4.3 AIR QUALITY

Issues & Supporting Information Sources	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management or pollution control district may be relied upon to make the following determinations. **Would the Project:**				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

4.3.1 Environmental Setting

4.3.1.1 Introduction

The Old River site is located on the boundary between Contra Costa County, which is in the San Francisco Bay Area Air Basin, and San Joaquin County, which is in the San Joaquin Valley Air Basin. These air basins are under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD), respectively. The Connection Slough site is wholly in the San Joaquin Valley Air Basin.

State and federal laws define criteria emissions to include the following: reactive or volatile organic compounds (ROC or VOC), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). During the installation of Project components, the Project would temporarily cause criteria emissions from the combustion of fossil fuels (i.e., diesel, gasoline) used to run construction equipment and vehicles, both onsite and offsite. Installation activities also would cause emissions of fugitive dust, primarily as PM_{10}. During operations, emissions would result primarily from vehicle trips generated by the gate operations and the potential use of diesel-powered generators at each of the Project sites. Because the Project would request that PG&E provide electric power, the generators would be used as back-up source of power. However, it may take some time before PG&E is able to connect the Project facilities to the electric grid, and the generators would be used until this occurred. The generators would be State-certified under the Portable Equipment Registration Program (PERP) or permitted pursuant to SJVAPCD regulations.

The potential for impacts on climate change associated with greenhouse gas emissions is discussed in Section 5.

4.3.1.2 Meteorology

In summer, northwest winds to the west of the Pacific coastline are drawn into the interior through the Golden Gate and over the lower portions of the San Francisco Peninsula. This channeling of the flow through the Golden Gate produces a jet that sweeps eastward but widens downstream producing southwest winds at Berkeley and northwest winds at San Jose; a branch curves eastward through the Carquinez Strait and into the Central Valley. In winter, the Bay Area experiences periods of storminess and moderate-to-strong winds and periods of stagnation with very light winds. Winter stagnation episodes are characterized by outflow from the Central Valley, nighttime drainage flows in coastal valleys, weak onshore flows in the afternoon and otherwise light and variable winds (BAAQMD n.d.). Annual average wind speeds in the central Bay Area are 8.7 miles per hour (mph) or 3.9 meters per second (m/s). Annual average wind speeds in the Stockton area are 7.5 mph or 3.3 m/s. In the Project area, typical wind speed is about 8.1 mph or 3.6 m/s. The Project area climate is characterized by moderately wet winters and dry summers. About 90 percent of the annual total rainfall is received between November and April period. Between June and September, normal rainfall is typically less than 0.1 inch (BAAQMD n.d.). Temperatures in the Project area average about 60 degrees Fahrenheit (°F) annually, with summer highs in the 80s and winter lows in the 40s. Precipitation averages about 18 inches per year, although annual precipitation varies markedly from year to year (CSW 2008).

4.3.1.3 Ambient Air Quality

The BAAQMD and SJVAPCD each operate a regional air monitoring network, together comprising over 50 monitoring stations that collectively measure the ambient concentrations of the six criteria air pollutants described above: O_3, NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$.

Not all monitoring stations are fully instrumented for all the above pollutants. For this assessment, BAAQMD's Bethel Island station data is used as historic and representative since it is located only 4.3 miles northwest (upwind) of the Old River site and monitors all but one pollutant ($PM_{2.5}$), while SJVAPCD's Stockton station is 15 miles east (downwind). Existing and probable future air quality in the Project area can generally be inferred from ambient air quality measurements taken at the Bethel Island site. Table 4.3-1 is a six-year summary of historic monitoring data (2002 to 2007) obtained by the Bethel Island station, except for $PM_{2.5}$. Data on $PM_{2.5}$ are from the BAAQMD's Concord monitoring station (BAAQMD 2008).

During the period from 2002 to 2007, there were no daily violations of state or federal ambient air quality standards for nitrogen dioxide, sulfur dioxide, or carbon monoxide recorded at the Bethel Island station (BAAQMD 2008); however, there were exceedences of ozone, PM_{10} and $PM_{2.5}$ standards. Table 4.3-2 shows the incidence of daily violations of ambient ozone, PM_{10} and $PM_{2.5}$ standards for the six-year period.

Table 4.3-1 Ambient Air Quality Summary for Bethel Island 2002 to 2007, Maximums

Pollutant	Period	Units	2007	2006	2005	2004	2003	2002
Ozone (O_3)	1-hour max	ppmv	0.093	0.116	0.089	0.100	0.090	0.110
	8-hour max	ppmv	0.078	0.090	0.077	0.080	0.080	0.100
	3-year avg	ppmv	0.073	0.073	0.072	0.075	0.079	0.079
Nitrogen Dioxide (NO_2)	1-hour max	ppmv	0.048	0.044	0.038	0.030	0.050	0.040
	Annual avg	ppmv	0.008	0.008	0.007	0.008	0.009	0.010
Sulfur Dioxide (SO_2)	24-hour max	ppmv	0.005	0.007	0.006	0.006	0.006	0.009
	Annual avg	ppmv	0.002	0.002	0.002	0.002	0.002	0.003
Carbon Monoxide (CO)	1-hour max	ppmv	1.1	1.3	1.1	1.2	1.6	1.7
	8-hour max	ppmv	0.8	1.0	0.9	0.9	0.9	1.3
Particulates (as PM_{10})	24-hour max	µg/m^3	49.0	84.0	64.0	42.0	51.0	58.0
	Annual avg	µg/m^3	18.8	19.4	18.5	19.5	19.4	23.8
Particulates (as $PM_{2.5}$)	24-hour max	µg/m^3	46.2	62.1	48.9	74.0	50.0	77.0
	Annual avg	µg/m^3	8.4	9.3	9.0	10.7	9.7	13.3

Source: BAAQMD 2008

Notes:

Bethel Island, Concord for PM2.5
ppmv = parts per million by volume
µg/m3 = micrograms per cubic meter

Table 4.3-2 Ozone, PM_{10} and $PM_{2.5}$ Standard Violation Days for Bethel Island, 2002 to 2007

Pollutant	Standard	Total	2007	2006	2005	2004	2003	2002
Ozone (O_3)	Federal	4	0	1	0	0	0	3
	California	21	4	14	2	1	0	0
Particulates (as PM_{10})	Federal	0	0	0	0	0	0	0
	California	6	0	1	1	0	1	3
Particulates (as $PM_{2.5}$)	Federal	17	7	5	0	1	0	4
	California	0	0	0	0	0	0	0

Source: BAAQMD 2008

4.3.1.4 Sensitive Receptors

Certain population groups are considered more sensitive to air pollution and odors than others, particularly children, elderly, and acutely ill and chronically ill persons, especially those with cardio-respiratory diseases such as asthma and bronchitis. Sensitive receptors (land uses) indicate locations where such individuals are typically found; e.g., schools, daycare centers, hospitals, convalescent homes, residences of sensitive persons, and parks with active recreational uses, such as youth sports.

Persons engaged in strenuous work or physical exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their

residences, resulting in greater exposure to ambient air quality conditions. Recreational uses such as parks are also considered sensitive due to the greater exposure to ambient air quality conditions and because the presence of pollution detracts from the recreational experience.

The Project sites are located in a sparsely populated rural (agricultural) area. The nearest house is approximately 600 feet (183 meters) south of the Old River site; however, it is unoccupied. The next nearest receptor is a marina with live-aboard boat owners approximately 0.8 mile south of the Old River site. It is not known whether the marina, which is outside the immediate vicinity of the Old River site (defined as 1,000 feet or 305 meters), houses potentially sensitive persons.

4.3.2 Regulatory Setting

4.3.2.1 State and National Ambient Air Quality Standards

The Clean Air Act of 1970 (CAA), (as amended 1977 and 1990, 42 USC 7401 et seq.) established national ambient air quality standards (NAAQS) and delegates the enforcement of these standards to the states. In California, the California Air Resources Board (CARB) is responsible for enforcing air pollution regulations. The CARB has in turn delegated the responsibility of regulating stationary emission sources to local air agencies (i.e., BAAQMD and SJVAPCD). In areas that exceed the NAAQS, the CAA requires preparation of a State Implementation Plan (SIP), detailing how the states will attain the standards within mandated time frames. As shown in Table 4.3-3, California ambient air quality standards (CAAQS) tend to be at least as protective as national standards and are often more stringent.

Air districts in California are required to monitor air pollutant levels to assure that NAAQS and CAAQS are met and, in the event that they are not, to develop strategies to meet these standards. Depending on whether the standards are met or exceeded, the local air basin is classified as being in "attainment" or "non-attainment."

The air pollutants of most concern in California are ozone and particulate matter. The San Francisco Bay Area Air Basin (including Contra Cost County) and the San Joaquin Valley Air Basin (including San Joaquin County) are in NAAQS attainment except for the following federal standards shown in Table 4.3-3:

- 8-hour ozone – Non-attainment for both the San Francisco and San Joaquin Valley Air Basins (CARB 2006b).
- 24-hour PM_{10} – Unclassified for the San Francisco Bay Area Air Basin (CARB 2009).
- 24-hour $PM_{2.5}$ – Non-attainment for San Joaquin Valley Air Basin (San Francisco Bay Area Air Basin - Unclassified) (CARB 2006c).
- The San Francisco Bay Area Air Basin is a "Marginal" area for federal 8-hour ozone and originally had to attain the now revoked federal 1-hour ozone standard by 1999.
- The San Joaquin Valley Air Basin is presently a "Serious" and a pending "Severe 17" area for federal 8-hour ozone and nevertheless plans to attain the now revoked federal 1-hour ozone standard by 2010 (see below).

On April 30, 2007, the Governing Board of the SJVAPCD voted to request the U.S. Environmental Protection Agency (EPA) to reclassify the San Joaquin Valley Air Basin as "extreme" (now referred to as "severe 17") non-attainment for the federal 8-hour ozone standards. The CARB, on June 14, 2007, approved this request. This request must be forwarded to EPA by the CARB and would become effective upon EPA final rulemaking after a notice and comment process; it is not yet in effect (SJVAPCD 2007).

Effective June 15, 2005, the EPA revoked in the federal 1-hour ozone standard, including associated designations and classifications. However, EPA had previously classified the SJVAB as extreme nonattainment for this standard. Many applicable requirements for extreme 1-hour ozone nonattainment areas continue to apply to the SJVAB (SJVAPCD 2005).

Table 4.3-3 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		Federal Standards	
		ppmv	µg/m³	ppmv	µg/m³
Ozone (O_3)	1-hour	0.09	177	--	--
	8-hour	0.07	137	0.075	147
Nitrogen Dioxide (NO_2)	1-hour	0.18	338	--	--
	Annual	0.03	56	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	655	--	--
	3-hour (secondary)	--	--	0.50	1,309
	24-hour	0.04	105	0.14	367
	Annual	--	--	0.03	79
Carbon Monoxide (CO)	1-hour	20	22,898	35	40,071
	8-hour	9	10,304	9	10,304
	Lake Tahoe (8-hour)	6	6,869	--	--
Particulates (as PM_{10})	24-hour	--	50	--	150
	Annual	--	20	--	--
Particulates (as $PM_{2.5}$)	24-hour	--	--	--	35
	Annual	--	12	--	15
Lead (Pb)	30-day	--	1.5	--	--
	90-day	--	--	--	1.5
Sulfates (as SO_4)	24-hour	--	25	none	none
Hydrogen Sulfide (H_2S)	1-hour	0.03	42	none	none
Vinyl Chloride (C_2H_3Cl)	24-hour	0.01	26	none	none
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.		none	None

Source: CARB 2008

Notes:
Standard Temperature = 25 degrees Celsius
Standard Molar Volume = 24.465 liter/g-mole
For gases, µg/m3 calculated from ppmv based on molecular weight and standard conditions
ppmv = parts per million by volume
µg/m3 = micrograms per cubic meter

The San Francisco Bay Area and San Joaquin Valley Air Basins are in CAAQS attainment except for the following state standards shown in Table 4.3-3 (BAAQMD 2008, SJVAPCD 2008):

- 8-hour ozone – Non-attainment
- 1-hour ozone – Non-attainment
- Annual PM_{10} – Non-attainment
- 24-hour PM_{10} – Non-attainment
- Annual $PM_{2.5}$ – Non-attainment
- 1-hour hydrogen sulfide - Unclassified
- 8-hour visibility reducing particles – Unclassified

Similar to the federal CAA, the California CAA also classifies areas according to pollution levels. Under the California CAA, the San Francisco Bay Area Air Basin is a "serious" state ozone non-attainment area and a state PM_{10} and $PM_{2.5}$ non-attainment area. The San Joaquin Valley Air Basin is presently a "severe" state ozone non-attainment area, in addition to being a state PM_{10} and $PM_{2.5}$ non-attainment area.

4.3.2.2 Regional Plans

For the San Francisco Bay Area Air Basin, the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC), and BAAQMD jointly prepare the Bay Area Clean Air Plan and Ozone Attainment Plan (BAAQMD 2000, 2001).

For the San Joaquin Valley Air Basin, the Extreme Ozone Attainment Demonstration Plan is prepared by the SJVAPCD, in conjunction with the CARB, the EPA, and the eight regional Transportation Planning Agencies (SJVAPCD 2005).

These plans contain control strategies that demonstrate attainment with the national ambient air quality standards by the deadlines established in the CAA.

4.3.2.3 Air Toxics Control Measures

On July 26, 2007, the CARB adopted a regulation to reduce diesel particulate matter and nitrogen oxide emissions from in use (existing) off-road heavy-duty diesel vehicles in California. The regulation will require fleet owners to accelerate turnover to cleaner engines and install exhaust retrofits.

4.3.2.4 Senate Bill 656

Senate Bill (SB) 656 is a planning requirement that calls for a plan and strategy for reducing $PM_{2.5}$ and PM_{10}. This bill requires the CARB to identify, develop, and adopt a list of control measures to reduce the emissions of $PM_{2.5}$ and PM_{10} from new and existing stationary, mobile, and area sources. The BAAQMD and SJVAPCD have developed particulate matter control measures and submitted plans to the CARB that include lists of measures to reduce particulate matter. Under the plans, the Districts are required to continue to assess $PM_{2.5}$ and PM_{10} emissions and their impacts. For construction emissions of fugitive PM_{10}, the Districts have adopted a number of feasible control measures that can be reasonably implemented to significantly reduce

fugitive PM_{10} emissions from construction. In general, the Districts' approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions.

4.3.2.5 Toxic Air Contaminants

A project with the potential to expose sensitive receptors (including residential areas) or the general public to substantial levels of toxic air contaminants, as designated by the CARB under 17 CCR Section 93001, listed in the BAAQMD 2003 Annual Report Appendix A: Toxic Air Contaminants (BAAQMD 2003), and similarly, in the SJVAPCD 2006 Annual Report on the District's Toxics Program (SJVAPCD 2006), would be deemed to have a significant impact. This includes projects that would locate receptors near existing sources of toxic air contaminants, as well as projects that would place sources of toxic air contaminants near existing receptors.

Proposed projects that have the potential to expose the public to toxic air contaminants in excess of the following thresholds would be considered to have a significant air quality impact. These thresholds, which are based on the BAAQMD's (2002) Risk Management Policy for Diesel-Fueled Engines and SJVAPCD (2002) Assessment Guidance, are as follows:

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds ten in one million. The MEI is a hypothetical person exposed for 70 years continuously (24 hours per day, 365 days per year).
- Ground-level concentrations of non-carcinogenic toxic air contaminants would result in a Hazard Index greater than one for the MEI.

Diesel particulate matter is considered a toxic air contaminant in California (BAAQMD 2003, SJVAPCD 2006). The impact assessment includes a screening-level Health Risk Assessment for diesel particulate matter impacts on sensitive receptors from construction equipment.

4.3.2.6 General Conformity

Section 176(c) of the CAA contains the General Conformity Rule (40 CFR 51.850-860 and 40 CFR 93.150-160). The General Conformity Rule requires that a federal agency responsible for a proposed action (e.g., the 2-Gates Project) in a NAAQS non-attainment or maintenance area endeavor to ensure that the proposed action conforms to the applicable state implementation plan (SIP). This means that federally supported or funded activities shall not: 1) cause or contribute to any new air quality standard violation, 2) increase the frequency or severity of any existing standard violation, or 3) delay the timely attainment of any standard, interim emission reduction, or other milestone. Emissions of attainment pollutants are exempt from the General Conformity Rule. A federal action would comply with an applicable SIP if it does not exceed identified annual emission de minimis thresholds, the magnitudes of which are based on the severity of the non-attainment rating of the Project region. Actions that exceed these thresholds are required to conduct in depth conformity determinations.

Contra Costa and San Joaquin counties are in federal and state non-attainment for ozone, PM_{10}, and $PM_{2.5}$. Thus, the emissions of non-attainment pollutants NO_X, ROC, PM_{10}, and $PM_{2.5}$ would be subject to the General Conformity Rule. As discussed below under Impacts and Mitigation

Measures, Project emissions would be below BAAQMD and SJVAPCD annual significance thresholds for non-attainment pollutants; thus, the de minimis requirement is satisfied.

4.3.3 Impacts and Mitigation Measures

4.3.3.1 No Project

No air quality impacts would result from the No Project alternative because no construction would occur.

4.3.3.2 2-Gates Project

The only source of direct emissions during operation of the Project would be associated with vehicle trips required during infrequent periodic inspections and maintenance activities, personal vehicle trips by the gate operators when the gates are being operated, and the temporary use of portable generators at each of the Project sites until power could be obtained from PG&E. Emissions from these sources would be minor and intermittent and would not result in permanent air quality impacts, nor would they require permits from the BAAQMD or the SJVAPCD. Any impacts from operations would be negligible and less than significant. The impact assessment focuses on the emissions that would occur as a result of Project construction activities because these are the main source of emissions.

Methodology

Project construction emissions fall into three general categories: 1) onsite use of diesel-powered construction equipment, 2) onsite controlled (mitigated) fugitive dust generation from demolition and earthmoving activities, and 3) offsite vehicle traffic comprising project-related trucking and project worker commuting. Construction-related emissions are generally short-term in duration, but may still cause localized adverse air quality impacts. Specific to this type of project, dredging and pile driving equipment would be permitted pursuant to SJVAPCD regulations.

The analysis of the Project's air quality impacts is based on equipment specifications and planning estimates for the construction (installation) phase of the Project as listed in Tables 4.3-4 and 4.3-5, respectively. A detailed air impact analysis associated with the complete removal of all Project components at the end of the demonstration project is not included because emissions would be less than those required for installation.

Table 4.3-4 Construction Estimated Equipment List

Equipment Type	Manufacturers Model	Quantity	Horsepower
Off Road Construction (onsite)			
Loader	CAT 966G	2	233
Forklift	CAT TH83	2	109
Excavator	CAT 330	2	268
On Road Vehicles (offsite)			
Grove Boom Truck RT 522	RT 522	1	150
Flat Bed Truck	Chevy	1	250

Table 4.3-4 Construction Estimated Equipment List

Equipment Type	Manufacturers Model	Quantity	Horsepower
Pick Up Truck	Chevy/Silverado	4	200
Fuel/Service Truck	Kenworth	1	225
Water Truck (3600 gallons)	Kenworth	1	400
Marine Vessels and Equipment (onsite)			
DB 24 (with Amclyde 28 crane)	CAT 3412	1	525
CB 8 (with Bucyrus-Erie 88B crane)	Cummins V1710	1	365
CB Doolittle (with Bucyrus-Erie 65D crane)	Cummins 855	1	280
Workboat	John Deer 400	3	600
Tugboat "Sarah Reed"	Cummins KTA38	2	1700
Dump Scow 5	CAT 3208	2	210
Flat Deck Material Barge	N/A	6	
Vibratory Hammer	APE 200/CAT C16	1	630
Generator 25KW	Rental	4	35

Source: Dutra Group 2008 (see Appendix G)

Table 4.3-5 Construction Planning Estimate

	Schedule			
Project Pile Activity	hours/day	days/week	months	hours
Dredging	24	7	0.2	146
Rock Placement	10	7	1.1	334
Pile Driving	10	7	2.1	637
Vessels Tending (concurrent)	12	7	2.4	874

Source: Dutra Group 2008 (see Appendix G)

Onsite Combustion Emissions. Table 4.3-6 shows estimated maximum fuel consumption for the Project based on equipment specifications and planning estimates for the construction activity provided by the contractor, assuming a brake specific fuel consumption (BSFC) of 0.051 gallons per brake horsepower-hour (BHP-hr) (AP-42, Table 3.3-1) (EPA 2006). If actual fuel consumption is lower, there would be correspondingly lower emissions. California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment to minimize sulfur dioxide and particulate emissions.

Table 4.3-6 Estimated Maximum Fuel Consumption for Project

Project Activity	Hourly gal/hr	Daily gal/day	Project gallons
Off Road Construction	20	160	3,900
On Road Vehicles	20	120	3,900
Marine Vessels and Equipment	100	1,460	57,900
Maximum Rates	110	1,160	65,700

Source: Dutra Group 2008 (see Appendix G)

Notes:
BSFC = (7,000 BTU/BHP-hr) / (137,030 BTU/gal) = 0.051 gal/BHP-hr
AP-42 Table 3.3-1 (EPA 2006)

Construction combustion emissions were estimated using the emission factors given in Table 4.3-7 for diesel nonroad equipment. For calculating emissions, EPA Tiered emission factors (40 CFR 89.112 & 13 CCR 2423) in grams per BHP-hr were converted to pounds per thousand gallons (mgal) burned, assuming a diesel default heat rate of 7,000 British thermal units (BTU) per BHP-hr and a higher heating value of 137,030 BTU per gallon (AP-42, Table 3.3-1) (EPA 2006). Average engine age (Tier) was estimated based on Annex 3, Table A-101 and Table A-84, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007 (EPA 2009). The age analysis yielded an estimated distribution of 31 percent Tier 3, 28 percent Tier 2, 19 percent Tier 1, and 22 percent Uncontrolled for 2010. The use of newer, less polluting Tier 1, 2, and 3 engines in the majority of construction equipment used onsite is a mitigating factor for combustion emissions of NO_X, ROC, CO, PM_{10}, and $PM_{2.5}$.

Onsite Fugitive Dust Emissions. PM_{10} in the form of fugitive dust is the pollutant of greatest concern with respect to construction activities. Fugitive PM_{10} emissions can result from a variety of construction activities, including excavation, grading, demolition, vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust. Construction-related emissions can cause substantial increases in localized concentrations of PM_{10}. Particulate emissions from construction activities can lead to adverse health effects as well as nuisance concerns such as reduced visibility and soiling of exposed surfaces.

Table 4.3-7 Tiered Nonroad Diesel Emission Factors, Pounds per 1000 Gallons

Emittent	Precontrol lb/mgal	Tier 1 (96) lb/mgal	Tier 2 (01) lb/mgal	Tier 3 (06) lb/mgal	Composite lb/mgal
Oxides of Nitrogen (as NO_2)	604.2	297.8	181.3	112.2	276.2
Hydrocarbons (ROC as CH_4)	47.5	43.2	25.9	17.3	30.2
Carbon Monoxide (CO)	129.5	366.8	112.2	112.2	164.0
Particulates (as PM_{10})	43.2	17.3	6.5	6.5	17.3
Sulfur Dioxide (SO_2)	0.2	0.2	0.2	0.2	0.2
Carbon Dioxide (GHG - CO_2)	22,485	22,485	22,485	22,485	22,485
Nitrous Oxide (GHG - N_2O)	0.6	0.6	0.6	0.6	0.6

Table 4.3-7 Tiered Nonroad Diesel Emission Factors, Pounds per 1000 Gallons

Emittent	Precontrol lb/mgal	Tier 1 (96) lb/mgal	Tier 2 (01) lb/mgal	Tier 3 (06) lb/mgal	Composite lb/mgal
Methane (GHG - CH_4)	1.3	1.3	1.3	1.3	1.3

Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007, EPA 2009; 40 CFR 89.112; 13 CCR 2423

Notes:
Nonroad Tier 1, 2, 3 per 40 CFR 89.112 & 13 CCR 2423
Precontrol NO_X, ROC, CO, PM_{10} per AP-42 Table 3.3-1
2010 engine age profile estimation based on Annex 3, Table A-101, Table A-84, US GHG Inventory
22% Precontrol (uncontrolled)
19% Tier 1
28% Tier 2
31% Tier 3
Default heat rate = 7,000 BTU/BHP-hr (AP-42 Table 3.3-1)
Diesel = 19,300 BTU/lb, 7.1 lb/gal (AP-42 Table 3.3-1)

Construction areas on Bacon Island, the Holland Tract, and Connection Slough would comprise 4.13, 4.13, and 2.75 acres, respectively, for a total of 11.02 acres. These areas were used to estimate fugitive dust emissions using the BAAQMD and SJVAPCD protocol described below.

Construction emissions of fugitive PM_{10} can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors. Despite this variability in emissions, experience has shown that there are a number of feasible control measures that can be reasonably implemented to significantly reduce fugitive PM_{10} emissions from construction. The Districts' approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions.

For land disturbance, fugitive dust (as PM_{10}) was estimated as 51 pounds per acre per day unmitigated (uncontrolled) as specified in the BAAQMD CEQA Guidelines (BAAQMD 1999), consistent with SJVAPCD Assessment Guidelines (SJVAPCD 2002), Section 3.3; AP-42 Chapter 13.2.3 "Heavy Construction Operations"; and AP-42 Chapter 13.2.2 "Unpaved Roads," Figure 13.2.2-2 (EPA 2006). For the BAAQMD and SJVAPCD control measures listed in Section 4.3.3.3 below, an equivalent soil to moisture ratio of 5:1 was assumed for all feasible measures, which reduces fugitive dust emissions by 95 percent from uncontrolled levels.

Offsite Vehicle Emissions. A relatively small source of emissions compared to onsite equipment, offsite vehicle emissions consist of worker commute trips in light-duty vehicles (passenger cars and light trucks) to and from the Project sites, and heavy-duty truck emissions generally associated with hauling away debris and transporting materials and equipment to the site. Commuter trip estimates were developed using the generalized emissions estimation methodology given in the BAAQMD (1999) CEQA Guidelines Section 3.4, Tables 10 and 11. Similarly, heavy-duty truck trip estimates were developed and translated into emissions utilizing CARB's EMFAC 2007 computer program (i.e., determination of emission factors).

Dispersion Modeling. For onsite emissions, EPA's SCREEN Version 96043 (EPA 1992) was used to model the Gaussian dispersion of emissions to obtain ambient impacts. For combustion emissions from construction equipment, a single equivalent point source (stack) was modeled to

yield maximum potential downwind impact from the construction site, which is highly conservative and thus tends to overestimate impacts. Fugitive dust emissions were modeled as an equilateral area source with zero release height, which is also conservative and thus tends to overestimate impacts. For screening dispersion modeling, the annual average wind speed of 3.6 m/s (NOAA 2008) was assumed for neutral Stability Class D.

Appendix G, Air Quality Calculations, includes detailed calculation and modeling templates.

4.3.3.3 Impact Assessment

a. Conflict with or obstruct implementation of the applicable air quality plan

Less than Significant. The Project would not conflict with or obstruct any air quality plans of the BAAQMD or SJVAPCD (specifically, the BAAQMD Clean Air Plan and Ozone Attainment Plan [BAAQMD 2000] and the SJVAPCD Extreme Ozone Attainment Demonstration Plan [SJVAPCD 2005]) because general construction-related emissions (i.e., temporary sources) are accounted for in the emission inventories included in the plans, and each district requires the implementation of standard dust suppression measures. Therefore, the Project would not prevent attainment or maintenance of the ozone, particulate matter, and carbon monoxide standards within the Bay Area or San Joaquin Valley.

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation

Less than Significant. The Project would generate PM_{10} and $PM_{2.5}$, primarily through fugitive dust (PM_{10}) emissions during construction activities, and from PM_{10} and $PM_{2.5}$ emissions from diesel-powered construction equipment. The BAAQMD and SJVAPCD significance criteria for ozone precursors (NO_X and ROC) and PM_{10} emitted from Project activities are shown in Tables 4.3-8 and 4.3-9, respectively. For CO emissions, significance is defined as causing a violation of the state standard for CO of 9 ppm averaged over 8 hours or 20 ppm for 1 hour (BAAQMD 1999, SJVAPCD 2002).

Table 4.3-8 BAAQMD Thresholds of Significance

	Total Project	
Significance Criteria	**tons/year**	**lbs/day**
Oxides of Nitrogen (as NO_2)	15	80
Hydrocarbons (ROC as CH_4)	15	80
Particulates (as PM_{10})	15	80
Carbon Monoxide (CO)	Violation of CAAQS for CO	

Source: BAAQMD CEQA Guidelines, Table 3 (BAAQMD 1999)

Table 4.3-9 SJVAPCD Thresholds of Significance		
	Total Project	
Significance Criteria	tons/year	lbs/day
Oxides of Nitrogen (as NO_2)	10	n/a
Hydrocarbons (ROC as CH_4)	10	n/a
Carbon Monoxide (CO)	Violation of CAAQS for CO	
Source: Guide for Assessing and Mitigating Air Quality Impacts, Table 4-1 (SJVAPCD 2002)		

A preliminary screening impact analysis was performed, estimating the controlled[1] onsite, offsite, and total emissions from construction activities. The results are summarized in Tables 4.3-10, 4.3-11, and 4.3-12, respectively.

Table 4.3-10 Estimated Onsite Construction Criteria Emissions, Controlled			
Project Emissions	tons	lbs/day	lbs/hour
Oxides of Nitrogen (as NO_2)	9.08	319.29	30.38
Hydrocarbons (ROC as CH_4)	0.99	34.91	3.32
Carbon Monoxide (CO)	5.39	189.58	18.04
Particulates (as PM_{10})	0.57	20.00	1.90
Sulfur Dioxide (SO_2)	0.01	0.23	0.02
Diesel Particulate Matter (DPM)	0.57	20.00	1.90
Fugitive Dust (as PM_{10})	1.43	28.10	2.81

[1] Controlled" means implementation of BAAQMD and/or SJVAPCD required emissions control measures. These measures are in Section 4.3.3.3.

Table 4.3-11 Estimated Offsite Construction Criteria Emissions, Controlled

Project Emissions	tons	lbs/day	lbs/hour
Oxides of Nitrogen (as NO_2)	0.47	9.23	2.33
Hydrocarbons (ROC as CH_4)	0.07	1.32	0.35
Carbon Monoxide (CO)	1.09	21.43	5.64
Particulates (as PM_{10})	0.13	2.48	0.62
Sulfur Dioxide (SO_2)	0.009	0.173	0.043
Diesel Particulate Matter (DPM)	0.0078	0.1533	0.0383
Fugitive Dust (as PM_{10})	3.33	65.38	16.34

Table 4.3-12 Estimated Total Construction Criteria Emissions, Controlled

Project Emissions	tons	lb/day	lb/hr
Oxides of Nitrogen (as NO_2)	9.55	328.52	32.71
Hydrocarbons (ROC as CH_4)	1.06	36.23	3.67
Carbon Monoxide (CO)	6.48	211.02	23.68
Particulates (as PM_{10})	0.69	22.48	2.52
Sulfur Dioxide (SO_2)	0.02	0.40	0.07
Diesel Particulate Matter (DPM)	0.58	20.15	1.94
Fugitive Dust (as PM_{10})	4.77	93.48	19.15

Although no SJVAPCD significance thresholds would be exceeded, daily emissions of NO_X and combined daily emissions of PM_{10} are over the BAAQMD levels of significance. Since Contra Costa and San Joaquin counties are in non-attainment for PM_{10} and $PM_{2.5}$, screening dispersion modeling was performed to determine whether state or federal ambient air quality standards would be exceeded solely due to Project activities against historic maximum background levels. The screening air quality impacts are shown in Table 4.3-13. A screening risk evaluation for diesel particulate matter for the construction period is shown in Table 4.3-14.

The results of the screening analysis for criteria pollutants show that no exceedance of ambient air quality standards in the Project vicinity would result solely from Project activities. Notwithstanding Project- generated impacts, maximum background levels of particulate matter (PM_{10}, $PM_{2.5}$) already exceed state or federal standards as applicable in the Project vicinity. Therefore, the Project would contribute to these existing exceedences. The BAAQMD and SJVAPCD developed the following emission control measures for construction emissions that, when implemented, would prevent significant impacts.

Table 4.3-13 Estimated Construction Criteria Maximum Impacts, Controlled

Criteria Pollutant	Averaging Period	Modeled µg/m³	Back-ground µg/m³	Total µg/m3	California Standard		Federal Standard	
					µg/m³	Status	µg/m³	Status
Nitrogen Dioxide (NO_2)	1-hour max	6.3	94	100	338	Under	---	Under
	Annual avg	0.1	19	19	56	Under	100	Under
Sulfur Dioxide (SO_2)	1-hour max	0.0	59	59	655	Under	---	Under
	3-hour	0.0	53	53	---	Under	1309	Under
	24-hour	0.0	24	24	105	Under	367	Under
	Annual avg	0.0	7	7	---	Under	79	Under
Carbon Monoxide (CO)	1-hour max	23.3	1,946	1,969	22,898	Under	40,071	Under
	8-hour	16.3	1,488	1,504	10,304	Under	10,304	Under
Particulates (as PM_{10})	24-hour	0.49	84.0	84.5	50	Exceed	150	Under
	Annual avg	0.05	23.8	23.9	20	Exceed	---	Under
Particulates (as $PM_{2.5}$)	24-hour	0.49	77.0	77.5	---	Under	35	Exceed
	Annual avg	0.05	13.3	13.4	12	Exceed	15	Under
Fugitive Dust (as PM_{10})	24-hour	17.79	84.0	101.8	50	Exceed	150	Under
	Annual avg	1.99	23.8	25.8	20	Exceed	---	Under

Source: BAAQMD 2008

Notes:
Background reference is Bethel Island 2002 to 2007 (Concord for $PM_{2.5}$)
Combustion emissions maximum impact at 1000 m (3281 ft), point or volume source.
Fugitive dust maximum impact at 158 m (518 ft), area source.
µg/m³ = micrograms per cubic meter

Table 4.3-14 Diesel Particulate Matter Screening Health Risk Assessment

Pollutant	Annual µg/m³	URV $(µg/m^3)^{-1}$	Activity days	Annual MEI Correction	Cancer Risk
Diesel Particulate Matter (DPM)	0.05	3.00E-04	102	0.0040	5.5E-08

Source: California EPA, Office of Environmental Health Hazard Assessment 2005

Notes:
µg/m³ = micrograms per cubic meter
URV = Unit Reference Value

Diesel Emissions Control Measures

The following requirements would be incorporated into contract specifications:

- To minimize potential diesel odor impacts on nearby receptors (pursuant to BAAQMD Regulation 1, Rule 301, and SJVAPCD Regulation IV, Rule 4102, Nuisance), construction equipment will be properly tuned. A schedule of tune-ups will be developed and performed for all equipment operating within the Project area. A log of required tune-ups will be maintained and a copy of the log will be submitted to the Project Environmental Compliance Officer (ECO) for review every 2,000 service hours.

- Fixed temporary sources of air emissions (such as portable pumps, compressors, generators, etc.) will be electrically powered unless the contractor submits documentation and receives approval from ECO that the use of such equipment is not practical, feasible, or available (generally contingent upon power line proximity, capacity, and accessibility). California ultra-low sulfur diesel fuel with maximum sulfur content of 15 ppm by weight, or an approved alternative fuel, will be used for onsite fixed equipment not using line power.
- To minimize diesel emission impacts, construction contracts will require off-road compression ignition equipment operators to reduce unnecessary idling with a two-minute time limit.
- On-road and off-road material hauling vehicles will shut off engines while queuing for loading and unloading for time periods longer that two minutes.
- Off-road diesel equipment will be fitted with verified diesel emission control systems (e.g., diesel oxidation catalysts) to the extent reasonably and economically feasible.
- Utilize alternative fuel equipment (i.e., compressed or liquefied natural gas, biodiesel, electric) to the extent reasonably and economically feasible.

Construction emissions of fugitive PM_{10} can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors. Despite this variability in emissions, experience has shown that there are a number of feasible control measures that can be reasonably implemented to significantly reduce fugitive PM_{10} emissions from construction. The Districts' approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions.

Dust Control Measures

To control emissions of particulate matter, the Project would implement the following fugitive dust and particulate matter emissions control measures suggested by the BAAQMD CEQA and SJVAPCD Assessment Guidelines as applicable (BAAQMD 1999, SJVAPCD 2002). The following controls would be implemented at the construction and staging sites as applicable.

- Water all active construction areas at least twice daily as necessary and indicated by soil and air conditions.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

- All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, will be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.
- All on-site unpaved roads and off-site unpaved access roads will be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut & fill, and demolition activities will be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.
- When materials are transported off-site, all material will be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container will be maintained.
- All operations will limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.
- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles will be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

The estimated effectiveness of these control measures is quantified in Table 4.3-15.

Table 4.3-15 Estimated Fugitive Dust Emissions from Construction

Location	Area acres	Schedule days	Control percent	Uncontrolled		Controlled	
				lbs/day	lbs/year	lbs/day	lbs/year
Bacon Island	4.13	102	95%	211	21,496	11	1,075
Holland Tract	4.13	102	95%	211	21,496	11	1,075
Connection Slough	2.75	102	95%	140	14,331	7	717
Totals	11.02			562	57,322	28	2,866

Source: Fugitive dust (as PM_{10}) 51 lb/acre-day unmitigated, BAAQMD (1999) CEQA Guidelines, Section 3.3; BAAQMD Ref: AP-42 Chapter 13.2.3 "Heavy Construction Operations"; Mitigation Ref: AP-42 Chapter 13.2.2 "Unpaved Roads", Figure 13.2.2-2 (EPA 2006)

Notes:
Soil moisture ratio = 5 (for all feasible mitigation measures)

Diesel Particulate Matter Emissions Control Measures

The following measures would be implemented to reduce particulate matter emissions from diesel exhaust:

- Grid power will be used instead of diesel generators where it is feasible to connect to grid power (generally contingent upon power line proximity, capacity, and accessibility).
- The Project specifications will include 13 CCR Sections 2480 and 2485, which limit the idling of all diesel-fueled commercial vehicles (weighing over 10,000 pounds, both

California- or non California-based trucks) to 30 seconds at a school or five minutes at any location. In addition, the use of diesel auxiliary power systems and main engines will be limited to five minutes when within 100 feet of homes or schools while the driver is resting.

- The Project specifications will include 17 CCR Section 93115, Airborne Toxic Control Measure for Stationary Compression Ignition Engines, which specifies fuel and fuel additive requirements; emission standards for operation of any stationary, diesel-fueled, compression-ignition engines; and operation restrictions within 500 feet of school grounds when school is in session.
- A schedule of low-emissions tune-ups will be developed and such tune-ups will be performed on all equipment, particularly for haul and delivery trucks.
- Low-sulfur (maximum sulfur content of 15 ppm by weight) fuels will be used in all stationary and mobile equipment.

c. Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)

Less than Significant. The Project would result in an incremental contribution to a cumulative effect for several criteria pollutants for which the San Francisco Bay Area and San Joaquin Valley Air Basins are in non-attainment under an applicable federal or state ambient air quality standard. However, that impact would not be cumulatively considerable. As shown in Table 4.3-8, the significance criteria in the BAAQMD (1999) CEQA Guidelines for Project operations are 80 pounds per day oxides of nitrogen, hydrocarbons, or particulate matter as PM_{10} or 15 tons per year oxides of nitrogen, hydrocarbons, or PM_{10}. Similarly, as shown in Table 4.3-9, the significance criteria in the SJVAPCD (2002) Assessment Guidelines for Project operations are 10 tons per year oxides of nitrogen or hydrocarbons with no daily significance thresholds defined. As shown in Table 4.3-12, total NO_X construction emissions for the Project are estimated to be approximately 9.3 tons, total ROC emissions about 1.0 ton, and total PM_{10} emissions about 3.1 tons. All of these quantities are below the long-term annual significance thresholds of both Districts; only NO_X and PM_{10} exceed the short-term daily significance thresholds of the BAAQMD.

The San Francisco Bay Area and San Joaquin Valley Air Basins are in non-attainment of state and federal ozone, PM_{10}, and $PM_{2.5}$ standards for several different averaging times. As detailed in (b) above, the onsite operation of heavy equipment during construction would generate combustion emissions and fugitive dust emissions, resulting in a short-term incremental impact. Also detailed in (b), offsite vehicle emissions (trucks and worker vehicles) would also contribute to a short-term incremental impact in the region.

These incremental impacts were previously determined to be less than significant because the Project would implement the applicable fugitive dust and particulate matter emissions control measures contained in the BAAQMD (1999) CEQA Guidelines and listed under (b). The use of newer, less polluting Tier 1, 2, and 3 engines in the majority of construction equipment used onsite is a measure for reducing combustion emissions of NO_X, ROC, CO, PM_{10}, and $PM_{2.5}$. Although not a mitigation measure per se, California ultra-low sulfur diesel fuel with a

maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment which minimizes sulfur dioxide and particulate emissions. The results of the screening analysis for criteria pollutants presented in (b) show that no exceedance of ambient air quality standards in the Project vicinity would result solely from Project activities. Thus, short-term emissions of NO_X and PM_{10} would be less than significant and not cumulatively considerable because the Project would comply with specific requirements in the Districts' approved air quality plans for attainment of ozone and particulate matter. In short, these regional plans address the existing and cumulative impact issues.

d. Expose sensitive receptors to substantial pollutant concentrations

Less than Significant. Construction emissions are transient and temporary, and BAAQMD and SJVAPCD control measures would be implemented as described previously. The Project would not expose sensitive receptors to substantial pollutant concentrations. The Project sites are located in a sparsely populated rural (agricultural) area. The nearest house relative to the Project sites is approximately 600 feet (183 meters) south of the Old River site; however, it is unoccupied. The next nearest receptor is a marina with live-aboard boat owners approximately 0.8 mile south (1,300 meters) of the Old River site. It is not known whether the marina, which is outside the immediate vicinity (i.e., 1000 feet or 305 meters) of the Old River site, houses potentially sensitive persons.

Construction activities would cause short-term emissions of NO_X, ROC, CO, SO_2, PM_{10}, and $PM_{2.5}$ from diesel-powered equipment and earthmoving (ground disturbance). The results of the screening analysis contained in (b) above shows that no exceedance of ambient air quality standards in the Project vicinity would result solely from Project activities. Notwithstanding Project-generated impacts, maximum background levels of particulate matter (PM_{10}, $PM_{2.5}$) already exceed state or federal standards as applicable in the Project vicinity.

Diesel particulate matter contain substances that are suspected carcinogens, along with pulmonary irritants and hazardous compounds that may affect sensitive receptors such as young children, senior citizens, or those susceptible to respiratory disease. Where construction activity occurs in proximity to long-term sensitive receptors, there could be a potential for unhealthful exposure of those receptors to diesel exhaust, including residential receptors. The results of the screening risk assessment contained in (b), analyses show that the probability of contracting cancer from diesel particulate matter, for the MEI is about 5.5×10^{-8}, which is less than the 10 in one million (1×10^{-5}) BAAQMD or SJVAPCD CEQA threshold and thus is less than significant.

e. Create objectionable odors affecting a substantial number of people

No Impact. California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). Moreover, the Project sites are located in an unpopulated area, and the nearest area potentially containing sensitive receptors is approximately 0.8 mile from the Old River site. Therefore, no objectionable odors are anticipated from construction activities or normal operation of the Project.

4.3.3.4 Cumulative Impacts

Cumulative impacts would be less than significant, as discussed under (c) above.