APPENDIX P
AIR QUALITY ANALYSIS REPORT (2010)

DRAFT
Air Quality Analysis

In Support of:

Sacramento Channel Deepening
Sacramento, California

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November 2010

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ACRONYMS

AB32	Assembly Bill 32 California Global Warming Solutions Act of 2006
AQI	Air Quality Impact
AQAP	Air Quality Management Plan
AQS	Air Quality Study
CAAQS	California Ambient Air Quality Standard
CCAR	California Climate Action Registry
ARB	California Air Resources Board
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2-e	Carbon Dioxide Equivalent
CEQ	Council on Environmental Quality
DPM	Diesel Particulate Matter
EMFAC2007	Emission Factors model developed by the California Air Resources Board and used to calculate emission rates from on-road motor vehicles
GHG	Greenhouse Gas
GWP	Global Warming Potential
hp	Horsepower
LCFS	Low Carbon Fuel Standard
MSERC	Mobile Source Emission Reduction Credit
mton	Metric Ton
mty	Metric Tons per Year
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standard
NHTSA	National Highway Traffic Safety Administration
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
OGV	Ocean Going Vessel
OPR	Office of Planning and Research
OFFROAD2007	Off-road emissions inventory, developed by ARB is an estimate of the population, activity, and emissions estimate of varied types of off-road equipment
POWS	Port of West Sacramento
PERP	Portable Equipment Registration Program
PFCs	Perfluorocarbons

PM_{10}	Particulate Matter, diameter <10 microns
$PM_{2.5}$	Particulate Matter, diameter <2.5 microns
POLB	Port of Long Beach
ppmV	Parts Per Million on a Volume Basis
SB	Senate Bill
SVAB	Sacramento Valley Air Basin
SF_6	Sulfur Hexafluoride
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SRA	Source Receptor Area
SRDWSC	Sacramento River Deep Water Shipping Channel
TAC	Toxic Air Contaminant
URBEMIS	Urban Emissions software is used to estimate construction, area source, and operational air pollutant emissions from land use projects
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
YSAQMD	Yolo Solano Air Quality Management District
WRI	World Resources Institute

1.0 Introduction

This Air Quality Study (AQS) was prepared in support of the Environmental Impact Study / Report (EIS/EIR) for the Sacramento River Deep Water Shipping Channel (SRDWSC).

Many of the vessels currently calling on the Port of West Sacramento (POWS) must be light-loaded due to channel depth restrictions. In addition, the existing width of the SRDWSC can make navigating to the POWS difficult, particularly in inclement weather. The Proposed Project involves deepening the SRDWSC from Reaches 1 through 4 to 35 feet as well as selective widening, thereby completing construction that was suspended in 1990. The Proposed Project also includes limited maintenance dredging in Reach 5. A detailed discussion of Project purpose, objectives and proposed actions is presented in the Project Description section of the EIS/EIR document.

This AQS analyzes air emissions and impacts related to air quality due to construction and operation of the Proposed Project. In addition to analyzing the 35-foot deepening Proposed Project, this AQS also includes an analysis of a 33-foot Channel Deepening and Selective Widening Alternative (33-foot Alternative) as well as the Future without Project Alternative, where the SRDWSC would remain at its current approximate 30-foot depth. Specifics of the 33-foot Alternative and the Future without Project Alternative are discussed in detail in the Project Description and in the body of the SEIS/SEIR.

2.0 Environmental Setting

The Proposed Project activities would be limited to the SRDWSC and adjacent or nearby sites, primarily within the Sacramento Valley Air Basin (SVAB). The SVAB is bounded by the North Coast Ranges on the west and Northern Sierra Nevada Mountains on the east. The intervening terrain is relatively flat. The region includes all of Sacramento and Yolo counties and portions of Placer, El Dorado, Solano, and Sutter counties. The overwhelming majority of the potential air quality impacts associated with the Proposed Project would be within the SVAB and within the jurisdiction of the Yolo Solano Air Quality Management District (YSAQMD), which includes all of Yolo County and parts of Solano County. However, some construction activities would also occur within the Sacramento Metropolitan Air Quality Management District (SMAQMD) and the Bay Area Air Quality Management District (BAAQMD).

2.1 Regional Climate and Meteorology

Hot dry summers and mild rainy winters characterize the Mediterranean climate of the SVAB. During the year the temperature may range from 20 to 115 $^{\circ}$F with summer highs in the 90s and winter lows occasionally below freezing. Average annual rainfall is 20 inches, and the rainy season generally occurs from November through March. The prevailing winds are moderate in strength and vary from moist clean breezes from the south to dry land flows from the north (YSAQMD 2007).

The mountains surrounding the SVAB create a barrier to airflow, which can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells collect over the Sacramento Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with temperature inversions that trap pollutants near the ground.

The ozone season occurs in May through October and is characterized by stagnant morning air or light winds with the delta sea breeze arriving in the afternoon out of the southwest. Usually the evening breeze transports the airborne pollutants to the north out of the Sacramento Valley. During about half of the days from July to September, however, a phenomenon called the "Schultz Eddy" prevents this from occurring. Instead of allowing for the prevailing wind patterns to move north carrying the pollutants out, the Schultz Eddy causes the wind pattern to circle back to the south. Essentially, this phenomenon causes the air pollutants to be blown south toward the District. This phenomenon has the effect of exacerbating the pollution levels in the area and increases the likelihood of violating federal or state standards. The eddy normally dissipates around noon when the delta sea breeze arrives.

2.2 Criteria Pollutants and Air Monitoring

Criteria Pollutants

Air quality at a given location can be characterized by the concentration of various pollutants in the air. Units of concentration are generally expressed as parts per million on a volume basis (ppmv) or micrograms per cubic meter (µg/m3) of air. The significance of a pollutant concentration is determined by comparing the concentration to an appropriate national or state ambient air quality standard. These standards represent the allowable atmospheric concentrations at which the public health and welfare are protected. They include a reasonable margin of safety to protect the more sensitive individuals in the population.

The United States Environmental Protection Agency (USEPA) establishes the national ambient air quality standards (NAAQS). For most pollutants, maximum concentrations must not exceed an NAAQS more than once per year; and they must not exceed the annual standards. The California Air Resources Board (ARB) establishes the California Ambient Air Quality Standards (CAAQS), which are generally more stringent and include more pollutants than the NAAQS. Maximum pollutant concentrations must not equal or exceed the CAAQS.

Pollutants that have corresponding national or state ambient air quality standards are known as criteria pollutants. The criteria pollutants of primary concern in this air quality assessment are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter with particle diameter less than 10 microns (PM_{10}), and particulate matter with particle diameter less than 2.5 microns ($PM_{2.5}$). Criteria pollutants contribute directly to regional health issues. The known adverse effects associated with these criteria pollutants are shown in Table 2.1.

Of the criteria pollutants of concern, ozone is unique because it is not directly emitted from project-related sources. Rather, ozone is a secondary pollutant, formed from the precursor pollutants volatile organic compounds (VOC) and nitrogen oxides (NOx). VOC and NOx react to form ozone in the presence of sunlight through a complex series of photochemical reactions. As a result, unlike inert pollutants, ozone levels usually peak several hours after the precursors are emitted and many miles downwind of the source. Because of the complexity and uncertainty in predicting photochemical pollutant concentrations, ozone impacts are indirectly addressed in this study by comparing project-generated emissions of VOC and NOx to daily emission thresholds set by each air quality district and by comparing pollutant concentrations to federal and state ambient air standards.

Table 2.1. Adverse Effects Associated with Criteria Pollutants

Pollutant	*Adverse Effects*
Ozone	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals and (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	(a) Broncho-constriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM_{10})	(a) Excess deaths from short-term and long-term exposures; (b) excess seasonal declines in pulmonary function, especially in children; (c) asthma exacerbation and possibly induction; (d) adverse birth outcomes including low birth weight; (e) increased infant mortality; (f) increased respiratory symptoms in children such as cough and bronchitis; and (g) increased hospitalization for both cardiovascular and respiratory disease (including asthma) [a]
Suspended Particulate Matter ($PM_{2.5}$)	(a) Excess deaths from short-term and long-term exposures; (b) excess seasonal declines in pulmonary function, especially in children; (c) asthma exacerbation and possibly induction; (d) adverse birth outcomes including low birth weight; (e) increased infant mortality; (f) increased respiratory symptoms in children such as cough and bronchitis; and (g) increased hospitalization for both cardiovascular and respiratory disease (including asthma)[a]

[a] More detailed discussions on the health effects associated with exposure to suspended particulate matter can be found in the following documents: OEHHA, *Particulate Matter Health Effects and Standard Recommendations* (www.oehha.ca.gov/air/toxic_contaminants/PM_{10}notice.html#may), May 9, 2002 (OEHHA 2002); and U.S. EPA, *Air Quality Criteria for Particulate Matter*, October 2004.

[b] California Ambient Air Quality Standards have also been established for lead, sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. They are not shown in this table because they are not pollutants of concern for the Proposed Project.

Local Air Monitoring Levels

USEPA designates all areas of the United States according to whether they meet the NAAQS. A nonattainment designation means that a primary NAAQS has been exceeded more than once per year in a given area. USEPA currently designates the Yolo-Solano portions of the Sacramento Valley Air Basin as nonattainment for 8-hr O_3; and attainment/unclassified for PM_{10}, $PM_{2.5}$, CO, NO_2 and SO_2 (USEPA 2010). USEPA also designates the SMAQMD as nonattainment for O_3, PM_{10}, and $PM_{2.5}$; and attainment/unclassified for CO, NO_2, and SO_2. USEPA designates the BAAQMD as nonattainment for O_3 and $PM_{2.5}$; and attainment/unclassified for PM_{10}, CO, NO_2, and SO_2. States with nonattainment areas must prepare a State Implementation Plan (SIP) that demonstrates how those areas will come into attainment.

The ARB also designates areas of the state according to whether they meet the CAAQS. A nonattainment designation means that a CAAQS has been exceeded more than once in 3 years. The ARB currently designates the Yolo-Solano portions of the Sacramento River Basin as nonattainment area for O_3, PM_{10}, $PM_{2.5}$ (Solano only); as attainment/unclassified $PM_{2.5}$ (Yolo portion), CO, NO_2, SO_2, sulfates, hydrogen sulfide, lead, and visibility reducing particles (ARB 2010a). The ARB also designates the SMAQMD and the BAAQMD as nonattainment for O_3, $PM_{2.5}$, and PM_{10}; and attainment/unclassified for CO, NO_2, and SO_2.

ARB and YSAQMD maintain a network of monitoring stations in the vicinity of the Sacramento River. The most representative station for the project vicinity is the West Sacramento – 15th Street monitoring station because it is the closest monitoring station to the Project site. The station monitors PM_{10} concentrations. However, the station does not monitor concentrations of other criteria pollutants. Table 2.2 shows the highest pollutant concentrations recorded at the station for 2006 to 2008, inclusive, the most recent complete 3-year period of data available from the ARB. Table 2.2 shows exceedances of the NAAQS and CAAQS in bold.

Table 2.2. Maximum Pollutant Concentrations Measured at the Sacramento T Street Monitoring Station

Pollutant	Averaging Period	National Standard	State Standard	Highest Monitored Concentration		
				2007	2008	2009
O_3	8-hour	0.075 ppm	0.070 ppm	**0.089 μg/m³**	**0.092 μg/m³**	**0.088 μg/m³**
PM_{10}	24-hour	150 μg/m³	50 μg/m³	46.0 μg/m³	**135.9 μg/m³**	38.2 μg/m³

Source: iADAM ARB database - historical air quality data, 2010.
Note: Exceedances of the standards are highlighted in bold.
μg/m3 micrograms per cubic meter
ppm parts per million

2.3 Toxic Air Contaminants

Toxic air contaminants (TACs) are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment (OEHHA). TACs include air pollutants that can produce adverse human health effects, including carcinogenic effects, after short-term (acute) or long-term (chronic) exposure. ARB designates diesel particulate matter (DPM) as a TAC.

2.4 Sensitive Receptors

The impact of air emissions on sensitive members of the population is a special concern. Sensitive receptor groups include children, the elderly, and the acutely and chronically ill. The locations of these groups include residences, schools, daycare centers, convalescent homes, and hospitals. The following summarizes, but does not list all, the sensitive receptors within approximately one mile of the POWS complex.

- Discovery Preschool, located approximately 0.5 miles east of the POWS;
- Southport Elementary, located approximately 0.75 miles south of the POWS; and
- Westmore Oaks Elementary School, located approximately 1 mile northeast of the POWS.

The Sacramento River channel flows through chiefly rural areas. However, sensitive receptors are located within 1 mile of the channel primarily within the River Delta Unified and Antioch Unified School Districts.

2.5 Greenhouse Gas Emissions

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). GHGs are emitted by natural processes and human activities. Examples of GHGs that are produced both by natural processes and industry include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons HFCs and perfluorocarbons PFCs) and sulfur hexafluoride.

The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without these natural GHGs, the earth's surface would be about 61°F cooler (AEP, 2007). However, emissions from fossil fuel combustion for activities such as electricity production and vehicular transportation have elevated the concentration of GHGs in the atmosphere above natural levels. There appears to be a close relationship between the increased concentration of GHGs in the atmosphere and global temperatures. Scientific evidence indicates a trend of increasing global temperatures near the earth's surface over the past century due to increased human induced levels of GHGs.

GHGs differ from criteria pollutants in that GHG emissions do not cause direct adverse human health effects. Rather, the direct environmental effect of GHG emissions is the increase in global temperatures, which in turn has numerous indirect effects on the environment and humans.

The World Resources Institute's GHG Protocol Initiative identifies six GHGs generated by human activity that are believed to be contributors to global warming (WRI/WBCSD, 2007). These are the same six GHGs that are identified in California Assembly Bill (AB) 32 and by the USEPA.

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)

The different GHGs have varying global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO_2 is assigned a GWP of 1. By comparison, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. N_2O has a GWP of 310, which means that it has a global warming effect 310 times greater than CO_2 on an equal-mass basis. To account for their GWPs, GHG emissions are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its GWP, and adding the results together to produce a single, combined emission rate representing all GHGs.

This air quality analysis includes estimates of GHG emissions generated by the Proposed Project construction and operational activities.

3.0 Regulatory Setting

The Federal Clean Air Act of 1969 and its subsequent amendments established air quality regulations and the NAAQS, and delegated enforcement of these standards to the states. In California, the ARB is responsible for enforcing air pollution regulations. The ARB has, in turn, delegated the responsibility of regulating stationary emission sources to the local air agencies. In the Sacramento River Basin, the local air agency is the YSAQMD.

The following is a summary of the key federal, state, and local air quality rules, policies, and agreements that potentially apply to the project and its related activities.

3.1 Federal Regulations

State Implementation Plan

The Sacramento region is designated a nonattainment area for the federal 8-hour ozone air quality standard and as such is required, per the California Clean Air Act (CCAA) to undertake planning efforts to reach this health-based standard. In response to this requirement, the YSAQMD developed the 1992 Air Quality Attainment Plan (AQAP) to address the non-attainment status for ozone. The AQAP and progress toward attainment is reviewed and assessed every three year. The triennial assessment is designed to report the extent of air quality improvement and the amounts of emission reductions achieved from control measures for the preceding three year period. Although the District is not required to prepare a PM10 attainment plan, the District has developed a list of particulate matter control measures it considers cost-effective. Similar plans have been prepared by the BAAQMD (BAAQMD 2009) and the SMAQMD (SMAQMD 2009).

Emission Standards for Non-road Diesel Engines

To reduce emissions from off-road diesel equipment, USEPA established a series of increasingly strict emission standards for new off-road diesel engines. Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category. Tier 2 standards were phased in from 2001 to 2006. Tier 3 standards were phased in from 2006 to 2008. Tier 4 standards, which require add-on emission control equipment to attain them, will be phased in from 2008 to 2015. These standards apply to construction equipment and terminal equipment, based on year of manufacture. Locomotives and marine vessels are exempt.

Emission Standards for Marine Diesel Engines

To reduce emissions from Category 1 (at least 50 horsepower [hp] but < 5 liters per cylinder displacement) and Category 2 (5 to 30 liters per cylinder displacement) marine diesel engines, USEPA established emission standards for new engines, referred to as Tier 2, 3 and 4 marine engine standards. Tier 2 standards were phased in between 2004 and 2007 (year of manufacture), depending on the engine size. Tier 3 standards are being phased in between 2009 and 2014. The after-treatment-based Tier 4 standards will be phased in from 2014 to 2017. The standards apply to harbor craft, depending on year of engine manufacture.

Emission Standards for On-Road Trucks

To reduce emissions from on-road, heavy-duty diesel trucks, USEPA established a series of increasingly strict emission standards for new engines, starting in 1988. Tier 2 standards began phase-in in 2004. Complete phase-in of the Tier 2 standards for new engines will be accomplished in 2010.

Non-road Diesel Fuel Rule

With this rule, USEPA set sulfur limitations for non-road diesel fuel, including marine vessels. For the Proposed Project, this rule affects construction equipment and harbor craft, although the California Diesel Fuel Regulations (described under state regulations) generally pre-empt this rule. Under this rule, the diesel fuel used by off-road equipment and harbor craft was limited to 500 ppm sulfur content prior to June 1, 2007; and further limited to 15 ppm sulfur content (ultra low sulfur diesel) starting January 1, 2010 for nonroad fuel, and June 2012 for locomotive and marine fuels.

Highway Diesel Fuel Rule

With this rule, USEPA set sulfur limitations for on-road diesel fuel to 15 ppm starting June 1, 2006.

General Conformity Rule

Section 176(c) of the CAA states that a federal agency cannot support an activity unless the agency determines that the activity will conform to the most recent USEPA-approved SIP. This means that projects using federal funds or requiring federal approval must not: (1) cause or contribute to any new violation of a NAAQS; (2) increase the frequency or severity of any existing violation; or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone.

In an area with a SIP (non-attainment), conformity can be demonstrated in one of four ways:

- By showing that the emission increases caused by an action are included in the SIP,
- By demonstrating that the State agrees to include the emission increases in the SIP,
- Through offsets,
- Through mitigation.

In creating de minimis emission levels, (USEPA sought to limit the need to conduct conformity determinations for actions with minimal emission increases. When the total direct and indirect emissions from the project/actions are below the de minimis levels, the project/action would not be subject to a conformity determination. Under the existing regulations, de minimis emission levels are listed for each criteria pollutant. The defined de minimis level is 25 tons/year for ozone (VOC or NOx). Federal actions with emissions below this minimum threshold are not obligated to perform a conformity determination (YSAQMD CEQA Handbook 2007).

Mandatory Reporting of Greenhouse Gases Rule

In response to the FY2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110–161), EPA issued the Mandatory Reporting of Greenhouse Gases Rule. Signed on September 22, 2009, the rule required that suppliers of fossil fuels and industrial GHGs, manufacturers of vehicles and engines outside of the light duty sector, and facilities that emit 25,000 metric tons or more of GHGs per year to submit annual reports to EPA. The rule was intended to collect emissions data to guide future policy decisions on climate change.

Proposed Greenhouse Gas Permitting Requirements on Large Industrial Facilities

On September 30, 2009 EPA proposed new thresholds for GHG emissions that define when Clean Air Act permits under the New Source Review and Title V operating permits programs would be required. The proposed thresholds would tailor these permit programs to limit which facilities would be required to obtain permits and would cover nearly 70 percent of the nation's largest stationary source GHG emitters—including power plants, refineries, and cement production facilities, while shielding small businesses and farms from permitting requirements. This rule although not directly relevant to Proposed Project activities, serves to highlight the developing GHG regulatory framework.

Greenhouse Gas Endangerment and Cause or Contribute Findings for GHGs under the Clean Air Act

On December 7, 2009, two findings were signed by EPA regarding greenhouse gases under section 202(a) of the Clean Air Act:

- Endangerment Finding: The EPA found that the current and projected concentrations of the six key GHGs in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

Although these findings do not themselves impose any requirements on industry or other entities, this action is a prerequisite to finalizing the EPA's proposed greenhouse gas emission standards for light-duty vehicles, which EPA proposed in a joint proposal including the Department of Transportation's proposed CAFE standards on September 15, 2009. The final rule became effective in January, 2010.

EPA and NHTSA National Program to Cut Greenhouse Gas Emissions and Improve Fuel Economy for Cars and Trucks

On April 1, 2010, EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) announced a new national program to reduce greenhouse gas emissions and improve fuel economy for new cars and trucks sold in the United States. The EPA and NHTSA finalized a joint rule that established a national program consisting of new standards for model year 2012 through 2016 light-duty vehicles that would reduce greenhouse gas emissions and improve fuel economy. EPA finalized the national GHG emissions standards under the Clean Air Act, and NHTSA finalized Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act. This rule although not directly relevant to Proposed Project activities, serves to highlight the developing GHG regulatory framework.

Council on Environmental Quality (CEQ) NEPA Guidance on Consideration of Effects of Climate Change and GHG Emissions

In February 2010, CEQ released a guidance memorandum on the ways in which Federal agencies can improve their consideration of the effects of GHG emissions and climate change in their evaluation of proposals for Federal actions under NEPA. The guidance was intended to help explain how agencies of the Federal government should analyze the environmental effects of GHG emissions and climate change when they describe the environmental effects of a proposed agency action in accordance with Section 102 of NEPA and the CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 C.F.R. parts 1500-1508. The guidance affirmed the requirements of the statute and regulations and their applicability to GHGs and climate change impacts. CEQ proposed to advise Federal agencies that they should consider opportunities to reduce GHG emissions caused by proposed Federal actions and adapt their actions to climate change impacts throughout the NEPA process and to address these issues in their agency NEPA procedures.

The guidance advised Federal agencies to consider whether analysis of the direct and indirect GHG emissions from their proposed actions may provide meaningful information to decision makers and the public. Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO2-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. The guidance identified a "reference point" of 25,000 metric tons of direct CO2-equivalent GHG emissions as an "indicator" that the proposed federal action's anticipated GHG emissions warrant detailed consideration in a NEPA review. For indirect GHG emissions (i.e., GHG emissions that have a causal nexus to, but are not directly emitted by, or the direct result of, the project), the guidance did not propose a reference point indicating when such indirect emissions are significant and cautioned that any consideration of indirect GHG emissions needed to recognize the limits of feasibility in evaluating upstream and downstream effects of proposed federal actions.

The guidance did not propose this reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment, but rather as a minimum standard for reporting emissions under the Clean Air Act.

3.2 State Regulations

California Clean Air Act

The California Clean Air Act of 1988, as amended in 1992, outlines a program to attain the CAAQS by the earliest practical date. Because the CAAQS are more stringent than the NAAQS, attainment of the CAAQS requires more emissions reductions than what would be required to show attainment of the NAAQS. Consequently, the main focus of attainment planning in California has shifted from the federal to state requirements. Similar to the federal system, the state requirements and compliance dates are based upon the severity of the ambient air quality standard violation within a region.

Heavy Duty Diesel Truck Idling Regulation Heavy Duty Diesel Truck Idling Regulation

This ARB rule affected heavy-duty diesel trucks in California starting February 1, 2005. The rule requires that heavy-duty trucks shall not idle for longer than 5 minutes at a time. However, truck idling for longer than 5 minutes while queuing is allowed if the queue is located beyond 100 feet from any homes or schools.

California Diesel Fuel Regulations

With this rule, the ARB set sulfur limitations for diesel fuel sold in California for use in on-road and off-road motor vehicles. Harbor craft were originally excluded from the rule, but were later included by a 2004 rule amendment. Under this rule, diesel fuel used in motor vehicles except harbor craft has been limited to 500-ppm sulfur since 1993. The sulfur limit was reduced to 15 ppm on September 1, 2006. (A federal diesel rule similarly limited sulfur content nationwide to 15 ppm by October 15, 2006.)

Statewide Portable Equipment Registration Program (PERP)

The PERP establishes a uniform program to regulate portable engines and portable engine-driven equipment units. Once registered in the PERP, engines and equipment units may operate throughout California without the need to obtain individual permits from local air districts. The PERP generally would apply to proposed dredging equipment.

ARB OGV Fuel Rule

The rule regulates the sulfur content of fuel burned in OGV engines and boilers operating within 24 nautical miles of California. The rule requires that starting July 1, 2009, marine gas oil (DMA) at or below 1.5% sulfur or marine diesel oil (DMB) at or below 0.5% sulfur be used. The rule requires that starting January 1, 2012 marine gas oil (DMA) or marine diesel oil (DMB) at or below 0.1% sulfur be used.

ARB OGV Vessel Speed Reduction

ARB is evaluating the role of OGV speed reductions along California's coastline as a means to reduce NOx, SOx, PM and CO2 emissions. Regulation has not yet been proposed, but several California ports have implemented voluntary vessel speed reduction programs. A vessel speed reduction program is not directly relevant to the Proposed Project because vessel speeds within the Sacramento River channel are below speeds promulgated in existing vessel speed reduction programs; a further reduction of vessel speed would not serve to reduce emissions.

ARB Shore Power Rule

In December2007, ARB approved a regulation to reduce emissions from diesel auxiliary engines on container ships, passenger ships, and refrigerated-cargo ships while berthing at a California Port. The regulation defined a California Port as the Ports of Los Angeles, Long Beach, Oakland, San Diego, San Francisco, and Hueneme. The regulation provides vessel fleet operators visiting these ports two options to reduce at-berth emissions from auxiliary engines: 1) turn off auxiliary engines for most of a vessel's stay in port and connect the vessel to some other source of power, most likely grid-based shore power; or 2)use alternative control technique(s) that achieve equivalent emission reductions. This rule is not directly relevant to the Proposed Projects because the Port of West Sacramento is not identified in the regulation. However, the rule summary is provided here serves as an indication of the regulatory framework for OGVs.

ARB Harbor Craft Rule - Airborne Toxic Control Measure for Commercial Harbor Craft

In 2010 ARB (ARB 2010b) approved a regulation to reduce emissions from diesel engines on commercial harbor craft vessels. The regulation applies to all commercial harbor craft vessels including, but not limited to, ferries, excursion vessels, tugboats, towboats, crew and supply vessels, work boats, pilot vessels, commercial and charter fishing boats, and dredging equipment. The regulation requires that engines on all new commercial harbor craft vessels meet the U.S. EPA marine engine emission standards in effect at the time the vessel is acquired. The regulation also specifies low sulfur fuel use requirements for all harbor craft as well as requires existing retrofit or replacement of in-use Tier 1 and earlier auxiliary and propulsion engines to U.S. EPA Tier 2 or Tier 3 standards in effect at the time of regulation compliance.

Executive Order S-3-05

California Governor Arnold Schwarzenegger announced on June 1, 2005 through Executive Order S-3-05, state-wide GHG emission reduction targets as follows: 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. Some literature equates these reductions to 11 percent by 2010 and 25 percent by 2020.

AB 32 - California Global Warming Solutions Act of 2006

The purpose of Assembly Bill (AB) 32 is to reduce statewide GHG emissions to 1990 levels by 2020. This enactment instructs the ARB to adopt regulations that reduce emissions from significant sources of GHGs and establish a mandatory GHG reporting and verification program by January 1, 2008. AB 32 requires the ARB to adopt GHG emission limits and emission reduction measures by January 1, 2011, both of which are to become effective on January 1, 2012. The ARB must also evaluate whether to establish a market-based cap and trade system. AB32 does not identify a significance level of GHG for CEQA/NEPA purposes, nor has the ARB adopted such a significance threshold.

California Climate Change Scoping Plan

The Climate Change Scoping Plan is the state's roadmap to reach the greenhouse gas reduction goals required in the Global Warming Solutions Act of 2006, or AB 32. This plan calls for reductions in California's carbon footprint to 1990 levels. The Scoping Plan calls to cut approximately 30% from business-as-usual emissions levels projected for 2020, or about 15% from today's levels. The Scoping Plan includes strategies such as the cap-and-trade program, improved appliance efficiency standards and other energy efficiency measures, capture of high global warming potential gases, more efficient agricultural equipment and uses, reduction of 30% in vehicle greenhouse gas emissions by 2016 (known as the 'Pavley standards') followed by further reductions from 2017, better land-use planning, regulations on largest emission sources, forestry measures, waste facility emission reduction measures, and improved recycling measures. The Scoping Plan requires ARB and other state agencies to adopt regulations and other initiatives in 2010 and 2011.

Senate Bill 97 Chapter 185, Statutes of 2007

SB 97 required the Office of Planning and Research (OPR) to prepare guidelines to submit to the California Resources Agency regarding feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by CEQA. The California Resources Agency was required to certify and adopt these revisions to the State CEQA Guidelines by January 1, 2010. The amendments became effective on March 18, 2010.

Executive Order S-01-07

Executive Order S-01-07 was enacted by the Governor on January 18, 2007. The order mandates the following: 1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and 2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California.

California Climate Action Registry

Established by the California Legislature in 2000, the California Climate Action Registry (CCAR) is a nonprofit public-private partnership that maintains a voluntary registry for GHG emissions. The purpose of the CCAR is to help companies, organizations, and local agencies establish GHG emissions baselines for purposes of complying with future GHG emission reduction requirements. LAHD is a voluntary member of the CCAR and has made the following commitments:

- Identify sources of GHG emissions, including direct emissions from vehicles, onsite combustion, fugitive and process emissions, and indirect emissions from electricity, steam, and co-generation
- Calculate GHG emissions using the CCAR's General Reporting Protocol (Version 3.0, April 2008).
- Report final GHG emissions estimates on the CCAR website.

May 2008 Attorney General GHG CEQA Guidance Memo

Although not considered a regulation, the California State Attorney General's Office released a CEQA guidance memo related to GHG analysis and mitigation measures (California State Attorney General's Office 2008). The memo provides examples of mitigation measures that could be used in a diverse range of projects. Measures identified in the memo have been incorporated as GHG mitigation measures in this analysis.

Amendments to the CEQA Guidelines

As directed by SB97, the Natural Resources Agency adopted Amendments to the CEQA Guidelines for greenhouse gas emissions on December 30, 2009. The Amendments, which became effective on March 18, 2010, address the analysis and mitigation of greenhouse gas emissions.[1]

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[1] CCR Title 14. Natural Resources, Division 6. Resources Agency, Chapter 3. Guidelines for Implementation of the California Environmental Quality Act, Article 5. Preliminary Review of Projects and Conduct of Initial Study.

ARB Interim CEQA Thresholds

In October 2008, ARB released its preliminary draft staff proposal recommending approaches for setting interim significance thresholds for GHG under the California Environmental Quality Act. The ARB thresholds apply to industrial projects and set a quantitative standard of 7,000 mty of CO2eq for operational emissions. The proposal does not set quantitative standards for construction emissions, but instead refers to a future development of performance standards for transport and construction activities.

3.3 Local Regulations and Agreements

Through the attainment planning process, the YSAQMD develops YSAQMD Rules and Regulations to regulate sources of air pollution in the SVAB. The most pertinent YSAQMD rules to the Proposed Project are listed below. The emission sources associated with the Proposed Project are considered mobile or portable sources and are not subject to the YSAQMD rules that apply to stationary sources.

Rule R2.5 – Nuisance

This rule prohibits discharge of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or that endanger the comfort, repose, health, or safety of any such persons or the public; or that cause, or have a natural tendency to cause, injury or damage to business or property.

District Rule 2.3

Visible emissions from stationary diesel-powered equipment are not allowed to be as dark or darker than as a shade that is designated as No. 1 opacity on the Ringelmann Chart for more than 3 minutes in any 1-hour period.

4.0 Environmental Impacts

4.1 Methodology and Assumptions

This analysis quantified construction and operational emissions for the Proposed Project, the 33-foot Alternative and the Future without Project Alternative. Only marine sources were considered in quantifying emissions and impacts due to operational activities. This decision was based on the USACE's position that the Proposed Project and Alternatives are not growth inducing and therefore would have no effect on land-side emissions. The USACE economic analysis concluded that cargo throughput would be unaffected by the Proposed Project (USACE 2010). Both marine and land-based sources were considered in quantifying emissions and impacts due to construction activities.

4.1.1 Methodology for Determining Project-Related Construction Emissions

The following sequential and non-overlapping phases were considered in the analysis:

- Phase 1 Placement Site Preparation: Preparation of each placement site would take approximately 3 months. Placement sites would conservatively range between 200 and 500 acres, although the actual usable area of the site is likely to be smaller. It was assumed that the preparation of each placement site would occur sequentially.

- Phase 2 Hydraulic Dredging: Dredging in any given reach would take place following preparation of a placement site designated for that reach. It was estimated that dredging would take place over a 6 month period. It was assumed that the dredging of each reach would occur sequentially.

A detailed description of construction activities is presented in the Project Description of the EIS/EIR.

USACE's construction estimates provided information about the number of equipment, crew and operating hours required for each Proposed Project component. The proposed construction activities would include the following distinct types of emission sources. Table 4.1 presents the activity and equipment parameters for each source category. Construction activities associated with the Proposed Project and 33-foot Alternative would not vary, with the exception that construction would be completed in 2015 for the Proposed Project and in 2013 for the 33-foot Alternative.

Harbor Craft

- Push Tugboat: A tugboat would be used to position the dredging barge at the beginning of each reach.
- Dredge Tugboat Tender: A tugboat tender would be used to position the barge.
- Pipeline Tugboat Tender: A tugboat tender would be used to position the pipeline necessary to convey dredged material to the placement site along the channel.
- Workboat/crew boat: Workboat/crew boat would be used to shuttle workers and supplies out to the dredging barge.

Emission calculations for harbor craft exhaust (e.g. push tug/tender, tugboats, and workboats/crew boats) were based on ARB's emissions estimation methodology for harbor craft (ARB 2007). Equation 4.1 reports the basic equation used in estimating emissions from these sources.

$$E = EFo * F * \left(1 + D * \frac{A}{UL}\right) * HP * LF * Hr$$ **Equation 4.1**

Where:

E = criteria pollutant emission

EFo = specific zero hour emission factor (when engine is new)

F = fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel

D = horsepower and pollutant specific engine deterioration factor, which is the percentage increase of emission factors at the end of the useful life of the engine

A = age of the engine when the emissions are estimated

UL = vessel type and engine use specific engine useful life

HP = rated horsepower of the engine

LF = the vessel type and engine use specific engine load factor

Hr = the number of annual operating hours of the engine

A fuel-based methodology was used to estimate SOx emissions from harbor craft sources. Equation 4.2 shows the basic equation used to determine annual fuel consumption. Fuel consumption was then converted to SOx emissions based on mass based sulfur content of 15 ppm.

$$Fc = HP * LG * Hr * BSCF * C$$ **Equation 4.2**

Where:

Fc = fuel consumed per engine per year

HP = rated horsepower of the engine

Hr = the number of annual operating hours of the engine

LF = the load factor

LF = the vessel type specific engine load factor

BSFC = brake specific fuel consumption rate of 0.078 gal/kW-hr or 184 g/hp-hr

The power of each harbor craft engine (propulsion and auxiliary), as well as the activity, were provided by USACE as part of the project specifications.

Dredging Equipment

A single hydraulic cutter head dredge would be used. Dredging equipment would be positioned on a barge and operated with diesel engines. Although in some instances it is possible to electrify the main engines associated with dredging equipment, this project configuration and location would not allow the use of electric equipment due to lack of access to the electrical grid in the dredging locations along the channel.

The emission calculations for dredging equipment exhaust were based on generalized emission factors for construction and dredging equipment in the San Francisco area. To derive the generalized emission factors, the OFFROAD2007 program was used to calculate annual emission inventories for all specified equipment in the SCAB (OFFROAD2007). OFFROAD2007 is the most current emissions program for California off-road sources developed by the ARB. The county-wide emission inventories were then divided by the population of specified equipment in the county, as provided by OFFROAD2007, to produce the emission factors. The basic equation used to estimate off-road equipment emissions is:

E = EF * Pop * AvgHp * Load * Activity **Equation 4.3**

Where:

E = Emission, ton/day

AvgHp = Maximum rated average horsepower

Load = Load factor

Activity = Annual activity in hours per year (hr/yr)

EF = Emission factor in grams per horsepower-hour (g/bhp-hr)

Pop = Population

The equipment power and activity levels were provided as part of the project specifications. Emission factors, load factors, and population were generated by OFFROAD2007. The following equation was then used to convert OFFROAD output to daily emissions:

$E = E_{OFFROAD} / Pop * EqCt * 2000\ lb/ton$ **Equation 4.4**

Where:

E = Emission, lb/day

$E_{OFFROAD}$ = *OFFROAD Emission Output, ton/day*

Pop = Population from OFFROAD output

EqCt = Equipment Count

Off-Road and On-Road Mobile Sources

Grading and associated construction equipment would be used in preparation of placement sites. Urban Emissions software (URBEMIS) was used to estimate construction-related air pollutant emissions. URBEMIS was used to quantify exhaust emissions from construction sources as well as fugitive dust generated during construction. URBEMIS defaults were used for equipment power rating.

Worker vehicles and limited haul truck trips comprise the on-road emission source category for this project. Haul trucks could be used to haul debris and soil during preparation of placement sites. Truck emissions associated with construction activities were estimated using URBEMIS model. For this air quality analysis it was assumed that 20-cubic yard heavy-duty diesel trucks would travel an average of 5 miles per round trip. URBMEIS defaults were assumed for worker vehicle fleet mix and transit distances.

Table 4.1. Construction Source Activity and Characteristics

Activity/Source	Source Category	Pieces of Equipment	Engine Power Rating (hp)	Activity (hr/day)	Emissions Estimation Model
Phase 1: Placement Site Preparation – 3 month duration					
Dozer	Off-Road, Land	1	default	7	URBEMIS
Excavator	Off-Road, Land	1	default	6	URBEMIS
Scraper	Off-Road, Land	2	default	8	URBEMIS
Loader	Off-Road, Land	1	default	7	URBEMIS
Water Truck	Off-Road, Land	1	default	8	URBEMIS
20 CY Trucks to haul soil and debris	On-Road	2	default	5 mile trips	URBEMIS
Workers	On-Road	8	default	default	URBEMIS
Phase 2: Hydraulic Dredging – 6 month duration					
Dredging Equipment	Off-Road, Marine	1	3000 hp main engine	20	OFFROAD2007
		1	2220 hp genset engine	23	OFFROAD2007
		1	460 hp crane/derrick	3	OFFROAD2007
Push Tug	Harbor Craft	1	700 hp main engine (2 engines)	2	ARB
			115 hp auxiliary engine (2 engines)	2	ARB

Activity/Source	Source Category	Pieces of Equipment	Engine Power Rating (hp)	Activity (hr/day)	Emissions Estimation Model
Dredge Tender	Harbor Craft	1	335 hp main engine (2 engines)	12-18	ARB
			50 hp auxiliary engine (1 engine)	12-18	ARB
Pipeline Tender	Harbor Craft	1	238 hp main engine (1 engines)	12-18	ARB
Work/Crew Boat	Harbor Craft	1	50 gasoline engine	24	ARB
Dozer	Off-Road, Land	1	default	18	URBEMIS
Excavator	Off-Road, Land	1	default	18	URBEMIS
Workers	On-Road	6	default	default	URBEMIS
Notes: Equipment size, operating hours, number of workers represent typical, but conservative estimates.					

Construction equipment would be diesel-fueled and would generate emissions of diesel exhaust in the form of VOC, CO, NOX, SOX, PM_{10} and $PM_{2.5}$. GHG emissions would also be generated from these sources. Equipment usage and scheduling data required to quantify emissions for the proposed activities were obtained from the engineering specifications for the project and consultation with contractors/engineers. In estimating emissions, emissions were first calculated for the individual equipment and then summed within each phase.

4.1.2 Methodology for Determining Project-Related Operational Emissions

Operational activities would include the transit of ocean going vessels (OGVs) along the SRDWSC, hotelling while at POWS, and harbor craft used to maneuver OGVs through the port harbor. In addition, harbor craft associated with the anticipated barge service (POWS 2010, TIGER 2010) were also considered in this analysis.[2]

Criteria pollutant and GHG emissions from OGV propulsion engines, auxiliary engines, and auxiliary boilers were quantified during OGV transit, maneuvering, berth hotelling, and anchorage hotelling. Criteria pollutant and GHG emissions from harbor craft used to assist OGV vessels, and harbor craft used during barge service were also quantified.

Ocean Going Vessels (OGV)

The air quality analysis is highly dependent upon the number of vessels calling at the POWS, the size of those vessels, vessel fleet mix, vessel engine size, and activity. USACE's economic

[2] The Ports of Oakland, Stockton and West Sacramento propose to establish a barge service linking the Ports of Stockton and West Sacramento to Oakland to provide an alternative transportation option that removes trucks from the region's heavily congested corridors, reduces energy consumption and reduces greenhouse gas and diesel particulate matter emissions (POWS 2010, TIGER 2010).

study (USACE 2010) was used as the primary source of data for historic vessel calls, historic and projected vessel size, fleet mix, and commodity throughput.

Because the USACE economic study did not specify future vessel calls, this information was determined based on forecasted throughput, vessel size and fleet mix. The USACE projected fleet mix for each vessel type and dead weight ton (DWT) category was scaled by commodity throughput and vessel payload. The payload, provided by the USACE separately from the economic study, represents the weight of commodity that can be loaded on a vessel such that the vessel still clears the available river draft.

USACE's economic study concluded that deepening of the channel would not serve to increase the number of vessels transiting the channel or calling at the POWS. The study concluded that regional growth would be responsible for any increase in vessel traffic and that channel deepening would in fact serve to decrease the resulting number of vessels by enabling fuller loaded vessels to transit through the channel. Historically, vessels have been required to transit the channel light loaded because the existing 30-foot channel depth does not allow even smaller vessels to transit fully loaded. Channel deepening would allow vessels to transit loaded fuller and thereby decrease the overall number of vessels that would otherwise transit the channel without the deepening project.

Table 4.2 presents vessel counts predicted for the Proposed Project, the 33-foot Alternative, and the Future without Project. The table shows that the number of vessels calling at the POWS would decrease for the 33-foot Alternative and further decrease for the Proposed Project. In addition to reduced vessel counts, a deeper channel would shift the fleet mix toward larger vessels that currently transit the SRDWSC. Vessel sizes can be represented in numerous ways including length, width, tonnage, displacement and deadweight tons. For the purposes of this analysis, the DWT was chosen to represent vessel sizes able to traverse the SCRDSC.[3]

Figure 1 and Figure 2 and show how the vessel fleet-mix would change for the Proposed Project in comparison to the Future without Project for bulk carrier vessels and tankers, respectively. The figures show that although vessel counts increase over the years, the Proposed Project would result in fewer vessel calls compared to the Future without Project. Bulk carriers and tankers were chosen for the figures because they represent the best reflection of regional growth and vessel distribution in the channel. General carriers were not represented in the figures because they would not require a deeper channel and as such neither the number of general carriers nor their fleet mix change would change appreciably.

[3] The DWT represents the displacement at any loaded condition minus the lightship weight. It includes the crew, passengers, cargo, fuel, water, and stores.

Table 4.2 Vessel Counts

Analysis Year	Proposed Project (35-foot channel)			33-foot Channel Alternative			Future without Project (30-foot channel)		
	Bulk Carrier	General Carrier	Tanker	Bulk Carrier	General Carrier	Tanker	Bulk Carrier	General Carrier	Tanker
2011	45	9	4	45	9	4	45	9	4
2012	50	9	23	50	9	23	50	9	23
2013	56	9	25	44	9	20	56	9	25
2015	40	9	20	47	9	23	59	9	29
2018	43	9	24	50	9	28	64	9	35
2023	48	9	28	55	9	32	70	9	41
2028	53	9	28	62	9	32	78	9	41
2033	59	9	28	69	9	32	87	9	41
2053	63	9	28	73	9	32	93	9	41
2062	63	9	28	73	9	32	93	9	41

Figure 1. Vessel Count and Distribution – Bulk Carrier Vessels

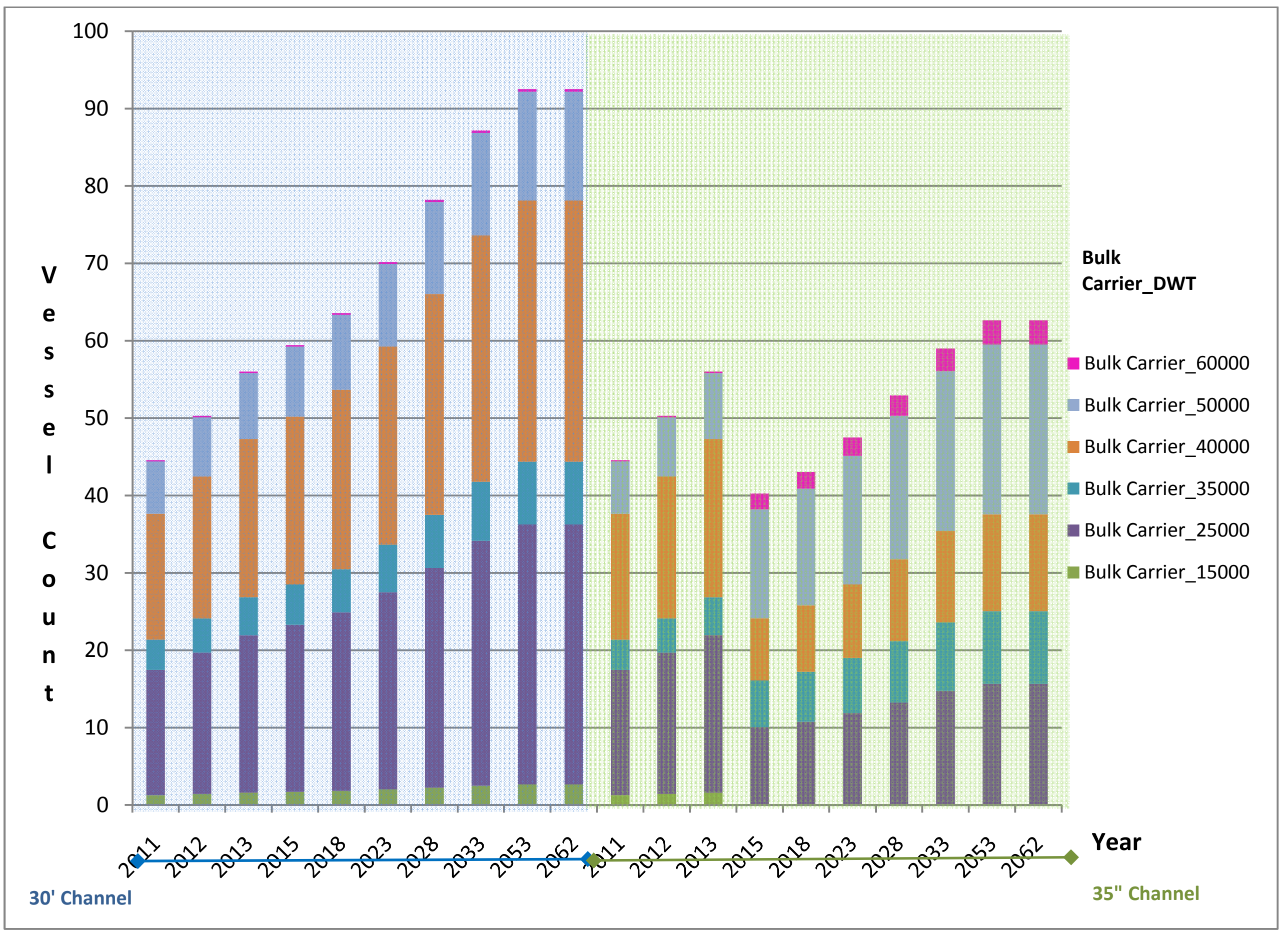
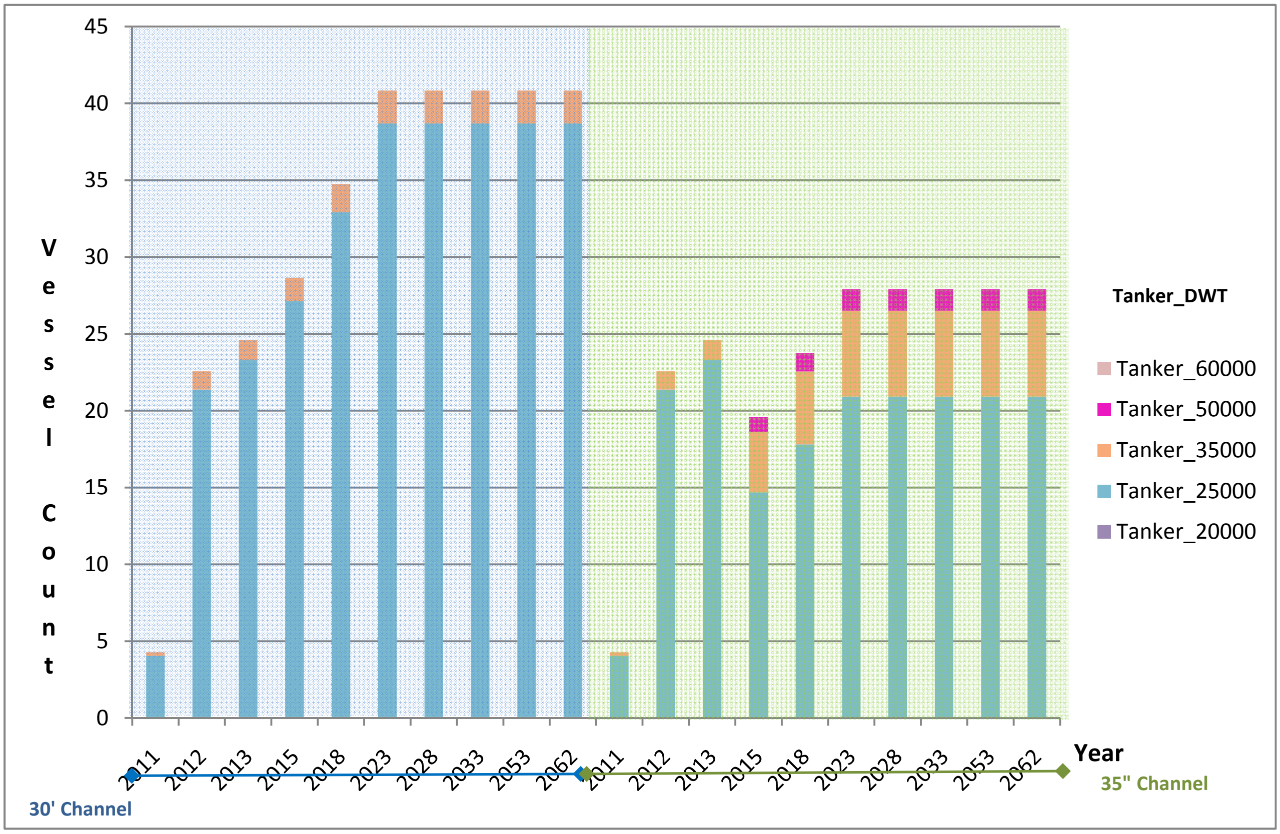


Figure 2. Vessel Count and Distribution - Tankers



OGV emissions were quantified for bulk carriers, general carriers and tankers and were based on generalized emission factors prepared for other port inventories (Starcrest 2009), fuel correction factors, and load factors per Equation 4.5.

$E = Energy * EF * FCF$ **Equation 4.5**

Where:

E = pollutant emission

*Energy (kw-hr) = MCR (kW) * LF * Act (hr)*

Where:

MCR is the engine rating in kW (Lloyds' engine rating)

LF (Load Factor) is the ratio of a vessel's power output at a given speed to the vessel's MCR power

LF at service speed is 80%

LF at intermediate speeds is determined by the Propeller Law that states that propulsion power varies as the cube of speed

Act (hr)= Activity = Distance Travelled (nautical miles) / Actual Speed (knots)

EF = emission factor (g/kW-hr)

FCF = fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel

Vessel engine power ratings were estimated based on several regression analyses (USEPA 2000 and Chamber of Shipping 2005-2006) where the engine power rating was presented as a function of vessel dead weight tons (DWT).

Harbor Craft

Emissions for tugboat exhaust were calculated using the same methodology as harbor craft emission calculations under construction activities per Equation 4.1. Tugboat fleet mix was assumed to change in accordance with ARB replacement and retrofit requirements.

4.2 NEPA Baseline

Construction Activities

Construction emissions associated with the NEPA baseline include maintenance dredging in the channel, which occurs annually. Maintenance dredging activities are identical to Phase 1 preparation of site placement and Phase 2 dredging activities, with the exception that maintenance dredging would occur over a much shorter time. Emissions from maintenance dredging were based on the following assumptions:

- Phase 1 – Site placement preparation: 2 days of activity per year;
- Phase 2 – Maintenance dredging: 6 weeks of activity per year;
- Phase 1 and Phase 2 would not occur concurrently; and
- Equipment used during maintenance dredging would be the same as equipment used during the Project and 33-foot Alternative prior to any mitigation.

Emissions from maintenance dredging represent the CEQA and NEPA construction baseline and were subtracted from Proposed Project and 33-foot Alternative construction emissions in determining significance. Table 4.3 presents the NEPA baseline for construction emissions.

Operational Activities

Operational emissions associated with the NEPA baseline reflect regional growth and are presented in Table 4.3. The operational emissions considered under the NEPA baseline account for regulatory requirements that in some cases are phased in over several years.

The NEPA emissions in Table 4.3 are compared to the Proposed Project and the 33-foot Alternative operational emissions to determine NEPA significance for impacts within the same corresponding analysis year.

Table 4.3. NEPA Baseline

Analysis Year	Emissions			
	PM10 (lb/day) peak	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
Construction NEPA Baseline				
2009 - 2015	151	14	1	1,159
Operational NEPA Baseline				
2011	462	63	3	4,176
2012	332	86	4	6,759
2013	332	93	4	7,258
2015	332	100	4	7,924
2018	332	109	5	8,884
2023	333	120	5	9,951
2028	333	127	6	10,297
2033	333	134	6	10,683
2053	333	139	6	10,961
2062	333	139	6	10,986

Notes:
Emissions are presented in units consistent with YSAQMD significance thresholds.
Emissions are presented only for those pollutants for which significance thresholds are specified by the YSAQMD.

4.3 CEQA Baseline

Construction Activities

Construction emissions associated with the CEQA baseline include maintenance dredging in the channel. Maintenance dredging activities and assumptions are described under the NEPA baseline for construction (Section 4.2).

Operational Activities

It is the position of the USACE that any increase in commodity throughput and consequently vessel traffic in the SRDWSC in future years would be due to regional growth in the area and not due to the proposed channel deepening. This position is documented in the Sacramento River Deep Water Ship Channel Limited Reevaluation Report (LRR) (USACE 2010).

Section 15125 of the CEQA Guidelines requires EIRs to include a description of the physical environmental conditions in the Proposed Project vicinity that exist at the time of the NOP. These environmental conditions would normally constitute the baseline physical conditions by which the CEQA lead agency determines whether an impact is significant. For purposes of this draft EIS/EIR, the CEQA baseline is 2009. However, although the CEQA baseline is identified in this analysis, at the request of the USACE, it is not used to determine the significance of potential impacts of the Proposed Project and alternatives because an unchanging CEQA baseline would not account for regional growth. Therefore, a comparison of the Proposed Project or project Alternative to the CEQA baseline would highlight impacts attributable to regional growth rather that the impacts attributable to the Proposed Project or project Alternative.

In contrast, the Future without Project Alternative addresses what is likely to happen at the site over time, starting from the existing conditions. The Future without Project Alternative allows for economic growth at the Proposed Project site that would occur without additional approvals. Therefore, to accurately show impacts resulting from the Proposed Project and project Alternative, this analysis compares the Proposed Project and project Alternative to the Future without Project Alternative rather than the CEQA baseline.

Table 4.4 presents the CEQA baseline and the Future without Project Alternative.

Table 4.4. CEQA Baseline and Future without Project Alternative Emissions.

Baseline Year	Emissions			
	PM10 (lb/day)	NOx (tpy)	ROG (tpy)	CO2-e (mty)
Construction CEQA Baseline				
2009	151	14	1	1,159
Operational CEQA Baseline				
2009	348	23	1	1,145
Future without Project Alternative				
2011	462	63	3	4,176
2012	332	86	4	6,759
2013	332	93	4	7,258
2015	332	100	4	7,924
2018	332	109	5	8,884
2023	333	120	5	9,951
2028	333	127	6	10,297
2033	333	134	6	10,683
2053	333	139	6	10,961
2062	333	139	6	10,986

Notes:
Emissions are presented in units consistent with YSAQMD significance thresholds.
Emissions are presented only for those pollutants for which significance thresholds are specified by the YSAQMD.

4.4 Thresholds of Significance

The significance thresholds were based on standards established by the YSAQMD, SMAQMD, and BAAQMD for construction (YSAQMD 2007, SMAQMD 2009, and BAAQMD 2010) because construction activities would occur in each of the above mentioned air districts. Because the overwhelming majority of operational emissions associated with vessel traffic and berthing at the POWS would occur in the YSAQMD, the significance thresholds for operational activities were based on YSAQMD standards. The air quality district guidance does not address GHG emissions. Therefore, thresholds of significance AQ-8 and AQ-9 (below) are separately defined and evaluated.

Impact AQ-1: A project would have a significant impact if it conflicts with or obstructs implementation of the applicable air quality plan.

Impact AQ-2: A project's construction activities would have a significant impact if they violate any air quality standard or contribute substantially to an existing or projected air quality violation, per the thresholds set forth by YSAQMD, SMAQMD, and BAAQMD in Table 4.5.

Table 4.5. Thresholds of Significance for Criteria Pollutants

Pollutant	YSAQMD	SMAQMD	BAAQMD
PM_{10}	80 lbs/peak day	Concentration-based [1]	82 lb exhaust/average day
$PM_{2.5}$	na	Concentration-based [1]	54 lb exhaust/average day
NOx	10 tons/year	85 lb/peak day	54 lb/average day
ROG	10 tons/year	na	54 lb/average day
CO	Violation of a state ambient air quality standard for CO	Violation of a state ambient air quality standard for CO	Violation of a state ambient air quality standard for CO

Notes:

1. SMAQMD significance threshold for PM_{10} and $PM_{2.5}$ are concentration based. Air dispersion modeling is not required if less than 15 acres would be disturbed on a maximum day and if the project conforms with the SMAQMD's Basic Construction Emission Controls and Practices". Placement site S14 is the only site in the SMAQMD. The site is 19 usable acres. The SMAQMD's default for peak daily site disturbance is 25% of total site. 25%*19 acres is less than the 15 maximum daily screening threshold.

na: not applicable

Source: YSAQMD 2007, SMAQMD 2009, BAAQMD 2010.

Impact AQ-3: A project's operations would have a significant impact if they violate any air quality standard or contribute substantially to an existing or projected air quality violation, per the YSAQMD thresholds set forth by in Table 4.5.

Impact AQ-4: A project would have a significant impact if it results 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).

The YSAQMD requires that an air quality analysis address a project's cumulative impact on ozone and localized pollutants and stipulates that any Proposed Project that would individually have a significant air quality impact, as defined in Table 4.5 would also be considered to have a significant cumulative impact.

YSAQMD also defines that CO impacts would be considered cumulatively significant if modeling shows that the combined emissions from the project and other existing and planned projects (i.e., background concentration) would exceed air quality standards. The YSAQMD specifies that the cumulative impact be evaluated using the screening criteria identified in the Handbook for the project level thresholds to determine if cumulative development could cause a violation of the CAAQS.

Impact AQ-5: A project would have a significant impact if it exposes sensitive receptors to substantial pollutant concentrations. Per the YSAQMD, a project would have a significant impact if it exposes sensitive receptors to TACs from stationary sources in excess of the following thresholds:

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) equals to 10 in one million or more.
- Ground-level concentrations of non-carcinogenic toxic air contaminants would result in a Hazard Index equal to 1 for the MEI or greater.

Per the YSAQMD, although YSAQMD's Risk Management Policy provides a basis for a threshold for TACs from stationary sources, the policy does not cover TACs from mobile sources. As such, no specific mobile source TAC threshold are referenced in the Handbook and while the YSAQMD continues to evaluate a threshold of significance for mobile source TAC, no specific mobile source TAC threshold is proposed at this time.

However, it should be noted that diesel fueled mobile sources can generate TACs in the form of DPM. Because mobile sources are not subject to YSAQMD permitting, ARB imposes rules and regulations that serve to reduce emissions of pollutants from mobile sources. ARB rules considered in this analysis are described in Section 3.2.

Impact AQ-6: A project would have a significant impact if it creates objectionable odors affecting a substantial number of people.

While offensive odors rarely cause physical harm, they can lead to considerable distress among the public. The YSAQMD's nuisance rule (YSAQMD Rule 2.5) is the basis for this threshold. A project may reasonably be expected to have a significant adverse odor impact where it "generates odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property."

Offensive odors are another source of concern where incompatible land uses are located in proximity to each other. Odor impacts on residential areas and other sensitive receptors warrant close scrutiny, but consideration should also be given to other land uses where people may congregate, such as recreational facilities, worksites, and commercial areas. The YSAQMD Handbook specifies that screening of potential odor impacts should be conducted for the following two situations:

- Projects that would potentially generate odorous emissions proposed to locate near existing sensitive receptors or other land uses where people may congregate, and
- Residential or other sensitive receptor projects or other projects that may attract people locating near existing odor sources.

Impact AQ-7: General Conformity: A project would have a significant impact if it does not conform to the State Implementation Plan.

Section 176(c) of the CAA states that a federal agency cannot support an activity unless the agency determines that the activity will conform to the most recent EPA-approved State Implementation Plan. This means that projects using federal funds or requiring federal approval must not:

- Cause or contribute to any new violation of a NAAQS;
- Increase the frequency or severity of any existing violation; or
- Delay the timely attainment of any standard, interim emission reduction, or other milestone.

Based on the present attainment status of the Sacramento River Air Basin, a federal action would conform to the State Implementation Plan if its annual direct and indirect emissions remain below 25 tons per year for ozone precursors (ROG or NOx). Federal actions with emissions below this minimum threshold are not obligated to perform a conformity determination. These de minimis thresholds apply to the federal project, which may include construction and/or operation, depending on the Federal authority. If the proposed action exceeds one or more of the de minimis thresholds, a more rigorous conformity determination would be the next step in the conformity evaluation process.

Impact AQ-8: A project would have a significant impact under CEQA if it generates greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment as determined by the significance threshold discussed below.

Subsequent to the adoption of Assembly Bill (AB) 32 – The California Global Warming Solutions Act of 2006, there had been little regulatory guidance with regard to analyzing GHG emission impacts in CEQA documents until the OPR released its Technical Advisory on CEQA and Climate Change in June 19, 2008. Consistent with Senate Bill 97, OPR's Technical Advisory was developed in cooperation with the Resources Agency, the California Environmental Protection Agency (CalEPA), and ARB. According to OPR, the Technical Advisory offers informal interim guidance regarding the steps lead agencies should take to address climate change in their CEQA documents, until CEQA guidelines are developed pursuant to SB 97 on how state and local agencies should analyze, and when necessary, mitigate greenhouse gas emissions.

In October 2008, ARB prepared a Preliminary Draft Proposal of Recommended Approaches for Setting Interim Significance Thresholds for GHGs under CEQA. The draft guidance specifies a 7,000 metric tons (mton) carbon dioxide equivalent (CO2-e) as a significance threshold for industrial projects and the use of performance standards for construction-related emissions. In the draft guidance, ARB stated that it intends to compile benchmark performance standards as part of its final threshold recommendation.

In addition, in February 2010, CEQ released a guidance memorandum on the ways in which Federal agencies can improve their consideration of the effects of GHG emissions and climate change in their evaluation of proposals for Federal actions under NEPA. The guidance advised that if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO2-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. The guidance did not propose this reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment, but rather as a minimum standard for reporting emissions under the Clean Air Act.

The USACE has established the following position under NEPA. In the absence of an adopted or science-based GHG standard, the USACE will not use ARB's interim proposed CEQA GHG standard, propose a new GHG standard, or make a NEPA impact determination for GHG emissions anticipated to result from the Proposed Project or any of the alternatives. Rather, in compliance with the CEQ and Corps NEPA implementing regulations, the anticipated emissions relative to the NEPA baseline will be disclosed for the Proposed Project and each alternative without expressing a judgment as to their significance.

Impact AQ-9: A project would have a significant impact under CEQA if it conflicts with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

4.5 Proposed Project (35-foot SRDWSC) Significance Determination

Impact AQ-1: The Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan.

Proposed Project activities would produce emissions of nonattainment pollutants. The YSAQMD AQAP has set forth emission reduction measures designed to bring the SVAB into attainment of the state and national AAQS. The attainment strategies in these plans include mobile-source control measures and clean fuel programs that are enforced at the state and federal level on engine manufacturers and petroleum refiners and retailers; as a result, Proposed Project operations would comply with these control measures. YSAQMD also adopts AQAP control measures into its rules and regulations, which are then used to regulate sources of air pollution in the SVAB. Therefore, compliance with these requirements would ensure that the Proposed Project would not conflict with or obstruct implementation of the AQAP.

NEPA Impact Determination

The Proposed Project would not conflict with or obstruct implementation of the AQAP; therefore, significant impacts under NEPA are not anticipated.

Mitigation Measures

None required.

NEPA Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

The Proposed Project would not conflict with or obstruct implementation of the AQAP; therefore, significant impacts under CEQA are not anticipated.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-2: The Proposed Project's construction activities would not exceed significance thresholds. Table 4.6 presents the Project's construction impacts.

Table 4.6 Summary of Construction Emissions—Proposed Project (35' Channel Deepening) without Mitigation

Year		PM10 (lb/day) peak	PM10 (lb/day) average	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m³)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
2009	CEQA Baseline	151	107	6	4		14	170	169	1	15	1,159
2009-2015	NEPA Baseline	151	107	6	4		14	170	169	1	15	1,159
2011	Phase 1	1,254	878	3	3		3	96	78	0	9	305
	Phase 2 - landside	626	438	1	1		1	19	19	0	2	122
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	20	20	20	16		54	659	659	5	56	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	509
	Total	1,254	878	24	19		63	729	729	6	65	5,260
	CEQA Increment	**1,103**	**771**	**18**	**15**		**49**	**559**	**559**	**4**	**50**	**4,101**
	NEPA Increment	**1,103**	**771**	**18**	**15**		**49**	**559**	**559**	**4**	**50**	**4,101**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	**Yes**					**Yes**			No		na
	Bay Area AQMD			No	No				**Yes**		No	na
	Sacramento Metropolitan AQMD					No		**Yes**				na
2012	Phase 1	1,254	878	3	3		3	90	73	0	8	309
	Phase 2 - landside	626	438	1	1		2	18	18	0	2	167
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	18	18	18	15		51	623	623	4	53	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	541
	Total	1,254	878	23	18		60	692	691	5	61	5,340
	CEQA Increment	**1,102**	**771**	**17**	**14**		**46**	**522**	**522**	**4**	**46**	**4,181**
	NEPA Increment	**1,102**	**771**	**17**	**14**		**46**	**522**	**522**	**4**	**46**	**4,181**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	**Yes**					**Yes**			No		na

Year		PM10 (lb/day) peak	PM10 (lb/day) average	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m^3)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
	Bay Area AQMD			No	No				**Yes**		No	na
	Sacramento Metropolitan AQMD					No		**Yes**				na
2013	Phase 1	1,253	878	3	3		3	84	68	0	8	309
	Phase 2 - landside	626	438	1	1		2	17	17	0	2	168
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	17	17	17	14		48	588	588	4	50	4,191.9
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	569
	Total	1,253	878	21	17		57	655	655	5	58	5,369
	CEQA Increment	**1,102**	**771**	**16**	**13**		**43**	**486**	**485**	**4**	**43**	**4,210**
	NEPA Increment	**1,102**	**771**	**16**	**13**		**43**	**486**	**485**	**4**	**43**	**4,210**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	**Yes**					**Yes**			No		na
	Bay Area AQMD			No	No				**Yes**		No	na
	Sacramento Metropolitan AQMD					No		**Yes**				na
2014	Phase 1	1,253	878	3	2		3	78	63	0	8	309
	Phase 2 - landside	626	438	1	1		1	16	16	0	2	168
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	13	13	13	11		39	474	474	4	47	4,191.9
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	597
	Total	1,253	878	17	14		47	540	540	5	55	5,398
	CEQA Increment	**1,102**	**770**	**12**	**9**		**33**	**371**	**370**	**4**	**40**	**4,238**
	NEPA Increment	**1,102**	**770**	**12**	**9**		**33**	**371**	**370**	**4**	**40**	**4,238**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											

Year		PM10 (lb/day) peak	PM10 (lb/day) average	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m^3)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
	Yolo Solano AQMD	**Yes**					**Yes**			No		na
	Bay Area AQMD			No	No				**Yes**		No	na
	Sacramento Metropolitan AQMD					No		**Yes**				na
2015	Phase 1	1,253	877	2	2		2	72	58	0	7	309
	Phase 2 - landside	626	438	1	1		1	15	15	0	2	168
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	13	13	13	10		37	459	459	4	44	4,191.9
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	625
	Total	1,253	877	17	13		46	524	523	5	51	5,425
	CEQA Increment	**1,102**	**770**	**11**	**9**		**32**	**354**	**354**	**3**	**36**	**4,266**
	NEPA Increment	**1,102**	**770**	**11**	**9**		**32**	**354**	**354**	**3**	**36**	**4,266**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	**Yes**					**Yes**			No		na
	Bay Area AQMD			No	No				**Yes**		No	na
	Sacramento Metropolitan AQMD					No		**Yes**				na

NEPA Impact Determination

Table 4.6 shows that emissions would exceed significance thresholds for PM_{10} in all construction years in YSAQMD; for NOx in 2011 in YSAQMD; and for NOx in all analysis years in SMAQMD and BAAQMD. PM_{10} emissions would be driven by fugitive dust generated during Phase 1 activities. NOx emissions would be driven by emissions from dredging equipment during Phase 2. Therefore, significant impacts under NEPA would occur for Proposed Project construction prior to mitigation.

It should be noted that YSAQMD's thresholds for PM_{10} are presented in pounds per peak day. Peak daily emissions represent a maximum theoretical activity scenario and would rarely, if ever, occur. Average PM_{10} emissions in pounds per day are presented as a better estimate of anticipated emissions, but are not compared to YSAQMD significance thresholds.

Mitigation Measures

MM-1: Apply soil stabilizers to inactive areas.

MM-2: Replace ground cover in disturbed areas.

MM-3: Water exposed surfaces 3 times daily.

MM-4: Reduce speed on unpaved roads to less than 15 mph.

MM-5: Utilize diesel particulate filter (DPF) on land-side off-road construction equipment.

MM-6: Utilize selective catalytic reduction (SCR) on dredging equipment.

Mitigation measures MM-1 through MM-4 would serve to reduce fugitive dust emissions, while MM-5 would serve to reduce diesel exhaust emissions. MM-6 would reduce both NOx and PM exhaust emissions.

NEPA Residual Impacts

Table 4.7 shows that following mitigation, all pollutants would decrease below significance. Therefore, impacts under NEPA would not be significant for Proposed Project construction following mitigation.

Table 4.7 Summary of Construction Emissions—Proposed Project (35' Channel Deepening) with Mitigation

Year		PM10 (lb/day) peak	PM10 (lb/day) average	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m^3)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
2009	CEQA Baseline	151	107	6	4		14	170	169	1	15	1,159
2009-2015	NEPA Baseline	151	107	6	4		14	170	169	1	15	1,159
2011	Phase I	79	55	1	0		3	96	78	0	9	305
	Phase 2 - landside	44	31	0	0		1	19	19	0	2	122
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	3	3	3	2		11	132	132	2	28	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	509
	Total	79	55	6	5		20	201	201	3	36	5,260
	CEQA Increment	**-72**	**-53**	**1**	**1**		**6**	**32**	**32**	**2**	**21**	**4,101**
	NEPA Increment	**-72**	**-53**	**1**	**1**		**6**	**32**	**32**	**2**	**21**	**4,101**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	No					No			No		na
	Bay Area AQMD			No	No				No		No	na
	Sacramento Metropolitan AQMD					No		No				na
2012	Phase I	76	53	0	0		3	90	73	0	8	309
	Phase 2 - landside	44	31	0	0		2	18	18	0	2	167
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	3	3	3	2		10	125	125	2	26	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	541
	Total	76	53	6	5		19	193	193	3	35	5,340
	CEQA Increment	**-75**	**-54**	**1**	**0**		**6**	**23**	**23**	**2**	**20**	**4,181**
	NEPA Increment	**-75**	**-54**	**1**	**0**		**6**	**23**	**23**	**2**	**20**	**4,181**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note		85				na

Year		PM10 (lb/day) peak	PM10 (lb/day) average	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m^3)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
						[1]						
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	No					No			No		na
	Bay Area AQMD			No	No				No		No	na
	Sacramento Metropolitan AQMD					No		No				na
2013	Phase I	76	53	0	0		3	84	68	0	8	309
	Phase 2 - landside	44	31	0	0		2	17	17	0	2	168
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	2	2	2	2		10	118	118	2	25	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	569
	Total	76	53	6	5		19	185	185	3	33	5,369
	CEQA Increment	**-75**	**-54**	**0**	**0**		**5**	**15**	**15**	**2**	**18**	**4,210**
	NEPA Increment	**-75**	**-54**	**0**	**0**		**5**	**15**	**15**	**2**	**18**	**4,210**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	No					No			No		na
	Bay Area AQMD			No	No				No		No	na
	Sacramento Metropolitan AQMD					No		No				na
2014	Phase I	76	53	0	0		3	78	63	0	8	309
	Phase 2 - landside	44	31	0	0		1	16	16	0	2	168
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	2	2	2	1		8	95	95	2	23	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	597
	Total	76	53	5	4		16	161	161	3	31	5,398
	CEQA Increment	**-75**	**-54**	**0**	**0**		**3**	**-9**	**-9**	**2**	**16**	**4,238**
	NEPA Increment	**-75**	**-54**	**0**	**0**		**3**	**-9**	**-9**	**2**	**16**	**4,238**

Year		PM10 (lb/day) peak	PM10 (lb/day) average	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m^3)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	No					No			No		na
	Bay Area AQMD			No	No				No		No	na
	Sacramento Metropolitan AQMD					No		No				na
2015	Phase I	76	53	0	0		2	72	58	0	7	309
	Phase 2 - landside	44	31	0	0		1	15	15	0	2	168
	Phase 2 - workers	2	0	0	0		0	0	0	0	0	132
	Phase 2 - dredger	2	2	2	1		7	92	92	2	22	4,192
	Phase 2 - tenders, other HC	4	3	3	3		5	50	50	1	6	625
	Total	76	53	5	4		16	157	156	3	30	5,425
	CEQA Increment	**-75**	**-54**	**0**	**0**		**2**	**-13**	**-13**	**2**	**15**	**4,266**
	NEPA Increment	**-75**	**-54**	**0**	**0**		**2**	**-13**	**-13**	**2**	**15**	**4,266**
	Significance Thresholds											
	Yolo Solano AQMD	80					10			10		na
	Bay Area AQMD			82	54				54		54	na
	Sacramento Metropolitan AQMD					Note [1]		85				na
	CEQA/NEPA Significance Determination											
	Yolo Solano AQMD	No					No			No		na
	Bay Area AQMD			No	No				No		No	na
	Sacramento Metropolitan AQMD					No		No				na

CEQA Impact Determination

Table 4.6 shows that emissions shows that emissions would exceed significance thresholds for PM_{10} in all construction years in YSAQMD; for NOx in 2011 in YSAQMD; and for NOx in all analysis years in SMAQMD and BAAQMD. PM_{10} emissions would be driven by fugitive dust generated during Phase 1 activities. NOx emissions would be driven by emissions from dredging equipment during Phase 2. Therefore, significant impacts under CEQA would occur for Proposed Project construction prior to mitigation.

It should be noted that YSAQMD's thresholds for PM_{10} are presented in pounds per peak day. Peak daily emissions represent a maximum theoretical activity scenario and would rarely, if ever, occur. Average PM_{10} emissions in pounds per day are presented as a better estimate of anticipated emissions, but are not compared to YSAQMD significance thresholds.

<u>Mitigation Measures</u>

Mitigation measures MM-1 through MM-6.

<u>CEQA Residual Impacts</u>

Table 4.7 shows that following mitigation, all pollutants would decrease below significance. Therefore, impacts under CEQA would not be significant for Proposed Project construction following mitigation.

Impact AQ-3: The Proposed Project operation activities would not exceed significance thresholds.

Table 4.8 compares the Proposed Project's operational emissions, prior to mitigation, to YSAQMD's significance thresholds.[4]

Table 4.8 Summary of Operational Emissions—Proposed Project (35' Channel Deepening) without Mitigation

Year	Source	PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
2009 CEQA Baseline						
	Bulk Carrier	348	5	23	1	1,145
	General Carrier	392	2	10	0	564
	Tanker	244	1	4	0	545
	Harbor Craft	11	0	1	0	37
	Total	648	9	37	1	2,291
2015	Bulk Carrier	165	3	34	1	1,660
	General Carrier	185	1	10	0	565

[4] The overwhelming majority of operational emissions associated with vessel traffic and berthing at the POWS would occur in the YSAQMD, the significance thresholds for operational activities were based on YSAQMD standards.

Year	Source	PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	Tanker	127	3	20	1	2,529
	Harbor Craft	20	16	13	1	1,283
	Total	332	24	77	4	6,036
	Future without Project	332	27	100	4	7,924
	2015 NEPA Baseline	332	27	100	4	7,924
	CEQA Increment	0	-3	-23	-1	-1,888
	NEPA Increment	0	-3	-23	-1	-1,888
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2018	Bulk Carrier	165	4	36	1	1,775
	General Carrier	185	1	10	0	565
	Tanker	145	4	24	1	3,067
	Harbor Craft	20	16	13	1	1,294
	Total	350	25	83	4	6,701
	Future without Project	332	28	109	5	8,884
	2018 NEPA Baseline	332	28	109	5	8,884
	CEQA Increment	18	-3	-26	-1	-2,183
	NEPA Increment	18	-3	-26	-1	-2,183
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2023	Bulk Carrier	165	4	40	1	1,960
	General Carrier	185	1	10	0	565
	Tanker	145	5	29	1	3,605
	Harbor Craft	21	16	13	1	1,311
	Total	351	26	91	4	7,440
	Future without Project	333	29	120	5	9,951
	2023 NEPA Baseline	333	29	120	5	9,951
	CEQA Increment	18	-4	-29	-1	-2,511
	NEPA Increment	18	-4	-29	-1	-2,511
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2028	Bulk Carrier	165	5	44	2	2,184

Year	Source	PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	General Carrier	185	1	10	0	565
	Tanker	145	5	29	1	3,605
	Harbor Craft	21	16	13	1	1,326
	Total	351	26	96	4	7,679
	Future without Project	333	30	127	6	10,297
	2028 NEPA Baseline	333	30	127	6	10,297
	CEQA Increment	18	-4	-31	-1	-2,618
	NEPA Increment	18	-4	-31	-1	-2,618
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2033	Bulk Carrier	165	5	50	2	2,434
	General Carrier	185	1	10	0	565
	Tanker	145	5	29	1	3,605
	Harbor Craft	21	16	13	1	1,343
	Total	351	27	101	4	7,946
	Future without Project	333	31	134	6	10,683
	2033 NEPA Baseline	333	31	134	6	10,683
	CEQA Increment	18	-4	-33	-1	-2,737
	NEPA Increment	18	-4	-33	-1	-2,737
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2053	Bulk Carrier	165	5	53	2	2,584
	General Carrier	185	1	10	0	565
	Tanker	145	5	29	1	3,605
	Harbor Craft	21	16	13	1	1,386
	Total	351	27	104	5	8,139
	Future without Project	333	31	139	6	10,961
	2053 NEPA Baseline	333	31	139	6	10,961
	CEQA Increment	18	-4	-35	-1	-2,822
	NEPA Increment	18	-4	-35	-1	-2,822
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2062	Bulk Carrier	165	5	53	2	2,584
	General Carrier	185	1	10	0	565
	Tanker	145	5	29	1	3,605
	Harbor Craft	21	16	13	1	1,403

Year	Source	PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	Total	351	27	104	5	8,156
	Future without Project	333	31	139	6	10,986
	2062 NEPA Baseline	333	31	139	6	10,986
	CEQA Increment	18	-4	-35	-1	-2,830
	NEPA Increment	18	-4	-35	-1	-2,830
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na

Notes:
Total OGV emissions are represented by the maximum of the bulk carriers and the general carriers, plus tankers. This is because Port berths can only be occupied by a set number of OGVs on any given day.
The CEQA increment was determined by subtracting the Future without Project from the Proposed Project emissions (Section 4.1.2).

NEPA Impact Determination

Table 4.8 shows that the pollutant emissions would not exceed YSAQMD's thresholds under NEPA.

In general, channel deepening would result in fuller loaded vessels being able to traverse the channel. Fewer fuller loaded vessels would be required to bring in anticipated commodities once the channel is deepened, than without channel deepening. However, as the throughput of commodities would continue to increase due to regional growth (USACE 2010) the number of ships would likewise increase, although not to without project levels.

Figure 1 and Figure 2 (Section 4.1.2) show projected bulk carrier vessel and tanker counts for the Proposed Project (35-foot deep channel) and the Future without Project (30-foot deep channel). The figures show that although vessel counts would increase over the years for both scenarios, the Proposed Project scenario would result in fewer vessel calls. Bulk carriers and tankers were chosen for the figures because they represent the best reflection of anticipated regional growth and consequent vessel distribution in the channel. General carriers were not represented in the figures because they would not require a deeper channel and as such, neither the number of general carriers nor their fleet mix would change appreciably.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Table 4.8 shows that the pollutant emissions would not exceed YSAQMD's thresholds under CEQA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-4: The Proposed Project would not result in a cumulatively considerable net increase.

The Project region is in non-attainment for ozone and PM_{10}. The YSAQMD CEQA Handbook stipulates that a project would be considered cumulatively significant if the project individually has a significant air quality impact under the YSAQMD thresholds of significance, as defined in Table 4.5. In addition, a project would be considered cumulatively significant for CO impacts if the combined emissions from the Project and other existing and planned projects exceeds air quality standards. YSAQMD's CO screening criteria estimate whether or not a project's traffic impact would cause a potential CO hotspot at any given intersection. Proposed Project activities would not result in on-road sources beyond several truck trips during Phase 1 construction, would therefore not result in traffic impacts, and would not result in CO impacts.

NEPA Impact Determination

Table 4.6 presents Proposed Project construction emissions and shows that under NEPA the Proposed Project would exceed significance thresholds for PM_{10} and NOx associated with construction and would therefore be considered cumulatively significant under NEPA. Table 4.8 shows that the Proposed Project operational emissions would not exceed significance thresholds under NEPA. The Project would not be significant for cumulative CO impacts.

Mitigation Measures

MM-1 through MM-6.

NEPA Residual Impacts

Table 4.7 shows that following mitigation, PM_{10} and NOx emissions associated with construction would decrease below significance. Table 4.8 shows that operational emissions would not exceed significance thresholds. Therefore, impacts would be less than significant under NEPA following mitigation.

CEQA Impact Determination

Table 4.6 presents Proposed Project construction emissions and shows that under CEQA the Proposed Project would exceed significance thresholds for PM_{10} and NOx associated with construction and would therefore be considered cumulatively significant under CEQA. Table 4.8 shows that the Proposed Project operational emissions would not exceed significance thresholds under CEQA. The Project would not be significant for cumulative CO impacts.

Mitigation Measures

MM-1 through MM-6.

CEQA Residual Impacts

Table 4.7 shows that following mitigation, PM_{10} and NOx emissions associated with construction would decrease below significance. Table 4.8 shows that operational emissions would not exceed significance thresholds. Therefore, impacts would be less than significant under CEQA following mitigation.

Impact AQ-5: The Proposed Project would not expose sensitive receptors to substantial pollutant concentrations. The Project would not expose sensitive receptors to TACs from stationary sources in excess of thresholds set forth by YSAQMD.

Although YSAQMD's Risk Management Policy provides a basis for a threshold for TACs from stationary sources, the policy does not cover TACs from mobile sources. As such, no specific mobile source TAC threshold are referenced in the YSAQMD CEQA Handbook and while the YSAQMD continues to evaluate a threshold of significance for mobile source TAC, no specific mobile source TAC threshold is proposed at this time.

However, it should be noted that diesel fueled mobile sources can generate TACs in the form of DPM. Because mobile sources are not subject to YSAQMD permitting, ARB imposes rules and regulations that serve to reduce emissions of pollutants from mobile sources. ARB rules considered in this analysis are described in Section 3.0, Regulatory Setting.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

<u>Mitigation Measures</u>

None required.

<u>Residual Impacts</u>

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

<u>Mitigation Measures</u>

None required.

<u>Residual Impacts</u>

Impacts would be less than significant under CEQA.

Impact AQ-6: The Proposed Project would not create objectionable odors affecting a substantial number of people.

The Proposed Project would increase air pollutants due to the combustion of diesel fuel. Although some individuals may find diesel combustion emissions to be objectionable in nature, odorous impacts of these emissions are subjective in nature. In addition, the mobile nature of project emission sources would serve to disperse Proposed Project emissions.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-7: General Conformity: The Proposed Project would conform to the State Implementation Plan.

NEPA Impact Determination

Table 4.8 presents Proposed Project operational emissions resulting from the proposed Federal action. The table shows that NOx and ROG emissions would not exceed the de minimis level of 25 tons per year.

CEQA Impact Determination

CEQA impact determination is not applicable to general conformity.

Impact AQ-8: The Proposed Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment under CEQA.

NEPA Impact Determination

The CEQ reference level of 25,000 mty applies to direct long-term activities. Since construction activities are considered short-term in nature, only long-term operational activities resulting in GHG emissions were considered in the NEPA impact evaluation. Table 4.8 shows that the Proposed Project's operational CO_2e emissions would be below CEQ's reference level of 25,000 mty emissions in all analysis years. Table 4.8 also shows that the total CO_2e emissions resulting from Proposed Project operations would be less than NEPA baseline emissions for every project analysis year.

CEQ's reference level does not constitute a significance threshold, but rather indicates the level at which GHG emissions should be disclosed. Therefore, the anticipated emissions are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

Mitigation Measures

None required.

NEPA Residual Impacts

Anticipated emissions are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

CEQA Impact Determination

Table 4.8 shows that operational CO2-e emissions would not exceed the ARB interim GHG significance threshold in any analysis year. The ARB interim GHG threshold at this time applies to operational emissions only.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-9: The Proposed Project would not conflict with applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

NEPA Impact Determination

It is the USACE's position that anticipated GHG impacts are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

Mitigation Measures

None required.

NEPA Residual Impacts

Anticipated impacts are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

CEQA Impact Determination

ARB's GHG Scoping Plan provides a roadmap to reach the GHG reduction goals required in the Global Warming Solutions Act of 2006, or AB 32. Many of the strategies in the Scoping Plan and anticipated regulatory framework would include measures enforced at the state level and imposed on equipment manufacturers and fuel suppliers (clean fuels, clean ship measures) (ARB 2008); as a result, Proposed Project operations would comply with the regulatory framework resulting from the Scoping Plan. Therefore, the Proposed Project would not conflict with or obstruct implementation of plans, policies or regulations adopted for the purpose of reducing GHG emissions.

Mitigation Measures

No feasible mitigation measures were identified for operational impacts.

CEQA Residual Impacts

Impacts would not be significant under CEQA.

4.6 33-foot Alternative - Significance Determination

For the purposes of this air quality analysis, the 33-foot Alternative is defined as deepening and selective widening of the SRDWSC from the existing 30-foot depth to a 33-foot depth. Construction activities would be similar for this Alternative as for the Proposed Project with the exception that channel dredging would require fewer years and would be completed in 2013. Operational activities would be similar for this Alternative as for the Proposed Project with the exception that the OGV fleet mix would reflect vessels which could traverse the 33-foot deep channel and reflect the fact that a greater number of vessels than forecasted for the Proposed Project would be required to accommodate regional growth.

Impact AQ-1: The 33-foot Alternative would not conflict with or obstruct implementation of the applicable air quality plan.

The 33-foot Alternative activities would produce emissions of nonattainment pollutants. The YSAQMD AQAP has set forth emission reduction measures designed to bring the SVAB into attainment of the state and national AAQS. The attainment strategies in these plans include mobile-source control measures and clean fuel programs that are enforced at the state and federal level on engine manufacturers and petroleum refiners and retailers; as a result, 33-foot Alternative operations would comply with these control measures. YSAQMD also adopts AQAP control measures into its rules and regulations, which are then used to regulate sources of air pollution in the SVAB. Therefore, compliance with these requirements would ensure that the 33-foot Alternative would not conflict with or obstruct implementation of the AQAP.

NEPA Impact Determination

The 33-foot Alternative would not conflict with or obstruct implementation of the AQAP; therefore, significant impacts under NEPA are not anticipated.

Mitigation Measures

None required.

NEPA Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

The 33-foot Alternative would not conflict with or obstruct implementation of the AQAP; therefore, significant impacts under CEQA are not anticipated.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-2: The 33-foot Alternative's construction activities would not exceed significance thresholds set forth by YSAQMD.

Construction emissions for the 33-foot Alternative would be identical to those under the Proposed Project because equipment and operating hours would be the same on a daily and on an annual basis, with the exception that construction for the 33-foot Alternative would end in 2013, two years earlier than the Proposed Project. Therefore, although over the life of the project, the Proposed Project construction would result in greater emissions than the 33-foot Alternative, impacts would be the same on a daily and annual basis. Since construction emissions on a daily and annual basis are equivalent for the Proposed Project and the 33-foot Alternative, Table 4.6, years 2011 through 2013 reflect construction emissions for the 33-foot Alternative.

NEPA Impact Determination

Table 4.6 shows that emissions would exceed significance thresholds for PM_{10} in all construction years in YSAQMD; for NOx in 2011 in YSAQMD; and for NOx in all analysis years in SMAQMD and BAAQMD. PM_{10} emissions would be driven by fugitive dust generated during Phase 1 activities. NOx emissions would be driven by emissions from dredging equipment during Phase 2. Therefore, significant impacts under NEPA would occur for the 33-foot Alternative construction prior to mitigation.

It should be noted that YSAQMD's thresholds for PM_{10} are presented in pounds per peak day. Peak daily emissions represent a maximum theoretical activity scenario and would rarely, if ever, occur. Average PM_{10} emissions in pounds per day are presented as a better estimate of anticipated emissions, but are not compared to YSAQMD significance thresholds.

<u>Mitigation Measures</u>

Mitigation measures MM-1 through MM-6.

Mitigation measures MM-1 through MM-4 would serve to reduce fugitive dust emissions, while MM-5 would serve to reduce diesel exhaust emissions. MM-6 would reduce both NOx and PM emissions.

<u>NEPA Residual Impacts</u>

Table 4.7 shows that following mitigation, all pollutants would decrease below significance. Therefore, impacts under NEPA would not be significant for the 33-foot Alternative construction following mitigation.

CEQA Impact Determination

Table 4.6 shows that emissions shows that emissions would exceed significance thresholds for PM_{10} in all construction years in YSAQMD; for NOx in 2011 in YSAQMD; and for NOx in all analysis years in SMAQMD and BAAQMD. PM_{10} emissions would be driven by fugitive dust generated during Phase 1 activities. NOx emissions would be driven by emissions from dredging equipment during Phase 2. Therefore, significant impacts under CEQA would occur for 33-foot Alternative construction prior to mitigation.

It should be noted that YSAQMD's thresholds for PM_{10} are presented in pounds per peak day. Peak daily emissions represent a maximum theoretical activity scenario and would rarely, if ever, occur. Average PM_{10} emissions in pounds per day are presented as a better estimate of anticipated emissions, but are not compared to YSAQMD significance thresholds.

Mitigation Measures

Mitigation measures MM-1 through MM-6.

CEQA Residual Impacts

Table 4.7 shows that following mitigation, all pollutants would decrease below significance. Therefore, impacts under CEQA would not be significant for 33-foot Alternative construction following mitigation.

Impact AQ-3: The 33-foot Alternative operation activities would not exceed significance thresholds.Table 4.9 compares the 33-foot Alternative's operational emissions, prior to mitigation, to YSAQMD's significance thresholds.[5]

Table 4.9 Summary of Operational Emissions—33-foot Alternative without Mitigation

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
2009 CEQA Baseline						
	Bulk Carrier	348	5	23	1	1,145
	General Carrier	392	2	10	0	564
	Tanker	244	1	4	0	545
	Harbor Craft	11	0.14	1	0	37
	Total	648	9	37	1	2,291
2013	Bulk Carrier	165	4	37	1	1,804
	General Carrier	185	1	10	0	565
	Tanker	127	3	20	1	2,501
	Harbor Craft	20	16	13	1	1,284
	Total	332	24	79	4	6,154
	Future without Project	332	26	93	4	7,258
	2013 NEPA Baseline	332	26	93	4	7,258
	CEQA Increment	0	-2	-14	-1	-1,104
	NEPA Increment	0	-2	-14	-1	-1,104
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na

5 The overwhelming majority of operational emissions associated with vessel traffic and berthing at the POWS would occur in the YSAQMD, the significance thresholds for operational activities were based on YSAQMD standards.

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
2015	Bulk Carrier	165	4	39	1	1,915
	General Carrier	185	1	8	0	369
	Tanker	127	4	23	1	2,914
	Harbor Craft	20	16	13	1	1,292
	Total	332	24	82	4	6,490
	Future without Project	332	27	100	4	7,924
	2015 NEPA Baseline	332	27	100	4	7,924
	CEQA Increment	0	-2	-18	-1	-1,434
	NEPA Increment	0	-2	-18	-1	-1,434
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2018	Bulk Carrier	165	4	42	1	2,048
	General Carrier	185	1	10	0	565
	Tanker	127	4	28	1	3,534
	Harbor Craft	20	16	13	1	1,305
	Total	332	26	92	4	7,451
	Future without Project	332	28	109	5	8,884
	2018 NEPA Baseline	332	28	109	5	8,884
	CEQA Increment	0	-2	-17	-1	-1,432
	NEPA Increment	0	-2	-17	-1	-1,432
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2023	Bulk Carrier	165	5	46	2	2,260
	General Carrier	185	1	10	0	565
	Tanker	127	5	32	1	4,153
	Harbor Craft	21	16	13	1	1,325
	Total	333	27	101	5	8,304
	Future without Project	333	29	120	5	9,951
	2023 NEPA Baseline	333	29	120	5	9,951
	CEQA Increment	0	-2	-19	-1	-1,648
	NEPA Increment	0	-2	-19	-1	-1,648
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2028	Bulk Carrier	165	5	51	2	2,519
	General Carrier	185	1	10	0	565

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	Tanker	127	5	32	1	4,153
	Harbor Craft	21	16	13	1	1,343
	Total	333	27	106	5	8,580
	Future without Project	333	30	127	6	10,297
	2028 NEPA Baseline	333	30	127	6	10,297
	CEQA Increment	0	-3	-21	-1	-1,717
	NEPA Increment	0	-3	-21	-1	-1,717
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2033	Bulk Carrier	165	6	57	2	2,808
	General Carrier	185	1	10	0	565
	Tanker	127	5	32	1	4,153
	Harbor Craft	21	16	13	1	1,362
	Total	333	28	112	5	8,887
	Future without Project	333	31	134	6	10,683
	2033 NEPA Baseline	333	31	134	6	10,683
	CEQA Increment	0	-3	-22	-1	-1,795
	NEPA Increment	0	-3	-22	-1	-1,795
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2053	Bulk Carrier	165	6	60	2	2,980
	General Carrier	185	1	10	0	565
	Tanker	127	5	32	1	4,153
	Harbor Craft	21	16	13	1	1,411
	Total	333	28	116	5	9,110
	Future without Project	333	31	139	6	10,961
	2053 NEPA Baseline	333	31	139	6	10,961
	CEQA Increment	0	-3	-23	-1	-1,851
	NEPA Increment	0	-3	-23	-1	-1,851
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2062	Bulk Carrier	165	6	60	2	2,980
	General Carrier	185	1	10	0	565
	Tanker	127	5	32	1	4,153
	Harbor Craft	21	16	13	1	1,431
	Total	333	28	116	5	9,130

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	Future without Project	333	31	139	6	10,986
	2062 NEPA Baseline	333	31	139	6	10,986
	CEQA Increment	0	-3	-23	-1	-1,856
	NEPA Increment	0	-3	-23	-1	-1,856
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na

NEPA Impact Determination Table 4.9 shows that the estimated emissions would not exceed YSAQMD's thresholds under NEPA. In general, channel deepening would result in fuller loaded vessels being able to traverse the channel. Fewer vessels would be required to bring in anticipated commodities once the channel is deepened, than without channel deepening.

The 33-foot Alternative would result in fewer vessel calls than the Future without Project, but more vessel calls than the Proposed Project. Table 4.2 shows a comparison of vessel counts for the 33-foot Alternative, the Proposed Project and the Future without Project.

Mitigation Measures

None required.

NEPA Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination Table 4.9 shows that the estimated emissions would not exceed YSAQMD's thresholds under CEQA.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-4: The 33-foot Alternative would not result in a cumulatively considerable net increase.

NEPA Impact Determination

Table 4.6 presents 33-foot Alternative construction emissions and shows that under NEPA the proposed Alternative would exceed significance thresholds for PM_{10} and NOx associated with construction and would therefore be considered cumulatively significant under NEPA. Table 4.9 shows that the 33-foot Alternative operational emissions would not exceed significance thresholds under NEPA. The Alternative would not be significant for cumulative CO impacts.

Mitigation Measures

MM-1 through MM-6.

NEPA Residual Impacts

Table 4.7 shows that following mitigation, PM_{10} and NOx emissions associated with construction would decrease below significance. Table 4.9 shows that operational emissions would not exceed significance thresholds. Therefore, impacts would be less than significant under NEPA following mitigation.

CEQA Impact Determination

Table 4.6 presents 33-foot Alternative construction emissions and shows that under CEQA the Alternative would exceed significance thresholds for PM_{10} and NOx associated with construction and would therefore be considered cumulatively significant under CEQA. Table 4.9 shows that the Alternative operational emissions would not exceed significance thresholds under CEQA. The 33-foot Alternative would not be significant for cumulative CO impacts.

Mitigation Measures

MM-1 through MM-6.

CEQA Residual Impacts

Table 4.7 shows that following mitigation, PM_{10} and NOx emissions associated with construction would decrease below significance. Table 4.9 shows that operational emissions would remain below significance thresholds. Therefore, impacts would be less than significant under CEQA following mitigation.

Impact AQ-5: The 33-foot Alternative would not expose sensitive receptors to substantial pollutant concentrations. The 33-foot Alternative would not expose sensitive receptors to TACs from stationary sources in excess of thresholds set forth by YSAQMD.

Although YSAQMD's Risk Management Policy provides a basis for a threshold for TACs from stationary sources, the policy does not cover TACs from mobile sources. As such, no specific mobile source TAC threshold are referenced in the YSAQMD CEQA Handbook and while the YSAQMD continues to evaluate a threshold of significance for mobile source TAC, no specific mobile source TAC threshold is proposed at this time.

However, it should be noted that diesel fueled mobile sources can generate TACs in the form of DPM. Because mobile sources are not subject to YSAQMD permitting, ARB imposes rules and regulations that serve to reduce emissions of pollutants from mobile sources. ARB rules considered in this analysis are described in Section 3.0, Regulatory Setting.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-6: The 33-foot Alternative would not create objectionable odors affecting a substantial number of people.

The 33-foot Alternative would increase air pollutants due to the combustion of diesel fuel. Although some individuals may find diesel combustion emissions to be objectionable in nature, odorous impacts of these emissions are subjective in nature. In addition, the mobile nature of project emission sources would serve to disperse proposed emissions.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-7: General Conformity: The 33-foot Alternative would conform to the State Implementation Plan.

NEPA Impact Determination

Table 4.8 presents the 33-foot Alternative emissions resulting from the proposed Federal action. The table shows that NOx and ROG emissions would not exceed the de minimis level of 25 tons per year.

CEQA Impact Determination

CEQA impact determination is not applicable to general conformity.

Impact AQ-8: The 33-foot Alternative would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment under CEQA.

NEPA Impact Determination

The CEQ reference level of 25,000 mty applies to direct long-term activities. Since construction activities are considered short-term in nature, only long-term operational activities resulting in GHG emissions were considered in the NEPA impact evaluation. Table 4.9 shows that the 33-foot Alternative's operational CO_2e emissions would be below CEQ's reference level of 25,000 mty emissions in all analysis years. Table 4.9 Table 4.9also shows that the total CO_2e emissions resulting from the 33-foot Alternative operations would be less than NEPA baseline emissions for every project analysis year.

CEQ's reference level does not constitute a significance threshold, but rather indicates the level at which GHG emissions should be disclosed. Therefore, the anticipated emissions are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

<u>Mitigation Measures</u>

None required.

<u>NEPA Residual Impacts</u>

Anticipated emissions are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

CEQA Impact Determination

Table 4.9 shows that operational CO2-e emissions would not exceed the ARB interim GHG significance threshold in any analysis year. The ARB interim GHG threshold at this time applies to operational emissions only.

<u>Mitigation Measures</u>

None required.

<u>CEQA Residual Impacts</u>

Impacts would be less than significant under CEQA.

Impact AQ-9: The 33-foot Alternative would not conflict with applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

NEPA Impact Determination

It is the USACE's position that anticipated GHG impacts are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

Mitigation Measures

None required.

NEPA Residual Impacts

Anticipated impacts are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

CEQA Impact Determination

ARB's GHG Scoping Plan provides a roadmap to reach the GHG reduction goals required in the Global Warming Solutions Act of 2006, or AB 32. Many of the strategies in the Scoping Plan and anticipated regulatory framework would include measures enforced at the state level and imposed on equipment manufacturers and fuel suppliers (clean fuels, clean ship measures) (ARB 2008); as a result, 33-foot Alternative operations would comply with the regulatory framework resulting from the Scoping Plan. Therefore, the 33-foot Alternative would not conflict with or obstruct implementation of plans, policies or regulations adopted for the purpose of reducing GHG emissions.

Mitigation Measures

No feasible mitigation measures were identified for operational impacts.

CEQA Residual Impacts

Impacts would not be significant under CEQA.

4.7 Future without Project Alternative - Significance Determination

For the purposes of this air quality analysis, the Future without Project Alternative is defined as the future without federal action. Regional or market growth is forecasted to occur at the POWS under the Future without Project Alternative. Forecasted increases in commodity throughput to the POWS would be the same for the Proposed Project. Vessels traversing the SCRDWSC would continue to require light-loading in order to traverse the SCRDWSC and the number of vessels required to accommodate market growth would increase. Table 4.2 (Section 4.1.2, Methodology for Determining Project-Related Operational Emissions) shows anticipated vessel counts for the Future without Project Alternative.

Impact AQ-1: The Future without Project Alternative would not conflict with or obstruct implementation of the applicable air quality plan.

The Future without Project Alternative activities would produce emissions of nonattainment pollutants. The YSAQMD AQAP has set forth emission reduction measures designed to bring the SVAB into attainment of the state and national AAQS. The attainment strategies in these plans include mobile-source control measures and clean fuel programs that are enforced at the state and federal level on engine manufacturers and petroleum refiners and retailers; as a result, Future without Project Alternative operations would comply with these control measures. YSAQMD also adopts AQAP control measures into its rules and regulations, which are then used to regulate sources of air pollution in the SVAB. Therefore, compliance with these requirements would ensure that the Future without Project Alternative would not conflict with or obstruct implementation of the AQAP.

NEPA Impact Determination

The Future without Project Alternative would not conflict with or obstruct implementation of the AQAP; therefore, significant impacts under NEPA are not anticipated.

Mitigation Measures

None required.

NEPA Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

The Future without Project Alternative would not conflict with or obstruct implementation of the AQAP; therefore, significant impacts under CEQA are not anticipated.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-2: The Future without Project Alternative's construction activities would not exceed significance thresholds set forth by YSAQMD as construction activities would not occur under the Future without Project Alternative.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

Mitigation Measures

None required.

NEPA Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-3: The Future without Project Alternative operation activities would not exceed significance thresholds set forth by YSAQMD.

Table 4.10 compares the Future without Project Alternative's operational emissions, prior to mitigation, to YSAQMD's significance thresholds.

Table 4.10 Summary of Operational Emissions—Future without Project Alternative without Mitigation

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
2009 CEQA Baseline						
	Bulk Carrier	348	5	23	1	1,145
	General Carrier	392	2	10	0	564
	Tanker	244	1	4	0	545
	Harbor Craft	11	0	1	0	37
	Total	648	9	37	1	2,291
2011	Bulk Carrier	242	5	36	1	1,799
	General Carrier	272	2	10	0	565
	Tanker	170	1	4	0	545
	Harbor Craft	20	16	13	1	1,267
	Total	462	24	63	3	4,176
	2011 NEPA Baseline	462	24	63	3	4,176
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	
2012	Bulk Carrier	165	4	41	1	2,030
	General Carrier	185	1	10	0	565
	Tanker	127	4	22	1	2,874
	Harbor Craft	20	16	13	1	1,291
	Total	332	25	86	4	6,759
	2012 NEPA Baseline	332	25	86	4	6,759
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	
2013	Bulk Carrier	165	5	46	2	2,261
	General Carrier	185	1	10	0	565
	Tanker	127	4	24	1	3,132
	Harbor Craft	20	16	13	1	1,300

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	Total	332	26	93	4	7,258
	2013 NEPA Baseline	332	26	93	4	7,258
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2015	Bulk Carrier	165	5	48	2	2,399
	General Carrier	185	1	10	0	565
	Tanker	127	5	28	1	3,650
	Harbor Craft	20	16	13	1	1,311
	Total	332	27	100	4	7,924
	2015 NEPA Baseline	332	27	100	4	7,924
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2018	Bulk Carrier	165	5	52	2	2,566
	General Carrier	185	1	10	0	565
	Tanker	127	6	34	1	4,426
	Harbor Craft	20	16	13	1	1,327
	Total	332	28	109	5	8,884
	2018 NEPA Baseline	332	28	109	5	8,884
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2023	Bulk Carrier	165	6	57	2	2,832
	General Carrier	185	1	10	0	565
	Tanker	127	6	40	2	5,202
	Harbor Craft	21	16	13	1	1,352
	Total	333	29	120	5	9,951
	2023 NEPA Baseline	333	29	120	5	9,951

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2028	Bulk Carrier	165	7	64	2	3,157
	General Carrier	185	1	10	0	565
	Tanker	127	6	40	2	5,202
	Harbor Craft	21	16	13	1	1,374
	Total	333	30	127	6	10,297
	2028 NEPA Baseline	333	30	127	6	10,297
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2033	Bulk Carrier	165	7	71	2	3,518
	General Carrier	185	1	10	0	565
	Tanker	127	6	40	2	5,202
	Harbor Craft	21	16	13	1	1,398
	Total	333	31	134	6	10,683
	2033 NEPA Baseline	333	31	134	6	10,683
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2053	Bulk Carrier	165	8	75	3	3,735
	General Carrier	185	1	10	0	565
	Tanker	127	6	40	2	5,202
	Harbor Craft	21	16	13	1	1,460
	Total	333	31	139	6	10,961
	2053 NEPA Baseline	333	31	139	6	10,961
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000

Year		PM10 (lb/day) peak	PM10 (lb/day)	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na
2062	Bulk Carrier	165	8	75	3	3,735
	General Carrier	185	1	10	0	565
	Tanker	127	6	40	2	5,202
	Harbor Craft	21	16	13	1	1,484
	Total	333	31	139	6	10,986
	2062 NEPA Baseline	333	31	139	6	10,986
	CEQA Increment	0	0	0	0	0
	NEPA Increment	0	0	0	0	0
	Significance Threshold	80	na	10	10	7,000
	Significance Determination					
	CEQA Significance Determination	No	na	No	No	No
	NEPA Significance Determination	No	na	No	No	na

NEPA Impact Determination

The Future without Project Alternative is equivalent to the NEPA baseline. Table 4.10 shows that the estimated emissions would not exceed YSAQMD's thresholds under NEPA for any criteria pollutant. Therefore, significant impacts under NEPA would not occur for the Future without Project Alternative operation prior to mitigation.

<u>Mitigation Measures</u>

None required.

<u>NEPA Residual Impacts</u>

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Table 4.10 shows that emissions would not exceed YSAQMD's thresholds under CEQA. Therefore, significant impacts under CEQA would not occur for the Future without Project Alternative.

<u>Mitigation Measures</u>

None required.

<u>CEQA Residual Impacts</u>

Impacts would be less than significant under CEQA.

Impact AQ-4: The Future without Project Alternative would not result in a cumulatively considerable net increase.

NEPA Impact Determination

Table 4.10 presents the Future without Project Alternative operational emissions and shows that emissions would not exceed significance thresholds and would therefore not be considered cumulatively significant under NEPA. As in the case of the Proposed Project, the Future without Project Alternative would not be significant for cumulative CO impacts.

Mitigation Measures

None required.

NEPA Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Table 4.10 presents Future without Project Alternative operational emissions and shows that emissions would not exceed significance thresholds and would therefore not be considered cumulatively significant under CEQA. As in the case of the Proposed Project, the Future without Project Alternative would not be significant for cumulative CO impacts.

Mitigation Measures

None required.

CEQA Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-5: The Future without Project Alternative would not expose sensitive receptors to substantial pollutant concentrations. The Future without Project Alternative would not expose sensitive receptors to TACs from stationary sources in excess of thresholds set forth by YSAQMD.

Although YSAQMD's Risk Management Policy provides a basis for a threshold for TACs from stationary sources, the policy does not cover TACs from mobile sources. As such, no specific mobile source TAC threshold are referenced in the YSAQMD CEQA Handbook and while the YSAQMD continues to evaluate a threshold of significance for mobile source TAC, no specific mobile source TAC threshold is proposed at this time.

However, it should be noted that diesel fueled mobile sources can generate TACs in the form of DPM. Because mobile sources are not subject to YSAQMD permitting, ARB imposes rules and regulations that serve to reduce emissions of pollutants from mobile sources. ARB rules considered in this analysis are described in Section 3.0, Regulatory Setting.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-6: The Future without Project Alternative would not create objectionable odors affecting a substantial number of people.

The Future without Project Alternative would increase air pollutants due to the combustion of diesel fuel. Although some individuals may find diesel combustion emissions to be objectionable in nature, odorous impacts of these emissions are subjective in nature. In addition, the mobile nature of project emission sources would serve to disperse proposed emissions.

NEPA Impact Determination

Impacts would be less than significant under NEPA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under NEPA.

CEQA Impact Determination

Impacts would be less than significant under CEQA.

Mitigation Measures

None required.

Residual Impacts

Impacts would be less than significant under CEQA.

Impact AQ-7: General Conformity: Under the Future without Project Alternative, no federal action would occur. Therefore a general conformity analysis is not applicable.

NEPA Impact Determination

NEPA impact determination is not applicable to general conformity for the Future without Project Alternative.

CEQA Impact Determination

CEQA impact determination is not applicable to general conformity.

Impact AQ-8: The Future without Project Alternative would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment under CEQA.

NEPA Impact Determination

The CEQ reference level of 25,000 mty applies to direct long-term activities. Since construction activities are considered short-term in nature, only long-term operational activities resulting in GHG emissions were considered in the NEPA impact evaluation. Table 4.10 shows that the Future without Project Alternative's operational CO_2e emissions would be below CEQ's reference level of 25,000 mty emissions in all analysis years. CEQ's reference level does not constitute a significance threshold, but rather indicates the level at which GHG emissions should be disclosed. Therefore, the anticipated emissions are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

Mitigation Measures

None required.

NEPA Residual Impacts

Anticipated emissions are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

CEQA Impact Determination

Table 4.10 shows that operational CO2-e emissions would not exceed the ARB interim GHG significance threshold in any analysis year.

Mitigation Measures

No feasible mitigation measures were identified for operational impacts.

CEQA Residual Impacts

Impacts would be significant under CEQA.

Impact AQ-9: The Future without Project Alternative would not conflict with applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

NEPA Impact Determination

It is the USACE's position that anticipated GHG impacts are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

Mitigation Measures

None required.

NEPA Residual Impacts

Anticipated impacts are disclosed relative to the NEPA baseline without expressing judgment as to their significance.

CEQA Impact Determination

ARB's GHG Scoping Plan provides a roadmap to reach the GHG reduction goals required in the Global Warming Solutions Act of 2006, or AB 32. Many of the strategies in the Scoping Plan and anticipated regulatory framework would include measures enforced at the state level and imposed on equipment manufacturers and fuel suppliers (clean fuels, clean ship measures) (ARB 2008); as a result, Future without Project Alternative operations would comply with the regulatory framework resulting from the Scoping Plan. Therefore, the Future without Project Alternative would not conflict with or obstruct implementation of plans, policies or regulations adopted for the purpose of reducing GHG emissions.

Mitigation Measures

No feasible mitigation measures were identified for operational impacts.

CEQA Residual Impacts

Impacts would not be significant under CEQA.

4.8 Impacts Summary

Table 4.11 summarizes impacts for construction activities associated with the Proposed Project and the 33-foot Alternative following mitigation and shows that following mitigation, construction impacts would not be significant under NEPA and CEQA. Table 4.12 summarizes impacts for operational activities associated with the Proposed Project, the 33-foot Alternative, and the Future without Project Alternative and shows that operational impacts would not be significant under NEPA and CEQA.

Figure 3 through Figure 6 show the trend of operational impacts for the Proposed Project, the 33-foot Alternative and the Future without Project Alternative. CEQA and NEPA increments are equivalent because the comparison is done for Proposed Project or the Alternative minus the Future without Project Alternative. Figure 3 shows that impacts for PM_{10} would increase over time and would be higher than the 33-foot Alternative. This is explained by the fact that PM_{10} is analyzed on a peak day basis and therefore assumes that the same number of ships would be present at the POWS on a peak day under all scenarios. However, under the Proposed Project the SRDWSC would be dredged to a depth of 35 feet thereby allowing larger vessels to traverse the SRDWSC. Under the 33-foot Alternative, because the SRDWSC would only be dredged to a depth of 33 feet, the vessel fleet mix would be comprised of vessels smaller than those under the Proposed Project.

Figure 4 through Figure 6 show that impacts would be reduced for the Proposed Project and the 33-foot Alternatives when compared to the Future without Project Alternative. Impacts would be less on an annual basis under the Proposed Project than under the 33-foot Alternative. This reflects the fact that under the Proposed Project, on an annual basis, fewer vessels would traverse the SRDWSC and call at the POWS thereby resulting in lesser impacts.

Table 4.11 Significance Determination Comparison: Construction of Proposed Project and Alternative following Mitigation

Year	CEQA/NEPA Significance Determination	PM10 (lb/day) peak	PM10 (lb/day) average exhaust	PM2.5 (lb/day) average exhaust	PM10 or PM2.5 (ug/m^3)	NOx (tpy) average	NOx (lb/day) peak	NOx (lb/day) average	ROG (tpy) average	ROG (lb/day) average	CO2-e (mty)
2011	YSAQMD	No				No			No		na
	BAAQMD		No	No				No		No	na
	SMAQMD				No		No				na
2012	YSAQMD	No				No			No		na
	BAAQMD		No	No				No		No	na
	SMAQMD				No		No				na
2013	YSAQMD	No				No			No		na
	BAAQMD		No	No				No		No	na
	SMAQMD				No		No				na
2014	YSAQMD	No				No			No		na
	BAAQMD		No	No				No		No	na
	SMAQMD				No		No				na
2015	YSAQMD	No				No			No		na
	BAAQMD		No	No				No		No	na
	SMAQMD				No		No				na

Notes:
Construction impacts would be equivalent for the Proposed Project and for the 33-foot Alternative.
Proposed Project construction would end in 2015; 33-foot Alternative construction would end in 2013.
Construction would not occur under the Future without Project Alternative.

Table 4.12 Significance Determination Comparison: Operation of Proposed Project and Alternatives

		Proposed Project				33-foot Alternative				Future without Project Alternative			
Year		PM10 (lb/day) peak	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)	PM10 (lb/day) peak	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)	PM10 (lb/day) peak	NOx (tpy) average	ROG (tpy) average	CO2-e (mty)
2011	**CEQA Significance Determination**									No	No	No	No
2012										No	No	No	No
2013						No	No	No	No	No	No	No	No
2015		No	No	No	No	No	No	No	No	No	No	No	No
2018		No	No	No	No	No	No	No	No	No	No	No	No
2023		No	No	No	No	No	No	No	No	No	No	No	No
2028		No	No	No	No	No	No	No	No	No	No	No	No
2033		No	No	No	No	No	No	No	No	No	No	No	No
2053		No	No	No	No	No	No	No	No	No	No	No	No
2062		No	No	No	No	No	No	No	No	No	No	No	No
2011	**NEPA Significance Determination**									No	No	No	na
2012										No	No	No	na
2013						No	No	No	na	No	No	No	na
2015		No	No	No	na	No	No	No	na	No	No	No	na
2018		No	No	No	na	No	No	No	na	No	No	No	na
2023		No	No	No	na	No	No	No	na	No	No	No	na
2028		No	No	No	na	No	No	No	na	No	No	No	na
2033		No	No	No	na	No	No	No	na	No	No	No	na
2053		No	No	No	na	No	No	No	na	No	No	No	na
2062		No	No	No	na	No	No	No	na	No	No	No	na

Figure 3. Operational Increment Comparisons for PM10

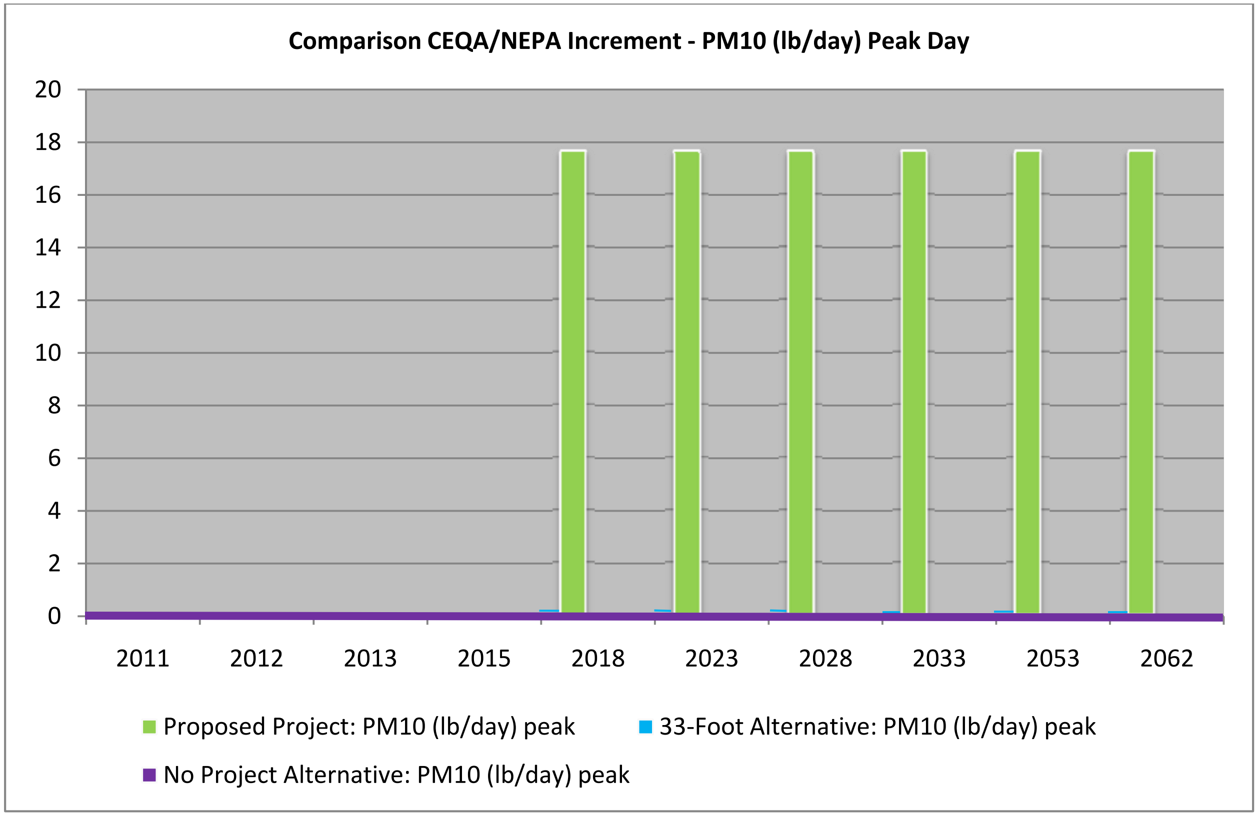


Figure 4. Operation Increment Comparisons for NOx

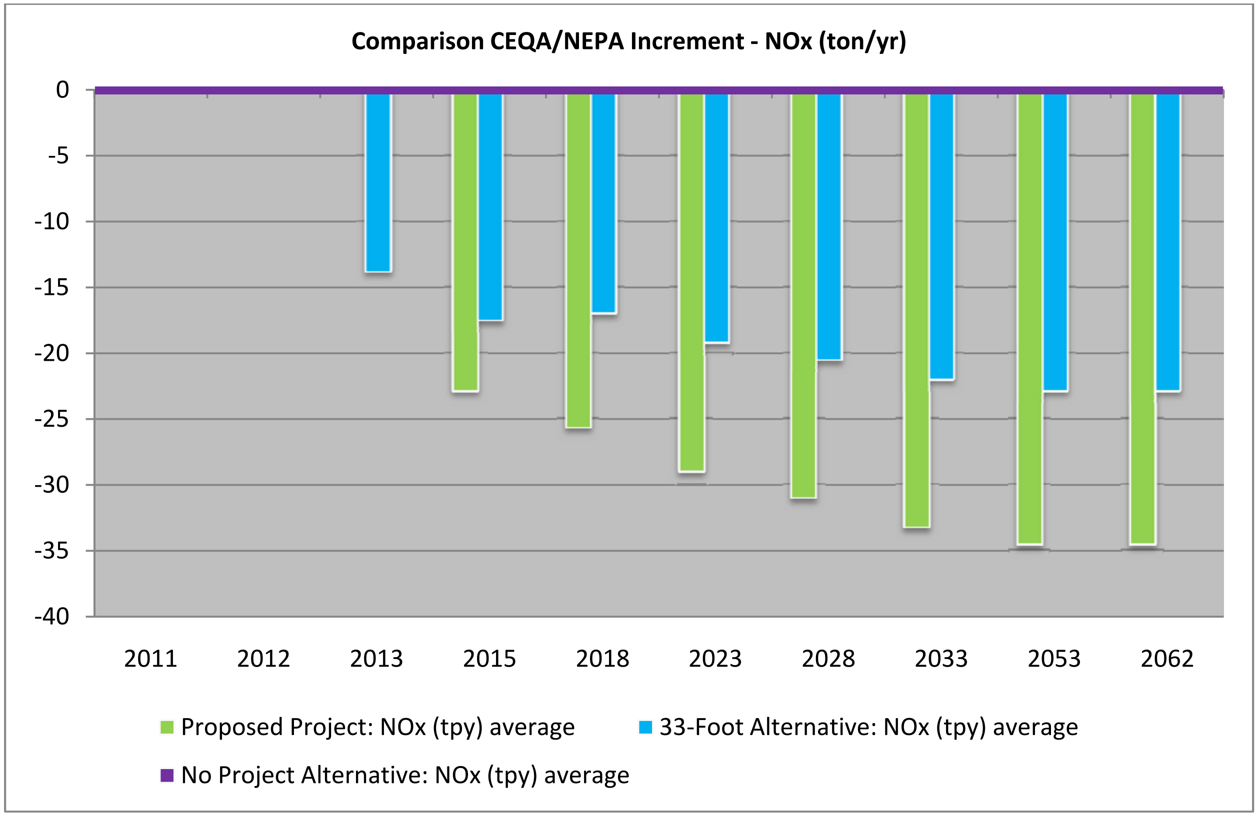


Figure 5. Operation Increment Comparisons for ROG

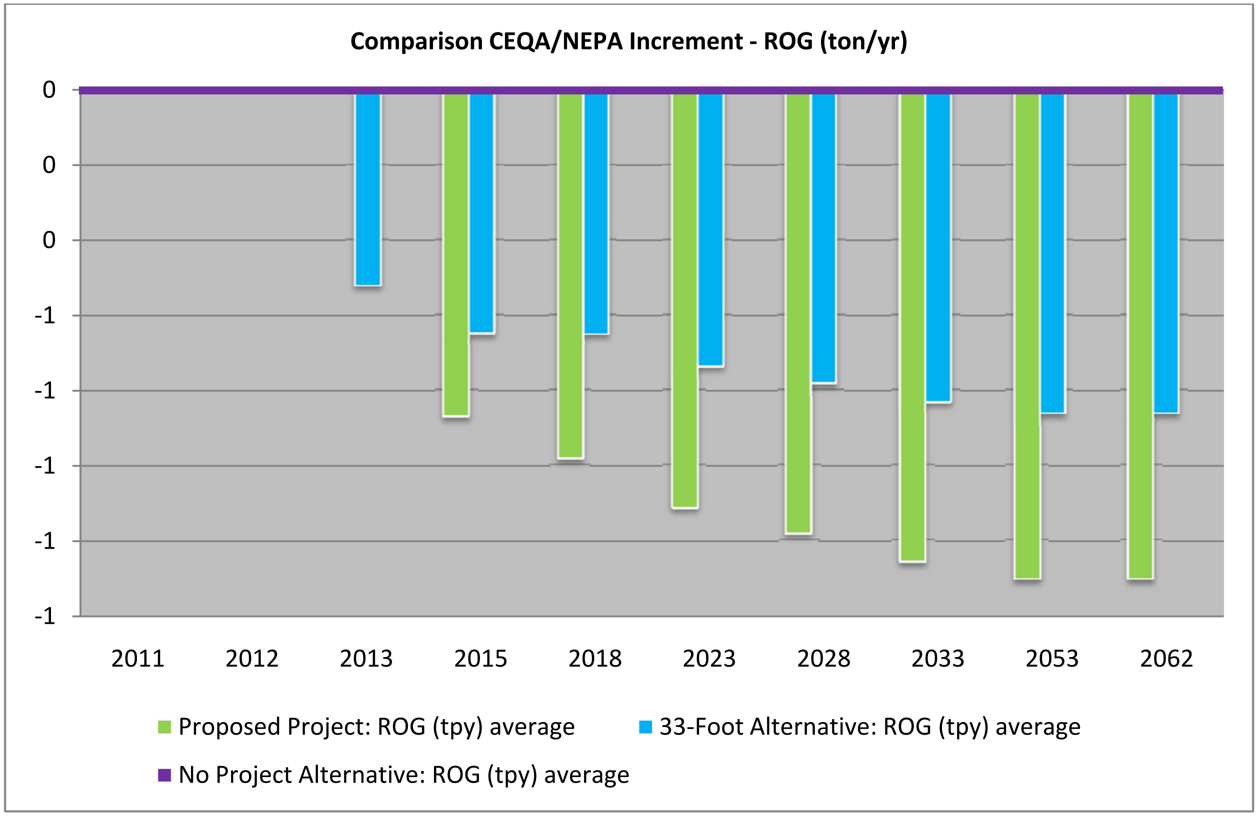
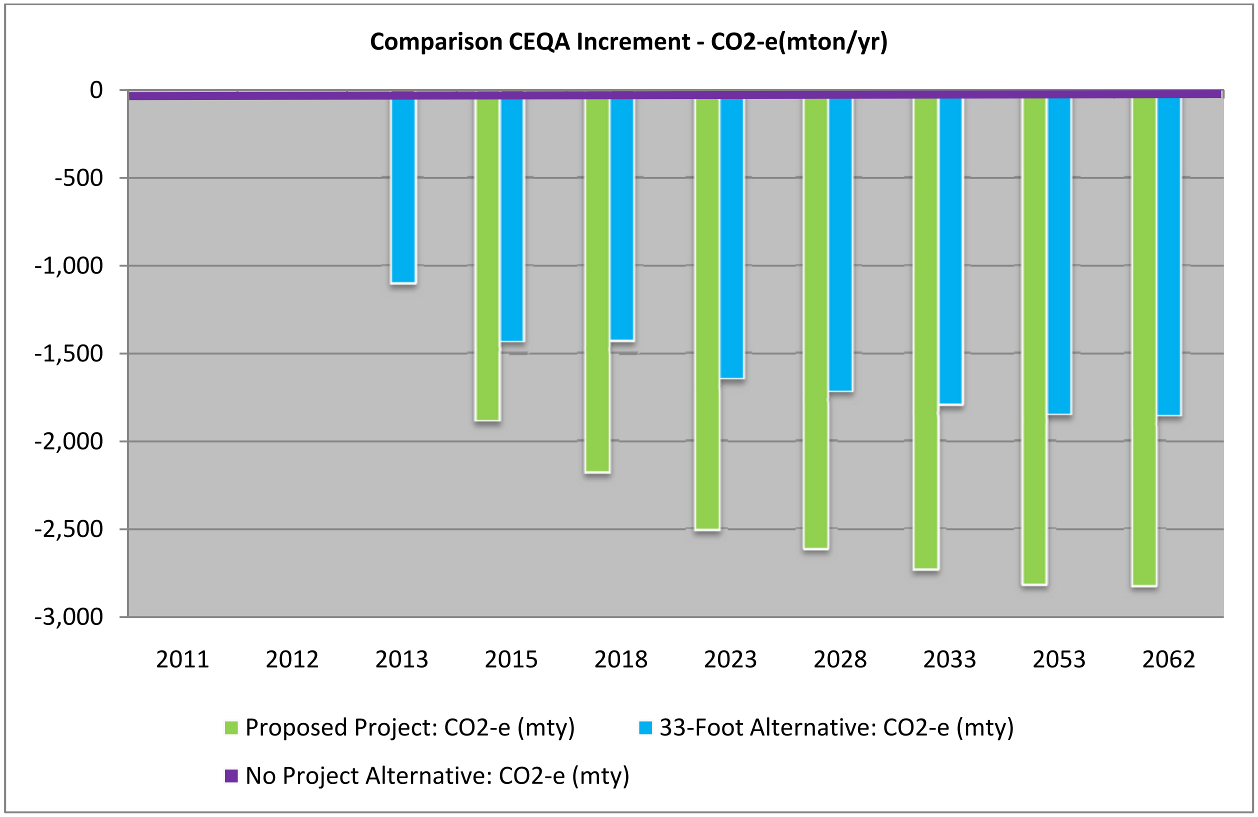


Figure 6. Operation Increment Comparisons for GHG



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Appendix A

Calculation Tables

Table A1. Commodities Throughput

Forecasted Throughput (Project = No Project; forecasted throughput is based on regional growth and facility permit caps)

Vessel Type	Commodity	Baseline 2009	2010	2011	2012	2013	2015	2016	2018	2021	2023	2026	2028	2033	2036	2053	2062	2065
Bulk Carrier	Bulk Rice [2], [3]	281,309		318,738	318,738	318,738	318,738		318,738		318,738		318,738	318,738		318,738	318,738	
Bulk Carrier	Urea [1,4]	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652	124,652
Bulk Carrier	Fertilizer [1], [6]	28,291																
Bulk Carrier	Cement - Sand/Gravel [1,5]	95,313	97,696	118,693	139,690	160,687	202,681	223,678	235,436	253,072	266,374	286,327	300,578	336,207	357,584	357,584	357,584	357,584
Bulk Carrier	Wood Pellets [1]	0	0	0	75,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Bulk Carrier	Recycled Metal [1]	0	0	270,000	280,890	291,781	313,562	324,452	357,955	408,210	450,362	513,591	566,171	697,622	776,493	776,493	776,493	776,493
	Total BULK CARRIER Throughput	**529,565**		**832,083**	**938,971**	**1,045,858**	**1,109,633**		**1,186,781**		**1,310,127**		**1,460,140**	**1,627,220**		**1,727,467**	**1,727,467**	
General Carrier	Power Generating Equipment [2,7]	5,028		5,028	5,028	5,028	5,028		5,028		5,028		5,028	5,028		5,028	5,028	
	Total GENERAL CARRIER Throughput	**5,028**		**5,028**	**5,028**	**5,028**	**5,028**		**5,028**		**5,028**		**5,028**	**5,028**		**5,028**	**5,028**	
Liquid Tanker	Anhydrous Ammonia [1,4]	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200	63,200
Liquid Tanker	Biofuels (capped growth) [1,8]	0	0	0	270,000	300,000	360,000	390,000	450,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000
	Total LIQUID TANKER Throughput	**63,200**		**63,200**	**333,200**	**363,200**	**423,200**		**513,200**		**603,200**		**603,200**	**603,200**		**603,200**	**603,200**	
	Total Commodity Throughput	**597,793**		**900,311**	**1,277,199**	**1,414,086**	**1,537,861**		**1,705,009**		**1,918,355**		**2,068,368**	**2,235,448**		**2,335,695**	**2,335,695**	

	Number of Barges per Day [10]
Marine Highway Barge Service	**1**

Source of Throughput Data: USACE, *San Francisco District. Sacramento River Deep Water Ship Channel Limited Reevaluation Report, Without Project Economics* . January 2010.

[1] Throughput analysis was based on USACE growth forecasts.

[2] Throughput analysis assumed that rice and generating equipment vessels do not require a greater channel depth and as such would not experience an increase in throughput.
Throughput was assumed constant (based on historical average) for all analysis years.

[3] Bagged rice was not included in USACE regional growth projections. Per Tom Scheeler, throughput of bulk rice is actually for bagged rice (4/15/2010).

[4] Throughput was assumed constant (based on historical average) for all analysis years.

[5] Combines sand, gravel and Cemex

[6] Fertilizer shipments recently shifted from the POWS to the Port of Stockton. Therefore, there would be no fertilizer throughput in future years.

Commodities where USACE forecast exceeded facility permit caps used permit caps to estimate number of ships in future.

[7] Throughput assumes maximum historical = very conservative

[8] A new biofuels facility is permitted and will begin operation in 2012. Throughput was capped at the facility permit cap. Any additional increase would require additional permitting on the part of the tenant and separate environmental documentation on the part of the tenant. USACE projected that demand will exceed permit cap after 2021.

[9] Slag - USACE did not include slag in their projections. If in the future a slag facility is approved it would accommodate 75,000 metric tons of throughput.

[10] Number of barges per day was specified in the TIGER fund application.

[11] based on permit limit, but not addressed in USACE regional growth projections. Tom (4/5/10): aggregate portion is not built yet, but will operate.

Table A.2 Ocean Going Vessel Engine Data

Baseline

Vessel Type_DWT	DWT [1]	Propulsion Fuel Type (HFO, MGO, MDO, etc)	Auxiliary Engine Fuel Type	Service Speed (knots)	Activity: Average Time in River (hr) / one-way trip	Average Time Maneuvering (hr) / one-way trip	Average Time at Berth (hr) / call [2]	Average Time at Anchorage for Tidal Delay (hr) / call [2]	Propulsion Engine Rating (hP) [3]	Auxiliary Engine Loads (kW) [4]: River	Maneuvering	Berth Hotelling	Tidal Delay Anchorage Hotelling	River	Auxiliary Boiler Loads (kw) [6]: Maneuvering	Berth Hotelling	Tidal Delay Anchorage Hotelling
Bulk Carrier_15000	15,000	HFO	ULSD	14	5	1.1	58.7	12	8,204	462	1,227	356	311	0	109	109	109
Bulk Carrier_25000	25,000			14	5	1.1	58.7	12	9,189	483	1,282	371	326	0	109	109	109
Bulk Carrier_35000	35,000			14	5	1.1	58.7	12	10,174	504	1,338	386	341	0	109	109	109
Bulk Carrier_40000	40,000			14	5	1.1	58.7	12	10,666	515	1,366	393	349	0	109	109	109
Bulk Carrier_50000	50,000			14	5	1.1	58.7	12	11,651	536	1,422	408	364	0	109	109	109
Bulk Carrier_60000	60,000			14	5	1.1	58.7	12	12,636	557	1,477	423	379	0	109	109	109
									10,420								
General Carrier_11000	11,000	HFO	ULSD	15	5	1.1	57.8	12	6,214	508	1,348	617	514	0	252	252	252
General Carrier_14000	14,000			15	5	1.1	57.8	12	7,078	523	1,386	645	536	0	252	252	252
General Carrier_16000	16,000			15	5	1.1	57.8	12	7,654	532	1,412	663	551	0	252	252	252
General Carrier_20000	20,000			15	5	1.1	57.8	12	8,806	551	1,463	700	580	0	252	252	252
General Carrier_24000	24,000			15	5	1.1	57.8	12	9,958	571	1,514	738	610	0	252	252	252
General Carrier_30000	30,000			15	5	1.1	57.8	12	11,686	599	1,590	793	654	0	252	252	252
									8,566								
Tanker_20000	20,000	HFO	ULSD	20	5	1.1	34.9	24	8,745	506	703	453	509	0	371	2,500	371
Tanker_25000	25,000			20	5	1.1	34.9	24	9,287	611	849	527	532	0	371	2,500	371
Tanker_35000	35,000			20	5	1.1	34.9	24	10,370	820	1,139	675	578	0	371	2,500	371
Tanker_50000	50,000			20	5	1.1	34.9	24	11,994	1,133	1,574	897	647	0	371	2,500	371
Tanker_60000	60,000			20	5	1.1	34.9	24	13,077	1,342	1,864	1,045	693	0	371	2,500	371

10,694

9,846 1,350

[1] Source: USACE

[2] CARB 2008, Emisison Estimation Methodology for OGV, App. D, Table II-2 (at berth time for Sacramento), Table II-3 (anchorage time for Sacramento).

[3] Analysis of Commercial Marine Vessel Emissions and Fuel Consumption Data, Table 4-3. EPA420-R-00-002. February 2000. (propulsion engines in hp)

Table A3. Vessel Calls

Vessel Type_DWT	Vessel Type [1]	Draft (feet) [1]	Vessel Size (DWT) [1]	# Vessel Calls / Year Baseline 2009	# Vessel Calls / Year Without Project (30' draft) 2011	2012	2013	2015	2018	2023	2028	2033	2053	2062
Bulk Carrier_15000	Bulk Carrier	32	15,000	0.8	1.3	1.4	1.6	1.7	1.8	2.0	2.2	2.5	2.6	2.6
Bulk Carrier_25000	Bulk Carrier	38	25,000	10.3	16.2	18.3	20.3	21.6	23.1	25.5	28.4	31.7	33.6	33.6
Bulk Carrier_35000	Bulk Carrier	39	35,000	2.5	3.9	4.4	4.9	5.2	5.6	6.2	6.9	7.6	8.1	8.1
Bulk Carrier_40000	Bulk Carrier	41	40,000	10.4	16.3	18.4	20.4	21.7	23.2	25.6	28.5	31.8	33.8	33.8
Bulk Carrier_50000	Bulk Carrier	42	50,000	4.3	6.8	7.6	8.5	9.0	9.7	10.7	11.9	13.3	14.1	14.1
Bulk Carrier_60000	Bulk Carrier	43	60,000	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Bulk Carrier Total	Bulk Carrier Total			28.4	44.6	50.3	56.0	59.4	63.6	70.2	78.2	87.2	92.5	92.5
General Carrier_11000	General Carrier	29	11,000	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
General Carrier_14000	General Carrier	32	14,000	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
General Carrier_16000	General Carrier	32	16,000	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
General Carrier_20000	General Carrier	32	20,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General Carrier_24000	General Carrier	33	24,000	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
General Carrier_30000	General Carrier	34	30,000	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
General Carrier Total [2]	General Carrier Total [2]			8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Tanker_20000	Tanker	n/a	20,000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker_25000	Tanker	39	25,000	4.1	4.1	21.4	23.3	27.1	32.9	38.7	38.7	38.7	38.7	38.7
Tanker_35000	Tanker	33	35,000	0.2	0.2	1.2	1.3	1.5	1.8	2.1	2.1	2.1	2.1	2.1
Tanker_50000	Tanker	n/a	50,000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker_60000	Tanker	n/a	60,000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker Total	Tanker Total			4.3	4.3	22.6	24.6	28.7	34.7	40.8	40.8	40.8	40.8	40.8
Total Number of Vessels				41	58	82	89	97	107	120	128	137	142	142

[1] Source of Vessel Characteristics: USACE, *San Francisco District. Sacramento River Deep Water Ship Channel Limited Reevaluation Report, Without Project Economics* . October 2010.

[2] General Carrier vessel count was assumed not to change with or without the project because future throughput would remain constant and because the large size of the power generation equipment carried on these vessels limits the

Table A3. Vessel Calls

	# Vessel Calls / Year With Project (35' draft)										# Vessel Calls / Year Alternative 1 (33' draft)							
Vessel Type_DWT	2011	2012	2013	2015	2018	2023	2028	2033	2053	2062	2011	2012	2013	2015	2018	2023	2028	2033
Bulk Carrier_15000	1.3	1.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.4	0.4	0.5	0.5	0.6	0.6	0.7
Bulk Carrier_25000	16.2	18.3	20.3	10.1	10.8	11.9	13.2	14.8	15.7	15.7	16.2	18.3	14.1	15.0	16.0	17.7	19.7	22.0
Bulk Carrier_35000	3.9	4.4	4.9	6.0	6.5	7.1	7.9	8.9	9.4	9.4	3.9	4.4	4.0	4.2	4.5	5.0	5.6	6.2
Bulk Carrier_40000	16.3	18.4	20.4	8.0	8.6	9.5	10.6	11.8	12.5	12.5	16.3	18.4	13.3	14.1	15.0	16.6	18.5	20.6
Bulk Carrier_50000	6.8	7.6	8.5	14.1	15.1	16.6	18.5	20.7	21.9	21.9	6.8	7.6	11.0	11.7	12.5	13.8	15.4	17.2
Bulk Carrier_60000	0.2	0.2	0.2	2.0	2.2	2.4	2.6	3.0	3.1	3.1	0.2	0.2	1.3	1.4	1.5	1.7	1.9	2.1
Bulk Carrier Total	44.6	50.3	56.0	40.2	43.0	47.5	52.9	59.0	62.6	62.6	44.6	50.3	44.2	46.9	50.2	55.4	61.7	68.8
General Carrier_11000	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
General Carrier_14000	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
General Carrier_16000	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
General Carrier_20000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General Carrier_24000	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
General Carrier_30000	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
General Carrier Total [2]	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Tanker_20000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker_25000	4.1	21.4	23.3	14.7	17.8	20.9	20.9	20.9	20.9	20.9	4.1	21.4	16.6	19.3	23.5	27.6	27.6	27.6
Tanker_35000	0.2	1.2	1.3	3.9	4.7	5.6	5.6	5.6	5.6	5.6	0.2	1.2	2.9	3.4	4.1	4.9	4.9	4.9
Tanker_50000	0.0	0.0	0.0	1.0	1.2	1.4	1.4	1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker_60000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanker Total	4.3	22.6	24.6	19.6	23.7	27.9	27.9	27.9	27.9	27.9	4.3	22.6	19.5	22.8	27.6	32.4	32.4	32.4
Total Number of Vessels	58	82	89	69	76	84	90	96	99	99	58	82	73	78	87	97	103	110

[1] Source of Vessel Charac

[2] General Carrier vessel cnumber of pieces that can fit on a ship, regardless of ship DWT and regardless of channel depth.

Table A3. Vessel Calls

			# Vessel Calls / Day	# Vessel Calls / Day - Peak										# Vessel Calls /				
			Baseline	Without Project (30' draft)										With Project (				
Vessel Type_DWT	2053	2062	2009	2011	2012	2013	2015	2018	2023	2028	2033	2053	2062	2011	2012	2013	2015	2018
Bulk Carrier_15000	0.7	0.7	1	2	2	2	2	2	3	3	3	3	3	2	2	2	0	0
Bulk Carrier_25000	23.4	23.4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bulk Carrier_35000	6.6	6.6	3	4	5	5	5	5	5	5	5	5	5	4	5	5	5	5
Bulk Carrier_40000	21.9	21.9	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bulk Carrier_50000	18.3	18.3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bulk Carrier_60000	2.2	2.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3
Bulk Carrier Total	73.0	73.0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
General Carrier_11000	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Carrier_14000	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Carrier_16000	1.3	1.3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
General Carrier_20000	1.0	1.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Carrier_24000	3.8	3.8	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
General Carrier_30000	1.3	1.3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
General Carrier Total [2]	8.8	8.8	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Tanker_20000	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanker_25000	27.6	27.6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Tanker_35000	4.9	4.9	1	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Tanker_50000	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Tanker_60000	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanker Total	32.4	32.4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Number of Vessels	114	114																

Peak Day

Bulk and General Carriers are assumed to occupy berths: 5

Tankers assumed to occupy berths: 2

[1] Source of Vessel Charac

[2] General Carrier vessel c

Table A3. Vessel Calls

	Day - Peak					# Vessel Calls / Day - Peak									
	35' draft)					Alternative 1 (33' draft)									
Vessel Type_DWT	2023	2028	2033	2053	2062	2011	2012	2013	2015	2018	2023	2028	2033	2053	2062
Bulk Carrier_15000	0	0	0	0	0	2	2	1	1	1	1	1	1	1	1
Bulk Carrier_25000	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bulk Carrier_35000	5	5	5	5	5	4	5	4	5	5	5	5	5	5	5
Bulk Carrier_40000	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bulk Carrier_50000	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bulk Carrier_60000	3	3	3	4	4	1	1	2	2	2	2	2	3	3	3
Bulk Carrier Total	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
General Carrier_11000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Carrier_14000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Carrier_16000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
General Carrier_20000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General Carrier_24000	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
General Carrier_30000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
General Carrier Total [2]	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Tanker_20000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanker_25000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Tanker_35000	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
Tanker_50000	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0
Tanker_60000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanker Total	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Number of Vessels															

[1] Source of Vessel Charac

[2] General Carrier vessel c

Table A4. Future Fleet Mix [1]

VesselType_DWT	Vessel Type [1]	Draft (feet) [1]	Vessel Size (DWT) [1]	# Vessel Calls / Period of Years: Historical Average [2]	Fleet Mix by Channel Depth: 30 feet	33 feet [4]	35 feet [4]	Payload by Project Depth (tons/vessel) [3]: 30 feet	33 feet	35 feet
Bulk Carrier_15000	Bulk Carrier	32	15,000	16	3%	1%	0%	11,947	13,500	13,500
Bulk Carrier_25000	Bulk Carrier	38	25,000	203	36%	32%	25%	14,461	17,663	19,798
Bulk Carrier_35000	Bulk Carrier	39	35,000	49	9%	9%	15%	20,352	24,301	26,934
Bulk Carrier_40000	Bulk Carrier	41	40,000	204	36%	30%	20%	21,062	25,354	28,216
Bulk Carrier_50000	Bulk Carrier	42	50,000	85	15%	25%	35%	22,981	27,913	31,202
Bulk Carrier_60000	Bulk Carrier	43	60,000	2	0.4%	3%	5%	31,254	36,780	40,464
Bulk Carrier Total				559				18,670	23,662	27,577
General Carrier_11000	General Carrier	29	11,000	9	8%	8%	8%	8,550	8,550	8,550
General Carrier_14000	General Carrier	32	14,000	8	8%	8%	8%	10,175	10,175	10,175
General Carrier_16000	General Carrier	32	16,000	16	15%	15%	15%	12,640	12,640	12,640
General Carrier_20000	General Carrier	32	20,000	12	11%	11%	11%	11,761	11,761	11,761
General Carrier_24000	General Carrier	33	24,000	45	42%	42%	42%	12,169	12,169	12,169
General Carrier_30000	General Carrier	33	30,000	16	15%	15%	15%	12,914	12,914	12,914
General Carrier Total				106				11,849	11,849	11,849
Tanker_20000	Tanker	n/a	20,000	0	0%	0%	0%	0	0	0
Tanker_25000	Tanker	39	25,000	18	95%	85%	75%	14,533	17,801	19,981
Tanker_35000	Tanker	33	35,000	1	5%	15%	20%	19,039	23,092	25,795
Tanker_50000	Tanker	n/a	50,000	0	0%	0%	5%	21,044	26,135	29,529
Tanker_60000	Tanker	n/a	60,000	0	0%	0%	0%	0	0	0
Tanker Total				19				14,770	18,595	21,621

Source of Future Fleet Mix is USACE, San Francisco District. Sacramento River Deep Water Ship Channel Limited Reevaluation Report, Without Project Economics. October 2010.

[1] Tables 20,21,22.

[2] Tables 23,24,25,26,27,28.

[3] All payload information provided by USACE. The main USACE office responsible for the Deep Draft analysis tools is the Institute for Water Resources (IWR) via its Navigation Data Center and Waterborne Commerce Statistics Center. http://www.iwr.usace.army.mil.

[4] Tables 29,30 for bulk carriers and tankers. No change in general carrier fleet is expected as these would not benefit from a deeper channel.

Calculations do not take into account how heavy commodities are. Ie. some ships will be DWT bound and some will not.

Table A5. Emission Factors for OGV Propulsion Power using Residual Oil, g/kW-hr

GHG Emission Factors for OGV Propulsion Power using Residual

Engine	Model Year	PM10	PM2.5	DPM	NOx	SOx	CO	HC	CO2	CH4	N2O
Slow Speed Diesel [1]	1999-	1.5	1.2	1.5	18.1	10.5	1.4	0.6	620	0.012	0.031
Medium Speed Diesel [2]	1999-	1.5	1.2	1.5	14	11.5	1.1	0.5	683	0.01	0.031
Slow Speed Diesel	2000+	1.5	1.2	1.5	17	10.5	1.4	0.6	620	0.012	0.031
Medium Speed Diesel [2]	2000+	1.5	1.2	1.5	13	11.5	1.1	0.5	683	0.010	0.031
Gas Turbine	all	0.05	0.04	0	6.1	16.5	0.2	0.1	970	0.002	0.08
Steam Ship	all	0.8	0.6	0	2.1	16.5	0.2	0.1	970	0.002	0.08

1. Slow speed diesel: engine speed < 130 rpm
2. Medium speed diesel: engine speed > 130 rpm (400 rpm typical)

Fuel sulfur content: 2.7%

GHG Source: IVL, Methodology for Calculating Emissions from Ships: Update on Emission Factors”. Prepared by IVL Swedish Environmental Research Institute for the Swedish Environmental Protection Agency.

Table A6. Low Load Factors - Propulsion Engines

Load		PM10	PM2.5	DPM	NOx	SOx	CO	HC	CO2	CH4	N2O
0.02	docking loa	7.29	7.29	7.29	4.63	1.00	9.68	21.67	1.00	21.67	4.63
0.03	transit load	4.33	4.33	4.33	2.92	1.00	6.46	11.95	1.00	11.95	2.92
0.04	transit load	3.09	3.09	3.09	2.21	1.00	4.86	7.87	1.00	7.87	2.21
0.05	transit load	2.44	2.44	2.44	1.83	1.00	3.89	5.73	1.00	5.73	1.83
0.06	transit load	2.04	2.04	2.04	1.60	1.00	3.25	4.43	1.00	4.43	1.60
0.07	transit load	1.79	1.79	1.79	1.45	1.00	2.79	3.59	1.00	3.59	1.45
0.08	transit load	1.61	1.61	1.61	1.35	1.00	2.45	2.99	1.00	2.99	1.35
0.09	transit load	1.48	1.48	1.48	1.27	1.00	2.18	2.56	1.00	2.56	1.27
0.10	transit load	1.38	1.38	1.38	1.22	1.00	1.96	2.23	1.00	2.23	1.22
0.11	transit load	1.30	1.30	1.30	1.17	1.00	1.79	1.98	1.00	1.98	1.17
0.12	transit load	1.24	1.24	1.24	1.14	1.00	1.64	1.78	1.00	1.78	1.14
0.13	transit load	1.19	1.19	1.19	1.11	1.00	1.52	1.61	1.00	1.61	1.11
0.14	transit load	1.15	1.15	1.15	1.08	1.00	1.41	1.48	1.00	1.48	1.08
0.15	transit load	1.11	1.11	1.11	1.06	1.00	1.32	1.36	1.00	1.36	1.06
0.16	transit load	1.08	1.08	1.08	1.05	1.00	1.24	1.27	1.00	1.27	1.05
0.17	transit load	1.06	1.06	1.06	1.03	1.00	1.17	1.19	1.00	1.19	1.03
0.18	transit load	1.04	1.04	1.04	1.02	1.00	1.11	1.12	1.00	1.12	1.02
0.19	transit load	1.02	1.02	1.02	1.01	1.00	1.05	1.05	1.00	1.05	1.01
0.20	transit load	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 7. Emission Factors for OGV Auxiliary Power using Residual Oil, g/kW-hr

GHG Emission Factors for OGV Auxiliary Power using Residual Oil, g/kW-hr

Engine	Model Year	PM10	PM2.5	DPM	NOx	SOx	CO	HC	CO2	CH4	N2O
Medium Speed Diesel	2000+	1.5	1.2	1.5	13	12.3	1.1	0.4	683	0.08	0.031
Medium Speed Diesel	<=1999	1.5	1.2	1.5	14.7	12.3	1.1	0.4	683	0.08	0.031

GHG Source: IVL, Methodology for Calculating Emissions from Ships: Update on Emission Factors". Prepared by IVL SwedishEnvironmental Research Institute for the Sw

Table 8. Emission Factors for OGV Auxiliary Boilers using Residual Oil, g/kW-hr

Engine	PM10	PM2.5	DPM	NOx	SOx	CO	HC	CO2	CH4	N2O
Steam Boiler	0.8	0.6	0	2.1	16.5	0.2	0.1	970	0.002	0.08

Table 9. Fuel Correction Factors

Actual Fuel	Sulfur Content	PM10	PM2.5	DPM	NOx	SOx	CO	HC	CO2	CH4	N2O
HFO	1.50%	0.82	0.82	0.82	1	0.56	1	1	1	1	1
MDO	1.50%	0.47	0.47	0.47	0.9	0.56	1	1	1	1	0.9
MGO	0.50%	0.25	0.25	0.25	0.94	0.18	1	1	1	1	0.94
MGO	0.20%	0.19	0.19	0.19	0.94	0.07	1	1	1	1	0.94
MGO	0.10%	0.17	0.17	0.17	0.94	0.04	1	1	1	1	0.94
	1.00%	0.36	0.36	0.36	0.92	0.37	1	1	1	1	0.92

Table A10. Harbor Craft (used to maneuver OGVs) Emission Factors - Unmitigated

												Unmitigated Criteria Pollutant Emission Factors (g/hp-hr) [2]						GHG Emission Factors (g/hp-hr) [3]			
Year	Equipment	Power Rating (hp)	Model Year	Number of Engines per Craft	Total Power Rating (hp)	kW/engine	Equipment Age (yr)	Average Operating Hours (hr/yr)	Cumulative Hours at the end of Useful Life (hr)	Cumulative Hours (hr)	Load Factor (%)	NOx	CO	ROG	HC	PM	SO2	CO2	N2O	CH4	Tier
2009	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	5	62	1,307	311	0.31	5.09	3.95	0.57	0.54	0.14	0.0055	602	0.03	0.01	
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	5	62	1,431	311	0.43	5.12	4.06	1.80	1.71	0.25	0.005	592	0.03	0.04	
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	35	62	1,307	2,178	0.31	19.26	4.35	1.38	1.31	0.91	0.005	1,297	0.06	0.04	
	Tug Boat (auxiliary engine)	83	1975	2	166	62	35	62	1,431	2,178	0.43	14.67	6.14	1.85	1.75	0.85	0.005	1,227	0.05	0.06	
2011	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	7	87	1,817	606	0.31	5.19	4.04	0.59	0.56	0.15	0.005	649	0.03	0.01	
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	7	87	1,990	606	0.43	5.15	4.20	1.88	1.78	0.26	0.005	634	0.03	0.04	
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	37	87	1,817	3,201	0.31	4.36	4.43	0.51	0.48	0.28	0.005	1,343	0.06	0.04	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	37	87	1,990	3,201	0.43	4.36	6.21	0.51	0.48	0.28	0.005	1,269	0.06	0.06	2
2012	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	8	123	2,573	980	0.31	5.24	4.09	0.60	0.57	0.15	0.005	672	0.03	0.01	
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	8	123	2,818	980	0.43	5.16	4.26	1.91	1.81	0.26	0.005	656	0.03	0.04	
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	38	123	2,573	4,656	0.31	4.36	4.46	0.51	0.48	0.28	0.005	1,367	0.06	0.04	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	38	123	2,818	4,656	0.43	4.36	6.24	0.51	0.48	0.28	0.005	1,290	0.06	0.07	2
2013	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	9	134	2,817	1,207	0.31	5.28	4.13	0.61	0.58	0.15	0.005	695	0.03	0.01	
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	9	134	3,086	1,207	0.43	5.17	4.33	1.95	1.85	0.27	0.005	677	0.03	0.04	
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	39	134	2,817	5,232	0.31	4.36	4.50	0.51	0.48	0.28	0.005	1,390	0.06	0.04	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	39	134	3,086	5,232	0.43	4.36	6.28	0.51	0.48	0.28	0.005	1,311	0.06	0.07	2
2015	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	11	145	3,053	1,599	0.31	5.38	4.22	0.63	0.60	0.16	0.005	741	0.03	0.01	
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	11	145	3,344	1,599	0.43	5.20	4.46	2.02	1.92	0.27	0.005	719	0.03	0.05	
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	41	145	3,053	5,961	0.31	4.36	4.57	0.51	0.48	0.28	0.005	1,436	0.06	0.04	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	41	145	3,344	5,961	0.43	4.36	6.35	0.51	0.48	0.28	0.005	1,353	0.06	0.07	2
2018	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	14	161	3,375	2,250	0.31	5.53	4.35	0.67	0.63	0.17	0.005	811	0.04	0.02	
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	14	161	3,697	2,250	0.43	5.24	4.66	2.13	2.02	0.28	0.005	782	0.03	0.05	
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	44	161	3,375	7,072	0.31	4.36	4.68	0.51	0.48	0.28	0.005	1,505	0.07	0.05	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	44	161	3,697	7,072	0.43	4.36	6.45	0.51	0.48	0.28	0.005	1,417	0.06	0.07	2
2023	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	19	180	3,775	3,416	0.31	4.36	4.57	0.51	0.48	0.28	0.005	926	0.04	0.02	2
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	19	180	4,135	3,416	0.43	4.36	4.99	0.51	0.48	0.28	0.005	888	0.04	0.06	2
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	49	180	3,775	8,809	0.31	4.36	4.87	0.51	0.48	0.28	0.005	1,621	0.07	0.05	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	49	180	4,135	8,809	0.43	4.36	6.62	0.51	0.48	0.28	0.005	1,523	0.07	0.08	2
2028	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	24	192	4,028	4,604	0.31	4.36	4.80	0.51	0.48	0.28	0.005	1,042	0.05	0.02	2
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	24	192	4,412	4,604	0.43	4.36	5.33	0.51	0.48	0.28	0.005	994	0.04	0.06	2
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	54	192	4,028	10,358	0.31	4.36	5.05	0.51	0.48	0.28	0.005	1,737	0.08	0.05	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	54	192	4,412	10,358	0.43	4.36	6.79	0.51	0.48	0.28	0.005	1,628	0.07	0.08	2
2033	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	29	205	4,310	5,952	0.31	4.36	5.02	0.51	0.48	0.28	0.005	1,158	0.05	0.02	2
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	29	205	4,721	5,952	0.43	4.36	5.66	0.51	0.48	0.28	0.005	1,100	0.05	0.07	2
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	59	205	4,310	12,109	0.31	4.36	5.23	0.51	0.48	0.28	0.005	1,853	0.08	0.06	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	59	205	4,721	12,109	0.43	4.36	6.97	0.51	0.48	0.28	0.005	1,734	0.08	0.09	2
2053	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	49	213	4,479	10,452	0.31	4.36	5.91	0.51	0.48	0.28	0.005	1,621	0.07	0.03	2
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	49	213	4,906	10,452	0.43	4.36	6.99	0.51	0.48	0.28	0.005	1,523	0.07	0.10	2
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	79	213	4,479	16,851	0.31	4.36	5.96	0.51	0.48	0.28	0.005	2,316	0.10	0.07	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	79	213	4,906	16,851	0.43	4.36	7.65	0.51	0.48	0.28	0.005	2,157	0.10	0.11	2
2062	Tug Boat - small (main engine)[1]	350	2005	3	1,050	261	58	213	4,479	12,371	0.31	4.36	6.31	0.51	0.48	0.28	0.005	1,830	0.08	0.04	2
	Tug Boat - small (auxiliary engine)	38	2005	2	76	28	58	213	4,906	12,371	0.43	4.36	7.59	0.51	0.48	0.28	0.005	1,713	0.08	0.11	2
	Tug Boat (main engine)[2]	2150	1975	1	2,150	1,604	88	213	4,479	18,770	0.31	4.36	6.29	0.51	0.48	0.28	0.005	2,525	0.11	0.08	2
	Tug Boat (auxiliary engine)	83	1975	2	166	62	88	213	4,906	18,770	0.43	4.36	7.96	0.51	0.48	0.28	0.005	2,347	0.10	0.12	2

Activity per OGV	
Peak Day (hr/day) / OGV	Average Year (hr/yr) / OGV
2	1.5

Reference:

[1] Mike Tugboats, per Port staff e-mail, August 10, 2010.

[2] Robert Tugboats, per Port staff e-mail, August 10, 2010.

[2]: Mitigated scenario assumes newer tugboats

Table A11. Harbor Craft (used during dredging) Emission Factors - Unmitigated

												Unmitigated Criteria Pollutant Emission Factors (g/hp-hr)[2]						GHG Emission Factors (g/hp-hr) [3]			
Year	Equipment	Power Rating (hp)	Model Year	Number of Engines per Craft	Total Power Rating (hp)	kW/engin e	Equipment Age (yr)	Average Operating Hours (hr/yr)	Average Useful Life (hr)	Cumulativ e Hours (hr)	Load Factor (%)	NOx	CO	ROG	HC	PM	SO2	CO2	N2O	CH4	Tier
2011	Dredge Tender (main engine)	335	2011	2	670	250	1	2,268	38,556	2,268	0.45	4.36	3.12	0.51	0.48	0.28	0.005	515	0.02	0.02	2
	Dredge Tender (auxiliary engine)	50	2011	1	50	37	1	2,268	52,164	2,268	0.43	4.36	4.36	0.51	0.48	0.28	0.005	508	0.02	0.02	2
	Pipeline Tender (main engine)	238	2011	1	238	178	1	2,268	38,556	2,268	0.45	4.36	3.10	0.51	0.48	0.28	0.005	515	0.02	0.02	2
	Pipeline Tender (auxiliary engine)	0	2011	0	0	0	1	2,268	52,164	2,268	0.43	4.36	4.56	0.51	0.48	0.28	0.005	508	0.02	0.02	2
	Tugboat (main engine)	700	2011	2	1,400	522	1	12	204	12	0.31	4.36	3.12	0.51	0.48	0.28	0.005	515	0.02	0.02	2
	Tugboat (auxiliary engine)	115	2011	2	230	86	1	12	276	12	0.43	4.36	4.56	0.51	0.48	0.28	0.005	508	0.02	0.02	2
2012	Dredge Tender (main engine)	335	2011	2	670	250	2	2,268	38,556	4,536	0.45	4.36	3.16	0.51	0.48	0.28	0.005	544	0.02	0.02	2
	Dredge Tender (auxiliary engine)	50	2011	1	50	37	2	2,268	52,164	4,536	0.43	4.36	4.39	0.51	0.48	0.28	0.005	529	0.02	0.02	2
	Pipeline Tender (main engine)	238	2011	1	238	178	2	2,268	38,556	4,536	0.45	4.36	3.13	0.51	0.48	0.28	0.005	544	0.02	0.02	2
	Pipeline Tender (auxiliary engine)	0	2011	0	0	0	2	2,268	52,164	4,536	0.43	4.36	4.59	0.51	0.48	0.28	0.005	529	0.02	0.02	2
	Tugboat (main engine)	700	2011	2	1,400	522	2	12	204	24	0.31	4.36	3.16	0.51	0.48	0.28	0.005	544	0.02	0.02	2
	Tugboat (auxiliary engine)	115	2011	2	230	86	2	12	276	24	0.43	4.36	4.59	0.51	0.48	0.28	0.005	529	0.02	0.02	2
2013	Dredge Tender (main engine)	335	2011	2	670	250	3	2,268	38,556	6,804	0.45	4.36	3.21	0.51	0.48	0.28	0.005	572	0.03	0.02	2
	Dredge Tender (auxiliary engine)	50	2011	1	50	37	3	2,268	52,164	6,804	0.43	4.36	4.42	0.51	0.48	0.28	0.005	550	0.02	0.02	2
	Pipeline Tender (main engine)	238	2011	1	238	178	3	2,268	38,556	6,804	0.45	4.36	3.16	0.51	0.48	0.28	0.005	572	0.03	0.02	2
	Pipeline Tender (auxiliary engine)	0	2011	0	0	0	3	2,268	52,164	6,804	0.43	4.36	4.62	0.51	0.48	0.28	0.005	550	0.02	0.02	2
	Tugboat (main engine)	700	2011	2	1,400	522	3	12	204	36	0.31	4.36	3.21	0.51	0.48	0.28	0.005	572	0.03	0.02	2
	Tugboat (auxiliary engine)	115	2011	2	230	86	3	12	276	36	0.43	4.36	4.62	0.51	0.48	0.28	0.005	550	0.02	0.02	2
2014	Dredge Tender (main engine)	335	2011	2	670	250	4	2,268	38,556	9,072	0.45	4.36	3.25	0.51	0.48	0.28	0.005	601	0.03	0.02	2
	Dredge Tender (auxiliary engine)	50	2011	1	50	37	4	2,268	52,164	9,072	0.43	4.36	4.45	0.51	0.48	0.28	0.005	571	0.03	0.02	2
	Pipeline Tender (main engine)	238	2011	1	238	178	4	2,268	38,556	9,072	0.45	4.36	3.19	0.51	0.48	0.28	0.005	601	0.03	0.02	2
	Pipeline Tender (auxiliary engine)	0	2011	0	0	0	4	2,268	52,164	9,072	0.43	4.36	4.65	0.51	0.48	0.28	0.005	571	0.03	0.02	2
	Tugboat (main engine)	700	2011	2	1,400	522	4	12	204	48	0.31	4.36	3.25	0.51	0.48	0.28	0.005	601	0.03	0.02	2
	Tugboat (auxiliary engine)	115	2011	2	230	86	4	12	276	48	0.43	4.36	4.65	0.51	0.48	0.28	0.005	571	0.03	0.02	2
2015	Dredge Tender (main engine)	335	2011	2	670	250	5	2,268	38,556	11,340	0.45	4.36	3.30	0.51	0.48	0.28	0.005	629	0.03	0.02	2
	Dredge Tender (auxiliary engine)	50	2011	1	50	37	5	2,268	52,164	11,340	0.43	4.36	4.48	0.51	0.48	0.28	0.005	592	0.03	0.02	2
	Pipeline Tender (main engine)	238	2011	1	238	178	5	2,268	38,556	11,340	0.45	4.36	3.22	0.51	0.48	0.28	0.005	629	0.03	0.02	2
	Pipeline Tender (auxiliary engine)	0	2011	0	0	0	5	2,268	52,164	11,340	0.43	4.36	4.69	0.51	0.48	0.28	0.005	592	0.03	0.02	2
	Tugboat (main engine)	700	2011	2	1,400	522	5	12	204	60	0.31	4.36	3.30	0.51	0.48	0.28	0.005	629	0.03	0.02	2
	Tugboat (auxiliary engine)	115	2011	2	230	86	5	12	276	60	0.43	4.36	4.69	0.51	0.48	0.28	0.005	592	0.03	0.02	2

Reference:

Tender and tugboat main engine hp was provided by Tom Scheeler

Tender and tugboat auxiliary engine hp was assumed based on other similar dredging projects.

Table A12. Phase 2: Dredging Equipment Unmitigated Emission Factors and Activity

											Emission Factors									
Year	Equipment	OFFROAD Key	Power Rating (hp)	Load Factor	No. Active	Hourly hp-hrs	Hours per Day	Daily hp-hrs	Work hours/ year	Total hp-hrs/year	ROG Exhaust (g/hp-hr)	CO Exhaust (g/hp-hr)	NOX Exhaust (g/hp-hr)	SO2 Exhaust (g/hp-hr)	PM Exhaust (g/hp-hr)	PM Fugitive Dust (g/hp-hr)	CO2 Exhaust (g/hp-hr)	N2O Exhaust (g/hp-hr)	CH4 Exhaust (g/hp-hr)	Emission Factor Reference
2011	Hydraulic Dredge Plant, 20" - Main Engine [1]	2011_dredge	3,004	0.51	1	1,532	16	24,513	2,592	3,971,048	0.57	2.01	6.61	0.01	0.20	0.00	568.31	0.00	0.05	OFFROAD2007
	Hydraulic Dredge Plant, 20" - Prime Genset [1]	2011_dredge	2,220	0.51	1	1,132	18	20,380	2,916	3,301,495	0.57	2.01	6.61	0.01	0.20	0.00	568.31	0.00	0.05	OFFROAD2007
	Hydraulic Dredge Plant, 20" - Auxiliary [1]	2011_dredge	80	0.51	1	41	6	245	1,404	57,283	0.57	2.01	6.61	0.01	0.20	0.00	568.31	0.00	0.05	OFFROAD2007
	Crane/Derrick and barge [1]	2011_crane	460	0.43	1	198	1	198	234	46,285	0.27	1.01	3.34	0.01	0.11	0.00	568.31	0.00	0.02	OFFROAD2007
	Total																			
2012	Hydraulic Dredge Plant, 20" - Main Engine [1]	2012_dredge	3,004	0.51	1	1,532	16	24,513	2,592	3,971,048	0.53	1.83	6.25	0.01	0.18	0.00	568.31	0.00	0.05	OFFROAD2007
	Hydraulic Dredge Plant, 20" - Prime Genset [1]	2012_dredge	2,220	0.51	1	1,132	18	20,380	2,916	3,301,495	0.53	1.83	6.25	0.01	0.18	0.00	568.31	0.00	0.05	OFFROAD2009
	Hydraulic Dredge Plant, 20" - Auxiliary [1]	2012_dredge	80	0.51	1	41	6	245	1,404	57,283	0.53	1.83	6.25	0.01	0.18	0.00	568.31	0.00	0.05	OFFROAD2009
	Crane/Derrick and barge [1]	2012_crane	460	0.43	1	198	1	198	234	46,285	0.26	1.01	2.98	0.01	0.09	0.00	568.31	0.00	0.02	OFFROAD2010
	Total																			
2013	Hydraulic Dredge Plant, 20" - Main Engine [1]	2013_dredge	3,004	0.51	1	1,532	16	24,513	2,592	3,971,048	0.50	1.67	5.90	0.01	0.17	0.00	568.31	0.00	0.04	OFFROAD2007
	Hydraulic Dredge Plant, 20" - Prime Genset [1]	2013_dredge	2,220	0.51	1	1,132	18	20,380	2,916	3,301,495	0.50	1.67	5.90	0.01	0.17	0.00	568.31	0.00	0.04	OFFROAD2012
	Hydraulic Dredge Plant, 20" - Auxiliary [1]	2013_dredge	80	0.51	1	41	6	245	1,404	57,283	0.50	1.67	5.90	0.01	0.17	0.00	568.31	0.00	0.04	OFFROAD2012
	Crane/Derrick and barge [1]	2013_crane	460	0.43	1	198	1	198	234	46,285	0.25	1.00	2.65	0.01	0.08	0.00	568.31	0.00	0.02	OFFROAD2013
	Total																			
2014	Hydraulic Dredge Plant, 20" - Main Engine [1]	2014_dredge	3,004	0.51	1	1,532	16	24,513	2,592	3,971,048	0.47	1.52	4.09	0.01	0.11	0.00	568.31	0.00	0.04	CARB 2010 standa
	Hydraulic Dredge Plant, 20" - Prime Genset [1]	2014_dredge	2,220	0.51	1	1,132	18	20,380	2,916	3,301,495	0.47	1.52	5.55	0.01	0.16	0.00	568.31	0.00	0.04	OFFROAD2015
	Hydraulic Dredge Plant, 20" - Auxiliary [1]	2014_dredge	80	0.51	1	41	6	245	1,404	57,283	0.47	1.52	5.55	0.01	0.16	0.00	568.31	0.00	0.04	OFFROAD2015
	Crane/Derrick and barge [1]	2014_crane	460	0.43	1	198	1	198	234	46,285	0.24	1.00	2.23	0.01	0.07	0.00	568.31	0.00	0.02	OFFROAD2016
	Total																			
2015	Hydraulic Dredge Plant, 20" - Main Engine [1]	2015_dredge	3,004	0.51	1	1,532	16	24,513	2,592	3,971,048	0.44	1.40	4.09	0.01	0.11	0.00	568.31	0.00	0.04	CARB 2010 standa
	Hydraulic Dredge Plant, 20" - Prime Genset [1]	2015_dredge	2,220	0.51	1	1,132	18	20,380	2,916	3,301,495	0.44	1.40	5.22	0.01	0.15	0.00	568.31	0.00	0.04	OFFROAD2018
	Hydraulic Dredge Plant, 20" - Auxiliary [1]	2015_dredge	80	0.51	1	41	6	245	1,404	57,283	0.44	1.40	5.22	0.01	0.15	0.00	568.31	0.00	0.04	OFFROAD2018
	Crane/Derrick and barge [1]	2015_crane	460	0.43	1	198	1	198	234	46,285	0.22	1.00	1.91	0.01	0.06	0.00	568.31	0.00	0.02	OFFROAD2019
	Total																			

Table A13. Dredging Equipment Mitigation Measures - % Reduction

	ROG	CO	NOx	SO2	PM10	PM2.5	CO2
SCR [1]	50%	50%	80%	0%	30%	30%	0%
PM Filter [1]	0%	0%	0%	0%	80%	80%	0%

Source: 1. Johnson Matthey. Reductions represent low end values; actual reductions may be greater.

Table A14. Phase 1 Construction Equipment URBEMIS Output:
200 acre Placement Site Preparation
Daily Emissions (lb/day)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (lbs/day unmitigated)	6.88	60.16	30.31	0.00	500.01	2.65	502.65	104.42	2.43	106.86	6,071
2011 TOTALS (lbs/day mitigated)	6.88	60.16	30.31	0.00	30.20	0.40	30.60	6.31	0.37	6.68	6,071
2012 TOTALS (lbs/day unmitigated)	6.53	56.33	28.59	0.00	500.01	2.45	502.45	104.42	2.25	106.67	6,071
2012 TOTALS (lbs/day mitigated)	6.53	56.33	28.59	0.00	30.20	0.37	30.57	6.31	0.34	6.65	6,071
2013 TOTALS (lbs/day unmitigated)	6.30	52.79	26.98	0.00	500.01	2.26	502.27	104.42	2.08	106.51	6,071
2013 TOTALS (lbs/day mitigated)	6.30	52.79	26.98	0.00	30.20	0.35	30.54	6.31	0.32	6.62	6,071
2014 TOTALS (lbs/day unmitigated)	5.97	48.90	25.69	0.00	500.01	2.07	502.08	104.42	1.90	106.32	6,077
2014 TOTALS (lbs/day mitigated)	5.97	48.90	25.69	0.00	30.20	0.32	30.51	6.31	0.29	6.60	6,077
2015 TOTALS (lbs/day unmitigated)	5.62	44.95	24.41	0.00	500.01	1.90	501.90	104.42	1.74	106.17	6,072
2015 TOTALS (lbs/day mitigated)	5.62	44.95	24.41	0.00	30.20	0.29	30.49	6.31	0.27	6.57	6,072

Table A15. Phase 1 Construction Equipment URBEMIS Output:
500 acre Placement Site Preparation
Daily Emissions (lb/day)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (lbs/day unmitigated)	10.78	95.57	47.18	0.00	1,250.01	4.04	1,254.06	261.05	3.72	264.77	9,560
2011 TOTALS (lbs/day mitigated)	10.78	95.57	47.18	0.00	78.28	0.61	78.90	16.35	0.56	16.91	9,560
2012 TOTALS (lbs/day unmitigated)	10.26	89.54	44.35	0.00	1,250.01	3.75	1,253.76	261.05	3.45	264.50	9,560
2012 TOTALS (lbs/day mitigated)	10.26	89.54	44.35	0.00	75.49	0.57	76.06	15.77	0.52	16.29	9,560
2013 TOTALS (lbs/day unmitigated)	9.92	83.97	41.68	0.00	1,250.01	3.48	1,253.49	261.05	3.20	264.25	9,560
2013 TOTALS (lbs/day mitigated)	9.92	83.97	41.68	0.00	75.49	0.53	76.02	15.77	0.49	16.25	9,560
2014 TOTALS (lbs/day unmitigated)	9.42	77.76	39.54	0.00	1,250.01	3.19	1,253.20	261.05	2.93	263.98	9,565
2014 TOTALS (lbs/day mitigated)	9.42	77.76	39.54	0.00	75.49	0.49	75.97	15.77	0.45	16.21	9,565
2015 TOTALS (lbs/day unmitigated)	8.87	71.59	37.42	0.00	1,250.01	2.92	1,252.93	261.05	2.69	263.74	9,560
2015 TOTALS (lbs/day mitigated)	8.87	71.59	37.42	0.00	75.49	0.45	75.93	15.77	0.41	16.18	9,560

Table A16. Phase 1 Construction Equipment URBEMIS Output:
200 acre Placement Site Preparation
Annual Emissions (ton/yr)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (tons/year unmitigated)	0.27	2.35	1.18	0.00	19.50	0.10	19.60	4.07	0.09	4.17	236.78
2011 TOTALS (tons/year mitigated)	0.27	2.35	1.18	0.00	1.18	0.02	1.19	0.25	0.01	0.26	236.78
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.78	93.91	93.96	84.80	93.75	0.00
2012 TOTALS (tons/year unmitigated)	0.26	2.23	1.13	0.00	19.75	0.10	19.85	4.12	0.09	4.21	239.82
2012 TOTALS (tons/year mitigated)	0.26	2.23	1.13	0.00	1.19	0.01	1.21	0.25	0.01	0.26	239.82
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.77	93.92	93.96	84.80	93.77	0.00
2013 TOTALS (tons/year unmitigated)	0.25	2.09	1.07	0.00	19.75	0.09	19.84	4.12	0.08	4.21	239.82
2013 TOTALS (tons/year mitigated)	0.25	2.09	1.07	0.00	1.19	0.01	1.21	0.25	0.01	0.26	239.82
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.76	93.92	93.96	84.79	93.78	0.00
2014 TOTALS (tons/year unmitigated)	0.24	1.93	1.01	0.00	19.75	0.08	19.83	4.12	0.08	4.20	240.02
2014 TOTALS (tons/year mitigated)	0.24	1.93	1.01	0.00	1.19	0.01	1.21	0.25	0.01	0.26	240.02
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.70	93.92	93.96	84.73	93.79	0.00
2015 TOTALS (tons/year unmitigated)	0.22	1.78	0.96	0.00	19.75	0.07	19.83	4.12	0.07	4.19	239.83
2015 TOTALS (tons/year mitigated)	0.22	1.78	0.96	0.00	1.19	0.01	1.20	0.25	0.01	0.26	239.83
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.73	93.93	93.96	84.76	93.81	0.00

Table A17. Phase 1 Construction Equipment URBEMIS Output:
500 acre Placement Site Preparation
Annual Emissions (ton/yr)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (tons/year unmitigated)	0.42	3.73	1.84	0.00	48.75	0.16	48.91	10.18	0.15	10.33	372.83
2011 TOTALS (tons/year mitigated)	0.42	3.73	1.84	0.00	3.05	0.02	3.08	0.64	0.02	0.66	372.83
Percent Reduction	0.00	0.00	0.00	0.00	93.74	84.80	93.71	93.74	84.82	93.61	0.00
2012 TOTALS (tons/year unmitigated)	0.41	3.54	1.75	0.00	49.38	0.15	49.52	10.31	0.14	10.45	377.62
2012 TOTALS (tons/year mitigated)	0.41	3.54	1.75	0.00	2.98	0.02	3.00	0.62	0.02	0.64	377.62
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.79	93.93	93.96	84.82	93.84	0.00
2013 TOTALS (tons/year unmitigated)	0.39	3.32	1.65	0.00	49.38	0.14	49.51	10.31	0.13	10.44	377.62
2013 TOTALS (tons/year mitigated)	0.39	3.32	1.65	0.00	2.98	0.02	3.00	0.62	0.02	0.64	377.62
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.78	93.94	93.96	84.81	93.85	0.00
2014 TOTALS (tons/year unmitigated)	0.37	3.07	1.56	0.00	49.38	0.13	49.50	10.31	0.12	10.43	377.83
2014 TOTALS (tons/year mitigated)	0.37	3.07	1.56	0.00	2.98	0.02	3.00	0.62	0.02	0.64	377.83
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.74	93.94	93.96	84.76	93.86	0.00
2015 TOTALS (tons/year unmitigated)	0.35	2.83	1.48	0.00	49.38	0.12	49.49	10.31	0.11	10.42	377.63
2015 TOTALS (tons/year mitigated)	0.35	2.83	1.48	0.00	2.98	0.02	3.00	0.62	0.02	0.64	377.63
Percent Reduction	0.00	0.00	0.00	0.00	93.96	84.75	93.94	93.96	84.78	93.87	0.00

Table A18. Phase 2 Construction Equipment URBEMIS Output:
200 acre Placement Site Activity during Dredging
Daily Emissions (lb/day)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (lbs/day unmitigated)	2.32	19.36	11.43	0.00	250.00	0.90	250.90	52.21	0.83	53.04	1,844
2011 TOTALS (lbs/day mitigated)	2.32	19.36	11.43	0.00	17.42	0.14	17.56	3.64	0.13	3.76	1,844
2012 TOTALS (lbs/day unmitigated)	2.20	18.26	10.90	0.00	250.00	0.83	250.83	52.21	0.76	52.97	1,844
2012 TOTALS (lbs/day mitigated)	2.20	18.26	10.90	0.00	17.42	0.13	17.55	3.64	0.12	3.75	1,844
2013 TOTALS (lbs/day unmitigated)	2.13	17.22	10.38	0.00	250.00	0.77	250.78	52.21	0.71	52.92	1,844
2013 TOTALS (lbs/day mitigated)	2.13	17.22	10.38	0.00	17.42	0.12	17.54	3.64	0.11	3.75	1,844
2014 TOTALS (lbs/day unmitigated)	2.02	16.10	9.91	0.00	250.00	0.70	250.71	52.21	0.65	52.86	1,844
2014 TOTALS (lbs/day mitigated)	2.02	16.10	9.91	0.00	17.42	0.11	17.53	3.64	0.10	3.74	1,844
2015 TOTALS (lbs/day unmitigated)	1.89	14.88	9.47	0.00	250.00	0.65	250.65	52.21	0.60	52.81	1,844
2015 TOTALS (lbs/day mitigated)	1.89	14.88	9.47	0.00	17.42	0.10	17.52	3.64	0.09	3.73	1,844

Table A19. Phase 2 Construction Equipment URBEMIS Output:
500 acre Placement Site Activity during Dredging
Daily Emissions (lb/day)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (lbs/day unmitigated)	2.32	19.36	11.43	0.00	625.00	0.90	625.90	130.53	0.83	131.35	1,844
2011 TOTALS (lbs/day mitigated)	2.32	19.36	11.43	0.00	43.55	0.14	43.68	9.09	0.13	9.22	1,844
2012 TOTALS (lbs/day unmitigated)	2.20	18.26	10.90	0.00	625.00	0.83	625.83	130.53	0.76	131.29	1,844
2012 TOTALS (lbs/day mitigated)	2.20	18.26	10.90	0.00	43.55	0.13	43.67	9.09	0.12	9.21	1,844
2013 TOTALS (lbs/day unmitigated)	2.13	17.22	10.38	0.00	625.00	0.77	625.78	130.53	0.71	131.24	1,844
2013 TOTALS (lbs/day mitigated)	2.13	17.22	10.38	0.00	43.55	0.12	43.66	9.09	0.11	9.20	1,844
2014 TOTALS (lbs/day unmitigated)	2.02	16.10	9.91	0.00	625.00	0.70	625.71	130.53	0.65	131.17	1,844
2014 TOTALS (lbs/day mitigated)	2.02	16.10	9.91	0.00	43.55	0.11	43.65	9.09	0.10	9.19	1,844
2015 TOTALS (lbs/day unmitigated)	1.89	14.88	9.47	0.00	625.00	0.65	625.65	130.53	0.60	131.12	1,844
2015 TOTALS (lbs/day mitigated)	1.89	14.88	9.47	0.00	43.55	0.10	43.65	9.09	0.09	9.19	1,844

Table A20. Phase 2 Construction Equipment URBEMIS Output:
200 acre Placement Site Activity during Dredging
Annual Emissions (ton/yr)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (tons/year unmitigated)	0.15	1.28	0.75	0.00	16.50	0.06	16.56	3.45	0.05	3.50	121.69
2011 TOTALS (tons/year mitigated)	0.15	1.28	0.75	0.00	1.15	0.01	1.16	0.24	0.01	0.25	121.69
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.83	93.00	93.03	84.85	92.90	0.00
2012 TOTALS (tons/year unmitigated)	0.20	1.65	0.99	0.00	22.63	0.07	22.70	4.73	0.07	4.79	166.87
2012 TOTALS (tons/year mitigated)	0.20	1.65	0.99	0.00	1.58	0.01	1.59	0.33	0.01	0.34	166.87
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.82	93.00	93.03	84.85	92.91	0.00
2013 TOTALS (tons/year unmitigated)	0.19	1.57	0.94	0.00	22.75	0.07	22.82	4.75	0.06	4.82	167.79
2013 TOTALS (tons/year mitigated)	0.19	1.57	0.94	0.00	1.59	0.01	1.60	0.33	0.01	0.34	167.79
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.81	93.01	93.03	84.84	92.92	0.00
2014 TOTALS (tons/year unmitigated)	0.18	1.46	0.90	0.00	22.75	0.06	22.81	4.75	0.06	4.81	167.80
2014 TOTALS (tons/year mitigated)	0.18	1.46	0.90	0.00	1.59	0.01	1.59	0.33	0.01	0.34	167.80
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.79	93.01	93.03	84.82	92.93	0.00
2015 TOTALS (tons/year unmitigated)	0.17	1.35	0.86	0.00	22.75	0.06	22.81	4.75	0.05	4.81	167.80
2015 TOTALS (tons/year mitigated)	0.17	1.35	0.86	0.00	1.59	0.01	1.59	0.33	0.01	0.34	167.80
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.78	93.01	93.03	84.80	92.94	0.00

Table A21. Phase 2 Construction Equipment URBEMIS Output:
500 acre Placement Site Activity during Dredging
Annual Emissions (ton/yr)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2011 TOTALS (tons/year unmitigated)	0.15	1.28	0.75	0.00	41.25	0.06	41.31	8.61	0.05	8.67	121.69
2011 TOTALS (tons/year mitigated)	0.15	1.28	0.75	0.00	2.87	0.01	2.88	0.60	0.01	0.61	121.69
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.83	93.02	93.03	84.85	92.98	0.00
2012 TOTALS (tons/year unmitigated)	0.20	1.65	0.99	0.00	56.56	0.07	56.64	11.81	0.07	11.88	166.87
2012 TOTALS (tons/year mitigated)	0.20	1.65	0.99	0.00	3.94	0.01	3.95	0.82	0.01	0.83	166.87
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.82	93.02	93.03	84.85	92.98	0.00
2013 TOTALS (tons/year unmitigated)	0.19	1.57	0.94	0.00	56.88	0.07	56.95	11.88	0.06	11.94	167.79
2013 TOTALS (tons/year mitigated)	0.19	1.57	0.94	0.00	3.96	0.01	3.97	0.83	0.01	0.84	167.79
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.81	93.02	93.03	84.84	92.99	0.00
2014 TOTALS (tons/year unmitigated)	0.18	1.46	0.90	0.00	56.88	0.06	56.94	11.88	0.06	11.94	167.80
2014 TOTALS (tons/year mitigated)	0.18	1.46	0.90	0.00	3.96	0.01	3.97	0.83	0.01	0.84	167.80
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.79	93.02	93.03	84.82	92.99	0.00
2015 TOTALS (tons/year unmitigated)	0.17	1.35	0.86	0.00	56.88	0.06	56.93	11.88	0.05	11.93	167.80
2015 TOTALS (tons/year mitigated)	0.17	1.35	0.86	0.00	3.96	0.01	3.97	0.83	0.01	0.84	167.80
Percent Reduction	0.00	0.00	0.00	0.00	93.03	84.78	93.02	93.03	84.80	92.99	0.00

Table A22. Construction Equipment URBEMIS Output:
Worker Vehicle Emissions
Daily Emissions (lb/day)

Year	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
2011	0.60	0.45	7.75	0.01	1.54	0.29	763
2012	0.56	0.41	7.14	0.01	1.54	0.29	762
2013	0.53	0.38	6.58	0.01	1.54	0.29	762
2014	0.49	0.34	6.05	0.01	1.54	0.29	762
2015	0.46	0.32	5.58	0.01	1.54	0.29	762

Table A23. Construction Equipment URBEMIS Output:
Worker Vehicle Emissions
Annual Emissions (ton/yr)

Year	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
2011	0.10	0.10	1.38	0.00	0.28	0.05	132
2012	0.10	0.09	1.28	0.00	0.28	0.05	132
2013	0.09	0.08	1.18	0.00	0.28	0.05	132
2014	0.08	0.08	1.09	0.00	0.28	0.05	132
2015	0.08	0.07	1.00	0.00	0.28	0.05	132

Table 24. Construction/Dredging Activity

Sequential Order by Time	Conceptual Equipment List Per Yearly Contract	HP	Number of Pieces in Operation	Number of Hours in Use during Days in Operation	Number of Hours in Use during Days in Mobilization	Operating days per month	Operating Hrs per Year	Load Factors
Phase 1	**Placement Site Preparation**							
May, June, July	Dozer, CAT-D8 w/ compactor attachment	310	1	7		26		URBEMIS default
months:	Excavater, CAT-345	380	1	6		26		URBEMIS default
3	Scraper, CAT 620	330	2	8		26		URBEMIS default
	Loader, CAT-966	275	1	7		26		URBEMIS default
	20 CY Trucks to haul soil and debris	GVWR	2	6		26		URBEMIS default
	Water Truck	175	1	8		26		URBEMIS default
	Fill Crew (operators/laborers)	-	8 Man Crew	8.5		26		not applicable
Phase 2	**Hydraulic Dredging**							
August, September,	Hydraulic Dredge Plant, 20" - Main Engine [1]	3,004	1	16		30	2,592	OFFROAD default
October, November	Hydraulic Dredge Plant, 20" - Prime Genset [1]	2,220	1	18		30	2,916	OFFROAD default
	Hydraulic Dredge Plant, 20" - Auxiliary [1]	80	1	6	24	30	1,404	51%
December, January,	Crane/Derrick and barge [1]	460	1	1	4	30	234	43%
February	Dredge Tender	670	1	12	18	30	2,268	31% main engine; 43% auxiliary engine
months:	Pipeline Tender	238	1	12	18	30	2,268	31% main engine; 43% auxiliary engine
6	Work/Crew/Survey Vessel	50	3	24		30	3,888	not applicable
	Dredge Crew (operators/deckhands)	-	18 Man Crew	24		30	3,888	not applicable
	Dozer, CAT D6R LGP [2]	200	1	12	2	30	1,980	URBEMIS default
	Excavator, CAT 320 [2]	150	1	2	2	30	360	URBEMIS default
	Fill Crew (operators/laborers)	-	6 Man Crew	6		30	972	not applicable
	Tugboat used to initially position barge			2		1	12	31% main engine; 43% auxiliary engine

Maintenance Dredging		Scaling Factor = maintenance dredging activity / Phase 1 or 2 activity
weeks/year:		
Phase 1	2	0.022
Phase 2	6	0.233

[1] Dredging engine information and activity were obtained from Ross Island dredging contractor. 10/21/2010 e-mail. Load factors provided by Ross Island were higher than OFFROAD2007 defaults; OFFROAD default load factor
[2] Landside construction equipment activity was provided by Ross Island dredging contractor. 10/21/2010 e-mail.
[3] Phase I and Phase 2 are not concurrent.