the sand mined by Hanson and Jerico is delivered directly by barge to the point of use, or to a facility such as a concrete batch plant immediately adjacent to the off-loading facility. The 10-mile round trip figure was also used for sand brought from British Columbia.

For sand brought from British Columbia, emissions are provided for each phase in the mining and transportation cycle, including ocean transportation. Emissions associated with mining of material in British Columbia are assumed to be the same on a unit basis as Bay Area quarries. Both are based on emission estimates contained in a recently-certified EIR for the San Rafael Rock Quarry in Marin County (Marin County 2009). Ocean transportation emissions are estimated based on emission factors for bulk cargo ships provided by CARB (2008b).

Table 4.5-11 shows that mining sand from the Bay and Delta under the 2014 scenario with regulatory upgrades for the whole year ~~2012 scenario with retrofits for a half year only~~ has much lower emissions of PM_{10} (most of which is from fugitive dust) than Bay Area quarry and import from Canada. Emissions of greenhouse gases (CO_2e) are somewhat lower for sand mined from the Bay and Delta compared to Bay Area land-based quarries, but much lower (less than half) compared to sand imported from British Columbia. With regard to emissions of NO_x, mining sand from the Bay and Delta under the 2014 scenario with regulatory upgrades for the whole year ~~2012 scenario with retrofits for a half year only~~ would result in slightly higher emissions compared with sand from land-based quarries in the Bay Area; however, mining sand from the Bay and Delta would result in substantially lower emissions of NO_x compared to importing sand from British Columbia. ~~When Hanson's proposed marine engine retrofits become operational for the entire year (2013 and beyond), NO_x emissions on a unit basis can be expected to be less than those associated with the Bay Area and British Columbia land-based quarries. Although lifecycle criteria pollutant emissions (NO_x and PM_{10}) associated with importing sand from British Columbia would be expected to be much higher than sand mining from the Bay and Delta, most of these emissions would be generated outside of the Bay Area Air Basin.~~

Table 4.5-12 uses the factors developed in Table 4.5-11 to construct a comparison of lifecycle Project emissions with the No Project Alternative, assuming that the same volume of sand (2,040,000 cy/yr) is brought to market, but none of the sand would come from Bay and Delta sand mining. In the comparative No Project scenario, one half of the sand would come from British Columbia, and one half would come from Bay Area quarries. Table 4.5-12 demonstrates that under the No Project Alternative, lifecycle emissions of NO_x, PM_{10}, and GHG would rise substantially compared to mining sand from the Bay and Delta, assuming that the demand for sand would be met from other sources. The vast majority of emissions presented in Table 4.5-12 for import from Canada would occur outside of the Bay Area Air Basin. Therefore, for a meaningful comparison with the Project, NO_x and PM_{10} emissions associated with the No Project Alternative that would occur within the Bay Area Air Basin have also been estimated. As indicated in Table 4.5-12, NO_x generated in the Bay Area Air Basin under the No Project Alternative would be less than under the Project; however, PM_{10} emissions generated in the Bay Area Air Basin would be substantially higher under the No Project Alternative compared to the Project.

Table 4.5-12. Comparison of Project with No Project Alternative

Emissions Scenario	No Project Alternative Lifecycle Emissions [1]			No Project Alternative – Bay Area Air Basin Emissions [2]	
	NO_x (tons)	PM_{10} (tons)	CO_2e (metric tons)	NO_x (tons)	PM_{10} (tons)
Bay Area Land-Based Quarry	56	53	6,930	56	53
Import from Canada	239	57.5	13,522	--	--
Ocean Transport and Vessel Hoteling	--	--	--	17	6
Total: No Project Alternative	295	110	20,451	73	59
Project as Proposed	117	6	10,316	117	6
Difference: Alternative minus Project	178	104	10,135	-44	+53
Percent Difference	+152%	+1,810%	+98%	-37%	+919%

Note: see Appendix D for all emissions factors and other assumptions used to estimate emissions.
[1] Assumes 50 percent of sand from BC, 50 percent from Bay Area Quarries.
[2] *Assumes 5.4 percent of ocean travel would occur in the SF Air Basin.*

Source: ESA

It is speculative to assume that, under the No Project Alternative, any particular quarry or facility would supply all of the material currently supplied from the Applicants' sand mining operations. Increased operations of land-based quarries, however, may result in greater health risks, since toxic air contaminants emitted by land-based quarries may be more likely to impact residential developments and other sensitive receptors than offshore mining activities and water transportation. Increased health risk effects could be significant and unavoidable.

Long-Term Management Strategy Management Plan Conformance Alternative

This alternative would require proposed sand mining operations to comply with the temporal and spatial restrictions on dredging contained in the *Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region Management Plan 2001* (LTMS Management Plan). The LTMS Management Plan Conformance Alternative would restrict sand mining in the Central Bay lease sites to a five- to six-month period, and in the Suisun Bay and western Delta sites for a three-month period each year.

This alternative would allow for the same volume of sand extraction as in the Project as proposed. Under this alternative more mining would be expected to occur during the allowable work windows, then no mining for the remainder of the year. This could be expected to cause incrementally greater daily air emissions, followed by periods of lower emissions, such that the annual emissions of criteria pollutants, GHGs, and TACs would be about the same as with the Project as proposed. Therefore, implementation of MM AIR-2 would be required to reduce annual GHG emissions to a less-than-significant level. However, if additional equipment is added to the existing fleet in order to achieve higher daily volumes, the periods of more intensive mining activities would be expected to result in higher criteria air pollutant emissions that could exceed daily emission thresholds set by the BAAQMD, resulting in a potentially significant adverse impact. Such impacts could be significant and unavoidable.

Clamshell Dredge Mining Alternative

The Clamshell Dredge Mining Alternative would employ a method other than suction dredge mining for recovering sand from the floor of the Bay-Delta estuary. The volume of sand and lease sites mined would remain the same as for the proposed Project. Because the clamshell method is less efficient than the suction dredging method (typically it takes about five times as long to dredge an equal volume of material, and uses larger diesel engines to operate the crane that controls the clamshell bucket), air emissions associated with active mining would expect to be of longer duration and at a higher rate. Increased emissions of criteria air pollutants, GHGs, and TACs, compared to the proposed Project, would likely be significant and may be unavoidable.

Reduced Project Alternative

The Reduced Project Alternative would reduce the allowable volume of mining to the baseline level, or approximately 1,346,267cy/yr.[1] All other aspects of the Project would remain the same, including mining methods, equipment, and locations.

Table 4.5-13 uses the factors developed in Table 4.5-11 to construct a comparison of lifecycle Project emissions with the Reduced Project Alternative, assuming that the maximum allowed volume of sand would be from the Bay and Delta, and the difference between this volume and the proposed volume (approximately 694,000 cy/yr) would be from land-based quarries in the Bay Area and British Columbia. Table 4.5-13 demonstrates that with each increment of reduced sand mining from the Bay and Delta -- assuming that the demand for sand would be met from other sources -- emissions of NO_x, PM_{10}, and CO_2e rise substantially. NO_x and PM_{10} emissions associated with the Reduced Project Alternative that would occur within the SF Basin have also been estimated. As the data suggest, NO_x generated in the Basin under the Reduced Project Alternative would be less than under the Project; however, PM_{10} emissions generated in the Basin would be substantially higher under the Reduced Project Alternative compared to the Project.

1 This figure does not include the 80,383 cy/yr that was mined from PRC 5871 during the baseline period, as a new lease is not proposed at this parcel.

Table 4.5-13. Comparison of Project with Reduced Project Alternative

Emissions Scenario	Reduced Project Alternative [1]			Reduced Project Alternative - SF Basin Emissions [2]	
	NO_x (tons)	PM10 (tons)	CO_2e (metric tons)	NO_x (tons)	PM10 (tons)
Bay Area Land-Based Quarry (347,000 cy/yr)	19	18	2,358	19	20
Import from Canada (347,000 cy/yr)	81	19.6	4,600	--	--
Ocean Transport and Vessel Hoteling	--	--	--	6	0.2
Sand Mining from the Bay and Delta (1,346,267 cy/yr)	77	4	6,807	77	1
Total: Reduced Project Alternative	178	41	13,764	102	21
Project as Proposed	117	6	10,316	117	6
Difference: Alternative minus Project	+61	+36	3,448	-15	+15
Percent Difference	+52%	+616%	+33%	-13%	+256%

Note: see Appendix D for all emissions factors and other assumptions used to estimate emissions.
[1] Assumes 694,000 cy/yr of sand from BC and Bay Area Quarries, 1,346,267 cy/yr from Bay and Delta.
[2] Assumes 5.4 percent of ocean travel would occur in the SF Air Basin.

Source: ESA

As with the No Project Alternative, it would be speculative to assume that, under the Reduced Project Alternative, any particular quarry or facility would supply all of the material currently supplied from the Applicants' sand mining operations. In general, however, increased production at land-based quarries may lead to higher health risks, since toxic air contaminant emissions from land-based quarries may be more likely to impact residential developments and other sensitive receptors than offshore mining activities and transportation; such effects could be significant and unavoidable.

Because this alternative would limit sand mining in the Bay and Delta to baseline levels, it would not result in an increase in direct emissions of GHGs, and therefore MM AIR-2 would not be necessary. Both GHG emissions and criteria pollutant emissions from other sources would, however, likely be significant, and because the CSLC would not have the authority to mitigate these impacts, ~~from sources beyond its control, these impacts~~ they would remain significant and unavoidable.

4.5.6 Cumulative Projects Impact Analysis

According to the BAAQMD CEQA Guidelines, any proposed project that would individually have a significant air quality impact or would cause city/county growth inconsistent with the applicable Clean Air Plan (CAP) population and vehicle miles traveled (VMT) assumptions would also be considered to have a significant cumulative air quality impact. As discussed above, operation of the proposed Project, with the implementation of MM AIR-2, would not result in any significant impacts to air quality, and would not contribute to climate change. Therefore, the Project, as mitigated, would not contribute to cumulative air quality or climate impacts.

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