

PORT OF LONG BEACH DEEP DRAFT NAVIGATION FEASIBILITY STUDY

Los Angeles County, California

**Draft Integrated Feasibility Report and
Environmental Impact Statement /
Environmental Impact Report (EIS/EIR)**

October 2019

Volume 2: Technical Appendices H to M



**US Army Corps
of Engineers®**



**Port of
LONG BEACH**
The Green Port

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DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT (EIS/EIR)

APPENDIX H: AIR QUALITY ANALYSIS

PORT OF LONG BEACH
DEEP DRAFT NAVIGATION STUDY
Los Angeles County, California

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Appendix H1 Criteria Pollutant and GHG Emission Calculations

H1.1 Introduction

This appendix describes the methods and assumptions used to quantify criteria pollutant and greenhouse gas (GHG) emissions generated from construction of the Deep Draft Navigation Project and Alternatives. Section H1.2 defines the pollutants, averaging times, analysis years, emission sources, and geographical boundaries included in the emission calculations under NEPA and CEQA. Section H1.3 describes the methodology for the construction emission calculations. Detailed source activity and emission calculation tables for the Action Alternatives are included as attachments at the end of this appendix.

Implementation of the No Action and Action Alternatives would not result in operational activities and would therefore not result in operational impacts. Furthermore, the No Action Alternative would not construct an Approach Channel to Pier J South, deepen the West Basin Channel, deepen the Approach Channel, widen portions of the Main Channel, or construct the Local Service Facilities. However maintenance dredging of existing channel depths would continue, when and where needed. The No Action Alternative would not increase ship calls or throughput, and would not incrementally increase operational emissions within the study area. Future maintenance dredging and disposal of dredged material would be subject to separate detailed analysis under CEQA and/or NEPA. Emission calculations associated with maintenance dredging are not included in this appendix. Please refer to Chapter 2 and Chapter 4 for a detailed explanation of the No Action Alternative and Action Alternatives, respectively.

The Action Alternatives are described in detail in Section 4 (Plan Formulation). The No Action Alternative is also described in detail in Section 4 (Plan Formulation), is assessed qualitatively in Sections 5.5 (Air Quality Environmental Consequences) and 5.6 (Greenhouse Gas Environmental Consequences) of the DEIS/DEIR, and therefore is not included in this appendix.

H1.2 Emission Parameters

Pollutants

The air quality analysis quantified emissions of the following criteria pollutants or precursors: volatile organic compounds (VOC), carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), and sulfur oxides (SO_x). Emissions of diesel particulate matter (DPM), a subset of PM₁₀, were also quantified because DPM is the dominant toxic air contaminant in the health risk evaluation conducted for this EIS/EIR. Estimates of lead emissions were not calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Emission factors developed by the U.S. Environmental Protection Agency, the California Air Resources Board, and the South Coast Air Quality Management District (SCAQMD), including those in CalEEMod, the SCAQMD-approved emission modeling software, do not provide estimated emissions for lead. Little to no quantifiable and foreseeable lead emissions would be generated by the Action Alternatives.

The air quality analysis also quantified emissions of the following GHGs: carbon dioxide (CO₂), nitrous oxide (N₂O), and methane (CH₄), which are products of engine exhaust. Global warming potential (GWP) is the ability of a gas or aerosol to trap heat in the atmosphere. GHGs have varying amounts of GWP. By convention, CO₂ is assigned a GWP of 1. In comparison, CH₄ has a GWP of 25, which means that it has a global warming effect 25 times greater than CO₂ on an equal-mass basis. N₂O has a GWP of 298 (IPCC, 2007). To account for their GWP, GHG emissions are reported in the emission tables as carbon dioxide

equivalent (CO₂e). CO₂e was calculated by multiplying each GHG emission by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. The GWPs used in the emission calculations are shown in tables at the end of this appendix.

Averaging Times

For criteria pollutants, annual emissions were calculated for comparison against the General Conformity applicability rates in nonattainment or maintenance areas (40 CFR Part 93). For CEQA impacts, peak daily (24-hour) emissions were calculated for comparison against the South Coast Air Quality Management District (SCAQMD) daily significance thresholds (SCAQMD 2019). Annual, peak 24-hour, peak 8-hour (for CO), and peak 1-hour criteria pollutant emissions were calculated to support the dispersion modeling analysis used to predict local ambient pollutant concentrations.

For GHG, annual and total construction emissions were calculated for presentation under NEPA. For CEQA impacts, total construction emissions were amortized over a 30-year period in accordance with SCAQMD guidance (SCAQMD 2008) for comparison against the SCAQMD CO₂e annualized significant emissions threshold for industrial projects (SCAQMD 2019).

Analysis Years

Construction emissions were based on anticipated equipment utilization in each construction year. Tables detailing construction schedules for all Action Alternatives are included as attachments at the end of this appendix. The following general construction schedules were used for the Action Alternatives:

- All Action Alternatives include widening of the Main channel to the authorized depth of -76' mean lower low water (MLLW), construction of structural improvements to the Pier J breakwater as described in Section 4.6.5, deepening Pier J Basin, berth dredging at the Pier J South Slips in the Pier J Basin and along Pier T, and, with implementation of MM-AQ-1, use of electric clamshell dredges and construction of an electrical substation at Pier J. Dredged material would be disposed at the Surfside Borrow Area, LA-2, and/or LA-3.
- Alternative 2. In addition, Alternative 2 includes constructing an approach channel to Pier J South to -53 ft MLLW; constructing a turning basin outside of Pier J South to -53 ft MLLW; deepening the West Basin to -53 ft MLLW; and the deepening of the Approach Channel to -78' MLLW. Construction activities associated with Alternative 2 would occur over approximately 34 months, from January 2024 through October 2026.
- Alternative 3. In addition to activities common to all Action Alternatives, Alternative 3 includes constructing an approach channel to Pier J South to -55 ft MLLW; constructing a turning basin outside of Pier J South to -55 ft MLLW; deepening the West Basin to -55 ft MLLW; and deepening of the Approach Channel to -80' MLLW. Construction activities associated with Alternative 3 would occur over approximately 40 months, from January 2024 through April 2027.
- Alternative 4. In addition to activities common to all Action Alternatives, Alternative 4 includes constructing an approach channel to Pier J South to -57 ft MLLW; constructing a turning basin outside of Pier J South to -57 ft MLLW; deepening the West Basin to -57 ft MLLW; deepening of the Approach Channel to -82' MLLW, Pier T wharf upgrades, and Pier J wharf upgrades. Construction activities associated with Alternative 4 would take occur over approximately 62 months, from January 2024 through February 2029.
- Alternative 5. In addition to activities common to all Action Alternatives, Alternative 5 includes constructing an approach channel to Pier J South to -55 ft MLLW; constructing a turning basin outside of Pier J South to -55 ft MLLW; deepening the West Basin to -55 ft MLLW; the deepening of the Approach Channel to -80' MLLW (like Alternative 3), and the construction of a Standby Area adjacent

to the Main Channel dredged to -67' MLLW, with a 300-foot diameter center anchor placement with a depth of -73' MLLW. Construction activities associated with Alternative 5 would take occur over approximately 50 months, from January 2024 through February 2028.

For the purposes of the emission calculations, construction activities were assumed to occur in the earliest foreseeable years. Should construction be delayed beyond the assumed dates, emissions would be lower due to the gradual replacement of older construction equipment with newer equipment meeting the existing State and federal off-road engine emission standards.

Emission Sources

Criteria pollutant and GHG emission sources associated with construction activities would include dredging equipment (hopper and clamshell dredges), harbor craft, off-road construction equipment, on-road vehicles, and worker vehicles. Earth-disturbance activities, such as grading, bulldozing, material handling, and driving over paved and unpaved surfaces, would be minimal and would generate particulate matter (PM) emissions in the form of fugitive dust. The same emission sources and utilization assumptions were analyzed under both NEPA (including General Conformity applicability) and CEQA. The emission calculation approach for each source category is described in Section H1.3 of this appendix.

Geographical Boundaries

All activity and therefore all emissions would occur within the South Coast Air Basin (SCAB). Therefore, criteria pollutant and GHG construction emissions were calculated within the SCAB to align with the General Conformity applicability rates in nonattainment and maintenance areas and SCAQMD daily emission significance thresholds.

H1.3 Methodology for Construction Emission Calculations

Air pollutant emissions from the proposed construction activities were calculated using the most current emission factors and methods available at the time the calculations were performed. Annual emissions, which were used for General Conformity applicability, GHG impacts, and dispersion modeling, were quantified based on the annual construction activity assumptions in each year of construction. To estimate peak daily construction emissions, emissions were first calculated for the individual construction activities and then summed for overlapping construction activities, per the anticipated construction schedule. The combination of construction activities producing the highest daily emissions was then selected as the peak day and compared to the SCAQMD emission thresholds for construction. The specific emission calculation approach for each construction source category is described below.

The Federal actions annual VOC, CO, NO₂, PM₁₀ and PM_{2.5} (including precursors) emission rates for each Action Alternative were first calculated for the applicable analysis years. For purposes of this evaluation, emissions of NO₂ are assumed to equal emissions of NO_x since NO₂ is the predominant form of NO_x. These emissions are associated with mobile and area sources expected to be used for on-site construction-related purposes. The annual emissions (tons per year) from each of the Action Alternatives were then compared to the General Conformity applicability rates, presented in Table 5.5-2, to assess General Conformity applicability under the Clean Air Act.

Dredging Equipment. As described in Section 4, hopper dredges would be used to dredge sediment in the Approach Channel and transport and place the dredged sediment at nearshore (primarily), LA-2, and/or LA-3 placement sites. Hopper dredge engines are large marine engines used for propulsion and operation of the dredging equipment. Emission factors for hopper dredge propulsion and auxiliary engines therefore

reflect existing USEPA marine engine standards (USEPA 2016a). Hopper dredge propulsion and auxiliary engines were assumed to be Tier 2 marine diesel engines, per USACE.

As described in Section 4, clamshell dredges would be used to dredge the Main Channel, West Basin, Pier J Basin (including berth dredging at Pier J South), Pier J Approach Channel and turning basin, Pier T Berths, and Standby Area (Alternative 5 only). Clamshell dredges are not self-propelled and emission factors for these engines reflect existing USEPA non-road engine standards; clamshell dredge engines were assumed to be Tier 3 non-road diesel engines, per USACE and the Port.

Both hopper dredge and clamshell dredge utilization, schedule, activity, engine size, and load factors were based on project-specific dredging requirements presented in tables at the end of this appendix.

Harbor Craft. Tugboats would be used to position clamshell dredges and transport sediment-laden barges to the nearshore, LA-2, and/or LA-3 placement sites. Crew boats and survey boats would also be used to support dredging activities. Harbor craft utilization, schedule, activity, and engine sizes, provided by the USACE and the Port, were used in the analysis. Harbor craft load factors were obtained from the Port 2013 Emissions Inventory (POLB 2013), which is consistent with the most recent Port emissions inventory (POLB 2017) available at the time the emission calculations were performed.

Emission factors for harbor craft reflect USEPA marine engine standards (USEPA 2016a) and harbor craft engine types common at the Port, as documented in the Port's Air Emissions Inventory (POLB 2017). The Port's 2017 Air Emissions Inventory identifies that most harbor craft propulsion engines operating at the Port in 2017 were USEPA Tier 2 diesel engines and that approximately half of all harbor craft auxiliary engines were Tier 3. This analysis conservatively used USEPA Tier 2 harbor craft emission standards for both propulsion and auxiliary engines.

Off-road Construction Equipment. Off-road construction equipment would be used during non-dredging activities such as construction of the electrical substation at Pier J (only for mitigated emissions), Pier J breakwater improvements, and wharf upgrades. Equipment type, utilization, schedule, activity, and engine sizes, provided by the Port, were used in the analysis, as shown in Table H1.6.

Criteria pollutant and GHG emission factors for off-road construction equipment reflect USEPA non-road engine standards (USEPA 2016b) and CARB requirements. Emission factors were generated using CARB's 2017 OFFROAD Inventory Model (CARB 2017a) for an average equipment fleet composition in the SCAB.

On-Road Construction Vehicles and Worker Vehicles. Construction vehicles would be used during non-dredging activities to deliver construction materials, such as sheetpiles (for wharf upgrades and Pier J breakwater improvements) and concrete (for the electrical substation), and haul away waste. Vehicle type, utilization, schedule, activity, and engine sizes, provided by the Port, were used in the analysis, as shown in Table H1.6.

Criteria pollutant and GHG emission factors reflect USEPA on-road engine standards and CARB requirements. Emission factors were generated using CARB's on-road EMFAC2017 model for truck and passenger vehicle fleets representative of the South Coast region (CARB 2017b). Emissions include engine exhaust, entrained road dust, and brake and tire wear.

Fugitive Dust. PM₁₀ and PM_{2.5} fugitive dust emissions from construction activities, such as grading, bulldozing, and material and debris loading and handling were calculated using emission factors from EPA's AP-42 emission factor handbook (USEPA 2006) and default parameters for soil and wind conditions

from CalEEMod (CAPCOA 2016). PM₁₀ and PM_{2.5} emissions from on- and off-site paved road dust were calculated using CARB's Miscellaneous Process Methodology (CARB 2016).

H1.4 Quantified Regulations for Construction

The following regulations were incorporated into the unmitigated emission calculations for the Action Alternatives, as applicable. These regulations are described in greater detail in the Air Quality Regulatory Setting and GHG Regulatory Setting of the EIS/EIR.

- Dredging Equipment: USEPA Emission Standards for Nonroad Diesel Engines; USEPA Emission Standards for Marine Diesel Engines; CARB In-Use Off-Road Diesel-Fleets Regulation; CARB Portable Diesel-Fueled Engines Air Toxic Control Measure (ATCM).
- Harbor Craft: USEPA Emission Standards for Marine Diesel Engines; CARB Commercial Harbor Craft Regulation.
- Off-Road Construction Equipment: USEPA Emission Standards for Nonroad Diesel Engines; California Diesel Fuel Regulations (Ultra Low Sulfur Diesel [ULSD] fuel); CARB In-Use Off-Road Diesel-Fleets Regulation; CARB Portable Diesel-Fueled Engines ATCM; Statewide Portable Equipment Registration Program.
- On-Road Construction Vehicles and Worker Vehicles: USEPA Emission Standards for On-Road Trucks; California Diesel Fuel Regulations (ULSD fuel); Heavy Duty Vehicle National Program to reduce fuel consumption and GHG; State Standards for Light-Duty Vehicle GHG Emissions and Corporate Average Fuel Economy Standards.
- Fugitive Dust: SCAQMD Rule 403 Compliance.

H1.5 Quantified Mitigation Measures for Construction

The EIS/EIR identifies mitigation measures designed to reduce construction emissions. The following three measures were quantified in the mitigated emission calculations for the Action Alternatives. The remaining mitigation measures were assessed qualitatively in the EIS/EIR.

MM-AQ-1: Electric clamshell dredge. This mitigation measure requires the use of an electric clamshell dredge and requires the construction of an electrical substation at Pier J to provide electric power to the clamshell dredge. The analysis assumes that it would not be possible to electrify all equipment on a clamshell dredge. Therefore, per communication with Dutra Group, a dredging contractor, the analysis conservatively assumes that 90 percent of clamshell dredge horsepower-hours would be electric (Dutra Group 2019). Criteria pollutant and GHG emissions associated with construction of the electrical substation, and indirect GHG emissions associated with clamshell dredge electricity consumption, were quantified for all mitigated Action Alternatives.

MM-AQ-2: Fleet Modernization of Harbor Craft. Harbor craft (tugboats, crew boats, and survey boats) with Category 1 or Category 2 marine engines shall meet USEPA Tier 3 emission standards for marine engines. In addition, the construction contractor shall require all construction tugboats that home fleet in the San Pedro Bay Ports: 1) to shut down their main engines and 2) to refrain from using auxiliary engines while at dock and instead to use electrical shore power, if feasible.

MM-AQ-3: Fleet Modernization of Construction Equipment. Self-propelled, diesel-fueled off-road construction equipment 25 hp or greater shall meet USEPA/CARB Tier 4 emission standards for non-road equipment.

H1.6 References for Appendix H1

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Appendix H1. Tables

H1.1	Construction Schedule: Alternative 2. (-53 and -78 MLLW)
H1.2	Construction Schedule: Alternative 3 NED (-55 and -80 MLLW)
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H1.8	Wharf Upgrades: Pier J, Berths 266-270
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H1.26	Alternative 2 Emissions by Task
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H1.29	Alternative 5 Emissions by Task

Table H1.1

Construction Schedule: Alternative 2. (-53 and -78 MLLW)

Task ID	Alternative 2	Start Date	End Date	Duration (days)
1	Electrical Substation Construction at Pier J (mitigation only)	1/1/2024	12/31/2024	60
2	Pier J Breakwater Construction	1/1/2024	3/2/2024	54
3	Approach Channel (hopper dredge 1,144,000 CY)	1/1/2025	3/8/2025	66
4	Main Channel Widening (clam shell dredge 1,065,000 CY)	1/1/2025	6/28/2025	178
5	West Basin (clam shell dredge 501,000 CY)	6/29/2025	9/21/2025	84
6	Pier J Basin (clam shell dredge 202,000 CY)	9/22/2025	10/26/2025	34
7	Pier J Approach (clam shell dredge 270,000 CY)	10/27/2025	12/11/2025	45
8	Pier J Approach (clam shell dredge 1,699,000 CY)	1/1/2026	10/11/2026	283

Source:

Dredging Alternative 2: POLB Channel Deepening - 53 and 78 Rev4.xlsx.

Substation and Pier J Breakwater - Email From: Khan, Naser <naser.khan@aecom.com>, Sent: Friday, May 31, 2019 10:54 PM, To: Barrera, Baron <baron.barrera@polb.com>.

Table H1.2

Construction Schedule: Alternative 3 NED (-55 and -80 MLLW)

Task ID	Alternative 3	Start Date	End Date	Duration (days)
1	Electrical Substation Construction at Pier J (mitigation only)	1/1/2024	12/31/2024	60
2	Pier J Breakwater Construction	1/1/2024	3/2/2024	54
3	Approach Channel (hopper dredge 2,600,000 CY)	1/1/2025	5/31/2025	150
4	Main Channel Widening (clam shell dredge 1,065,000 CY)	1/1/2025	6/27/2025	177
5	West Basin (clam shell dredge 717,000 CY)	6/28/2025	10/26/2025	120
6	Pier J Basin (clam shell dredge 258,000 CY)	10/27/2025	12/9/2025	43
7	Pier J Basin (clam shell dredge 46,000 CY)	1/1/2026	1/9/2026	8
8	Pier J Approach (clam shell dredge 1,994,000 CY)	1/10/2026	12/8/2026	332
9	Pier J Approach (clam shell dredge 679,000 CY)	1/1/2027	4/24/2027	113

Source:

Dredging Alternative 3: POLB Channel Deepening - NED 55 and 80 Rev4.xlsx.

Substation and Pier J Breakwater - Email From: Khan, Naser <naser.khan@aecom.com>, Sent: Friday, May 31, 2019 10:54 PM, To: Barrera, Baron <baron.barrera@polb.com>.

Table H1.3

Construction Schedule: Alternative 4: (-57 and -83 MLLW)

Task ID	Alternative 4	Start Date	End Date	Duration (days)
1	Electrical Substation Construction at Pier J (mitigation only)	1/1/2024	12/31/2024	60
2	Pier J Breakwater Construction	1/1/2024	3/2/2024	54
3	Pier J Wharf Upgrade	1/1/2024	6/24/2024	175
4	Pier T Wharf Upgrade	1/1/2024	11/16/2024	320
5	Approach Channel (hopper dredge 5,447,000 CY)	1/1/2025	2/4/2026	399
6	Main Channel Widening (clam shell dredge 1,065,000 CY)	1/1/2026	6/28/2026	178
7	West Basin (clam shell dredge 975,000 CY)	6/29/2026	12/9/2026	163
8	West Basin (clam shell dredge 513,000 CY)	1/1/2027	3/28/2027	86
9	Pier T Berths (clam shell dredge Berths T132 to T140, 44,000 CY)	3/29/2027	4/5/2027	7
10	Pier J Basin (clam shell dredge 408,000 CY)	4/6/2027	6/13/2027	68
11	Pier J Approach (clam shell dredge 1,066,000 CY)	6/14/2027	12/9/2027	178
12	Pier J Approach (clam shell dredge 2,040,000 CY)	1/1/2028	12/6/2028	340
13	Pier J Approach (clam shell dredge 297,000 CY)	1/1/2029	2/20/2029	50

Source:

Dredging Alternative 4: POLB Channel Deepening - 57 and 83 Rev4.xlsx.

Substation and Pier J Breakwater - Email From: Khan, Naser <naser.khan@aecom.com>, Sent: Friday, May 31, 2019 10:54 PM, To: Barrera, Baron <baron.barrera@polb.com>.

Table H1.4

Construction Schedule: Alternative 5 and Standby Area (-55 and -80 MLLW)

Task ID	Alternative 5	Start Date	End Date	Duration (days)
1	Electrical Substation Construction at Pier J (mitigation only)	1/1/2024	12/31/2024	60
2	Pier J Breakwater Construction	1/1/2024	3/2/2024	54
3	Approach Channel (hopper dredge 2,600,000 CY)	1/1/2025	5/31/2025	150
4	Main Channel Widening (clam shell dredge 1,065,000 CY)	1/1/2025	6/27/2025	177
5	West Basin (clam shell dredge 717,000 CY)	6/28/2025	10/26/2025	120
6	Pier J Basin (clam shell dredge 258,000 CY)	10/27/2025	12/9/2025	43
7	Pier J Basin (clam shell dredge 46,000 CY)	1/1/2026	1/9/2026	8
8	Pier J Approach (clam shell dredge 1,994,000 CY)	1/10/2026	12/8/2026	332
9	Pier J Approach (clam shell dredge 679,000 CY)	1/1/2027	4/24/2027	113
10	Standby Area (clam shell dredge 921,000 CY)	4/25/2027	12/8/2027	227
11	Standby Area (clam shell dredge 118,000 CY)	1/1/2028	2/24/2028	54

Source:

Dredging Alternative 5: POLB Channel Deepening - NED and Standby Area Rev4.xlsx.

Substation and Pier J Breakwater - Email From: Khan, Naser <naser.khan@aecom.com>, Sent: Friday, May 31, 2019 10:54 PM, To: Barrera, Baron <baron.barrera@polb.com>.

Table H1.5
Dredging Activity

		Activity			Load	Rating		Engine Tier
		Quantity	Number of Engines	(hr/day)		(hp)	(kw)	
Hopper Dredging								
Hopper propulsion engine	dredging	1	2	18	10%	9,000	6,711	Marine Tier 2
Hopper propulsion engine	transit	1	2	4	85%	9,000	6,711	Marine Tier 2
Hopper auxiliary engine	disposal	1	2	1.5	25%	600	447	Marine Tier 2
Hopper Crew boat propulsion engine	support	1	2	2	38%	325	242	Marine Tier 2
Hopper Crew boat auxiliary engine	support	1	1	2	32%	80	60	Marine Tier 2
Hopper Survey boat propulsion engine	dredging	1	1	8	38%	580	433	Marine Tier 2
Clamshell Dredging								
Clamshell Dredge hoist	dredging	1	1	22	50%	1,200	895	Offroad Tier 3
Clamshell Dredge generator	dredging	1	1	22	50%	900	671	Offroad Tier 3
Clamshell Barge dump scow	disposal	1	1	1	80%	175	130	Offroad Tier 3
Clamshell Tugboat propulsion engine	dredging	1	2	4	31%	300	224	Marine Tier 2
Clamshell Tugboat auxiliary engine	dredging	1	1	4	43%	78	58	Marine Tier 2
Clamshell Tugboat propulsion engine	transit	2	2	18	31%	600	447	Marine Tier 2
Clamshell Tugboat auxiliary engine	transit	2	2	18	43%	78	58	Marine Tier 2
Clamshell Crew boat propulsion engine	support	1	2	2	38%	325	242	Marine Tier 2
Clamshell Crew boat auxiliary engine	support	1	1	2	32%	80	60	Marine Tier 2
Clamshell Survey boat propulsion engine	dredging	1	1	2	38%	580	433	Marine Tier 2
Pier J Breakwater Construction								
Pier J Breakwater Tugboat propulsion engine		2	2	12	31%	475	354	Marine Tier 2
Pier J Breakwater Tugboat auxiliary engine		2	2	12	43%	78	58	Marine Tier 2
Pier J Breakwater Crew boat propulsion engine		1	2	2	38%	325	242	Marine Tier 2
Pier J Breakwater Crew boat auxiliary engine		1	1	2	32%	80	60	Marine Tier 2
Pier J Breakwater Survey boat propulsion engine		1	1	2	38%	580	433	Marine Tier 2
Pier J Wharf Upgrade								
Pier J Wharf Tugboat propulsion engine		1	2	12	31%	1000	746	Marine Tier 2
Pier J Wharf Tugboat auxiliary engine		1	2	12	43%	78	58	Marine Tier 2
Pier J Wharf Crew boat propulsion engine		1	2	2	38%	400	298	Marine Tier 2
Pier J Wharf Crew boat auxiliary engine		1	1	2	32%	80	60	Marine Tier 2
Pier J Wharf Survey boat propulsion engine		1	1	2	38%	400	298	Marine Tier 2
Pier T Wharf Upgrade								
Pier T Wharf Tugboat propulsion engine		1	2	12	31%	1000	746	Marine Tier 2
Pier T Wharf Tugboat auxiliary engine		1	2	12	43%	78	58	Marine Tier 2
Pier T Wharf Crew boat propulsion engine		1	2	2	38%	400	298	Marine Tier 2
Pier T Wharf Crew boat auxiliary engine		1	1	2	32%	80	60	Marine Tier 2
Pier T Wharf Survey boat propulsion engine		1	1	2	38%	400	298	Marine Tier 2
Notes:								
Hopper dredge is used only during dredging of Approach Channel.								
Dutra's hopper ship Stuyvensant has 2 aux engines (used for jet pumps which are only active during disposal events). These engines are scheduled to be upgraded to Tier 3 in a couple of years. Analysis conservatively assumed Tier 2 auxiliary engines.								
Dutra's dredge pumps are electric and are powered via main engines.								
Hopper auxiliary engine is only used during disposal events. 15 min per event and 6 events per day.								
Survey boats have outboard propulsion. If there is hopper and clamshells working concurrently then one survey boat can support both operations.								
Dutra's biggest clamshell dredge generator is 895bhp.								
Barge dump scow engine only runs for about 15 min while disposal event occurs; assumed 4 loads per day.								
Dutra's anchor tug fleet has typical twin 300 hp tier II configuration.								
Tugboats used for disposal - Dutra uses 1200 hp on the low end. Used this conservatively in lieu of 2017 POLB EI.								
Dutra survey boats don't have aux engines. Equipment is run off of inverters.								
Source:								
Dredging: KeyAssumptionsSummary Dutra revision.xlsx e-mailed 4/3/2019. Provided by USACE and Dutra								
Pier J Breakwater:								
E-mail from: Khan, Naser <naser.khan@aecom.com> Sent: Tuesday, May 21, 2019 10:51 PM To: Barrera, Baron <baron.barrera@polb.com>; Paulsen, Eric <eric.paulsen@polb.com>								
E-mail from: Khan, Naser <naser.khan@aecom.com> Sent: Thursday, May 30, 2019 11:56 AM To: Barrera, Baron <baron.barrera@polb.com>; Paulsen, Eric <eric.paulsen@polb.com>								
E-mail from: Khan, Naser <naser.khan@aecom.com> Sent: Friday, May 31, 2019 10:54 PM To: Barrera, Baron <baron.barrera@polb.com>								

Table H1.6
Landside Construction Equipment Activity

Equipment	Number of Pieces (peak day)	Number of Active Days	Utilization (hr/day)	HP (each) or other info	Transit Distance Offsite (mi)	Transit Distance Onsite (mi)
Electrical Substation Construction at Pier J						
Offroad Equipment						
Caterpillar 320 excavator	1	20	8	164		
Small asphalt roller	1	26	8	33		
Water truck	1	20	8	300		
Forklift	1	22	2	50		
Mobile crane (35 ton)	1	2	8	282		
Onroad Equipment						
Dump trucks	3	5	8	600	11	1
Concrete trucks	7	5	8	335	20	1
Workers	20	60			30	
Pier J Breakwater Construction						
Offroad Equipment						
Piling crane	1	54	10	250		
Long arm excavator	1	54	10	315		
Onroad Equipment						
Pile delivery truck	5	5			200	1
Workers	21	54			30	
Pier J Wharf Upgrade						
Offroad Equipment						
Const Barge - piling crane	1	170	10	250		
Cong Barge - long arm excavator	1	170	10	315		
Const barge - deck equipment	1	170	10	100		
Sheet pile barge - deck equipment	1	170	10	100		
Onroad Equipment						
Workers	19	175			30	
Pier T Wharf Upgrade						
Offroad Equipment						
Const Barge - piling crane	1	310	10	250		
Cong Barge - long arm excavator	1	310	10	315		
Const barge - deck equipment	1	310	10	100		
Sheet pile barge - deck equipment	1	310	10	100		
Onroad Equipment						
Workers	19	320			30	
Notes:						
1-way transit distance multiplied by 2 for total transit distance. Telephone conversation with Naser Khan (AECOM) 5/21/19.						
Source:						
Telephone conversation with Naser Khan (AECOM) 5/21/19.						
E-mail from: Khan, Naser <naser.khan@aecom.com> Sent: Tuesday, May 21, 2019 10:51 PM To: Barrera, Baron <baron.barrera@polb.com>; Paulsen, Eric <eric.paulsen@polb.com>						
E-mail from: Khan, Naser <naser.khan@aecom.com> Sent: Thursday, May 30, 2019 11:56 AM To: Barrera, Baron <baron.barrera@polb.com>; Paulsen, Eric <eric.paulsen@polb.com>						
E-mail from: Khan, Naser <naser.khan@aecom.com> Sent: Friday, May 31, 2019 10:54 PM To: Barrera, Baron <baron.barrera@polb.com>						

Table H1.7

Soil Handling - Electrical Substation Construction

Task	Peak Day Volume of Soil Handled (cyd/day)	Total Volume of Soil Handled (cyd)	Peak Day Volume of Soil Handled (ton/day)	Total Volume of Soil Handled (ton)
Electrical Substation Construction at Pier J	72	1500	91.8	1912.5

Table H1.8

Wharf Upgrades: Pier J, Berths 266-270

Activity No.	Description	No. of Working Days	Equipment	Horsepower	No. of People	Notes
1	Mobilize/Demobilize	5	Construction Barge with piling crane and long arm excavator. Tug boat	Piling Crane: 250 HP	8	Assume piling frame is constructed off site and placed onto barge at contractors' yard
		5		Long Arm Excavator: 315 HP		
		5		Tugboat: 2,000 HP		
2	Sheet Pile Delivery	10	As Activity No. 1	Construction Barge Deck Equipment: 100 HP	As above	Assume sheet piles are delivered onsite via a small barge as needed. Sheet piles will be loaded onto the small barge at the contractors' yard and delivered onsite from the waterside.
		10	Small barge for sheet piles	Sheet pile Barge Deck Equipment: 100 HP		
		10	Tug Boat	Survey Boat: 400 HP		
3	Clearing of seabed of any obstruction prior to pile driving	20	As Activity No. 1	Crew Boat: 400 HP	As above	Any debris will be cleared using the long arm excavator mounted on the construction barge, includes team of four divers
		20	Survey boat		7	
4	Driving of bulkhead wall	135	As Activity No. 3		19	Assumes driving rate of 20 LF per day
		135	Crew Boat		2	
5	Installation of anti-scour rock in front of new bulkhead wall	130	Small barge for storage of rock		4	Long arm excavator on construction barge used to place rock. Overlaps with activity No. 4, finish at probably the same time.
		130	Tug Boat			
6	Survey of installed bulkhead wall	5	Survey boat		3	Survey team

Source:

E-mail: From: Barrera, Baron <baron.barrera@polb.com>, Sent: Thursday, June 6, 2019 1:13 PM, To: Lora Granovsky <lora.granovsky@ilancoenvironmental.com>, Subject: FW: LB Deep Draft Nav Study - Construction Schedule for Pier J and T Sheet Pile Wall.

Duration: 175 working days for Pier J, Berths 266-270

Wharf upgrades apply to Alternative 4 only.

Table H1.9

Wharf Upgrades: Pier T, Berths 134-140

Activity No.	Description	No. of Working Days	Equipment	Horsepower	No. of People	Notes
1	Mobilize/Demobilize	5	Construction Barge with piling crane and long arm excavator. Tug boat	Piling Crane: 250 HP	8	Assume piling frame is constructed off site and placed onto barge at contractors' yard
		5		Long Arm Excavator: 315 HP		
		5		Tugboat: 2,000 HP		
2	Sheet Pile Delivery	20	As Activity No. 1	Construction Barge Deck Equipment: 100 HP	As above	Assume sheet piles are delivered onsite via a small barge as needed. Sheet piles will be loaded onto the small barge at the contractors' yard and delivered onsite from the waterside.
		20	Small barge for sheet piles	Sheet pile Barge Deck Equipment: 100 HP		
		20	Tug Boat	Survey Boat: 400 HP		
3	Clearing of seabed of any obstruction prior to pile driving	35	As Activity No. 1	Crew Boat: 400 HP	As above	Any debris will be cleared using the long arm excavator mounted on the construction barge, includes team of four divers
		35	Survey boat		7	
4	Driving of bulkhead wall	250	As Activity No. 3		19	Assumes driving rate of 20 LF per day
		250	Crew Boat		2	
5	Installation of anti-scour rock in front of new bulkhead wall	245	Small barge for storage of rock		4	Long arm excavator on construction barge used to place rock. Overlaps with activity No. 4, finish at probably the same time.
		245	Tug Boat			
6	Survey of installed bulkhead wall	10	Survey boat		3	Survey team

Source:

E-mail: From: Barrera, Baron <baron.barrera@polb.com>, Sent: Thursday, June 6, 2019 1:13 PM, To: Lora Granovsky <lora.granovsky@ilancoenvironmental.com>, Subject: FW: LB Deep Draft Nav Study - Construction Schedule for Pier J and T Sheet Pile Wall.

Duration: 320 working days for Pier T, Berths 134-140

Wharf upgrades apply to Alternative 4 only.

Table H1.10

Offroad Engine Emission Factors - USEPA Standards

Emission Factor (g/hp-hr)								
	High HP	PM10	PM2.5	DPM	NOX	SOX	CO	VOC
Tier 1	50	0.6	0.6	0.6	6.745	0.005552	4.1	
	100	0.6	0.6	0.6	6.9	0.005552	4.1	
	175	0.6	0.6	0.6	6.9	0.004994	4.1	
	300	0.4	0.4	0.4	6.9	0.004994	8.5	1.053
	600	0.4	0.4	0.4	6.9	0.004994	8.5	1.053
	750	0.4	0.4	0.4	6.9	0.004994	8.5	1.053
	>750	0.4	0.4	0.4	6.9	0.004994	8.5	1.053
Tier 2	50	0.45	0.45	0.45	5.32	0.005552	4.1	0.29484
	100	0.3	0.3	0.3	5.32	0.005552	3.7	0.29484
	175	0.22	0.22	0.22	4.655	0.004994	3.7	0.257985
	300	0.15	0.15	0.15	4.655	0.004994	2.6	0.257985
	600	0.15	0.15	0.15	4.56	0.004994	2.6	0.25272
	750	0.15	0.15	0.15	4.56	0.004994	2.6	0.25272
	>750	0.15	0.15	0.15	4.56	0.004994	2.6	0.25272
Tier 3	50	0.45	0.45	0.45	5.32	0.005552	4.1	0.29484
	100	0.3	0.3	0.3	3.325	0.005552	3.7	0.184275
	175	0.22	0.22	0.22	2.85	0.004994	3.7	0.15795
	300	0.15	0.15	0.15	2.85	0.004994	2.6	0.15795
	600	0.15	0.15	0.15	2.85	0.004994	2.6	0.15795
	750	0.15	0.15	0.15	2.85	0.004994	2.6	0.15795
	>750	0.15	0.15	0.15	4.56	0.004994	2.6	0.25272
Tier 4 Interim	50	0.22	0.22	0.22	5.32	0.005552	4.1	0.29484
	75	0.22	0.22	0.22	3.325	0.005552	3.7	0.184275
	175	0.015	0.015	0.015	0.3	0.004994	3.7	0.14742
	750	0.015	0.015	0.015	0.3	0.004994	2.6	0.14742
	>750	0.075	0.075	0.075	2.6	0.004994	2.6	0.3159
Tier 4 Final	50	0.022	0.022	0.022	3.325	0.005552	4.1	0.184275
	75	0.022	0.022	0.022	3.325	0.005552	3.7	0.184275
	175	0.015	0.015	0.015	0.3	0.004994	3.7	0.14742
	750	0.015	0.015	0.015	0.3	0.004994	2.6	0.14742
	>750	0.03	0.03	0.03	2.6	0.004994	2.6	0.3159

Source:

USEPA Engine Standards. DieselNet: <https://www.dieselnet.com/standards/us/nonroad.php#tier3>

NMHC+NOx Pollutant Fractions (2017 Carl Moyer Program Guidelines, Table D-25):

NOx = 0.95

HC 0.05

SOx is a function of fuel sulfur content and does not change with Tier.

Used for Marine Offroad Equipment: Tier 3

Used for Mitigation: Tier 4 offroad equipment

Table H1.11

Harbor Craft Emission Factors - USEPA Standards

				g/kw-hr											
Engine Displacement	(kW)	EPA Tier	MY	NMHC+NOx	PM10	PM2.5	DPM	NOx	SOX	CO	HC	VOC	CO2	CH4	N2O
Category 1 HC auxiliary engines															
>2.5	>37	Tier 1	2004		0.54	0.4806	0.54	17	0.00552	11.4	1.3	1.3689	652	0.026	0.031
<0.9	≥37	Tier 2	2005	7.5	0.4	0.356	0.4	7.125	0.00552	5	0.375	0.394875	652	0.0075	0.031
0.9 < displ < 1.2	75-130	Tier 2	2004	7.2	0.3	0.267	0.3	6.84	0.00552	5	0.36	0.37908	652	0.0072	0.031
1.2 < displ < 2.5	130-560	Tier 2	2004	7.2	0.3	0.267	0.3	6.84	0.00552	5	0.36	0.37908	652	0.0072	0.031
2.5 < displ < 5	>560	Tier 2	2007	7.2	0.2	0.178	0.2	6.84	0.00552	5	0.36	0.37908	652	0.0072	0.031
<0.9	<19	Tier 3	2009	7.5	0.4	0.356	0.4	7.125	0.00552	6.6	0.375	0.394875	652	0.0075	0.031
<0.9	19-75	Tier 3	2009-2013	7.5	0.3	0.267	0.3	7.125	0.00552	5.5	0.375	0.394875	652	0.0075	0.031
<0.9	19-75	Tier 3	2014+	4.7	0.3	0.267	0.3	4.465	0.00552	5.5	0.235	0.247455	652	0.0047	0.031
<0.9	>75	Tier 3	2012+	5.4	0.14	0.1246	0.14	5.13	0.00552	5.5	0.27	0.28431	652	0.0054	0.031
0.9 < displ < 1.2	all	Tier 3	2013+	5.4	0.14	0.1246	0.14	5.13	0.00552	5	0.27	0.28431	652	0.0054	0.031
1.2 < displ < 2.5	<600	Tier 3	2014-2017	5.6	0.11	0.0979	0.11	5.32	0.00552	5	0.28	0.29484	652	0.0056	0.031
1.2 < displ < 2.5	<600	Tier 3	2018+	5.6	0.1	0.089	0.1	5.32	0.00552	5	0.28	0.29484	652	0.0056	0.031
1.2 < displ < 2.5	≥600	Tier 3	2014+	5.6	0.11	0.0979	0.11	5.32	0.00552	5	0.28	0.29484	652	0.0056	0.031
2.5 < displ < 3.5	<600	Tier 3	2013-2017	5.6	0.11	0.0979	0.11	5.32	0.00552	5	0.28	0.29484	652	0.0056	0.031
2.5 < displ < 3.5	<600	Tier 3	2018+	5.6	0.1	0.089	0.1	5.32	0.00552	5	0.28	0.29484	652	0.0056	0.031
2.5 < displ < 3.5	≥600	Tier 3	2013+	5.6	0.11	0.0979	0.11	5.32	0.00552	5	0.28	0.29484	652	0.0056	0.031
3.5 ≤ D < 7	<600	Tier 3	2012-2017	5.8	0.11	0.0979	0.11	5.51	0.00552	5	0.29	0.30537	652	0.0058	0.031
3.5 ≤ D < 7	<600	Tier 3	2018+	5.8	0.1	0.089	0.1	5.51	0.00552	5	0.29	0.30537	652	0.0058	0.031
3.5 ≤ D < 7	≥600	Tier 3	2012+	5.8	0.11	0.0979	0.11	5.51	0.00552	5	0.29	0.30537	652	0.0058	0.031
	600-1400	Tier 4	2017+		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
	1400-2000	Tier 4	2016+		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
	2000-3700	Tier 4	2014+		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
<15.0	>3700	Tier 4	2014-2015		0.12	0.1068	0.12	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
15 < displ < 30	>3700	Tier 4	2014-2015		0.25	0.2225	0.25	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
all	>3700	Tier 4	2016+		0.06	0.0534	0.06	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
Category 2 HC propulsion engines															
>2.5	>37	Tier 1	2004		0.54	0.4806	0.54	17	0.00552	11.4	1.3	1.3689	652	0.026	0.031
5.0 ≤ D < 15	all	Tier 2	2007	7.8	0.27	0.2403	0.27	7.41	0.00552	5	0.39	0.41067	652	0.0078	0.031
15 ≤ D < 20	< 3300 kW	Tier 2	2007	8.7	0.5	0.445	0.5	8.265	0.00552	5	0.435	0.458055	652	0.0087	0.031
15 ≤ D < 20	≥ 3300 kW	Tier 2	2007	9.8	0.5	0.445	0.5	9.31	0.00552	5	0.49	0.51597	652	0.0098	0.031
20 ≤ D < 25	all	Tier 2	2007	9.8	0.5	0.445	0.5	9.31	0.00552	5	0.49	0.51597	652	0.0098	0.031
25 ≤ D < 30	all	Tier 2	2007	11	0.5	0.445	0.5	10.45	0.00552	5	0.55	0.57915	652	0.011	0.031
7 ≤ D < 15	<2000	Tier 3	2013+	6.2	0.14	0.1246	0.14	5.89	0.00552	5	0.31	0.32643	652	0.0062	0.031
7 ≤ D < 15	2000-3700	Tier 3	2013+	7.8	0.14	0.1246	0.14	7.41	0.00552	5	0.39	0.41067	652	0.0078	0.031
15 ≤ D < 20	<2000	Tier 3	2014+	7	0.34	0.3026	0.34	6.65	0.00552	5	0.35	0.36855	652	0.007	0.031
20 ≤ D < 25	<2000	Tier 3	2014+	9.8	0.27	0.2403	0.27	9.31	0.00552	5	0.49	0.51597	652	0.0098	0.031
25 ≤ D < 30	<2000	Tier 3	2014+	11	0.27	0.2403	0.27	10.45	0.00552	5	0.55	0.57915	652	0.011	0.031
all	2000-3700	Tier 4	2014		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
<15	>3700	Tier 4	2014		0.12	0.1068	0.12	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
15 ≤ D < 30	>3700	Tier 4	2014		0.25	0.2225	0.25	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
all	>3700	Tier 4	2016		0.06	0.0534	0.06	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
all	1400-2000	Tier 4	2016		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
all	600-1400	Tier 4	2017		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
	600-1400	Tier 4	2017+		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
	1400-2000	Tier 4	2016+		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
	2000-3700	Tier 4	2014+		0.04	0.0356	0.04	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
<15.0	>3700	Tier 4	2014-2015		0.12	0.1068	0.12	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
15 < displ < 30	>3700	Tier 4	2014-2015		0.25	0.2225	0.25	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031
all	>3700	Tier 4	2016+		0.06	0.0534	0.06	1.8	0.00552	5	0.19	0.20007	652	0.0038	0.031

Source:

Federal Marine Compression-Ignition Engines - Exhaust Emission Standards Reference Guide, <http://epa.gov/OMS/standards/nonroad/marineci.htm>

Tier 1 and Tier 2 standards: 40CFR Part 94.8

Tier 3 and Tier 4 standards: 40CFR Part 1042.101

EPA Tier 1 emissions standards for marine engines do not specify restrictions to PM, SOx, CO, or VOC. NOx reflects Marpol Annex VI (17 g/kw-hr). PM10, SOx, CO and VOC emissions factors were obtained from EPA offroad emission engine standards for Tier 1 engines.

EPA Tier 2 and Tier 3 emission standards are reported as NOx+THC. 5% is HC per Carl Moyer Program guidelines. 95% is NOx.

SOx emission factor is based on 15 ppm fuel sulfur content.

PM2.5 is 89% of PM10, per SCAQMD 2006 Final Methodology to Calculate PM2.5 and PM 2.5 Significance Thresholds, Table 5.

CO2 and N2O emission factors are from IVL: Methodology for Calculating Emissions from Ships: Update on Emission Factors, 2004, also summarized in POLA 2009 Emissions Inventory, Appendix B. CH4 is 2% of HC, per IVL study.

Table H1.12

SOx Emission Factor - Harbor Craft

Harbor Craft	0.00552 g/hp-hr
Dredging Equipment	use OFFROAD BSFC and convert to g SOx /hp-hr
SOx (gms/hp-hr) = (S content in X/1,000,000) x (MW SO ₂ / MW S) x BSF =	
Where:	
X = S content in parts per million (ppm)	15 ppm
S MW = Molecular Weight	32
SO ₂ MW = Molecular Weight	64
BSFC for harbor craft = Brake Specific Fuel Consumption (per CARB 2007 Harbor Craft Methodology)	184 (g/hp-hr)

Table H1.13

Harbor Craft Load Factor

Type	Main Engine	Auxiliary Engine
Assist tugboat	0.31	0.43
Commercial fishing	0.27	0.43
Crew boat	0.38	0.32
Excursion	0.42	0.43
Ferry	0.42	0.43
Government	0.51	0.43
Ocean tug	0.68	0.43
Tugboat	0.31	0.43
Workboat Diveboat	0.38	0.32
Source:		
2013 POLB Emissions Inventory, Table 3.4.		

Table H1.14

Paved Road Dust Emission Factor Derivation							
Emission Source	(sL) Silt Loading (g/m2)	(K) Particle Size Multiplier - PM10 (g/VMT)	(K) Particle Size Multiplier - PM2.5 (g/VMT)	(W) Average Vehicle Weight on Road (tons)	(E) Uncontrol led PM10 Emission Factor (g/VMT)	(E) Uncontrol led PM2.5 Emission Factor (g/VMT)	
Onsite Trucks	0.6	1.00	0.25	20.0	13.34	3.34	
Offsite Roadway (all vehicles) - CARB 2016							
Freeway							
Statewide	0.015	1.00	0.25	2.4	0.05	0.01	
Major LA County	0.013	1.00	0.25	2.4	0.05	0.01	
Collector LA County	0.013	1.00	0.25	2.4	0.05	0.01	
Local LA County	0.135	1.00	0.25	2.4	0.39	0.10	
Notes:							
1. Emission factors are calculated using CARB's Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust.							
November 2016. Available: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-9_2016.pdf . Accessed 7/2019. Because the emissions are primarily used for peak day or peak hour calculations, downward adjustment due to annual precipitation was not made.							
2. Emission factors exclude engine exhaust, tire wear, and brake wear, which are accounted for in EMFAC calculations.							
3. The equation is: $E = k (sL)^{0.91} \times (W)^{1.02}$							
Summary of Daily VMT by Roadway Type							
Los Angeles - Long Beach - Santa Ana Metro Area							
Metropolitan Area	Interstate/ Other Fwy/ Exprwy	Other Principal Arterial	Minor Arterial	Collector	Local		
Daily Vehicle-Miles Travelled (Thousands)	132,796	67,118	49,528	15,304	14,481		
Travel Fraction	0.48	0.24	0.18	0.05	0.05		
Source: Federal Highway Administration. Highway Statistics 2016 - Urbanized Areas - 2016 Miles and Daily Last accessed February 2019. https://www.fhwa.dot.gov/policyinformation/statistics/2016/							
Composite Paved Road Dust Emission Factors for Project Trips							
Road Type	Fraction of Travel by Roadway Type					Composite EF	
	Interstate/ Other Fwy/ Exprwy	Other Principal Arterial	Minor Arterial	Collector	Local	PM10 (g/VMT)	PM2.5 (g/VMT)
Vehicle Trips in Los Angeles - Long Beach - Santa Ana Metro Area	0.48	0.24	0.18	0.05	0.05	0.068	0.017

Table H1.15

Material Loading/Handling Dust Emission Factors

PM10 (lb/ton)	0.0560274
PM2.5 (lb/ton)	0.0084841
$EF = (k)(0.0032)[(U/5)^{-1.3}]/[(M/2)^{-1.4}]$ EF = lb/ton k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5) U = average wind speed = 2.2 m/s (CalEEMod), 4.9 mph M = moisture content = 12% (CalEEMod)	
Soil density (ton/cyd):	1.26
Truck capacity (cyd)	20
Truck capacity (ton)	25.28
Source: AP-42, p. 13.2.4 & CalEEMod	

Table H1.16

Asphalt Paving

VOC (lb/acre)	2.62	(lb/ft ²)	6.015E-05
Source: CalEEMod, Appendix A, Section 4.8.			

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Port of Long Beach Deep Draft Navigation Study
Los Angeles County, California

Appendix H1 - Tables
October 2019

Table H1.17
OFFROAD 2017 Output

OFFROAD2017 (v1.0.1) Emissions Inventory

Region Type: Air District

Region: South Coast AQMD

Calendar Year: 2024

Scenario: All Adopted Rules - Exhaust

Vehicle Classification: OFFROAD2017 Equipment Types

Units: Emissions: tons/day, Fuel Consumption: gallons/year, Activity: hours/year, HP-Hours: HP-hours/year

Region	CalYr	VehClass	MdYr	HP Bin	Fuel	HC tpd	ROG tpd	TOG tpd	CO tpd	NOx tpd	CO2 tpd	PM10 tpd	PM2.5 tpd	PM tpd	SOx tpd	NH3 tpd	Fuel gpy	Total Actvity hpy	Total Population	Horsepower Hours hhpy
South Coast	2024	Industrial - Aerial Lifts	Aggregated	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	2024	Industrial - Aerial Lifts	Aggregated	50	Diesel	0.003326937	0.004025594	0.004790789	0.079014703	0.073312641	14.908399	0.000549907	0.000505915	0.000549907	0.000137736	0.00012168	483686.6	591600.15	1911.1402	27291100
South Coast	2024	Industrial - Aerial Lifts	Aggregated	75	Diesel	0.00196584	0.002378667	0.00283081	0.068456702	0.035496583	11.411501	0.000789221	0.000726084	0.000789221	0.000105446	9.31391E-05	370233.6	332424.62	1079.5822	23226784.67
South Coast	2024	Industrial - Aerial Lifts	Aggregated	100	Diesel	0.002124473	0.002570612	0.003059241	0.087821283	0.039766347	14.601892	0.000515682	0.000474427	0.000515682	0.000134938	0.000119179	473742.3	382664.21	1235.6121	29712613.35
South Coast	2024	Industrial - Aerial Lifts	Aggregated	175	Diesel	0.000214867	0.000259899	0.000309409	0.008606927	0.001722874	1.589384	7.29618E-05	6.71248E-05	7.29618E-05	1.46924E-05	1.2976E-05	51580.414	24809.443	80.269691	3236722.847
South Coast	2024	Industrial - Aerial Lifts	Aggregated	300	Diesel	1.20506E-05	1.45812E-05	1.73529E-05	0.000174235	0.000123207	0.095005	1.66541E-06	1.53218E-06	1.66541E-06	7.75418E-07	3082.3312	840.96234	2.7057199	193421.391	
South Coast	2024	Industrial - Aerial Lifts	Aggregated	600	Diesel	6.889E-06	8.33569E-06	9.92015E-06	0.000122497	3.36709E-05	0.0674673	1.17545E-06	1.08141E-06	1.17545E-06	6.23562E-07	5.50659E-07	2188.9019	280.32078	0.9019066	137357.1828
South Coast	2024	OFF - ConstMin - Plate Compactors	Aggregated	25	Diesel	0.00057186	0.000680561	0.000823478	0.004319479	0.005156935	0.7074236	0.000201509	0.000185389	0.000201509	1.10081E-05	5.93633E-06	23597.25	119822.2	199.52	958577.6
South Coast	2024	OFF - Light Commercial - Air Compressors	Aggregated	25	Diesel	0.000876803	0.001043468	0.001262597	0.004623625	0.00778996	1.0040399	0.000324279	0.000298337	0.000324279	1.33207E-05	8.40727E-06	33419.4	61002.45	74.88	1218428.4
South Coast	2024	OFF - Light Commercial - Air Compressors	Aggregated	50	Diesel	0.009822428	0.011689501	0.014144297	0.09693465	0.076597813	11.231237	0.002732976	0.002514338	0.002732976	0.000145192	9.4613E-06	376092.35	368463.85	452.64	13633162.45
South Coast	2024	ConstMin - Cranes	Aggregated	25	Diesel	2.0286E-05	2.4546E-05	2.92118E-05	0.000113714	9.66561E-05	0.0116572	7.59123E-06	6.98393E-06	7.59123E-06	1.07168E-07	9.51442E-08	378.20384	913.58918	1.8645734	22839.72944
South Coast	2024	ConstMin - Cranes	Aggregated	50	Diesel	0.000533764	0.000645855	0.000768621	0.00240237	0.001906914	0.1888651	0.000192194	0.000176818	0.000192194	1.73014E-06	1.54149E-06	6127.5216	8886.7971	19.888783	366338.4637
South Coast	2024	ConstMin - Cranes	Aggregated	75	Diesel	0.000150058	0.000181571	0.000216084	0.0006252	0.001360003	0.0247463	0.000128061	0.000117816	0.000128061	6.65577E-07	5.91542E-07	2351.413	2336.9873	6.2152447	156830.8722
South Coast	2024	ConstMin - Cranes	Aggregated	100	Diesel	0.00341141	0.004127807	0.004912431	0.033268294	0.03700243	4.5468204	0.002322333	0.002136547	0.002322333	4.19353E-05	3.71105E-05	147516.58	111966.96	244.88064	993003.218
South Coast	2024	ConstMin - Cranes	Aggregated	175	Diesel	0.007878513	0.009533001	0.011345059	0.082290973	0.091768248	12.794175	0.004960442	0.004563606	0.004960442	0.000118052	0.000104424	415092.91	188449.19	404.61243	27828778.99
South Coast	2024	ConstMin - Cranes	Aggregated	300	Diesel	0.010227738	0.012374837	0.014727078	0.070919069	0.13264119	22.212489	0.005532029	0.005089647	0.005532029	0.000205059	0.000181295	720659.73	220360.18	456.82048	48391095.85
South Coast	2024	ConstMin - Cranes	Aggregated	600	Diesel	0.013079131	0.015825749	0.018833949	0.126470765	0.160367746	39.707164	0.006453087	0.006453087	0.000393684	0.006453087	0.00036672	235911.53	465.52183	86509887	
South Coast	2024	ConstMin - Cranes	Aggregated	750	Diesel	0.000414325	0.000501334	0.000596629	0.003739171	0.005075816	0.683406	0.000251319	0.000231319	0.000251319	6.306E-06	5.57787E-06	22172.354	2334.8086	5.9937022	1489529.811
South Coast	2024	ConstMin - Cranes	Aggregated	9999	Diesel	0.001949465	0.002358853	0.00280723	0.020123424	0.028121534	2.1690511	0.00124691	0.001417157	0.00124691	1.99955E-05	1.77035E-05	70372.473	5039.9912	9.9443915	4725395.503
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	50	Diesel	0.00051222	0.000619786	0.000737597	0.004409124	0.004234062	0.6033835	0.000223061	0.000205216	0.000223061	5.56321E-06	4.92474E-06	19576.114	17120.573	47.013303	664158.3093
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	75	Diesel	0.000263062	0.000318305	0.000378809	0.004716774	0.004238804	0.7420077	0.000228886	0.000210575	0.000228886	6.85234E-06	6.05617E-06	24073.619	12982.677	26.228474	943030.4836
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	100	Diesel	0.00093599	0.000960255	0.001142782	0.019037587	0.011339025	3.029392	0.000420387	0.000383756	0.000420387	2.79844E-05	2.47255E-05	98285.289	45684.545	117.28582	3828325.49
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	175	Diesel	0.000864172	0.001045468	0.001244408	0.024581837	0.008641458	4.4183065	0.000395182	0.000363567	0.000395182	4.08235E-05	3.60616E-05	143347.09	36690.577	113.3268	5472037.01
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	300	Diesel	0.001173139	0.001414948	0.00168932	0.012973941	0.013711353	6.437411	0.000444948	0.000409352	0.000444948	5.94819E-05	5.25413E-05	208854.71	13539.791	116.79094	8081075.955
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	600	Diesel	0.001554492	0.001880935	0.002238468	0.018645424	0.014595768	9.166594	0.00052562	0.00048357	0.00052562	9.16372E-05	8.09379E-05	321733.02	13270.72	92.541974	12510630.99
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	750	Diesel	0.000781732	0.000948595	0.001125694	0.011646979	0.006753384	6.4171702	0.000260066	0.000239621	0.000260066	5.93065E-05	5.23761E-05	208198.02	12460.525	20.784828	7940119.213
South Coast	2024	ConstMin - Bore/Drill Rigs	Aggregated	9999	Diesel	0.000874856	0.001058576	0.001259793	0.0061952	0.024104296	3.295717	0.000556735	0.000512196	0.000556735	3.04443E-05	2.68992E-05	106925.91	2215.243	2.9692612	4121374.97
South Coast	2024	ConstMin - Excavators	Aggregated	25	Diesel	2.61182E-05	3.16031E-05	3.76103E-05	8.87472E-05	6.0281E-05	0.0046697	8.40136E-06	7.72925E-06	8.40136E-06	4.23906E-06	3.81139E-06	151.50483	275.77022	1.0544567	6894.255522
South Coast	2024	ConstMin - Excavators	Aggregated	50	Diesel	0.014304132	0.017304733	0.020594062	0.174964361	0.14597323	24.486123	0.004967812	0.004570387	0.004967812	0.000225957	0.000199852	794425.29	100959.98	1349.1965	36148196.64
South Coast	2024	ConstMin - Excavators	Aggregated	75	Diesel	0.000507738	0.000614363	0.000731143	0.003570783	0.005562328	0.459396	0.000486584	0.000447657	0.000486584	4.23211E-06	3.74953E-06	14904.596	10331.373	17.687131	754837.4229
South Coast	2024	ConstMin - Excavators	Aggregated	100	Diesel	0.010208364	0.01235212	0.014700044	0.205627234	0.129200323	31.273571	0.005594634	0.005594634	0.000288833	0.000255251	1014636.6	633591.45	954.55236	1513820.79	
South Coast	2024	ConstMin - Excavators	Aggregated	175	Diesel	0.018032642	0.021819497	0.025967005	0.391556344	0.169853816	67.036141	0.008413443	0.007140638	0.008413443	0.000619241	0.00054714	2174913.8	753439.12	1245.248	110081748.9
South Coast	2024	ConstMin - Excavators	Aggregated	300	Diesel	0.018873432	0.022837941	0.027179038	0.179374516	0.13938627	85.411425	0.006010834	0.005529967	0.006010834	0.000789105	0.000697117	2771079.6	640988.81	1072.835	140136243.1
South Coast	2024	ConstMin - Excavators	Aggregated	600	Diesel	0.028770215	0.03481196	0.041429109	0.301095489	0.23734104	151.63337	0.008158568	0.007305182	0.008158568	0.001401063	0.001237611	4919577.8	73809.91	1125.347	249471503.6
South Coast	2024	ConstMin - Excavators	Aggregated	750	Diesel	0.00057652	0.000697589	0.000830189	0.005593627	0.007306292	1.8945769	0.000289998	0.000267968	0.000289998	1.7499E-05	1.54633E-05	61467.46	5041.3638	8.8435656	3094568.773
South Coast	2024	ConstMin - Excavators	Aggregated	9999	Diesel	0.000527283	0.000638013	0.000759288	0.007852624	0.0186676	4.2238993	0.000168585	0.000155098	0.000168585	3.90362E-05	3.44749E-05	137039.76	5756.9455	8.2908427	6862542.808
South Coast	2024	Industrial - Forklifts	Aggregated	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	2024	Industrial - Forklifts	Aggregated	50	Diesel	0.009766457	0.011817413	0.014												

Port of Long Beach Deep Draft Navigation Study
Los Angeles County, California

Appendix H1 - Tables
October 2019

Table H1.17
OFFROAD 2017 Output

OFFROAD2017 (v1.0.1) Emissions Inventory

Region Type: Air District

Region: South Coast AQMD

Calendar Year: 2024

Scenario: All Adopted Rules - Exhaust

Vehicle Classification: OFFROAD2017 Equipment Types

Units: Emissions: tons/day, Fuel Consumption: gallons/year, Activity: hours/year, HP-Hours: HP-hours/year

Region	CalYr	VehClass		MdYr	HP_Bin	Fuel	HC_tpd	ROG_tpd	TOG_tpd	CO_tpd	NOx_tpd	CO2_tpd	PM10_tpd	PM2.5_tpd	PM_tpd	SOx_tpd	NH3_tpd	Fuel_gpy	Total_Acti vity_hpy	Total_Pop ulation	Horsepower_ Hours_hhpy
South Coast	2024	ConstMin - Rollers	Aggregated	25	Diesel	1.23124E-05	1.4898E-05	1.77299E-05	4.09387E-05	2.81896E-05	0.0021541	3.87551E-06	3.56547E-06	3.87551E-06	1.95467E-08	1.75818E-08	69.888498	129.65933	0.5548322	3241.483206	
South Coast	2024	ConstMin - Rollers	Aggregated	50	Diesel	0.011992489	0.014510912	0.017269184	0.098438392	0.0895041	13.770478	0.00450214	0.004141969	0.00450214	0.000126955	0.000112393	446767.98	579437.17	1636.2003	20710298.11	
South Coast	2024	ConstMin - Rollers	Aggregated	75	Diesel	0.000421644	0.00051019	0.000607168	0.001676968	0.004108178	0.1440202	0.000292348	0.00026896	0.000292348	0.000181896	0.000174576	4672.576	3397.0744	14.425638	240816.2704	
South Coast	2024	ConstMin - Rollers	Aggregated	100	Diesel	0.008695146	0.010521127	0.012521011	0.138388178	0.11129523	21.378227	0.005815078	0.005349871	0.005815078	0.000197391	0.000174486	693593.04	409397.38	1206.2053	35725253.04	
South Coast	2024	ConstMin - Rollers	Aggregated	175	Diesel	0.004923844	0.005957852	0.007090336	0.122822641	0.055812137	22.25171	0.002550065	0.00234606	0.002550065	0.00020558	0.000181615	721932.22	258909.58	705.74662	37231225.07	
South Coast	2024	ConstMin - Rollers	Aggregated	300	Diesel	0.001262148	0.001527199	0.001817493	0.010840604	0.01678491	3.7610907	0.000644822	0.000593237	0.000644822	3.47353E-05	3.06975E-05	122024.44	28939.962	91.547321	6285112.896	
South Coast	2024	ConstMin - Rollers	Aggregated	600	Diesel	0.000458011	0.000554193	0.000659535	0.005551711	0.005568297	2.0783996	0.000192721	0.000177303	0.000192721	1.92021E-05	1.69636E-05	67431.385	9829.4737	31.625438	3457290.353	
South Coast	2024	OFF - ConstMin - Concrete/Industrial Saws	Aggregated	25	Diesel	2.77468E-05	3.3021E-05	3.99554E-05	0.000136373	0.000252486	0.0331201	9.43423E-06	8.6795E-06	9.43423E-06	4.20231E-07	2.74549E-07	1091.35	1460	2.47	26280	
South Coast	2024	OFF - ConstMin - Concrete/Industrial Saws	Aggregated	50	Diesel	0.000357428	0.000425369	0.000514696	0.003966817	0.003389996	0.5205313	0.000106107	9.76183E-05	0.000106107	6.72917E-06	4.37259E-06	17381.3	12574.25	21.69	414950.25	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	50	Diesel	0.006662172	0.008061228	0.009593528	0.05406046	0.044072078	6.3492579	0.0025773	0.002371116	0.0025773	5.85022E-05	5.18218E-05	205994.68	220674.69	305.16729	7861115.123	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	75	Diesel	0.001452469	0.001757487	0.002091555	0.008058636	0.012884958	0.9662441	0.001160007	0.001067206	0.001160007	8.88983E-06	7.88635E-06	31348.724	18620.121	37.808336	1339585.937	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	100	Diesel	0.003624851	0.004386069	0.005219785	0.060272849	0.044447771	8.8467446	0.002327824	0.002141598	0.002327824	8.16838E-05	7.22059E-05	287022.89	154842.87	210.64644	2174024.85	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	175	Diesel	0.001017612	0.001231311	0.001465361	0.014956776	0.010422026	2.4477513	0.000495738	0.000456079	0.000495738	2.26001E-05	1.99782E-05	79414.597	21078.906	28.626312	3369090.779	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	300	Diesel	0.000432949	0.000523869	0.000623447	0.003152671	0.005546099	1.4699861	0.000178266	0.000164005	0.000178266	1.35778E-05	1.19978E-05	47692.079	9648.3328	12.962858	2023292.245	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	600	Diesel	2.29474E-05	2.77664E-05	3.30443E-05	0.000366227	0.000100205	0.1985199	3.56024E-06	3.27542E-06	3.56024E-06	1.83473E-06	1.62029E-06	6440.7599	828.00972	1.0802382	273243.2084	
South Coast	2024	ConstMin - Sweepers/Scrubbers	Aggregated	9999	Diesel	2.27293E-05	2.75024E-05	3.27301E-05	0.000455952	0.00019877	0.255068	8.77137E-06	8.06966E-06	8.77137E-06	2.35755E-06	2.08183E-06	8275.4006	414.00486	0.5401191	351076.1223	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	25	Diesel	0.000128867	0.000155929	0.000185568	0.000546659	0.000360918	0.0371849	0.04906E-05	3.72513E-05	0.04906E-05	3.39926E-07	3.03498E-07	1206.4216	2198.4654	1.6210636	54961.63618	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	50	Diesel	0.000791984	0.0009583	0.001140456	0.008510279	0.006412569	0.944039	0.000285524	0.000262682	0.000285524	8.70435E-06	7.70512E-06	30628.306	48486.833	29.179145	1406479.035	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	75	Diesel	0.000119463	0.00014455	0.000172027	0.002441878	0.001010142	0.3278079	1.57444E-05	1.44848E-05	1.57444E-05	3.02716E-06	2.67552E-06	10635.365	7435.1319	4.8631908	536120.823	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	100	Diesel	0.000367415	0.000444572	0.000529077	0.004878728	0.003805187	0.6478043	0.000249476	0.000229518	0.000249476	5.97825E-06	5.28729E-06	21017.297	12066.305	9.1860271	1061262.052	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	175	Diesel	0.008357059	0.010112041	0.012034165	0.1477215904	0.067944933	23.215059	0.003228043	0.002969799	0.003228043	0.000214384	0.000189478	753187.01	242050.29	168.59062	38211388.35	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	300	Diesel	0.015129065	0.018306168	0.021785853	0.114997517	0.123528153	47.238543	0.004959633	0.004562862	0.004959633	0.00043629	0.000385555	1532602.5	370015.88	284.76684	77867725.97	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	600	Diesel	0.058236141	0.07046573	0.083860042	0.459017571	0.474739913	202.75199	0.017019359	0.01565781	0.017019359	0.001872796	0.001654835	6578065.1	884662.62	634.37623	333092899.3	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	750	Diesel	0.027894111	0.033751875	0.04016752	0.215852461	0.269766929	68.782433	0.010317412	0.009492019	0.010317412	0.000635091	0.000561393	2231570.3	170543.3	136.7097	113065982.5	
South Coast	2024	ConstMin - Off-Highway Trucks	Aggregated	9999	Diesel	0.036383424	0.044023943	0.05239213	0.277142358	0.343397735	121.84398	0.013918208	0.012804751	0.013918208	0.001125417	0.000994474	3953093.8	157171.97	108.61126	199864257.2	
South Coast	2024	Portable Equipment - Non-Rental Generator	Aggregated	9999	Diesel	0.054834837	0.066350153	0.078962166	0.364390609	0.860047669	173.40668	0.022422232	0.020628453	0.022422232	0.001601586	0.001415322	5625988.8	287460.91	209.54657	355674068.2	
South Coast	2024	ConstMin - Other Construction Equipment	Aggregated	175	Diesel	0.003873866	0.004687378	0.005578367	0.05614685	0.045236761	9.3493624	0.0023471	0.002159332	0.0023471	8.63233E-05	7.63082E-05	303329.77	93141.719	220.48396	14171966.91	
South Coast	2024	ConstMin - Other Construction Equipment	Aggregated	300	Diesel	0.004011354	0.004853739	0.00577635	0.030878801	0.051786757	12.214429	0.002006795	0.001846252	0.002006795	0.000112808	9.96925E-05	396283.68	84034.967	201.66216	18414850.18	
South Coast	2024	ConstMin - Other Construction Equipment	Aggregated	600	Diesel	0.012213304	0.014777778	0.017586777	0.118138309	0.141507367	47.820916	0.005305875	0.004881405	0.005305875	0.000441762	0.000390308	1551496.9	188946.41	411.92856	72164310.34	
South Coast	2024	ConstMin - Other Construction Equipment	Aggregated	750	Diesel	0.002402639	0.002907193	0.0034598	0.018556932	0.030189068	8.9145077	0.001049856	0.000965868	0.001049856	0.000082347	0.000072759	289221.38	21884.983	44.634557	13442495.18	
South Coast	2024	ConstMin - Other Construction Equipment	Aggregated	9999	Diesel	0.000651657	0.000788505	0.000938386	0.005748044	0.016643808	3.0263327	0.000306163	0.00028167	0.000306163	2.79604E-05	2.47005E-05	98186.033	4977.8299	10.217549	4572752.526	

Table H1.18
Onroad Vehicles Emission Factors

	Year	Vehicle Type	Units	PM10 brake wear	PM10 tire wear	PM2.5 brake wear	PM2.5 tire wear	PM10	PM2.5	DPM	NOX	SOX	CO	HC	VOC	CO2	CH4	N2O
Onsite Transit																		
	2024	Construction Trucks	g/mi					0.0138088	0.0132114	0.01380879	7.1482981	0.0222671	0.8332295		0.0954593	2356.9337	0.0044338	0.3704772
	2024	Worker Vehicles	g/mi					0.0094329	0.0086791	0.000157774	0.0773779	0.0062548	1.2481561		0.0622942	632.26873	0.0159141	0.0087178
	2025	Construction Trucks	g/mi					0.0125616	0.0120182	0.012561611	7.2105688	0.0220306	0.8408242		0.0902488	2331.8994	0.0041918	0.3665421
	2025	Worker Vehicles	g/mi					0.009093	0.0083658	0.000134133	0.0698737	0.0060653	1.1723031		0.0552776	613.11787	0.0142835	0.008216
	2026	Construction Trucks	g/mi					0.0114689	0.0109728	0.011468947	7.2869609	0.0218538	0.8488409		0.0855193	2313.1788	0.0039721	0.3635995
	2026	Worker Vehicles	g/mi					0.0087032	0.0080066	0.000111355	0.0637728	0.0058973	1.1099064		0.0494789	596.14033	0.0129276	0.0078087
Offsite Transit																		
	2024	Construction Trucks	g/mi	0.13034	0.012	0.05586	0.003	0.0100878	0.0096514	0.010087792	1.4591341	0.0086835	0.0838267		0.0115988	919.13301	0.0005387	0.1444749
	2024	Worker Vehicles	g/mi	0.03675	0.008	0.01575	0.002	0.0016106	0.0014829	5.21621E-05	0.0419133	0.0026543	0.6905881		0.0107865	268.3068	0.002754	0.0047139
	2025	Construction Trucks	g/mi	0.13034	0.012	0.05586	0.003	0.0099871	0.0095551	0.009987136	1.446922	0.0085844	0.0832898		0.0110903	908.64595	0.0005151	0.1428265
	2025	Worker Vehicles	g/mi	0.03675	0.008	0.01575	0.002	0.0015419	0.0014195	4.56363E-05	0.0376355	0.0025626	0.6460573		0.0094866	259.03839	0.0024539	0.004419
	2026	Construction Trucks	g/mi	0.13034	0.012	0.05586	0.003	0.00992	0.0094909	0.009920032	1.4390438	0.008509	0.0828843		0.0106317	900.66095	0.0004938	0.1415714
	2026	Worker Vehicles	g/mi	0.03675	0.008	0.01575	0.002	0.0014682	0.0013515	3.93525E-05	0.0342168	0.0024832	0.6098724		0.0084219	251.01696	0.0022067	0.0041838
Source: EMFAC2017																		
Notes: Refer to Table H1.19 for onsite and offsite transit vehicles speeds and worker vehicle fleet mix.																		

Table H1.19

EMFAC2017 Output Onsite Transit

Fleet Mix Exhaust

EMFAC2017 (v1.0.2) Emission Rates

Region Type: Air District

Region: SOUTH COAST AQMD

Calendar Year: 2024, 2025, 2026

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUN EX	TOG_RUN EX	CO_RUNEX	NOx_RUNE X	SOx_RUNE X	CO2_RUNE X	CH4_RUNE X	PM10_RU NEX	PM2_5_RU NEX	N2O_RUN EX	DPM
SOUTH COAST	2024	LDA	Aggregated	5	GAS	720460.97	0.0470391	0.0686394	1.05892149	0.0546265	0.0058733	593.51674	0.01285	0.0090214	0.0082949	0.0068814	0
SOUTH COAST	2024	LDA	Aggregated	5	DSL	7337.2646	0.1570907	0.1788373	3.091287246	0.1141596	0.0045594	482.29097	0.007297	0.018095	0.0173122	0.0758094	0.018095
SOUTH COAST	2024	LDT1	Aggregated	5	GAS	81952.175	0.1245176	0.1816814	2.038238071	0.1624728	0.0068432	691.52653	0.029136	0.0120593	0.0110882	0.0127061	0
SOUTH COAST	2024	LDT1	Aggregated	5	DSL	23.045112	0.7094762	0.8076915	3.723673086	0.7190657	0.0097987	1036.5024	0.032954	0.4710287	0.4506522	0.1629237	0.4710287
SOUTH COAST	2024	LDT2	Aggregated	5	GAS	247273.33	0.0816633	0.1191576	1.473764265	0.1137081	0.0072224	729.84822	0.020747	0.0094428	0.0086823	0.009991	0
SOUTH COAST	2024	LDT2	Aggregated	5	DSL	2002.5419	0.257779	0.2934642	2.356618059	0.1521124	0.0060967	644.90278	0.011973	0.0117186	0.0112117	0.1013697	0.0117186
SOUTH COAST	2024	T6 instate c	Aggregated	5	DSL	517.83259	0.0954593	0.1086731	0.833229494	7.1482981	0.0222671	2356.9337	0.004434	0.0138088	0.0132114	0.3704772	0.0138088
SOUTH COAST	2025	LDA	Aggregated	5	GAS	719865.83	0.041315	0.0602867	0.998863317	0.049705	0.005702	576.20675	0.011485	0.0087325	0.0080292	0.0065106	0
SOUTH COAST	2025	LDA	Aggregated	5	DSL	7572.0712	0.1468369	0.167164	3.043218836	0.102991	0.0044332	468.94706	0.00682	0.0150433	0.0143925	0.0737119	0.0150433
SOUTH COAST	2025	LDT1	Aggregated	5	GAS	83153.597	0.1087688	0.1587152	1.84570184	0.1435799	0.0066594	672.95289	0.025701	0.0113458	0.0104321	0.0116068	0
SOUTH COAST	2025	LDT1	Aggregated	5	DSL	21.61003	0.6745385	0.7679173	3.643948927	0.6755583	0.009606	1016.1174	0.031331	0.4350876	0.4162659	0.1597195	0.4350876
SOUTH COAST	2025	LDT2	Aggregated	5	GAS	248475.98	0.0732723	0.1069188	1.381806608	0.1018897	0.0069694	704.27494	0.018816	0.0091508	0.0084138	0.0092515	0
SOUTH COAST	2025	LDT2	Aggregated	5	DSL	2096.776	0.2581362	0.2938709	2.403328973	0.1513147	0.0059232	626.55562	0.01199	0.0108116	0.0103439	0.0984858	0.0108116
SOUTH COAST	2025	T6 instate c	Aggregated	5	DSL	513.877	0.0902488	0.1027414	0.840824192	7.2105688	0.0220306	2331.8994	0.004192	0.0125616	0.0120182	0.3665421	0.0125616
SOUTH COAST	2026	LDA	Aggregated	5	GAS	718112.77	0.0366883	0.0535355	0.950427358	0.0458416	0.0055499	560.82858	0.010369	0.0083858	0.0077104	0.0062177	0
SOUTH COAST	2026	LDA	Aggregated	5	DSL	7761.4934	0.137457	0.1564857	3.000891738	0.0931671	0.0043236	457.35359	0.006385	0.0120555	0.011534	0.0718896	0.0120555
SOUTH COAST	2026	LDT1	Aggregated	5	GAS	84093.411	0.0954301	0.1392514	1.681728688	0.1276488	0.0064961	656.44567	0.022784	0.0106604	0.0098018	0.0106829	0
SOUTH COAST	2026	LDT1	Aggregated	5	DSL	19.63734	0.6135771	0.6985168	3.546443567	0.6100648	0.0093765	991.84897	0.028499	0.3720013	0.3559087	0.1559048	0.3720013
SOUTH COAST	2026	LDT2	Aggregated	5	GAS	249304.65	0.0662088	0.0966117	1.30564874	0.0921561	0.0067457	681.67186	0.017184	0.0088093	0.0080998	0.0086447	0
SOUTH COAST	2026	LDT2	Aggregated	5	DSL	2177.4535	0.2589294	0.2947739	2.447840667	0.1510853	0.005777	611.08714	0.012027	0.0104381	0.0099865	0.0960544	0.0104381
SOUTH COAST	2026	T6 instate c	Aggregated	5	DSL	512.39198	0.0855193	0.0973572	0.848840877	7.2869609	0.0218538	2313.1788	0.003972	0.0114689	0.0109728	0.3635995	0.0114689

Table H1.20

EMFAC2017 Output Offsite Transit

Fleet Mix Exhaust

EMFAC2017 (v1.0.2) Emission Rates

Region Type: Air District

Region: SOUTH COAST AQMD

Calendar Year: 2024, 2025, 2026

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	ROG_RUNE X	ROG_IDLEX	ROG_STRE X	ROG_HOTS OAK	ROG_RUNL OSS	ROG_REST LOSS	ROG_DIUR N	TOG_RUNE X	TOG_IDLEX	TOG_STRE X	TOG_HOTS OAK	TOG_RUNL OSS	TOG_RESTL OSS	TOG_DIUR N
SOUTH COA	2024	LDA	Aggregated	Aggregated	GAS	6543321.5	247047080	30912773	0.0082219	0	0.1888817	0.0900536	0.1997274	0.2074037	0.2191751	0.0119974	0	0.2068017	0.0900536	0.1997274	0.2074037	0.2191751
SOUTH COA	2024	LDA	Aggregated	Aggregated	DSL	63999.088	2508733.2	304606.89	0.0145786	0	0	0	0	0	0.0165967	0	0	0	0	0	0	0
SOUTH COA	2024	LDA	Aggregated	Aggregated	ELEC	172307.13	7265020	857849.63	0	0	0	0.004888	0	0.0079037	0.023477	0	0	0	0.004888	0	0.0079037	0.023477
SOUTH COA	2024	LDT1	Aggregated	Aggregated	GAS	758038.32	27517267	3506784.4	0.0241292	0	0.2935381	0.1753748	0.6117487	0.4403211	0.5238993	0.0352054	0	0.3213871	0.1753748	0.6117487	0.4403211	0.5238993
SOUTH COA	2024	LDT1	Aggregated	Aggregated	DSL	328.77854	7657.7325	1149.5715	0.1708218	0	0	0	0	0	0.1944693	0	0	0	0	0	0	0
SOUTH COA	2024	LDT1	Aggregated	Aggregated	ELEC	8873.8766	385871.85	44565.445	0	0	0	0.004888	0	0.0078613	0.0233652	0	0	0	0.004888	0	0.0078613	0.0233652
SOUTH COA	2024	LDT2	Aggregated	Aggregated	GAS	2256847	83361536	10593017	0.0149087	0	0.2669594	0.1136523	0.3879008	0.3356143	0.332401	0.0217534	0	0.2922868	0.1136523	0.3879008	0.3356143	0.332401
SOUTH COA	2024	LDT2	Aggregated	Aggregated	DSL	16402.997	669969.53	80362.135	0.020122	0	0	0	0	0	0.0229076	0	0	0	0	0	0	0
SOUTH COA	2024	LDT2	Aggregated	Aggregated	ELEC	34685.637	1081895.4	174560.97	0	0	0	0.004888	0	0.0078852	0.0234323	0	0	0	0.004888	0	0.0078852	0.0234323
SOUTH COA	2024	T6 instate cd	Aggregated	Aggregated	DSL	4467.8956	291328.11	20199.182	0.0115988	0.0497707	0	0	0	0	0.0132043	0.0566602	0	0	0	0	0	0
SOUTH COA	2025	LDA	Aggregated	Aggregated	GAS	6623932.9	247134863	31282323	0.0072078	0	0.1730799	0.0857858	0.1949939	0.1971446	0.2069079	0.0105176	0	0.1895006	0.0857858	0.1949939	0.1971446	0.2069079
SOUTH COA	2025	LDA	Aggregated	Aggregated	DSL	66922.32	2593390.4	318755.57	0.0131775	0	0	0	0	0	0	0.0150017	0	0	0	0	0	0
SOUTH COA	2025	LDA	Aggregated	Aggregated	ELEC	200007.11	8588255.8	994212.63	0	0	0	0.004888	0	0.0079137	0.0235063	0	0	0	0.004888	0	0.0079137	0.0235063
SOUTH COA	2025	LDT1	Aggregated	Aggregated	GAS	778181.88	27926963	3602142.6	0.0209762	0	0.2647065	0.1625491	0.5727636	0.4114373	0.4829739	0.0306084	0	0.2898203	0.1625491	0.5727636	0.4114373	0.4829739
SOUTH COA	2025	LDT1	Aggregated	Aggregated	DSL	306.69855	7182.2408	1077.0936	0.1589987	0	0	0	0	0	0	0.1810095	0	0	0	0	0	0
SOUTH COA	2025	LDT1	Aggregated	Aggregated	ELEC	10974.675	485559.29	55032.388	0	0	0	0.004888	0	0.0078683	0.0233853	0	0	0	0.004888	0	0.0078683	0.0233853
SOUTH COA	2025	LDT2	Aggregated	Aggregated	GAS	2295149.4	83832765	10772144	0.0133343	0	0.2461323	0.1083691	0.376717	0.3261566	0.3205227	0.0194574	0	0.2694839	0.1083691	0.376717	0.3261566	0.3205227
SOUTH COA	2025	LDT2	Aggregated	Aggregated	DSL	17587.778	702822.89	85874.295	0.0198868	0	0	0	0	0	0	0.0226398	0	0	0	0	0	0
SOUTH COA	2025	LDT2	Aggregated	Aggregated	ELEC	41917.383	1280277.3	210324.6	0	0	0	0.004888	0	0.0078902	0.0234468	0	0	0	0.004888	0	0.0078902	0.0234468
SOUTH COA	2025	T6 instate cd	Aggregated	Aggregated	DSL	4547.4396	289102.73	20558.798	0.0110903	0.0496598	0	0	0	0	0.0126254	0.0565339	0	0	0	0	0	0
SOUTH COA	2026	LDA	Aggregated	Aggregated	GAS	6704944.2	246806990	31652207	0.006388	0	0.1593916	0.0819021	0.1906985	0.187688	0.1957856	0.0093213	0	0.1745138	0.0819021	0.1906985	0.187688	0.1957856
SOUTH COA	2026	LDA	Aggregated	Aggregated	DSL	69486.663	2662198.2	331542.63	0.0118584	0	0	0	0	0	0	0.0135	0	0	0	0	0	0
SOUTH COA	2026	LDA	Aggregated	Aggregated	ELEC	226692.73	9539586.4	1124278.2	0	0	0	0.004888	0	0.0079235	0.0235345	0	0	0	0.004888	0	0.0079235	0.0235345
SOUTH COA	2026	LDT1	Aggregated	Aggregated	GAS	797971.55	28250579	3694973.3	0.0183022	0	0.2394362	0.1509449	0.5377018	0.3845134	0.4455651	0.0267065	0	0.2621525	0.1509449	0.5377018	0.3845134	0.4455651
SOUTH COA	2026	LDT1	Aggregated	Aggregated	DSL	270.69602	6522.8307	971.57155	0.1391271	0	0	0	0	0	0	0.1583869	0	0	0	0	0	0
SOUTH COA	2026	LDT1	Aggregated	Aggregated	ELEC	13055.319	564811.17	65291.34	0	0	0	0.004888	0	0.0078739	0.0234014	0	0	0	0.004888	0	0.0078739	0.0234014
SOUTH COA	2026	LDT2	Aggregated	Aggregated	GAS	2335277.2	84175951	10957538	0.012009	0	0.2278263	0.1034755	0.3655973	0.3166753	0.3090774	0.0175236	0	0.2494411	0.1034755	0.3655973	0.3166753	0.3090774
SOUTH COA	2026	LDT2	Aggregated	Aggregated	DSL	18735.824	731082.45	91136.642	0.0198152	0	0	0	0	0	0	0.0225583	0	0	0	0	0	0
SOUTH COA	2026	LDT2	Aggregated	Aggregated	ELEC	48997.68	1464375.6	244977.96	0	0	0	0.004888	0	0.0078949	0.0234608	0	0	0	0.004888	0	0.0078949	0.0234608
SOUTH COA	2026	T6 instate cd	Aggregated	Aggregated	DSL	4614.6301	288267.27	20862.563	0.0106317	0.0495653	0	0	0	0	0	0.0121033	0.0564263	0	0	0	0	0

Port of Long Beach Deep Draft Navigation Study
Los Angeles County, California

Appendix H1 - Tables
October 2019

Table H1.20

EMFAC2017 Output Offsite Transit

Fleet Mix Exhaust

EMFAC2017 (v1.0.2) Emission Rates

Region Type: Air District

Region: SOUTH COAST AQMD

Calendar Year: 2024, 2025, 2026

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and NEX

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	CO_RUNEX	CO_IDLEX	CO_STREX	NOx_RUNEX X	NOx_IDLEX	NOx_STREX X	CO2_RUNEX X	CO2_IDLEX	CO2_STREX	CH4_RUNEX X	CH4_IDLEX	CH4_STREX	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	PM2_5_RUNEX
SOUTH COA	2024	LDA	Aggregated	Aggregated	GAS	0.6170464	0	2.0207049	0.0309611	0	0.1642574	258.07942	0	51.791051	0.0022311	0	0.0436026	0.0015408	0	0.0017461	0.008	0.03675	0.0014167
SOUTH COA	2024	LDA	Aggregated	Aggregated	DSL	0.2478206	0	0	0.0491271	0	0	199.32668	0	0	0.0006771	0	0	0.0059574	0	0	0.008	0.03675	0.0056997
SOUTH COA	2024	LDA	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2024	LDT1	Aggregated	Aggregated	GAS	1.1388644	0	2.1397201	0.0881606	0	0.2238707	301.4961	0	60.692708	0.0055697	0	0.0603888	0.002162	0	0.0023056	0.008	0.03675	0.0019879
SOUTH COA	2024	LDT1	Aggregated	Aggregated	DSL	1.0129839	0	0	0.9123372	0	0	439.67457	0	0	0.0079343	0	0	0.1275098	0	0	0.008	0.03675	0.1219938
SOUTH COA	2024	LDT1	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2024	LDT2	Aggregated	Aggregated	GAS	0.8502923	0	2.5178682	0.0632094	0	0.2371036	317.80192	0	65.105601	0.0037395	0	0.0589011	0.0016344	0	0.0017692	0.008	0.03675	0.0015027
SOUTH COA	2024	LDT2	Aggregated	Aggregated	DSL	0.1813322	0	0	0.0405709	0	0	271.56232	0	0	0.0009346	0	0	0.0050299	0	0	0.008	0.03675	0.0048123
SOUTH COA	2024	LDT2	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2024	T6 instate cd	Aggregated	Aggregated	DSL	0.0838267	2.065668	0	1.4591341	2.9858499	2.608719	919.13301	611.50258	0	0.0005387	0.0023117	0	0.0100878	0.0010908	0	0.012	0.13034	0.0096514
SOUTH COA	2025	LDA	Aggregated	Aggregated	GAS	0.5828174	0	1.9420882	0.0281874	0	0.1548852	250.52752	0	50.2837	0.0019906	0	0.0404113	0.0014892	0	0.0016933	0.008	0.03675	0.0013692
SOUTH COA	2025	LDA	Aggregated	Aggregated	DSL	0.23993	0	0	0.0413241	0	0	193.81353	0	0	0.0006121	0	0	0.0050812	0	0	0.008	0.03675	0.0048614
SOUTH COA	2025	LDA	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2025	LDT1	Aggregated	Aggregated	GAS	1.0361128	0	2.0545514	0.0777812	0	0.2079147	293.35819	0	59.006598	0.0048877	0	0.0552078	0.0020231	0	0.0021721	0.008	0.03675	0.0018602
SOUTH COA	2025	LDT1	Aggregated	Aggregated	DSL	0.9514419	0	0	0.8441278	0	0	430.90778	0	0	0.0073852	0	0	0.1178524	0	0	0.008	0.03675	0.1127542
SOUTH COA	2025	LDT1	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2025	LDT2	Aggregated	Aggregated	GAS	0.7987576	0	2.4329096	0.0565713	0	0.2188839	306.65172	0	62.854964	0.0033811	0	0.0548503	0.0015807	0	0.0017244	0.008	0.03675	0.0014534
SOUTH COA	2025	LDT2	Aggregated	Aggregated	DSL	0.1833707	0	0	0.0385982	0	0	263.81093	0	0	0.0009237	0	0	0.0048189	0	0	0.008	0.03675	0.0046105
SOUTH COA	2025	LDT2	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2025	T6 instate cd	Aggregated	Aggregated	DSL	0.0832898	2.0686502	0	1.446922	2.9691191	2.614563	908.64595	606.79401	0	0.0005151	0.0023066	0	0.0099871	0.0010229	0	0.012	0.13034	0.0095551
SOUTH COA	2026	LDA	Aggregated	Aggregated	GAS	0.5551503	0	1.8711474	0.026021	0	0.1470536	243.80237	0	48.911179	0.0017939	0	0.0376081	0.0014287	0	0.001636	0.008	0.03675	0.0013136
SOUTH COA	2026	LDA	Aggregated	Aggregated	DSL	0.2328975	0	0	0.0343627	0	0	189.00964	0	0	0.0005508	0	0	0.0042255	0	0	0.008	0.03675	0.0040427
SOUTH COA	2026	LDA	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2026	LDT1	Aggregated	Aggregated	GAS	0.9485731	0	1.9744754	0.0691259	0	0.1943035	286.11364	0	57.468364	0.004308	0	0.0506358	0.001893	0	0.0020461	0.008	0.03675	0.0017405
SOUTH COA	2026	LDT1	Aggregated	Aggregated	DSL	0.8707018	0	0	0.7424044	0	0	420.343	0	0	0.0064622	0	0	0.1007983	0	0	0.008	0.03675	0.0964378
SOUTH COA	2026	LDT1	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2026	LDT2	Aggregated	Aggregated	GAS	0.7560499	0	2.3573407	0.0511453	0	0.2035334	296.78376	0	60.814875	0.0030782	0	0.0512609	0.0015198	0	0.001672	0.008	0.03675	0.0013974
SOUTH COA	2026	LDT2	Aggregated	Aggregated	DSL	0.1858674	0	0	0.0375382	0	0	257.27608	0	0	0.0009204	0	0	0.0047493	0	0	0.008	0.03675	0.0045438
SOUTH COA	2026	LDT2	Aggregated	Aggregated	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.03675	0
SOUTH COA	2026	T6 instate cd	Aggregated	Aggregated	DSL	0.0828843	2.0712518	0	1.4390438	2.9545035	2.6200331	900.66095	602.4448	0	0.0004938	0.0023022	0	0.00992	0.0009645	0	0.012	0.13034	0.0094909

Port of Long Beach Deep Draft Navigation Study
Los Angeles County, California

Appendix H1 - Tables
October 2019

Table H1.20

EMFAC2017 Output Offsite Transit

Fleet Mix Exhaust

EMFAC2017 (v1.0.2) Emission Rates

Region Type: Air District

Region: SOUTH COAST AQMD

Calendar Year: 2024, 2025, 2026

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW an

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	PM2_5_IDL EX	PM2_5_ST REX	PM2_5_P MTW	PM2_5_P MBW	SOx_RUNE X	SOx_IDLEX	SOx_STREX	N2O_RUNE X	N2O_IDLEX	N2O_STREX
SOUTH COA	2024	LDA	Aggregated	Aggregated	GAS	0	0.0016055	0.002	0.01575	0.0025539	0	0.0005125	0.0039333	0	0.0237369
SOUTH COA	2024	LDA	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0018844	0	0	0.0313314	0	0
SOUTH COA	2024	LDA	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2024	LDT1	Aggregated	Aggregated	GAS	0	0.0021199	0.002	0.01575	0.0029835	0	0.0006006	0.0070454	0	0.0264144
SOUTH COA	2024	LDT1	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0041565	0	0	0.0691107	0	0
SOUTH COA	2024	LDT1	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2024	LDT2	Aggregated	Aggregated	GAS	0	0.0016267	0.002	0.01575	0.0031449	0	0.0006443	0.0056392	0	0.0288227
SOUTH COA	2024	LDT2	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0025672	0	0	0.0426858	0	0
SOUTH COA	2024	LDT2	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2024	T6 instate cd	Aggregated	Aggregated	DSL	0.0010436	0	0.003	0.05586	0.0086835	0.0057772	0	0.1444749	0.0961197	0
SOUTH COA	2025	LDA	Aggregated	Aggregated	GAS	0	0.0015569	0.002	0.01575	0.0024792	0	0.0004976	0.0037231	0	0.0227572
SOUTH COA	2025	LDA	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0018322	0	0	0.0304648	0	0
SOUTH COA	2025	LDA	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2025	LDT1	Aggregated	Aggregated	GAS	0	0.0019972	0.002	0.01575	0.002903	0	0.0005839	0.0064378	0	0.0252484
SOUTH COA	2025	LDT1	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0040736	0	0	0.0677327	0	0
SOUTH COA	2025	LDT1	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2025	LDT2	Aggregated	Aggregated	GAS	0	0.0015855	0.002	0.01575	0.0030346	0	0.000622	0.0052221	0	0.0273272
SOUTH COA	2025	LDT2	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.002494	0	0	0.0414674	0	0
SOUTH COA	2025	LDT2	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2025	T6 instate cd	Aggregated	Aggregated	DSL	0.0009786	0	0.003	0.05586	0.0085844	0.0057327	0	0.1428265	0.0953796	0
SOUTH COA	2026	LDA	Aggregated	Aggregated	GAS	0	0.0015042	0.002	0.01575	0.0024126	0	0.000484	0.0035575	0	0.0219275
SOUTH COA	2026	LDA	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0017868	0	0	0.0297097	0	0
SOUTH COA	2026	LDA	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2026	LDT1	Aggregated	Aggregated	GAS	0	0.0018813	0.002	0.01575	0.0028313	0	0.0005687	0.0059312	0	0.0242542
SOUTH COA	2026	LDT1	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0039738	0	0	0.0660721	0	0
SOUTH COA	2026	LDT1	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2026	LDT2	Aggregated	Aggregated	GAS	0	0.0015373	0.002	0.01575	0.0029369	0	0.0006018	0.0048815	0	0.0260461
SOUTH COA	2026	LDT2	Aggregated	Aggregated	DSL	0	0	0.002	0.01575	0.0024322	0	0	0.0404402	0	0
SOUTH COA	2026	LDT2	Aggregated	Aggregated	ELEC	0	0	0.002	0.01575	0	0	0	0	0	0
SOUTH COA	2026	T6 instate cd	Aggregated	Aggregated	DSL	0.0009228	0	0.003	0.05586	0.008509	0.0056916	0	0.1415714	0.0946959	0

Table H1.21

Vehicle Idling Exhaust Onsite

Fleet Mix

EMFAC2011 Vehicle Category used in calculations	CY	EMFAC2007 Vehicle Category	Fuel_Type	air_basin	season	HC (g/hr- veh)	CO (g/hr- veh)	NOX (g/hr- veh)	PM10 (g/hr- veh)	PM2.5 (g/hr-veh)	CO2 (g/hr- veh)	CO2 (with Pavley+LCF S) (g/hr- veh)	TOG (g/hr- veh)	ROG (g/hr- veh)	Sox (g/hr- veh)
T6	2024	HHDT	D	SC	a	5.7674343	41.174525	39.594888	0.1098485	0.1010606	7034.4313	6330.9882	8.31491	7.3038788	0.0671118
MDV	2024	MHDT	D	SC	a	1.6687434	24.958118	40.456694	0.0924351	0.0850403	7631.5418	6868.3876	2.4058274	2.1132967	0.0728085
T6	2025	HHDT	D	SC	a	5.7741329	41.226754	39.487118	0.1095804	0.100814	7034.5905	6331.1314	8.3245674	7.3123619	0.0671133
MDV	2025	MHDT	D	SC	a	1.6722817	25.016612	40.203586	0.0921005	0.0847325	7632.6786	6869.4107	2.4109285	2.1177775	0.0728193
T6	2026	HHDT	D	SC	a	5.7806792	41.277289	39.381355	0.1093443	0.1005968	7034.7179	6331.2461	8.3340052	7.3206522	0.0671145
MDV	2026	MHDT	D	SC	a	1.6757603	25.073503	39.955666	0.0917989	0.084455	7633.684	6870.3156	2.4159437	2.1221829	0.0728289
Source: EMFAC2011 Idling Emission Rates - Idling rates for combined model year: HD_Idle_ER worksheet															

Table H1.22

Construction Equipment Load Factors

Equipment	CalEEMod HP	CalEEMod LF
Aerial Lifts	63	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	221	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	231	0.29
Crawler Tractors	212	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	158	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	187	0.41
Off-Highway Tractors	124	0.44
Off-Highway Trucks	402	0.38
Other Construction Equipment	172	0.42
Other General Industrial Equipment	88	0.34
Other Material Handling Equipment	168	0.4
Pavers	130	0.42
Paving Equipment	132	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.3
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	247	0.4
Rubber Tired Loaders	203	0.36
Scrapers	367	0.48
Signal Boards	6	0.82
Skid Steer Loaders	65	0.37
Surfacing Equipment	263	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	78	0.5
Welders	46	0.45

Source:

CalEEMod, Appendix D.

Table H1.23

GHG Emission Factors

	CO2 (lb CO2/MW hr)	CH4 (lb CO2/GW hr)	N2O (lb CO2/GW hr)
Electricity generation	527.9	33	4
Source: 2019 Climate Registry Default Emission Factors, Table 3.1, Default Factors for Calculating Emissions from Grid Electricity by eGrid Subregion. CAMX subregion.			

Table H1.24

Global Warming Potentials (GWP)

CO2	CH4	N2O
1	25	298
Source: IPCC 2007. Intergovernmental Panel on Climate Change. 4th Assessment Report, Climate Change 2007: The Physical Science Basis, Chapter 2, Table 2.14. June, 4th Assessment Report was chosen to maintain consistency with the U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015, April 2017.		

Table H1.25

SOx Emission Factor - Offroad Construction Equipment

Offroad Construction Equipment less	0.005552064 g/hp-hr
Offroad Construction Equipment grea	0.004994136 g/hp-hr
$SO_x \text{ (gms/hp-hr)} = (S \text{ content in } X/1,000,000) \times (MW \text{ } SO_2 / MW \text{ } S) \times BSF =$	
Where:	
X = S content in parts per million (ppm)	15 ppm
S MW = Molecular Weight	32
SO2 MW = Molecular Weight	64
BSFC for offroad construction equipment less than 100 hp (per CARB OFFROAD 2017 Diesel Emission Factors excel spreadsheet)	0.408 (lb/hp-hr)
BSFC for offroad construction equipment greater than 100 hp (per CARB OFFROAD 2017 Diesel Emission Factors excel spreadsheet)	0.367 (lb/hp-hr)
BSFC for offroad construction equipment less than 100 hp	185.0688 (g/hp-hr)
BSFC for offroad construction equipment greater than 100 hp	166.4712 (g/hp-hr)

Table H1.26
Alternative 2 Emissions by Task

						Unmitigated Emissions										
						Peak Day										
						PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
1	Electrical Substation Construction at Pier J (mitigation only)															
1	Off-Road Equipment															
1	Caterpillar 320 excavator	Offroad Construction Equipment		onsite	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Small asphalt roller	Offroad Construction Equipment		onsite	26	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Water truck	Offroad Construction Equipment		onsite	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Forklift	Offroad Construction Equipment		onsite	22	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Mobile crane (35 ton)	Offroad Construction Equipment		onsite	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	On-Road Vehicles															
1	Haul trucks	Onroad Construction Vehicles		onsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles		onsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Haul trucks	Onroad Construction Vehicles		offsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles		offsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Workers	Onroad Construction Vehicles		offsite	60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Fugitive Dust															
1	Soil handling	Fugitive Emissions		onsite	20	n/a	n/a									
1	Asphalting	Fugitive Emissions		onsite												
2	Pier J Breakwater Construction															
2	Marine Activities															
2	Pier J Breakwater Tugboat propulsion engine	Marine Equipment		onsite	54	5.81	5.17	5.81	108.18	0.06	58.10	6.00	3.44	0.00	0.00	3.4864
2	Pier J Breakwater Tugboat auxiliary engine	Marine Equipment		onsite	54	1.06	0.94	1.06	18.86	0.01	13.23	1.05	0.78	0.00	0.00	0.7941
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment		onsite	54	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment		onsite	54	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment		onsite	54	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.00	0.00	0.2174
2	Off-Road Equipment															
2	Piling crane	Offroad Construction Equipment		onsite	54	0.21	0.19	0.21	5.00	0.01	2.67	0.47	0.38	0.00	0.00	0.3800
2	Long arm excavator	Offroad Construction Equipment		onsite	54	0.08	0.07	0.08	2.19	0.01	2.78	0.32	0.63	0.00	0.00	0.6340
2	On-Road Vehicles															
2	Delivery Trucks	Onroad Construction Vehicles		onsite	5	0.15	0.04	0.00	0.08	0.00	0.01	0.00	0.01	0.00	0.00	0.0123
2	Delivery Trucks	Onroad Construction Vehicles		offsite	5	0.49	0.19	0.02	3.22	0.02	0.18	0.03	0.92	0.00	0.00	0.9622
2	Workers	Onroad Construction Vehicles		offsite	54	0.16	0.05	0.00	0.06	0.00	0.96	0.01	0.17	0.00	0.00	0.1700

Table H1.26
Alternative 2 Emissions by Task

			Unmitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
1 Electrical Substation Construction at Pier J (mitigation only)													
1	Off-Road Equipment												
1	Caterpillar 320 excavator	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Small asphalt roller	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Water truck	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Forklift	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Mobile crane (35 ton)	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	On-Road Vehicles												
1	Haul trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Haul trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Workers	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Fugitive Dust												
1	Soil handling	Fugitive Emissions	n/a	n/a									
1	Asphalting	Fugitive Emissions											
2 Pier J Breakwater Construction													
2	Marine Activities												
2	Pier J Breakwater Tugboat propulsion engine	Marine Equipment	313.73	279.22	313.73	5841.59	3.46	3137.27	323.75	185.57	0.00	0.01	188.27
2	Pier J Breakwater Tugboat auxiliary engine	Marine Equipment	57.17	50.88	57.17	1018.30	0.79	714.59	56.44	42.27	0.00	0.00	42.88
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment	21.93	19.52	21.93	433.28	0.24	219.27	24.01	12.97	0.00	0.00	13.16
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	1.82	1.62	1.82	32.38	0.03	22.73	1.79	1.34	0.00	0.00	1.36
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment	19.57	17.41	19.57	386.62	0.22	195.66	21.43	11.57	0.00	0.00	11.74
2	Off-Road Equipment												
2	Piling crane	Offroad Construction Equipment	11.27	10.36	11.27	270.12	0.42	144.43	25.20	20.52	0.00	0.00	20.52
2	Long arm excavator	Offroad Construction Equipment	4.06	3.74	4.06	118.13	0.70	149.87	17.33	34.23	0.00	0.00	34.23
2	On-Road Vehicles												
2	Delivery Trucks	Onroad Construction Vehicles	0.74	0.18	0.00	0.39	0.00	0.05	0.01	0.06	0.00	0.00	0.06
2	Delivery Trucks	Onroad Construction Vehicles	2.43	0.94	0.11	16.08	0.10	0.92	0.13	4.60	0.00	0.00	4.81
2	Workers	Onroad Construction Vehicles	8.58	2.72	0.00	3.14	0.20	51.79	0.81	9.13	0.00	0.00	9.18

Table H1.26

Alternative 2 Emissions by Task

			Mitigated										
			Peak Day										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
1	Electrical Substation Construction at Pier J (mitigation only)												
1	Off-Road Equipment												
1	Caterpillar 320 excavator	Offroad Construction Equipment	0.02	0.02	0.02	0.33	0.01	1.23	0.16	0.26	0.00	0.00	0.2648
1	Small asphalt roller	Offroad Construction Equipment	0.00	0.00	0.00	0.74	0.00	0.91	0.04	0.06	0.00	0.00	0.0581
1	Water truck	Offroad Construction Equipment	0.03	0.03	0.03	0.60	0.01	2.59	0.30	0.00	0.00	0.00	0.0000
1	Forklift	Offroad Construction Equipment	0.00	0.00	0.00	0.15	0.00	0.16	0.01	0.00	0.00	0.00	0.0000
1	Mobile crane (35 ton)	Offroad Construction Equipment	0.02	0.02	0.02	0.43	0.01	2.41	0.21	0.00	0.00	0.00	0.0000
1	On-Road Vehicles												
1	Haul trucks	Onroad Construction Vehicles	0.09	0.02	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.0074
1	Supply trucks	Onroad Construction Vehicles	0.21	0.05	0.00	0.11	0.00	0.01	0.00	0.02	0.00	0.00	0.0173
1	Haul trucks	Onroad Construction Vehicles	0.02	0.01	0.00	0.11	0.00	0.01	0.00	0.03	0.00	0.00	0.0318
1	Supply trucks	Onroad Construction Vehicles	0.07	0.03	0.00	0.45	0.00	0.03	0.00	0.13	0.00	0.00	0.1347
1	Workers	Onroad Construction Vehicles	0.15	0.05	0.00	0.06	0.00	0.91	0.01	0.16	0.00	0.00	0.1619
1	Fugitive Dust												
1	Soil handling	Fugitive Emissions	2.01	0.30									
1	Asphalting	Fugitive Emissions											
2	Pier J Breakwater Construction												
2	Marine Activities												
2	Pier J Breakwater Tugboat propulsion engine	Marine Equipment	3.95	3.52	3.95	77.27	0.06	58.10	4.28	3.44	0.00	0.00	3.4860
2	Pier J Breakwater Tugboat auxiliary engine	Marine Equipment	0.37	0.33	0.37	13.58	0.01	14.56	0.75	0.78	0.00	0.00	0.7940
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.27	0.21	0.00	0.00	0.2174
2	Off-Road Equipment												
2	Piling crane	Offroad Construction Equipment	0.02	0.02	0.02	0.48	0.01	2.67	0.24	0.38	0.00	0.00	0.3800
2	Long arm excavator	Offroad Construction Equipment	0.04	0.04	0.04	0.79	0.01	2.78	0.32	0.63	0.00	0.00	0.6340
2	On-Road Vehicles												
2	Delivery Trucks	Onroad Construction Vehicles	0.15	0.04	0.00	0.08	0.00	0.01	0.00	0.01	0.00	0.00	0.0123
2	Delivery Trucks	Onroad Construction Vehicles	0.49	0.19	0.02	3.22	0.02	0.18	0.03	0.92	0.00	0.00	0.9622
2	Workers	Onroad Construction Vehicles	0.16	0.05	0.00	0.06	0.00	0.96	0.01	0.17	0.00	0.00	0.1700

Table H1.26
Alternative 2 Emissions by Task

			Mitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
1	Electrical Substation Construction at Pier J (mitigation only)												
1	Off-Road Equipment												
1	Caterpillar 320 excavator	Offroad Construction Equipment	0.33	0.33	0.33	6.59	0.11	24.52	3.12	5.30	0.00	0.00	5.30
1	Small asphalt roller	Offroad Construction Equipment	0.13	0.13	0.13	19.12	0.03	23.58	1.06	1.51	0.00	0.00	1.51
1	Water truck	Offroad Construction Equipment	0.60	0.60	0.60	12.06	0.20	51.75	5.93	0.00	0.00	0.00	0.00
1	Forklift	Offroad Construction Equipment	0.02	0.02	0.02	3.23	0.01	3.59	0.18	0.00	0.00	0.00	0.00
1	Mobile crane (35 ton)	Offroad Construction Equipment	0.04	0.04	0.04	0.87	0.01	4.83	0.43	0.00	0.00	0.00	0.00
1	On-Road Vehicles												
1	Haul trucks	Onroad Construction Vehicles	0.44	0.11	0.00	0.24	0.00	0.03	0.00	0.04	0.00	0.00	0.04
1	Supply trucks	Onroad Construction Vehicles	1.03	0.26	0.00	0.55	0.00	0.06	0.01	0.08	0.00	0.00	0.09
1	Haul trucks	Onroad Construction Vehicles	0.08	0.03	0.00	0.53	0.00	0.03	0.00	0.15	0.00	0.00	0.16
1	Supply trucks	Onroad Construction Vehicles	0.34	0.13	0.02	2.25	0.01	0.13	0.02	0.64	0.00	0.00	0.67
1	Workers	Onroad Construction Vehicles	9.08	2.88	0.00	3.33	0.21	54.81	0.86	9.66	0.00	0.00	9.71
1	Fugitive Dust												
1	Soil handling	Fugitive Emissions	40.12	6.07									
1	Asphalting	Fugitive Emissions											
2	Pier J Breakwater Construction												
2	Marine Activities												
2	Pier J Breakwater Tugboat propulsion engine	Marine Equipment	213.33	189.87	213.33	4172.56	3.46	3137.27	231.25	185.57	0.00	0.01	188.25
2	Pier J Breakwater Tugboat auxiliary engine	Marine Equipment	20.01	17.81	20.01	733.17	0.79	786.05	40.63	42.27	0.00	0.00	42.88
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment	14.91	13.27	14.91	291.63	0.24	219.27	16.16	12.97	0.00	0.00	13.16
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	0.64	0.57	0.64	23.32	0.03	25.00	1.29	1.34	0.00	0.00	1.36
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment	13.30	11.84	13.30	260.22	0.22	195.66	14.42	11.57	0.00	0.00	11.74
2	Off-Road Equipment												
2	Piling crane	Offroad Construction Equipment	1.29	1.29	1.29	25.89	0.42	144.43	12.72	20.52	0.00	0.00	20.52
2	Long arm excavator	Offroad Construction Equipment	2.14	2.14	2.14	42.75	0.70	149.87	17.33	34.23	0.00	0.00	34.23
2	On-Road Vehicles												
2	Delivery Trucks	Onroad Construction Vehicles	0.74	0.18	0.00	0.39	0.00	0.05	0.01	0.06	0.00	0.00	0.06
2	Delivery Trucks	Onroad Construction Vehicles	2.43	0.94	0.11	16.08	0.10	0.92	0.13	4.60	0.00	0.00	4.81
2	Workers	Onroad Construction Vehicles	8.58	2.72	0.00	3.14	0.20	51.79	0.81	9.13	0.00	0.00	9.18

Table H1.26

Alternative 2 Emissions by Task

						Unmitigated Emissions										
						Peak Day										
						PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
3 Approach Channel (hopper dredge 1,144,000 CY)																
3	Marine Hopper Dredge															
3	Hopper propulsion engine	Marine Equipment	dredging	onsite	66	26.63	23.70	26.63	495.89	0.29	266.32	27.48	15.75	0.00	0.00	15.9819
3	Hopper propulsion engine	Marine Equipment	transit	offsite	66	50.31	44.77	50.31	936.68	0.56	503.05	51.91	29.76	0.00	0.00	30.1880
3	Hopper auxiliary engine	Marine Equipment	disposal	near shore	66	0.22	0.20	0.22	5.06	0.00	3.70	0.28	0.00	0.00	0.00	0.2219
3	Hopper Crew boat propulsion engine	Marine Equipment	support	onsite	66	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
3	Hopper Crew boat auxiliary engine	Marine Equipment	support	onsite	66	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
3	Hopper Survey boat propulsion engine	Marine Equipment	dredging	onsite	66	1.45	1.29	1.45	28.64	0.02	14.49	1.59	0.86	0.00	0.00	0.8697
4 Main Channel Widening (clam shell dredge 1,065,000 CY)																
4	Marine Clamshell Dredge															
4	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	178	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.00	0.00	5.7854
4	Clamshell Dredge generator	Marine Equipment	dredging	onsite	178	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.00	0.00	3.1964
4	Clamshell Barge dump scow	Marine Equipment	disposal	near shore	178	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
4	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	178	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.00	0.00	0.3670
4	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	178	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.00	0.00	0.0662
4	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	178	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.00	0.00	6.6058
4	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	178	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.1911
4	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	178	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
4	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	178	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
4	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	178	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.00	0.00	0.2174
5 West Basin (clam shell dredge 501,000 CY)																
5	Marine Clamshell Dredge															
5	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	84	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.00	0.00	5.7854
5	Clamshell Dredge generator	Marine Equipment	dredging	onsite	84	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.00	0.00	3.1964
5	Clamshell Barge dump scow	Marine Equipment	disposal	near shore	84	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
5	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	84	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.00	0.00	0.3670
5	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	84	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.00	0.00	0.0662
5	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	84	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.00	0.00	6.6058
5	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	84	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.1911
5	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	84	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
5	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	84	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
5	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	84	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.00	0.00	0.2174

Table H1.26

Alternative 2 Emissions by Task

			Unmitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
3 Approach Channel (hopper dredge 1,144,000 CY)													
3	Marine Hopper Dredge												
3	Hopper propulsion engine	Marine Equipment	1757.72	1564.37	1757.72	32728.77	19.41	17577.21	1813.86	1039.68	0.02	0.05	1054.80
3	Hopper propulsion engine	Marine Equipment	3320.14	2954.92	3320.14	61821.01	36.65	33201.40	3426.19	1963.84	0.03	0.09	1992.41
3	Hopper auxiliary engine	Marine Equipment	14.65	13.04	14.65	333.97	0.27	244.13	18.51	14.44	0.00	0.00	14.65
3	Hopper Crew boat propulsion engine	Marine Equipment	26.80	23.85	26.80	529.56	0.30	268.00	29.35	15.85	0.00	0.00	16.08
3	Hopper Crew boat auxiliary engine	Marine Equipment	2.22	1.98	2.22	39.58	0.03	27.78	2.19	1.64	0.00	0.00	1.67
3	Hopper Survey boat propulsion engine	Marine Equipment	95.65	85.13	95.65	1890.14	1.06	956.55	104.75	56.58	0.00	0.00	57.40
4 Main Channel Widening (clam shell dredge 1,065,000 CY)													
4	Marine Clamshell Dredge												
4	Clamshell Dredge hoist	Marine Equipment	776.98	776.98	776.98	23620.32	25.87	13467.72	1309.06	1029.80	0.00	0.00	1029.80
4	Clamshell Dredge generator	Marine Equipment	582.74	582.74	582.74	17715.24	19.40	10100.79	981.80	568.97	0.00	0.00	568.97
4	Clamshell Barge dump scow	Marine Equipment	8.24	8.24	8.24	156.57	0.27	142.84	8.68	6.80	0.00	0.00	6.80
4	Clamshell Tugboat propulsion engine	Marine Equipment	108.86	96.88	108.86	2026.91	1.20	1088.56	112.33	64.39	0.00	0.00	65.32
4	Clamshell Tugboat auxiliary engine	Marine Equipment	15.70	13.98	15.70	279.72	0.22	196.29	15.50	11.61	0.00	0.00	11.78
4	Clamshell Tugboat propulsion engine	Marine Equipment	1959.42	1743.88	1959.42	36484.31	21.63	19594.15	2022.00	1158.98	0.02	0.06	1175.84
4	Clamshell Tugboat auxiliary engine	Marine Equipment	282.66	251.57	282.66	5034.91	3.90	3533.27	279.04	208.99	0.00	0.01	212.01
4	Clamshell Crew boat propulsion engine	Marine Equipment	72.28	64.33	72.28	1428.22	0.80	722.78	79.15	42.75	0.00	0.00	43.38
4	Clamshell Crew boat auxiliary engine	Marine Equipment	5.99	5.33	5.99	106.75	0.08	74.91	5.92	4.43	0.00	0.00	4.50
4	Clamshell Survey boat propulsion engine	Marine Equipment	64.49	57.40	64.49	1274.41	0.71	644.94	70.63	38.15	0.00	0.00	38.70
5 West Basin (clam shell dredge 501,000 CY)													
5	Marine Clamshell Dredge												
5	Clamshell Dredge hoist	Marine Equipment	366.67	366.67	366.67	11146.67	12.21	6355.56	617.76	485.97	0.00	0.00	485.97
5	Clamshell Dredge generator	Marine Equipment	275.00	275.00	275.00	8360.00	9.16	4766.67	463.32	268.50	0.00	0.00	268.50
5	Clamshell Barge dump scow	Marine Equipment	3.89	3.89	3.89	73.89	0.13	67.41	4.10	3.21	0.00	0.00	3.21
5	Clamshell Tugboat propulsion engine	Marine Equipment	51.37	45.72	51.37	956.52	0.57	513.70	53.01	30.39	0.00	0.00	30.83
5	Clamshell Tugboat auxiliary engine	Marine Equipment	7.41	6.60	7.41	132.00	0.10	92.63	7.32	5.48	0.00	0.00	5.56
5	Clamshell Tugboat propulsion engine	Marine Equipment	924.67	822.95	924.67	17217.32	10.21	9246.68	954.20	546.94	0.01	0.03	554.89
5	Clamshell Tugboat auxiliary engine	Marine Equipment	133.39	118.72	133.39	2376.02	1.84	1667.38	131.68	98.62	0.00	0.00	100.05
5	Clamshell Crew boat propulsion engine	Marine Equipment	34.11	30.36	34.11	673.99	0.38	341.09	37.35	20.18	0.00	0.00	20.47
5	Clamshell Crew boat auxiliary engine	Marine Equipment	2.83	2.52	2.83	50.38	0.04	35.35	2.79	2.09	0.00	0.00	2.12
5	Clamshell Survey boat propulsion engine	Marine Equipment	30.44	27.09	30.44	601.41	0.34	304.36	33.33	18.00	0.00	0.00	18.26

Table H1.26

Alternative 2 Emissions by Task

			Mitigated Peak Day										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
3 Approach Channel (hopper dredge 1,144,000 CY)													
3	Marine Hopper Dredge												
3	Hopper propulsion engine	Marine Equipment	26.63	23.70	26.63	495.89	0.29	266.32	27.48	15.75	0.00	0.00	15.9819
3	Hopper propulsion engine	Marine Equipment	50.31	44.77	50.31	936.68	0.56	503.05	51.91	29.76	0.00	0.00	30.1880
3	Hopper auxiliary engine	Marine Equipment	0.22	0.20	0.22	5.06	0.00	3.70	0.28	0.22	0.00	0.00	0.2219
3	Hopper Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
3	Hopper Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
3	Hopper Survey boat propulsion engine	Marine Equipment	0.99	0.88	0.99	19.28	0.02	14.49	1.07	0.86	0.00	0.00	0.8696
4 Main Channel Widening (clam shell dredge 1,065,000 CY)													
4	Marine Clamshell Dredge												
4	Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.74	0.58	0.00	0.00	0.5785
4	Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.55	0.32	0.00	0.00	0.3196
4	Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
4	Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.45	0.36	0.00	0.00	0.3670
4	Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.06	0.07	0.00	0.00	0.0662
4	Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.11	6.51	0.00	0.00	6.6051
4	Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.1910
4	Clamshell Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
4	Clamshell Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
4	Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.27	0.21	0.00	0.00	0.2174
5 West Basin (clam shell dredge 501,000 CY)													
5	Marine Clamshell Dredge												
5	Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.74	0.58	0.00	0.00	0.5785
5	Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.55	0.32	0.00	0.00	0.3196
5	Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
5	Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.45	0.36	0.00	0.00	0.3670
5	Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.06	0.07	0.00	0.00	0.0662
5	Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.11	6.51	0.00	0.00	6.6051
5	Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.1910
5	Clamshell Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
5	Clamshell Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
5	Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.27	0.21	0.00	0.00	0.2174
Note: clamshell dredge would be electric with mitigation: assume 90 percent reduction in diesel exhaust emissions													

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.26

Alternative 2 Emissions by Task

			Mitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
3 Approach Channel (hopper dredge 1,144,000 CY)													
3	Marine Hopper Dredge												
3	Hopper propulsion engine	Marine Equipment	1757.72	1564.37	1757.72	32728.77	19.41	17577.21	1813.86	1039.68	0.02	0.05	1054.80
3	Hopper propulsion engine	Marine Equipment	3320.14	2954.92	3320.14	61821.01	36.65	33201.40	3426.19	1963.84	0.03	0.09	1992.41
3	Hopper auxiliary engine	Marine Equipment	14.65	13.04	14.65	333.97	0.27	244.13	18.51	14.44	0.00	0.00	14.65
3	Hopper Crew boat propulsion engine	Marine Equipment	18.22	16.22	18.22	356.44	0.30	268.00	19.75	15.85	0.00	0.00	16.08
3	Hopper Crew boat auxiliary engine	Marine Equipment	0.78	0.69	0.78	28.50	0.03	30.55	1.58	1.64	0.00	0.00	1.67
3	Hopper Survey boat propulsion engine	Marine Equipment	65.05	57.89	65.05	1272.21	1.06	956.55	70.51	56.58	0.00	0.00	57.40
4 Main Channel Widening (clam shell dredge 1,065,000 CY)													
4	Marine Clamshell Dredge												
4	Clamshell Dredge hoist	Marine Equipment	77.70	77.70	77.70	2362.03	2.59	1346.77	130.91	102.98	0.00	0.00	102.98
4	Clamshell Dredge generator	Marine Equipment	58.27	58.27	58.27	1771.52	1.94	1010.08	98.18	56.90	0.00	0.00	56.90
4	Clamshell Barge dump scow	Marine Equipment	8.24	8.24	8.24	156.57	0.27	142.84	8.68	6.80	0.00	0.00	6.80
4	Clamshell Tugboat propulsion engine	Marine Equipment	74.02	65.88	74.02	1447.79	1.20	1088.56	80.24	64.39	0.00	0.00	65.32
4	Clamshell Tugboat auxiliary engine	Marine Equipment	5.50	4.89	5.50	201.40	0.22	215.92	11.16	11.61	0.00	0.00	11.78
4	Clamshell Tugboat propulsion engine	Marine Equipment	1332.40	1185.84	1332.40	26060.22	21.63	19594.15	1444.28	1158.98	0.01	0.06	1175.72
4	Clamshell Tugboat auxiliary engine	Marine Equipment	98.93	88.05	98.93	3625.13	3.90	3886.59	200.91	208.99	0.00	0.01	212.00
4	Clamshell Crew boat propulsion engine	Marine Equipment	49.15	43.74	49.15	961.30	0.80	722.78	53.28	42.75	0.00	0.00	43.37
4	Clamshell Crew boat auxiliary engine	Marine Equipment	2.10	1.87	2.10	76.86	0.08	82.40	4.26	4.43	0.00	0.00	4.49
4	Clamshell Survey boat propulsion engine	Marine Equipment	43.86	39.03	43.86	857.78	0.71	644.94	47.54	38.15	0.00	0.00	38.70
5 West Basin (clam shell dredge 501,000 CY)													
5	Marine Clamshell Dredge												
5	Clamshell Dredge hoist	Marine Equipment	36.67	36.67	36.67	1114.67	1.22	635.56	61.78	48.60	0.00	0.00	48.60
5	Clamshell Dredge generator	Marine Equipment	27.50	27.50	27.50	836.00	0.92	476.67	46.33	26.85	0.00	0.00	26.85
5	Clamshell Barge dump scow	Marine Equipment	3.89	3.89	3.89	73.89	0.13	67.41	4.10	3.21	0.00	0.00	3.21
5	Clamshell Tugboat propulsion engine	Marine Equipment	34.93	31.09	34.93	683.23	0.57	513.70	37.87	30.39	0.00	0.00	30.82
5	Clamshell Tugboat auxiliary engine	Marine Equipment	2.59	2.31	2.59	95.04	0.10	101.90	5.27	5.48	0.00	0.00	5.56
5	Clamshell Tugboat propulsion engine	Marine Equipment	628.77	559.61	628.77	12298.08	10.21	9246.68	681.57	546.94	0.01	0.03	554.83
5	Clamshell Tugboat auxiliary engine	Marine Equipment	46.69	41.55	46.69	1710.74	1.84	1834.12	94.81	98.62	0.00	0.00	100.04
5	Clamshell Crew boat propulsion engine	Marine Equipment	23.19	20.64	23.19	453.65	0.38	341.09	25.14	20.18	0.00	0.00	20.47
5	Clamshell Crew boat auxiliary engine	Marine Equipment	0.99	0.88	0.99	36.27	0.04	38.89	2.01	2.09	0.00	0.00	2.12
5	Clamshell Survey boat propulsion engine	Marine Equipment	20.70	18.42	20.70	404.79	0.34	304.36	22.43	18.00	0.00	0.00	18.26

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.26
Alternative 2 Emissions by Task

						Unmitigated Emissions										
						Peak Day										
						PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
6 Pier J Basin (clam shell dredge 202,000 CY)																
6	Marine Clamshell Dredge															
6	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	34	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.00	0.00	5.7854
6	Clamshell Dredge generator	Marine Equipment	dredging	onsite	34	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.00	0.00	3.1964
6	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	34	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
6	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	34	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.00	0.00	0.3670
6	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	34	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.00	0.00	0.0662
6	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	34	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.00	0.00	6.6058
6	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	34	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.1911
6	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	34	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
6	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	34	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
6	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	34	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.00	0.00	0.2174
7 Pier J Approach (clam shell dredge 270,000 CY)																
7	Marine Clamshell Dredge															
7	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	45	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.00	0.00	5.7854
7	Clamshell Dredge generator	Marine Equipment	dredging	onsite	45	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.00	0.00	3.1964
7	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	45	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
7	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	45	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.00	0.00	0.3670
7	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	45	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.00	0.00	0.0662
7	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	45	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.00	0.00	6.6058
7	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	45	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.1911
7	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	45	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
7	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	45	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
7	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	45	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.00	0.00	0.2174
8 Pier J Approach (clam shell dredge 1,699,000 CY)																
8	Marine Clamshell Dredge															
8	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	283	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.00	0.00	5.7854
8	Clamshell Dredge generator	Marine Equipment	dredging	onsite	283	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.00	0.00	3.1964
8	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	283	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
8	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	283	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.00	0.00	0.3670
8	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	283	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.00	0.00	0.0662
8	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	283	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.00	0.00	6.6058
8	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	283	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.1911
8	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	283	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.00	0.00	0.2437
8	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	283	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.00	0.00	0.0253
8	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	283	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.00	0.00	0.2174

Table H1.26
Alternative 2 Emissions by Task

			Unmitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
6 Pier J Basin (clam shell dredge 202,000 CY)													
6	Marine Clamshell Dredge												
6	Clamshell Dredge hoist	Marine Equipment	148.41	148.41	148.41	4511.75	4.94	2572.49	250.05	196.70	0.00	0.00	196.70
6	Clamshell Dredge generator	Marine Equipment	111.31	111.31	111.31	3383.81	3.71	1929.37	187.53	108.68	0.00	0.00	108.68
6	Clamshell Barge dump scow	Marine Equipment	1.57	1.57	1.57	29.91	0.05	27.28	1.66	1.30	0.00	0.00	1.30
6	Clamshell Tugboat propulsion engine	Marine Equipment	20.79	18.51	20.79	387.16	0.23	207.93	21.46	12.30	0.00	0.00	12.48
6	Clamshell Tugboat auxiliary engine	Marine Equipment	3.00	2.67	3.00	53.43	0.04	37.49	2.96	2.22	0.00	0.00	2.25
6	Clamshell Tugboat propulsion engine	Marine Equipment	374.27	333.10	374.27	6968.91	4.13	3742.70	386.22	221.38	0.00	0.01	224.60
6	Clamshell Tugboat auxiliary engine	Marine Equipment	53.99	48.05	53.99	961.72	0.75	674.89	53.30	39.92	0.00	0.00	40.50
6	Clamshell Crew boat propulsion engine	Marine Equipment	13.81	12.29	13.81	272.81	0.15	138.06	15.12	8.17	0.00	0.00	8.29
6	Clamshell Crew boat auxiliary engine	Marine Equipment	1.14	1.02	1.14	20.39	0.02	14.31	1.13	0.85	0.00	0.00	0.86
6	Clamshell Survey boat propulsion engine	Marine Equipment	12.32	10.96	12.32	243.43	0.14	123.19	13.49	7.29	0.00	0.00	7.39
7 Pier J Approach (clam shell dredge 270,000 CY)													
7	Marine Clamshell Dredge												
7	Clamshell Dredge hoist	Marine Equipment	196.43	196.43	196.43	5971.43	6.54	3404.76	330.94	260.34	0.00	0.00	260.34
7	Clamshell Dredge generator	Marine Equipment	147.32	147.32	147.32	4478.57	4.90	2553.57	248.21	143.84	0.00	0.00	143.84
7	Clamshell Barge dump scow	Marine Equipment	2.08	2.08	2.08	39.58	0.07	36.11	2.19	1.72	0.00	0.00	1.72
7	Clamshell Tugboat propulsion engine	Marine Equipment	27.52	24.49	27.52	512.42	0.30	275.20	28.40	16.28	0.00	0.00	16.51
7	Clamshell Tugboat auxiliary engine	Marine Equipment	3.97	3.53	3.97	70.71	0.05	49.62	3.92	2.94	0.00	0.00	2.98
7	Clamshell Tugboat propulsion engine	Marine Equipment	495.36	440.87	495.36	9223.56	5.47	4953.58	511.18	293.00	0.00	0.01	297.26
7	Clamshell Tugboat auxiliary engine	Marine Equipment	71.46	63.60	71.46	1272.87	0.99	893.24	70.54	52.83	0.00	0.00	53.60
7	Clamshell Crew boat propulsion engine	Marine Equipment	18.27	16.26	18.27	361.07	0.20	182.73	20.01	10.81	0.00	0.00	10.97
7	Clamshell Crew boat auxiliary engine	Marine Equipment	1.52	1.35	1.52	26.99	0.02	18.94	1.50	1.12	0.00	0.00	1.14
7	Clamshell Survey boat propulsion engine	Marine Equipment	16.30	14.51	16.30	322.18	0.18	163.05	17.86	9.64	0.00	0.00	9.78
8 Pier J Approach (clam shell dredge 1,699,000 CY)													
8	Marine Clamshell Dredge												
8	Clamshell Dredge hoist	Marine Equipment	1235.32	1235.32	1235.32	37553.65	41.13	21412.17	2081.26	1637.26	0.00	0.00	1637.26
8	Clamshell Dredge generator	Marine Equipment	926.49	926.49	926.49	28165.24	30.85	16059.13	1560.95	904.59	0.00	0.00	904.59
8	Clamshell Barge dump scow	Marine Equipment	13.10	13.10	13.10	248.94	0.44	227.10	13.80	10.82	0.00	0.00	10.82
8	Clamshell Tugboat propulsion engine	Marine Equipment	173.07	154.03	173.07	3222.55	1.91	1730.69	178.60	102.37	0.00	0.00	103.86
8	Clamshell Tugboat auxiliary engine	Marine Equipment	24.97	22.22	24.97	444.72	0.34	312.08	24.65	18.46	0.00	0.00	18.73
8	Clamshell Tugboat propulsion engine	Marine Equipment	3115.25	2772.57	3115.25	58005.95	34.39	31152.50	3214.75	1842.65	0.03	0.09	1869.45
8	Clamshell Tugboat auxiliary engine	Marine Equipment	449.40	399.97	449.40	8004.94	6.20	5617.50	443.64	332.27	0.00	0.02	337.08
8	Clamshell Crew boat propulsion engine	Marine Equipment	114.91	102.27	114.91	2270.71	1.27	1149.14	125.85	67.97	0.00	0.00	68.96
8	Clamshell Crew boat auxiliary engine	Marine Equipment	9.53	8.48	9.53	169.72	0.13	119.10	9.41	7.04	0.00	0.00	7.15
8	Clamshell Survey boat propulsion engine	Marine Equipment	102.54	91.26	102.54	2026.17	1.13	1025.39	112.29	60.65	0.00	0.00	61.53

Table H1.26
Alternative 2 Emissions by Task

Task ID	Construction Element/Equipment	Source Type 1	Mitigated										
			Peak Day										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
			(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
6 Pier J Basin (clam shell dredge 202,000 CY)													
6	Marine Clamshell Dredge												
6	Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.74	0.58	0.00	0.00	0.5785
6	Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.55	0.32	0.00	0.00	0.3196
6	Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
6	Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.45	0.36	0.00	0.00	0.3670
6	Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.06	0.07	0.00	0.00	0.0662
6	Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.11	6.51	0.00	0.00	6.6051
6	Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.1910
6	Clamshell Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
6	Clamshell Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
6	Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.27	0.21	0.00	0.00	0.2174
7 Pier J Approach (clam shell dredge 270,000 CY)													
7	Marine Clamshell Dredge												
7	Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.74	0.58	0.00	0.00	0.5785
7	Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.55	0.32	0.00	0.00	0.3196
7	Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
7	Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.45	0.36	0.00	0.00	0.3670
7	Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.06	0.07	0.00	0.00	0.0662
7	Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.11	6.51	0.00	0.00	6.6051
7	Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.1910
7	Clamshell Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
7	Clamshell Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
7	Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.27	0.21	0.00	0.00	0.2174
8 Pier J Approach (clam shell dredge 1,699,000 CY)													
8	Marine Clamshell Dredge												
8	Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.74	0.58	0.00	0.00	0.5785
8	Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.55	0.32	0.00	0.00	0.3196
8	Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.00	0.00	0.0382
8	Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.45	0.36	0.00	0.00	0.3670
8	Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.06	0.07	0.00	0.00	0.0662
8	Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.11	6.51	0.00	0.00	6.6051
8	Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.1910
8	Clamshell Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.30	0.24	0.00	0.00	0.2436
8	Clamshell Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.02	0.02	0.00	0.00	0.0253
8	Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.27	0.21	0.00	0.00	0.2174

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.26

Alternative 2 Emissions by Task

			Mitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
6 Pier J Basin (clam shell dredge 202,000 CY)													
6	Marine Clamshell Dredge												
6	Clamshell Dredge hoist	Marine Equipment	14.84	14.84	14.84	451.17	0.49	257.25	25.00	19.67	0.00	0.00	19.67
6	Clamshell Dredge generator	Marine Equipment	11.13	11.13	11.13	338.38	0.37	192.94	18.75	10.87	0.00	0.00	10.87
6	Clamshell Barge dump scow	Marine Equipment	1.57	1.57	1.57	29.91	0.05	27.28	1.66	1.30	0.00	0.00	1.30
6	Clamshell Tugboat propulsion engine	Marine Equipment	14.14	12.58	14.14	276.54	0.23	207.93	15.33	12.30	0.00	0.00	12.48
6	Clamshell Tugboat auxiliary engine	Marine Equipment	1.05	0.93	1.05	38.47	0.04	41.24	2.13	2.22	0.00	0.00	2.25
6	Clamshell Tugboat propulsion engine	Marine Equipment	254.50	226.51	254.50	4977.80	4.13	3742.70	275.87	221.38	0.00	0.01	224.57
6	Clamshell Tugboat auxiliary engine	Marine Equipment	18.90	16.82	18.90	692.44	0.75	742.38	38.38	39.92	0.00	0.00	40.49
6	Clamshell Crew boat propulsion engine	Marine Equipment	9.39	8.36	9.39	183.62	0.15	138.06	10.18	8.17	0.00	0.00	8.28
6	Clamshell Crew boat auxiliary engine	Marine Equipment	0.40	0.36	0.40	14.68	0.02	15.74	0.81	0.85	0.00	0.00	0.86
6	Clamshell Survey boat propulsion engine	Marine Equipment	8.38	7.46	8.38	163.84	0.14	123.19	9.08	7.29	0.00	0.00	7.39
7 Pier J Approach (clam shell dredge 270,000 CY)													
7	Marine Clamshell Dredge												
7	Clamshell Dredge hoist	Marine Equipment	19.64	19.64	19.64	597.14	0.65	340.48	33.09	26.03	0.00	0.00	26.03
7	Clamshell Dredge generator	Marine Equipment	14.73	14.73	14.73	447.86	0.49	255.36	24.82	14.38	0.00	0.00	14.38
7	Clamshell Barge dump scow	Marine Equipment	2.08	2.08	2.08	39.58	0.07	36.11	2.19	1.72	0.00	0.00	1.72
7	Clamshell Tugboat propulsion engine	Marine Equipment	18.71	16.66	18.71	366.01	0.30	275.20	20.28	16.28	0.00	0.00	16.51
7	Clamshell Tugboat auxiliary engine	Marine Equipment	1.39	1.24	1.39	50.91	0.05	54.59	2.82	2.94	0.00	0.00	2.98
7	Clamshell Tugboat propulsion engine	Marine Equipment	336.84	299.79	336.84	6588.26	5.47	4953.58	365.13	293.00	0.00	0.01	297.23
7	Clamshell Tugboat auxiliary engine	Marine Equipment	25.01	22.26	25.01	916.47	0.99	982.57	50.79	52.83	0.00	0.00	53.59
7	Clamshell Crew boat propulsion engine	Marine Equipment	12.43	11.06	12.43	243.03	0.20	182.73	13.47	10.81	0.00	0.00	10.96
7	Clamshell Crew boat auxiliary engine	Marine Equipment	0.53	0.47	0.53	19.43	0.02	20.83	1.08	1.12	0.00	0.00	1.14
7	Clamshell Survey boat propulsion engine	Marine Equipment	11.09	9.87	11.09	216.85	0.18	163.05	12.02	9.64	0.00	0.00	9.78
8 Pier J Approach (clam shell dredge 1,699,000 CY)													
8	Marine Clamshell Dredge												
8	Clamshell Dredge hoist	Marine Equipment	123.53	123.53	123.53	3755.37	4.11	2141.22	208.13	163.73	0.00	0.00	163.73
8	Clamshell Dredge generator	Marine Equipment	92.65	92.65	92.65	2816.52	3.08	1605.91	156.09	90.46	0.00	0.00	90.46
8	Clamshell Barge dump scow	Marine Equipment	13.10	13.10	13.10	248.94	0.44	227.10	13.80	10.82	0.00	0.00	10.82
8	Clamshell Tugboat propulsion engine	Marine Equipment	117.69	104.74	117.69	2301.82	1.91	1730.69	127.57	102.37	0.00	0.00	103.85
8	Clamshell Tugboat auxiliary engine	Marine Equipment	8.74	7.78	8.74	320.20	0.34	343.29	17.75	18.46	0.00	0.00	18.72
8	Clamshell Tugboat propulsion engine	Marine Equipment	2118.37	1885.35	2118.37	41432.82	34.39	31152.50	2296.25	1842.65	0.02	0.09	1869.26
8	Clamshell Tugboat auxiliary engine	Marine Equipment	157.29	139.99	157.29	5763.55	6.20	6179.25	319.42	332.27	0.00	0.02	337.05
8	Clamshell Crew boat propulsion engine	Marine Equipment	78.14	69.55	78.14	1528.36	1.27	1149.14	84.70	67.97	0.00	0.00	68.95
8	Clamshell Crew boat auxiliary engine	Marine Equipment	3.33	2.97	3.33	122.20	0.13	131.01	6.77	7.04	0.00	0.00	7.15
8	Clamshell Survey boat propulsion engine	Marine Equipment	69.73	62.06	69.73	1363.77	1.13	1025.39	75.58	60.65	0.00	0.00	61.53

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
							PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
1 Electrical Substation Construction at Pier J (mitigation only)																	
1		Off-Road Equipment															
1		Caterpillar 320 excavator	Offroad Construction Equipment		onsite	20.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Small asphalt roller	Offroad Construction Equipment		onsite	26.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Water truck	Offroad Construction Equipment		onsite	20.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Forklift	Offroad Construction Equipment		onsite	22.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Mobile crane (35 ton)	Offroad Construction Equipment		onsite	2.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		On-Road Vehicles															
1		Haul trucks	Onroad Construction Vehicles		onsite	5.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Supply trucks	Onroad Construction Vehicles		onsite	5.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Haul trucks	Onroad Construction Vehicles		offsite	5.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Supply trucks	Onroad Construction Vehicles		offsite	5.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Workers	Onroad Construction Vehicles		offsite	60.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Fugitive Dust															
1		Soil handling	Fugitive Emissions		onsite	20.00	n/a	n/a									
1		Asphalting	Fugitive Emissions		onsite												
2 Pier J Breakwater Construction																	
2		Marine Activities															
2		Pier J Breakwater Tugboat propulsion	Marine Equipment	Pier J Breakwater Construction	onsite	54.00	5.81	5.17	5.81	108.18	0.06	58.10	6.00	3.44	0.0001	0.00	3.49
2		Pier J Breakwater Tugboat auxiliary	Marine Equipment	Pier J Breakwater Construction	onsite	54.00	1.06	0.94	1.06	18.86	0.01	13.23	1.05	0.78	0.0000	0.00	0.79
2		Pier J Breakwater Crew boat propulsion engine	Marine Equipment	Pier J Breakwater Construction	onsite	54.00	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.0000	0.00	0.24
2		Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	Pier J Breakwater Construction	onsite	54.00	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.0000	0.00	0.03
2		Pier J Breakwater Survey boat propulsion engine	Marine Equipment	Pier J Breakwater Construction	onsite	54.00	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.0000	0.00	0.22
2		Off-Road Equipment															
2		Piling crane	Offroad Construction Equipment		onsite	54.00	0.21	0.19	0.21	5.00	0.01	2.67	0.47	0.38	0.0000	0.00	0.38
2		Long arm excavator	Offroad Construction Equipment		onsite	54.00	0.08	0.07	0.08	2.19	0.01	2.78	0.32	0.63	0.0000	0.00	0.63
2		On-Road Vehicles															
2		Delivery Trucks	Onroad Construction Vehicles		onsite	5.00	0.15	0.04	0.00	0.08	0.00	0.01	0.00	0.01	0.0000	0.00	0.01
2		Delivery Trucks	Onroad Construction Vehicles		offsite	5.00	0.49	0.19	0.02	3.22	0.02	0.18	0.03	0.92	0.0000	0.00	0.96
2		Workers	Onroad Construction Vehicles		offsite	54.00	0.16	0.05	0.00	0.06	0.00	0.96	0.01	0.17	0.0000	0.00	0.17

Table H1.27
Alternative 3 Emissions by Task

			Unmitigated Emissions										
			Total										
Task ID	Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
1 Electrical Substation Construction at Pier J (mitigation only)													
1	Off-Road Equipment												
1	Caterpillar 320 excavator	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Small asphalt roller	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Water truck	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Forklift	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Mobile crane (35 ton)	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	On-Road Vehicles												
1	Haul trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Haul trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Workers	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Fugitive Dust												
1	Soil handling	Fugitive Emissions	n/a	n/a									
1	Asphalting	Fugitive Emissions											
2 Pier J Breakwater Construction													
2	Marine Activities												
2	Pier J Breakwater Tugboat propulsion	Marine Equipment	313.73	279.22	313.73	5841.59	3.46	3137.27	323.75	185.57	0.00	0.01	188.27
2	Pier J Breakwater Tugboat auxiliary	Marine Equipment	57.17	50.88	57.17	1018.30	0.79	714.59	56.44	42.27	0.00	0.00	42.88
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment	21.93	19.52	21.93	433.28	0.24	219.27	24.01	12.97	0.00	0.00	13.16
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	1.82	1.62	1.82	32.38	0.03	22.73	1.79	1.34	0.00	0.00	1.36
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment	19.57	17.41	19.57	386.62	0.22	195.66	21.43	11.57	0.00	0.00	11.74
2	Off-Road Equipment												
2	Piling crane	Offroad Construction Equipment	11.27	10.36	11.27	270.12	0.42	144.43	25.20	20.52	0.00	0.00	20.52
2	Long arm excavator	Offroad Construction Equipment	4.06	3.74	4.06	118.13	0.70	149.87	17.33	34.23	0.00	0.00	34.23
2	On-Road Vehicles												
2	Delivery Trucks	Onroad Construction Vehicles	0.74	0.18	0.00	0.39	0.00	0.05	0.01	0.06	0.00	0.00	0.06
2	Delivery Trucks	Onroad Construction Vehicles	2.43	0.94	0.11	16.08	0.10	0.92	0.13	4.60	0.00	0.00	4.81
2	Workers	Onroad Construction Vehicles	8.58	2.72	0.00	3.14	0.20	51.79	0.81	9.13	0.00	0.00	9.18

Table H1.27
Alternative 3 Emissions by Task

Task ID	Construction Element/Equipment	Source Type 1	Mitigated										
			Peak Day										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
			(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
1 Electrical Substation Construction at Pier J (mitigation only)													
1	Off-Road Equipment												
1	Caterpillar 320 excavator	Offroad Construction Equipment	0.02	0.02	0.02	0.33	0.01	1.23	0.1561	0.26	0.00	0.00	0.26
1	Small asphalt roller	Offroad Construction Equipment	0.00	0.00	0.00	0.74	0.00	0.91	0.0408	0.06	0.00	0.00	0.06
1	Water truck	Offroad Construction Equipment	0.03	0.03	0.03	0.60	0.01	2.59	0.2964	0.00	0.00	0.00	0.00
1	Forklift	Offroad Construction Equipment	0.00	0.00	0.00	0.15	0.00	0.16	0.0081	0.00	0.00	0.00	0.00
1	Mobile crane (35 ton)	Offroad Construction Equipment	0.02	0.02	0.02	0.43	0.01	2.41	0.2126	0.00	0.00	0.00	0.00
1	On-Road Vehicles												
1	Haul trucks	Onroad Construction Vehicles	0.09	0.02	0.00	0.05	0.00	0.01	0.0006	0.01	0.00	0.00	0.01
1	Supply trucks	Onroad Construction Vehicles	0.21	0.05	0.00	0.11	0.00	0.01	0.0015	0.02	0.00	0.00	0.02
1	Haul trucks	Onroad Construction Vehicles	0.02	0.01	0.00	0.11	0.00	0.01	0.0008	0.03	0.00	0.00	0.03
1	Supply trucks	Onroad Construction Vehicles	0.07	0.03	0.00	0.45	0.00	0.03	0.0036	0.13	0.00	0.00	0.13
1	Workers	Onroad Construction Vehicles	0.15	0.05	0.00	0.06	0.00	0.91	0.0143	0.16	0.00	0.00	0.16
1	Fugitive Dust												
1	Soil handling	Fugitive Emissions	2.01	0.30									
1	Asphalting	Fugitive Emissions											
2 Pier J Breakwater Construction													
2	Marine Activities												
2	Pier J Breakwater Tugboat propulsion	Marine Equipment	3.95	3.52	3.95	77.27	0.06	58.10	4.2824	3.44	0.00	0.00	3.49
2	Pier J Breakwater Tugboat auxiliary	Marine Equipment	0.37	0.33	0.37	13.58	0.01	14.56	0.7525	0.78	0.00	0.00	0.79
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.2993	0.24	0.00	0.00	0.24
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.0239	0.02	0.00	0.00	0.03
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.2671	0.21	0.00	0.00	0.22
2	Off-Road Equipment												
2	Piling crane	Offroad Construction Equipment	0.02	0.02	0.02	0.48	0.01	2.67	0.2356	0.38	0.00	0.00	0.38
2	Long arm excavator	Offroad Construction Equipment	0.04	0.04	0.04	0.79	0.01	2.78	0.3209	0.63	0.00	0.00	0.63
2	On-Road Vehicles												
2	Delivery Trucks	Onroad Construction Vehicles	0.15	0.04	0.00	0.08	0.00	0.01	0.0011	0.01	0.00	0.00	0.01
2	Delivery Trucks	Onroad Construction Vehicles	0.49	0.19	0.02	3.22	0.02	0.18	0.0256	0.92	0.00	0.00	0.96
2	Workers	Onroad Construction Vehicles	0.16	0.05	0.00	0.06	0.00	0.96	0.0150	0.17	0.00	0.00	0.17

Table H1.27
Alternative 3 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
1 Electrical Substation Construction at Pier J (mitigation only)														
1		Off-Road Equipment												
		Caterpillar 320 excavator	Offroad Construction Equipment	0.33	0.33	0.33	6.59	0.11	24.52	3.12	5.30	0.00	0.00	5.30
1		Small asphalt roller	Offroad Construction Equipment	0.13	0.13	0.13	19.12	0.03	23.58	1.06	1.511223352	0	0	1.511223352
1		Water truck	Offroad Construction Equipment	0.60	0.60	0.60	12.06	0.20	51.75	5.93	0	0	0	0
1		Forklift	Offroad Construction Equipment	0.02	0.02	0.02	3.23	0.01	3.59	0.18	0	0	0	0
1		Mobile crane (35 ton)	Offroad Construction Equipment	0.04	0.04	0.04	0.87	0.01	4.83	0.43	0	0	0	0
1		On-Road Vehicles												
1		Haul trucks	Onroad Construction Vehicles	0.44	0.11	0.00	0.24	0.00	0.03	0.00	0.035354006	6.65075E-08	5.55716E-06	0.037011702
1		Supply trucks	Onroad Construction Vehicles	1.03	0.26	0.00	0.55	0.00	0.06	0.01	0.082492681	1.55184E-07	1.29667E-05	0.086360637
1		Haul trucks	Onroad Construction Vehicles	0.08	0.03	0.00	0.53	0.00	0.03	0.00	0.151656946	8.88911E-08	2.38384E-05	0.158763
1		Supply trucks	Onroad Construction Vehicles	0.34	0.13	0.02	2.25	0.01	0.13	0.02	0.643393105	3.77114E-07	0.000101132	0.673539999
1		Workers	Onroad Construction Vehicles	9.08	2.88	0.00	3.33	0.21	54.81	0.86	9.659044664	9.91447E-05	0.0001697	9.712093981
1		Fugitive Dust												
1		Soil handling	Fugitive Emissions	40.12	6.07									
1		Asphalting	Fugitive Emissions											
2 Pier J Breakwater Construction														
2		Marine Activities												
2		Pier J Breakwater Tugboat propulsion	Marine Equipment	213.33	189.87	213.33	4172.56	3.46	3137.27	231.25	185.57	0.00	0.01	188.25
2		Pier J Breakwater Tugboat auxiliary	Marine Equipment	20.01	17.81	20.01	733.17	0.79	786.05	40.63	42.27	0.00	0.00	42.88
2		Pier J Breakwater Crew boat propulsion engine	Marine Equipment	14.91	13.27	14.91	291.63	0.24	219.27	16.16	12.97	0.00	0.00	13.16
2		Pier J Breakwater Crew boat auxiliary engine	Marine Equipment	0.64	0.57	0.64	23.32	0.03	25.00	1.29	1.34	0.00	0.00	1.36
2		Pier J Breakwater Survey boat propulsion engine	Marine Equipment	13.30	11.84	13.30	260.22	0.22	195.66	14.42	11.57	0.00	0.00	11.74
2		Off-Road Equipment												
2		Piling crane	Offroad Construction Equipment	1.29	1.29	1.29	25.89	0.42	144.43	12.72	20.52	0.00	0.00	20.52
2		Long arm excavator	Offroad Construction Equipment	2.14	2.14	2.14	42.75	0.70	149.87	17.33	34.23	0.00	0.00	34.23
2		On-Road Vehicles												
2		Delivery Trucks	Onroad Construction Vehicles	0.74	0.18	0.00	0.39	0.00	0.05	0.01	0.058923344	1.10846E-07	9.26193E-06	0.06168617
2		Delivery Trucks	Onroad Construction Vehicles	2.43	0.94	0.11	16.08	0.10	0.92	0.13	4.595665034	2.69367E-06	0.000722375	4.81099999
2		Workers	Onroad Construction Vehicles	8.58	2.72	0.00	3.14	0.20	51.79	0.81	9.127797208	9.36918E-05	0.000160367	9.177928812

Table H1.27
Alternative 3 Emissions by Task

Task ID							Unmitigated Emissions										
							Peak Day										
							PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
3 Approach Channel (hopper dredge 2,600,000 CY)																	
3		Marine Hopper Dredge															
3		Hopper propulsion engine	Marine Equipment	dredging	onsite	150.00	26.63	23.70	26.63	495.89	0.29	266.32	27.48	15.75	0.0002	0.00	15.98
3		Hopper propulsion engine	Marine Equipment	transit	offsite	150.00	50.31	44.77	50.31	936.68	0.56	503.05	51.91	29.76	0.0004	0.00	30.19
3		Hopper auxiliary engine	Marine Equipment	disposal	near shore	150.00	0.22	0.20	0.22	5.06	0.00	3.70	0.28	0.22	0.0000	0.00	0.22
3		Crew boat propulsion engine	Marine Equipment	support	onsite	150.00	0.41	0.36	0.41	8.02	0.00	4.06	0.44	0.24	0.0000	0.00	0.24
3		Crew boat auxiliary engine	Marine Equipment	support	onsite	150.00	0.03	0.03	0.03	0.60	0.00	0.42	0.03	0.02	0.0000	0.00	0.03
3		Survey boat propulsion engine	Marine Equipment	dredging	onsite	150.00	1.45	1.29	1.45	28.64	0.02	14.49	1.59	0.86	0.0000	0.00	0.87
4 Main Channel Widening (clam shell dredge 1,065,000 CY)																	
4		Marine Clamshell Dredge															
4		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	177.00	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.0000	0.00	5.79
4		Clamshell Dredge generator	Marine Equipment	dredging	onsite	177.00	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.0000	0.00	3.20
4		Clamshell Barge dump scow	Marine Equipment	disposal	near shore	177.00	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.0000	0.00	0.04
4		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	177.00	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.0000	0.00	0.37
4		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	177.00	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.0000	0.00	0.07
4		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	177.00	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.0001	0.00	6.61
4		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	177.00	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.19
4		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	177	0.4060579	0.3613915	0.4060579	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
4		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	177.0000	0.0336683	0.0300	0.0336683	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
4		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	177.00	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.0000	0.00	0.22

Table H1.27
Alternative 3 Emissions by Task

				Unmitigated Emissions											
				Total											
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e	
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
3 Approach Channel (hopper dredge 2,600,000 CY)															
3		Marine Hopper Dredge													
3		Hopper propulsion engine	Marine Equipment	3994.82	3555.39	3994.82	74383.56	44.10	39948.21	4122.42	2362.91	0.04	0.11	2397.28	
3		Hopper propulsion engine	Marine Equipment	7545.77	6715.74	7545.77	140502.28	83.31	75457.73	7786.78	4463.28	0.07	0.21	4528.20	
3		Hopper auxiliary engine	Marine Equipment	33.29	29.63	33.29	759.02	0.61	554.84	42.07	32.82	0.00	0.00	33.29	
3		Crew boat propulsion engine	Marine Equipment	60.91	54.21	60.91	1203.56	0.67	609.09	66.70	36.03	0.00	0.00	36.55	
3		Crew boat auxiliary engine	Marine Equipment	5.05	4.49	5.05	89.96	0.07	63.13	4.99	3.73	0.00	0.00	3.79	
3		Survey boat propulsion engine	Marine Equipment	217.40	193.48	217.40	4295.77	2.40	2173.97	238.08	128.59	0.00	0.01	130.46	
4 Main Channel Widening (clam shell dredge 1,065,000 CY)															
4		Marine Clamshell Dredge													
4		Clamshell Dredge hoist	Marine Equipment	772.62	772.62	772.62	23487.62	25.72	13392.06	1301.71	1024.01	0.00	0.00	1024.01	
4		Clamshell Dredge generator	Marine Equipment	579.46	579.46	579.46	17615.71	19.29	10044.05	976.28	565.77	0.00	0.00	565.77	
4		Clamshell Barge dump scow	Marine Equipment	8.19	8.19	8.19	155.69	0.27	142.04	8.63	6.77	0.00	0.00	6.77	
4		Clamshell Tugboat propulsion engine	Marine Equipment	108.24	96.34	108.24	2015.52	1.20	1082.45	111.70	64.03	0.00	0.00	64.96	
4		Clamshell Tugboat auxiliary engine	Marine Equipment	15.62	13.90	15.62	278.15	0.22	195.19	15.42	11.55	0.00	0.00	11.71	
4		Clamshell Tugboat propulsion engine	Marine Equipment	1948.41	1734.08	1948.41	36279.34	21.51	19484.07	2010.64	1152.47	0.02	0.05	1169.23	
4		Clamshell Tugboat auxiliary engine	Marine Equipment	281.07	250.16	281.07	5006.62	3.88	3513.42	277.47	207.82	0.00	0.01	210.82	
4		Clamshell Crew boat propulsion engine	Marine Equipment	71.87225	63.966303	71.87225	1420.19566	0.7934696	718.7225	78.708739	42.512033	0.000678106	0.002021278	43.131327	
4		Clamshell Crew boat auxiliary engine	Marine Equipment	5.9592862	5.3037647	5.9592862	106.149785	0.0822381	74.49	5.8829328	4.4061055	0.00	0.000209493	4.4698014	
4		Clamshell Survey boat propulsion engine	Marine Equipment	64.13	57.08	64.13	1267.25	0.71	641.32	70.23	37.93	0.00	0.00	38.49	

Table H1.27
Alternative 3 Emissions by Task

				Mitigated										
				Peak Day										
		Construction Element/Equipment	Source Type 1	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
Task ID														
3 Approach Channel (hopper dredge 2,600,000 CY)														
3		Marine Hopper Dredge												
3		Hopper propulsion engine	Marine Equipment	26.63	23.70	26.63	495.89	0.29	266.32	27.4828	15.75	0.00	0.00	15.98
3		Hopper propulsion engine	Marine Equipment	50.31	44.77	50.31	936.68	0.56	503.05	51.9119	29.76	0.00	0.00	30.19
3		Hopper auxiliary engine	Marine Equipment	0.22	0.20	0.22	5.06	0.00	3.70	0.2804	0.22	0.00	0.00	0.22
3		Crew boat propulsion engine	Marine Equipment	0.28	0.25	0.28	5.40	0.00	4.06	0.2993	0.24	0.00	0.00	0.24
3		Crew boat auxiliary engine	Marine Equipment	0.01	0.01	0.01	0.43	0.00	0.46	0.0239	0.02	0.00	0.00	0.03
3		Survey boat propulsion engine	Marine Equipment	0.99	0.88	0.99	19.28	0.02	14.49	1.0683	0.86	0.00	0.00	0.87
4 Main Channel Widening (clam shell dredge 1,065,000 CY)														
4		Marine Clamshell Dredge												
4		Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.7354	0.58	0.00	0.00	0.58
4		Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.5516	0.32	0.00	0.00	0.32
4		Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.0488	0.04	0.00	0.00	0.04
4		Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.4508	0.36	0.00	0.00	0.37
4		Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.0627	0.07	0.00	0.00	0.07
4		Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.1140	6.51	0.00	0.00	6.61
4		Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.19
4		Clamshell Crew boat propulsion engine	Marine Equipment	0.2761194	0.2457462	0.2761194	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
4		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
4		Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.2671	0.21	0.00	0.00	0.22
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.														

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
3 Approach Channel (hopper dredge 2,600,000 CY)														
3		Marine Hopper Dredge												
3		Hopper propulsion engine	Marine Equipment	3994.82	3555.39	3994.82	74383.56	44.10	39948.21	4122.42	2362.91	0.04	0.11	2397.28
3		Hopper propulsion engine	Marine Equipment	7545.77	6715.74	7545.77	140502.28	83.31	75457.73	7786.78	4463.282182	0.067086143	0.212211269	4528.198294
3		Hopper auxiliary engine	Marine Equipment	33.29	29.63	33.29	759.02	0.61	554.84	42.07	32.81825134	0.00036241	0.001560377	33.29230393
3		Crew boat propulsion engine	Marine Equipment	41.42	36.86	41.42	810.09	0.67	609.09	44.90	36.02714702	0.000386795	0.001712947	36.54727515
3		Crew boat auxiliary engine	Marine Equipment	1.77	1.57	1.77	64.77	0.07	69.44	3.59	3.733987708	3.09257E-05	0.000177536	3.787666645
3		Survey boat propulsion engine	Marine Equipment	147.83	131.57	147.83	2891.38	2.40	2173.97	160.24	128.5892017	0.001380559	0.006113904	130.445659
4 Main Channel Widening (clam shell dredge 1,065,000 CY)														
4		Marine Clamshell Dredge												
4		Clamshell Dredge hoist	Marine Equipment	77.26	77.26	77.26	2348.76	2.57	1339.21	130.17	102.4011648	0	0	102.4011648
4		Clamshell Dredge generator	Marine Equipment	57.95	57.95	57.95	1761.57	1.93	1004.40	97.63	56.57711647	0	0	56.57711647
4		Clamshell Barge dump scow	Marine Equipment	8.19	8.19	8.19	155.69	0.27	142.04	8.63	6.766310242	0	0	6.766310242
4		Clamshell Tugboat propulsion engine	Marine Equipment	73.61	65.51	73.61	1439.66	1.20	1082.45	79.79	64.02622048	0.000687398	0.003044191	64.95057449
4		Clamshell Tugboat auxiliary engine	Marine Equipment	5.47	4.86	5.47	200.26	0.22	214.71	11.10	11.54537331	9.56212E-05	0.000548936	11.7113469
4		Clamshell Tugboat propulsion engine	Marine Equipment	1324.92	1179.18	1324.92	25913.82	21.51	19484.07	1436.17	1152.471969	0.012373165	0.054795446	1169.110341
4		Clamshell Tugboat auxiliary engine	Marine Equipment	98.38	87.55	98.38	3604.77	3.88	3864.76	199.78	207.8167195	0.001721181	0.009880856	210.8042442
4		Clamshell Crew boat propulsion engine	Marine Equipment	48.87313	43.497086	48.87313	955.900927	0.7934696	718.7225	52.977036	42.51203349	0.000456418	0.002021278	43.12578467
4		Clamshell Crew boat auxiliary engine	Marine Equipment	2.0857502	1.8563176	2.0857502	76.4278451	0.0822381	81.94	4.2357116	4.406105495	3.64923E-05	0.000209493	4.469446641
4		Clamshell Survey boat propulsion engine	Marine Equipment	43.61	38.81	43.61	852.96	0.71	641.32	47.27	37.93	0.00	0.00	38.48
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.														

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
							PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
5 West Basin (clam shell dredge 717,000 CY)																	
5		Marine Clamshell Dredge															
5		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	120.00	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.0000	0.00	5.79
5		Clamshell Dredge generator	Marine Equipment	dredging	onsite	120.00	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.0000	0.00	3.20
5		Clamshell Barge dump scow	Marine Equipment	disposal	near shore	120.00	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.0000	0.00	0.04
5		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	120.00	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.0000	0.00	0.37
5		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	120.00	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.0000	0.00	0.07
5		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	120.00	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.0001	0.00	6.61
5		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	120.00	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.00	0.00	1.19
5		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	120	0.4060579	0.3613915	0.4060579	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
5		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	120.0000	0.0336683	0.0300	0.0336683	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
5		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	120.00	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.0000	0.00	0.22
6 Pier J Basin (clam shell dredge 258,000 CY)																	
6		Marine Clamshell Dredge															
6		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	43.00	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.0000	0.00	5.79
6		Clamshell Dredge generator	Marine Equipment	dredging	onsite	43.00	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.0000	0.00	3.20
6		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	43.00	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.0000	0.00	0.04
6		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	43.00	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.0000	0.00	0.37
6		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	43.00	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.0000	0.00	0.07
6		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	43.00	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.0001	0.00	6.61
6		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	43.00	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.0000	0.00	1.19
6		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	43	0.4060579	0.3613915	0.4060579	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
6		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	43.0000	0.0336683	0.0300	0.0336683	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
6		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	43.00	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.0000	0.00	0.22

Table H1.27
Alternative 3 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
5 West Basin (clam shell dredge 717,000 CY)														
5		Marine Clamshell Dredge												
5		Clamshell Dredge hoist	Marine Equipment	523.81	523.81	523.81	15923.81	17.44	9079.37	882.51	694.25	0.00	0.00	694.25
5		Clamshell Dredge generator	Marine Equipment	392.86	392.86	392.86	11942.86	13.08	6809.52	661.89	383.57	0.00	0.00	383.57
5		Clamshell Barge dump scow	Marine Equipment	5.56	5.56	5.56	105.56	0.18	96.30	5.85	4.59	0.00	0.00	4.59
5		Clamshell Tugboat propulsion engine	Marine Equipment	73.39	65.31	73.39	1366.45	0.81	733.86	75.73	43.41	0.00	0.00	44.04
5		Clamshell Tugboat auxiliary engine	Marine Equipment	10.59	9.42	10.59	188.57	0.15	132.33	10.45	7.83	0.00	0.00	7.94
5		Clamshell Tugboat propulsion engine	Marine Equipment	1320.95	1175.65	1320.95	24596.16	14.58	13209.54	1363.15	781.34	0.01	0.04	792.70
5		Clamshell Tugboat auxiliary engine	Marine Equipment	190.56	169.60	190.56	3394.32	2.63	2381.98	188.12	140.89	0.00	0.01	142.93
5		Clamshell Crew boat propulsion engine	Marine Equipment	48.726949	43.366985	48.726949	962.844517	0.5379455	487.26949	53.361857	28.821718	0.000459733	0.001370358	29.241578
5		Clamshell Crew boat auxiliary engine	Marine Equipment	4.040194	3.5957727	4.040194	71.9659558	0.0557547	50.50	3.988429	2.9871902	0.00	0.0001	3.0303738
5		Clamshell Survey boat propulsion engine	Marine Equipment	43.48	38.70	43.48	859.15	0.48	434.79	47.62	25.72	0.00	0.00	26.09
6 Pier J Basin (clam shell dredge 258,000 CY)														
6		Marine Clamshell Dredge												
6		Clamshell Dredge hoist	Marine Equipment	187.70	187.70	187.70	5706.03	6.25	3253.44	316.23	248.77	0.00	0.00	248.77
6		Clamshell Dredge generator	Marine Equipment	140.77	140.77	140.77	4279.52	4.69	2440.08	237.18	137.45	0.00	0.00	137.45
6		Clamshell Barge dump scow	Marine Equipment	1.99	1.99	1.99	37.82	0.07	34.51	2.10	1.64	0.00	0.00	1.64
6		Clamshell Tugboat propulsion engine	Marine Equipment	26.30	23.40	26.30	489.65	0.29	262.97	27.14	15.55	0.00	0.00	15.78
6		Clamshell Tugboat auxiliary engine	Marine Equipment	3.79	3.38	3.79	67.57	0.05	47.42	3.74	2.80	0.00	0.00	2.85
6		Clamshell Tugboat propulsion engine	Marine Equipment	473.34	421.27	473.34	8813.63	5.23	4733.42	488.46	279.98	0.00	0.01	284.05
6		Clamshell Tugboat auxiliary engine	Marine Equipment	68.28	60.77	68.28	1216.30	0.94	853.54	67.41	50.49	0.00	0.00	51.22
6		Clamshell Crew boat propulsion engine	Marine Equipment	17.46049	15.539836	17.46049	345.019285	0.1927638	174.6049	19.121332	10.327782	0.000164738	0.000491045	10.478232
6		Clamshell Crew boat auxiliary engine	Marine Equipment	1.4477362	1.2884852	1.4477362	25.7878008	0.0199788	18.10	1.4291871	1.0704098	0.00	0.0001	1.085884
6		Clamshell Survey boat propulsion engine	Marine Equipment	15.58	13.87	15.58	307.86	0.17	155.80	17.06	9.22	0.00	0.00	9.35

Table H1.27
Alternative 3 Emissions by Task

				Mitigated										
				Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
5 West Basin (clam shell dredge 717,000 CY)														
5		Marine Clamshell Dredge												
5		Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.7354	0.58	0.00	0.00	0.58
5		Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.5516	0.32	0.00	0.00	0.32
5		Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.0488	0.04	0.00	0.00	0.04
5		Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.4508	0.36	0.00	0.00	0.37
5		Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.0627	0.07	0.00	0.00	0.07
5		Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.1140	6.51	0.00	0.00	6.61
5		Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.19
5		Clamshell Crew boat propulsion engine	Marine Equipment	0.2761194	0.2457462	0.2761194	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
5		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
5		Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.2671	0.21	0.00	0.00	0.22
6 Pier J Basin (clam shell dredge 258,000 CY)														
6		Marine Clamshell Dredge												
6		Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.7354	0.58	0.00	0.00	0.58
6		Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.5516	0.32	0.00	0.00	0.32
6		Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.0488	0.04	0.00	0.00	0.04
6		Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.4508	0.36	0.00	0.00	0.37
6		Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.0627	0.07	0.00	0.00	0.07
6		Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.1140	6.51	0.00	0.00	6.61
6		Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.1287	1.17	0.00	0.00	1.19
6		Clamshell Crew boat propulsion engine	Marine Equipment	0.2761194	0.2457462	0.2761194	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
6		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
6		Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.2671	0.21	0.00	0.00	0.22
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.														

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
5 West Basin (clam shell dredge 717,000 CY)														
5		Marine Clamshell Dredge												
5		Clamshell Dredge hoist	Marine Equipment	52.38	52.38	52.38	1592.38	1.74	907.94	88.25	69.42451853	0	0	69.42451853
5		Clamshell Dredge generator	Marine Equipment	39.29	39.29	39.29	1194.29	1.31	680.95	66.19	38.3573671	0	0	38.3573671
5		Clamshell Barge dump scow	Marine Equipment	5.56	5.56	5.56	105.56	0.18	96.30	5.85	4.587328978	0	0	4.587328978
5		Clamshell Tugboat propulsion engine	Marine Equipment	49.90	44.41	49.90	976.04	0.81	733.86	54.09	43.4076071	0.000466033	0.002063859	44.03428779
5		Clamshell Tugboat auxiliary engine	Marine Equipment	3.71	3.30	3.71	135.77	0.15	145.57	7.52	7.827371733	6.48279E-05	0.00037216	7.939896204
5		Clamshell Tugboat propulsion engine	Marine Equipment	898.25	799.44	898.25	17568.69	14.58	13209.54	973.68	781.3369279	0.008388587	0.037149455	792.6171802
5		Clamshell Tugboat auxiliary engine	Marine Equipment	66.70	59.36	66.70	2443.91	2.63	2620.18	135.44	140.8926912	0.001166903	0.006698886	142.9181317
5		Clamshell Crew boat propulsion engine	Marine Equipment	33.134326	29.48955	33.134326	648.068425	0.5379455	487.26949	35.916634	28.82171762	0.000309436	0.001370358	29.23782012
5		Clamshell Crew boat auxiliary engine	Marine Equipment	1.4140679	1.2585204	1.4140679	51.82	0.0557547	55.552668	2.87	2.987190166	2.47405E-05	0.000142029	3.030133316
5		Clamshell Survey boat propulsion engine	Marine Equipment	29.57	26.31	29.57	578.28	0.48	434.79	32.05	25.72	0.00	0.00	26.09
6 Pier J Basin (clam shell dredge 258,000 CY)														
6		Marine Clamshell Dredge												
6		Clamshell Dredge hoist	Marine Equipment	18.77	18.77	18.77	570.60	0.62	325.34	31.62	24.87711914	0	0	24.87711914
6		Clamshell Dredge generator	Marine Equipment	14.08	14.08	14.08	427.95	0.47	244.01	23.72	13.74472321	0	0	13.74472321
6		Clamshell Barge dump scow	Marine Equipment	1.99	1.99	1.99	37.82	0.07	34.51	2.10	1.643792884	0	0	1.643792884
6		Clamshell Tugboat propulsion engine	Marine Equipment	17.88	15.91	17.88	349.75	0.29	262.97	19.38	15.55439255	0.000166995	0.000739549	15.77895312
6		Clamshell Tugboat auxiliary engine	Marine Equipment	1.33	1.18	1.33	48.65	0.05	52.16	2.70	2.804808204	2.323E-05	0.000133357	2.845129473
6		Clamshell Tugboat propulsion engine	Marine Equipment	321.87	286.47	321.87	6295.45	5.23	4733.42	348.90	279.9790658	0.00300591	0.013311888	284.0211562
6		Clamshell Tugboat auxiliary engine	Marine Equipment	23.90	21.27	23.90	875.73	0.94	938.90	48.53	50.48654767	0.00041814	0.002400434	51.21233051
6		Clamshell Crew boat propulsion engine	Marine Equipment	11.873133	10.567089	11.873133	232.224519	0.1927638	174.6049	12.870127	10.32778215	0.000110881	0.000491045	10.47688554
6		Clamshell Crew boat auxiliary engine	Marine Equipment	0.5067077	0.4509698	0.5067077	18.57	0.0199788	19.906373	1.03	1.07040981	8.86536E-06	5.08937E-05	1.085797771
6		Clamshell Survey boat propulsion engine	Marine Equipment	10.59	9.43	10.59	207.22	0.17	155.80	11.48	9.22	0.00	0.00	9.35
Note: clamshell dredge would be electric with mitigation: assume 90 percent reduction in diesel exhaust emissions														

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
7 Pier J Basin (clam shell dredge 46,000 CY)																	
7		Marine Clamshell Dredge															
7		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	8.00	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.0000	0.00	5.79
7		Clamshell Dredge generator	Marine Equipment	dredging	onsite	8.00	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.0000	0.00	3.20
7		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	8.00	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.0000	0.00	0.04
7		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	8.00	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.0000	0.00	0.37
7		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	8.00	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.0000	0.00	0.07
7		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	8.00	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.0001	0.00	6.61
7		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	8.00	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.0000	0.00	1.19
7		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	8	0.4060579	0.3613915	0.4060579	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
7		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	8.0000	0.0336683	0.0300	0.0336683	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
7		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	8.00	0.36	0.32	0.36	7.16	0.00	3.62	0.40	0.21	0.0000	0.00	0.22
8 Pier J Approach (clam shell dredge 1,994,000 CY)																	
8		Marine Clamshell Dredge															
8		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	332.00	4.37	4.37	4.37	132.70	0.15	75.66	7.35	5.79	0.0000	0.00	5.79
8		Clamshell Dredge generator	Marine Equipment	dredging	onsite	332.00	3.27	3.27	3.27	99.52	0.11	56.75	5.52	3.20	0.0000	0.00	3.20
8		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	332.00	0.05	0.05	0.05	0.88	0.00	0.80	0.05	0.04	0.0000	0.00	0.04
8		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	332.00	0.61	0.54	0.61	11.39	0.01	6.12	0.63	0.36	0.0000	0.00	0.37
8		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	332.00	0.09	0.08	0.09	1.57	0.00	1.10	0.09	0.07	0.0000	0.00	0.07
8		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	332.00	11.01	9.80	11.01	204.97	0.12	110.08	11.36	6.51	0.0001	0.00	6.61
8		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	332.00	1.59	1.41	1.59	28.29	0.02	19.85	1.57	1.17	0.0000	0.00	1.19
8		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	332	0.4060579	0.3613915	0.4060579	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
8		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	332	0.0336683	0.0299648	0.0336683	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
8		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	332	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374

Table H1.27
Alternative 3 Emissions by Task

				Unmitigated Emissions											
				Total											
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e	
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	
7 Pier J Basin (clam shell dredge 46,000 CY)															
7		Marine Clamshell Dredge													
7		Clamshell Dredge hoist	Marine Equipment	34.92	34.92	34.92	1061.59	1.16	605.29	58.83	46.28	0.00	0.00	46.28	
7		Clamshell Dredge generator	Marine Equipment	26.19	26.19	26.19	796.19	0.87	453.97	44.13	25.57	0.00	0.00	25.57	
7		Clamshell Barge dump scow	Marine Equipment	0.37	0.37	0.37	7.04	0.01	6.42	0.39	0.31	0.00	0.00	0.31	
7		Clamshell Tugboat propulsion engine	Marine Equipment	4.89	4.35	4.89	91.10	0.05	48.92	5.05	2.89	0.00	0.00	2.94	
7		Clamshell Tugboat auxiliary engine	Marine Equipment	0.71	0.63	0.71	12.57	0.01	8.82	0.70	0.52	0.00	0.00	0.53	
7		Clamshell Tugboat propulsion engine	Marine Equipment	88.06	78.38	88.06	1639.74	0.97	880.64	90.88	52.09	0.00	0.00	52.85	
7		Clamshell Tugboat auxiliary engine	Marine Equipment	12.70	11.31	12.70	226.29	0.18	158.80	12.54	9.39	0.00	0.00	9.53	
7		Clamshell Crew boat propulsion engine	Marine Equipment	3.2484633	2.8911323	3.2484633	64.1896345	0.035863	32.484633	3.5574571	1.9214478	3.06489E-05	9.13572E-05	1.9494385	
7		Clamshell Crew boat auxiliary engine	Marine Equipment	0.2693463	0.24	0.2693463	4.79773039	0.003717	3.37	0.2658953	0.199146	0.00	0.0000	0.2020249	
7		Clamshell Survey boat propulsion engine	Marine Equipment	2.90	2.58	2.90	57.28	0.03	28.99	3.17	1.71	0.00	0.00	1.74	
8 Pier J Approach (clam shell dredge 1,994,000 CY)															
8		Marine Clamshell Dredge													
8		Clamshell Dredge hoist	Marine Equipment	1449.21	1449.21	1449.21	44055.87	48.25	25119.58	2441.62	1920.75	0.00	0.00	1920.75	
8		Clamshell Dredge generator	Marine Equipment	1086.90	1086.90	1086.90	33041.90	36.19	18839.68	1831.22	1061.22	0.00	0.00	1061.22	
8		Clamshell Barge dump scow	Marine Equipment	15.37	15.37	15.37	292.04	0.51	266.42	16.19	12.69	0.00	0.00	12.69	
8		Clamshell Tugboat propulsion engine	Marine Equipment	203.04	180.70	203.04	3780.52	2.24	2030.36	209.52	120.09	0.00	0.01	121.84	
8		Clamshell Tugboat auxiliary engine	Marine Equipment	29.29	26.07	29.29	521.72	0.40	366.12	28.91	21.66	0.00	0.00	21.97	
8		Clamshell Tugboat propulsion engine	Marine Equipment	3654.64	3252.63	3654.64	68049.39	40.35	36546.40	3771.37	2161.70	0.03	0.10	2193.14	
8		Clamshell Tugboat auxiliary engine	Marine Equipment	527.21	469.22	527.21	9390.95	7.28	6590.14	520.46	389.80	0.00	0.02	395.44	
8		Clamshell Crew boat propulsion engine	Marine Equipment	134.81123	119.98199	134.81123	2663.86983	1.4883159	1348.1123	147.63447	79.740085	0.001271928	0.003791323	80.901698	
8		Clamshell Crew boat auxiliary engine	Marine Equipment	11.17787	9.9483044	11.17787	199.105811	0.1542546	139.72338	11.034654	8.2645595	9.50678E-05	0.000392947	8.3840343	
8		Clamshell Survey boat propulsion engine	Marine Equipment	120.29309	107.06085	120.29309	2376.99154	1.3280358	1202.9309	131.73537	71.152692	0.001134951	0.003383027	72.189207	

Table H1.27
Alternative 3 Emissions by Task

				Mitigated										
				Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
7 Pier J Basin (clam shell dredge 46,000 CY)														
7		Marine Clamshell Dredge												
7		Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.7354	0.58	0.00	0.00	0.58
7		Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.5516	0.32	0.00	0.00	0.32
7		Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.0488	0.04	0.00	0.00	0.04
7		Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.4508	0.36	0.00	0.00	0.37
7		Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.0627	0.07	0.00	0.00	0.07
7		Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.1140	6.51	0.00	0.00	6.61
7		Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.56	20.37	0.02	21.83	1.1287	1.17	0.00	0.00	1.19
7		Clamshell Crew boat propulsion engine	Marine Equipment	0.2761194	0.2457462	0.2761194	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
7		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
7		Clamshell Survey boat propulsion engine	Marine Equipment	0.25	0.22	0.25	4.82	0.00	3.62	0.2671	0.21	0.00	0.00	0.22
8 Pier J Approach (clam shell dredge 1,994,000 CY)														
8		Marine Clamshell Dredge												
8		Clamshell Dredge hoist	Marine Equipment	0.44	0.44	0.44	13.27	0.01	7.57	0.7354	0.58	0.00	0.00	0.58
8		Clamshell Dredge generator	Marine Equipment	0.33	0.33	0.33	9.95	0.01	5.67	0.5516	0.32	0.00	0.00	0.32
8		Clamshell Barge dump scow	Marine Equipment	0.05	0.05	0.05	0.88	0.00	0.80	0.0488	0.04	0.00	0.00	0.04
8		Clamshell Tugboat propulsion engine	Marine Equipment	0.42	0.37	0.42	8.13	0.01	6.12	0.4508	0.36	0.00	0.00	0.37
8		Clamshell Tugboat auxiliary engine	Marine Equipment	0.03	0.03	0.03	1.13	0.00	1.21	0.0627	0.07	0.00	0.00	0.07
8		Clamshell Tugboat propulsion engine	Marine Equipment	7.49	6.66	7.49	146.41	0.12	110.08	8.1140	6.51	0.00	0.00	6.61
8		Clamshell Tugboat auxiliary engine	Marine Equipment	0.56	0.49	0.5558	20.37	0.02	21.83	1.13	1.17	0.00	0.00	1.19
8		Clamshell Crew boat propulsion engine	Marine Equipment	0.2761194	0.2457462	0.2761194	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
8		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
8		Clamshell Survey boat propulsion engine	Marine Equipment	0.2463834	0.2192813	0.2463834	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
7 Pier J Basin (clam shell dredge 46,000 CY)														
7		Marine Clamshell Dredge												
7		Clamshell Dredge hoist	Marine Equipment	3.49	3.49	3.49	106.16	0.12	60.53	5.88	4.628301236	0	0	4.628301236
7		Clamshell Dredge generator	Marine Equipment	2.62	2.62	2.62	79.62	0.09	45.40	4.41	2.557157807	0	0	2.557157807
7		Clamshell Barge dump scow	Marine Equipment	0.37	0.37	0.37	7.04	0.01	6.42	0.39	0.305821932	0	0	0.305821932
7		Clamshell Tugboat propulsion engine	Marine Equipment	3.33	2.96	3.33	65.07	0.05	48.92	3.61	2.893840474	3.10688E-05	0.000137591	2.935619186
7		Clamshell Tugboat auxiliary engine	Marine Equipment	0.25	0.22	0.25	9.05	0.01	9.70	0.50	0.521824782	4.32186E-06	2.48107E-05	0.529326414
7		Clamshell Tugboat propulsion engine	Marine Equipment	59.88	53.30	59.88	1171.25	0.97	880.64	64.91	52.08912852	0.000559239	0.00247663	52.84114534
7		Clamshell Tugboat auxiliary engine	Marine Equipment	4.45	3.96	4.45	162.93	0.18	174.68	9.03	9.392846079	7.77935E-05	0.000446592	9.527875445
7		Clamshell Crew boat propulsion engine	Marine Equipment	2.208955	1.96597	2.208955	43.2045617	0.035863	32.484633	2.3944423	1.921447841	2.0629E-05	9.13572E-05	1.949188008
7		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0942712	0.0839014	0.0942712	3.45	0.003717	3.7035112	0.19	0.199146011	1.64937E-06	9.4686E-06	0.202008888
7		Clamshell Survey boat propulsion engine	Marine Equipment	1.97	1.75	1.97	38.55	0.03	28.99	2.14	1.71	0.00	0.00	1.74
8 Pier J Approach (clam shell dredge 1,994,000 CY)														
8		Marine Clamshell Dredge												
8		Clamshell Dredge hoist	Marine Equipment	144.92	144.92	144.92	4405.59	4.83	2511.96	244.16	192.0745013	0	0	192.0745013
8		Clamshell Dredge generator	Marine Equipment	108.69	108.69	108.69	3304.19	3.62	1883.97	183.12	106.122049	0	0	106.122049
8		Clamshell Barge dump scow	Marine Equipment	15.37	15.37	15.37	292.04	0.51	266.42	16.19	12.69161017	0	0	12.69161017
8		Clamshell Tugboat propulsion engine	Marine Equipment	138.06	122.88	138.06	2700.37	2.24	2030.36	149.66	120.0943797	0.001289357	0.005710009	121.8281962
8		Clamshell Tugboat auxiliary engine	Marine Equipment	10.25	9.12	10.25	375.64	0.40	402.73	20.82	21.65572846	0.000179357	0.001029644	21.96704616
8		Clamshell Tugboat propulsion engine	Marine Equipment	2485.15	2211.79	2485.15	48606.71	40.35	36546.40	2693.83	2161.698834	0.023208423	0.102780159	2192.907532
8		Clamshell Tugboat auxiliary engine	Marine Equipment	184.52	164.23	184.52	6761.48	7.28	7249.15	374.73	389.8031123	0.003228431	0.018533584	395.4068309
8		Clamshell Crew boat propulsion engine	Marine Equipment	91.671634	81.587754	91.671634	1792.98931	1.4883159	1348.1123	99.369355	79.74008541	0.000856105	0.003791323	80.89130232
8		Clamshell Crew boat auxiliary engine	Marine Equipment	3.9122545	3.4819065	3.9122545	143.356184	0.1542546	153.69571	7.9449506	8.26455946	6.84488E-05	0.000392947	8.38336884
8		Clamshell Survey boat propulsion engine	Marine Equipment	81.799304	72.801381	81.799304	1599.89815	1.3280358	1202.9309	88.66804	71.1526916	0.000763909	0.003383027	72.1799313
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.														

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

							Unmitigated Emissions									
							Peak Day									
							PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/da y)	(tonnes/day)	(tonnes/day)	(tonnes/da y)
9 Pier J Approach (clam shell dredge 679,000 CY)																
9		Marine Clamshell Dredge														
9		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	113	4.3650794	4.3650794	4.3650794	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0 5.7853765
9		Clamshell Dredge generator	Marine Equipment	dredging	onsite	113	3.2738095	3.2738095	3.2738095	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0 3.1964473
9		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	113	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0 0.0382277
9		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	113	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05 0.3669912
9		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	113	0.0882214	0.0785171	0.0882214	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06 0.0661711
9		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	113	11.00795	9.7970759	11.00795	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579 6.6058422
9		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	113	1.5879856	1.4133072	1.5879856	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05 1.191079
9		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	113	0.4060579	0.3613915	0.4060579	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05 0.2436798
9		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	113	0.0336683	0.0299648	0.0336683	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06 0.0252531
9		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	113	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05 0.2174374

Table H1.27
Alternative 3 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
9 Pier J Approach (clam shell dredge 679,000 CY)														
9		Marine Clamshell Dredge												
9		Clamshell Dredge hoist	Marine Equipment	493.25397	493.25397	493.25397	14994.9206	16.422516	8549.7354	831.03429	653.74755	0	0	653.74755
9		Clamshell Dredge generator	Marine Equipment	369.94048	369.94048	369.94048	11246.1905	12.316887	6412.3016	623.27571	361.19854	0	0	361.19854
9		Clamshell Barge dump scow	Marine Equipment	5.2314815	5.2314815	5.2314815	99.3981481	0.1741782	90.679012	5.50875	4.3197348	0	0	4.3197348
9		Clamshell Tugboat propulsion engine	Marine Equipment	69.105467	61.503866	69.105467	1286.74379	0.7629244	691.05467	71.312696	40.875497	0.000614386	0.001943467	41.470009
9		Clamshell Tugboat auxiliary engine	Marine Equipment	9.9690209	8.8724286	9.9690209	177.573185	0.1375725	124.61276	9.8412928	7.370775	8.47865E-05	0.000350451	7.4773291
9		Clamshell Tugboat propulsion engine	Marine Equipment	1243.8984	1107.0696	1243.8984	23161.3883	13.732638	12438.984	1283.6285	735.75894	0.011058953	0.034982404	746.46017
9		Clamshell Tugboat auxiliary engine	Marine Equipment	179.44238	159.70371	179.44238	3196.31733	2.4763048	2243.0297	177.14327	132.67395	0.001526157	0.006308117	134.59192
9		Clamshell Crew boat propulsion engine	Marine Equipment	45.884544	40.837244	45.884544	906.678587	0.5065654	458.84544	50.249082	27.140451	0.000432915	0.00129042	27.535819
9		Clamshell Crew boat auxiliary engine	Marine Equipment	3.804516	3.3860193	3.804516	67.7679417	0.0525023	47.55645	3.7557707	2.8129374	3.23574E-05	0.000133744	2.853602
9		Clamshell Survey boat propulsion engine	Marine Equipment	40.943131	36.439387	40.943131	809.036278	0.4520122	409.43131	44.837642	24.217633	0.000386294	0.001151452	24.570423

Table H1.27
Alternative 3 Emissions by Task

				Mitigated										
				Peak Day										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
9 Pier J Approach (clam shell dredge 679,000 CY)														
9		Marine Clamshell Dredge												
9		Clamshell Dredge hoist	Marine Equipment	0.4365079	0.4365079	0.4365079	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
9		Clamshell Dredge generator	Marine Equipment	0.327381	0.327381	0.327381	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
9		Clamshell Barge dump scow	Marine Equipment	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
9		Clamshell Tugboat propulsion engine	Marine Equipment	0.4158559	0.3701118	0.4158559	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
9		Clamshell Tugboat auxiliary engine	Marine Equipment	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
9		Clamshell Tugboat propulsion engine	Marine Equipment	7.4854063	6.6620116	7.4854063	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
9		Clamshell Tugboat auxiliary engine	Marine Equipment	0.555795	0.4946575	0.555795	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
9		Clamshell Crew boat propulsion engine	Marine Equipment	0.2761194	0.2457462	0.2761194	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
9		Clamshell Crew boat auxiliary engine	Marine Equipment	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
9		Clamshell Survey boat propulsion engine	Marine Equipment	0.2463834	0.2192813	0.2463834	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.27
Alternative 3 Emissions by Task

				Mitigated Emissions											
				Total											
Task ID		Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)
9 Pier J Approach (clam shell dredge 679,000 CY)															
9		Marine Clamshell Dredge													
9		Clamshell Dredge hoist	Marine Equipment	49.325397	49.325397	49.325397	1499.49206	1.6422516	854.97354	83.103429	65.37475495	0	0	65.37475495	
9		Clamshell Dredge generator	Marine Equipment	36.994048	36.994048	36.994048	1124.61905	1.2316887	641.23016	62.327571	36.11985402	0	0	36.11985402	
9		Clamshell Barge dump scow	Marine Equipment	5.2314815	5.2314815	5.2314815	99.3981481	0.1741782	90.679012	5.50875	4.319734787	0	0	4.319734787	
9		Clamshell Tugboat propulsion engine	Marine Equipment	46.991718	41.822629	46.991718	919.10271	0.7629244	691.05467	50.93764	40.87549669	0.000438847	0.001943467	41.465621	
9		Clamshell Tugboat auxiliary engine	Marine Equipment	3.4891573	3.10535	3.4891573	127.852693	0.1375725	137.07404	7.0857308	7.370775048	6.10463E-05	0.000350451	7.476735592	
9		Clamshell Tugboat propulsion engine	Marine Equipment	845.85092	752.80731	845.85092	16543.8488	13.732638	12438.984	916.87751	735.7589404	0.007899252	0.034982404	746.381178	
9		Clamshell Tugboat auxiliary engine	Marine Equipment	62.804832	55.8963	62.804832	2301.34848	2.4763048	2467.3327	127.54316	132.6739509	0.001098833	0.006308117	134.5812407	
9		Clamshell Crew boat propulsion engine	Marine Equipment	31.20149	27.769326	31.20149	610.264434	0.5065654	458.84544	33.821497	27.14045076	0.000291385	0.00129042	27.53228061	
9		Clamshell Crew boat auxiliary engine	Marine Equipment	1.3315806	1.1851067	1.3315806	48.7929181	0.0525023	52.312095	2.7041549	2.812937407	2.32973E-05	0.000133744	2.853375539	
9		Clamshell Survey boat propulsion engine	Marine Equipment	27.841329	24.778783	27.841329	544.543649	0.4520122	409.43131	30.179182	24.21763298	0.000260005	0.001151452	24.56726578	

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.28
Alternative 4 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
1		Electrical Substation Construction at Pier J (mitigation only)															
1		Off-Road Equipment															
1		Caterpillar 320 excavator	Offroad Construction Equipment		onsite	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Small asphalt roller	Offroad Construction Equipment		onsite	26	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Water truck	Offroad Construction Equipment		onsite	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Forklift	Offroad Construction Equipment		onsite	22	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Mobile crane (35 ton)	Offroad Construction Equipment		onsite	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		On-Road Vehicles															
1		Haul trucks	Onroad Construction Vehicles		onsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Supply trucks	Onroad Construction Vehicles		onsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Haul trucks	Onroad Construction Vehicles		offsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Supply trucks	Onroad Construction Vehicles		offsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Workers	Onroad Construction Vehicles		offsite	60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Fugitive Dust															
1		Soil handling	Fugitive Emissions		onsite	20	n/a	n/a									
1		Asphalting	Fugitive Emissions		onsite												
2		Pier J Breakwater Construction															
2		Marine Activities															
2		Pier J Breakwater Construction Tugboat propulsion engine	Marine Equipment		onsite	54	5.810	5.171	5.810	108.178	0.064	58.098	5.995	3.436	0.000	0.000	3.486
2		Pier J Breakwater Construction Tugboat auxiliary engine	Marine Equipment		onsite	54	1.059	0.942	1.059	18.857	0.015	13.233	1.045	0.783	0.000	0.000	0.794
2		Pier J Breakwater Construction Crew boat propulsion engine	Marine Equipment		onsite	54	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
2		Pier J Breakwater Construction Crew boat auxiliary engine	Marine Equipment		onsite	54	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
2		Pier J Breakwater Construction Survey boat propulsion engine	Marine Equipment		onsite	54	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217
2		Off-Road Equipment															
2		Piling crane	Offroad Construction Equipment		onsite	54	0.209	0.192	0.209	5.002	0.008	2.675	0.467	0.380	0.000	0.000	0.380
2		Long arm excavator	Offroad Construction Equipment		onsite	54	0.075	0.069	0.075	2.188	0.013	2.775	0.321	0.634	0.000	0.000	0.634
2		On-Road Vehicles															
2		Delivery Trucks	Onroad Construction Vehicles		onsite	5	0.147	0.037	0.000	0.079	0.000	0.009	0.001	0.012	0.000	0.000	0.012
2		Delivery Trucks	Onroad Construction Vehicles		offsite	5	0.486	0.189	0.022	3.217	0.019	0.185	0.026	0.919	0.000	0.000	0.962
2		Workers	Onroad Construction Vehicles		offsite	54	0.159	0.050	0.000	0.058	0.004	0.959	0.015	0.169	0.000	0.000	0.170

Table H1.28
Alternative 4 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
1		Electrical Substation Construction at Pier J (mitigation only)												
1		Off-Road Equipment												
		Caterpillar 320 excavator	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Small asphalt roller	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Water truck	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Forklift	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Mobile crane (35 ton)	Offroad Construction Equipment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		On-Road Vehicles												
1		Haul trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Supply trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Haul trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Supply trucks	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Workers	Onroad Construction Vehicles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1		Fugitive Dust												
1		Soil handling	Fugitive Emissions	n/a	n/a									
1		Asphalting	Fugitive Emissions											
2		Pier J Breakwater Construction												
2		Marine Activities												
		Pier J Breakwater Construction Tugboat propulsion engine	Marine Equipment											
2		Pier J Breakwater ConstructionTugboat auxiliary engine	Marine Equipment	313.727	279.217	313.727	5841.589	3.464	3137.266	323.747	185.568	0.003	0.009	188.267
2				57.167	50.879	57.167	1018.296	0.789	714.594	56.435	42.268	0.000	0.002	42.879
2		Pier J Breakwater Construction Crew boat propulsion engine	Marine Equipment	21.927	19.515	21.927	433.280	0.242	219.271	24.013	12.970	0.000	0.001	13.159
2		Pier J Breakwater Construction Crew boat auxiliary engine	Marine Equipment	1.818	1.618	1.818	32.385	0.025	22.726	1.795	1.344	0.000	0.000	1.364
2		Pier J Breakwater Construction Survey boat propulsion engine	Marine Equipment	19.566	17.414	19.566	386.619	0.216	195.657	21.427	11.573	0.000	0.001	11.742
2		Off-Road Equipment												
2		Piling crane	Offroad Construction Equipment	11.266	10.365	11.266	270.124	0.418	144.427	25.201	20.519	0.000	0.000	20.519
2		Long arm excavator	Offroad Construction Equipment	4.061	3.736	4.061	118.133	0.697	149.866	17.327	34.235	0.000	0.000	34.235
2		On-Road Vehicles												
2		Delivery Trucks	Onroad Construction Vehicles	0.736	0.185	0.001	0.394	0.001	0.046	0.005	0.059	0.000	0.000	0.062
2		Delivery Trucks	Onroad Construction Vehicles	2.431	0.943	0.111	16.084	0.096	0.924	0.128	4.596	0.000	0.001	4.811
2		Workers	Onroad Construction Vehicles	8.583	2.719	0.000	3.143	0.199	51.794	0.809	9.128	0.000	0.000	9.178

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
		Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID				(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
1		Electrical Substation Construction at Pier J (mitigation only)												
1		Off-Road Equipment												
		Caterpillar 320 excavator	Offroad Construction Equipment	0.016	0.016	0.016	0.330	0.005	1.226	0.156	0.265	0.000	0.000	0.265
1		Small asphalt roller	Offroad Construction Equipment	0.005	0.005	0.005	0.735	0.001	0.907	0.041	0.058	0.000	0.000	0.058
1		Water truck	Offroad Construction Equipment	0.030	0.030	0.030	0.603	0.010	2.587	0.296	0.482	0.000	0.000	0.482
1		Forklift	Offroad Construction Equipment	0.001	0.001	0.001	0.147	0.000	0.163	0.008	0.012	0.000	0.000	0.012
1		Mobile crane (35 ton)	Offroad Construction Equipment	0.022	0.022	0.022	0.433	0.007	2.414	0.213	0.343	0.000	0.000	0.343
1		On-Road Vehicles												
1		Haul trucks	Onroad Construction Vehicles	0.088	0.022	0.000	0.047	0.000	0.006	0.001	0.007	0.000	0.000	0.007
1		Supply trucks	Onroad Construction Vehicles	0.206	0.052	0.000	0.110	0.000	0.013	0.001	0.016	0.000	0.000	0.017
1		Haul trucks	Onroad Construction Vehicles	0.016	0.006	0.001	0.113	0.002	0.006	0.004	0.030	0.000	0.000	0.032
1		Supply trucks	Onroad Construction Vehicles	0.068	0.026	0.003	0.514	0.019	0.026	0.038	0.129	0.000	0.000	0.135
1		Workers	Onroad Construction Vehicles	0.151	0.048	0.000	0.055	0.004	0.913	0.014	0.161	0.000	0.000	0.162
1		Fugitive Dust												
1		Soil handling	Fugitive Emissions	2.006	0.304									
1		Asphalting	Fugitive Emissions											
2		Pier J Breakwater Construction												
2		Marine Activities												
		Pier J Breakwater Construction Tugboat propulsion engine	Marine Equipment	3.951	3.516	3.951	77.270	0.064	58.098	4.282	3.436	0.000	0.000	3.486
		Pier J Breakwater Construction Tugboat auxiliary engine	Marine Equipment	0.371	0.330	0.371	13.577	0.015	14.557	0.752	0.783	0.000	0.000	0.794
		Pier J Breakwater Construction Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
		Pier J Breakwater Construction Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
		Pier J Breakwater Construction Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
2		Off-Road Equipment												
2		Piling crane	Offroad Construction Equipment	0.024	0.024	0.024	0.479	0.008	2.675	0.236	0.380	0.000	0.000	0.380
2		Long arm excavator	Offroad Construction Equipment	0.040	0.040	0.040	0.792	0.013	2.775	0.321	0.634	0.000	0.000	0.634
2		On-Road Vehicles												
2		Delivery Trucks	Onroad Construction Vehicles	0.147	0.037	0.000	0.079	0.000	0.009	0.001	0.012	0.000	0.000	0.012
2		Delivery Trucks	Onroad Construction Vehicles	0.486	0.189	0.022	3.541	0.101	0.185	0.199	0.919	0.000	0.000	0.962
2		Workers	Onroad Construction Vehicles	0.159	0.050	0.000	0.058	0.004	0.959	0.015	0.169	0.000	0.000	0.170

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
1	Electrical Substation Construction at Pier J (mitigation only)													
1		Off-Road Equipment												
		Caterpillar 320 excavator	Offroad Construction Equipment	0.330	0.330	0.330	6.595	0.108	24.518	3.122	5.296	0.000	0.000	5.296
1		Small asphalt roller	Offroad Construction Equipment	0.127	0.127	0.127	19.120	0.031	23.576	1.060	1.511	0.000	0.000	1.511
1		Water truck	Offroad Construction Equipment	0.603	0.603	0.603	12.063	0.196	51.747	5.928	9.642	0.000	0.000	9.642
1		Forklift	Offroad Construction Equipment	0.021	0.021	0.021	3.225	0.005	3.589	0.179	0.260	0.000	0.000	0.260
1		Mobile crane (35 ton)	Offroad Construction Equipment	0.043	0.043	0.043	0.865	0.014	4.827	0.425	0.686	0.000	0.000	0.686
1		On-Road Vehicles												
1		Haul trucks	Onroad Construction Vehicles	0.442	0.111	0.000	0.236	0.001	0.028	0.003	0.035	0.000	0.000	0.037
1		Supply trucks	Onroad Construction Vehicles	1.030	0.258	0.001	0.552	0.002	0.064	0.007	0.082	0.000	0.000	0.086
1		Haul trucks	Onroad Construction Vehicles	0.080	0.031	0.004	0.563	0.011	0.031	0.021	0.152	0.000	0.000	0.159
1		Supply trucks	Onroad Construction Vehicles	0.340	0.132	0.016	2.570	0.093	0.130	0.188	0.643	0.000	0.000	0.674
1		Workers	Onroad Construction Vehicles	9.083	2.877	0.000	3.326	0.211	54.809	0.856	9.659	0.000	0.000	9.712
1		Fugitive Dust												
1		Soil handling	Fugitive Emissions	40.118	6.075									
1		Asphalting	Fugitive Emissions											
2	Pier J Breakwater Construction													
2		Marine Activities												
		Pier J Breakwater Construction Tugboat propulsion engine	Marine Equipment	213.334	189.867	213.334	4172.564	3.464	3137.266	231.248	185.568	0.002	0.009	188.247
		Pier J Breakwater Construction Tugboat auxiliary engine	Marine Equipment	20.009	17.808	20.009	733.173	0.789	786.053	40.633	42.268	0.000	0.002	42.875
2		Pier J Breakwater Construction Crew boat propulsion engine	Marine Equipment	14.910	13.270	14.910	291.631	0.242	219.271	16.162	12.970	0.000	0.001	13.157
2		Pier J Breakwater Construction Crew boat auxiliary engine	Marine Equipment	0.636	0.566	0.636	23.317	0.025	24.999	1.292	1.344	0.000	0.000	1.364
		Pier J Breakwater Construction Survey boat propulsion engine	Marine Equipment	13.305	11.841	13.305	260.224	0.216	195.657	14.422	11.573	0.000	0.001	11.740
2		Off-Road Equipment												
2		Piling crane	Offroad Construction Equipment	1.295	1.295	1.295	25.893	0.418	144.427	12.724	20.519	0.000	0.000	20.519
2		Long arm excavator	Offroad Construction Equipment	2.138	2.138	2.138	42.750	0.697	149.866	17.327	34.235	0.000	0.000	34.235
2		On-Road Vehicles												
2		Delivery Trucks	Onroad Construction Vehicles	0.736	0.185	0.001	0.394	0.001	0.046	0.005	0.059	0.000	0.000	0.062
2		Delivery Trucks	Onroad Construction Vehicles	2.431	0.943	0.111	17.707	0.503	0.926	0.996	4.596	0.000	0.001	4.811
2		Workers	Onroad Construction Vehicles	8.583	2.719	0.000	3.143	0.199	51.794	0.809	9.128	0.000	0.000	9.178

Table H1.28
Alternative 4 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
3 Pier J Wharf Upgrade																	
3		Marine Activities															
3		Pier J Wharf Tugboat propulsion engine	Marine Equipment		onsite	175	6.116	5.443	6.116	113.871	0.068	61.155	6.311	3.617	0.000	0.000	3.670
3		Pier J Wharf Tugboat auxiliary engine	Marine Equipment		onsite	175	0.529	0.471	0.529	9.429	0.007	6.617	0.523	0.391	0.000	0.000	0.397
3		Pier J Wharf Crew boat propulsion engine	Marine Equipment		onsite	175	0.500	0.445	0.500	9.306	0.006	4.998	0.516	0.296	0.000	0.000	0.300
3		Pier J Wharf Crew boat auxiliary engine	Marine Equipment		onsite	175	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
3		Pier J Wharf Survey boat propulsion engine	Marine Equipment		onsite	175	0.250	0.222	0.250	4.653	0.003	2.499	0.258	0.148	0.000	0.000	0.150
3		Off-Road Equipment															
3		Const Barge - piling crane	Offroad Construction Equipment		onsite	170	0.209	0.192	0.209	5.002	0.008	2.675	0.467	0.380	0.000	0.000	0.380
3		Cong Barge - long arm excavator	Offroad Construction Equipment		onsite	170	0.075	0.069	0.075	2.188	0.013	2.775	0.321	0.634	0.000	0.000	0.634
3		Const barge - deck equipment	Offroad Construction Equipment		onsite	170	0.192	0.177	0.192	2.758	0.004	2.819	0.327	0.181	0.000	0.000	0.181
3		Sheet pile barge - deck equipment	Offroad Construction Equipment		onsite	170	0.192	0.177	0.192	2.758	0.004	2.819	0.327	0.181	0.000	0.000	0.181
3		On-Road Vehicles															
3		Workers	Onroad Construction Vehicles		offsite	175	0.144	0.046	0.000	0.053	0.003	0.868	0.014	0.153	0.000	0.000	0.154
4 Pier T Wharf Upgrade																	
4		Marine Activities															
4		Pier T Wharf Tugboat propulsion engine	Marine Equipment		onsite	320	6.116	5.443	6.116	113.871	0.068	61.155	6.311	3.617	0.000	0.000	3.670
4		Pier T Wharf Tugboat auxiliary engine	Marine Equipment		onsite	320	0.529	0.471	0.529	9.429	0.007	6.617	0.523	0.391	0.000	0.000	0.397
4		Pier T Wharf Crew boat propulsion engine	Marine Equipment		onsite	320	0.500	0.445	0.500	9.306	0.006	4.998	0.516	0.296	0.000	0.000	0.300
4		Pier T Wharf Crew boat auxiliary engine	Marine Equipment		onsite	320	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
4		Pier T Wharf Survey boat propulsion engine	Marine Equipment		onsite	320	0.250	0.222	0.250	4.653	0.003	2.499	0.258	0.148	0.000	0.000	0.150
4		Off-Road Equipment															
4		Const Barge - piling crane	Offroad Construction Equipment		onsite	310	0.209	0.192	0.209	5.002	0.008	2.675	0.467	0.380	0.000	0.000	0.380
4		Cong Barge - long arm excavator	Offroad Construction Equipment		onsite	310	0.075	0.069	0.075	2.188	0.013	2.775	0.321	0.634	0.000	0.000	0.634
4		Const barge - deck equipment	Offroad Construction Equipment		onsite	310	0.192	0.177	0.192	2.758	0.004	2.819	0.327	0.181	0.000	0.000	0.181
4		Sheet pile barge - deck equipment	Offroad Construction Equipment		onsite	310	0.192	0.177	0.192	2.758	0.004	2.819	0.327	0.181	0.000	0.000	0.181
4		On-Road Vehicles															
4		Workers	Onroad Construction Vehicles		offsite	320	0.144	0.046	0.000	0.053	0.003	0.868	0.014	0.153	0.000	0.000	0.154

Table H1.28
Alternative 4 Emissions by Task

				Unmitigated Emissions											
				Total											
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e	
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	
3	Pier J Wharf Upgrade														
3		Marine Activities													
3		Pier J Wharf Tugboat propulsion engine	Marine Equipment	1070.217	952.493	1070.217	19927.448	11.815	10702.174	1104.400	633.028	0.010	0.030	642.235	
3		Pier J Wharf Tugboat auxiliary engine	Marine Equipment	92.632	82.443	92.632	1650.016	1.278	1157.906	91.446	68.490	0.001	0.003	69.480	
3		Pier J Wharf Crew boat propulsion engine	Marine Equipment	87.459	77.838	87.459	1628.480	0.966	874.586	90.252	51.731	0.001	0.002	52.484	
3		Pier J Wharf Crew boat auxiliary engine	Marine Equipment	5.892	5.244	5.892	104.950	0.081	73.649	5.816	4.356	0.000	0.000	4.419	
3		Pier J Wharf Survey boat propulsion engine	Marine Equipment	43.729	38.919	43.729	814.240	0.483	437.293	45.126	25.866	0.000	0.001	26.242	
3		Off-Road Equipment													
3		Const Barge - piling crane	Offroad Construction Equipment	35.467	32.630	35.467	850.389	1.315	454.676	79.338	64.597	0.000	0.000	64.597	
3		Cong Barge - long arm excavator	Offroad Construction Equipment	12.784	11.761	12.784	371.901	2.195	471.801	54.548	107.776	0.000	0.000	107.776	
3		Const barge - deck equipment	Offroad Construction Equipment	32.705	30.088	32.705	468.878	0.625	479.240	55.642	30.730	0.000	0.000	30.730	
3		Sheet pile barge - deck equipment	Offroad Construction Equipment	32.705	30.088	32.705	468.878	0.625	479.240	55.642	30.730	0.000	0.000	30.730	
3		On-Road Vehicles													
3		Workers	Onroad Construction Vehicles	25.167	7.972	0.000	9.217	0.584	151.865	2.372	26.764	0.000	0.000	26.911	
4	Pier T Wharf Upgrade														
4		Marine Activities													
4		Pier T Wharf Tugboat propulsion engine	Marine Equipment	1956.969	1741.702	1956.969	36438.762	21.605	19569.690	2019.475	1157.536	0.017	0.055	1174.372	
4		Pier T Wharf Tugboat auxiliary engine	Marine Equipment	169.385	150.753	169.385	3017.173	2.338	2117.314	167.215	125.238	0.001	0.006	127.048	
4		Pier T Wharf Crew boat propulsion engine	Marine Equipment	159.924	142.333	159.924	2977.791	1.766	1599.243	165.032	94.594	0.001	0.004	95.970	
4		Pier T Wharf Crew boat auxiliary engine	Marine Equipment	10.774	9.589	10.774	191.909	0.149	134.673	10.636	7.966	0.000	0.000	8.081	
4		Pier T Wharf Survey boat propulsion engine	Marine Equipment	79.962	71.166	79.962	1488.896	0.883	799.622	82.516	47.297	0.001	0.002	47.985	
4		Off-Road Equipment													
4		Const Barge - piling crane	Offroad Construction Equipment	64.675	59.501	64.675	1550.709	2.397	829.115	144.674	117.794	0.000	0.000	117.794	
4		Cong Barge - long arm excavator	Offroad Construction Equipment	23.312	21.447	23.312	678.172	4.003	860.342	99.471	196.533	0.000	0.000	196.533	
4		Const barge - deck equipment	Offroad Construction Equipment	59.638	54.867	59.638	855.012	1.140	873.908	101.465	56.037	0.000	0.000	56.037	
4		Sheet pile barge - deck equipment	Offroad Construction Equipment	59.638	54.867	59.638	855.012	1.140	873.908	101.465	56.037	0.000	0.000	56.037	
4		On-Road Vehicles													
4		Workers	Onroad Construction Vehicles	46.019	14.578	0.000	16.854	1.067	277.697	4.337	48.939	0.001	0.001	49.208	

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
		Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID				(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
3	Pier J Wharf Upgrade													
3		Marine Activities												
3		Pier J Wharf Tugboat propulsion engine	Marine Equipment	4.159	3.701	4.159	81.337	0.068	61.155	4.508	3.617	0.000	0.000	3.670
3		Pier J Wharf Tugboat auxiliary engine	Marine Equipment	0.185	0.165	0.185	6.789	0.007	7.278	0.376	0.391	0.000	0.000	0.397
3		Pier J Wharf Crew boat propulsion engine	Marine Equipment	0.340	0.302	0.340	6.647	0.006	4.998	0.368	0.296	0.000	0.000	0.300
3		Pier J Wharf Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
3		Pier J Wharf Survey boat propulsion engine	Marine Equipment	0.170	0.151	0.170	3.323	0.003	2.499	0.184	0.148	0.000	0.000	0.150
3		Off-Road Equipment												
3		Const Barge - piling crane	Offroad Construction Equipment	0.024	0.024	0.024	0.479	0.008	2.675	0.236	0.380	0.000	0.000	0.380
3		Cong Barge - long arm excavator	Offroad Construction Equipment	0.040	0.040	0.040	0.792	0.013	2.775	0.321	0.634	0.000	0.000	0.634
3		Const barge - deck equipment	Offroad Construction Equipment	0.014	0.014	0.014	0.278	0.004	2.819	0.137	0.181	0.000	0.000	0.181
3		Sheet pile barge - deck equipment	Offroad Construction Equipment	0.014	0.014	0.014	0.278	0.004	2.819	0.137	0.181	0.000	0.000	0.181
3		On-Road Vehicles												
3		Workers	Onroad Construction Vehicles	0.144	0.046	0.000	0.053	0.003	0.868	0.014	0.153	0.000	0.000	0.154
4	Pier T Wharf Upgrade													
4		Marine Activities												
4		Pier T Wharf Tugboat propulsion engine	Marine Equipment	4.159	3.701	4.159	81.337	0.068	61.155	4.508	3.617	0.000	0.000	3.670
4		Pier T Wharf Tugboat auxiliary engine	Marine Equipment	0.185	0.165	0.185	6.789	0.007	7.278	0.376	0.391	0.000	0.000	0.397
4		Pier T Wharf Crew boat propulsion engine	Marine Equipment	0.340	0.302	0.340	6.647	0.006	4.998	0.368	0.296	0.000	0.000	0.300
4		Pier T Wharf Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
4		Pier T Wharf Survey boat propulsion engine	Marine Equipment	0.170	0.151	0.170	3.323	0.003	2.499	0.184	0.148	0.000	0.000	0.150
4		Off-Road Equipment												
4		Const Barge - piling crane	Offroad Construction Equipment	0.024	0.024	0.024	0.479	0.008	2.675	0.236	0.380	0.000	0.000	0.380
4		Cong Barge - long arm excavator	Offroad Construction Equipment	0.040	0.040	0.040	0.792	0.013	2.775	0.321	0.634	0.000	0.000	0.634
4		Const barge - deck equipment	Offroad Construction Equipment	0.014	0.014	0.014	0.278	0.004	2.819	0.137	0.181	0.000	0.000	0.181
4		Sheet pile barge - deck equipment	Offroad Construction Equipment	0.014	0.014	0.014	0.278	0.004	2.819	0.137	0.181	0.000	0.000	0.181
4		On-Road Vehicles												
4		Workers	Onroad Construction Vehicles	0.144	0.046	0.000	0.053	0.003	0.868	0.014	0.153	0.000	0.000	0.154

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
3		Pier J Wharf Upgrade												
3		Marine Activities												
3		Pier J Wharf Tugboat propulsion engine	Marine Equipment	727.748	647.696	727.748	14233.892	11.815	10702.174	788.857	633.028	0.007	0.030	642.167
3		Pier J Wharf Tugboat auxiliary engine	Marine Equipment	32.421	28.855	32.421	1188.012	1.278	1273.697	65.841	68.490	0.001	0.003	69.474
3		Pier J Wharf Crew boat propulsion engine	Marine Equipment	59.472	52.930	59.472	1163.200	0.966	874.586	64.466	51.731	0.001	0.002	52.478
3		Pier J Wharf Crew boat auxiliary engine	Marine Equipment	2.062	1.835	2.062	75.564	0.081	81.014	4.188	4.356	0.000	0.000	4.419
3		Pier J Wharf Survey boat propulsion engine	Marine Equipment	29.736	26.465	29.736	581.600	0.483	437.293	32.233	25.866	0.000	0.001	26.239
3		Off-Road Equipment												
3		Const Barge - piling crane	Offroad Construction Equipment	4.076	4.076	4.076	81.515	1.315	454.676	40.056	64.597	0.000	0.000	64.597
3		Cong Barge - long arm excavator	Offroad Construction Equipment	6.729	6.729	6.729	134.583	2.195	471.801	54.548	107.776	0.000	0.000	107.776
3		Const barge - deck equipment	Offroad Construction Equipment	2.361	2.361	2.361	47.222	0.625	479.240	23.205	30.730	0.000	0.000	30.730
3		Sheet pile barge - deck equipment	Offroad Construction Equipment	2.361	2.361	2.361	47.222	0.625	479.240	23.205	30.730	0.000	0.000	30.730
3		On-Road Vehicles												
3		Workers	Onroad Construction Vehicles	25.167	7.972	0.000	9.217	0.584	151.865	2.372	26.764	0.000	0.000	26.911
4		Pier T Wharf Upgrade												
4		Marine Activities												
4		Pier T Wharf Tugboat propulsion engine	Marine Equipment	1330.739	1184.358	1330.739	26027.687	21.605	19569.690	1442.482	1157.536	0.012	0.055	1174.248
4		Pier T Wharf Tugboat auxiliary engine	Marine Equipment	59.285	52.763	59.285	2172.364	2.338	2329.046	120.395	125.238	0.001	0.006	127.038
4		Pier T Wharf Crew boat propulsion engine	Marine Equipment	108.749	96.786	108.749	2126.994	1.766	1599.243	117.880	94.594	0.001	0.004	95.960
4		Pier T Wharf Crew boat auxiliary engine	Marine Equipment	3.771	3.356	3.771	138.175	0.149	148.140	7.658	7.966	0.000	0.000	8.080
4		Pier T Wharf Survey boat propulsion engine	Marine Equipment	54.374	48.393	54.374	1063.497	0.883	799.622	58.940	47.297	0.001	0.002	47.980
4		Off-Road Equipment												
4		Const Barge - piling crane	Offroad Construction Equipment	7.432	7.432	7.432	148.644	2.397	829.115	73.044	117.794	0.000	0.000	117.794
4		Cong Barge - long arm excavator	Offroad Construction Equipment	12.271	12.271	12.271	245.417	4.003	860.342	99.471	196.533	0.000	0.000	196.533
4		Const barge - deck equipment	Offroad Construction Equipment	4.306	4.306	4.306	86.111	1.140	873.908	42.315	56.037	0.000	0.000	56.037
4		Sheet pile barge - deck equipment	Offroad Construction Equipment	4.306	4.306	4.306	86.111	1.140	873.908	42.315	56.037	0.000	0.000	56.037
4		On-Road Vehicles												
4		Workers	Onroad Construction Vehicles	46.019	14.578	0.000	16.854	1.067	277.697	4.337	48.939	0.001	0.001	49.208

Table H1.28
Alternative 4 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
5		Approach Channel (hopper dredge 5,447,000 CY)															
5		Marine Hopper Dredge															
5		Hopper propulsion engine	Marine Equipment	dredging	onsite	399	26.632	23.703	26.632	495.890	0.294	266.321	27.483	15.753	0.000	0.001	15.982
5		Hopper propulsion engine	Marine Equipment	transit	offsite	399	50.305	44.772	50.305	936.682	0.555	503.052	51.912	29.755	0.000	0.001	30.188
5		Hopper auxiliary engine	Marine Equipment	disposal	offsite	399	0.222	0.198	0.222	5.060	0.004	3.699	0.280	0.219	0.000	0.000	0.222
5		Crew boat propulsion engine	Marine Equipment	support	onsite	399	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
5		Crew boat auxiliary engine	Marine Equipment	support	onsite	399	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
5		Survey boat propulsion engine	Marine Equipment	dredging	onsite	399	1.449	1.290	1.449	28.638	0.016	14.493	1.587	0.857	0.000	0.000	0.870
6		Main Channel Widening (clam shell dredge 1,065,000 CY)															
6		Marine Clamshell Dredge															
6		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	178	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
6		Clamshell Dredge generator	Marine Equipment	dredging	onsite	178	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
6		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	178	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
6		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	178	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
6		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	178	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
6		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	178	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
6		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	178	1.588	1.413	1.588	28.286	0.022	19.850	1.568	1.174	0.000	0.000	1.191
6		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	178	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
6		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	178	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
6		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	178	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217

Table H1.28
Alternative 4 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
5		Approach Channel (hopper dredge 5,447,000 CY)												
5		Marine Hopper Dredge												
5		Hopper propulsion engine	Marine Equipment	10626.223	9457.339	10626.223	197860.275	117.314	106262.232	10965.625	6285.351	0.094	0.299	6376.769
5		Hopper propulsion engine	Marine Equipment	20071.755	17863.862	20071.755	373736.076	221.592	200717.549	20712.847	11872.331	0.178	0.564	12045.007
5		Hopper auxiliary engine	Marine Equipment	88.552	78.811	88.552	2018.982	1.629	1475.864	111.894	87.297	0.001	0.004	88.558
5		Crew boat propulsion engine	Marine Equipment	162.017	144.195	162.017	3201.458	1.789	1620.171	177.428	95.832	0.002	0.005	97.228
5		Crew boat auxiliary engine	Marine Equipment	13.434	11.956	13.434	239.287	0.185	167.921	13.262	9.932	0.000	0.000	10.076
5		Survey boat propulsion engine	Marine Equipment	578.276	514.666	578.276	11426.742	6.384	5782.764	633.282	342.047	0.005	0.016	347.030
6		Main Channel Widening (clam shell dredge 1,065,000 CY)												
6		Marine Clamshell Dredge												
6		Clamshell Dredge hoist	Marine Equipment	776.984	776.984	776.984	23620.317	25.869	13467.725	1309.063	1029.797	0.000	0.000	1029.797
6		Clamshell Dredge generator	Marine Equipment	582.738	582.738	582.738	17715.238	19.402	10100.794	981.797	568.968	0.000	0.000	568.968
6		Clamshell Barge dump scow	Marine Equipment	8.241	8.241	8.241	156.574	0.274	142.840	8.678	5.631	0.000	0.000	5.631
6		Clamshell Tugboat propulsion engine	Marine Equipment	108.856	96.882	108.856	2026.906	1.202	1088.564	112.333	64.388	0.001	0.003	65.324
6		Clamshell Tugboat auxiliary engine	Marine Equipment	15.703	13.976	15.703	279.717	0.217	196.293	15.502	11.611	0.000	0.001	11.778
6		Clamshell Tugboat propulsion engine	Marine Equipment	1959.415	1743.880	1959.415	36484.311	21.632	19594.152	2021.999	1158.983	0.017	0.055	1175.840
6		Clamshell Tugboat auxiliary engine	Marine Equipment	282.661	251.569	282.661	5034.907	3.901	3533.268	279.040	208.991	0.002	0.010	212.012
6		Clamshell Crew boat propulsion engine	Marine Equipment	72.278	64.328	72.278	1428.219	0.798	722.783	79.153	42.752	0.001	0.002	43.375
6		Clamshell Crew boat auxiliary engine	Marine Equipment	5.993	5.334	5.993	106.750	0.083	74.912	5.916	4.431	0.000	0.000	4.495
6		Clamshell Survey boat propulsion engine	Marine Equipment	64.494	57.400	64.494	1274.411	0.712	644.945	70.629	38.148	0.001	0.002	38.704

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
5	Approach Channel (hopper dredge 5,447,000 CY)													
5		Marine Hopper Dredge												
5		Hopper propulsion engine	Marine Equipment	26.632	23.703	26.632	495.890	0.294	266.321	27.483	15.753	0.000	0.001	15.982
5		Hopper propulsion engine	Marine Equipment	50.305	44.772	50.305	936.682	0.555	503.052	51.912	29.755	0.000	0.001	30.188
5		Hopper auxiliary engine	Marine Equipment	0.222	0.198	0.222	5.060	0.004	3.699	0.280	0.219	0.000	0.000	0.222
5		Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
5		Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
5		Survey boat propulsion engine	Marine Equipment	0.986	0.877	0.986	19.276	0.016	14.493	1.068	0.857	0.000	0.000	0.870
6	Main Channel Widening (clam shell dredge 1,065,000 CY)													
6		Marine Clamshell Dredge												
6		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
6		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
6		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
6		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
6		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
6		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
6		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
6		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
6		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
6		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.										

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
5		Approach Channel (hopper dredge 5,447,000 CY)												
5		Marine Hopper Dredge												
5		Hopper propulsion engine	Marine Equipment	10626.223	9457.339	10626.223	197860.275	117.314	106262.232	10965.625	6285.351	0.094	0.299	6376.769
5		Hopper propulsion engine	Marine Equipment	20071.755	17863.862	20071.755	373736.076	221.592	200717.549	20712.847	11872.331	0.178	0.564	12045.007
5		Hopper auxiliary engine	Marine Equipment	88.552	78.811	88.552	2018.982	1.629	1475.864	111.894	87.297	0.001	0.004	88.552
5		Crew boat propulsion engine	Marine Equipment	110.172	98.053	110.172	2154.828	1.789	1620.171	119.423	95.832	0.001	0.005	97.216
5		Crew boat auxiliary engine	Marine Equipment	4.702	4.185	4.702	172.286	0.185	184.713	9.548	9.932	0.000	0.000	10.075
5		Survey boat propulsion engine	Marine Equipment	393.228	349.973	393.228	7691.077	6.384	5782.764	426.248	342.047	0.004	0.016	346.985
6		Main Channel Widening (clam shell dredge 1,065,000 CY)												
6		Marine Clamshell Dredge												
6		Clamshell Dredge hoist	Marine Equipment	77.698	77.698	77.698	2362.032	2.587	1346.772	130.906	102.980	0.000	0.000	102.980
6		Clamshell Dredge generator	Marine Equipment	58.274	58.274	58.274	1771.524	1.940	1010.079	98.180	56.897	0.000	0.000	56.897
6		Clamshell Barge dump scow	Marine Equipment	8.241	8.241	8.241	156.574	0.274	142.840	8.678	5.631	0.000	0.000	5.631
6		Clamshell Tugboat propulsion engine	Marine Equipment	74.022	65.880	74.022	1447.790	1.202	1088.564	80.238	64.388	0.001	0.003	65.318
6		Clamshell Tugboat auxiliary engine	Marine Equipment	5.496	4.892	5.496	201.396	0.217	215.922	11.162	11.611	0.000	0.001	11.778
6		Clamshell Tugboat propulsion engine	Marine Equipment	1332.402	1185.838	1332.402	26060.222	21.632	19594.152	1444.285	1158.983	0.012	0.055	1175.715
6		Clamshell Tugboat auxiliary engine	Marine Equipment	98.932	88.049	98.932	3625.133	3.901	3886.595	200.909	208.991	0.002	0.010	211.995
6		Clamshell Crew boat propulsion engine	Marine Equipment	49.149	43.743	49.149	961.301	0.798	722.783	53.276	42.752	0.000	0.002	43.369
6		Clamshell Crew boat auxiliary engine	Marine Equipment	2.098	1.867	2.098	76.860	0.083	82.403	4.260	4.431	0.000	0.000	4.495
6		Clamshell Survey boat propulsion engine	Marine Equipment	43.856	39.032	43.856	857.777	0.712	644.945	47.539	38.148	0.000	0.002	38.699
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.										

Table H1.28
Alternative 4 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
7	West Basin	(clam shell dredge 975,000 CY)															
7		Marine Clamshell Dredge															
7		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	163	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
7		Clamshell Dredge generator	Marine Equipment	dredging	onsite	163	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
7		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	163	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
7		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	163	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
7		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	163	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
7		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	163	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
7		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	163	1.588	1.413	1.588	28.286	0.022	19.850	1.568	1.174	0.000	0.000	1.191
7		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	163	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
7		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	163	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
7		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	163	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217
8	West Basin	(clam shell dredge 513,000 CY)															
8		Marine Clamshell Dredge															
8		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	86	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
8		Clamshell Dredge generator	Marine Equipment	dredging	onsite	86	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
8		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	86	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
8		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	86	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
8		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	86	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
8		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	86	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
8		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	86	1.588	1.413	1.588	28.286	0.022	19.850	1.568	1.174	0.000	0.000	1.191
8		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	86	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
8		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	86	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
8		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	86	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217

Table H1.28
Alternative 4 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
7	West Basin	(clam shell dredge 975,000 CY)												
7		Marine Clamshell Dredge												
7		Clamshell Dredge hoist	Marine Equipment	711.508	711.508	711.508	21629.841	23.689	12332.804	1198.749	943.016	0.000	0.000	943.016
7		Clamshell Dredge generator	Marine Equipment	533.631	533.631	533.631	16222.381	17.767	9249.603	899.061	521.021	0.000	0.000	521.021
7		Clamshell Barge dump scow	Marine Equipment	7.546	7.546	7.546	143.380	0.251	130.802	7.946	5.156	0.000	0.000	5.156
7		Clamshell Tugboat propulsion engine	Marine Equipment	99.683	88.718	99.683	1856.099	1.101	996.831	102.867	58.962	0.001	0.003	59.820
7		Clamshell Tugboat auxiliary engine	Marine Equipment	14.380	12.798	14.380	256.145	0.198	179.751	14.196	10.632	0.000	0.001	10.786
7		Clamshell Tugboat propulsion engine	Marine Equipment	1794.296	1596.923	1794.296	33409.790	19.809	17942.959	1851.606	1061.316	0.016	0.050	1076.752
7		Clamshell Tugboat auxiliary engine	Marine Equipment	258.842	230.369	258.842	4610.617	3.572	3235.521	255.525	191.379	0.002	0.009	194.146
7		Clamshell Crew boat propulsion engine	Marine Equipment	66.187	58.907	66.187	1307.864	0.731	661.874	72.483	39.149	0.001	0.002	39.720
7		Clamshell Crew boat auxiliary engine	Marine Equipment	5.488	4.884	5.488	97.754	0.076	68.599	5.418	4.058	0.000	0.000	4.116
7		Clamshell Survey boat propulsion engine	Marine Equipment	59.060	52.563	59.060	1167.017	0.652	590.596	64.677	34.933	0.001	0.002	35.442
8	West Basin	(clam shell dredge 513,000 CY)												
8		Marine Clamshell Dredge												
8		Clamshell Dredge hoist	Marine Equipment	375.397	375.397	375.397	11412.063	12.499	6506.878	632.469	497.542	0.000	0.000	497.542
8		Clamshell Dredge generator	Marine Equipment	281.548	281.548	281.548	8559.048	9.374	4880.159	474.351	274.894	0.000	0.000	274.894
8		Clamshell Barge dump scow	Marine Equipment	3.981	3.981	3.981	75.648	0.133	69.012	4.193	2.720	0.000	0.000	2.720
8		Clamshell Tugboat propulsion engine	Marine Equipment	52.594	46.808	52.594	979.292	0.581	525.935	54.273	31.109	0.000	0.001	31.561
8		Clamshell Tugboat auxiliary engine	Marine Equipment	7.587	6.752	7.587	135.144	0.105	94.838	7.490	5.610	0.000	0.000	5.691
8		Clamshell Tugboat propulsion engine	Marine Equipment	946.684	842.549	946.684	17627.251	10.451	9466.837	976.921	559.958	0.008	0.027	568.102
8		Clamshell Tugboat auxiliary engine	Marine Equipment	136.567	121.544	136.567	2432.595	1.885	1707.085	134.817	100.973	0.001	0.005	102.433
8		Clamshell Crew boat propulsion engine	Marine Equipment	34.921	31.080	34.921	690.039	0.386	349.210	38.243	20.656	0.000	0.001	20.956
8		Clamshell Crew boat auxiliary engine	Marine Equipment	2.895	2.577	2.895	51.576	0.040	36.193	2.858	2.141	0.000	0.000	2.172
8		Clamshell Survey boat propulsion engine	Marine Equipment	31.160	27.733	31.160	615.727	0.344	311.603	34.124	18.431	0.000	0.001	18.700

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
				(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
7	West Basin	(clam shell dredge 975,000 CY)												
7		Marine Clamshell Dredge												
7		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
7		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
7		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
7		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
7		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
7		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
7		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
7		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
7		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
7		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
8	West Basin	(clam shell dredge 513,000 CY)												
8		Marine Clamshell Dredge												
8		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
8		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
8		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
8		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
8		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
8		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
8		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
8		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
8		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
8		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.														

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
7	West Basin	(clam shell dredge 975,000 CY)												
7		Marine Clamshell Dredge												
7		Clamshell Dredge hoist	Marine Equipment	71.151	71.151	71.151	2162.984	2.369	1233.280	119.875	94.302	0.000	0.000	94.302
7		Clamshell Dredge generator	Marine Equipment	53.363	53.363	53.363	1622.238	1.777	924.960	89.906	52.102	0.000	0.000	52.102
7		Clamshell Barge dump scow	Marine Equipment	7.546	7.546	7.546	143.380	0.251	130.802	7.946	5.156	0.000	0.000	5.156
7		Clamshell Tugboat propulsion engine	Marine Equipment	67.785	60.328	67.785	1325.785	1.101	996.831	73.476	58.962	0.001	0.003	59.813
7		Clamshell Tugboat auxiliary engine	Marine Equipment	5.033	4.479	5.033	184.425	0.198	197.726	10.221	10.632	0.000	0.001	10.785
7		Clamshell Tugboat propulsion engine	Marine Equipment	1220.121	1085.908	1220.121	23864.136	19.809	17942.959	1322.576	1061.316	0.011	0.050	1076.638
7		Clamshell Tugboat auxiliary engine	Marine Equipment	90.595	80.629	90.595	3319.644	3.572	3559.073	183.978	191.379	0.002	0.009	194.130
7		Clamshell Crew boat propulsion engine	Marine Equipment	45.007	40.057	45.007	880.293	0.731	661.874	48.787	39.149	0.000	0.002	39.715
7		Clamshell Crew boat auxiliary engine	Marine Equipment	1.921	1.709	1.921	70.383	0.076	75.459	3.901	4.058	0.000	0.000	4.116
7		Clamshell Survey boat propulsion engine	Marine Equipment	40.161	35.743	40.161	785.492	0.652	590.596	43.533	34.933	0.000	0.002	35.438
8	West Basin	(clam shell dredge 513,000 CY)												
8		Marine Clamshell Dredge												
8		Clamshell Dredge hoist	Marine Equipment	37.540	37.540	37.540	1141.206	1.250	650.688	63.247	49.754	0.000	0.000	49.754
8		Clamshell Dredge generator	Marine Equipment	28.155	28.155	28.155	855.905	0.937	488.016	47.435	27.489	0.000	0.000	27.489
8		Clamshell Barge dump scow	Marine Equipment	3.981	3.981	3.981	75.648	0.133	69.012	4.193	2.720	0.000	0.000	2.720
8		Clamshell Tugboat propulsion engine	Marine Equipment	35.764	31.830	35.764	699.494	0.581	525.935	38.767	31.109	0.000	0.001	31.558
8		Clamshell Tugboat auxiliary engine	Marine Equipment	2.655	2.363	2.655	97.304	0.105	104.322	5.393	5.610	0.000	0.000	5.690
8		Clamshell Tugboat propulsion engine	Marine Equipment	643.745	572.933	643.745	12590.894	10.451	9466.837	697.801	559.958	0.006	0.027	568.042
8		Clamshell Tugboat auxiliary engine	Marine Equipment	47.798	42.541	47.798	1751.469	1.885	1877.793	97.068	100.973	0.001	0.005	102.425
8		Clamshell Crew boat propulsion engine	Marine Equipment	23.746	21.134	23.746	464.449	0.386	349.210	25.740	20.656	0.000	0.001	20.954
8		Clamshell Crew boat auxiliary engine	Marine Equipment	1.013	0.902	1.013	37.134	0.040	39.813	2.058	2.141	0.000	0.000	2.172
8		Clamshell Survey boat propulsion engine	Marine Equipment	21.189	18.858	21.189	414.431	0.344	311.603	22.968	18.431	0.000	0.001	18.697
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.										

Table H1.28
Alternative 4 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
9		Pier T Berths (clam shell dredge Berths T132 to T140, 44,000 CY)															
9		Marine Clamshell Dredge															
9		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	7	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
9		Clamshell Dredge generator	Marine Equipment	dredging	onsite	7	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
9		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	7	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
9		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	7	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
9		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	7	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
9		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	7	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
9		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	7	1.588	1.413	1.588	28.286	0.022	19.850	1.568	1.174	0.000	0.000	1.191
9		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	7	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
9		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	7	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
9		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	7	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217
10		Pier J Basin (clam shell dredge 408,000 CY)															
10		Marine Clamshell Dredge															
10		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	68	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
10		Clamshell Dredge generator	Marine Equipment	dredging	onsite	68	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
10		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	68	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
10		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	68	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
10		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	68	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
10		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	68	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
10		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	68	1.588	1.413	1.588	28.286	0.022	19.850	1.568	1.174	0.000	0.000	1.191
10		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	68	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
10		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	68	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
10		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	68	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217

Table H1.28
Alternative 4 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
9	Pier T Berths (clam shell dredge Berths T132 to T140, 44,000 CY)													
9		Marine Clamshell Dredge												
9		Clamshell Dredge hoist	Marine Equipment	30.556	30.556	30.556	928.889	1.017	529.630	51.480	40.498	0.000	0.000	40.498
9		Clamshell Dredge generator	Marine Equipment	22.917	22.917	22.917	696.667	0.763	397.222	38.610	22.375	0.000	0.000	22.375
9		Clamshell Barge dump scow	Marine Equipment	0.324	0.324	0.324	6.157	0.011	5.617	0.341	0.221	0.000	0.000	0.221
9		Clamshell Tugboat propulsion engine	Marine Equipment	4.281	3.810	4.281	79.710	0.047	42.809	4.418	2.532	0.000	0.000	2.569
9		Clamshell Tugboat auxiliary engine	Marine Equipment	0.618	0.550	0.618	11.000	0.009	7.719	0.610	0.457	0.000	0.000	0.463
9		Clamshell Tugboat propulsion engine	Marine Equipment	77.056	68.580	77.056	1434.776	0.851	770.557	79.517	45.578	0.001	0.002	46.241
9		Clamshell Tugboat auxiliary engine	Marine Equipment	11.116	9.893	11.116	198.002	0.153	138.949	10.973	8.219	0.000	0.000	8.338
9		Clamshell Crew boat propulsion engine	Marine Equipment	2.842	2.530	2.842	56.166	0.031	28.424	3.113	1.681	0.000	0.000	1.706
9		Clamshell Crew boat auxiliary engine	Marine Equipment	0.236	0.210	0.236	4.198	0.003	2.946	0.233	0.174	0.000	0.000	0.177
9		Clamshell Survey boat propulsion engine	Marine Equipment	2.536	2.257	2.536	50.117	0.028	25.363	2.778	1.500	0.000	0.000	1.522
10	Pier J Basin (clam shell dredge 408,000 CY)													
10		Marine Clamshell Dredge												
10		Clamshell Dredge hoist	Marine Equipment	296.825	296.825	296.825	9023.492	9.883	5144.974	500.091	393.406	0.000	0.000	393.406
10		Clamshell Dredge generator	Marine Equipment	222.619	222.619	222.619	6767.619	7.412	3858.730	375.069	217.358	0.000	0.000	217.358
10		Clamshell Barge dump scow	Marine Equipment	3.148	3.148	3.148	59.815	0.105	54.568	3.315	2.151	0.000	0.000	2.151
10		Clamshell Tugboat propulsion engine	Marine Equipment	41.586	37.011	41.586	774.324	0.459	415.856	42.914	24.598	0.000	0.001	24.955
10		Clamshell Tugboat auxiliary engine	Marine Equipment	5.999	5.339	5.999	106.858	0.083	74.988	5.922	4.436	0.000	0.000	4.500
10		Clamshell Tugboat propulsion engine	Marine Equipment	748.541	666.201	748.541	13937.827	8.264	7485.406	772.449	442.758	0.007	0.021	449.197
10		Clamshell Tugboat auxiliary engine	Marine Equipment	107.983	96.105	107.983	1923.448	1.490	1349.788	106.599	79.839	0.001	0.004	80.993
10		Clamshell Crew boat propulsion engine	Marine Equipment	27.612	24.575	27.612	545.612	0.305	276.119	30.238	16.332	0.000	0.001	16.570
10		Clamshell Crew boat auxiliary engine	Marine Equipment	2.289	2.038	2.289	40.781	0.032	28.618	2.260	1.693	0.000	0.000	1.717
10		Clamshell Survey boat propulsion engine	Marine Equipment	24.638	21.928	24.638	486.854	0.272	246.383	26.982	14.573	0.000	0.001	14.786

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
				(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
9		Pier T Berths (clam shell dredge Berths T132 to T140, 44,000 CY)												
9		Marine Clamshell Dredge												
9		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
9		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
9		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
9		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
9		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
9		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
9		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
9		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
9		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
9		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
10		Pier J Basin (clam shell dredge 408,000 CY)												
10		Marine Clamshell Dredge												
10		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
10		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
10		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
10		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
10		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
10		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
10		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
10		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
10		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
10		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.										

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions											
				Total											
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e	
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	
9		Pier T Berths (clam shell dredge Berths T132 to T140, 44,000 CY)													
9		Marine Clamshell Dredge													
9		Clamshell Dredge hoist	Marine Equipment	3.056	3.056	3.056	92.889	0.102	52.963	5.148	4.050	0.000	0.000	4.050	
9		Clamshell Dredge generator	Marine Equipment	2.292	2.292	2.292	69.667	0.076	39.722	3.861	2.238	0.000	0.000	2.238	
9		Clamshell Barge dump scow	Marine Equipment	0.324	0.324	0.324	6.157	0.011	5.617	0.341	0.221	0.000	0.000	0.221	
9		Clamshell Tugboat propulsion engine	Marine Equipment	2.911	2.591	2.911	56.936	0.047	42.809	3.155	2.532	0.000	0.000	2.569	
9		Clamshell Tugboat auxiliary engine	Marine Equipment	0.216	0.192	0.216	7.920	0.009	8.491	0.439	0.457	0.000	0.000	0.463	
9		Clamshell Tugboat propulsion engine	Marine Equipment	52.398	46.634	52.398	1024.840	0.851	770.557	56.798	45.578	0.000	0.002	46.236	
9		Clamshell Tugboat auxiliary engine	Marine Equipment	3.891	3.463	3.891	142.561	0.153	152.844	7.901	8.219	0.000	0.000	8.337	
9		Clamshell Crew boat propulsion engine	Marine Equipment	1.933	1.720	1.933	37.804	0.031	28.424	2.095	1.681	0.000	0.000	1.706	
9		Clamshell Crew boat auxiliary engine	Marine Equipment	0.082	0.073	0.082	3.023	0.003	3.241	0.168	0.174	0.000	0.000	0.177	
9		Clamshell Survey boat propulsion engine	Marine Equipment	1.725	1.535	1.725	33.733	0.028	25.363	1.870	1.500	0.000	0.000	1.522	
10		Pier J Basin (clam shell dredge 408,000 CY)													
10		Marine Clamshell Dredge													
10		Clamshell Dredge hoist	Marine Equipment	29.683	29.683	29.683	902.349	0.988	514.497	50.009	39.341	0.000	0.000	39.341	
10		Clamshell Dredge generator	Marine Equipment	22.262	22.262	22.262	676.762	0.741	385.873	37.507	21.736	0.000	0.000	21.736	
10		Clamshell Barge dump scow	Marine Equipment	3.148	3.148	3.148	59.815	0.105	54.568	3.315	2.151	0.000	0.000	2.151	
10		Clamshell Tugboat propulsion engine	Marine Equipment	28.278	25.168	28.278	553.088	0.459	415.856	30.653	24.598	0.000	0.001	24.953	
10		Clamshell Tugboat auxiliary engine	Marine Equipment	2.100	1.869	2.100	76.938	0.083	82.487	4.264	4.436	0.000	0.000	4.499	
10		Clamshell Tugboat propulsion engine	Marine Equipment	509.008	453.017	509.008	9955.590	8.264	7485.406	551.749	442.758	0.005	0.021	449.150	
10		Clamshell Tugboat auxiliary engine	Marine Equipment	37.794	33.637	37.794	1384.882	1.490	1484.767	76.752	79.839	0.001	0.004	80.987	
10		Clamshell Crew boat propulsion engine	Marine Equipment	18.776	16.711	18.776	367.239	0.305	276.119	20.353	16.332	0.000	0.001	16.568	
10		Clamshell Crew boat auxiliary engine	Marine Equipment	0.801	0.713	0.801	29.362	0.032	31.480	1.627	1.693	0.000	0.000	1.717	
		Clamshell Survey boat propulsion engine	Marine Equipment												
10				16.754	14.911	16.754	327.690	0.272	246.383	18.161	14.573	0.000	0.001	14.784	
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.											

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							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
11 Pier J Approach (clam shell dredge 1,066,000 CY)																	
11		Marine Clamshell Dredge															
11		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	178	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
11		Clamshell Dredge generator	Marine Equipment	dredging	onsite	178	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
11		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	178	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
11		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	178	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
11		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	178	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
11		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	178	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
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11		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	178	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217
12 Pier J Approach (clam shell dredge 2,040,000 CY)																	
12		Marine Clamshell Dredge															
12		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	340	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
12		Clamshell Dredge generator	Marine Equipment	dredging	onsite	340	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
12		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	340	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
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				Total										
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Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
11	Pier J Approach (clam shell dredge 1,066,000 CY)													
11		Marine Clamshell Dredge												
11		Clamshell Dredge hoist	Marine Equipment	776.984	776.984	776.984	23620.317	25.869	13467.725	1309.063	1029.797	0.000	0.000	1029.797
11		Clamshell Dredge generator	Marine Equipment	582.738	582.738	582.738	17715.238	19.402	10100.794	981.797	568.968	0.000	0.000	568.968
11		Clamshell Barge dump scow	Marine Equipment	8.241	8.241	8.241	156.574	0.274	142.840	8.678	5.631	0.000	0.000	5.631
11		Clamshell Tugboat propulsion engine	Marine Equipment	108.856	96.882	108.856	2026.906	1.202	1088.564	112.333	64.388	0.001	0.003	65.324
11		Clamshell Tugboat auxiliary engine	Marine Equipment	15.703	13.976	15.703	279.717	0.217	196.293	15.502	11.611	0.000	0.001	11.778
11		Clamshell Tugboat propulsion engine	Marine Equipment	1959.415	1743.880	1959.415	36484.311	21.632	19594.152	2021.999	1158.983	0.017	0.055	1175.840
11		Clamshell Tugboat auxiliary engine	Marine Equipment	282.661	251.569	282.661	5034.907	3.901	3533.268	279.040	208.991	0.002	0.010	212.012
11		Clamshell Crew boat propulsion engine	Marine Equipment	72.278	64.328	72.278	1428.219	0.798	722.783	79.153	42.752	0.001	0.002	43.375
11		Clamshell Crew boat auxiliary engine	Marine Equipment	5.993	5.334	5.993	106.750	0.083	74.912	5.916	4.431	0.000	0.000	4.495
11		Clamshell Survey boat propulsion engine	Marine Equipment	64.494	57.400	64.494	1274.411	0.712	644.945	70.629	38.148	0.001	0.002	38.704
12	Pier J Approach (clam shell dredge 2,040,000 CY)													
12		Marine Clamshell Dredge												
12		Clamshell Dredge hoist	Marine Equipment	1484.127	1484.127	1484.127	45117.460	49.413	25724.868	2500.457	1967.028	0.000	0.000	1967.028
12		Clamshell Dredge generator	Marine Equipment	1113.095	1113.095	1113.095	33838.095	37.060	19293.651	1875.343	1086.792	0.000	0.000	1086.792
12		Clamshell Barge dump scow	Marine Equipment	15.741	15.741	15.741	299.074	0.524	272.840	16.575	10.755	0.000	0.000	10.755
12		Clamshell Tugboat propulsion engine	Marine Equipment	207.928	185.056	207.928	3871.618	2.296	2079.280	214.569	122.988	0.002	0.006	124.777
12		Clamshell Tugboat auxiliary engine	Marine Equipment	29.995	26.696	29.995	534.291	0.414	374.941	29.611	22.178	0.000	0.001	22.498
12		Clamshell Tugboat propulsion engine	Marine Equipment	3742.703	3331.006	3742.703	69689.133	41.319	37427.032	3862.245	2213.788	0.033	0.105	2245.986
12		Clamshell Tugboat auxiliary engine	Marine Equipment	539.915	480.524	539.915	9617.238	7.451	6748.939	532.997	399.196	0.005	0.019	404.967
12		Clamshell Crew boat propulsion engine	Marine Equipment	138.060	122.873	138.060	2728.059	1.524	1380.597	151.192	81.662	0.001	0.004	82.851
12		Clamshell Crew boat auxiliary engine	Marine Equipment	11.447	10.188	11.447	203.904	0.158	143.090	11.301	8.464	0.000	0.000	8.586
12		Clamshell Survey boat propulsion engine	Marine Equipment	123.192	109.641	123.192	2434.268	1.360	1231.917	134.910	72.867	0.001	0.003	73.929

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
		Construction Element/Equipment	Source Type 1	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID				(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
11	Pier J Approach (clam shell dredge 1,066,000 CY)													
11		Marine Clamshell Dredge												
11		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
11		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
11		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
11		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
11		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
11		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
11		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
11		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
11		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
11		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
12	Pier J Approach (clam shell dredge 2,040,000 CY)													
12		Marine Clamshell Dredge												
12		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
12		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
12		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
12		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
12		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
12		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
12		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
12		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
12		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
12		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.										

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
11	Pier J Approach (clam shell dredge 1,066,000 CY)													
11		Marine Clamshell Dredge												
11		Clamshell Dredge hoist	Marine Equipment	77.698	77.698	77.698	2362.032	2.587	1346.772	130.906	102.980	0.000	0.000	102.980
11		Clamshell Dredge generator	Marine Equipment	58.274	58.274	58.274	1771.524	1.940	1010.079	98.180	56.897	0.000	0.000	56.897
11		Clamshell Barge dump scow	Marine Equipment	8.241	8.241	8.241	156.574	0.274	142.840	8.678	5.631	0.000	0.000	5.631
11		Clamshell Tugboat propulsion engine	Marine Equipment	74.022	65.880	74.022	1447.790	1.202	1088.564	80.238	64.388	0.001	0.003	65.318
11		Clamshell Tugboat auxiliary engine	Marine Equipment	5.496	4.892	5.496	201.396	0.217	215.922	11.162	11.611	0.000	0.001	11.778
11		Clamshell Tugboat propulsion engine	Marine Equipment	1332.402	1185.838	1332.402	26060.222	21.632	19594.152	1444.285	1158.983	0.012	0.055	1175.715
11		Clamshell Tugboat auxiliary engine	Marine Equipment	98.932	88.049	98.932	3625.133	3.901	3886.595	200.909	208.991	0.002	0.010	211.995
11		Clamshell Crew boat propulsion engine	Marine Equipment	49.149	43.743	49.149	961.301	0.798	722.783	53.276	42.752	0.000	0.002	43.369
11		Clamshell Crew boat auxiliary engine	Marine Equipment	2.098	1.867	2.098	76.860	0.083	82.403	4.260	4.431	0.000	0.000	4.495
11		Clamshell Survey boat propulsion engine	Marine Equipment	43.856	39.032	43.856	857.777	0.712	644.945	47.539	38.148	0.000	0.002	38.699
12	Pier J Approach (clam shell dredge 2,040,000 CY)													
12		Marine Clamshell Dredge												
12		Clamshell Dredge hoist	Marine Equipment	148.413	148.413	148.413	4511.746	4.941	2572.487	250.046	196.703	0.000	0.000	196.703
12		Clamshell Dredge generator	Marine Equipment	111.310	111.310	111.310	3383.810	3.706	1929.365	187.534	108.679	0.000	0.000	108.679
12		Clamshell Barge dump scow	Marine Equipment	15.741	15.741	15.741	299.074	0.524	272.840	16.575	10.755	0.000	0.000	10.755
12		Clamshell Tugboat propulsion engine	Marine Equipment	141.391	125.838	141.391	2765.442	2.296	2079.280	153.264	122.988	0.001	0.006	124.764
12		Clamshell Tugboat auxiliary engine	Marine Equipment	10.498	9.344	10.498	384.690	0.414	412.435	21.320	22.178	0.000	0.001	22.496
12		Clamshell Tugboat propulsion engine	Marine Equipment	2545.038	2265.084	2545.038	49777.952	41.319	37427.032	2758.747	2213.788	0.024	0.105	2245.749
12		Clamshell Tugboat auxiliary engine	Marine Equipment	188.970	168.184	188.970	6924.411	7.451	7423.833	383.758	399.196	0.003	0.019	404.935
12		Clamshell Crew boat propulsion engine	Marine Equipment	93.881	83.554	93.881	1836.194	1.524	1380.597	101.764	81.662	0.001	0.004	82.840
12		Clamshell Crew boat auxiliary engine	Marine Equipment	4.007	3.566	4.007	146.811	0.158	157.399	8.136	8.464	0.000	0.000	8.585
12		Clamshell Survey boat propulsion engine	Marine Equipment	83.770	74.556	83.770	1638.450	1.360	1231.917	90.805	72.867	0.001	0.003	73.919
				Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.										

Table H1.28
Alternative 4 Emissions by Task

							Unmitigated Emissions										
							Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
13		Pier J Approach (clam shell dredge 297,000 CY)															
13		Marine Clamshell Dredge															
13		Clamshell Dredge hoist	Marine Equipment	dredging	onsite	50	4.365	4.365	4.365	132.698	0.145	75.661	7.354	5.785	0.000	0.000	5.785
13		Clamshell Dredge generator	Marine Equipment	dredging	onsite	50	3.274	3.274	3.274	99.524	0.109	56.746	5.516	3.196	0.000	0.000	3.196
13		Clamshell Barge dump scow	Marine Equipment	disposal	offsite	50	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
13		Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	50	0.612	0.544	0.612	11.387	0.007	6.116	0.631	0.362	0.000	0.000	0.367
13		Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	50	0.088	0.079	0.088	1.571	0.001	1.103	0.087	0.065	0.000	0.000	0.066
13		Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	50	11.008	9.797	11.008	204.968	0.122	110.080	11.360	6.511	0.000	0.000	6.606
13		Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	50	1.588	1.413	1.588	28.286	0.022	19.850	1.568	1.174	0.000	0.000	1.191
13		Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	50	0.406	0.361	0.406	8.024	0.004	4.061	0.445	0.240	0.000	0.000	0.244
13		Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	50	0.034	0.030	0.034	0.600	0.000	0.421	0.033	0.025	0.000	0.000	0.025
13		Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	50	0.362	0.322	0.362	7.160	0.004	3.623	0.397	0.214	0.000	0.000	0.217

Table H1.28
Alternative 4 Emissions by Task

				Unmitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
13		Pier J Approach (clam shell dredge 297,000 CY)												
13		Marine Clamshell Dredge												
13		Clamshell Dredge hoist	Marine Equipment	218.254	218.254	218.254	6634.921	7.267	3783.069	367.714	289.269	0.000	0.000	289.269
13		Clamshell Dredge generator	Marine Equipment	163.690	163.690	163.690	4976.190	5.450	2837.302	275.786	159.822	0.000	0.000	159.822
13		Clamshell Barge dump scow	Marine Equipment	2.315	2.315	2.315	43.981	0.077	40.123	2.438	1.582	0.000	0.000	1.582
13		Clamshell Tugboat propulsion engine	Marine Equipment	30.578	27.214	30.578	569.356	0.338	305.776	31.554	18.087	0.000	0.001	18.350
13		Clamshell Tugboat auxiliary engine	Marine Equipment	4.411	3.926	4.411	78.572	0.061	55.138	4.355	3.261	0.000	0.000	3.309
13		Clamshell Tugboat propulsion engine	Marine Equipment	550.398	489.854	550.398	10248.402	6.076	5503.975	567.977	325.557	0.005	0.015	330.292
13		Clamshell Tugboat auxiliary engine	Marine Equipment	79.399	70.665	79.399	1414.300	1.096	992.491	78.382	58.705	0.001	0.003	59.554
13		Clamshell Crew boat propulsion engine	Marine Equipment	20.303	18.070	20.303	401.185	0.224	203.029	22.234	12.009	0.000	0.001	12.184
13		Clamshell Crew boat auxiliary engine	Marine Equipment	1.683	1.498	1.683	29.986	0.023	21.043	1.662	1.245	0.000	0.000	1.263
13		Clamshell Survey boat propulsion engine	Marine Equipment	18.116	16.124	18.116	357.981	0.200	181.164	19.840	10.716	0.000	0.001	10.872

Table H1.28
Alternative 4 Emissions by Task

				Mitigated										
				Peak Day										
Task ID		Construction Element/Equipment	Source Type 1	PM10 (lb/day)	PM2.5 (lb/day)	DPM (lb/day)	NOX (lb/day)	SOX (lb/day)	CO (lb/day)	VOC (lb/day)	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
13		Pier J Approach (clam shell dredge 297,000 CY)												
13		Marine Clamshell Dredge												
13		Clamshell Dredge hoist	Marine Equipment	0.437	0.437	0.437	13.270	0.015	7.566	0.735	0.579	0.000	0.000	0.579
13		Clamshell Dredge generator	Marine Equipment	0.327	0.327	0.327	9.952	0.011	5.675	0.552	0.320	0.000	0.000	0.320
13		Clamshell Barge dump scow	Marine Equipment	0.046	0.046	0.046	0.880	0.002	0.802	0.049	0.032	0.000	0.000	0.032
13		Clamshell Tugboat propulsion engine	Marine Equipment	0.416	0.370	0.416	8.134	0.007	6.116	0.451	0.362	0.000	0.000	0.367
13		Clamshell Tugboat auxiliary engine	Marine Equipment	0.031	0.027	0.031	1.131	0.001	1.213	0.063	0.065	0.000	0.000	0.066
13		Clamshell Tugboat propulsion engine	Marine Equipment	7.485	6.662	7.485	146.406	0.122	110.080	8.114	6.511	0.000	0.000	6.605
13		Clamshell Tugboat auxiliary engine	Marine Equipment	0.556	0.495	0.556	20.366	0.022	21.835	1.129	1.174	0.000	0.000	1.191
13		Clamshell Crew boat propulsion engine	Marine Equipment	0.276	0.246	0.276	5.401	0.004	4.061	0.299	0.240	0.000	0.000	0.244
13		Clamshell Crew boat auxiliary engine	Marine Equipment	0.012	0.010	0.012	0.432	0.000	0.463	0.024	0.025	0.000	0.000	0.025
13		Clamshell Survey boat propulsion engine	Marine Equipment	0.246	0.219	0.246	4.819	0.004	3.623	0.267	0.214	0.000	0.000	0.217

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.28
Alternative 4 Emissions by Task

				Mitigated Emissions										
				Total										
				PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	Source Type 1	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
13		Pier J Approach (clam shell dredge 297,000 CY)												
13		Marine Clamshell Dredge												
13		Clamshell Dredge hoist	Marine Equipment	21.825	21.825	21.825	663.492	0.727	378.307	36.771	28.927	0.000	0.000	28.927
13		Clamshell Dredge generator	Marine Equipment	16.369	16.369	16.369	497.619	0.545	283.730	27.579	15.982	0.000	0.000	15.982
13		Clamshell Barge dump scow	Marine Equipment	2.315	2.315	2.315	43.981	0.077	40.123	2.438	1.582	0.000	0.000	1.582
13		Clamshell Tugboat propulsion engine	Marine Equipment	20.793	18.506	20.793	406.683	0.338	305.776	22.539	18.087	0.000	0.001	18.348
13		Clamshell Tugboat auxiliary engine	Marine Equipment	1.544	1.374	1.544	56.572	0.061	60.652	3.135	3.261	0.000	0.000	3.308
13		Clamshell Tugboat propulsion engine	Marine Equipment	374.270	333.101	374.270	7320.287	6.076	5503.975	405.698	325.557	0.003	0.015	330.257
13		Clamshell Tugboat auxiliary engine	Marine Equipment	27.790	24.733	27.790	1018.296	1.096	1091.740	56.435	58.705	0.000	0.003	59.549
13		Clamshell Crew boat propulsion engine	Marine Equipment	13.806	12.287	13.806	270.029	0.224	203.029	14.965	12.009	0.000	0.001	12.182
13		Clamshell Crew boat auxiliary engine	Marine Equipment	0.589	0.524	0.589	21.590	0.023	23.147	1.197	1.245	0.000	0.000	1.263
13		Clamshell Survey boat propulsion engine	Marine Equipment	12.319	10.964	12.319	240.949	0.200	181.164	13.354	10.716	0.000	0.001	10.870

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.29
Alternative 5 Emissions by Task

						Unmitigated Emissions										
						Peak Day										
						PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
Task ID	Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)				
1	Electrical Substation Construction at Pier J (mitigation only)															
1	Off-Road Equipment															
1	Caterpillar 320 excavator	Offroad Construction Equipment		onsite	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Small asphalt roller	Offroad Construction Equipment		onsite	26	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Water truck	Offroad Construction Equipment		onsite	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Forklift	Offroad Construction Equipment		onsite	22	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Mobile crane (35 ton)	Offroad Construction Equipment		onsite	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	On-Road Vehicles															
1	Haul trucks	Onroad Construction Vehicles		onsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles		onsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Haul trucks	Onroad Construction Vehicles		offsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Supply trucks	Onroad Construction Vehicles		offsite	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Workers	Onroad Construction Vehicles		offsite	60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Fugitive Dust															
1	Soil handling	Fugitive Emissions		onsite	20	n/a	n/a									
1	Asphalting	Fugitive Emissions		onsite												
2	Pier J Breakwater Construction															
2	Marine Activities															
2	Pier J Breakwater Tugboat propulsion engine	Marine Equipment		onsite	54	5.8097516	5.170679	5.80975164	108.17758	0.0641397	58.097516	5.9953151	3.4364356	5.16519E-05	0.000163389	3.4864167
2	Pier J Breakwater Tugboat auxiliary engine	Marine Equipment		onsite	54	1.0586571	0.9422048	1.05865709	18.857329	0.0146095	13.233214	1.045093	0.7827372	9.00388E-06	3.7216E-05	0.7940526
2	Pier J Breakwater Crew boat propulsion engine	Marine Equipment		onsite	54	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
2	Pier J Breakwater Crew boat auxiliary engine	Marine Equipment		onsite	54	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
2	Pier J Breakwater Survey boat propulsion engine	Marine Equipment		onsite	54	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
2	Off-Road Equipment															
2	Piling crane	Offroad Construction Equipment		onsite	54	0.208629	0.1919387	0.208629	5.0022874	0.0077334	2.6745656	0.4666913	0.3799798	0	0	0.3799798
2	Long arm excavator	Offroad Construction Equipment		onsite	54	0.0752002	0.0691842	0.07520024	2.1876515	0.0129141	2.7752975	0.3208734	0.6339765	0	0	0.6339765
2	On-Road Vehicles															
2	Delivery Trucks	Onroad Construction Vehicles		onsite	5	0.1472023	0.0369081	0.00015221	0.0787952	0.0002454	0.0091846	0.0010522	0.0117847	2.21692E-08	1.85239E-06	0.0123372
2	Delivery Trucks	Onroad Construction Vehicles		offsite	5	0.3360402	0.1510393	0.0222394	3.216786	0.0191435	0.1848032	0.0255705	0.919133	5.38734E-07	0.000144475	0.9622
2	Workers	Onroad Construction Vehicles		offsite	54	0.0643898	0.0267123	0	0.0582129	0.0036865	0.9591501	0.0149813	0.1690333	1.73503E-06	2.96976E-06	0.1699616
3	Approach Channel (hopper dredge 2,600,000 CY)															
3	Marine Hopper Dredge															
3	Hopper propulsion engine	Marine Equipment	dredging	onsite	150	26.632138	23.702603	26.6321383	495.89041	0.2940188	266.32138	27.482769	15.752761	0.000236775	0.000748981	15.981876
3	Hopper propulsion engine	Marine Equipment	transit	offsite	150	50.30515	44.771584	50.3051501	936.68189	0.5553689	503.0515	51.911897	29.755215	0.000447241	0.001414742	30.187989
3	Hopper auxiliary engine	Marine Equipment	disposal	near shore	150	0.2219345	0.1975217	0.22193449	5.0601063	0.0040836	3.6989081	0.2804364	0.2187883	2.41607E-06	1.04025E-05	0.2219487
3	Hopper Crew boat propulsion engine	Marine Equipment	support	onsite	150	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
3	Hopper Crew boat auxiliary engine	Marine Equipment	support	onsite	150	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
3	Hopper Survey boat propulsion engine	Marine Equipment	dredging	onsite	150	1.4493144	1.2898898	1.44931439	28.638452	0.0160004	14.493144	1.5871732	0.8572613	1.36741E-05	4.07594E-05	0.8697495

Table H1.29
Alternative 5 Emissions by Task

		Unmitigated Emissions											
		Total											
		PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e	
Task ID	Construction Element/Equipment	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	
1	Electrical Substation Construction at Pier J (mitigation on												
1	Off-Road Equipment												
1	Caterpillar 320 excavator	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Small asphalt roller	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Water truck	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Forklift	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Mobile crane (35 ton)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	On-Road Vehicles												
1	Haul trucks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Supply trucks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Haul trucks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Supply trucks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1	Fugitive Dust												
1	Soil handling	n/a	n/a										
1	Asphalting												
2	Pier J Breakwater Construction												
2	Marine Activities												
2	Pier J Breakwater Tugboat propulsion engine	313.72659	279.21666	313.72659	5841.5891	3.4635415	3137.2659	323.74702	185.56752	0.002789205	0.008822996	188.2665	
2	Pier J Breakwater Tugboat auxiliary engine	57.167483	50.87906	57.167483	1018.2958	0.7889113	714.59353	56.435024	42.267807	0.000486209	0.002009666	42.878843	
2	Pier J Breakwater Crew boat propulsion engine	21.927127	19.515143	21.927127	433.28003	0.2420755	219.27127	24.012836	12.969773	0.00020688	0.000616661	13.15871	
2	Pier J Breakwater Crew boat auxiliary engine	1.8180873	1.6180977	1.8180873	32.38468	0.0250896	22.726091	1.7947931	1.3442356	1.54628E-05	6.3913E-05	1.3636682	
2	Pier J Breakwater Survey boat propulsion engine	19.565744	17.413512	19.565744	386.61911	0.2160058	195.65744	21.426838	11.573028	0.0001846	0.000550251	11.741618	
2	Off-Road Equipment												
2	Piling crane	11.265966	10.364689	11.265966	270.12352	0.4176015	144.42654	25.20133	20.518908	0	0	20.518908	
2	Long arm excavator	4.0608129	3.7359478	4.0608129	118.13318	0.6973593	149.86606	17.327165	34.234729	0	0	34.234729	
2	On-Road Vehicles												
2	Delivery Trucks	0.7360113	0.1845407	0.0007611	0.3939759	0.0012272	0.0459231	0.0052612	0.0589233	1.10846E-07	9.26193E-06	0.0616862	
2	Delivery Trucks	1.680201	0.7551964	0.111197	16.08393	0.0957177	0.924016	0.1278527	4.595665	2.69367E-06	0.000722375	4.811	
2	Workers	3.4770481	1.4424651	0	3.1434973	0.199072	51.794108	0.8089905	9.1277972	9.36918E-05	0.000160367	9.1779288	
3	Approach Channel (hopper dredge 2,600,000 CY)												
3	Marine Hopper Dredge												
3	Hopper propulsion engine	3994.8207	3555.3905	3994.8207	74383.562	44.102821	39948.207	4122.4153	2362.9141	0.035516193	0.112347143	2397.2814	
3	Hopper propulsion engine	7545.7725	6715.7375	7545.7725	140502.28	83.305328	75457.725	7786.7845	4463.2822	0.067086143	0.212211269	4528.1983	
3	Hopper auxiliary engine	33.290173	29.628254	33.290173	759.01594	0.6125392	554.83621	42.065462	32.818251	0.00036241	0.001560377	33.292304	
3	Hopper Crew boat propulsion engine	60.908687	54.208731	60.908687	1203.5556	0.6724319	609.08687	66.702321	36.027147	0.000574666	0.001712947	36.551972	
3	Hopper Crew boat auxiliary engine	5.0502425	4.4947158	5.0502425	89.957445	0.0696933	63.128031	4.9855363	3.7339877	4.29523E-05	0.000177536	3.7879673	
3	Hopper Survey boat propulsion engine	217.39716	193.48347	217.39716	4295.7678	2.4000646	2173.9716	238.07598	128.5892	0.002051116	0.006113904	130.46242	

Table H1.29
Alternative 5 Emissions by Task

			Mitigated										
			Peak Day										
Task ID		Construction Element/Equipment	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
			(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
1		Electrical Substation Construction at Pier J (mitigation on											
1		Off-Road Equipment											
1		Caterpillar 320 excavator	0.0164868	0.0164868	0.01648677	0.3297354	0.005393	1.2259134	0.1560831	0.2647818	0	0	0.2647818
1		Small asphalt roller	0.0048656	0.0048656	0.00486561	0.7353704	0.0011814	0.9067725	0.040755	0.058124	0	0	0.058124
1		Water truck	0.0301587	0.0301587	0.03015873	0.6031746	0.0098162	2.5873661	0.2964	0	0	0	0
1		Forklift	0.00097	0.00097	0.00097002	0.1466049	0.0002398	0.1631393	0.008125	0	0	0	0
1		Mobile crane (35 ton)	0.0216349	0.0216349	0.02163492	0.4326984	0.0069786	2.413528	0.212628	0	0	0	0
1		On-Road Vehicles											
1		Haul trucks	0.0883214	0.0221449	9.1328E-05	0.0472771	0.0001473	0.0055108	0.0006313	0.0070708	1.33015E-08	1.11143E-06	0.0074023
1		Supply trucks	0.2060832	0.0516714	0.0002131	0.1103132	0.0003436	0.0128585	0.0014731	0.0164985	3.10369E-08	2.59334E-06	0.0172721
1		Haul trucks	0.0110893	0.0049843	0.0007339	0.1061539	0.0006317	0.0060985	0.0008438	0.0303314	1.77782E-08	4.76767E-06	0.0317526
1		Supply trucks	0.0470456	0.0211455	0.00311352	0.45035	0.0026801	0.0258724	0.0035799	0.1286786	7.54228E-08	2.02265E-05	0.134708
1		Workers	0.0613236	0.0254403	0	0.0554409	0.003511	0.9134763	0.0142679	0.1609841	1.65241E-06	2.82834E-06	0.1618682
1		Fugitive Dust											
1		Soil handling	2.0058916	0.3037493									
1		Asphalting											
2		Pier J Breakwater Construction											
2		Marine Activities											
2		Pier J Breakwater Tugboat propulsion engine	3.9506311	3.5160617	3.95063112	77.269697	0.0641397	58.097516	4.2823679	3.4364356	3.68942E-05	0.000163389	3.4860478
2		Pier J Breakwater Tugboat auxiliary engine	0.37053	0.3297717	0.37052998	13.577277	0.0146095	14.556535	0.752467	0.7827372	6.48279E-06	3.7216E-05	0.7939896
2		Pier J Breakwater Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
2		Pier J Breakwater Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
2		Pier J Breakwater Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
2		Off-Road Equipment											
2		Piling crane	0.0239749	0.0239749	0.02397487	0.4794974	0.0077334	2.6745656	0.235625	0.3799798	0	0	0.3799798
2		Long arm excavator	0.0395833	0.0395833	0.03958333	0.7916667	0.0129141	2.7752975	0.3208734	0.6339765	0	0	0.6339765
2		On-Road Vehicles											
2		Delivery Trucks	0.1472023	0.0369081	0.00015221	0.0787952	0.0002454	0.0091846	0.0010522	0.0117847	2.21692E-08	1.85239E-06	0.0123372
2		Delivery Trucks	0.3360402	0.1510393	0.0222394	3.216786	0.0191435	0.1848032	0.0255705	0.919133	5.38734E-07	0.000144475	0.9622
2		Workers	0.0643898	0.0267123	0	0.0582129	0.0036865	0.9591501	0.0149813	0.1690333	1.73503E-06	2.96976E-06	0.1699616
3		Approach Channel (hopper dredge 2,600,000 CY)											
3		Marine Hopper Dredge											
3		Hopper propulsion engine	26.632138	23.702603	26.6321383	495.89041	0.2940188	266.32138	27.482769	15.752761	0.000236775	0.000748981	15.981876
3		Hopper propulsion engine	50.30515	44.771584	50.3051501	936.68189	0.5553689	503.0515	51.911897	29.755215	0.000447241	0.001414742	30.187989
3		Hopper auxiliary engine	0.2219345	0.1975217	0.22193449	5.0601063	0.0040836	3.6989081	0.2804364	0.2187883	2.41607E-06	1.04025E-05	0.2219487
3		Hopper Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
3		Hopper Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
3		Hopper Survey boat propulsion engine	0.9855338	0.8771251	0.98553378	19.275881	0.0160004	14.493144	1.0682896	0.8572613	9.20373E-06	4.07594E-05	0.8696377

Table H1.29
Alternative 5 Emissions by Task

			Mitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
1		Electrical Substation Construction at Pier J (mitigation on											
1		Off-Road Equipment											
1		Caterpillar 320 excavator	0.3297354	0.3297354	0.3297354	6.594709	0.1078608	24.518268	3.1216628	5.2956351	0	0	5.2956351
1		Small asphalt roller	0.1265058	0.1265058	0.1265058	19.11963	0.0307154	23.576085	1.05963	1.5112234	0	0	1.5112234
1		Water truck	0.6031746	0.6031746	0.6031746	12.063492	0.1963245	51.747323	5.928	0	0	0	0
1		Forklift	0.0213404	0.0213404	0.0213404	3.2253086	0.0052753	3.5890653	0.17875	0	0	0	0
1		Mobile crane (35 ton)	0.0432698	0.0432698	0.0432698	0.8653968	0.0139572	4.827056	0.425256	0	0	0	0
1		On-Road Vehicles											
1		Haul trucks	0.4416068	0.1107244	0.0004566	0.2363855	0.0007363	0.0275539	0.0031567	0.035354	6.65075E-08	5.55716E-06	0.0370117
1		Supply trucks	1.0304159	0.258357	0.0010655	0.5515662	0.0017181	0.0642924	0.0073657	0.0824927	1.55184E-07	1.29667E-05	0.0863606
1		Haul trucks	0.0554466	0.0249215	0.0036695	0.5307697	0.0031587	0.0304925	0.0042191	0.1516569	8.88911E-08	2.38384E-05	0.158763
1		Supply trucks	0.2352281	0.1057275	0.0155676	2.2517502	0.0134005	0.1293622	0.0178994	0.6433931	3.77114E-07	0.000101132	0.67354
1		Workers	3.679416	1.526418	0	3.3264522	0.2106582	54.80858	0.8560746	9.6590447	9.91447E-05	0.0001697	9.712094
1		Fugitive Dust											
1		Soil handling	40.117832	6.074986									
1		Asphalting											
2		Pier J Breakwater Construction											
2		Marine Activities											
2		Pier J Breakwater Tugboat propulsion engine	213.33408	189.86733	213.33408	4172.5636	3.4635415	3137.2659	231.24787	185.56752	0.001992289	0.008822996	188.24658
2		Pier J Breakwater Tugboat auxiliary engine	20.008619	17.807671	20.008619	733.17297	0.7889113	786.05289	40.633218	42.267807	0.000350071	0.002009666	42.87544
2		Pier J Breakwater Crew boat propulsion engine	14.910446	13.270297	14.910446	291.63079	0.2420755	219.27127	16.162485	12.969773	0.000139246	0.000616661	13.157019
2		Pier J Breakwater Crew boat auxiliary engine	0.6363306	0.5663342	0.6363306	23.31697	0.0250896	24.9987	1.292251	1.3442356	1.11332E-05	6.3913E-05	1.36356
2		Pier J Breakwater Survey boat propulsion engine	13.304706	11.841188	13.304706	260.2244	0.2160058	195.65744	14.42191	11.573028	0.00012425	0.000550251	11.740109
2		Off-Road Equipment											
2		Piling crane	1.2946429	1.2946429	1.2946429	25.892857	0.4176015	144.42654	12.72375	20.518908	0	0	20.518908
2		Long arm excavator	2.1375	2.1375	2.1375	42.75	0.6973593	149.86606	17.327165	34.234729	0	0	34.234729
2		On-Road Vehicles											
2		Delivery Trucks	0.7360113	0.1845407	0.0007611	0.3939759	0.0012272	0.0459231	0.0052612	0.0589233	1.10846E-07	9.26193E-06	0.0616862
2		Delivery Trucks	1.680201	0.7551964	0.111197	16.08393	0.0957177	0.924016	0.1278527	4.595665	2.69367E-06	0.000722375	4.811
2		Workers	3.4770481	1.4424651	0	3.1434973	0.199072	51.794108	0.8089905	9.1277972	9.36918E-05	0.000160367	9.1779288
3		Approach Channel (hopper dredge 2,600,000 CY)											
3		Marine Hopper Dredge											
3		Hopper propulsion engine	3994.8207	3555.3905	3994.8207	74383.562	44.102821	39948.207	4122.4153	2362.9141	0.035516193	0.112347143	2397.2814
3		Hopper propulsion engine	7545.7725	6715.7375	7545.7725	140502.28	83.305328	75457.725	7786.7845	4463.2822	0.067086143	0.212211269	4528.1983
3		Hopper auxiliary engine	33.290173	29.628254	33.290173	759.01594	0.6125392	554.83621	42.065462	32.818251	0.00036241	0.001560377	33.292304
3		Hopper Crew boat propulsion engine	41.417907	36.861937	41.417907	810.08553	0.6724319	609.08687	44.895793	36.027147	0.000386795	0.001712947	36.547275
3		Hopper Crew boat auxiliary engine	1.7675849	1.5731505	1.7675849	64.76936	0.0696933	69.440835	3.5895861	3.7339877	3.09257E-05	0.000177536	3.7876666
3		Hopper Survey boat propulsion engine	147.83007	131.56876	147.83007	2891.3822	2.4000646	2173.9716	160.24345	128.5892	0.001380559	0.006113904	130.44566

Table H1.29
Alternative 5 Emissions by Task

						Unmitigated Emissions										
						Peak Day										
						PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
4 Main Channel Widening (clam shell dredge 1,065,000 CY)																
4	Marine Clamshell Dredge															
4	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	177	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
4	Clamshell Dredge generator	Marine Equipment	dredging	onsite	177	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
4	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	177	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
4	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	177	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
4	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	177	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
4	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	177	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
4	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	177	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
4	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	177	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
4	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	177	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
4	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	177	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
5 West Basin (clam shell dredge 717,000 CY)																
5	Marine Clamshell Dredge															
5	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	120	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
5	Clamshell Dredge generator	Marine Equipment	dredging	onsite	120	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
5	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	120	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
5	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	120	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
5	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	120	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
5	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	120	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
5	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	120	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
5	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	120	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
5	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	120	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
5	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	120	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
6 Pier J Basin (clam shell dredge 258,000 CY)																
6	Marine Clamshell Dredge															
6	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	43	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
6	Clamshell Dredge generator	Marine Equipment	dredging	onsite	43	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
6	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	43	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
6	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	43	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
6	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	43	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
6	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	43	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
6	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	43	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
6	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	43	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
6	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	43	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
6	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	43	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
7 Pier J Basin (clam shell dredge 46,000 CY)																
7	Marine Clamshell Dredge															
7	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	8	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
7	Clamshell Dredge generator	Marine Equipment	dredging	onsite	8	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
7	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	8	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
7	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	8	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
7	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	8	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
7	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	8	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
7	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	8	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
7	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	8	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
7	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	8	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
7	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	8	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374

Table H1.29
Alternative 5 Emissions by Task

		Unmitigated Emissions											
		Total	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
4	Main Channel Widening (clam shell dredge 1,065,000 CY)												
4	Marine Clamshell Dredge												
4	Clamshell Dredge hoist	772.61905	772.61905	772.61905	23487.619	25.723764	13392.063	1301.7086	1024.0116		0	0	1024.0116
4	Clamshell Dredge generator	579.46429	579.46429	579.46429	17615.714	19.292823	10044.048	976.28143	565.77116		0	0	565.77116
4	Clamshell Barge dump scow	8.1944444	8.1944444	8.1944444	155.69444	0.2728278	142.03704	8.62875	6.7663102		0	0	6.7663102
4	Clamshell Tugboat propulsion engine	108.24485	96.337913	108.24485	2015.519	1.1950231	1082.4485	111.70219	64.06222	0.000962357	0.003044191	64.957448	
4	Clamshell Tugboat auxiliary engine	15.615192	13.897521	15.615192	278.14561	0.2154897	195.1899	15.415122	11.545373	0.000132807	0.000548936	11.712277	
4	Clamshell Tugboat propulsion engine	1948.4072	1734.0824	1948.4072	36279.343	21.510416	19484.072	2010.6394	1152.472	0.017322431	0.054795446	1169.2341	
4	Clamshell Tugboat auxiliary engine	281.07346	250.15538	281.07346	5006.6209	3.8788137	3513.4182	277.4722	207.81672	0.00239053	0.009880856	210.82098	
4	Clamshell Crew boat propulsion engine	71.87225	63.966303	71.87225	1420.1957	0.7934696	718.7225	78.708739	42.512033	0.000678106	0.002021278	43.131327	
4	Clamshell Crew boat auxiliary engine	5.9592862	5.3037647	5.9592862	106.14978	0.0822381	74.491077	5.8829328	4.4061055	0.000209493	0.000209493	4.4698014	
4	Clamshell Survey boat propulsion engine	64.132162	57.077624	64.132162	1267.2515	0.7080191	641.32162	70.232413	37.933814	0.000605079	0.001803602	38.486415	
5	West Basin (clam shell dredge 717,000 CY)												
5	Marine Clamshell Dredge												
5	Clamshell Dredge hoist	523.80952	523.80952	523.80952	15923.81	17.43984	9079.3651	882.51429	694.24519		0	0	694.24519
5	Clamshell Dredge generator	392.85714	392.85714	392.85714	11942.857	13.07988	6809.5238	661.88571	383.57367		0	0	383.57367
5	Clamshell Barge dump scow	5.5555556	5.5555556	5.5555556	105.55556	0.184968	96.296296	5.85	4.587329		0	0	4.587329
5	Clamshell Tugboat propulsion engine	73.386337	65.31384	73.386337	1366.4536	0.8101852	733.86337	75.730296	43.407607	0.000652446	0.002063859	44.038948	
5	Clamshell Tugboat auxiliary engine	10.586571	9.4220481	10.586571	188.57329	0.1460947	132.33214	10.45093	7.8273717	0.000388E-05	0.00037216	7.9405265	
5	Clamshell Tugboat propulsion engine	1320.9541	1175.6491	1320.9541	24596.165	14.583333	13209.541	1363.1453	781.33693	0.011744021	0.037149455	792.70107	
5	Clamshell Tugboat auxiliary engine	190.55828	169.59687	190.55828	3394.3193	2.6297042	2381.9784	188.11675	140.89269	0.001620698	0.006698886	142.92948	
5	Clamshell Crew boat propulsion engine	48.726949	43.366985	48.726949	962.84452	0.5379455	487.26949	53.361857	28.821718	0.000459733	0.001370358	29.241578	
5	Clamshell Crew boat auxiliary engine	4.040194	3.5957727	4.040194	71.965956	0.0557547	50.502425	3.988429	2.9871902	0.000142029	0.000142029	3.0303738	
5	Clamshell Survey boat propulsion engine	43.479432	38.696694	43.479432	859.15357	0.4800129	434.79432	47.615195	25.71784	0.000410223	0.001222781	26.092485	
6	Pier J Basin (clam shell dredge 258,000 CY)												
6	Marine Clamshell Dredge												
6	Clamshell Dredge hoist	187.69841	187.69841	187.69841	5706.0317	6.249276	3253.4392	316.23429	248.77119		0	0	248.77119
6	Clamshell Dredge generator	140.77381	140.77381	140.77381	4279.5238	4.686957	2440.0794	237.17571	137.44723		0	0	137.44723
6	Clamshell Barge dump scow	1.9907407	1.9907407	1.9907407	37.824074	0.0662802	34.506173	2.09625	1.6437929		0	0	1.6437929
6	Clamshell Tugboat propulsion engine	26.296771	23.404126	26.296771	489.64587	0.2903163	262.96771	27.136689	15.554393	0.000233793	0.000739549	15.780623	
6	Clamshell Tugboat auxiliary engine	3.7935212	3.3762339	3.7935212	67.572097	0.0523506	47.419015	3.7449167	2.8048082	0.000133357	0.000133357	2.8453553	
6	Clamshell Tugboat propulsion engine	473.34187	421.27426	473.34187	8813.6256	5.2256943	4733.4187	488.46041	279.97907	0.004208274	0.013311888	284.05122	
6	Clamshell Tugboat auxiliary engine	68.283382	60.77221	68.283382	1216.2977	0.9423107	853.54228	67.408501	50.486548	0.00058075	0.002400434	51.216396	
6	Clamshell Crew boat propulsion engine	17.46049	15.539836	17.46049	345.01929	0.1927638	174.6049	19.121332	10.327782	0.000164738	0.000491045	10.478232	
6	Clamshell Crew boat auxiliary engine	1.4477362	1.2884852	1.4477362	25.787801	0.0199788	18.096702	1.4291871	1.0704098	0.000131E-05	0.000131E-05	1.085884	
6	Clamshell Survey boat propulsion engine	15.58013	13.866315	15.58013	307.86336	0.1720046	155.8013	17.062112	9.2155595	0.000146997	0.000438163	9.349807	
7	Pier J Basin (clam shell dredge 46,000 CY)												
7	Marine Clamshell Dredge												
7	Clamshell Dredge hoist	34.920635	34.920635	34.920635	1061.5873	1.162656	605.29101	58.834286	46.283012		0	0	46.283012
7	Clamshell Dredge generator	26.190476	26.190476	26.190476	796.19048	0.871992	453.96825	44.125714	25.571578		0	0	25.571578
7	Clamshell Barge dump scow	0.3703704	0.3703704	0.3703704	7.037037	0.0123312	6.4197531	0.39	0.3058219		0	0	0.3058219
7	Clamshell Tugboat propulsion engine	4.8924224	4.354256	4.8924224	91.096906	0.0540123	48.924224	5.0486864	2.8938405	0.000137591	0.000137591	2.9359299	
7	Clamshell Tugboat auxiliary engine	0.7057714	0.6281365	0.7057714	12.571553	0.0097396	8.8221424	0.6967287	0.5218248	0.000259E-06	0.000259E-06	0.5293684	
7	Clamshell Tugboat propulsion engine	88.063604	78.376607	88.063604	1639.7443	0.9722222	880.63604	90.876355	52.089129	0.000782935	0.00247663	52.846738	
7	Clamshell Tugboat auxiliary engine	12.703885	11.306458	12.703885	226.28795	0.1753136	158.79856	12.541117	9.3928461	0.000108047	0.000446592	9.5286318	
7	Clamshell Crew boat propulsion engine	3.2484633	2.8911323	3.2484633	64.189634	0.035863	32.484633	3.5574571	1.9214478	0.000489E-05	9.13572E-05	1.9494385	
7	Clamshell Crew boat auxiliary engine	0.2693463	0.2397182	0.2693463	4.7977304	0.003717	3.3668283	0.2658953	0.199146	0.000290E-06	9.4686E-06	0.2020249	
7	Clamshell Survey boat propulsion engine	2.8986288	2.5797796	2.8986288	57.276905	0.0320009	28.986288	3.1743463	1.7145227	0.000274E-05	8.15187E-05	1.739499	

Table H1.29
Alternative 5 Emissions by Task

		Mitigated										
		Peak Day										
		PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
4	Main Channel Widening (clam shell dredge 1,065,000 CY)											
4	Marine Clamshell Dredge											
4	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
4	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
4	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
4	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
4	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
4	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
4	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
4	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
4	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
4	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
5	West Basin (clam shell dredge 717,000 CY)											
5	Marine Clamshell Dredge											
5	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
5	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
5	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
5	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
5	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
5	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
5	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
5	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
5	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
5	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
6	Pier J Basin (clam shell dredge 258,000 CY)											
6	Marine Clamshell Dredge											
6	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
6	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
6	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
6	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
6	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
6	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
6	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
6	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
6	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
6	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
7	Pier J Basin (clam shell dredge 46,000 CY)											
7	Marine Clamshell Dredge											
7	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
7	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
7	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
7	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
7	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
7	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
7	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
7	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
7	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
7	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.												

Table H1.29
Alternative 5 Emissions by Task

		Mitigated Emissions										
		Total										
		PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
4	Main Channel Widening (clam shell dredge 1,065,000 CY)											
4	Marine Clamshell Dredge											
4	Clamshell Dredge hoist	77.261905	77.261905	77.261905	2348.7619	2.5723764	1339.2063	130.17086	102.40116	0	0	102.40116
4	Clamshell Dredge generator	57.946429	57.946429	57.946429	1761.5714	1.9292823	1004.4048	97.628143	56.577116	0	0	56.577116
4	Clamshell Barge dump scow	8.1944444	8.1944444	8.1944444	155.69444	0.2728278	142.03704	8.62875	6.7663102	0	0	6.7663102
4	Clamshell Tugboat propulsion engine	73.606496	65.509781	73.606496	1439.6565	1.1950231	1082.4485	79.787276	64.02622	0.000687398	0.003044191	64.950574
4	Clamshell Tugboat auxiliary engine	5.4653172	4.8641323	5.4653172	200.26484	0.2154897	214.70889	11.098888	11.545373	9.56212E-05	0.000548936	11.711347
4	Clamshell Tugboat propulsion engine	1324.9169	1179.1761	1324.9169	25913.816	21.510416	19484.072	1436.171	1152.472	0.012373165	0.054795446	1169.1103
4	Clamshell Tugboat auxiliary engine	98.37571	87.554382	98.37571	3604.7671	3.8788137	3864.76	199.77999	207.81672	0.001721181	0.009880856	210.80424
4	Clamshell Crew boat propulsion engine	48.87313	43.497086	48.87313	955.90093	0.7934696	718.7225	52.977036	42.512033	0.000456418	0.002021278	43.125785
4	Clamshell Crew boat auxiliary engine	2.0857502	1.8563176	2.0857502	76.427845	0.0822381	81.940185	4.2357116	4.4061055	3.64923E-05	0.000209493	4.4694466
4	Clamshell Survey boat propulsion engine	43.60987	38.812784	43.60987	852.95775	0.7080191	641.32162	47.271816	37.933814	0.000407265	0.001803602	38.481469
5	West Basin (clam shell dredge 717,000 CY)											
5	Marine Clamshell Dredge											
5	Clamshell Dredge hoist	52.380952	52.380952	52.380952	1592.381	1.743984	907.93651	88.251429	69.424519	0	0	69.424519
5	Clamshell Dredge generator	39.285714	39.285714	39.285714	1194.2857	1.307988	680.95238	66.188571	38.357367	0	0	38.357367
5	Clamshell Barge dump scow	5.5555556	5.5555556	5.5555556	105.55556	0.184968	96.296296	5.85	4.587329	0	0	4.587329
5	Clamshell Tugboat propulsion engine	49.902709	44.413411	49.902709	976.03828	0.8101852	733.86337	54.093069	43.407607	0.000466033	0.002063859	44.034288
5	Clamshell Tugboat auxiliary engine	3.7052998	3.2977168	3.7052998	135.77277	0.1460947	145.56535	7.5246699	7.8273717	6.48279E-05	0.00037216	7.9398962
5	Clamshell Tugboat propulsion engine	898.24876	799.4414	898.24876	17568.689	14.583333	13209.541	973.67524	781.33693	0.008388587	0.037149455	792.61718
5	Clamshell Tugboat auxiliary engine	66.695396	59.358903	66.695396	2443.9099	2.6297042	2620.1763	135.44406	140.89269	0.001166903	0.006698886	142.91813
5	Clamshell Crew boat propulsion engine	33.134326	29.48955	33.134326	648.06843	0.5379455	487.26949	35.916634	28.821718	0.000309436	0.001370358	29.23782
5	Clamshell Crew boat auxiliary engine	1.4140679	1.2585204	1.4140679	51.815488	0.0557547	55.552668	2.8716689	2.9871902	2.47405E-05	0.000142029	3.0301333
5	Clamshell Survey boat propulsion engine	29.566014	26.313752	29.566014	578.27644	0.4800129	434.79432	32.048689	25.71784	0.000276112	0.001222781	26.089132
6	Pier J Basin (clam shell dredge 258,000 CY)											
6	Marine Clamshell Dredge											
6	Clamshell Dredge hoist	18.769841	18.769841	18.769841	570.60317	0.6249276	325.34392	31.623429	24.877119	0	0	24.877119
6	Clamshell Dredge generator	14.077381	14.077381	14.077381	427.95238	0.4686957	244.00794	23.717571	13.744723	0	0	13.744723
6	Clamshell Barge dump scow	1.9907407	1.9907407	1.9907407	37.824074	0.0662802	34.506173	2.09625	1.6437929	0	0	1.6437929
6	Clamshell Tugboat propulsion engine	17.881804	15.914806	17.881804	349.74705	0.2903163	262.96771	19.38335	15.554393	0.000166995	0.000739549	15.778953
6	Clamshell Tugboat auxiliary engine	1.3277324	1.1816819	1.3277324	48.65191	0.0523506	52.160917	2.6963401	2.8048082	2.323E-05	0.000133357	2.8451295
6	Clamshell Tugboat propulsion engine	321.87247	286.4665	321.87247	6295.4469	5.2256943	4733.4187	348.90029	279.97907	0.00300591	0.013311888	284.02116
6	Clamshell Tugboat auxiliary engine	23.899184	21.270274	23.899184	875.73438	0.9423107	938.8965	48.534121	50.486548	0.00041814	0.002400434	51.212331
6	Clamshell Crew boat propulsion engine	11.873133	10.567089	11.873133	232.22452	0.1927638	174.6049	12.870127	10.327782	0.000110881	0.000491045	10.476886
6	Clamshell Crew boat auxiliary engine	0.5067077	0.4509698	0.5067077	18.567217	0.0199788	19.906373	1.0290147	1.0704098	8.86536E-06	5.08937E-05	1.0857978
6	Clamshell Survey boat propulsion engine	10.594488	9.4290945	10.594488	207.21572	0.1720046	155.8013	11.484114	9.2155595	9.89401E-05	0.000438163	9.3486056
7	Pier J Basin (clam shell dredge 46,000 CY)											
7	Marine Clamshell Dredge											
7	Clamshell Dredge hoist	3.4920635	3.4920635	3.4920635	106.15873	0.1162656	60.529101	5.8834286	4.6283012	0	0	4.6283012
7	Clamshell Dredge generator	2.6190476	2.6190476	2.6190476	79.619048	0.0871992	45.396825	4.4125714	2.5571578	0	0	2.5571578
7	Clamshell Barge dump scow	0.3703704	0.3703704	0.3703704	7.037037	0.0123312	6.4197531	0.39	0.3058219	0	0	0.3058219
7	Clamshell Tugboat propulsion engine	3.3268473	2.9608941	3.3268473	65.069218	0.0540123	48.924224	3.6062046	2.8938405	3.10688E-05	0.000137591	2.9356192
7	Clamshell Tugboat auxiliary engine	0.24702	0.2198478	0.24702	9.0515181	0.0097396	9.7043566	0.5016447	0.5218248	4.32186E-06	2.48107E-05	0.5293264
7	Clamshell Tugboat propulsion engine	59.883251	53.296093	59.883251	1171.2459	0.9722222	880.63604	64.911682	52.089129	0.000559239	0.00247663	52.841145
7	Clamshell Tugboat auxiliary engine	4.4463598	3.9572602	4.4463598	162.92733	0.1753136	174.67842	9.0296039	9.3928461	7.77935E-05	0.000446592	9.5278754
7	Clamshell Crew boat propulsion engine	2.208955	1.96597	2.208955	43.204562	0.035863	32.484633	2.3944423	1.9214478	2.0629E-05	9.13572E-05	1.949188
7	Clamshell Crew boat auxiliary engine	0.0942712	0.0839014	0.0942712	3.4543659	0.003717	3.7035112	0.1914446	0.199146	1.64937E-06	9.4686E-06	0.2020089
7	Clamshell Survey boat propulsion engine	1.9710676	1.7542501	1.9710676	38.551763	0.0320009	28.986288	2.1365793	1.7145227	1.84075E-05	8.15187E-05	1.7392755
Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.												

Table H1.29
Alternative 5 Emissions by Task

						Unmitigated Emissions										
						Peak Day										
						PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2 (tonnes/day)	CH4 (tonnes/day)	N2O (tonnes/day)	CO2e (tonnes/day)
Task ID	Construction Element/Equipment	Source Type 1	Source Type 2	Onsite/Off site	Days Total	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)				
8 Pier J Approach (clam shell dredge 1,994,000 CY)																
8	Marine Clamshell Dredge															
8	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	332	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
8	Clamshell Dredge generator	Marine Equipment	dredging	onsite	332	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
8	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	332	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
8	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	332	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
8	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	332	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
8	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	332	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
8	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	332	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
8	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	332	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
8	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	332	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
8	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	332	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
9 Pier J Approach (clam shell dredge 679,000 CY)																
9	Marine Clamshell Dredge															
9	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	113	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
9	Clamshell Dredge generator	Marine Equipment	dredging	onsite	113	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
9	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	113	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
9	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	113	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
9	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	113	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
9	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	113	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
9	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	113	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
9	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	113	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
9	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	113	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
9	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	113	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
10 Standby Area (clam shell dredge 921,000 CY)																
10	Marine Clamshell Dredge															
10	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	227	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
10	Clamshell Dredge generator	Marine Equipment	dredging	onsite	227	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
10	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	227	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
10	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	227	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
10	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	227	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
10	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	227	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
10	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	227	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
10	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	227	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
10	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	227	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
10	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	227	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374
11 Standby Area (clam shell dredge 118,000 CY)																
11	Marine Clamshell Dredge															
11	Clamshell Dredge hoist	Marine Equipment	dredging	onsite	54	4.3650794	4.3650794	4.36507937	132.69841	0.145332	75.661376	7.3542857	5.7853765	0	0	5.7853765
11	Clamshell Dredge generator	Marine Equipment	dredging	onsite	54	3.2738095	3.2738095	3.27380952	99.52381	0.108999	56.746032	5.5157143	3.1964473	0	0	3.1964473
11	Clamshell Barge dump scow	Marine Equipment	disposal	offsite	54	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
11	Clamshell Tugboat propulsion engine	Marine Equipment	dredging	onsite	54	0.6115528	0.544282	0.6115528	11.387113	0.0067515	6.115528	0.6310858	0.3617301	5.43705E-06	1.71988E-05	0.3669912
11	Clamshell Tugboat auxiliary engine	Marine Equipment	dredging	onsite	54	0.0882214	0.0785171	0.08822142	1.5714441	0.0012175	1.1027678	0.0870911	0.0652281	7.50323E-07	3.10134E-06	0.0661711
11	Clamshell Tugboat propulsion engine	Marine Equipment	transit	offsite	54	11.00795	9.7970759	11.0079505	204.96804	0.1215278	110.0795	11.359544	6.5111411	9.78668E-05	0.000309579	6.6058422
11	Clamshell Tugboat auxiliary engine	Marine Equipment	transit	offsite	54	1.5879856	1.4133072	1.58798563	28.285994	0.0219142	19.84982	1.5676396	1.1741058	1.35058E-05	5.5824E-05	1.191079
11	Clamshell Crew boat propulsion engine	Marine Equipment	support	onsite	54	0.4060579	0.3613915	0.40605791	8.0237043	0.0044829	4.0605791	0.4446821	0.240181	3.83111E-06	1.14196E-05	0.2436798
11	Clamshell Crew boat auxiliary engine	Marine Equipment	support	onsite	54	0.0336683	0.0299648	0.03366828	0.5997163	0.0004646	0.4208535	0.0332369	0.0248933	2.86349E-07	1.18357E-06	0.0252531
11	Clamshell Survey boat propulsion engine	Marine Equipment	dredging	onsite	54	0.3623286	0.3224725	0.3623286	7.1596131	0.0040001	3.623286	0.3967933	0.2143153	3.41853E-06	1.01898E-05	0.2174374

Table H1.29
Alternative 5 Emissions by Task

		Unmitigated Emissions										
		Total										
Task ID	Construction Element/Equipment	PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
		(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
8	Pier J Approach (clam shell dredge 1,994,000 CY)											
8	Marine Clamshell Dredge											
8	Clamshell Dredge hoist	1449.2063	1449.2063	1449.2063	44055.873	48.250224	25119.577	2441.6229	1920.745	0	0	1920.745
8	Clamshell Dredge generator	1086.9048	1086.9048	1086.9048	33041.905	36.187668	18839.683	1831.2171	1061.2205	0	0	1061.2205
8	Clamshell Barge dump scow	15.37037	15.37037	15.37037	292.03704	0.5117448	266.41975	16.185	12.69161	0	0	12.69161
8	Clamshell Tugboat propulsion engine	203.03553	180.70162	203.03553	3780.5216	2.2415123	2030.3553	209.52049	120.09438	0.0018051	0.005710009	121.84109
8	Clamshell Tugboat auxiliary engine	29.289513	26.067666	29.289513	521.71945	0.4041953	366.11891	28.914241	21.655728	0.000249107	0.001029644	21.96879
8	Clamshell Tugboat propulsion engine	3654.6396	3252.6292	3654.6396	68049.389	40.347221	36546.396	3771.3687	2161.6988	0.032491792	0.102780159	2193.1396
8	Clamshell Tugboat auxiliary engine	527.21123	469.21799	527.21123	9390.95	7.275515	6590.1404	520.45634	389.80311	0.004483932	0.018533584	395.43822
8	Clamshell Crew boat propulsion engine	134.81123	119.98199	134.81123	2663.8698	1.4883159	1348.1123	147.63447	79.740085	0.001271928	0.003791323	80.901698
8	Clamshell Crew boat auxiliary engine	11.17787	9.9483044	11.17787	199.10581	0.1542546	139.72338	11.034654	8.2645595	9.50678E-05	0.000392947	8.3840343
8	Clamshell Survey boat propulsion engine	120.29309	107.06085	120.29309	2376.9915	1.3280358	1202.9309	131.73537	71.152692	0.001134951	0.003383027	72.189207
9	Pier J Approach (clam shell dredge 679,000 CY)											
9	Marine Clamshell Dredge											
9	Clamshell Dredge hoist	493.25397	493.25397	493.25397	14994.921	16.422516	8549.7354	831.03429	653.74755	0	0	653.74755
9	Clamshell Dredge generator	369.94048	369.94048	369.94048	11246.19	12.316887	6412.3016	623.27571	361.19854	0	0	361.19854
9	Clamshell Barge dump scow	5.2314815	5.2314815	5.2314815	99.398148	0.1741782	90.679012	5.50875	4.3197348	0	0	4.3197348
9	Clamshell Tugboat propulsion engine	69.105467	61.503866	69.105467	1286.7438	0.7629244	691.05467	71.312696	40.875497	0.000614386	0.001943467	41.470009
9	Clamshell Tugboat auxiliary engine	9.9690209	8.8724286	9.9690209	177.57318	0.1375725	124.61276	9.8412928	7.370775	8.47865E-05	0.000350451	7.4773291
9	Clamshell Tugboat propulsion engine	1243.8984	1107.0696	1243.8984	23161.388	13.732638	12438.984	1283.6285	735.75894	0.011058953	0.034982404	746.46017
9	Clamshell Tugboat auxiliary engine	179.44238	159.70371	179.44238	3196.3173	2.4763048	2243.0297	177.14327	132.67395	0.001526157	0.006308117	134.59192
9	Clamshell Crew boat propulsion engine	45.884544	40.837244	45.884544	906.67859	0.5065654	458.84544	50.249082	27.140451	0.000432915	0.00129042	27.535819
9	Clamshell Crew boat auxiliary engine	3.804516	3.3860193	3.804516	67.767942	0.0525023	47.55645	3.7557707	2.8129374	3.23574E-05	0.000133744	2.853602
9	Clamshell Survey boat propulsion engine	40.943131	36.439387	40.943131	809.03628	0.4520122	409.43131	44.837642	24.217633	0.000386294	0.001151452	24.570423
10	Standby Area (clam shell dredge 921,000 CY)											
10	Marine Clamshell Dredge											
10	Clamshell Dredge hoist	990.87302	990.87302	990.87302	30122.54	32.990364	17175.132	1669.4229	1313.2805	0	0	1313.2805
10	Clamshell Dredge generator	743.15476	743.15476	743.15476	22591.905	24.742773	12881.349	1252.0671	725.59353	0	0	725.59353
10	Clamshell Barge dump scow	10.509259	10.509259	10.509259	199.67593	0.3498978	182.16049	11.06625	8.6776973	0	0	8.6776973
10	Clamshell Tugboat propulsion engine	138.82249	123.55201	138.82249	2584.8747	1.5326003	1388.2249	143.25648	82.112723	0.00123421	0.003904133	83.30701
10	Clamshell Tugboat auxiliary engine	20.026263	17.823374	20.026263	356.71781	0.2763624	250.32829	19.769677	14.806778	0.000170323	0.000704003	15.020829
10	Clamshell Tugboat propulsion engine	2498.8048	2223.9362	2498.8048	46527.745	27.586805	24988.048	2578.6166	1478.029	0.022215774	0.070274386	1499.5262
10	Clamshell Tugboat auxiliary engine	360.47274	320.82074	360.47274	6420.9206	4.9745238	4505.9092	355.85418	266.52201	0.003065821	0.012672059	270.37493
10	Clamshell Crew boat propulsion engine	92.175146	82.03588	92.175146	1821.3809	1.0176136	921.75146	100.94285	54.521082	0.000869661	0.00259226	55.315318
10	Clamshell Crew boat auxiliary engine	7.6427003	6.8020033	7.6427003	136.1356	0.1054693	95.533754	7.5447782	5.6507681	6.50012E-05	0.000268671	5.7324572
10	Clamshell Survey boat propulsion engine	82.248592	73.201246	82.248592	1625.2322	0.9080245	822.48592	90.072078	48.649581	0.000776006	0.002313094	49.358283
11	Standby Area (clam shell dredge 118,000 CY)											
11	Marine Clamshell Dredge											
11	Clamshell Dredge hoist	235.71429	235.71429	235.71429	7165.7143	7.847928	4085.7143	397.13143	312.41033	0	0	312.41033
11	Clamshell Dredge generator	176.78571	176.78571	176.78571	5374.2857	5.885946	3064.2857	297.84857	172.60815	0	0	172.60815
11	Clamshell Barge dump scow	2.5	2.5	2.5	47.5	0.0832356	43.333333	2.6325	2.064298	0	0	2.064298
11	Clamshell Tugboat propulsion engine	33.023851	29.391228	33.023851	614.90411	0.3645833	330.23851	34.078633	19.533423	0.000293601	0.000928736	19.817527
11	Clamshell Tugboat auxiliary engine	4.7639569	4.2399216	4.7639569	84.857982	0.0657426	59.549461	4.7029187	3.5223173	4.05175E-05	0.000167472	3.5732369
11	Clamshell Tugboat propulsion engine	594.42933	529.0421	594.42933	11068.274	6.5624998	5944.2933	613.4154	351.60162	0.00528481	0.016717255	356.71548
11	Clamshell Tugboat auxiliary engine	85.751224	76.318589	85.751224	1527.4437	1.1833669	1071.8903	84.652537	63.401711	0.000729314	0.003014499	64.318264
11	Clamshell Crew boat propulsion engine	21.927127	19.515143	21.927127	433.28003	0.2420755	219.27127	24.012836	12.969773	0.00020688	0.000616661	13.15871
11	Clamshell Crew boat auxiliary engine	1.8180873	1.6180977	1.8180873	32.38468	0.0250896	22.726091	1.7947931	1.3442356	1.54628E-05	6.3913E-05	1.3636682
11	Clamshell Survey boat propulsion engine	19.565744	17.413512	19.565744	386.61911	0.2160058	195.65744	21.426838	11.573028	0.0001846	0.000550251	11.741618

Table H1.29
Alternative 5 Emissions by Task

Alternative 3 Emissions by Task		Mitigated										
		Peak Day										
		PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID	Construction Element/Equipment	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)	(tonnes/day)
8	Pier J Approach (clam shell dredge 1,994,000 CY)											
8	Marine Clamshell Dredge											
8	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
8	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
8	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
8	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
8	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
8	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
8	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
8	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
8	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
8	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
9	Pier J Approach (clam shell dredge 679,000 CY)											
9	Marine Clamshell Dredge											
9	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
9	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
9	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
9	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
9	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
9	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
9	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
9	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
9	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
9	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
10	Standby Area (clam shell dredge 921,000 CY)											
10	Marine Clamshell Dredge											
10	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
10	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
10	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
10	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
10	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
10	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
10	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
10	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
10	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
10	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094
11	Standby Area (clam shell dredge 118,000 CY)											
11	Marine Clamshell Dredge											
11	Clamshell Dredge hoist	0.4365079	0.4365079	0.43650794	13.269841	0.0145332	7.5661376	0.7354286	0.5785377	0	0	0.5785377
11	Clamshell Dredge generator	0.327381	0.327381	0.32738095	9.952381	0.0108999	5.6746032	0.5515714	0.3196447	0	0	0.3196447
11	Clamshell Barge dump scow	0.0462963	0.0462963	0.0462963	0.8796296	0.0015414	0.8024691	0.04875	0.0382277	0	0	0.0382277
11	Clamshell Tugboat propulsion engine	0.4158559	0.3701118	0.41585591	8.1336523	0.0067515	6.115528	0.4507756	0.3617301	3.8836E-06	1.71988E-05	0.3669524
11	Clamshell Tugboat auxiliary engine	0.0308775	0.027481	0.0308775	1.1314398	0.0012175	1.2130446	0.0627056	0.0652281	5.40233E-07	3.10134E-06	0.0661658
11	Clamshell Tugboat propulsion engine	7.4854063	6.6620116	7.48540633	146.40574	0.1215278	110.0795	8.1139603	6.5111411	6.99049E-05	0.000309579	6.6051432
11	Clamshell Tugboat auxiliary engine	0.555795	0.4946575	0.55579497	20.365916	0.0219142	21.834802	1.1287005	1.1741058	9.72419E-06	5.5824E-05	1.1909844
11	Clamshell Crew boat propulsion engine	0.2761194	0.2457462	0.27611938	5.4005702	0.0044829	4.0605791	0.2993053	0.240181	2.57863E-06	1.14196E-05	0.2436485
11	Clamshell Crew boat auxiliary engine	0.0117839	0.0104877	0.0117839	0.4317957	0.0004646	0.4629389	0.0239306	0.0248933	2.06171E-07	1.18357E-06	0.0252511
11	Clamshell Survey boat propulsion engine	0.2463834	0.2192813	0.24638345	4.8189703	0.0040001	3.623286	0.2670724	0.2143153	2.30093E-06	1.01898E-05	0.2174094

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Table H1.29
Alternative 5 Emissions by Task

			Mitigated Emissions										
			Total										
			PM10	PM2.5	DPM	NOX	SOX	CO	VOC	CO2	CH4	N2O	CO2e
Task ID		Construction Element/Equipment	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(tonnes)	(tonnes)
8		Pier J Approach (clam shell dredge 1,994,000 CY)											
8		Marine Clamshell Dredge											
8		Clamshell Dredge hoist	144.92063	144.92063	144.92063	4405.5873	4.8250224	2511.9577	244.16229	192.0745	0	0	192.0745
8		Clamshell Dredge generator	108.69048	108.69048	108.69048	3304.1905	3.6187668	1883.9683	183.12171	106.12205	0	0	106.12205
8		Clamshell Barge dump scow	15.37037	15.37037	15.37037	292.03704	0.5117448	266.41975	16.185	12.69161	0	0	12.69161
8		Clamshell Tugboat propulsion engine	138.06416	122.8771	138.06416	2700.3726	2.2415123	2030.3553	149.65749	120.09438	0.001289357	0.005710009	121.8282
8		Clamshell Tugboat auxiliary engine	10.251329	9.1236832	10.251329	375.638	0.4041953	402.7308	20.818253	21.655728	0.000179357	0.001029644	21.967046
8		Clamshell Tugboat propulsion engine	2485.1549	2211.7879	2485.1549	48606.706	40.347221	36546.396	2693.8348	2161.6988	0.023208423	0.102780159	2192.9075
8		Clamshell Tugboat auxiliary engine	184.52393	164.2263	184.52393	6761.484	7.275515	7249.1544	374.72856	389.80311	0.003228431	0.018533584	395.40683
8		Clamshell Crew boat propulsion engine	91.671634	81.587754	91.671634	1792.9893	1.4883159	1348.1123	99.369355	79.740085	0.000856105	0.003791323	80.891302
8		Clamshell Crew boat auxiliary engine	3.9122545	3.4819065	3.9122545	143.35618	0.1542546	153.69571	7.9449506	8.2645595	6.84488E-05	0.000392947	8.3833688
8		Clamshell Survey boat propulsion engine	81.799304	72.801381	81.799304	1599.8982	1.3280358	1202.9309	88.66804	71.152692	0.000763909	0.003383027	72.179931
9		Pier J Approach (clam shell dredge 679,000 CY)											
9		Marine Clamshell Dredge											
9		Clamshell Dredge hoist	49.325397	49.325397	49.325397	1499.4921	1.6422516	854.97354	83.103429	65.374755	0	0	65.374755
9		Clamshell Dredge generator	36.994048	36.994048	36.994048	1124.619	1.2316887	641.23016	62.327571	36.119854	0	0	36.119854
9		Clamshell Barge dump scow	5.2314815	5.2314815	5.2314815	99.398148	0.1741782	90.679012	5.50875	4.3197348	0	0	4.3197348
9		Clamshell Tugboat propulsion engine	46.991718	41.822629	46.991718	919.10271	0.7629244	691.05467	50.93764	40.875497	0.000438847	0.001943467	41.465621
9		Clamshell Tugboat auxiliary engine	3.4891573	3.10535	3.4891573	127.85269	0.1375725	137.07404	7.0857308	7.370775	6.10463E-05	0.000350451	7.4767356
9		Clamshell Tugboat propulsion engine	845.85092	752.80731	845.85092	16543.849	13.732638	12438.984	916.87751	735.75894	0.007899252	0.034982404	746.38118
9		Clamshell Tugboat auxiliary engine	62.804832	55.8963	62.804832	2301.3485	2.4763048	2467.3327	127.54316	132.67395	0.001098833	0.006308117	134.58124
9		Clamshell Crew boat propulsion engine	31.20149	27.769326	31.20149	610.26443	0.5065654	458.84544	33.821497	27.140451	0.000291385	0.00129042	27.532281
9		Clamshell Crew boat auxiliary engine	1.3315806	1.1851067	1.3315806	48.792918	0.0525023	52.312095	2.7041549	2.8129374	2.32973E-05	0.000133744	2.8533755
9		Clamshell Survey boat propulsion engine	27.841329	24.778783	27.841329	544.54365	0.4520122	409.43131	30.179182	24.217633	0.000260005	0.001151452	24.567266
10		Standby Area (clam shell dredge 921,000 CY)											
10		Marine Clamshell Dredge											
10		Clamshell Dredge hoist	99.087302	99.087302	99.087302	3012.254	3.2990364	1717.5132	166.94229	131.32805	0	0	131.32805
10		Clamshell Dredge generator	74.315476	74.315476	74.315476	2259.1905	2.4742773	1288.1349	125.20671	72.559353	0	0	72.559353
10		Clamshell Barge dump scow	10.509259	10.509259	10.509259	199.67593	0.3498978	182.16049	11.06625	8.6776973	0	0	8.6776973
10		Clamshell Tugboat propulsion engine	94.399291	84.015369	94.399291	1846.3391	1.5326003	1388.2249	102.32605	82.112723	0.000881578	0.003904133	83.298194
10		Clamshell Tugboat auxiliary engine	7.0091921	6.238181	7.0091921	256.83683	0.2763624	275.36112	14.234167	14.806778	0.000122633	0.000704003	15.019637
10		Clamshell Tugboat propulsion engine	1699.1872	1512.2766	1699.1872	33234.103	27.586805	24988.048	1841.869	1478.029	0.01586841	0.070274386	1499.3675
10		Clamshell Tugboat auxiliary engine	126.16546	112.28726	126.16546	4623.0629	4.9745238	4956.5002	256.21501	266.52201	0.002207391	0.012672059	270.35347
10		Clamshell Crew boat propulsion engine	62.679099	55.784398	62.679099	1225.9294	1.0176136	921.75146	67.9423	54.521082	0.000585349	0.00259226	55.30821
10		Clamshell Crew boat auxiliary engine	2.6749451	2.3807012	2.6749451	98.017632	0.1054693	105.08713	5.4322403	5.6507681	4.68008E-05	0.000268671	5.7320022
10		Clamshell Survey boat propulsion engine	55.929042	49.776848	55.929042	1093.9063	0.9080245	822.48592	60.625437	48.649581	0.000522311	0.002313094	49.351941
11		Standby Area (clam shell dredge 118,000 CY)											
11		Marine Clamshell Dredge											
11		Clamshell Dredge hoist	23.571429	23.571429	23.571429	716.57143	0.7847928	408.57143	39.713143	31.241033	0	0	31.241033
11		Clamshell Dredge generator	17.678571	17.678571	17.678571	537.42857	0.5885946	306.42857	29.784857	17.260815	0	0	17.260815
11		Clamshell Barge dump scow	2.5	2.5	2.5	47.5	0.0832356	43.333333	2.6325	2.064298	0	0	2.064298
11		Clamshell Tugboat propulsion engine	22.456219	19.986035	22.456219	439.21722	0.3645833	330.23851	24.341881	19.533423	0.000209715	0.000928736	19.81543
11		Clamshell Tugboat auxiliary engine	1.6673849	1.4839726	1.6673849	61.097747	0.0657426	65.504407	3.3861015	3.5223173	2.91726E-05	0.000167472	3.5729533
11		Clamshell Tugboat propulsion engine	404.21194	359.74863	404.21194	7905.91	6.5624998	5944.2933	438.15386	351.60162	0.003774864	0.016717255	356.67773
11		Clamshell Tugboat auxiliary engine	30.012928	26.711506	30.012928	1099.7594	1.1833669	1179.0793	60.949826	63.401711	0.000525106	0.003014499	64.313159
11		Clamshell Crew boat propulsion engine	14.910446	13.270297	14.910446	291.63079	0.2420755	219.27127	16.162485	12.969773	0.000139246	0.000616661	13.157019
11		Clamshell Crew boat auxiliary engine	0.6363306	0.5663342	0.6363306	23.31697	0.0250896	24.9987	1.292251	1.3442356	1.11332E-05	6.3913E-05	1.36356
11		Clamshell Survey boat propulsion engine	13.304706	11.841188	13.304706	260.2244	0.2160058	195.65744	14.42191	11.573028	0.00012425	0.000550251	11.740109

Note: clamshell dredge would be electric with mitigation; assume 90 percent reduction in diesel exhaust emissions.

Appendix H2 Criteria Pollutant Dispersion Modeling Analysis

H2.1 Introduction

This appendix describes the methods and results of the air dispersion modeling performed to evaluate ground-level concentrations of criteria pollutants resulting from construction activities of All Action Alternatives. The Action Alternatives are described in detail in Section 4 (Plan Formulation). The No Action Alternative is also described in detail in Section 4 (Plan Formulation), is assessed qualitatively in Sections 5.5 (Air Quality Environmental Consequences) and 5.6 (Greenhouse Gas Environmental Consequences) of the DEIS/DEIR, and therefore is not included in this appendix. Implementation of the No Action and Action Alternatives would not result in operational activities and would therefore not result in operational impacts.

The air dispersion modeling was performed using the U.S. Environmental Protection Agency's (USEPA) AERMOD Modeling System, version 18081 (USEPA 2019a), which was the most recent version available at the time of the analysis. The following pollutants and averaging times were modeled:

- Nitrogen dioxide (NO₂) - 1-hour and annual
- Carbon monoxide (CO) - 1-hour and 8-hour
- Sulfur dioxide (SO₂) - 1-hour and 24-hour
- Particulate matter less than 10 microns in diameter (PM₁₀) - 24-hour and annual
- Particulate matter less than 2.5 microns in diameter (PM_{2.5}) - 24-hour

For CEQA impacts, the predicted ground-level concentrations were compared to applicable South Coast Air Quality Management District (SCAQMD) ambient air quality thresholds (SCAQMD 2019a) and the federal 1-hour NO₂ standard (USEPA 2019b) to determine their significance. SCAQMD also has ambient air quality thresholds for sulfate and lead; however, these pollutants were not modeled because impacts from the Action Alternatives would be well below the thresholds due to the low sulfur and lead levels in modern diesel fuel used in marine and other diesel equipment. The predicted ground-level concentrations were compared to the national ambient air quality standards (NAAQS) to determine their significance under NEPA.

H2.2 Development of Emission Scenarios

Construction Emissions

The dispersion modeling analysis included emissions from the following construction sources:

- Marine sources (i.e., diesel engine exhaust from hopper dredge, clamshell dredge, tugboats, crew boats, and survey boats)
- Off-road construction equipment (diesel engine exhaust)
- On-road vehicles driving and idling onsite (diesel engine exhaust)
- Onsite fugitive dust

These construction sources are further described in Section 5.5 of the EIS/EIR. Construction emissions used in the modeling analysis were calculated using the methods described in Appendix H1. The approach to developing the emissions for the various averaging times required for the dispersion modeling analysis is described in the following paragraphs.

Annual emissions were calculated for each year of construction based on the proposed construction schedule and the number of workdays anticipated for each construction activity. Peak daily (i.e., 24-hour) emissions were calculated for each year of construction based on the construction schedule and the

anticipated daily hours of operation for each construction activity and equipment type. The peak daily emissions represent the highest emissions that would occur from the various combinations of overlapping construction activities during each year of construction. Peak 8-hour and 1-hour emission rates were scaled from the peak daily emission rates in proportion to the number of operating hours for each activity or equipment type. For example, equipment that would operate 8 hours per day would have scaling factors of 1.0 (8-hr averaging time/8 hours operation per day) for peak 8-hour and 0.125 (1-hr averaging time/8 hours operation per day) for peak 1-hour emissions (applied to the peak daily emission rates). Equipment that would operate 4 hours per day would have scaling factors of 1.0 (i.e., all emissions) for peak 8-hour and 0.25 (1-hr averaging time/4 hours operation per day) for peak 1-hour emissions. This approach conservatively assumes that all equipment that operates on the peak day would also operate during the peak 8-hour and 1-hour periods.

The construction schedule and activity assumptions were developed by USACE, the Port, and the Port's engineering consultant, AECOM, and are presented in Appendix H1 tables.

For the annual averaging period, the analysis year producing the highest total construction emissions within the modeling domain was selected for modeling. Specifically, the construction period when hopper dredging and clamshell dredging would occur in the same year would produce the highest emissions. For Action Alternatives 2, 3, and 5, this construction period would occur in 2025; for Action Alternative 4, this construction period would occur in 2026.

For short-term averaging periods (24-hour, 8-hour, 1-hour), the combination of overlapping construction tasks, described in Appendix H1, that would produce the highest concentrations was selected for modeling. The following three combinations were considered and evaluated via AERMOD test runs:

- Combination 1: Overlap of construction Task 1 (Electrical Substation Construction, mitigated scenario only), Task 2 (Pier J Breakwater Construction), Task 3 (Pier J Wharf Upgrade), and Task 4 (Pier T Wharf Upgrade)
- Combination 2: Overlap of construction Task 5 (Approach Channel Dredging) and Task 6 (Main Channel Widening)
- Combination 3: Construction Task 7 (Dredging of West Basin). This task would not overlap with other construction tasks but was chosen for consideration because dredging in the West Basin would be closest to land-receptors.

AERMOD test runs showed that for all Action Alternatives, the highest short-term concentrations would occur for Combination 2, during overlap of construction Task 5 (Approach Channel Dredging) and Task 6 (Main Channel Widening). Therefore, Combination 2 was selected for modeling.

The schedule and equipment utilization assumed in this analysis are anticipated to result in conservatively high emission estimates because assumptions reflect an accelerated schedule and the earliest foreseeable construction years. Postponement of construction activities from the assumed schedule would likely result in lower impacts as increasingly stringent regulatory requirements are implemented compared to those assumed in the analysis years. The anticipated construction schedule and equipment utilization for each Action Alternative are included in Appendix H1.

H2.3 Dispersion Model Selection and Inputs

Model Selection

AERMOD version 18081 (USEPA 2019a) was used to perform the dispersion modeling for the air quality impact analysis. The AERMOD model was selected for the following reasons:

- AERMOD is a USEPA regulatory default model for dispersion modeling;
- General acceptance by the modeling community and regulatory agencies of its ability to provide reasonable results for large industrial complexes with multiple emission sources;
- Ability of the model to handle the various physical characteristics of Project emission sources, including “point,” “area,” and “volume” source types.

Temporal Distribution

Construction emission sources were modeled with diurnal emission patterns that reflect the daily cycle of activity associated with the Action Alternatives. The diurnal emission patterns assumed in AERMOD are shown in Table H2.1.

Table H2.1. Temporal Distribution of Emissions in AERMOD

Source Category	Time Period	Hours per Day
Hopper dredge	12am-12am	24
Clamshell dredge	12am-12am	24
Tugboats	12am-12am	24
Off-road construction equipment	7am-3pm	8
Crew boats	6am-6pm	12
Construction trucks	7am-3pm	8
Fugitive dust	7am-3pm	8

Emission Source Representation

AERMOD simulated all construction emissions as a collection of line and polygon-area sources. Polygon area sources simulate emissions emanating from a flat, non-rectangular, area with no thermal buoyancy or velocity (plume rise) associated with the emissions. Polygon area sources were used to model all dredging activities, harbor craft activities during dredging activities, on-site truck emissions, and land-side on-site fugitive dust. Line sources simulate emissions from volume sources moving along a path based on a start-point, end-point, and the path width with no thermal buoyancy or velocity (plume rise) associated with the emissions. Line sources were used to model hopper dredge and tugboat activities during transit to off-shore disposal locations.

Table H2.2 provides the source parameters used in AERMOD for the polygon-area and line sources. The initial vertical dimensions for polygon-area and line sources were determined based on USEPA guidance (USEPA 2019c).

All emission sources were positioned by using the Universal Transverse Mercator 13 coordinate system (NAD-83) referenced to topographic data obtained from the United States Geological Survey (USGS).

Figure H2.1 shows the locations of the construction sources modeled in AERMOD. The figure depicts the sources used to model annual concentrations. For short-term concentrations (1-hour, 8-hour, and 24-

hour averages), the AERMOD sources associated with dredging activities were condensed into reasonable daily work areas conservatively located closest to on-land receptors. For example, the Approach Channel Dredging task ("J" in the figure) was condensed into a 200 meter by 100 meter rectangular source at the far northern end of the dredging area for the short-term modeling.

Table H2.2. Source Parameters in AERMOD

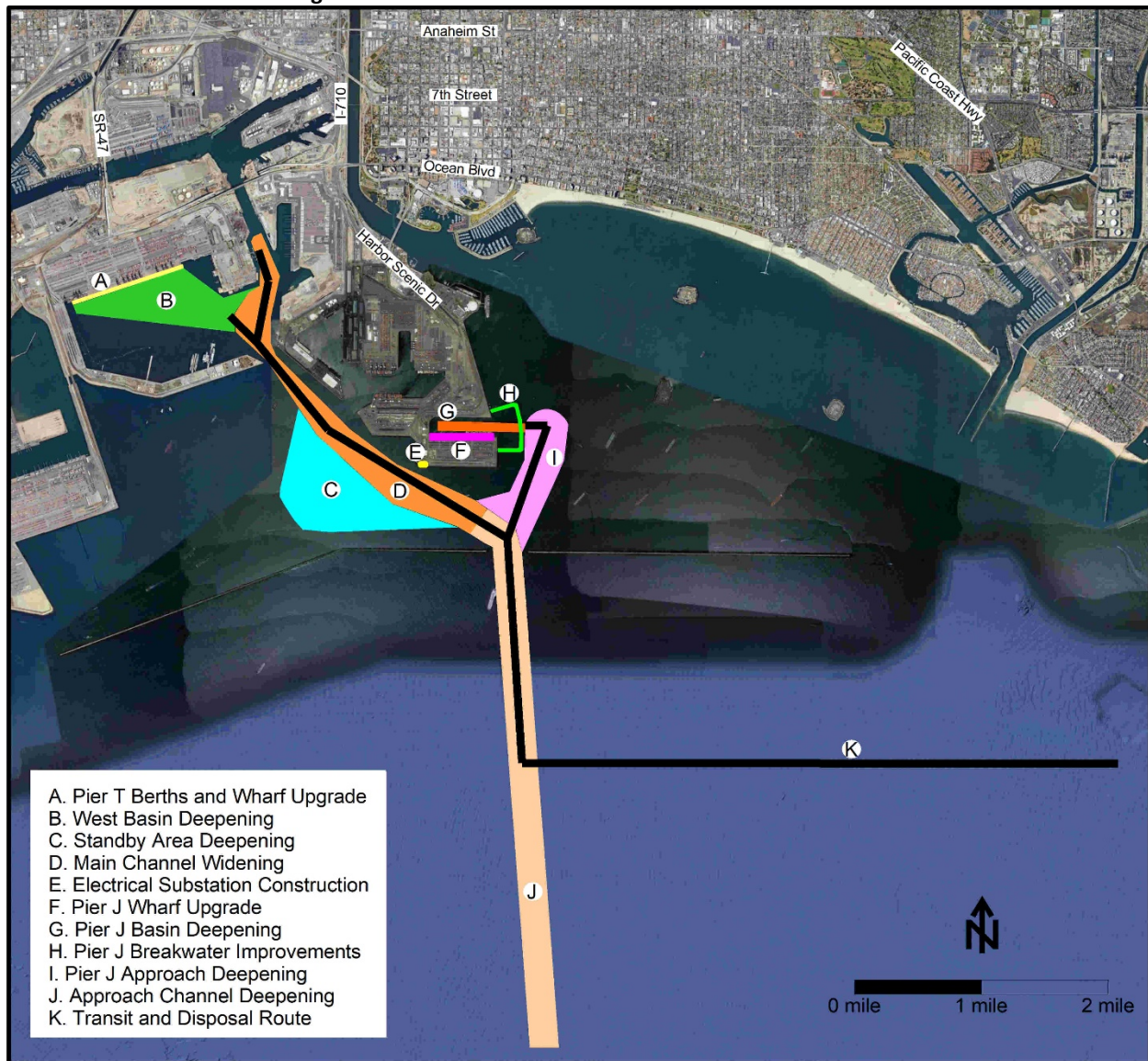
Source Category	Source Type	Source Height (m)	Vertical Dispersion Coefficient σ_z (m) ^h	Line Source Width (m)
Hopper dredge – transit ^a	Line	21.29	4.95	100
Hopper dredge – dredging ^a	Poly-area	21.29	4.95	n/a
Clamshell dredge ^b	Poly-area	24.23	5.64	n/a
Tugboats – transit ^c	Line	15.2	3.5	100
Tugboats – dredging ^c	Poly-area	15.2	3.5	n/a
Off-road construction equipment ^d	Poly-area	4.6	1.1	n/a
Crew boats ^e	Poly-area	15.2	3.5	n/a
Construction trucks ^f	Poly-area	4.6	1.1	n/a
Fugitive dust ^g	Poly-area	1.0	0.2	n/a

Notes:

- a. Release height (69'10") provided by Dutra Group (dredging contractor) for Stuyvesant hopper dredge (email from Dutra to iLanco 7/26/19). Width assumed to be 100 meters (approximately 50% of channel width).
- b. Release height (79'6") provided by Dutra Group (dredging contractor) for Stuyvesant hopper dredge (email from Dutra to iLanco 7/26/19).
- c. Source height (50') is from the Pier S Marine Terminal + Back Channel Improvements Project FEIS/FEIR (November 2012), Appendix B, Page A-2-7; and the Middle Harbor Redevelopment Project FEIS/FEIR (April 2009), Appendix A-2, Page A-2-6. Width assumed to be 100 meters (approximately 50% of channel width).
- d. Source height (15') is from the Pier S Marine Terminal + Back Channel Improvements Project FEIS/FEIR (November 2012), Appendix B, Page A-2-5; and the Middle Harbor Redevelopment Project FEIS/FEIR (April 2009), Appendix A-2, Page A-2-4.
- e. Source height is assumed to be similar to tugboats and therefore was set to 50'.
- f. Source height (15') is from the Pier S Marine Terminal + Back Channel Improvements Project FEIS/FEIR (November 2012), Appendix B, Page A-2-8; and the Middle Harbor Redevelopment Project FEIS/FEIR (April 2009), Appendix A-2, Page A-2-7.
- g. Fugitive dust source height is set close to ground-level, at a nominal 1 meter.
- h. Vertical dispersion coefficient was calculated by dividing the source height (assumed to be representative of the vertical dimension) by 4.3 in accordance with USEPA AERMOD guidelines (USEPA, 2019c).

1

Figure H2.1. Construction Sources Modeled in AERMOD



2

3

4 Meteorological Data

5 Meteorological data recorded at the POLB Gull Park monitoring station was selected to simulate
6 meteorological conditions within the dispersion modeling domain because of its proximity to the dredging
7 areas and affected terminals. The AERMOD sources for the construction modeling are located in the
8 Middle Harbor, Outer Harbor, and Beyond the Breakwater meteorological zones as defined in Figure I-3
9 of the San Pedro Bay Ports' "Sphere of Influence" analysis (POLB and POLA 2010). According to the
10 analysis, the four meteorological stations representative of those meteorological zones are Liberty Hill
11 Plaza, Terminal Island Treatment Plant, Berth 47, and Gull Park. Figure I-3 of the analysis shows that the
12 Gull Park station is the most centrally located station relative to the AERMOD sources. Therefore,
13 meteorological data from the Gull Park station were selected for the AERMOD modeling.

14 The Gull Park meteorological data set was processed for use in AERMOD in 2018 (Leidos 2018) using the
15 most recent available USEPA guidance (USEPA 2015; USEPA 2016). The SCAQMD provided additional input

and guidance on the overall methodology, dataset choice, physical parameter characterization, and seasonality/precipitation parameters. The processing was accomplished using USEPA's AERMET processor (Version 16216) and pre-processor programs AERMINUTE (Version 15272) and AERSURFACE (Version 13016). Consistent with USEPA's *Guideline on Air Quality Models* (USEPA 2017), the data set consists of hourly readings over a period of five calendar years. The five most recent available years meeting USEPA's data completeness requirements for wind speed, wind direction, and temperature were selected. For Gull Park, the selected years were 2011, 2012, 2013, 2015, and 2016. Year 2014 was not selected because it did not meet the data completeness requirement. Per USEPA guidance (USEPA 2017), the five selected years of data do not have to be consecutive.

Modeling Approach

Standard control parameters were used in AERMOD, including stack-tip downwash, non-screening mode, non-flat terrain, and sequential meteorological data check. Use of these options follows the USEPA modeling guidance (USEPA 2017). Source and receptor elevations were determined using USEPA's AERMAP terrain preprocessor (version 18081) with 1 arcsecond national elevation dataset (NED) files. As recommended by SCAQMD (SCAQMD 2019b), all sources were modeled with urban dispersion coefficients. An urban population of 9,818,605 representative of the Los Angeles County was used in AERMOD.

Consistent with USEPA AERMOD Guidance (USEPA 2019), the conversion of nitrogen oxide (NO_x) to NO₂ in ambient air was simulated in AERMOD using the Ambient Ratio Method (ARM2). The ARM2 option applies an ambient ratio to the 1-hr modeled NO_x concentrations based on a formula derived empirically from ambient monitored ratios of NO₂/NO_x. The default upper and lower limits on the ambient ratio applied to the modeled NO_x concentration are 0.9 and 0.5, respectively.

For each combination of pollutant and averaging time except for the federal 1-hour NO₂ concentration, the highest concentration of all modeled off-site receptors is reported in the results tables at the end of this appendix. To be consistent with the federal 1-hour NO₂ standard, the federal 1-hour NO₂ concentration is the 98th percentile (8th highest) of the annual distribution of the daily maximum 1-hour concentrations, averaged over all five years of meteorological data.

The CEQA significance thresholds for ambient concentrations are presented in Section 12.2.3 of the EIS/EIR. The NO₂ and CO thresholds are absolute concentration thresholds, meaning that the modeled concentrations are added to the background concentrations for the Project vicinity, and the resulting total concentrations are compared to the thresholds (SCAQMD 2011, USEPA 2019b). The PM₁₀ and PM_{2.5} thresholds are incremental concentration thresholds, meaning that the modeled concentrations are compared directly to the thresholds without adding the background concentrations (SCAQMD 2011).

The NEPA significance thresholds for ambient concentrations are the NAAQS, as presented in Section 5.5.1 of the EIS/EIR. Therefore, all of the thresholds are absolute concentration thresholds, meaning that the modeled concentrations are added to the background concentrations near the project area, and the resulting total concentrations are compared to the thresholds.

Table H2.3 presents the background concentrations used in the dispersion modeling. The background concentrations were derived from the monitored concentrations near the project area over the last 3 calendar years (2016, 2017, and 2018) of available data. Because it is the most representative site, the POLB Gull Park monitoring station was used for all pollutants except for PM_{2.5}. POLB's Superblock station was used for the PM_{2.5} background concentration because the Gull Park station has no Federal Reference Method (FRM) PM_{2.5} monitor (POLB 2016; POLB 2017; POLB 2018). The Superblock station is located about 2 miles north of the construction site, in a commercial/industrial area adjacent to the Port.

1 **Table H2.3. Background Concentrations**

Pollutant	Averaging Period	Monitored Concentration ^{a,i,j}			Background Concentration ^c	
		2016	2017	2018	(ppm)	(ug/m ³) ^d
NO ₂ (ppm)	1-Hour State	0.086	0.096	0.083	0.096	181
	1-Hour Federal ^b	--	--	--	0.075	141
	Annual	0.018	0.018	0.017	0.018	34
CO (ppm)	1-Hour	2.0	2.1	1.9	2.1	2,411
	8-Hour	1.7	1.7	1.5	1.7	1,952
SO ₂ (ppm)	1-Hour State	0.012	0.012	0.011	0.012	32
	1-Hour Federal ^e	--	--	--	0.009	24
	24-Hour	0.003	0.005	0.004	0.005	13
PM ₁₀ (ug/m ³)	24-Hour Federal ^f	51.2	66.4	48.6	--	66.4
PM _{2.5} (ug/m ³)	24-Hour Federal ^g	--	--	--	--	27.2
	Annual Federal ^h	8.7	9.3	9.5	--	9.2

2 ppm = parts per million; ug/m³ = micrograms per cubic meter.

3 Notes:

- 4 a. All reported values represent the highest recorded concentration during the year unless otherwise noted.
- 5 b. The background concentration reported for the federal 1-hour NO₂ standard represents the three-year average
- 6 (2016-2018) of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations.
- 7 c. The background concentrations for 1-hour federal NO₂, 1-hour federal SO₂, 24-hour federal PM_{2.5}, and annual
- 8 federal PM_{2.5} are three-year averages. The background concentrations for all other pollutants or averaging
- 9 periods are the maximum of the concentrations for the 3 reported years.
- 10 d. The concentration in micrograms per cubic meter (ug/m³) is calculated as follows: ug/m³ = ppm x MW /
- 11 0.0244. The molecular weights (MW) are 28.01 for CO, 46.0055 for NO₂, and 64.066 for SO₂.
- 12 e. The background concentration reported for the federal 1-hour SO₂ standard represents the three-year average
- 13 (2016-2018) of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.
- 14 f. The 24-hour federal PM₁₀ concentration reported for each year is the 2nd highest concentration during the
- 15 year. The background concentration is the highest of the 2nd highest concentrations.
- 16 g. The background concentration reported for the federal 24-hour PM_{2.5} standard represents the three-year
- 17 average (2016-2018) of the 98th percentile of the annual distribution of 24-hour average concentrations.
- 18 h. The background concentration reported for the federal annual PM_{2.5} concentration is the three-year average
- 19 of the annual mean concentrations.
- 20 i. The concentrations in this table were recorded at POLB's Gull Park monitoring station except for PM_{2.5}, which
- 21 was recorded at POLB's Superblock station because the Gull Park station has no Federal Reference Method
- 22 (FRM) PM_{2.5} monitor.
- 23 j. Source: Air Quality Monitoring Program at the Port of Long Beach. Annual Summary Reports. Calendar Years
- 24 2016, 2017, and 2018 (POLB 2016; POLB 2017; POLB 2018).

26 Receptor Locations

27 Cartesian coordinate receptor grids were used to provide adequate spatial coverage surrounding the
28 Project area to assess ground-level pollution concentrations, identify the extent of significant impacts,
29 and identify maximum-impact locations. Receptors over water were not considered in determining the
30 maximum receptor locations because any human exposure would be brief and transient. The following
31 receptor spacing was used in the modeling:

- 32 • Receptors positioned every 50 m along the site boundary, which, for this project, is considered to
- 33 be the shoreline.

- Receptor grid starting at the site boundary and extending outwards to 500 m, with receptors spaced 50 m apart;
- Receptor grid starting at 500 m and extending outwards to 1 kilometer (km), with receptors placed 100 m apart; and
- Receptor grid starting at 1 km and extending outwards to 5 km, with receptors placed 250 meters (m) apart.

H2.4 Predicted Air Quality Impacts

Table H2.4 presents the maximum offsite pollutant concentrations for the CEQA analysis associated with all unmitigated Action Alternatives. This table presents the highest modeled concentrations on land. Concentrations at all other modeled on-land receptors would be less than the displayed values.

Table H2.4. Maximum Pollutant Concentrations for CEQA, Prior to Mitigation – Action Alternatives

Pollutant	Averaging Time	Maximum Modeled Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	Significance Threshold (ug/m3)	Concentration Above Threshold?
Alternative 2						
NO ₂	1-Hour State	173.2	181.0	354	339	Yes
	1-Hour Federal	133.0	141.4	274	188	Yes
	Annual	2.0	33.9	36	57	No
SO ₂	1-Hour State	0.4	31.5	32	655	No
	1-Hour Federal	0.4	23.6	24	196	No
	24-Hour State	0.05	13.1	13	105	No
CO	1-Hour	197.1	2,410.7	2,608	23,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.1	n/a	0.1	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No
Alternative 3						
NO ₂	1-Hour State	173.2	181.0	354	339	Yes
	1-Hour Federal	133.0	141.4	274	188	Yes
	Annual	2.3	33.9	36	57	No
SO ₂	1-Hour State	0.4	31.5	32	655	No
	1-Hour Federal	0.4	23.6	24	196	No
	24-Hour State	0.05	13.1	13	105	No
CO	1-Hour	197.1	2,410.7	2,608	23,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No

Pollutant	Averaging Time	Maximum Modeled Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	Significance Threshold (ug/m3)	Concentration Above Threshold?
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.1	n/a	0.1	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No
Alternative 4						
NO ₂	1-Hour State	173.2	181.0	354	339	Yes
	1-Hour Federal	133.0	141.4	274	188	Yes
	Annual	3.0	33.9	37	57	No
SO ₂	1-Hour State	0.4	31.5	32	655	No
	1-Hour Federal	0.4	23.6	24	196	No
	24-Hour State	0.05	13.1	13	105	No
CO	1-Hour	197.1	2,410.7	2,608	23,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.2	n/a	0.2	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No
Alternative 5						
NO ₂	1-Hour State	173.2	181.0	354	339	Yes
	1-Hour Federal	133.0	141.4	274	188	Yes
	Annual	2.3	33.9	36	57	No
SO ₂	1-Hour State	0.4	31.5	32	655	No
	1-Hour Federal	0.4	23.6	24	196	No
	24-Hour State	0.05	13.1	13	105	No
CO	1-Hour	197.1	2,410.7	2,608	23,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.1	n/a	0.1	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No

- 1
- 2 Table H2.5 presents the maximum offsite pollutant concentrations for the NEPA analysis associated with
- 3 all unmitigated Action Alternatives. This table presents the highest modeled concentrations on land.
- 4 Concentrations at all other modeled on-land receptors would be less than the displayed values.

1 **Table H2.5. Maximum Pollutant Concentrations for NEPA, Prior to Mitigation – Action Alternatives**

Pollutant	Averaging Time	Maximum Modeled Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	NAAQS (ug/m3)	Concentration Exceeds NAAQS?
<i>Alternative 2</i>						
NO ₂	1-Hour	133.0	141.4	274	188	Yes
	Annual	2.0	33.9	36	100	No
SO ₂	1-Hour	0.4	23.6	24	196	No
CO	1-Hour	197.1	2,410.7	2,608	40,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.09	9.2	9.3	12.0	No
<i>Alternative 3</i>						
NO ₂	1-Hour	133.0	141.4	274	188	Yes
	Annual	2.3	33.9	36	100	No
SO ₂	1-Hour	0.4	23.6	24	196	No
CO	1-Hour	197.1	2,410.7	2,608	40,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.1	9.2	9.3	12.0	No
<i>Alternative 4</i>						
NO ₂	1-Hour	133.0	141.4	274	188	Yes
	Annual	3.0	33.9	37	100	No
SO ₂	1-Hour	0.4	23.6	24	196	No
CO	1-Hour	197.1	2,410.7	2,608	40,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.1	9.2	9.3	12.0	No
<i>Alternative 5</i>						
NO ₂	1-Hour	133.0	141.4	274	188	Yes
	Annual	2.3	33.9	36	100	No
SO ₂	1-Hour	0.4	23.6	24	196	No
CO	1-Hour	197.1	2,410.7	2,608	40,000	No
	8-Hour	57.9	1,951.5	2,009	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.1	9.2	9.3	12.0	No

2

3 Figure H2.2 shows the areas where the modeled 1-hour federal NO₂ concentration (presented in both

4 Tables H2.4 and H2.5) would exceed the threshold, and the location of the maximum on-land receptor.

5 Figure H.2.3 shows the areas where the modeled 1-hour state NO₂ concentration (presented in Table H2.4

6 only) would exceed the threshold, and the location of the maximum receptor. Both figures apply to all

7 Action Alternatives because short-term activities (24-hour, 8-hour, and 1-hour) would be nearly identical

and would therefore result in the same concentrations for all Action Alternatives. In all cases, the exceedance areas are over Port property and open water.

Section 5.5.5 of the EIS/EIR identifies five mitigation measures to reduce construction emissions, of which three are quantified. The following three measures were quantified in the dispersion modeling. The remaining mitigation measures were assessed qualitatively in the EIS/EIR.

MM-AQ-1: Electric clamshell dredge. The use of an electric clamshell dredge shall be required for project clamshell dredging activities during the entire construction period of the project, and the construction of an electrical substation at Pier J is also required to provide electric power to the clamshell dredge. This mitigation measure would reduce significant Impacts AQ-1, AQ-3, and AQ-4.

MM-AQ-2: Construction-Related Harbor Craft. Construction-related harbor craft (tugboats, crew boats, and survey boats) with Category 1 or Category 2 marine engines shall meet USEPA Tier 3 emission standards for marine engines. In addition, the construction contractor shall require all construction-related tugboats that home fleet in the San Pedro Bay Ports: 1) to shut down their main engines and 2) to refrain from using auxiliary engines while at dock and instead use electrical shore power, if feasible. This mitigation measure would reduce significant Impacts AQ-1, AQ-3, and AQ-4.

MM-AQ-3: Off-Road Construction Equipment. Self-propelled, diesel-fueled off-road construction equipment 25 hp or greater shall meet USEPA/CARB Tier 4 emission standards for non-road equipment. This mitigation measure would reduce significant Impacts AQ-1, AQ-3, and AQ-4.

Figure H2.2. Location of Maximum Concentration and Area of Exceedance of the 1-Hour Federal NO₂ Threshold, Without Mitigation



Figure H2.2. Location of Maximum Concentration and Area of Exceedance of the 1-Hour State NO₂ Threshold, Without Mitigation



- 1 Table H2.6 presents the maximum offsite pollutant concentrations for the CEQA analysis associated with
- 2 all mitigated Action Alternatives. This table presents the highest modeled concentrations on land.
- 3 Concentrations at all other modeled on-land receptors would be less than the displayed values.

4 **Table H2.6. Maximum Pollutant Concentrations for CEQA, After Mitigation – Action Alternatives**

Pollutant	Averaging Time	Maximum Modeled Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	Significance Threshold (ug/m3)	Concentration Above Threshold?
Alternative 2						
NO ₂	1-Hour State	138.8	181.0	320	339	No
	1-Hour Federal	114.9	141.4	256	188	Yes
	Annual	0.9	33.9	35	57	No
SO ₂	1-Hour State	0.1	31.5	32	655	No
	1-Hour Federal	0.1	23.6	24	196	No
	24-Hour State	0.02	13.1	13	105	No
CO	1-Hour	129.7	2,410.7	2,540	23,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.05	n/a	0.05	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No
Alternative 3						
NO ₂	1-Hour State	138.8	181.0	320	339	No
	1-Hour Federal	114.9	141.4	256	188	Yes
	Annual	1.2	33.9	35	57	No
SO ₂	1-Hour State	0.1	31.5	32	655	No
	1-Hour Federal	0.1	23.6	24	196	No
	24-Hour State	0.02	13.1	13	105	No
CO	1-Hour	129.7	2,410.7	2,540	23,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.06	n/a	0.06	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No
Alternative 4						
NO ₂	1-Hour State	138.8	181.0	320	339	No
	1-Hour Federal	114.9	141.4	256	188	Yes

Pollutant	Averaging Time	Maximum Modeled Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	Significance Threshold (ug/m3)	Concentration Above Threshold?
	Annual	1.9	33.9	36	57	No
SO ₂	1-Hour State	0.1	31.5	32	655	No
	1-Hour Federal	0.1	23.6	24	196	No
	24-Hour State	0.02	13.1	13	105	No
CO	1-Hour	129.7	2,410.7	2,540	23,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.1	n/a	0.1	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No
Alternative 5						
NO ₂	1-Hour State	138.8	181.0	320	339	No
	1-Hour Federal	114.9	141.4	256	188	Yes
	Annual	1.2	33.9	35	57	No
SO ₂	1-Hour State	0.1	31.5	32	655	No
	1-Hour Federal	0.1	23.6	24	196	No
	24-Hour State	0.02	13.1	13	105	No
CO	1-Hour	129.7	2,410.7	2,540	23,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	n/a	1.9	10.4	No
	Annual	0.06	n/a	0.06	1.0	No
PM _{2.5}	24-Hour	1.7	n/a	1.7	10.4	No

1

2

- 1 Table H2.7 presents the maximum offsite pollutant concentrations for the NEPA analysis associated with
2 all mitigated Action Alternatives. This table presents the highest modeled concentrations on land.
3 Concentrations at all other modeled on-land receptors would be less than the displayed values.

4 **Table H2.7. Maximum Pollutant Concentrations for NEPA, After Mitigation – Action Alternatives**

Pollutant	Averaging Time	Maximum Modeled Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	NAAQS (ug/m3)	Concentration Exceeds NAAQS?
Alternative 2						
NO ₂	1-Hour	114.9	141.4	256	188	Yes
	Annual	0.9	33.9	35	100	No
SO ₂	1-Hour	0.1	23.6	24	196	No
CO	1-Hour	129.7	2,410.7	2,540	40,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.04	9.2	9.2	12.0	No
Alternative 3						
NO ₂	1-Hour	114.9	141.4	256	188	Yes
	Annual	1.2	33.9	35	100	No
SO ₂	1-Hour	0.1	23.6	24	196	No
CO	1-Hour	129.7	2,410.7	2,540	40,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.06	9.2	9.2	12.0	No
Alternative 4						
NO ₂	1-Hour	114.9	141.4	256	188	Yes
	Annual	1.9	33.9	36	100	No
SO ₂	1-Hour	0.1	23.6	24	196	No
CO	1-Hour	129.7	2,410.7	2,540	40,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.1	9.2	9.3	12.0	No
Alternative 5						
NO ₂	1-Hour	114.9	141.4	256	188	Yes
	Annual	1.2	33.9	35	100	No
SO ₂	1-Hour	0.1	23.6	24	196	No
CO	1-Hour	129.7	2,410.7	2,540	40,000	No
	8-Hour	44.0	1,951.5	1,995	10,000	No
PM ₁₀	24-Hour	1.9	66.4	68	150	No
PM _{2.5}	24-Hour	1.7	27.2	29	35	No
	Annual	0.06	9.2	9.2	12.0	No

Figure H2.3 shows the area where the mitigated modeled 1-hour federal NO₂ concentration (presented in both Tables H2.6 and H2.7) would exceed the threshold, and the location of the maximum on-land receptor. The figure applies to all Action Alternatives because short-term activities (24-hour, 8-hour, and 1-hour) would be nearly identical and would therefore result in the same concentrations for all Action Alternatives. The exceedance area is over Port property and open water. There is no figure for the 1-hour state NO₂ concentration because the mitigation measures would reduce the modeled on-land concentrations to less than significant.

Figure H2.3. Location of Maximum Concentration and Area of Exceedance of the 1-Hour Federal NO₂ Threshold, With Mitigation



References for Appendix H2

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Appendix H3. Potential Impacts of Criteria Pollutant Emissions on Public Health

H3.1. Potential Impact of Significant Regional Emissions on Public Health

In *Sierra Club v. County of Fresno* (2018), the California Supreme Court ruled that an EIR for a proposed master-planned, mixed-use development in Fresno County known as Friant Ranch did not adequately relate the expected adverse air quality impacts to likely health consequences or explain in meaningful detail why it is not feasible at the time of drafting to provide such an analysis. The specific language in the Court's decision is provided below.

The EIR fails to provide an adequate discussion of health and safety problems that will be caused by the rise in various pollutants resulting from the Project's development. At this point, we cannot know whether the required additional analysis will disclose that the Project's effects on air quality are less than significant or unavoidable, or whether that analysis will require reassessment of proposed mitigation measures. Absent an analysis that reasonably informs the public how anticipated air quality effects will adversely affect human health, an EIR may still be sufficient if it adequately explains why it is not scientifically feasible at the time of drafting to provide such an analysis.

In response to the Court's decision, this section provides a discussion of the potential health effects associated with the TSP's significant construction emissions identified in Impact AQ-1.

Impact AQ-1 concluded that the TSP's mitigated construction emissions would exceed the SCAQMD's daily emission thresholds for PM_{2.5}, NO_x, CO, and VOC with mitigation. The SCAQMD's daily emission thresholds relate to *regional* air quality impacts. An exceedance of a daily emission threshold means the TSP would make a significant contribution to regional air pollutant emissions in the SCAB. However, a daily emission threshold exceedance does not necessarily mean that the TSP would contribute to a violation of the CAAQS or NAAQS or cause adverse health effects. Further analysis, discussed below, would be necessary to determine the downwind ambient concentrations of the emitted pollutant (or secondary pollutants formed from that pollutant) in the atmosphere where the general population would be exposed.

The pollutants evaluated for potential regional health effects associated with TSP construction are PM_{2.5}, NO₂, CO, and ozone. PM_{2.5} would be both directly emitted ("primary" PM_{2.5}) and would form through secondary reactions of precursor pollutants NO_x and VOC ("secondary" PM_{2.5}). NO₂ would be directly emitted as one of the NO_x components and would form through secondary photochemical reactions between nitric oxide (NO) and other air pollutants (CARB, 2019a). CO would be directly emitted. Ozone would not be directly emitted, but would form through secondary photochemical reactions between precursor pollutant NO_x and VOC. Primary pollutants typically reach their peak ambient concentrations in close proximity to the emission sources. Secondary pollutants typically reach their peak ambient concentrations farther downwind of the sources, sometimes many miles downwind, as the secondary reactions can take a considerable amount of time.

Approach and Limitations

This analysis links TSP emissions to regional health effects qualitatively because technical and scientific limitations prevent the accurate quantification of regional health effects. The quantification of regional health effects would not be possible for some pollutants and would produce an unacceptably high level of uncertainty for other pollutants.

Health effects quantification would require a two-stage process consisting of (a) regional modeling of emissions to estimate ambient pollutant concentrations in the region and to determine the exposed population; and (b) applying available methodologies to estimate the quantities of adverse health outcomes for the exposed population at the predicted concentration levels. There are modeling tools that could theoretically carry out these steps for ozone and secondary PM_{2.5}. For example, the Community Multiscale Air Quality Modeling System (CMAQ) (USEPA 2019a) and Comprehensive Air Quality Model with Extensions (CAMx) (Ramboll Environ 2019) are air quality modeling systems that can estimate ozone and secondary PM concentrations on a regional scale. The Environmental Benefits Mapping and Analysis Program (BenMAP) (USEPA 2019b) is a regional-scale health effects estimation model for ozone and PM. CARB also developed a methodology (CARB 2010) for estimating premature mortality associated with regional exposure to PM. Currently, there is no reliable methodology available to quantify health effects associated with regional exposure to CO and NO₂ concentrations.

The SCAQMD and San Joaquin Valley Air Pollution Control District (SJVAPCD) filed separate *amicus curiae* briefs with the California Supreme Court for the Friant Ranch case (SCAQMD 2015, SJVAPCD 2015). Both districts concluded that currently available regional modeling tools are not well suited to analyze relatively small changes in pollutant concentrations associated with individual projects. Regional modeling tools are generally designed to be used at the national, state, regional, and/or city levels. They are not equipped to analyze whether and to what extent the criteria pollutant emissions of an individual project directly impact human health in a particular area (SJVAPCD 2015). For example, running a photochemical grid model used for predicting ozone attainment with the emissions solely from an individual project is not likely to yield valid information given the relative scale involved (SJVAPCD 2015). SCAQMD stated that it does not currently know of a way to accurately quantify ozone-related health impacts caused by NO_x or VOC emissions from relatively small projects. The primary author of the CARB methodology (CARB 2010) for PM mortality has reported that this methodology is not suited for small projects and may yield unreliable results due to various uncertainties (SCAQMD 2015). Therefore, quantification of regional health effects associated with the TSP's criteria pollutant emissions is not feasible for this analysis. As a result, this document provides a qualitative discussion of the potential for the TSP's construction emissions to cause regional adverse health effects.

The qualitative regional health effects discussion follows a two-step approach. The first step determines whether the TSP's significant regional emissions would likely contribute to a violation of the CAAQS or NAAQS outside of the local Port area. If so, then the TSP is presumed to contribute to regional adverse health effects. If not, then the TSP is presumed not to contribute to regional adverse health effects because the CAAQS and NAAQS were established by CARB and USEPA to protect public health and welfare. Specifically, the CAAQS were established to protect public health, including the most sensitive groups (CARB 2019b). The NAAQS were established to protect public health with an adequate margin of safety (Title 42 United States Code [U.S.C.] Chapter 85, Subchapter I, Part A, Section 7409). The final step

describes the general types of adverse health effects that could be associated with the TSP's significant regional pollutant impacts.

A discussion of the TSP's *local* contributions to adverse health effects in the Port vicinity is provided below as part of Impact AQ-2.

Identification of Potential Regional Adverse Health Effects

PM2.5. The SCAB is currently nonattainment of the CAAQS and NAAQS for PM2.5. The state standard for PM2.5 is 12 µg/m3 for an annual average. The federal standards for PM2.5 are 35 µg/m3 for a 3-year average of the 98th percentile of the 24-hour concentrations, and 12 µg/m3 for a 3-year annual average. The highest annual PM2.5 concentration recorded in the SCAB over the last 3 available years (2016-2018) is 14.73 µg/m3, which is 1.2 times the state standard. This concentration occurred in 2016 at a station adjacent to Route 60 in Ontario. Exceedances of the annual standard occurred at several stations in the SCAB in each year of the 3-year period. The highest 3-year average of the 98th percentile of the 24-hour PM2.5 concentrations recorded in the SCAB over the last 3 available years (2016-2018) is 35.9 µg/m3, which is 1.03 times the federal standard. This concentration occurred at the Mira Loma (Jurupa Valley) station in Riverside County. The 24-hour PM2.5 concentration threshold of 35 µg/m3 was exceeded somewhere in the SCAB on 3 percent of days over the 3-year period. The highest 3-year annual average PM2.5 concentration recorded in the SCAB over the last 3 available years (2016-2018) is 14.5 µg/m3, which is 1.2 times the federal standard. This concentration occurred at a station adjacent to Route 60 in Ontario (SCAQMD 2019). Therefore, because (a) the region is nonattainment for PM2.5 and (b) construction of the TSP would exceed the SCAQMD's daily emission threshold for PM2.5, the TSP would potentially contribute to regional violations of the PM2.5 standards and to regional adverse health effects related to PM2.5.

Table 5.5-31 shows that the TSP's mitigated peak daily construction emissions would be 0.04 ton per day of PM2.5 (reported emissions were converted from pounds to tons). By comparison and for context, the most recent USEPA-approved SCAB emissions inventory estimated total anthropogenic emissions within the SCAB in 2012 to be 66 tons per day of PM2.5 (SCAQMD 2017). This estimate shows that the TSP's direct maximum regional PM2.5 contribution would be equivalent to about 0.06 percent of the total SCAB emissions. This emissions comparison shows that the TSP's contribution to regional violations of the PM2.5 standards would be relatively small. The TSP's VOC and NOx emissions, described below under ozone, would also contribute to secondary PM2.5 formation in the region.

The following summary of adverse health effects associated with PM10 and PM2.5 exposure was compiled in the 2016 AQMP (SCAQMD 2017). Appendix I of the 2016 AQMP provides an expanded discussion of the adverse health effects.

Several studies have found correlations between elevated ambient particulate matter levels (PM) and an increase in mortality rates, respiratory infections, number and severity of asthma attacks, and the number of hospital admissions in different parts of the United States and in various areas around the world. In recent years, studies have reported an association between long-term exposure to PM2.5 and increased total mortality (reduction in life-span and increased mortality from lung cancer). Higher levels of PM2.5 have also been related to increased mortality due to cardiovascular or respiratory diseases, hospital admissions for acute respiratory conditions, school absences, lost work days, a decrease in respiratory function in children, and increased medication

use in children and adults with asthma. Long-term exposure to PM has been found to be associated with reduced lung function growth in children, and increased risk of cardiovascular diseases in adults. Elderly persons, young children, and people with pre-existing respiratory and/or cardiovascular disease appear to be more susceptible to the effects of PM₁₀ and PM_{2.5}. In its most recent review, USEPA concluded that both short-term and long-term exposures to PM_{2.5} are causally related to increased mortality risk (USEPA 2009).

Nitrogen Dioxide. The SCAB is currently in attainment of the CAAQS and NAAQS for NO₂. The most stringent state and federal NO₂ standards are 0.18 ppm for a 1-hour average (state 1-hour standard), 0.100 ppm for a 3-year average of the 98th percentile of the annual distributions of daily maximum 1-hour average concentrations (federal 1-hour standard), and 0.030 ppm for an annual average. The highest NO₂ concentrations recorded anywhere in the SCAB over the last 3 available years (2016-2018) are 0.1155 ppm for the state 1-hour average, 0.079 ppm for the federal 1-hour average (3-year average), and 0.0321 ppm for an annual average (SCAQMD 2019). These pollutant levels are 64, 79, and 107 percent of the state 1-hour, federal 1-hour, and state annual standards, respectively. The exceedance of the state annual standard of 0.030 ppm occurred in all 3 years at a single monitoring station adjacent to Route 60 in Ontario. This station is one of four near-road sites in the SCAB purposely placed by the SCAQMD to capture impacts from heavily traveled roadways (SCAQMD 2016). In November 2018, CARB proposed to separate the area surrounding this monitor from the remainder of the SCAB and reclassify the area as nonattainment. CARB is currently working with the SCAQMD to define the specific boundary of the nonattainment area. The remainder of the SCAB will remain classified as attainment (CARB 2018).

Table 5.5-31 shows that the TSP's mitigated peak daily construction emissions would be 0.8 ton per day of NO_x. By comparison and for context, the most recent EPA-approved SCAB emissions inventory estimated total anthropogenic emissions within the SCAB in 2012 to be 540 tons per day of NO_x (SCAQMD, 2017). This estimate shows that the TSP's maximum regional NO_x contribution would be equivalent to about 0.1 percent of the total SCAB emissions. Therefore, given (a) the attainment status of the region and (b) the relatively small increase in regional NO_x emissions contributions from the TSP, the TSP would not contribute to a regional violation of the NO₂ standards and would not contribute to regional adverse health effects related to NO₂ outside of the local Port area. Adverse health effects related to the TSP's NO₂ emissions are also addressed on a *local* level in Impact AQ-2.

Carbon Monoxide. The SCAB is currently in attainment of the CAAQS and NAAQS for CO. The most stringent CAAQS or NAAQS for CO are 20 ppm for a 1-hour average and 9.0 ppm for an 8-hour average. The highest CO concentrations recorded anywhere in the SCAB over the last 3 available years (2016-2018) are 8.4 ppm for a 1-hour average and 4.6 ppm for an 8-hour average (SCAQMD 2019). These pollutant levels are 42 and 51 percent of the 1-hour and 8-hour standards, respectively.

Table 5.5-31 shows that the TSP's mitigated peak daily construction emissions would be 0.5 ton per day of CO. By comparison and for context, the most recent EPA-approved SCAB emissions inventory estimated total anthropogenic emissions within the SCAB in 2012 to be 2,123 tons per day of CO (SCAQMD, 2017). This estimate shows that the TSP's maximum regional CO contribution would be equivalent to about 0.02 percent of the total SCAB emissions. Therefore, given (a) the attainment status of the region and (b) the relatively small regional emissions contribution from the TSP, the TSP would not contribute to a regional violation of the CO standards and would not contribute to regional adverse health effects related to CO.

Ozone. VOC and NO_x are precursors to ozone, for which the SCAB is currently in nonattainment of the CAAQS and NAAQS (also referred to as state and federal standards). The most stringent state and federal ozone standards are 0.09 ppm for a 1-hour average, 0.070 ppm for the 3-year average of the fourth-highest 8-hour concentration each year (known as the federal 8-hour standard), and 0.07 ppm for an 8-hour average (known as the state 8-hour standard). The highest 1-hour ozone concentration recorded in the SCAB over the last three available years (2016-2018) is 0.163 ppm, which is 1.8 times the standard. This concentration occurred in 2016 at the Crestline station in the central San Bernardino Mountains. The standard was exceeded somewhere in the SCAB on 25 percent of days during the 3-year period. The highest federal 8-hour ozone concentration (3-year average) recorded in the SCAB over the last three available years (2016-2018) is 0.112 ppm, which is 1.6 times the standard. This concentration occurred at both the Crestline and San Bernardino stations. The threshold of 0.070 ppm was exceeded somewhere in the SCAB on 38 percent of days during the 3-year period. The highest state 8-hour ozone concentration recorded in the SCAB over the last three available years (2016-2018) is 0.136 ppm, which is 1.9 times the standard. This concentration occurred in 2017 at the San Bernardino station. The standard was exceeded somewhere in the SCAB on 38 percent of days during the 3-year period (SCAQMD 2019). Therefore, because (a) the region is nonattainment for ozone and (b) construction of the TSP would exceed the SCAQMD's daily emission thresholds for NO_x and VOC, the TSP would potentially contribute to regional violations of the ozone standards and to regional adverse health effects related to ozone.

Table 5.5-31 shows that the TSP's mitigated peak daily construction emissions would be 0.05 ton per day of VOC and 0.8 ton per day of NO_x. By comparison and for context, the most recent EPA-approved SCAB emissions inventory estimated total anthropogenic emissions within the SCAB in 2012 to be 470 tons per day of VOC and 540 tons per day of NO_x (SCAQMD, 2017). These estimates show that the TSP's maximum regional VOC and NO_x contributions would be equivalent to about 0.01 and 0.1 percent, respectively, of the total SCAB emissions. These emissions comparisons show that the TSP's contribution to regional violations of the ozone standards would be relatively small.

The following summary of adverse health effects associated with ozone exposure was compiled by the SCAQMD in its Final 2016 AQMP (SCAQMD 2017). Appendix I of the 2016 AQMP provides an expanded discussion of the adverse health effects:

Short-term exposures (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Individuals working outdoors, children (including teenagers), older adults, people with pre-existing lung disease, such as asthma, and individuals with certain nutritional deficiencies are considered to be the subgroups most susceptible to ozone effects. Elevated ozone levels are associated with increased school absences and daily hospital admission rates, as well as increased mortality. An increased risk for asthma has been found in children who participate in multiple sports and live in high-ozone communities. Ozone exposure under exercising conditions is known to increase the severity of respiratory symptoms. Although lung volume and airway resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

In summary, construction of the TSP would potentially contribute to regional adverse health effects associated with exposure to PM_{2.5} and ozone in the SCAB. The TSP would not contribute to regional adverse health effects associated with exposure to CO or NO₂. Impacts would be temporary, occurring only during the construction period.

H3.2. Potential Impact of Significant Local Ambient Concentrations on Public Health

In response to the California Supreme Court's recent decision on *Sierra Club v. County of Fresno (2018)*, this section provides a discussion of the potential health effects associated with the significant local ambient pollutant concentrations identified in Impact AQ-2 for TSP construction. These pollutant concentrations are considered local impacts because they were determined through dispersion modeling of the TSP's primary pollutant emissions in the local Port area, and because the maximum pollutant concentrations predicted by the dispersion model would be located very close to the construction activities. By definition, a modeled exceedance of a SCAQMD ambient concentration threshold means that the TSP would contribute to a local violation of the CAAQS or NAAQS and therefore would contribute to local adverse health effects in the modeled exceedance area. If no modeled exceedance is predicted, the TSP is presumed not to contribute to local adverse health effects because the CAAQS and NAAQS were established by CARB and USEPA to protect public health and welfare.

Tables 5.5-32 and 5.5-33 show that construction of the TSP would produce significant local NO₂ concentrations with mitigation. The local concentrations would be less than significant for SO₂, CO, PM₁₀, and PM_{2.5}. Therefore, construction of the TSP would potentially contribute to local adverse health effects associated with exposure to NO₂.

Analysis Approach and Limitations

There is currently no reliable methodology available that can quantify health effects associated with local exposure to NO₂ concentrations. Therefore, this document provides a qualitative discussion of the potential for the TSP's local NO₂ impacts to cause adverse health effects. The qualitative discussion (a) identifies the local area where NO₂ concentrations are predicted to exceed the standards, which is presumed to be the area where project-related adverse health effects could potentially occur; and (b) describes the general types of adverse health effects that could be associated with exposure to elevated NO₂ levels.

A discussion of the TSP's *regional* contributions to adverse health effects in the SCAB is provided as part of Impact AQ-1.

Identification of Potential Local Adverse Health Effects

Nitrogen Dioxide. Table 5.5-32 shows that construction of the TSP with mitigation would produce local ambient NO₂ concentrations that exceed the 1-hour NAAQS. The maximum concentration on land is predicted to be 256 ug/m³ (Project plus background), which is 1.4 times the standard. Therefore, construction of the TSP would potentially contribute to local adverse health effects associated with short-term exposure to NO₂.

Appendix A, Figure A2.4 shows the area where the modeled NO₂ concentration would exceed the federal 1-hour NO₂ standard during TSP construction, after mitigation. This is the area where the potential for adverse health effects associated with NO₂ exposure during construction is presumed to exist. Most of

the impact area is over water, but a portion of the area covers Pier J, which is a POLB container terminal. The significant impact area would not extend over any existing residences.

The following summary of adverse health effects associated with NO₂ exposure was compiled in the 2016 AQMP. Appendix I of the 2016 AQMP provides an expanded discussion of the adverse health effects.

USEPA noted the respiratory effects of NO₂, and evidence suggestive of impacts on cardiovascular health, mortality and cancer (USEPA 2016). Evidence for low-level nitrogen dioxide (NO₂) exposure effects is derived from laboratory studies of asthmatics and from epidemiological studies. Additional evidence is derived from animal studies. USEPA cited the coherence of the results from a variety of studies, and a plausible biological mechanism to support the determination of a causal relationship between short term NO₂ exposures and asthma exacerbations (“asthma attacks”). The long-term link with respiratory outcomes was strengthened by recent experimental and epidemiological studies, and the strongest evidence available is from studies of asthma development. Experimental studies have found that NO₂ exposures increase responsiveness of airways, pulmonary inflammation, and oxidative stress, and can lead to the development of allergic responses. These biological responses provide evidence of a plausible mechanism for NO₂ to cause asthma. Additionally, results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (airway responsiveness) or after inhaled allergens. Animal studies also provide evidence that NO₂ exposures have negative effects on the immune system, and therefore increase the host’s susceptibility to respiratory infections. Epidemiological studies showing associations between NO₂ levels and hospital admissions for respiratory infections support such a link, although the studies examining respiratory infections in children are less consistent.

In summary, construction of the TSP would potentially contribute to local adverse health effects associated with exposure to NO₂. The area of impact would occur on POLB property. The TSP would not contribute to local adverse health effects associated with exposure to SO₂, CO, PM₁₀, or PM_{2.5}. Impacts would be temporary, occurring only during the construction period.

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Appendix H4. Health Risk Evaluation

H4.1. Introduction

This appendix describes the methods and results of a health risk evaluation of toxic air contaminant (TAC) emissions from construction activities associated with all Action Alternatives. The Action Alternatives are described in detail in Section 4 (Plan Formulation). The No Action Alternative is also described in detail in Section 4 (Plan Formulation), is assessed qualitatively in Sections 5.5 (Air Quality Environmental Consequences) and 5.6 (Greenhouse Gas Environmental Consequences) of the EIS/EIR, and therefore is not included in this appendix. TACs are compounds that are known or suspected to cause adverse carcinogenic or non-carcinogenic human health effects after short-term (acute) or long-term (chronic) exposure. This evaluation assesses the individual cancer risks and non-cancer chronic impacts associated with construction of the Action Alternatives to residential/sensitive receptors and offsite workers.¹

Individual cancer risk represents the chance that a person would contract cancer resulting from long-term exposure to the TACs of concern. A non-cancer chronic hazard index represents the potential for non-cancer health impacts resulting from long-term exposure to TACs. An acute non-cancer hazard index represents the potential for non-cancer health impacts resulting from a short-term (i.e., one-hour) exposure to TACs. Population cancer burden is the potential increase in the number of cancer cases in the affected population.

H4.2. Health Risk Estimation Approach

Since the Action Alternatives would produce TAC emissions only during temporary construction activities and because emissions would occur at a considerable distance from the nearest residential and sensitive receptors, a detailed health risk assessment was not performed. Instead, results of the PM₁₀ dispersion modeling, detailed in Appendix H2, and CARB's Hotspots Analysis and Reporting Program (HARP) were used to estimate maximum cancer risks. HARP's Risk Assessment Standalone Tool (RAST), which calculates potential health impacts using ground level TAC concentrations, was used to estimate health impacts (CARB 2019a).

TAC-related cancer risk in the Port area is dominated by emissions of diesel particulate matter (DPM), a TAC and component of diesel exhaust. This health risk evaluation used the annual PM₁₀ concentrations predicted by AERMOD (Appendix H2) during construction as a proxy for DPM. Although conservative, the approach is appropriate because more than 99 percent of PM₁₀ emissions associated with construction of the Action Alternatives would be from diesel exhaust. Non-exhaust PM₁₀ (i.e., fugitive dust, entrained road dust, tire wear, brake wear) would be limited to the project's minimal land-based construction activities.

Cancer risk at the maximally-impacted residential/sensitive receptor was calculated by HARP assuming the exposure period would start in the receptor's third trimester of gestation ("3TM") and continue for the duration of construction. Cancer risks were calculated separately for the period of the third trimester until just before the second birthday (referred to as "3TM < 2") and the period of the second birthday until just before the sixth birthday ("2 < 6") due to different risk sensitivity assumptions in HARP. The two resulting risk values were then added together to produce the final risk result. The receptor age period 3TM < 2 was conservatively modeled with the average PM₁₀ concentration during the two consecutive years with the greatest construction emissions because this age period has the greatest cancer risk sensitivity according to OEHHA guidelines (OEHHA 2015). The receptor age period 2 < 6 was modeled with the average PM₁₀ concentration during all other years of construction. The average PM₁₀ concentrations

¹ Sensitive receptors were conservatively evaluated with residential exposure assumptions.

during these two exposure periods were estimated by scaling the PM₁₀ concentration during the year of maximum emissions (Appendix H2) by the ratio of DPM emissions from the respective periods. Residential cancer risk was calculated by HARP using the “RMP derived” option in accordance with SCAQMD's *AB 2588 and Rule 1402 Supplemental Guidelines* (SCAQMD 2018).

Cancer risk at the maximally-impacted occupational receptor was calculated by HARP assuming an average PM₁₀ concentration over the entire construction period. The average PM₁₀ concentration was estimated by scaling the PM₁₀ concentration during the year of maximum emissions (Appendix H2) by the ratio of DPM emissions from the respective periods. Occupational cancer risk was estimated using the “OEHHA derived” option in accordance with SCAQMD's *AB 2588 and Rule 1402 Supplemental Guidelines*.

Chronic hazard indices at the maximally-impacted residential/sensitive and occupational receptors were directly calculated by dividing the PM₁₀ concentration during the year of maximum emissions (Appendix H2) by the Chronic Reference Exposure Level of 5.0 ug/m³ as published in CARB's *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CARB 2019b).

Acute non-cancer impacts and population cancer burden are addressed qualitatively. Past Port projects have consistently shown that the non-cancer acute hazard index and population cancer burden would not exceed SCAQMD thresholds. For example, the residential cancer risk for the Port's recent Pier B On-Dock Rail Support Facility project (POLB 2016) was estimated to be 8.7 in a million with mitigation, and the associated population cancer burden was estimated to be only 0.27 (POLB 2016), about one-half of the significance threshold of 0.5.

Table H4-1 shows that the Action Alternatives would produce maximum cancer risks roughly similar to Pier B; however, most activities associated with the Action Alternatives would occur over water and further from population centers than the Pier B project. Therefore, the population cancer burden for the Action Alternatives would likely be lower than 0.27 calculated for Pier B. Similarly, acute non-cancer impacts would also likely be lower than the 0.07 acute hazard index calculated for Pier B and therefore below the SCAQMD threshold of 1.

H4.3. Predicted Air Quality Impacts

Table **H4-1** presents the estimated residential cancer risk, off-site occupational cancer risk, residential chronic hazard index, and off-site occupational chronic hazard index associated with each Action Alternative using the methodology described above. The table shows that the cancer risk at the maximally-impacted residential/sensitive receptor would exceed the significance threshold for Alternative 4, both without and with mitigation. The residential/sensitive cancer risks associated with Alternatives 2, 3, and 5 would be below the threshold, both without and with mitigation. The occupational cancer risks and residential and occupational chronic hazard indices would be well below the thresholds for all Action Alternatives, both without and with mitigation.

Table H4-1. Estimated Cancer Risks Associated with Construction of the Action Alternatives

Alternative	Construction DPM Emissions ^a				Estimated DPM Concentration at the Maximum Residential Receptor			Estimated DPM Concentration at the Maximum Occupational Receptor		Estimated Individual Cancer Risk		Estimated Chronic Hazard Index ^m	
	Maximum Year (lb/yr) ^b	Average Years 1-2 (lb/yr) ^c	Average Years 3-6 (lb/yr) ^d	Average Years 1-6 (lb/yr) ^e	Maximum Year (ug/m3) ^f	Average Years 1-2 (ug/m3) ^g	Average Years 3-6 (ug/m3) ^h	Maximum Year (ug/m3) ⁱ	Average Years 1-6 (ug/m3) ^j	Maximum Residential Receptor ^k	Maximum Occupational Receptor ^l	Maximum Residential Receptor	Maximum Occupational Receptor
Alt 2 Unmitigated	12,645	9,405	107	3,207	2.3E-02	1.7E-02	1.9E-04	9.4E-02	2.4E-02	5.8E-06	3.7E-07	0.005	0.02
Alt 2 Mitigated	8,529	5,656	67	1,930	1.2E-02	7.7E-03	9.1E-05	4.6E-02	1.0E-02	2.6E-06	1.6E-07	0.002	0.009
Alt 3 Unmitigated	19,263	13,335	723	4,927	2.9E-02	2.0E-02	1.1E-03	1.1E-01	2.8E-02	6.9E-06	4.4E-07	0.006	0.02
Alt 3 Mitigated	15,108	9,225	344	3,305	2.0E-02	1.2E-02	4.6E-04	6.1E-02	1.3E-02	4.2E-06	2.1E-07	0.004	0.01
Alt 4 Unmitigated	27,035	19,484	5,077	9,879	5.0E-02	3.6E-02	9.4E-03	1.5E-01	5.4E-02	1.3E-05	8.4E-07	0.01	0.03
Alt 4 Mitigated	26,824	17,324	2,472	7,422	4.7E-02	3.0E-02	4.3E-03	1.0E-01	2.8E-02	1.1E-05	4.3E-07	0.009	0.02
Alt 5 Unmitigated	19,263	13,335	2,253	5,947	2.9E-02	2.0E-02	3.4E-03	1.1E-01	3.4E-02	7.2E-06	5.3E-07	0.006	0.02
Alt 5 Mitigated	15,108	9,225	1,035	3,765	2.0E-02	1.2E-02	1.4E-03	6.1E-02	1.5E-02	4.3E-06	2.4E-07	0.004	0.01
Threshold										1.0E-05	1.0E-05	1	1

Notes:

a. DPM emissions are from the emission calculations for each alternative, as described in Appendix H1.

b. This emission rate represents the maximum year of construction emissions, which occurs during dredging of the Approach Channel (hopper dredge). It is used in the chronic hazard index calculation.

c. This emission rate includes the two consecutive years with the greatest construction emissions. It is used in the residential cancer risk calculation for receptor age 3TM < 2.

d. This emission rate includes all remaining construction years except for the two consecutive years with the greatest emissions. It is used in the residential cancer risk calculation for receptor age 2 < 6.

e. This emission rate equals total construction emissions averaged over 6 years, which is the exposure duration selected in the HARP analysis to cover the alternative with the longest duration (6 years for Alternative 4). It is used in the occupational cancer risk calculation.

f. To be consistent with HARP HRA methodology, this concentration is the equivalent of the AERMOD "PERIOD" average using a 5-year meteorological data set; the emission rate modeled in AERMOD was the maximum annual PM₁₀ emissions converted to g/s. This concentration is used to determine the residential chronic hazard index. The dispersion modeling methodology is described in Appendix H2.

g. The estimated Average Years 1-2 Concentration = Maximum Year Concentration x Average Years 1-2 Emissions / Maximum Year Emissions. This concentration is used in the residential cancer risk calculation for receptor age 3TM < 2.

h. The estimated Average Years 3-6 Concentration = Maximum Year Concentration x Average Years 3-6 Emissions / Maximum Year Emissions. This concentration is used in the residential cancer risk calculation for receptor age 2 < 6.

i. To be consistent with HARP HRA methodology, this concentration is the AERMOD "PERIOD" average using a 5-year meteorological data set; the emission rate modeled in AERMOD was the maximum annual PM₁₀ emissions converted to grams per second. This concentration is used to determine the occupational chronic hazard index. The dispersion modeling methodology is described in Appendix H2.

j. The estimated Avg Years 1-6 Concentration = Maximum Year Concentration x Avg Years 1-6 Emissions / Maximum Year Emissions. This concentration is used in the occupational cancer risk calculation.

- 1 k. Residential cancer risk was calculated using HARP Risk Assessment Standalone Tool (RAST) (run at a unit concentration of 1 ug/m3 and scaled to the Project modeled concentration). The exposure
2 period was assumed to start in the 3rd trimester of gestation (3TM) and continue for the duration of construction. The risks for receptor age 3TM < 2 and 2 < 6 were calculated separately due to
3 different exposure parameters, and added together. Residential cancer risk was estimated using RMP derived methodology in accordance with SCAQMD's AB 2588 and Rule 1402 Supplemental
4 Guidelines (September 2018). The HARP RAST residential cancer risk results at a DPM unit concentration of 1 ug/m3 are 3.42E-04 for receptor age 3TM < 2 (2-year exposure) and 1.14E-04 for
5 receptor age 2 < 6 (4-year exposure).
- 6 l. Occupational cancer risk was calculated using HARP RAST (run at a unit concentration of 1 ug/m3 and scaled to the Project modeled concentration). The exposure period was assumed to be for the
7 duration of construction (up to 6 years depending on the alternative). Occupational cancer risk was estimated using OEHHA derived methodology in accordance with SCAQMD's AB 2588 and Rule
8 1402 Supplemental Guidelines (September 2018). The HARP RAST occupational cancer risk results at a DPM unit concentration of 1 ug/m3 are 1.55E-05 (6-year exposure).
- 9 m. The chronic hazard index was directly calculated by dividing the maximum year concentration by the Chronic Reference Exposure Level of 5.0 ug/m3 as published in CARB's Consolidated Table of
10 OEHHA/ARB Approved Risk Assessment Health Values. <https://www3.arb.ca.gov/toxics/healthval/contable.pdf>. (CARB, 2019b).
- 11

1 Table H4-2 presents locations of sensitive receptors in the project vicinity.

2 **Table H4-2. Sensitive Receptors**

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Category	Street Address	City
1	389912	3738586	12th Street Head Start	Child Care	1212 Long Beach Blvd	Long Beach
2	389883	3738053	8th Street Early Head Start	Child Care	820 Long Beach Blvd	Long Beach
3	390048	3737366	A Love 4 Learning Academy	Child Care	306 Elm Avenue	Long Beach
4	389599	3738178	ABC 123 Long Beach Learning Center	Child Care	909 Pine Ave	Long Beach
5	387995	3740853	Agu Family Child Care	Child Care	4400 Boyar Ave	Long Beach
6	389600	3738360	Aspiranet Foster Family Agency	Child Care	1043 Pine Ave	Long Beach
7	390314	3739617	Atlantic Headstart	Child Care	1862 Atlantic Ave	Long Beach
8	390224	3738014	Benford Family Child Care	Child Care	530 E 8th St	Long Beach
9	388691	3740431	Briggs Family Child Care	Child Care	Golden Ave	Long Beach
10	387340	3741495	Brown Family Child Care	Child Care	1831 W Jeanette Pl	Long Beach
11	386680	3739773	Cabrillo Child Development Center	Child Care	2205 San Gabriel Ave.	Long Beach
12	388011	3741615	Carol Daycare	Child Care	2842 Easy Ave	Long Beach
13	386767	3739844	Century Villages at Cabrillo Homeless Housing Community	Child Care	2001 River Ave	Long Beach
14	390062	3738250	Child Care Center At St Mary Medical Center	Child Care	930 Elm Ave	Long Beach
15	388899	3737062	Childtime Learning Center	Child Care	1 World Trade Ctr # 199	Long Beach
16	389481	3741039	Comprehensive Child Development	Child Care	2565 Pacific Ave.	Long Beach
17	387982	3740075	Costa Family Child Care	Child Care	2085 Easy Ave	Long Beach
18	388870	3737870	Edison Child Development Center	Child Care	640 W 7th St	Long Beach
19	389981	3738882	Elm Street Head Start	Child Care	1425 & 1429 Elm Ave	Long Beach
20	388635	3741379	Fords Family Day Care	Child Care	2726 San Francisco Ave	Long Beach
21	388088	3740588	Franklin Day Care Center	Child Care	2333 Fashion Ave	Carson
22	387556	3739981	Gallegos Family Child Care	Child Care	2024 Adriatic Ave	Long Beach
23	387670	3740411	Garfield Head Start	Child Care	2240 Baltic Ave	Long Beach
24	390403	3740229	Garibay Family Child Care	Child Care	2172 Lime Ave	Long Beach
25	388688	3740334	Hernandez Family Child Care	Child Care	2200 Golden Ave	Long Beach
26	388894	3740733	Hernandez Family Child Care	Child Care	5322 Elm Ave	Long Beach
27	388832	3740311	Herrera Family Child Care	Child Care	737 W Hill St	Long Beach
28	387501	3739748	Job Corp Head Start	Child Care	1903 Santa Fe Ave.	Long Beach
29	390444	3739033	Jones Family Child Care	Child Care	2275 Baltic Ave	Long Beach
30	390594	3738247	Kelly's Care	Child Care	943 N Washington Pl	Long Beach

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Category	Street Address	City
31	388725	3741155	Kelly's Kids Daycare Center	Child Care	855 W Willow St	Long Beach
32	390195	3739970	Kim Family Child Care	Child Care	2035 Linden Ave	Long Beach
33	388192	3740542	Lara Family Day Care	Child Care	1303 W 253rd St	Harbor City
34	383107	3737969	Lil Cowpoke Preschool	Child Care	445 N Avalon Blvd	Wilmington
35	389577	3738176	Little Lighthouse Educational Childcare Center	Child Care	911 Pine Avenue	Long Beach
36	389940	3740373	Long Beach Blvd Head Start	Child Care	2236 Long Beach Blvd	Long Beach
37	390373	3740260	Long Beach Center for Child Development	Child Care	622 E. Hill St	Long Beach
38	390533	3740347	Long Beach Child Development Center	Child Care	2222 Olive Ave	Long Beach
39	389282	3739139	Long Beach Day Nursery - West Branch	Child Care	1548 Chestnut Ave	Long Beach
40	388917	3737693	Loves Family Child Care	Child Care	527 Daisy Ave	Long Beach
41	388856	3738266	Lucy's Baby Care	Child Care	940 Maine Ave	Long Beach
42	390021	3738204	Montessori On Elm Preschool + Kindergarten	Child Care	930 Elm Ave	Long Beach
43	389217	3739222	N2 Lil Folkz	Child Care	1624 Chestnut Ave	Long Beach
44	389533	3741212	Oakwood Children's Center	Child Care	2650 Pacific Ave	Long Beach
45	389020	3739872	P.A.L. Family Day Care	Child Care	1980 Daisy Ave	Long Beach
46	389472	3740264	Pacific Head Start	Child Care	2179 Pacific Ave	Long Beach
47	387188	3740575	Patterson Family Child Care	Child Care	2133 Canal Ave	Long Beach
48	389579	3738221	Pine Head Start	Child Care	927 Pine Ave	Long Beach
49	390399	3739915	Poole Family Child Care	Child Care	2002 Lime Ave	Long Beach
50	389621	3738176	Progressive Steps Children Center	Child Care	911 Pine Ave	Long Beach
51	389036	3741241	Ruiz Family Daycare	Child Care	2670 Daisy Ave	Long Beach
52	389765	3740701	Sandford Family Child Care	Child Care	215 E Burnett St	Long Beach
53	390098	3740230	Sar Family Child Care	Child Care	2171 Pasadena Ave	Long Beach
54	390623	3740004	Smart & Manageable	Child Care	2054 Myrtle Ave	Long Beach
55	389894	3738960	Un Mundo De Amigos Preschool	Child Care	1480 Long Beach Blvd	Long Beach
56	389193	3738664	West Anaheim Child Care Center	Child Care	440 W. Anaheim St	Long Beach
57	387505	3740187	West Child Development Center/Westside Neighborhood Clinic	Child Care	2125 Santa Fe Ave.	Long Beach
58	384704	3739154	Wilmington Park Children's Center	Child Care	1419 E Young St	Wilmington
59	390296	3737362	YMCA GLB Fairfield 3rd Street Preschool	Child Care	607 E. 3rd St	Long Beach
60	389492	3740248	YMCA Play & Learn Preschool	Child Care	2179 Pacific Ave	Long Beach
61	389517	3739600	Young Horizons Child Development Center	Child Care	1840 Pacific Ave	Long Beach
62	389536	3740757	Young Horizons Child Development Center	Child Care	2418 Pacific Ave	Long Beach

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Category	Street Address	City
63	390248	3737686	Young Horizons Child Development Center	Child Care	501 Atlantic Ave	Long Beach
64	389459	3737689	Young Horizons/El Jardin de la Felicidad	Child Care	507 Pacific Ave	Long Beach
65	388854	3740055	Zarate Family Child Care	Child Care	2496 Oregon Ave	Long Beach
66	390353	3741373	Akin's Post Acute Rehab Hospital; Atlantic Memorial Healthcare Center	Elder Care	2750 Atlantic Ave	Long Beach
67	383100	3738224	American AAA Health Care Center	Elder Care	629 N Avalon Blvd	Wilmington
68	387401	3740832	Aquarius Home	Elder Care	1765 Aquarius St	Long Beach
69	387445	3739252	Bay Breeze Care	Elder Care	1653 Santa Fe Ave	Long Beach
70	389740	3736892	Breakers Of Long Beach, The	Elder Care	210 E Ocean Blvd	Long Beach
71	387440	3740697	Burnett Home Care	Elder Care	1740 West Burnett St.	Long Beach
72	390386	3740307	Caruthers Royale Care	Elder Care	2204 Lime Ave.	Long Beach
73	389587	3740686	Deluxe Guest Home	Elder Care	3260 Pine Ave	Long Beach
74	389586	3740722	Deluxe Guest Home II	Elder Care	3266 Pine Ave	Long Beach
75	389401	3740862	Garden, The	Elder Care	2485 Cedar Ave	Long Beach
76	389119	3738782	Harbor View Rehabilitation Center	Elder Care	490 W. 14th Street	Long Beach
77	387192	3740865	Hayes Home	Elder Care	2470 Hayes Ave	Long Beach
78	389645	3737994	Healthview Pine Villa Assisted Living	Elder Care	117 East 8th Street	Long Beach
79	389498	3740798	Heritage Board & Care #2	Elder Care	1509 E 4th St	Long Beach
80	387231	3740475	Loram Manor	Elder Care	1925 Gemini St	Long Beach
81	390455	3738345	Olive Tree Home	Elder Care	1035 Olive Street	Long Beach
82	390278	3738221	Padua House	Elder Care	940 Atlantic Ave	Long Beach
83	387154	3741415	Pioneer Homes Of California	Elder Care	2041 W Carolyn Pl	Long Beach
84	387349	3740831	Reliable Residential Care	Elder Care	1840 Aquarius St	Long Beach
85	390005	3740389	Right At Home	Elder Care	2245 Elm Ave	Long Beach
86	389478	3741347	Royal Care Skilled Nursing Center	Elder Care	2725 Pacific Avenue	Long Beach
87	390388	3740918	Serra Project Long Beach	Elder Care	1043 Elm Ave	Long Beach
88	390475	3738176	Villa Maria Care Center	Elder Care	723 E 9th St	Long Beach
89	389978	3741459	Earl & Lorraine Miller Children's Hospital; Long Beach Memorial Medical Center and Hospital	Hospital	2801 Atlantic Ave	Long Beach
90	389449	3739338	Long Beach Doctors Hospital	Hospital	1725 Pacific Ave	Long Beach
91	389539	3741329	Pacific Hospital of Long Beach (Hospital and Convalescent/Nursing Home)	Hospital	2776 Pacific Ave	Long Beach
92	390100	3738380	St Mary Medical Center	Hospital	1050 Linden Ave	Long Beach
93	389215	3739462	Tom Redgate Memorial Hospital	Hospital	1775 Chestnut Ave	Long Beach

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Category	Street Address	City
94	387362	3740183	Admiral Kidd Park	Recreational	2125 Santa Fe Ave	Long Beach
95	388669	3737500	Cesar Chavez Park	Recreational	401 Golden Avenue	Long Beach
96	388060	3738639	City of Long Beach Multi-Service Center	Recreational	1301 W. 12th Street	Long Beach
97	387306	3739448	Harbor Japanese Community Cultural Center	Recreational	1766 Seabright Ave	Long Beach
98	386955	3740430	Hudson Park	Recreational	2335 Webster Ave	Long Beach
99	387067	3741097	Khemara Buddhikaram Cambodian Buddhist Temple	Recreational	2100 W Willow Street	Long Beach
100	387129	3740300	Pramuan Simsiwatna Place of Worship	Recreational	2015 W Hill Street	Long Beach
101	386856	3739792	VA Long Beach Clinic and Veteran's Support Services	Recreational	2001 River Ave, Building 28	Long Beach
102	382237	3737492	Wilmington Waterfront Park	Recreational	S. C Street	Wilmington
103	383262	3736996	Wilmington Waterfront Promenade	Recreational	Water Street	Wilmington
104	384770	3739365	Apostolic Faith Center/Apostolic Faith Academy	School	1530 E Robidoux St	Wilmington
105	389454	3738592	Artesia Well Preparatory Academy	School	1235 Pacific Ave	Long Beach
106	386739	3740042	Bethune School/Program for the Homeless	School	2101 San Gabriel Ave	Long Beach
107	390228	3740326	Burnett Elementary	School	565 East Hill St.	Long Beach
108	387438	3739936	Cabrillo High School	School	2001 Santa Fe Ave.	Long Beach
109	389562	3740833	Cambodian Christian	School	2474 Pacific Ave	Long Beach
110	388744	3737296	Cesar Chavez Elementary	School	730 West Third St.	Long Beach
111	389879	3739303	Colegio New City	School	1637 Long Beach Blvd	Long Beach
112	390505	3737788	Constellation Community Charter Middle	School	620 Olive Ave.	Long Beach
113	388749	3737794	Edison Elementary	School	625 Maine Ave.	Long Beach
114	386969	3740593	Elizabeth Hudson Elementary School and Development Center Daycare	School	2335 Webster Ave	Long Beach
115	389624	3738317	First Baptist Church School	School	1000 Pine Ave	Long Beach
116	390180	3738228	First Lutheran Day Care, Preschool and Elementary School	School	946 Linden Ave	Long Beach
117	382757	3737606	Gang Alternative Program	School	231 Island Ave	Wilmington
118	382820	3738093	George de la Torre Jr. Elementary School	School	500 Island Ave	Wilmington
119	389389	3738887	George Washington Middle School	School	1450 Cedar Ave	Long Beach
120	384377	3739369	Holy Family Preschool and Elementary School	School	1122 E Robidoux St	Wilmington
121	389544	3740927	Holy Innocents Elementary School	School	2500 Pacific Ave	Long Beach
122	387067	3740604	Hudson Development Center Daycare and Elementary School	School	2335 Webster Ave	Long Beach
123	389714	3737893	International Elementary	School	700 Locust Ave	Long Beach
124	389686	3741436	Jackie Robinson Academy	School	2750 Pine Ave	Long Beach
125	387724	3740376	James Garfield Elementary School / LBUSD Child Development Center	School	2240 Baltic Ave	Long Beach

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Category	Street Address	City
126	387255	3739936	Juan Rodriguez Cabrillo High School	School	2001 Santa Fe Ave	Long Beach
127	389235	3740749	Lafayette Elementary School	School	2445 Chestnut Ave	Long Beach
128	390207	3737910	Long Beach Montessori School	School	525 E. 7th St	Long Beach
129	390337	3739143	Polytechnic High School	School	1600 Atlantic Ave.	Long Beach
130	389106	3738800	Regency High School	School	490 W. 14th Street	Long Beach
131	387111	3740236	Reid Continuation High School	School	2153 W Hill St	Long Beach
132	389785	3738088	Renaissance High School for the Arts	School	235 East 8th St.	Long Beach
133	390160	3739058	Roosevelt Elementary	School	1574 Linden Ave.	Long Beach
134	390534	3737794	Saint Anthony High School	School	620 Olive Ave.	Long Beach
135	390580	3737582	Saint Anthony Preschool / Elementary	School	855 East 5th St.	Long Beach
136	387406	3740569	Saint Lucy School	School	2320 Cota Ave.	Long Beach
137	387022	3740319	Savannah Academy	School	2152 Hill St.	Long Beach
138	390248	3737371	Select Community Day School	School	5869 Atlantic Ave.	Long Beach
139	390538	3737763	St. Anthony High School/Constellation Community Charter Middle	School	620 Olive Ave.	Long Beach
140	387420	3740551	St. Lucy School	School	2320 Cota Ave	Long Beach
141	387250	3741600	Stephens Middle School	School	1830 West Columbia Street	Long Beach
142	390365	3737647	Stevenson Elementary; Stevenson Child Development Centers/Preschool	School	515 Lime Ave.	Long Beach
143	389624	3738615	The New City School	School	1230 Pine Ave	Long Beach
144	390276	3738162	True Social Justice Academy	School	630 Magnolia Ave	Long Beach
145	387129	3741587	William Logan Stephens Middle School	School	1830 W Columbia St	Long Beach
146	384625	3739124	Wilmington Park Elementary School/Mahar House	School	1140 Mahar Ave	Wilmington

Note: Individual residences are not included in the table and accompanying figure.

- 1
- 2 The locations of sensitive receptors in Table H4-2 are shown on Figure 3-4 in Section 3.5.

1 **H4.4. References for Appendix H4**

- 2 CARB 2019a. Hotspots Analysis and Reporting Program (HARP). Risk Assessment Standalone Tool
3 (RAST). Version 19044. <https://ww3.arb.ca.gov/toxics/harp/harp.htm>. February 13.
- 4 CARB 2019b. *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*.
5 <https://ww3.arb.ca.gov/toxics/healthval/contable.pdf>. September 19.
- 6 OEHHA 2015. Office of Environmental Health Hazard Assessment. *Air Toxics Hot Spots Program Guidance*
7 *Manual for Preparation of Health Risk Assessments*. March 2015.
- 8 POLB 2016. Port of Long Beach. *Pier B On-Dock Rail Support Facility Draft EIR*, Appendix A, Table A3-7.
9 December 2016. Available: <http://www.polb.com/environment/docs.asp>. Accessed: September 2019.
- 10 SCAQMD 2018. *AB 2588 and Rule 1402 Supplemental Guidelines*. September.

DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT (EIS/EIR)

APPENDIX I: PLANNING AID REPORT AND ENDANGERED SPECIES ACT

PORT OF LONG BEACH
DEEP DRAFT NAVIGATION STUDY
Los Angeles County, California

October 2019



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PLANNING AID REPORT

US FISH AND WILDLIFE SERVICE
30 JUNE 2016



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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008



In Reply Refer To:
FWS-LA-15B0128-16CPA0091-E00880

June 30, 2016

Colonel Kirk Gibbs
U.S. Army Corps of Engineers, Los Angeles District
915 Wilshire Boulevard, Suite 930
Los Angeles, California 90017-3409

Attention: Lawrence Smith

Subject: Final Planning Aid Report for the Proposed Port of Long Beach Deep Draft Navigation Project, Los Angeles County, California

Dear Colonel Gibbs:

The U.S. Fish and Wildlife Service (Service) has prepared this Final Planning Aid Report (PAR) for the U.S. Army Corps of Engineers (Corps) on the proposed Port of Long Beach Deep Draft Navigation Project (project) to describe issues and opportunities related to the conservation and enhancement of fish and wildlife resources. The project, as proposed, would involve dredging and deepening portions of the Port of Long Beach (Port), Los Angeles County, California. The purpose of the proposed project is to improve transportation efficiency and safety at the Port for large ships.

The proposed project area would involve portions of the Los Angeles County coast of the eastern Pacific Ocean, within about 3 miles seaward of the historic coastline near the mouth of the Los Angeles River. These existing marine and estuarine areas have been heavily modified over the last century associated with development of Long Beach Harbor/Port of Long Beach and nearby civil engineering and commercial/urban development. Most of the direct project footprint would occur within the boundaries of the Port; exceptions include proposed modifications to portions of the Pier J ship approach area (Corps 2016) and potential (currently undetermined) dredge material disposal areas, both of which are outside the Port harbor district area. The project area is located south of the City of Long Beach and east of the community of San Pedro and the Port of Los Angeles. The depths, widths, and volumes of dredge and disposal material associated with the proposed project are currently undetermined.

This PAR is provided in accordance with the Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*), the Endangered Species Act (ESA) of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*), and the scope of work agreed upon by the Corps and the Service. This PAR does not constitute the report of the Secretary of the Interior as required by section 2(b) of the FWCA, nor does it constitute a biological opinion under section 7 of the ESA.

The purpose of this PAR is to deliver recommendations for use by the Corps design team in developing goals, objectives, and alternatives for the project.

In October 2015, the Council on Environmental Quality released Memorandum M-16-01 for Executive Departments and Agencies entitled Incorporating Ecosystem Services into Federal Decision Making. The memorandum recognizes that nature provides vital contributions to human economic and social well-being that are often not traded in markets or fully considered in decisions. It directs Federal agencies to incorporate ecosystem services into Federal planning and decision making,¹ and to develop, institutionalize, and implement policies to promote consideration of ecosystem services in planning, investments, and regulatory contexts. Additionally, it calls for integration of assessments of ecosystem services into relevant programs and projects, in accordance with the agency's statutory authority.

In November 2015 the White House released a Presidential Memorandum entitled Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment. This memorandum underscores the importance of effectively mitigating adverse impacts to land, water, wildlife, and other ecological resources (EPA 2016). It orders five federal agencies, including the Departments of the Interior and Defense, to streamline regulations for offsetting environmental harm and to promote mitigation efforts. The memorandum establishes a national policy "net benefit goal" for natural resource use from projects. The memo seeks to unify natural resource mitigation goals across agencies; at a minimum, the memorandum calls for "no net loss" of land, water, wildlife and other ecological resources from federal actions including permitting; this extends the no-net-loss national policy standard for wetlands established by the President in 1989. The memorandum also directs that compensatory mitigation is now national policy (White House 2015); the memorandum was designed to ensure consistency and transparency as agencies across the Federal government develop mitigation measures (Bean 2016). Concurrent with the release of the November 2015 Presidential Memorandum, the Department of the Interior issued formal policy and guidance to its bureaus and offices to best implement mitigation measures associated with legal and regulatory responsibilities and the management of Federal lands, waters, and other natural and cultural resources under its jurisdiction, using the best available science (Bean 2016). When assessing appropriate mitigation options, the Service relies upon a long established general mitigation hierarchy – first seeking to avoid impacts, then minimizing them, and then compensating for unavoidable impacts that could impair resource functions or values (Bean 2016).

As of March 2016, the Corps is preparing the Port of Long Beach Deep Draft Navigation Project Feasibility Study. The Corps is currently scoping project alternatives and will likely prepare an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the project. This feasibility study phase of the project would likely conclude with the distribution of the Draft EIS/EIR for public review, reportedly scheduled by the Corps for 2018 (Corps 2015).

Repeated dredging is often necessary to maintain operations of many marine harbors. The dredging proposed herein would be implemented to increase the design water depths within the Port for ship

¹ Broadly defined, ecosystem services are the benefits that flow from nature to people, e.g., nature's contributions to the production of food and timber; life-support processes, such as water purification and coastal protection; and life-fulfilling benefits, such as places to recreate.

navigation purposes for very large ships (as compared to regular maintenance dredging). Harbor dredging often has effects on the marine environment, and dredged material disposal may affect water quality, mobilize contaminants, and bury or alter habitats, bathymetry, and physical processes (NOAA 2014).

Introduction

Vessels of increasingly larger size and deeper drafts² have been entering U.S. ports over the last decade-plus (NOAA 2015). The proposed project would be another increment in a series of dredge-and-fill projects over the last several decades that have modernized and reshaped the Port. This project would deepen water depths for access and navigation of very large ships within the Port. The latest generation of large cargo ships being built is twice the size of those that entered the global fleet only 15 years ago; these ships are now calling at the Port (Port 2016). These larger ships are reportedly more cost effective for ocean carriers and decrease transportation diesel consumption (Port 2016). These massive vessels, some with capacity of 14,000 Twenty-foot Equivalent Units (TEUs),³ can be up to 1,200 feet long (Port 2016). Long Beach is one of only a handful of ports in North America capable of accommodating these larger ships, per the following features (Port 2016):

1. Deep-water main channel;
2. Deep-water terminals;
3. Berths designed to handle vessels that can exceed 156,000 tons fully loaded; and
4. Cranes that can move containers stacked 180 feet high and 24 boxes wide.

A century of harbor dredging and filling associated with development of the Port of Los Angeles and the Port of Long Beach has eliminated thousands of acres of the historic Wilmington Lagoon/Los Angeles River Estuary. In its place, behind manmade breakwaters, remains an open-water marine embayment of relatively high biological diversity and productivity.

Pacific Rim trade is increasing, along with the size of some of the associated ships entering U.S. ports. The Port is a major center of international commerce on the west coast of the United States. Development of a permanent industrial base within the Port was gradual and began with increased harbor improvements and transportation in the early 1900s. It is the second-busiest container port in the United States, after the adjacent Port of Los Angeles. The Corps, in conjunction with the Port, are now examining options to provide additional channel depths to allow very large ships (with greater drafts than those that can currently be effectively accommodated) into the Port.

² The draft of a ship's hull is the vertical distance between the waterline and the bottom of the hull or keel.

³ TEU or Twenty-Foot Equivalent Unit can be used to measure a ship's cargo carrying capacity. The dimensions of one TEU are equal to that of a standard 20-foot shipping container (20 feet long, 8.5 feet tall and 8 feet wide).

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act of 1934 included requirements that were the first formal expressions in U.S. law of a duty to minimize the negative environmental impacts of major water resource development projects and to compensate for those impacts that remained (Bean 2016).

The FWCA was a response to a U.S. era of big dam building and reflected a concern for the impact of those dams, particularly on anadromous fish (Bean 2016). As originally enacted in 1934, it required consultation with the Bureau of Fisheries (as the Service was then known) prior to the construction of any dam to determine if fish ladders or other aids to migration were necessary and economically practical to minimize impacts on fish populations. It required, as well, the opportunity to use the impounded waters for hatcheries to offset impacts that could not otherwise be avoided. The duties imposed by the FWCA were reinforced and expanded by the National Environmental Policy Act of 1969 (NEPA) (Bean 2016). Under NEPA and its implementing regulations, all federal agencies have a duty to assess the impacts of the major actions they propose to undertake and to consider reasonable alternatives to reduce or eliminate those impacts (Bean 2016). The Service, as the federal agency charged by Congress in the Fish and Wildlife Act of 1956 with the responsibility for management, conservation, and protection of fish and wildlife resources, routinely recommends mitigation measures to other federal agencies through the NEPA and FWCA processes (Bean 2016).

The FWCA directs and authorizes consultation, reporting, consideration, and installation/implementation of fish and wildlife conservation features. The authorities of the FWCA are considered to be “supplementary legislation” to the various Federal project authorizations, such as the Corps public works authorizations (Smalley and Mueller 2004). The FWCA conditions or supplements other water development statutes to require consideration of recommendations generated under the FWCA procedures, including portions of the Clean Water Act [*Zabel v. Tabb*, 430 F2d 199 (5th Cir. 1970) cert. denied 401 U.S. 910 (1972)]. For Federal water resources development projects, the FWCA requires that fish and wildlife conservation receive equal consideration by Federal agencies with other project purposes, and that such conservation be coordinated with other project features. The FWCA authorizes the project implementation of means and measures for both mitigating losses of fish and wildlife resources, and for enhancing these resources beyond the offsetting of project effects (Smalley and Mueller 2004).

Project Area History

In 1542, Juan Rodriquez Cabrillo “discovered” the “Bay of Smokes” that is now called San Pedro Bay, describing it from offshore aboard ship. The smoke he described above the bay may have originated from the several Native American villages that existed near the bay along the Los Angeles River at the time. Much of the south-facing San Pedro Bay along the coast was originally a shallow estuary and mudflat (see Figures 1 – 3).

The area currently occupied by the ports of Los Angeles and Long Beach formerly included several undeveloped islands, and likely included barrier beaches and beach/river-mouth sand spits. These islands and spits likely included unvegetated beach and open areas that historically supported what

are now sensitive species, including California least terns [*Sternula antillarum browni* (*Sterna a. b.*)];⁴ least tern] and western snowy plovers [*Charadrius alexandrinus nivosus* (*C. alexandrinus n.*); snowy plover].⁵ The area of the northern San Pedro Bay was originally largely a marsh, with the Los Angeles River and the Bay sharing a common opening into the ocean.

In 1899 construction of the San Pedro Bay breakwater began near the project area. In 1906, the Los Angeles Dock and Terminal Company started development of Long Beach Harbor by purchasing 800 acres of sloughs and salt marshes associated with the Los Angeles River mouth estuary — an area that later became the inner portion (Inner Harbor) of Long Beach Harbor. In 1907, construction began on the Craig Shipyard in the Inner Harbor; the Craig Shipyard Company was also awarded a contract to dredge a channel from the open ocean to the new Inner Harbor. In 1911, the State of California (State) granted the tidelands areas of what is now the Port of Long Beach to the City of Long Beach (City) for port operations.⁶ These tidelands were granted to the City in trust for the people of the State. This tidelands trust not only restricts the use of the tidelands, but the tidelands and tidelands-related revenues of the Port must be used for purposes related to harbor commerce, navigation, marine recreation, and fisheries. The Port currently includes more than 7,600 acres of wharves, cargo terminals, roadways, rail yards, and shipping channels, and is one of the world's busiest seaports (see Figure 3).

An 8.5 mile-long breakwater made of three rock segments stretches across most of San Pedro Bay, with two openings to allow ships to enter the harbor areas of the Ports of Los Angeles and Long Beach behind it. The initial western section of the breakwater, called the San Pedro Breakwater, was constructed between 1899 and 1911 at San Pedro; the Middle Breakwater was completed from 1911 to 1936, and the Long Beach Breakwater was completed after World War II. The San Pedro and Middle Breakwaters protect the Ports of Los Angeles and Long Beach, respectively (Long Beach 2009).

The Los Angeles River is a major river and flood management waterway for the Los Angeles watershed basin. In the 1930s, the Army Corps began channelizing the river for flood damage reduction and by 1954, the entire length of the river was channelized (Long Beach 2009). The river is now maintained by the Corps and the Los Angeles County Department of Public Works (Long Beach 2009). The Los Angeles River continues to discharge into San Pedro Bay at the northeastern edge of the proposed Project Area.

Considerable changes have occurred in the two ports since the 1970s. Some of these changes included deepening of navigational channels and basins; construction of substantial landfills at Piers 300 and 400 in the Port of Los Angeles; construction of a transportation corridor out to Pier 400; expansion of Pier J in the Port of Long Beach; and construction the west basin of the Cabrillo Marina

⁴ The California least tern was originally and remains federally- and California State-listed under the generic name of *Sterna antillarum browni*; this original name is now otherwise invalid. The American Ornithologists Union in 2006 changed the valid generic name of the least tern to *Sternula*, with the California least tern then becoming *Sternula a. b.*) (Service 2016).

⁵ California least terns typically nest in colonies on relatively open beach areas that are free of vegetation and are near fish prey (Service 2006). Sand spits, dune-backed beaches, beaches at creek and river mouths, and salt pans at lagoons and estuaries are the main coastal habitats for nesting western snowy plovers (Service 2007).

⁶ Tidelands in California are defined as those lands and water areas along the coast of the Pacific Ocean seaward of the ordinary high tide line to a distance of three miles.

complex. As part of mitigation for construction and channel deepening, shallow water habitats were created in formerly deepwater areas near Pier 300, near the San Pedro Breakwater, and on the east side of Pier 400. Thus, several areas that were previously aquatic natural communities are now developed land areas, some former deep water areas are now shallow, and water circulation patterns within the Ports have been substantially altered.

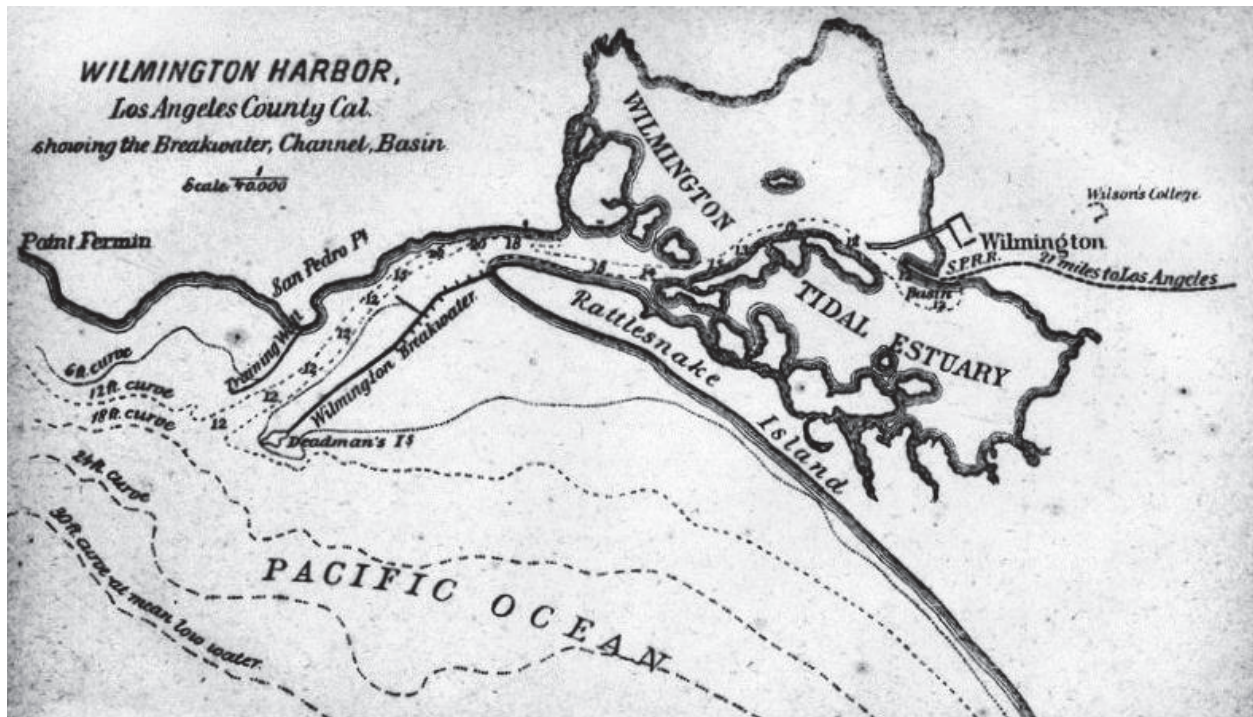


Figure 1. Circa 1880 drawing of Wilmington Harbor. The Future Port of Long Beach is on the east (right) side of the “Wilmington Tidal Estuary.” “Rattlesnake Island” would later be expanded to become Terminal Island within the ports of Los Angeles and Long Beach. Wilmington Harbor would later become the Port of Los Angeles. Note the water depths indicated. (Water Power and Associates 2014)

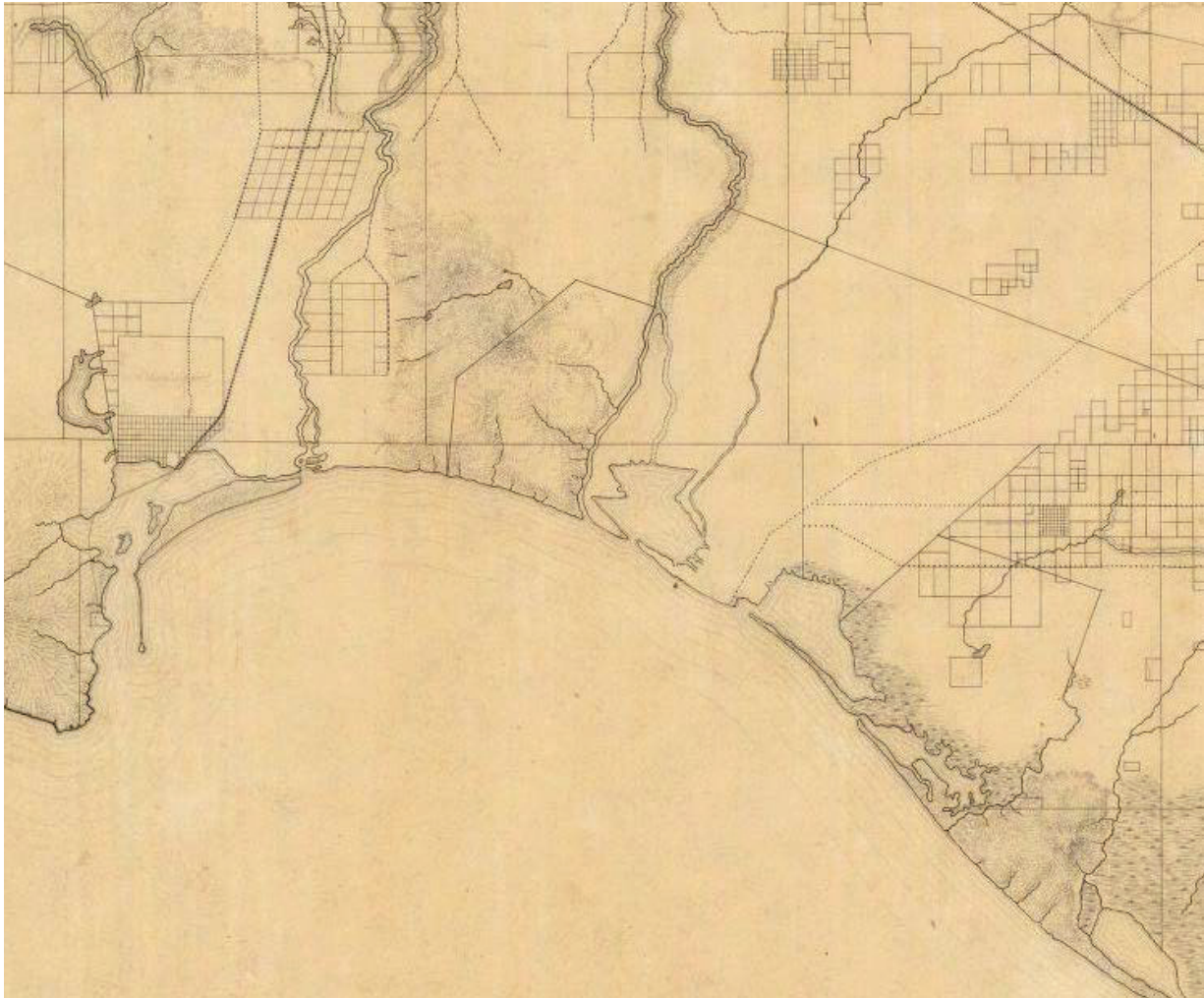


Figure 2. Portion of a circa 1880 drawing by William H. Hall of Los Angeles showing the San Pedro Bay coastline, estuaries, and ocean contours (Hall 1880). The future Port of Long Beach is in the center-left of the drawing.

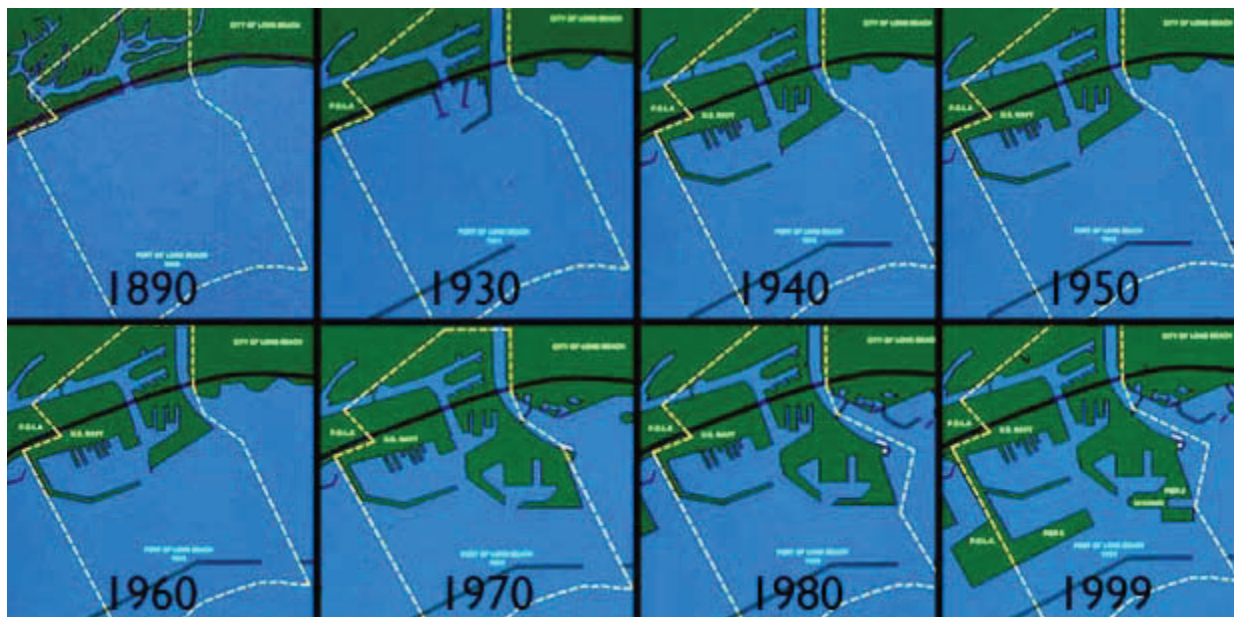


Figure 3. Drawings showing development progression of the Port since 1890 (Port 2014).

Description of the Project Area

The main project site is the Port of Long Beach and is located on the Pacific coast of southern California in western San Pedro Bay, at the southern end of the City, in southern Los Angeles County. The Port is less than 2 miles southwest of downtown Long Beach and about 25 miles south of downtown Los Angeles. To the west and northwest of San Pedro Bay are the communities of San Pedro and Wilmington, respectively, and to the east is the community of Seal Beach. Other areas that could be included in the Project area are local beaches or the open ocean for dredge disposal; the project dredge disposal areas are currently undetermined.

Two competing and independent commercial ports, the Port of Los Angeles and the Port of Long Beach, share the San Pedro Bay marine ecosystem. These man-made harbors have been created through over a century of dredging and filling of the former 3,450-acre Wilmington Lagoon and surrounding areas. The Port of Los Angeles and Port of Long Beach encompass 7,500 acres and 7,600 acres of land and water, respectively. The Port consists of: 3,000 acres of land, 4,600 acres of water, 10 piers, and 80 berths. Uses within both ports are largely industrial, although a variety of other uses (e.g., recreation, commercial fishing) are also supported.

The Port of Los Angeles and Port of Long Beach are both considered deep-water constructed ports, and do not have siltation problems like ports located in natural rivers (natural river ports) (LA/LBHSC 2016). The vast majority of sediments deposited in the ports are carried by the Los Angeles River, Dominguez Channel, and several smaller local creek/storm drains (LA/LBHSC 2016). Due to the region's Mediterranean climate, these channels carry significant quantities of storm water on rare occasions during the winter, and most of the silt settles out near the inlet mouths (LA/LBHSC 2016). As such, the ports need only to be dredged occasionally to maintain berth side design water depths (LA/LBHSC 2016).

The Port has 65 deep-water berths; all of these berths lay within three miles of the open sea, and are reached via the Port's Main Channel which has depths of minus 76 feet at Mean-Lower-Low-Water (MLLW) (LA/LBHSC 2016). The maximum ship draft in the Main Channel is currently limited to 65 feet (LA/LBHSC 2016). Dredging outside the Long Beach Breakwater Entrance Channel has deepened that area to minus 76 feet at MLLW (LA/LBHSC 2016). The Port is currently engaged in a capital development program (CDP) that includes but is not limited to dredging, terminal redevelopment, transportation, and public safety projects (LA/LBHSC 2016). Major components of the CDP include capital dredging in the West Basin and Inner Harbor Turning Basin, and in-water fill within the East Basin (LA/LBHSC 2016). The CDP includes the Middle Harbor Redevelopment Program, the replacement of the Gerald Desmond Bridge spanning the Back Channel, several rail infrastructure projects, and proposed security operations and support facilities (LA/LBHSC 2016). Though not a Port project, Caltrans is currently engaged in the replacement of the Commodore Schuyler Heim Bridge (SR-47) spanning the Cerritos Channel; it will be converted from a lift bridge to a fixed bridge (LA/LBHSC 2016).

Port of Long Beach Water Depths (LA/LBHSC 2016):

<u>Federal Channels in the Port</u>	<u>Current Depth</u>	<u>Current Width</u>
Main Channel	-76 feet	360 – 1500 feet
Back Channel	-52 feet	220 feet
Inner Harbor (Turning Basin)	-52 feet	960 feet
Cerritos Channel	-50 feet	325 feet
Channel 2	-37 to -55 feet	150 – 250 feet
Channel 3	-36 to -45 feet	150 – 200 feet

The outer limit of the Port is defined by breakwaters that were constructed during the early to mid 1900's (MEC 2002). The majority of the harbor waters within the Port currently range in water depth from 30 to 60 feet (MEC 2002) with navigation channels dredged to depths of 45 feet and greater (Service 2000). The adjacent Port of Los Angeles contains several hundred acres of waters currently shallower than 20 feet, primarily constructed by sub-aquatic fill of deeper areas performed to increase marine biological functions. The relative bathymetry⁷ of the areas within and around the ports of Long Beach and Los Angeles can be seen in Figure 4.

⁷ Bathymetry: the measurement of the depths of oceans, seas, or other large bodies of water, and the data derived from such measurement.

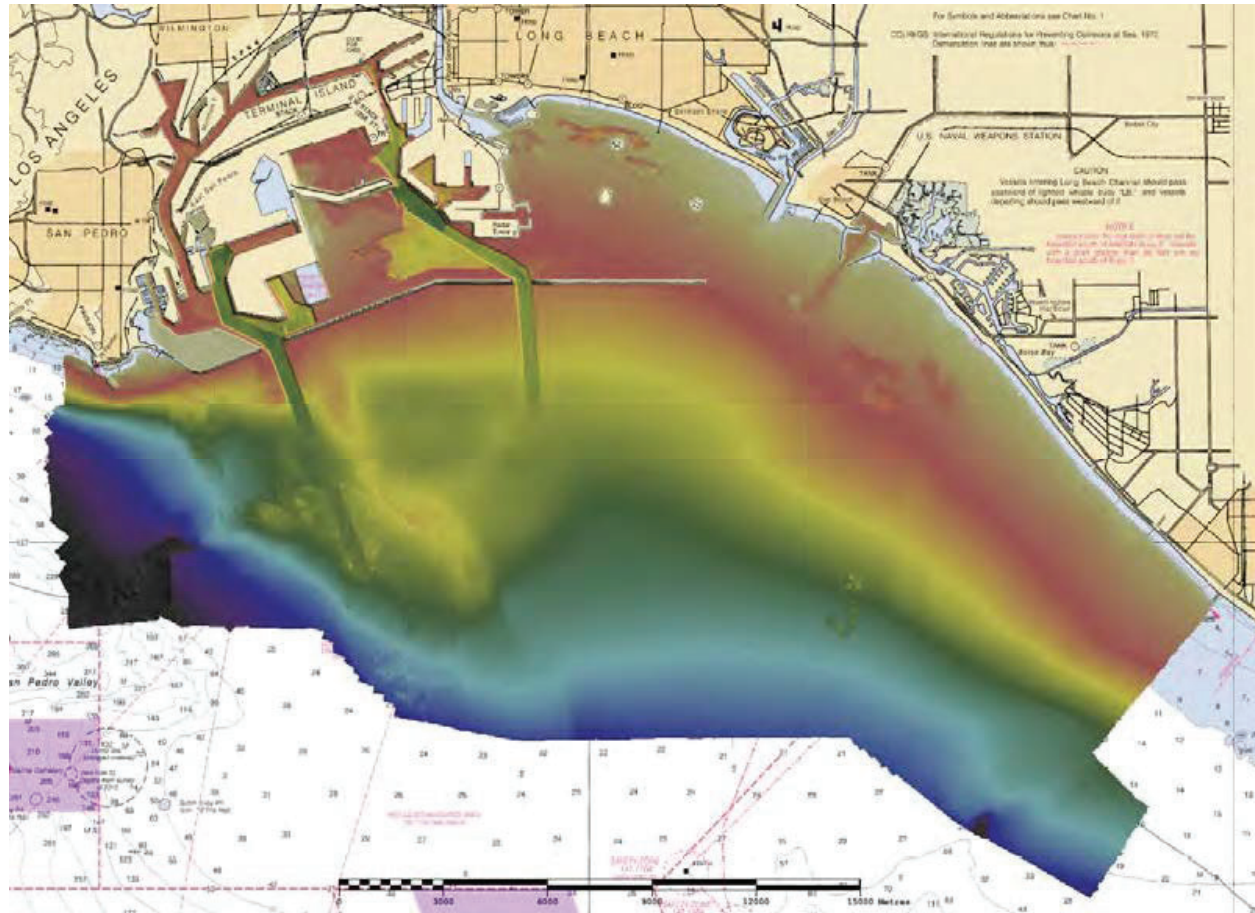


Figure 4. Relative bathymetry of the ports of Long Beach and Los Angeles and environs to highlight the deeper waters in the ports. (NOAA 2015)

Corps Study/Project Area

The Corps' study area for the proposed project includes the waters in the immediate vicinity (and shoreward) of the Port breakwaters throughout most of the Port, and the upstream reaches of the Los Angeles River that have direct impact on the San Pedro Bay, as well as the entire Port facility, including Outer Harbor, Inner Harbor, Cerritos Channel, West Basin, and the Back Channel (Corps 2015). The Corps' current Project Area is shown in Figure 5 (Corps 2016).

Project Description

The Corps, with the Port as the local sponsor, is considering the feasibility of deepening navigation channels within the harbor to increase water depths necessary to accommodate deeper draft ships in the Port. The proposed channel depths and methods to accomplish this are currently undetermined. The proposed project's proposed footprint areas are shown in Figure 5. Additional details regarding work areas have not been provided to the Service. Other project footprint areas could include areas within and/or outside the Port for dredge material disposal.



Figure 5. Corps Draft Project Area and Areas of Interest (Corps 2016)

The proposed project would require disposal site(s) for dredge materials. These sites are currently undetermined, but are expected to potentially include sites within the Port area, open-ocean, and/or nearby beach areas, depending in-part on sediment qualities and contaminant constituents in dredge materials (as determined through the testing requirements in 40 CFR §230). Re-use of dredge materials for sand replenishment on beaches near the Port is often desired by the Corps and locals where sediments are appropriate.

Background

The Port has undergone significant development and expansion in the past century (Corps 2015). In the last three decades, the ports of Los Angeles and Long Beach have undertaken accelerated long-range development efforts to increase the shipping and commercial capacity of the ports; both of the ports have become major transportation and trade centers. International commerce is almost 20 percent of the U.S. gross domestic product, and about 95 percent of these products arrive or leave the country in ships (Gray 2001). The Port provides the shipping terminals for nearly one-third of the waterborne trade moving through the west coast of the United States (Corps 2015).

The Port of Long Beach and the Port of Los Angeles are ranked sixth and eighth in tonnage in the United States respectively, moving a combined 139.2 million metric tons (DOT 2012). Trade currently valued annually at more than \$155 billion moves through the Port, making financially it the

second-busiest seaport in the United States (Corps 2015). To handle this high volume of trade, Port facilities include 10 piers, 80 berths, and 66 post-Panamax gantry cranes (Corps 2015). The Port has 22 shipping terminals to process break bulk (e.g., lumber, steel), bulk (e.g., salt, cement, and gypsum), containers, and liquid bulk (e.g., petroleum) (Corps 2015). Each year the Port handles more than 6 million Twenty-foot Equivalent Units (TEUs)⁸ and 75 million tons of cargo, and has over 2,000 vessels call (Corps 2015). Items from clothing and shoes to toys, furniture and consumer electronics arrive at the Port before making their way to stores throughout the country (Corps 2015). Specialized terminals also move petroleum, automobiles, cement, lumber, steel and other products (Corps 2015). The Port's top trading partners are China, South Korea, Hong Kong, and Japan. East Asian trade accounts for about 90 percent of the shipments through the Port (Corps 2015). Top imports are crude oil (16 million metric tons annually), electronics, plastics, and furniture (with inbound container tonnage on the order of 22 million tons annually), while top exports are petroleum products, chemicals, and agricultural commodities (Corps 2015). Currently, about one-third of liquid bulk and container cargo by weight is transported on vessels that could potentially experience operating constraints associated with the current channel depths in the Port (Corps 2015).

Under keel clearance for larger ships in the Port is important in terms of the depth of the seafloor and the static draft of the vessel transiting above it (NOAA 2015). This takes into play many elements: water level is the most obvious and important contributor to this equation. The term "tide" captures the astronomic contribution of the rise and fall of the sea's surface, whereas water level takes into account weather effects and riverine runoff contributions (NOAA 2015). In addition to the water levels, the other factors that must be considered include meteorological conditions, the vessel's motion induced by the prevailing sea state, the static draft of the vessel, the variation in this draft due to the vessel's motion through the water (dynamic draft), and the chemical composition of the water the vessel is sailing in, primarily salinity (NOAA 2015).

The large sizes of the many new trade ships are outsizing some of our waterways. Some Ultra Large Crude Carriers (ULCCs) entering the Port of Long Beach are carrying more than a million gallons of crude oil and are loading to drafts of 65 feet (NOAA 2015). Depending on the sea state in the approach channels of the Port, the ship's pitching may bring the hull close to the Port channel floor (NOAA 2015).

The channel leading into the Port of Long Beach currently has an authorized depth of 76 feet and local regulations allow drafts of 69 feet for ships with a displacement of up to 420,000 tons (NOAA 2015). In late 2012, at a Harbor Safety Committee meeting for the ports of Los Angeles and Long Beach, the Jacobsen Pilots⁹ noted that during storms and long period swell conditions outside of the breakwater, ULCCs demonstrated significant levels of pitch¹⁰ in high wave situations (NOAA 2015).¹¹ As a result, the Captain of the Port froze the maximum draft at 65 feet until they understood the effects of the swells on the ULCCs and could better predict their behavior (NOAA 2015). The effect

⁸ TEU or Twenty-Foot Equivalent Unit can be used to measure a ship's cargo carrying capacity. The dimensions of one TEU are equal to that of a standard 20-foot shipping container (20 feet long, 8.5 feet tall and 8 feet wide).

⁹ Jacobsen Pilots is the sole ship piloting company for the Port of Long Beach.

¹⁰ Pitch is the up/down rotation of a vessel about its lateral/Y (side-to-side or port-starboard) axis.

¹¹ As a point of reference, a 1,000-foot vessel pitching just 1 degree will experience an increase in draft of more than 10 feet (NOAA 2015).

of reducing the allowed under keel clearance means that ULCCs must wait outside of the sea buoy until conditions are favorable to make the transit into the Port of Long Beach, or lighter to another vessel in order to reduce their draft; both are expensive delays (NOAA 2015).

Presently the largest containerships dock primarily at one of two piers—Pier J or Pier T West Basin (Corps 2015). Access to south berthing area of Pier J is through a secondary channel connected to the Long Beach main access channel; that secondary access channel limits drafts to about 43 feet (Corps 2016). Access to the northern berthing area of Pier J is off the Southeast Basin and does not have this depth limitation (Corps 2016). About 20 years ago a small share of container vessels had to restrict drafts, utilize tides, or both (Corps 2015). However, the impact to operations has increased in the past few years due to the increasing share of larger containerships calling on the port (Corps 2015). Today containerships docking at south berthing area of Pier J have maximum operating drafts of 52 feet and over 7.5 million of the 36.6 million tons of container cargo in 2012 was handled by vessels at or near the 43-foot limit of the secondary access channel (Corps 2016).

Currently, light loading, and tidal delays increase transportation costs for goods transported on containers, and in the future the impact is expected to worsen (Corps 2015; Corps 2016). If sufficiently dredged, containerships with capacities of over 18,000 TEUs (e.g., 1300 feet long, 176 feet beam,¹² drafts approximately 52 feet) would be capable of operating fully loaded in the Port (Corps 2016). Thus, addressing operating constraints to containerships has the potential to significantly lower transportation costs (Corps 2015).

Through agreements with the Service and other resource agencies, the Port has restored some coastal wetlands in southern California in exchange for development approvals of various Port areas. The Port has participated in substantial wetlands restoration projects, including one at the National Wildlife Refuge in Seal Beach. In addition, the Port contributed \$39 million toward acquisition of 267 acres of degraded wetlands in Bolsa Chica Lagoon (Bolsa Chica Lowlands Restoration Project) in Huntington Beach (Port 2015).

Project Goals and Objectives

The proposed channel deepening project would allow large, deeper draft ships access to terminals within the Port. The Corps' stated planning goal is to provide safe, reliable, and efficient waterborne transportation improvements to the Port that address problems and opportunities as outlined herein. The Corps' planning objectives are specified as follows:

1. Reduce the cost of transporting cargo to and from the Port by improving channel dimensions, vessel operations, and other navigation features such as turning basins, waiting areas, and anchorages; and
2. Reduce expected future vessel re-routings from the Port to alternate facilities by improving channel dimensions, vessel operations, and other navigation features such as turning basins, waiting areas, and anchorages.

¹² The beam of a ship is its width at the widest point as measured at the ship's nominal waterline.

Description of Biological Resources

The Port of Long Beach represents a large harbor complex typified by extensive areas of hardened shoreline (riprap and quay wall) and dredge maintained shipping channels (SAIC 2010). The fish and wildlife resources of the Port and San Pedro Bay are reported in substantial detail in a 2000 biological baseline report entitled “Ports of Los Angeles and Long Beach Year 2000 Biological Baseline Study of San Pedro Bay” (MEC 2002). This information was updated with additional survey efforts in 2008 in a report entitled “Final 2008 Biological Surveys of Los Angeles and Long Beach Harbors” (SAIC 2010). A brief summary of the available information is provided herein, based primarily on these two baseline reports. The biological resource groups of San Pedro Bay that are typically considered the most important are the marine fishes and water-associated birds.

The benthic hard substrates in the ports are mostly artificial breakwaters and barriers of riprap (boulders and concrete rubble), and constructed shallow water areas in the ports (LA/LBHSC 2016). Kelp beds typically dominate the hard substrates, with surfgrass natural community potentially existing in waters less than 10 feet deep (LA/LBHSC 2016). Soft bottom substrates comprise the majority of acreage in the two ports (LA/LBHSC 2016). No eelgrass beds were identified within the Port of Long Beach (SAIC 2010). One area just outside the Port’s boundary line northeast of Island Grissom¹³ was identified as supporting a sizeable eelgrass bed (SAIC 2010). The water column within the ports provides important habitats for many fish, larvae, and plankton, seals, and sea lions (LA/LBHSC 2016).

Fish

Fish populations of San Pedro Bay (including the ports of Los Angeles and Long Beach and environs) are diverse and relatively abundant (SAIC 2010). During surveys conducted in 2000, a total of 74 species were recorded and an estimated 44 million fish occupied the 2 ports. Surveys of the 2 ports in 2008 identified total of 62 fish taxa representing 59 unique species of fish (SAIC 2010). Generally, schooling fishes were the most abundant species recorded.

Northern anchovy (*Engraulis mordax*) and white croaker (*Genyonemus lineatus*) were the most abundant species collected in 2000 surveys; white croaker was top ranked in terms of biomass (MEC 2002). From 2008 surveys in the two ports, pelagic fish from lampara¹⁴ net collections were dominated by four species: northern anchovy, topsmelt (*Atherinops affinis*), California grunion (*Leuresthes tenuis*), and Pacific sardine (*Sardinops sagax*). These species accounted for 98 percent of the total lampara net catch in 2008. All of these species are schooling fishes that spend most of their lives in the harbor environment. From 2008 otter trawl¹⁵ surveys, dominant species included northern anchovy, white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*), shiner surfperch (*Cymatogaster aggregata*), and white surfperch (*Phanerodon furcatus*). Other species

¹³ One of a set of four artificial oil production islands in San Pedro Bay off the coast of Long Beach.

¹⁴ A lampara net is a type of fishing net used for capturing certain pelagic fish, those swimming near the water's surface.

¹⁵ In otter trawling, a large net is dragged along the bottom or up in the water column behind a towing vessel. The mouth of the net is held open by two large "doors" which are attached to either side of the net. For the noted surveys performed in 2000 and 2008, trawl surveys were performed to capture bottom-dwelling demersal fish.

caught in high abundance were specklefin midshipman (*Porichthys myriaster*), California tonguefish (*Symphurus atricauda*), and yellowchin sculpin (*Icelinus quadriseriatus*).

The five most abundant species accounted for 92 percent of the total fish populations in the ports (MEC 2002). These included northern anchovy, white croaker, queenfish, Pacific sardine, and topsmelt. Other relatively abundant species included shiner surfperch, salema (*Xenistius californiensis*), and jacksmelt (*Atherinopsis californiensis*). Less numerous but ecologically and/or recreationally important species recorded were California barracuda (*Sphyraena argentea*), California halibut (*Paralichthys californicus*), barred sand bass (*Paralabrax nebulifer*), California corbina (*Menticirrhus undulatus*), white seabass (*Atractoscion nobilis*), California grunion (*Leuresthes tenuis*), and several species of sharks and rays.

In 2000, generally fewer species were caught in the Inner Harbor than Outer Harbor (MEC 2002). Benthic invertebrates, which represent an important food source for demersal fish,¹⁶ also exhibited a trend of decreasing function of habitats from Outer to Inner Harbor areas (MEC 2002). In 2008 surveys, few differences were observed for pelagic fish between Inner and Outer Harbor areas, with Inner Harbor stations having between 4 and 12 species and Outer Harbor stations typified by between 3 and 11 species (SAIC 2010). This likely indicates that pelagic schooling species move throughout the harbor complex (SAIC 2010). In contrast, Outer Harbor areas generally were typified by a greater number, biomass, and variety of trawl-caught (demersal) fish than Inner Harbor areas (SAIC 2010).

More species of fish were collected in the shallow waters of the ports of Los Angeles and Long Beach, including all three of the created shallow water mitigation sites within the Port of Los Angeles, than at deepwater survey stations in open water, channel, basin, and slip habitats (MEC 2002). The greater diversity is likely partially explained by the greater heterogeneity associated with the shallow water habitats, which were adjacent to rock riprap and/or vegetated areas (e.g., eelgrass beds, kelp bed); this likely results in higher fish nursery function, greater production, and generally higher abundance of fish in shallow waters. For instance, the Cabrillo Shallow Water Habitat area is located alongside the San Pedro Breakwater, which supports giant kelp and other macroalgae; the Long Beach Shallow Water Habitat area is located adjacent to the riprap shoreline along Pier 400 that supports giant kelp and other macroalgae, and extensive eelgrass beds occur within the Pier 300 Shallow Water Habitat. Studies conducted in the shallow areas of the Outer Harbor, including the Pier 300 Shallow Water Habitat (MEC 1988, 1999) created in 1984 and the Cabrillo Shallow Water Habitat (MEC 1999) constructed in 1997, have shown that these areas have both higher diversity and greater abundance of fish and invertebrates than the deeper soft bottom portions of the ports of Los Angeles and Long Beach (MEC 2002). A greater abundance of juvenile fish is also present in these shallow areas; they appear to enter these areas relatively soon after hatching/birth. Long Beach fishing experts often fish adjacent to the four manmade oil production islands located within the overall Port boundaries,¹⁷ due to the abundance of recreational fish found there; the abundance of recreational fish in these areas is reportedly due to shallow water combined with high relief from the riprap placed around the created islands (Ballanti 2007).

¹⁶ Fish dwelling at or near the bottom of a body of water.

¹⁷ The islands are controlled by the City of Long Beach and are not part of the Port's Harbor District.

Forty-four unique species of fish larvae and 13 categories of fish eggs were identified in the ports of Los Angeles and Long Beach during the 2000 surveys (MEC 2002). The most abundant fish larvae were gobies [arrow goby (*Clevelandia ios*), cheekspot goby (*Ilypnus gilberti*), shadow goby (*Acentrogobius nebulosus*), and bay goby (*Lepidogobius lepidus*)], northern anchovy, California clingfish, queenfish, blennies, and white croaker. With the exception of the Pier 300 Shallow Water Habitat (in the Port of Los Angeles) that had high larval abundance and the Long Beach West Basin with low larval abundance, the abundances of larvae were generally higher on the Long Beach side of the two-port complex. This bears some similarity to the abundance pattern indicated for adult fish caught by lampara net surveys, which generally showed higher abundance in the deepwater channel, basins, and slips in the Port of Long Beach (MEC 2002). The larval catch was dominated by benthic associated gobies, which inhabit burrows. The ichthyoplankton surveys provided a good measure of the importance of species inhabiting burrows or associated with rocky and/or vegetated habitats in the Long Beach-Los Angeles port complex (MEC 2002). These species (while poorly represented in the adult fish surveys), are an important part of the overall ecology of the diverse marine habitats in the two ports. The ichthyoplankton results also demonstrate that a wide variety of fish spawn and develop within the ports of Los Angeles and Long Beach. Similar to the previous baseline study (MEC 2002), the only exotic (non-indigenous) fish species collected in the 2008 sampling surveys was the yellowfin goby (*Acanthogobius flavimanus*), collected at three Port of Los Angeles stations and six Port of Long Beach Harbor stations (SAIC 2010).

Benthic Invertebrates

Over 400 species of benthic infauna (small organisms that live on and within the sediment) and larger macroinvertebrates were collected during the Year 2000 Baseline Study; over 250 species of benthic infauna and larger macroinvertebrates were collected during the Year 2008 Baseline Study (MEC 2002; SAIC 2010). Small infaunal organisms (which tend to be less motile than larger macroinvertebrates) and larger macroinvertebrates both exhibited spatial variability in species composition that appeared to be tied to a combination of factors including water depth, years since dredging/disposal in the area, and ecological/habitats functions (MEC 2002). Studies in 2008 found little difference in species composition among deepwater stations located in basins, channels, or slips of the Inner and Outer Harbors (SAIC 2010).

Benthic invertebrate assemblages generally differed between shallow and deepwater habitats (SAIC 2010), and differences were apparent between assemblages from areas that have or have not experienced recent dredging (MEC 2002). Areas of recent dredging had fewer species and lower abundance than non-dredged areas, indicating that the recently dredged areas were still in the colonization phase (MEC 2002). Species assemblages of benthic invertebrates can be indicative of habitat function (SAIC 2010). Certain species are tolerant of adverse environmental conditions, such as low oxygen and high pollutant conditions, and others are found only in more pristine areas (SAIC 2010). In the 2008 study, species assemblages indicated that stations in the Outer Harbor had the highest habitat function as indicated by relatively greater abundance of species that typically characterize areas having background to low organic enrichment (i.e., low pollution) (SAIC 2010). The species assemblages found in the Inner Harbor, basins, and slips were indicative of low to moderate organic enrichment compared to the open-water Outer Harbor stations, suggesting that

benthic invertebrate species composition is influenced by tidal circulation in the harbors, with Outer Harbor areas having greater circulation and higher functional habitats (SAIC 2010).

Non-indigenous invertebrates comprise about 15 percent of the infauna and macroinvertebrate species occurring in the ports, with some of these species representing numerical dominants (SAIC 2010). The relative abundance of these species has increased in the harbors since the 1970s (SAIC 2010). A total of 10 non-indigenous (introduced) and 32 cryptogenic species (of unknown origin) were identified among the 313 species of infauna and macroinvertebrates collected during the 2008 study (SAIC 2010). The overall percentage of introduced and cryptogenic species identified in the present study (14 percent) is similar to the 15 percent reported by MEC (2002) in 2000 (SAIC 2010).

In general, ecological/habitats function was highest for benthic invertebrates at the created Cabrillo, Pier 300, and Long Beach Shallow Water Habitat areas and the deep open waters of both ports (MEC 2002). A gradient of decreasing ecological/habitats function was observed in basin and slip habitats and the back channels of the Inner Harbor. Similar to fish, catch abundance was higher in basin habitats in the Port than in the open waters of the Outer Harbor (SAIC 2010). The lowest catch of benthic invertebrates was obtained in the Inner Harbor (SAIC 2010).

A steady improvement in benthic ecological/habitats function within the ports of Los Angeles and Long Beach over time has occurred, as demonstrated by increased diversity and less dominance by pollution tolerant benthic infauna species over the past half century. Many areas in both ports were severely polluted in the 1950s with depauperate benthic faunal assemblages in these areas during that period (MEC 2002) (please see Contaminants below).

Birds

Southern California's coastal areas, including its shorelines, estuaries, bays, and developed harbors, provide a variety of natural and artificial communities for large numbers of waterfowl, shorebirds, wading birds, and birds that forage from the air. The predominately open water and hardscape/landscape habitats within the ports of Long Beach and Los Angeles provide opportunities for nesting, foraging, and resting by a moderate diversity of bird species, including one species listed as endangered under the ESA, the California least tern.

Birds that occur in and near the ports of Los Angeles and Long Beach are primarily water-associated species; that is, they are dependent on the marine natural communities for food and other essentials. Over 100 avian species use the various habitats within the Ports seasonally, year-round, or during migration (SAIC 2010). The areas within and near the ports provide very limited areas of trees and/or shrubs for feeding, resting, and/or nesting; most of this small area of vegetation is made up of exotic landscaping. As a result of the high numbers of small fish in the shallow water areas of the ports, substantial numbers of fish-eating birds are found foraging in these areas. The ports provide high-function habitats for many foraging, resting, and breeding birds.

During the 2000-2001 monitoring year, a total of 99 bird species, representing 31 families, were observed within San Pedro Bay (MEC 2002). A total of 96 species representing 30 families were observed within the ports during the 2008 study (SAIC 2010). Of these species from both studies,

69 are considered to be dependent on marine habitats. Gulls comprised 44.5 percent of the birds observed in 2000, with aerial foragers (22.4 percent) and waterfowl (21.4 percent) also common. The remaining 21.7 percent of the birds were small and large shorebirds, wading/marsh birds, raptors, and upland birds. The most abundant birds included several gull species [e.g., Western (*Larus occidentalis*), Heermann's (*L. heermanni*), and California (*L. californicus*)], brown pelican (*Pelecanus occidentalis*), elegant tern (*Thalasseus elegans*), western grebe (*Aechmophorus occidentalis*), Brandt's cormorant (*Phalacrocorax penicillatus*), double-crested cormorant (*Phalacrocorax auritus*), surf scoter (*Melanitta perspicillata*), and rock pigeon (*Columba livia*).

The State and Federal endangered California least tern is a piscivorous (fish eating) sea bird that makes significant breeding use of San Pedro Bay (KBC 2005). The least tern has a long history of nesting on Terminal Island and Pier 400 in the Port of Los Angeles (Figure 4). Pier 400 is near the western portion of the proposed project footprint. This least tern nesting site is typical of those used by the species in highly developed coastal California; the site is a relatively flat, open, barren sandy area near the ocean where the least terns lay and incubate their eggs and chicks fledge. The least tern nesting period extends from April through August; along the California coast least terns typically begin to arrive (from wintering grounds) in the southern most colony breeding sites (e.g., San Diego) in early April and they continue to arrive through the later part of May. During the remainder of the year, the birds are gone from the area.

Least terns nest on sparsely vegetated substrates, including sandy beaches, salt flats, and dredge spoil, in colonies of a few to several hundred nesting pairs. This species relies on sight for foraging and usually requires relatively clear water to locate its preferred baitfish food sources, northern anchovy, topsmelt, and jacksmelt (LSA 2009). Although there is some field evidence to suggest that least terns will forage in turbid waters to which fish are attracted, the majority of foraging occurs in clearer waters (LSA 2009).

The location of the tern nesting site(s) in the ports of Los Angeles and Long Beach previously varied from year to year (KBC 1998) depending largely on development activities in the ports, with most nesting on Pier 400. The Los Angeles Harbor Department manages the Pier 400 nesting site pursuant to a Memorandum of Agreement with the Service, Corps, and California Department of Fish and Wildlife (Department) (LA 2006). A 15.7-acre fenced nesting site is located at the southern tip of Pier. 400, although some nesting by least terns also often occurs outside of this designated area.

Least terns have nested within the ports since the late 1800s and have been observed within the harbor almost every year since annual monitoring studies began in the ports in 1973 (SAIC 2010). Since 1973 the least tern has utilized nesting locations on and around Terminal Island, with nesting at Reeves Field and/or Pier 300 and Pier 400 areas (LAHD 2015). Zero least tern nesting pairs were recorded for the Terminal Island area in 1992 (LAHD 2015). The greatest documented nesting activity for the least tern in the area has occurred since the birds began utilizing the then newly-constructed Pier 400 as a nesting site in 1997. The number of recorded nests at Pier 400 peaked at 1,322 in 2005, then declined to 906 in 2006, and further declined to 710 in 2007 (KBC 2007) and 126 in 2014 (State 2015). The principal foraging areas for least tern in the ports and environs vary somewhat from year to year, but during the chick rearing period, the shallow water areas of the ports are used heavily, probably due to the relatively greater abundances of appropriate prey fish (size and

species) found there (see MEC 1988, 1999). Measures to protect the least tern during channel dredging and landfill construction projects have proven successful (Service 1992). Those measures have included nesting area and predator management, shallow water area conservation/creation, and protection of water quality in the shallow water areas during breeding season.

Least tern nest numbers at Pier 400 increased from approximately 565 during the 2000–2001 to 1,332 in 2005, and then declined to 521 in 2008 (SAIC 2010). The decrease in nest numbers is opined to be related to increases both in upland vegetation and predation at the Pier 400 nesting site (KBC 2008). The majority of least tern observations during 2007–2008 surveys were of individuals foraging or flying in the vicinity of the Pier 400 nesting site; least terns also were observed foraging along the outer breakwater and open-water areas of the Outer Harbor and within Inner Harbor basin and channel areas (SAIC 2010). Least terns foraged most frequently just off the Pier 400 nesting site, off Pier 300, and near Cabrillo Beach (SAIC 2010).

The brown pelican, formerly federally listed as endangered, is found in large numbers in San Pedro Bay (MEC 2002). This bird breeds on the offshore Channel Islands, and forages widely along the southern California coast on small fishes. Brown pelicans make heavy use of the Outer Harbor breakwaters for roosting. The brown pelican is present throughout the year. The peregrine falcon (*Falco peregrinus*), also formerly federally listed as endangered, nests on bridges within the area of the ports (SAIC 2010).

Several piscivorous seabirds began nesting in the adjacent Port of Los Angeles following construction of Pier 400. The royal tern (*Thalasseus maximus*), Caspian tern (*Hydroprogne caspia*), elegant tern, and black skimmer (*Rynchops niger*) had each been recorded nesting on Pier 400 up until 2005 (KBC 2005). No nesting by these species was recorded in 2006 or 2007 (KBC 2007). The landfill area of Pier 400 (constructed in 1996) initially provided a large expanse of suitable bare-dirt nesting habitat for terns adjacent to a well-developed forage base (consisting of small fish) in the Outer Harbor. However, development of Pier 400 is now complete and undeveloped areas in the ports of Los Angeles and Long Beach outside of the Pier 400 nesting site currently contain very little suitable seabird nesting habitats.

No snowy plovers were detected within either the ports of Long Beach or Los Angeles during the 2007–2008 surveys (SAIC 2010). Snowy plovers are occasionally observed during migration at the California least tern nesting site on Pier 400 (SAIC 2010). A few snowy plovers have been observed at nearby Point Fermin and Cabrillo Beach (outside of the breakwater), both south and outside of the Port of Los Angeles (SAIC 2010).

Mammals

Most marine mammals are under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA Fisheries), including all those potentially occurring in or near the ports. All marine mammals are protected under the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 *et seq.*) and some are also protected by the ESA. Marine mammals that are known to occur sporadically in waters of the ports include pinnipeds [California sea lion (*Zalophus californianus*) and harbor seal (*Phoca vitulina*)] and cetaceans (SAIC 2010). Cetaceans that have been observed in

outer harbor locations in the ports include the gray whale (*Eschrichtius robustus*), Pacific bottlenose dolphin (*Tursiops truncatus*), short-beaked common dolphin (*Delphinus delphis*), and Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) (SAIC 2010). None of these species are known to breed in the ports (SAIC 2010).

Riprap-Associated Organisms

A total of 334 species of invertebrates were identified from three tidal zones within the riprap community in the ports (SAIC 2010). Distinct tidal zonation was observed with increasing numbers of species with increasing depth. Mean total abundance was highest in the lower intertidal, lowest in the upper intertidal, and intermediate in the subtidal zone (SAIC 2010). Across all tidal zones, crustaceans were numerically dominant, followed by polychaetes, echinoderms, molluscs, and other phyla. Past studies have noted relatively greater community development in Outer Harbor compared to Inner Harbor areas (MEC 1988, 2002). However, the 2008 study noted general similarities in these communities throughout the two ports (SAIC 2010). Exceptions were for diversity, which was somewhat greater at Outer Harbor breakwater stations compared to Inner Harbor locations, but these differences were mainly associated with the upper intertidal zone (SAIC 2010). Community summary measures did not show distinct trends among Inner and Outer Harbor stations for the lower intertidal and subtidal zones, suggesting some improvement in ecological function at Inner Harbor stations since the 2000 study (SAIC 2010).

Kelp and Macroalgae

Within the ports, the majority of kelp and macroalgae surface canopy is closely associated with the outer breakwaters and with riprap structures in the Outer Harbor and in locations facing the port entrances (SAIC 2010). While algal diversity in the ports is considered relatively low, there is a general pattern of decreasing algal diversity from Outer to Inner Harbor locations (SAIC 2010). During the 2008 study, *Macrocystis* canopy in the two ports totaled 77.8 acres in spring and decreased to 50.4 acres in the fall (35% decrease) (SAIC 2010). Seasonal declines in kelp canopy cover for both studies are likely due to natural die-offs between winter and fall. Dominant macroalgal communities included the genera *Sargassum*, *Ulva*, *Colpomenia*, *Chondracnathus*, and *Halymenia* (SAIC 2010).

Occurrences of invasive exotic algae within the ports include the brown algae *Sargassum muticum* and *Undaria pinnatifida*. While *Sargassum* has become a commonly observed component of the algal flora in southern California, including the ports, *Undaria* was first reported in the United States in spring 2000 during the previous baseline study of the ports (MEC 2002). Notably, *Undaria* was documented during the present study at all eight Inner Harbor sites studied and at 7 of 12 Outer Harbor locations, indicating an expanded distribution since 2000 (SAIC 2010).

Contaminants

The marine biological environment of the ports of Los Angeles and Long Beach has been periodically studied since the 1950s. Early studies documented severe pollution in several of the basins in the harbors. As recently as the late 1960s, dissolved oxygen (DO) levels at some locations

in Los Angeles Harbor were so low that little or no marine life could survive (SAIC 2010). Since that time, regulations have reduced direct waste discharges into the ports, resulting in improved DO levels throughout the port areas (MEC 2002; SAIC 2010). Comprehensive studies in the 1970s reported a dramatic improvement in marine habitats function/quality relative to the 1950s, although areas of pollution are still evident in Inner Harbor and blind-end slip areas (MEC 2002).

Results from studies in 2000 and 2008 indicate a continued trend of water quality improvement since the 1970s, with most DO concentrations in excess of 5 milligrams/liter (MEC 2002; SAIC 2010). Episodic and localized changes in some parameters, such as low DO concentrations coinciding with low transmissivity, suggested minor effects possibly associated with sediment resuspension events (MEC 2002). Water clarity (transmissivity) decreased with increasing depth and was relatively lower in bottom waters at stations with fine sediments and/or in the vicinity of dredging and/or disposal (MEC 2002). Polluted and “semi-healthy” areas still exist in the ports; however, the spatial extent of these areas of relatively poorer ecological/habitats function is not as widespread today. The most polluted area is the Consolidated Slip of the Port of Los Angeles; “semi-healthy” areas exist in the Cerritos Channel of the Inner Harbor and in confined basins and slips in both ports (MEC 2002).

Water quality conditions measured during July 2008 generally were uniform throughout the environments of the ports, with only minor differences that appeared to be unrelated to natural community (SAIC 2010). Further, water quality conditions also were consistent with values reported previously for the ports (MEC 2002), and indicative of well-mixed and well-oxygenated waters (e.g., DO greater than 5 mg/L) for almost all stations (SAIC 2010). Some localized differences, associated with comparatively warmer surface water temperatures, lower surface water salinities, and lower DO concentrations in near-bottom water, were observed, but the magnitude of the differences were considered small (SAIC 2010).

The waters of ports of Los Angeles and Long Beach (including Inner and Outer Harbor, Main Channel, Consolidated Slip, Southwest Slip, Fish Harbor, Cabrillo Marina, Inner Cabrillo Beach), San Pedro Bay, Dominguez Channel, Dominguez Channel estuary, Torrance Lateral Channel (sometimes referred to as Torrance Carson Channel), and Los Angeles River Estuary are impaired by heavy metals and organic pollutants (CRWQCB 2011). More specifically, each of these water bodies are included on the 303(d) list for one or more of the following pollutants: cadmium, chromium, copper, mercury, lead, zinc, chlordane, dieldrin, toxaphene, DDT, PCBs, and certain PAH compounds (CRWQCB 2011). These impairments may exist in one or more environmental media — water, sediments, or tissue (CRWQCB 2011).

Some site specific data are available that suggest varying levels of contamination in the sediments to be dredged. Additional testing will be required to determine what materials from which areas may be re-used for habitat creation or beach replenishment, disposed of at an ocean dumping site, or disposed of at a confined disposal facility or appropriate upland site. The Service will provide additional input on these determinations as information regarding physical and chemical characteristics of the materials to be dredged becomes available.

San Pedro Bay Landfill Mitigation History

The agency consensus mitigation goal for San Pedro Bay (ports of Los Angeles and Long Beach) landfill impacts to date has been no net loss of habitat value for in-kind resources, as near to the site of loss as feasible, and in advance of, but not later than concurrently with, the fill (Corps and LAHD 1992). For the last several years, the Service, Department, the National Marine Fisheries Service, the City of Los Angeles Harbor Department, and the Port have been designing and executing mitigation plans for development projects in the ports. The process employs a modified habitat evaluation procedure and involves evaluation of the habitat value in the affected port area and compares that to predicted habitat value increases at conceptual mitigation areas.

Following implementation of measures for avoiding and minimizing impacts to fish and wildlife resources, on-site mitigation has been conducted in the adjacent Port of Los Angeles consisting of creation of shallow water from deep areas. In 1985, as a condition of the Harbor Deepening Project in the Port of Los Angeles, the Corps created 190 acres of shallow water (i.e., water less than -20 feet MLLW) as mitigation for the filling of 190 acres of shallow water to make the land area now called Pier 300. The created shallow water area, now called the Pier 300 Shallow Water Habitat, has been the subject of several biological investigations (MEC 1988, 1999) and shown to provide highly productive habitats for fish. It is also an important foraging area for the California least tern (KBC and Aspen Environmental Group 2004).

Potential Impacts of the Proposed Project on Biological Resources

The proposed project would involve deepening of portions of the Port to currently undetermined depths with the disposal of dredge material at currently undetermined locations. The project would involve dredging of only relatively deep (i.e., greater than 20 feet) water areas of San Pedro Bay. These deeper water impacts typically do not involve what is considered significant long-term loss of habitats warranting mitigation.¹⁸ Anticipated potential effects associated with dredging and disposal of dredge materials would depend largely on disposal location; these potentially include: 1) the permanent elimination of fish and wildlife habitats associated with any in-bay landfills; 2) a temporary reduction in available foraging habitat for piscivorous bird species, including the least tern, due to dredging or disposal-associated turbidity generated by the project (depending on locations); 3) the reduction of deep water habitats and creation of shallow water fish habitats with any in-bay subaquatic fill of deeper waters; 4) the reduction of deepwater habitats and creation of island (nesting bird) habitats with any in-bay island fill of deeper waters; and 5) temporary impacts of burying of beach- and nearshore-associated invertebrates and nearshore turbidity associated with disposal of dredge materials through local beach/nearshore replenishment.

The dredging of deeper water areas within the project footprint would impact the invertebrate benthic fauna and demersal fish communities found in these areas. These dredging impacts would be largely temporary, although the resultant areas would then be deeper in the long-term. The replacement benthic fauna that would colonize these dredged areas in the years following project

¹⁸ Historically, mitigation has been required for dredging that deepens shallow water areas, 20 feet deep or less, because the deepening reduces or eliminates the fish nursery and bird foraging values. No such impacts to areas less than 20 feet deep are anticipated with this project.

implementation would likely be different; this fauna would include species combinations adapted to these new deeper areas. The vast majority (if not all) of these areas have been subject to dredging in the past century, with varying levels of recovery since the last dredging event. It is undetermined what areas of the project footprint would be subject to future maintenance dredging.

The dredging and disposal of dredge materials creates temporary turbidity impacts to surrounding waters. When dredge materials are used to create shallow water or island habitats this typically creates long-term benefits due to the typically higher functions and values for fish and wildlife attributable to shallow water and sensitive species nesting areas. The size and duration of the turbidity plume generated by dredging and disposal activities is dependent on grain size of the suspended material and current velocities at the time the activity is conducted (Corps and LAHD 2000). Project dredge material qualities, disposal locations, and associated current velocities are unknown; therefore, turbidity is not readily predictable for the project. The amount of turbidity is generally greater in the immediate vicinity of the filling/disposal operations than at the dredge site because the dredge typically operates with suction, while the filling operation is often by discharge from a pipe (Corps and LAHD 2000). However, based on past dredge disposal operations, the extent of the turbidity plume is not expected to be greater than several hundred feet from the discharge point. Because several hundred acres of high-function shallow water foraging habitat are available for piscivorous bird species within the Port region (e.g., 193-acre Pier 300 Shallow Water Habitat and 326-acre Cabrillo Shallow Water Habitat), the area of disturbance from the project would likely represent a small portion of available foraging habitats for such birds.

Recommendations

The Fish and Wildlife Coordination Act states that "...wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development projects through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation..." (16 U.S.C. 661). Consistent with Fish and Wildlife Coordination Act, should the project be implemented, we suggest incorporation of the following planning aid recommendations in order avoid, minimize, and compensate potential impacts to fish and wildlife resources, and suggest the Corps incorporate the project design elements outlined below that would improve fish and wildlife resources:

1. The Corps should use dredge materials, as contaminant levels in the dredge materials allow, to construct areas of shallow water fish habitats (areas of water less than -20 feet MLLW).
2. Within the center of the area of created shallow water fish habitats noted above, the Corps should create a least tern/snowy plover nesting island with dredge materials. We suggest that the Outer Harbor in areas of low shipping traffic would likely be a functional location for this purpose, particularly areas adjacent to (behind) the existing Middle or Long Beach breakwaters.¹⁹ The middle of this island(s) should be at least several acres in size and relatively flat with the surface constructed of typical least tern nesting soil matrix materials.

¹⁹ We suggest these locations so as to minimize conflict with existing shipping traffic routes in the ports. These Outer Harbor areas would likely provide high ecological function for the fish and wildlife species targeted by these measures.

A portion of the island should have a zone of low gradient shoreline slope down to the water within a protected cove(s), likely adjacent to and facing the existing breakwater within the Port for swell protection. Other features such as subaquatic reefs constructed of rock are also suggested, in part to help prevent erosion of the island cove shoreline surface materials from swells. The configuration and slope surface of the noted cove should be constructed of sand and gravel or other compatible materials for snowy plover chick foraging; the configuration should be such that the cove areas remain open to tide-borne deposition of natural beach wrack²⁰ and would otherwise support snowy plover chick and adult foraging. The remainder of the island (outside of the cove portion) would likely need to be edged by riprap to avoid erosion of the island by swells. Possibly waste rock from other proposed projects in the area (e.g., partial or full removal of the Long Beach Breakwater) could be used/combined for this purpose. It is preferred that the surface of this island not be utilized for human recreation and be protected from unauthorized entry.

3. The Corps should implement a construction schedule for the project that avoids the least tern breeding season, if feasible.
4. Turbidity from dredge and fill activities in the vicinity of the shallow water habitats should not extend over an area greater than 5 acres of shallow waters (i.e., areas less than 20 feet deep) at any one time during the April-to-September breeding season of the California least tern. Monitoring of project-related turbidity, as provided for in measure 5 below, should be based on visually observed differences between ambient surface water conditions and any visible dredging turbidity plume.
5. The Corps should provide a qualified least tern biologist, acceptable to the Service and Department, and approved by the Corps, to help monitor and manage project activities. This program should be carried out during project activities. The biologist should coordinate with the Service and the Department and:
 - a. If the areas associated with project activities (such as staging areas) would occur within upland areas of the Port that are capable of supporting sensitive species, the Corps should provide an education program for construction crews, including the identity of the least tern and their nests, restricted areas and activities, and actions to be taken if least tern nesting sites are found outside the designated least tern nesting sites/within project activity areas.
 - b. Visually monitor and report to the dredging contractor or Corps contract manager and Service/Department any turbidity from project dredging which extends over an area greater than 5 acres of shallow waters.
6. If least tern or other protected species nests are found within the project's direct footprint in upland areas during construction, then all work in the immediate area should be halted, and the Corps biologist be notified immediately. An appropriate buffer zone around the nest for

²⁰ Beach wrack consists of organic material such as kelp and sea grass that is cast up onto the beach by surf, tides, and wind. Beach wrack supports a wide variety and large quantity of beach invertebrates.

exclusion of project-related activities should be specified by the biologist in coordination with the Service and the Department.

If you have any questions you have regarding this letter, please contact Jon Avery, Federal Projects Coordinator, at 760-431-9440, extension 309.

Sincerely,

CAROL
ROBERTS



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Scott A. Sobiech
Deputy Field Supervisor

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ENDANGERED SPECIES ACT

***US FISH AND WILDLIFE SERVICE
18 FEBRUARY 2015***

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United States Department of the Interior



FISH AND WILDLIFE SERVICE

Carlsbad Fish and Wildlife Office
2177 SALK AVENUE - SUITE 250
CARLSBAD, CA 92008

PHONE: (760)431-9440 FAX: (760)431-5901

URL: www.fws.gov/carlsbad/

Consultation Code: 08ECAR00-2015-SLI-0209

February 18, 2015

Event Code: 08ECAR00-2015-E-00451

Project Name: Port of Long Beach Deep Draft Navigation Reconnaissance

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



United States Department of Interior
Fish and Wildlife Service

Project name: Port of Long Beach Deep Draft Navigation Reconnaissance

Official Species List

Provided by:

Carlsbad Fish and Wildlife Office
2177 SALK AVENUE - SUITE 250
CARLSBAD, CA 92008
(760) 431-9440
<http://www.fws.gov/carlsbad/>

Consultation Code: 08ECAR00-2015-SLI-0209

Event Code: 08ECAR00-2015-E-00451

Project Type: Dredge / Excavation

Project Name: Port of Long Beach Deep Draft Navigation Reconnaissance

Project Description: Port of Long Beach Deep Draft Navigation Reconnaissance Study

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.



United States Department of Interior
Fish and Wildlife Service

Project name: Port of Long Beach Deep Draft Navigation Reconnaissance

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-118.2446426 33.7503824, -118.2252448 33.7566624, -118.2230132 33.7520952, -118.2182067 33.7533797, -118.2178634 33.7545215, -118.2199233 33.7575187, -118.2192367 33.7593811, -118.2216399 33.7635127, -118.2252448 33.7679365, -118.2207816 33.7705051, -118.220095 33.7660814, -118.21958 33.7636554, -118.2156318 33.7566624, -118.2151168 33.7566624, -118.2147735 33.7625137, -118.2142585 33.7625137, -118.2137435 33.761372, -118.2134002 33.7563769, -118.2134002 33.7553779, -118.2113402 33.7560915, -118.2103103 33.7566624, -118.208422 33.758375, -118.2087653 33.7596594, -118.2087653 33.762371, -118.2080787 33.7626564, -118.2067054 33.7562342, -118.2149451 33.7519525, -118.2151168 33.7456722, -118.2065337 33.7403907, -118.2051604 33.7419609, -118.2127135 33.7469568, -118.2063621 33.7509534, -118.2060187 33.7442448, -118.1986373 33.7442448, -118.1986373 33.7509534, -118.1974357 33.7508106, -118.1969207 33.7431029, -118.1929725 33.7436738, -118.1921142 33.7431029, -118.1950324 33.7398197, -118.2010406 33.7398197, -118.2034438 33.739106, -118.2031005 33.7381067, -118.2018989 33.7363937, -118.196749 33.7359654, -118.187816 33.732682, -118.1848977 33.7336813, -



United States Department of Interior
Fish and Wildlife Service

Project name: Port of Long Beach Deep Draft Navigation Reconnaissance

118.1850694 33.7361082, -118.1938241 33.7361082, -118.1943391 33.737964, -118.1860994
33.738535, -118.1648477 33.7376785, -118.1617233 33.7156959, -118.2315895 33.7128401, -
118.2424041 33.7421077, -118.2305595 33.7395382, -118.2169982 33.7443916, -118.2186805
33.7449625, -118.2310745 33.7411085, -118.2412025 33.7429641, -118.2417175 33.7432496, -
118.2446426 33.7503824)))

Project Counties: Los Angeles, CA



United States Department of Interior
Fish and Wildlife Service

Project name: Port of Long Beach Deep Draft Navigation Reconnaissance

Endangered Species Act Species List

There are a total of 6 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
California Least tern (<i>Sterna antillarum browni</i>)	Endangered		
Coastal California gnatcatcher (<i>Polioptila californica californica</i>) Population: Entire	Threatened	Final designated	
Least Bell's vireo (<i>Vireo bellii pusillus</i>) Population: Entire	Endangered	Final designated	
Light-Footed Clapper rail (<i>Rallus longirostris levipes</i>) Population: U.S.A. only	Endangered		
western snowy plover (<i>Charadrius nivosus ssp. nivosus</i>) Population: Pacific coastal pop.	Threatened	Final designated	
Mammals			
Pacific Pocket mouse (<i>Perognathus longimembris pacificus</i>) Population: Entire	Endangered		



United States Department of Interior
Fish and Wildlife Service

Project name: Port of Long Beach Deep Draft Navigation Reconnaissance

Critical habitats that lie within your project area

There are no critical habitats within your project area.

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ENDANGERED SPECIES ACT

***NATIONAL MARINE FISHERIES SERVICE
29 AUGUST 2014***



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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

AUG 29 2014

Josephine Axt
Office of the Chief
Planning Division
U.S. Army Corps of Engineers
Los Angeles District
915 Wilshire Boulevard Suite 930
Los Angeles, California 90017

Dear Ms. Axt:

NOAA's National Marine Fisheries Service (NMFS) has reviewed a letter from the U.S. Army Corps of Engineers (Corps), received August 8, 2014, requesting a current list of any species that are listed as endangered or threatened, or candidate species for listing, under the Endangered Species Act (ESA) that may be found within the vicinity of Port of Long Beach (POLB) areas under study for modifications to accommodate deep draft vessels. The letter also requests a list of any species of concern that may be in this area. NMFS has also reviewed the supporting project description and background information provided by the Corps along with the August 8, 2014, letter. NMFS offers the following response pursuant to the ESA.

Proposed Project

The proposed project briefly describes the planning study of a suite of construction and dredging operations that could be undertaken to improve the capability of the Port of Long Beach to efficiently accommodate large container vessels (greater than 43 ft draft). The list of measures under study and consideration includes the deepening of several access channels within POLB, the construction of multiple turning basins near these access channels, the construction of an inner harbor waiting area or deepening of the anchorage along the main channel of POLB, and the deepening of the approach channel into POLB. Given the proposed project, NMFS assumes that the project area includes POLB areas within the Long Beach Breakwater, extending out into open marine waters adjacent to the approach channel of POLB.

Endangered Species Act Species List

The following species listed as threatened or endangered under the ESA may be found within the vicinity of the proposed project area:



Sea Turtles	
Leatherback sea turtle - (<i>Dermochelys coriacea</i>)	Endangered
Loggerhead turtle - North Pacific Ocean and South Pacific Ocean DPS(<i>Caretta caretta</i>)	Endangered
Olive ridley (<i>Lepidochelys olivacea</i>)	Endangered/Threatened*
Green turtle (<i>Chelonia mydas</i>)	Endangered/Threatened*
Marine Mammals	Status
Blue whale (<i>Balaenoptera musculus</i>)	Endangered
Fin whale (<i>Balaenoptera physalus</i>)	Endangered
Humpback whale (<i>Megaptera novaeangliae</i>)	Endangered
Gray whale, western North Pacific population (<i>Eschrichtius robustus</i>)	Endangered

* Globally listed as threatened, but populations associated with breeding populations along the Pacific Mexican coast are listed as endangered. Individuals found in southern California are assumed to be part of endangered populations.

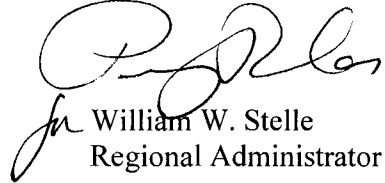
As indicated above, there are ESA-listed species of sea turtles and marine mammals that may be found in the vicinity of the project area. Green sea turtles are known to reside and forage year-round in the Long Beach area, including areas within the vicinity of POLB, through observations of free-swimming and stranded animals, as well as through directed scientific research conducted by NMFS. Olive ridley and loggerhead turtles may also occasionally visit coastal areas all along southern California, including the POLB area, as evidenced by stranding records and observations. Several ESA-listed species of whales are also known to occasionally or frequently visit or transit through the coastal waters of Long Beach, as evidenced by observations by an extensive whale watching community, scientific research, and records of stranded individuals. Blue, humpback, and fin whales may seasonally be found in marine waters adjacent to POLB. Gray whales regularly transit through marine waters adjacent to POLB twice a year, during seasonal migrations back and forth from summer foraging grounds in Alaska to winter breeding grounds in Mexico. Most of the gray whales that travel past Long Beach belong to the Eastern North Pacific stock of gray whales, which is not listed under the ESA. However, recent observations have confirmed that individuals from the endangered Western North Pacific stock have been seen migrating along the U.S. west coast, and may pass through marine waters adjacent to POLB. At this time, there are no additional candidate species, species currently proposed for listing, or critical habitats designated under the ESA that occur in the project area.

There may be some additional species in the vicinity of the project area that have been designated as species of concern by NMFS. Based on a review of the current list, it is possible that cowcod (*Sebastes levis*), green abalone (*Haliotis fulgens*), and pink abalone (*Haliotis corrugate*) could be found in the vicinity of POLB and adjacent marine waters. It is also possible that basking sharks (*Cetorhinus maximus*) could occasionally be found in adjacent marine waters. NMFS retains no regulatory authority to protect species of concern, and may not necessarily be the best source of information for all of these species.

Thank you for your consideration of ESA-listed species during the development of your project planning. Upon request, NMFS Protected Resources staff in Long Beach, California is available to help in the determination of how any ESA-listed species may be directly or indirectly affected by the

Project, and assist the Corps with ESA compliance. NMFS staff may also be able to assist in further development of protective measures that can help minimize the potential for adverse effects to ESA-listed species. If you have any questions pursuant to this letter or other ESA issues, please contact Dan Lawson at (562) 980-3209 or Dan.Lawson@noaa.gov.

Sincerely,



William W. Stelle
Regional Administrator

cc: Administrative File: 151422WCR2014PR00212

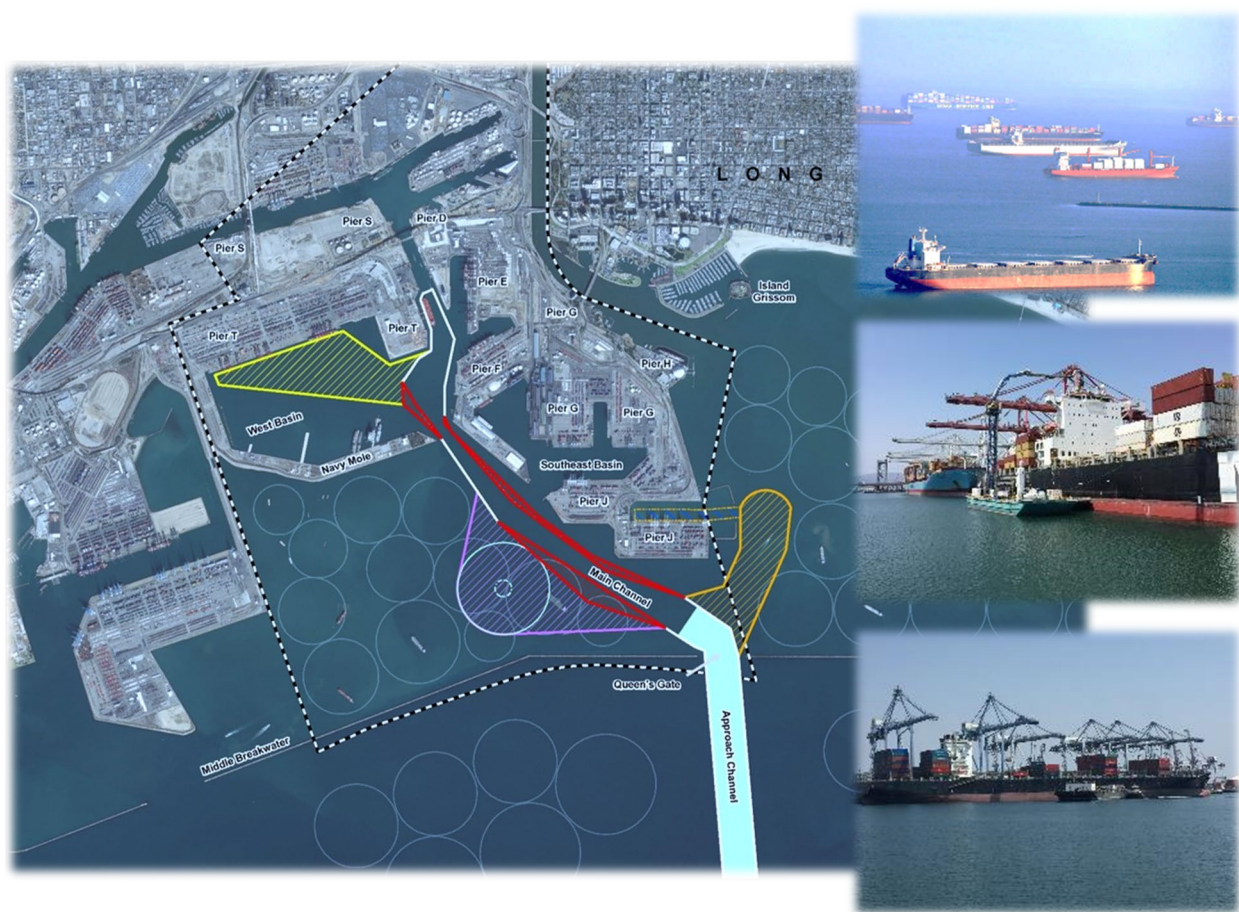
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DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT (EIS/EIR)

APPENDIX J: DISTRIBUTION LIST

PORT OF LONG BEACH
DEEP DRAFT NAVIGATION STUDY
Los Angeles County, California

October 2019



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RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
First Name	Last Name					
			Office of Planning and Research, State Clearing House	1400 Tenth Street	Sacramento, CA 95814	
			Main Library	200 West Broadway	Long Beach, CA 90802	
			San Pedro Regional Library	931 S. Gaffey Street	San Pedro, CA 90731	
			Wilmington Branch Library	1300 N. Avalon Boulevard	Wilmington, CA 90744	
Daniel	Garcia		South Coast Air Quality Management District	21865 Copley Drive	Diamond Bar, CA 91765	
			Southern California Association of Governments Los Angeles Office	900 Wilshire Blvd., Suite 1700	Los Angeles, CA 90017	
Monique	De La Garza, CMC	City Clerk	City of Long Beach	411 W. Ocean Blvd.	Long Beach, CA 90802	
Allan	Lowenthal	Congressman	California 47 th District	275 Magnolia Avenue, Suite 1955	Long Beach, CA 90802	
Allan	Lowenthal	Congressman	California 47 th District	108 Cannon House Office Building	Washington, DC 20515	
Robert	Garcia	Mayor	City of Long Beach	411 W. Ocean Blvd., 11th Floor	Long Beach, CA 90802	mayor@longbeach.gov
Lena	Gonzalez	Councilmember	City of Long Beach, District 1			
Jeannine	Pearce	Councilmember	City of Long Beach, District 2			
Suzie	Price	Councilmember	City of Long Beach, District 3			
Daryl	Supernaw	Councilmember	City of Long Beach, District 4			
Stacy	Mungo	Councilmember	City of Long Beach, District 5			

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Dee	Andrews	Vice Mayor	City of Long Beach, District 6			
Roberto	Uranga	Councilmember	City of Long Beach, District 7			
Al	Austin	Councilmember	City of Long Beach, District 8			
Rex	Richardson	Councilmember	City of Long Beach, District 9			
Beth	Collins		Brownstein Hyatt Farber Schreck, LLP	1021 Anacapa Street, 2nd Floor	Santa Barbara, CA 93101	
Jessica	Diaz		Brownstein Hyatt Farber Schreck, LLP	1021 Anacapa Street, 2nd Floor	Santa Barbara, CA 93101	
Richard "Cutter"	Jordan		Board of Harbor Commissioners			
Lou Ann	Bynum	President	Board of Harbor Commissioners			
Tracy	Egoscue	Vice President	Board of Harbor Commissioners			
Lou Ann	Guzmán	Secretary	Board of Harbor Commissioners			
Frank	Colonna	Commissioner	Board of Harbor Commissioners			
Bonnie	Lowenthal	Commissioner	Board of Harbor Commissioners			
			Los Angeles County Clerk	12400 Imperial Highway	Norwalk, CA 90650	
Joseph	Ontiveros	Cultural Resource Director	Soboba Band of Luiseño Indians	P.O. Box 487	San Jacinto, CA 92581	jontiveros@soboba- nsn.gov
Andrew	Salas	Chairperson	Gabrieleno Band of Mission Indians - Kizh Nation	P.O. Box 393	Covina, CA 91723	admin@gabrielenoindi ans.org
Anthony	Morales	Chairperson	Gabrieleno/Tongva San Gabriel Band of Mission Indians	P.O. Box 693	San Gabriel, CA 91778	GTtribalcouncil@aol.co m

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Sandonne	Goad	Chairperson	Gabrielino/Tongva Nation	106 1/2 Judge John Aiso Street, #231	Los Angeles, CA 90012	sgoad@gabrielino-tongva.com
Robert	Dorame	Chairperson	Gabrielino Tongva Indians of California Tribal Council	P.O. Box 490	Bellflower, CA 90707	gtongva@gmail.com
Charles	Alvarez		Gabrielino-Tongva Tribe	23454 Vanowen Street	West Hills, CA 91307	roadkingcharles@aol.com
Elizabeth	Yura		CA Air Resources Board	1001 I Street	Sacramento, CA 95814	
Terry	Allen		CA Air Resources Board	9480 Telstar Ave., No. 4	El Monte, CA 91731	terry.allen@arb.ca.gov
Allison	Dettmer		CA Coastal Commission	45 Fremont St Ste 2000	San Francisco, CA 94105-2219	larry_simon@coastal.ca.gov
Gary	Timm		CA Coastal Commission	200 Oceangate, Ste 1000	Long Beach, CA 90802	
Dani	Ziff		CA Coastal Commission	301 E. Ocean Blvd, Suite 300	Long Beach, CA 90802	
Shannon	Vaughn		CA Coastal Commission	301 E. Ocean Blvd, Suite 300	Long Beach, CA 90802	
Larry	Simon		CA Coastal Commission	45 Fremont Street, Suite 2000	San Francisco, CA 94105	
Megan	Cooper		CA Coastal Conservancy	1515 Clay St., 10th Floor	Oakland, CA 94612-2530	
Kenneth	Carlson		CA Dept of Conservation Oil Gas Geo	5816 Corporate Ave Ste 200	Cypress, CA 90630	
Loni	Adams		CA Dept of Fish & Wildlife	3883 Ruffin Road, Ste A	San Diego, CA 92123-4813	loni.adams@wildlife.ca.gov
Marilyn	Fluharty		CA Dept of Fish & Wildlife	3883 Ruffin Road	San Diego, CA 92123	
Nader	Gobran, P.E.		CA Dept of Transportation	11 Golden Shore, Ste 110	Long Beach, CA 90802	nader_gobran@dot.ca.gov
Tom	Cota		CA DTSC	5796 Corporate Plz	Cypress, CA 90630	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Peter	Garcia		CA DTSC	5796 Corporate Plz	Cypress, CA 90630	
			CA Public Utilities Commission	505 Van Ness Ave, Rm 3207	San Francisco, CA 94102-3214	
Michaela	Moser		CA State Lands Commission	100 Howe Ave, Ste 1005	Sacramento, CA 95825-8202	Michaela.moser@slc.ca.gov
Susan	Bransen		California Transportation Commission	1120 N Street, MS-52	Sacramento, CA 95814-5680	
Laura	Pennebaker		California Transportation Commission	1120 N Street, MS-52	Sacramento, CA 95814-5680	laura.pennebaker@dot.ca.gov
Miya	Edmonson		CA Dept of Transportation, District 7	100 S. Main Street	Los Angeles, CA 90012	
John	Christopher		Department of Toxic Substances Control	8800 Cal Center Dr	Sacramento, CA 95826-3200	
Roxanne	Johnson		US EPA, Region 9	75 Hawthorne St	San Francisco, CA 94105	johnson.roxanne@epa.gov
Al	Lipski		Maritime Administration	1301 Clay Street, Suite 140N	Oakland, CA 94612-5217	al.lipski@dot.gov
Rob	Wood		Native American Heritage Commission	1550 Harbor Blvd., Ste 100	West Sacramento, CA 95691	
Kelly L.	Finn		Naval Weapons Station Seal Beach	800 Seal Beach Boulevard	Seal Beach, CA 90740-5000	
Julianne	Polanco		Office of Historic Preservation	1725 23rd St., Ste 100	Sacramento, CA 95816	
Chris	Cannon		Port of Los Angeles	425 S Palos Verdes St	San Pedro, CA 90733-0151	
David	Hung		Regional Water Quality Control Board	320 W 4th St, Ste 200	Los Angeles, CA 90013	
Daniel	Garcia		South Coast Air Quality Management District	21865 Copley Dr	Diamond Bar, CA 91765-4182	Planning and Rules Manager
Lijin	Sun		South Coast Air Quality Management District	21865 Copley Dr	Diamond Bar, CA 91765-4182	lsun@aqmd.gov

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Ping	Chang		Southern California Council of Governments	900 Wilshire Blvd., Ste. 1700	Los Angeles, CA 90017	sunl@scag.co.gov
Hamid	Arshadi		Southern California Edison	2244 Walnut Grove Ave	Rosemead, CA 91770	
Damon	Hannaman		Southern California Edison	7300 Fenwick Lane, Second Floor	Westminster, CA 92683	
Larry	Labrado		Southern California Edison	2800 E Willow St	Long Beach, CA 90806	
			Third Party Environmental Review, Southern California Edison	2244 Walnut Grove, Go-1, Quad 2C	Rosemead, CA 91770	thirdPartyEnvReview@sce.com
Carol	Sachs		US EPA Region 9; ERS, ENF-2-4	75 Hawthorne St	San Francisco, CA 94105-3901	sachs.carol@eps.gov
Melissa	Scianni		US EPA Region 9	600 Wilshire Blvd, Ste 940	Los Angeles, CA 90017	
Johnathan	Bishop		Water Resources Control Board	1001 I Street	Sacramento, CA 95814	
			US Coast Guard Marine Safety office	1001 S Seaside Ave, No 20	San Pedro, CA 90731-7333	
Christine	Medak		US Fish & Wildlife Service	2177 Salk Ave, Suite 250	Carlsbad, CA 92008	
Bryan	Vogel		US Maritime Administration	1301 Clay Street, Suite 140N	Oakland, CA 94612-5217	bryan.vogel@dot.gov
Bryant	Chesney		National Marine Fisheries Service	501 W Ocean Blvd, Suite 4200	Long Beach, CA 90802-4221	
James	Callian		Navy Brac PMO West	33000 Nixie Way, Building 50	San Diego, CA 92147	
Dr. Charles	Lester	Executive Director	CA Coastal Commission	45 Fremont Street, Suite 2000	San Francisco, CA 94105-2219	
Emily	Duncan		CA Regional Water Quality Control Board, Los Angeles Region	320 W 4th St, Suite 200	Los Angeles, CA 90013	
Jon	Avery		US Fish & Wildlife Service	2177 Salk Ave, Suite 250	Carlsbad, CA 92008	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Diana	Tang	Chief of Staff	City of Long Beach, Mayor's Office	411 W. Ocean Blvd., 11th Floor	Long Beach, CA 90802	diana.tang@longbeach. gov
Nelson	Kerr		City of Long Beach Dept of Health & Human Svcs	2525 Grand Ave	Long Beach, CA 90815	nelson.kerr@longbeach .gov
Truong	Huynh		City of Long Beach Development Serv.	411 W. Ocean Blvd.	Long Beach, CA 90802	
Craig	Chalfant		City of Long Beach Development Serv.	411 W. Ocean Blvd.	Long Beach, CA 90802	craig.chalfant@longbea ch.gov
Mike	Conway		City of Long Beach Economic & Property Dev	411 W. Ocean Blvd.	Long Beach, CA 90802	
			City of Long Beach Engineering Bureau	411 W. Ocean Blvd.	Long Beach, CA 90802	
Ken	Ayala		City of Long Beach Fire Department	3205 Lakewood Blvd	Long Beach, CA 90808	kenneth.ayala@longbe ach.gov
Robert	Dowell		City of Long Beach Gas & Oil Department	2400 E Spring St	Long Beach, CA 90806	
Elvira	Hallinan		City of Long Beach Marine Dept	205 Marina Dr	Long Beach, CA 90802	elvira.hallinan@longbe ach.gov
Marie	Knight		City of Long Beach Parks & Recreation	2760 Studebaker Rd	Long Beach, CA 90815	
Chief Robert	Luna		City of Long Beach Police Department	400 W Broadway	Long Beach, CA 90802	Julie.Bedard@longbeac h.gov
Craig	Beck		City of Long Beach Public Works	411 W. Ocean Blvd.	Long Beach, CA 90802	
Eric	Widstrand		City of Long Beach Traffic Engineer	411 W. Ocean Blvd.	Long Beach, CA 90802	
Dennis	Santos		City of Long Beach Water Department	1800 E. Wardlow Rd	Long Beach, CA 90807	dennis.santos@lbwater .org
Mike	Zupanovich		Magnolia Industrial Group, Inc.	537 W. Anaheim	Long Beach, CA 90813	
Kat	Janowicz		3COTECH	224 West 8th Street	San Pedro, CA 90731	kat@3cotech.com

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Elaine	Silvestro		ACET (Alameda Corridor Engineering Team)	3760 Kilroy Airport Way, Ste 200	Long Beach, CA 90806	hersh@trenchteam.com
John	Doherty		ACTA	3760 Kilroy Airport Way, Ste 200	Long Beach, CA 90806	
Harold W	Coon		ADL Transport/AB Mobile Welding	1342 W 11th St	Long Beach, CA 90813	
Jim	Glick		Air Products	700 N. Henry Ford Ave.	Wilmington, CA 90744	glickjh@airproducts.com
Daniel and Lisa	Charleston		AJC Sandblasting	932 Schley Ave	Wilmington, CA 90744	dcharleston@ajcsb.com
George	Wall		Al Larson Boat Shop	1046 Seaside Ave	Terminal Island, CA 90731	george@larsonboat.com
			All Ports Logistics	1789 Pier B Street	Long Beach, CA 90813	
Lisa	Olsen		Allied Packing & Rubber, Inc.	1335 W. 11th Street	Long Beach, CA 90813	lisa@alliedpackingandrubber.com
Environmental	Manager		Andeavor Wilmington Calciner	2450 Pier B St.	Long Beach, CA 90813	
Chung	Liu		AQMD	21865 Copley Dr	Diamond Bar, CA 91765-4178	cliu@aqmd.com
		Building Manager	Arco Center Building	200 Oceangate	Long Beach, CA 90802	
Allen	Reyno		ATSI	1941 W. 9th Street	Long Beach, CA 90802	allenreyno@atscontainer.com
Robert M.	Orr		Attorney at Law	6700 E. Pacific Coast Highway, Suite 285	Long Beach, CA 90803	RMorrEsq@gmail.com
Harrison	Pollak		Attorney General's office, California Department of Justice	1515 Clay Street, 20th Floor	Oakland, CA 94612-0550	harrison.pollak@doj.ca.gov
			Attorney General's office, California Department of Justice	600 W. Broadway St., Ste. 1800	San Diego, CA 92101-3702	
Mitch E.	Bright		Baker Commodities Inc	4020 Bandini Blvd	Los Angeles, CA 90058	mebright@bakercommodities.com

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Dan	Berns		Berns Company	1250 W 17th St	Long Beach, CA 90813	dan.m.berns@gmail.com
Steven	Fukuto		Berth 55 Landing of Long Beach, Inc (DBA Long Beach Sportfishing)	555 Pico Ave	Long Beach, CA 90802	steve@longbeachsportfishing.com
Steven G.	Martin		Best Best & Krieger Attorneys At Law	655 West Broadway, 15th Floor	San Diego, CA 92101	STEVEN.MARTIN@BBKLAW.COM
Rick	Armstrong		BETA Offshore	111 W Ocean Blvd Ste 1240	Long Beach, CA 90802	rick.armstrong@amplifyenergy.com
Bruce	Harrison		Biltmore Metal Fabricators	1348 W. 11th St	Long Beach, CA 90813	bruceh@biltmf.com
Gilbert and Hilda	Urrutia		Border Valley Trading	604 Mead Rd	Brawley, CA 92227	gemm2006@gmail.com
Rob	Streed		BP Pipelines North America	4 Centerpointe Drive	La Palma, CA 90623	
Kimberly	Kesler		BRAC PMO/NAVFAC SW	33000 Nixie Way, Bldg 50, Ste 207	San Diego, CA 92147	
Kara	Karibian		Breathe California	5858 Wilshire Blvd, Ste 300	Los Angeles, CA 90036	
Walt	Smith		Burlington Northern Santa Fe	740 E Carnegie Dr	San Bernardino, CA 92408	
Chuck	Taylor		Butterfield Communication, Inc.	1410 Brett Pl #131	San Pedro, CA 90732	
Don	Holland		Cabrillo Boat Shop	1500 Pier C Street	Long Beach, CA 90813	
Chris	Marrs		Cacao D/Amour, LLC	1667 W. 9th Street	Long Beach, CA 90813-2609	
Frank	Komin		California Resources Company	111 W Ocean Blvd Ste 800	Long Beach, CA 90802	
George	Lang		California United Terminals	2525 Navy Way	Terminal Island, CA 90731	
Christian	Bushong		CalTrans HQ	1120 N. St., MS-32	Sacramento, CA 95814	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Wilkin	Mes		Carnival Cruises	231 Windsor Way	Long Beach, CA 90802	wmes@carnival.com
Greg	Bombard		Catalina Express	Berth 95	San Pedro, CA 90733	
			Catalina Water Company	1500 Pier C Street	Long Beach, CA 90813-4043	
Bill	Bayes		Cemex	16888 North E Street	Victorville, CA 92394-2900	
			Cemex	601 Pier D St	Long Beach, CA 90802	
Joann	Goeman		Cerritos Yacht Anchorage	Berth 205C	Wilmington CA 90744	
Michelle N.	Black		Chatten-Brown & Carstens, LLP	2200 Pacific Coast Highway, Ste. 318	Hermosa Beach, CA 90254	
Vince	Godfrey		Chemoil Marine Terminal	2365 E. Sepulveda Blvd	Long Beach, CA 90810-1944	vince.godfrey@gelincor-e-us.com
Craig	Smith		Chemoil Marine Terminal	1004 Pier F Ave	Long Beach, CA 90802	
Subir	Bector		Chevron Usa Inc	324 El Segundo	El Segundo, CA 90245	
Steven	Lohr		Chief of Land Use Planning, CSU Chancellor's office	401 Golden Shore	Long Beach, CA 90802-4210	
Elia	Rocha		Children Today	2591 Long Beach Blvd.	Long Beach, CA 90806-3157	
		Director of Planning	City of Bell	6330 Pine Ave	Bell, CA 90201	
Planning	Manager		City of Carson	701 E Carson St	Carson, CA 90745	jsgino@carson.ca.us
Gina	Nila		City of Commerce	2535 Commerce Way	Commerce, CA 90040	ginan@ci.commerce.ca.us
		Planning & Zoning Dept	City of Compton	205 S Willowbrook	Compton, CA 90220	
		Director of Planning	City of Cudahy	5220 Santa Ana St	Cudahy, CA 90201-6024	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
		Planning Department	City of El Segundo	350 Main St	El Segundo, CA 90245	
		Planning Department	City of Hawthorne	4455 W 126th St	Hawthorne, CA 90250	
		Director of Public Works	City of Huntington Park	Civic Center, 6550 Miles Ave	Huntington Park, CA 90255	
Mindy	Wilcox		City of Inglewood	One West Manchester Blvd, 4th Fl	Inglewood, CA 90301	
		Planning Department	City of Lawndale	14717 Burin Ave	Lawndale, CA 90260	
		Director of Planning	City of Maywood	4319 E Slauson Ave	Maywood, CA 90270	
		Director of Comm Development	City of Paramount	16400 Colorado Ave	Paramount, CA 90723	
Sebastian	Hernandez		City of Pasadena	221 E. Walnut St., Ste. 199	Pasadena, CA 91101	
		Harbor Director	City of Redondo Beach	415 Diamond Ave	Redondo Beach, CA 90277	
Gregory	Priamos		City of Riverside, Office of the City Attorney	3900 Main Street	Riverside, CA 92522	
		Community Development Department	City of South Gate	8650 California Ave	South Gate, CA 90280	
		Community Development Department	City of Torrance	3031 Torrance Blvd	Torrance, CA 90503	jgibson@torranceca.gov
		Director of Community Services	City of Vernon	4305 Santa Fe Ave	Vernon, CA 90058	
Victor	Hovsepian		City Paper and Metal	1452 W. 11th St.	Long Beach, CA 90813-2717	citymetal@juno.com
Greg	Roche		Clean Energy	4675 Macarthur Ct., Ste 800	Newport Beach, CA 92660	
Patricia	Castellanos		Coalition For A Clean & Safe Ports	464 Lucas Ave, Ste 202	Los Angeles CA 90017	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Jesse	Marquez		Coalition For A Safe Environment	1601 N. Wilmington Blvd. Suite B	Wilmington, CA 90744	jnmhev@yahoo.com
Nidia	Erceg		Coalition For Clean Air	660 South Figueroa, Ste. 1140	Los Angeles, CA 90017	
Bill	Magavern		Coalition For Clean Air	1107 9th St, Ste 440	Sacramento, CA	
Loara	Cadavona		Community Hospital Foundation	1720 Termino Ave	Long Beach, CA 90804	
David	Scott		Connolly Pacific Co	1925 Pier D St	Long Beach, CA 90802	david.scott@conpaco.com
			Cooper T Smith Stevedoring	Berth 207 - Pier F	Long Beach, CA 90802-6242	
			County of Los Angeles	500 W. Temple St.	Los Angeles, CA 90012-2713	
Steven	Chew		Curtin Maritime	1500 Pier C Street, Berth 57	Long Beach, CA 90813	stevec@curtinmaritime.com
Jim	Crane		Crane Marketing	11712 Leland Ave	Whittier, CA 90605	CRANEMKT@GMAIL.COM
Joshua	Ellis		Crowley Marine Services	300 South Harbor Blvd	San Pedro, CA 90731	
Bill	Terry		Eagle Rock Aggregates, Inc	700 Wright Ave	Richmond, CA 94804	bterry@eagleaggregates.com
Taylor	Thomas		East Yard Communities For Environmental Justice	2448 Santa Fe Ave.	Long Beach, CA 90810	tbthomas@eycej.org
Tony	Rivera		Easy Roll-off Services	2145 W. 16th St.	Long Beach, CA 90813	
Eddie	Umana		Eddie's Auto	1411 W. 11th St	Long Beach, CA 90813	umana_eduardo@yahoo.com
Hung	Nguyen		Energia Logistics, Ltd	2700 Nimitz Rd	Long Beach, CA 90802-1047	hung.p.nguyen@sea-launch.com
Jim	Doty		Engineering Services Program, Environmental Mng G	1149 S Broadway, Suite 600 MS-939	Los Angeles, CA 90015	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Planning Team	Leader		Federal Highway Administration - CA Division	650 Capitol Mall, Suite 4-100	Sacramento, CA 95814-4708	
Ed	McCain		Foss Maritime Company	Pier D Berth D-35 & D49	Long Beach, CA 90801	
Bill	McCord		Friction Materials Co.	1600 W. Anaheim St	Long Beach, CA 90813	bill@frictionmaterials.net
			Friends of The La River	570 W Avenue, 26 Ste 250	Los Angeles, CA 90065-1011	
Elizabeth	Warren		Future Ports	P.O. Box 768	San Pedro CA 90733-0768	EWARREN@FUTUREPORTS.ORG
Andrew	Salas		Gabrielino Band of Mission Indians - Kizh Nation	P.O. Box 393	Covina CA 91723	admin@gabrielinoindians.org
Anthony	Morales		Gabrielino/Tongva San Gabriel Band of Mission Indians	P.O. Box 693	San Gabriel, CA 91778	GTTribalcouncil@aol.com
Charles	Alvarez		Gabrielino Tongva Tribe	23454 Vanowen Street	West Hills, CA 91307	roadkingcharles@aol.com
			Gabrielino - Tongva Tribe	1999 Avenue of the Stars, Ste. 1100	Los Angeles, CA 90067-4618	
Robert	Dorame		Gabrielino Tongva Indians of CA Tribal Council	P.O. Box 490	Bellflower, CA 90707	gtongva@gmail.com
Joseph	Ontiveros		Soboba Band of Luiseno Indians	Po Box 487	San Jacinto, CA 92581	JONTIVEROS@SOBOBA-NSN.GOV
Goad	Sandonne		Gabrielino/Tongva Nation	106 1/2 Judge John Aiso St., #231	Los Angeles, CA 90012	sgoad@gabrielino-tongva.com
Sam	Dunlap		Gabrielino Tongva Nation	Po Box 86908	Los Angeles, CA 90086	samdunlap@earthlink.net
Robert	Stein		Gambol Industries, Inc	1825 W. Pier D St	Long Beach, CA 90802	
Nancy	Pfeffer		Gateway Cities COG	16401 Paramount Blvd	Paramount, CA 90723	
			Georgia-Pacific Gypsum, LLC	1401 Pier D St	Long Beach, CA 90802	

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Gilbert and Hilda	Haddad		Gil's Long Beach Plating	3772 Hackett Ave.	Long Beach, CA 90808-4216	
Sotiria	Contos		Golden Star Restaurant No. 1	1560 West Pacific Coast Highway	Long Beach, CA 90810	
Patrick	Kennedy		Greater LB Interfaith Community Organization	5600 Linden Avenue	Long Beach, CA 90805	
John	Whitcombe		Greenberg, Whitcombe, Takeuchi, Gibson & Grayver, LLP	21515 Hawthorne Blvd, Suite 450	Torrance, CA 90503-6531	
Henry	Rogers		Harbor Association of Industry & Commerce	6216 E. Pacific Coast Highway #407	Long Beach, CA 90803	
Manny	Elefante		Harbor Cogeneration Company	P.O. Box 550	Wilmington CA 90748	StahnJ@SouthwestGen.com; Fudalskil@SouthwestGen.com
			Harbor Cogeneration Company	505 Pier B St.	Wilmington, CA 90744	
Tamara	Kim		Harbor Community Clinic	593 W 6th Street	San Pedro, CA 90731	
Kirsten	James		Heal The Bay	1444 9th Street	Santa Monica, CA 90401	kjames@healthebay.org
Manny	Aschemeyer		Intl Seafarers Center of LB	120 S Pico Ave	Long Beach, CA 90802-6247	
Michael	Fogarty		Intl Transportation Service	1281 Pier G Way	Long Beach, CA 90802	
Whitney	Bagge		Island Express Helicopters Inc	1175 Queens Hwy	Long Beach, CA 90802	Whitney@islandexpress.com
Peter	Ruiz		Island Express Helicopters Inc	900 Queensway Drive	Long Beach, CA 90802	pruiz@islandexpress.com
Bob	Rollins Sr		Island Yacht Anchorage	1500 Anchorage Rd #205D	Wilmington, CA 90744	
Tom	Jacobsen		Jacobsen Pilot Services Inc	1259 Pier F Ave	Long Beach, CA 90802	
Jon	Ferguson		Jon's Body Shop	1556 W. 11th St.	Long Beach, CA 90813	

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Peter	Wu		Kair Trucking	1129 Canal Ave	Long Beach, CA 90813	peterw@laharborexpress.com
Scott	Lebbin		Koch Carbon Inc	1020 Pier F Ave Berth F211	Long Beach, CA 90802-6275	
Kathy	Bowes		L.G. Everist, Inc.	350 S. Main Ave., Ste 400	Sioux Falls, SD 57104	
Gloria	Cuevas		LA City Native American Indian Comm	3175 W. 6th Street, Rm 403	Los Angeles, CA 90020	
Richard	Bruckner		LA Co Regional Planning	320 W Temple St, 13th Floor	Los Angeles, CA 90012	
Sheheryar	Kaoosji		Laane	464 Lucas Ave, Ste 202	Los Angeles, CA 90017	skaoosji@laane.org
John	Donaldson		Lan Logistics, Inc.	1520 W. 11th St.	Long Beach, CA 90813-2618	john@lanlogistics.us
Theral	Golden		LB Assoc.	3549 Fashion Avenue	Long Beach, CA 90810	theralTG@msn.com
Ricardo	Vilchis		LB Transport	1532 1/2 W. Anaheim St.	Long Beach, CA 90813	rdovilchis@Hotmail.com
Hank	Bruzza		Lengner & Sons Express	1916 W Anaheim St	Long Beach, CA 90813-1106	family trust-midghome@yahoo.com
Barbara R.	Gleason		Lighthouse Yacht Landing	1300 Anchorage Rd, Berth 205-B	Wilmington, CA 90744	barbara@lighthouseyachtmarina.com
Chris	Luckey		Lineage Logistics	1710 Pier B St	Long Beach, CA 90813	cluckey@lineagelogistics.com
Sylvia	Betancourt		Long Beach Alliance For Children With Asthma	2651 Elm Ave., Ste. 100	Long Beach, CA 90806	
Gary	Shelton		Long Beach Area Coalition For The Homeless	P.O. Box 92365	Long Beach, CA 90809-2365	
Rev. C. Kit	Wilke		Long Beach Area Homeless Coalition	3737 Atlantic Ave., Apt 1001	Long Beach, CA 90807-6447	revkit@verizon.net
Arthur J	Merrick		Long Beach Container Terminal	1171 Pier F Ave, Berth F10	Long Beach, CA 90802	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
		Environmental Manager	Long Beach Generation, LLC	2665 W Seaside Ave	Long Beach, CA 90813	
Patricia	Benoit		Long Beach Homeless Coalition	4433 E. Barker Way	Long Beach, CA 90814-3018	
			Long Beach Multi-Service Center	1301 W. 12th St.	Long Beach, CA 90813-2720	
Ryan	Zummaller		Long Beach Post	444 W Ocean Blvd, Ste 150	Long Beach, CA 90802	
			Long Beach Shoreline Marina	450 E Shoreline Dr	Long Beach, CA 90802	
Alan	Reising		Long Beach Unified School District	2425 Webster Avenue	Long Beach, CA 90810	
Paul	Shadmani		Los Angeles County Dept of Public Works	900 S Fremont Ave 10th Floor	Alhambra, CA 91803-1331	
Lindy	Lee		Los Angeles County Metropolitan Transportation Authority	1 Gateway Plaza, Mail Stop 99-25-1	Los Angeles, CA 90012	leelin@metro.net
		Manager of Environmental Planning	Los Angeles Dept of Water & Power	111 Hope St	Los Angeles, CA 90012	
Evi	Boncato		Los Angeles Dept. of Water & Power	931 N Avalon Blvd	Wilmington, CA 90744	evi.boncato@ladwp.com
Jennifer	Pinkerton		Los Angeles Dept. of Water & Power	111 N Hope St, Rm 1044	Los Angeles, CA 90012	
Cris B.	Liban		Los Angeles Metropolitan Transportation Authority	One Gateway Plaza, Ms 99-17-2	Los Angeles, CA 90012	LibanE@metro.net
Marc	Stearns		Manson Construction Co.	340 Golden Shore, Ste 310	Long Beach, CA 90802-4229	
Kip	Louttit		Marine Exchange	3601 S Gaffey St, Bldg 803	San Pedro, CA 90731	310-832-6411
			Marine Express, Inc.	1500 Pier C Avenue	Long Beach, CA 90802	

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Raymond	Crispino		Marine Spill Response Corp	3300 East Spring Street	Long Beach, CA 90806	
Louis	Tilley		Marine Support International	Po Box 514	Summerland, CA 93067	louistilley@gmail.com
Ken	Pope		Marine Terminals Corp Lb Shop	2001 John S Gibson Blvd	San Pedro CA 90731	
Vincent	Passanisi		Marisa Foods	1401 Santa Fe Ave	Long Beach, CA 90813	
Michael	Carter		Maritime Administration	Mar-410, W25-302 1200 New Jersey Ave	Washington, DC 20590	
Dr Mark	Perez		Memorial Maritime Clinic	9017 Suva Street	Downey, CA 90240-3421	
Rob	Waterman		Metropolitan Stevedore Co.	3806 Worsham Ave.	Long Beach, CA 90808	
			Metropolitan Stevedore Co.	1045 Pier G Avenue	Long Beach, CA 90802	
Eric	Jen		Mitsubishi Cement Corp	1150 Pier F Ave	Long Beach, CA 90802	
Michael	Jasberg		Mitsubishi Cement Corporation	151 Cassia Way	Henderson, NV 89104-6616	mjasberg@mitsubishicement.com
Kyle	Gredvig		Morton Salt	1050 Pier F St	Long Beach, CA 90801	kgredvig@mortonsalt.com, mpavezmortonsalt.com
Eddie	Zepeda		MTA	One Gateway Plz	Los Angeles, CA 90012-2952	
David	Pettit		National Resources Defense Council (NRDC)	1314 Second Street	Santa Monica, CA 90401	dpettit@nrdc.org
Steve	Rogers		New NGC Inc	1850 Pier B St	Long Beach, CA 90802	sjrogers@nationalgypsum.com
Don	Beaumont		Nielsen Beaumont Marine	2420 Shelter Island Dr	San Diego, CA 92106	
Todd	Roloff		NRC Environmental Services	3777 Long Beach Blvd Ste 100	Long Beach, CA 90807-3336	
Paul	Morcos		NRC Environmental Services	Pier D Street, Berth 47	Long Beach, CA 90802	pmorcos@nrcc.com

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
		Environmental Manager	NRG Services Corp	301 Vista Del Mar Blvd	El Segundo, CA 90245	
Yutaka	Nagashima		NYK Line	300 Lighting Way	Secaucus, NJ 07094	
		HCC Holdings LLC	Oceanwide Ship Repair/APR Engineering	1812 W 9th St	Long Beach, CA 90813-2614	
Digran	Khalili		Oxbow Carbon & Minerals, LLC	330 Golden Shore Ste 210	Long Beach, CA 90802	digran.khalili@oxbow.com
Nauman	Charania		Oxy	111 West Ocean Blvd, Ste 800	Long Beach, CA 90802	
Jesse	Urquidi		P2S Engineering (Future Ports)	5000 Spring, 8th Floor	Long Beach, CA 90815	
Otis	Cliatt II		Pacific Harbor Line	705 N Henry Ford Ave	Wilmington, CA 90744	ocliatt@anacostia.com
Marc	La Maestra		Pacific Maritime Administration	555 Market St	San Francisco, CA 94105-2800	
			Pacific Merchant Shipping Association	70 Washington Street, Suite 305	Oakland, CA 94607	
Ray	Jackson		Pacific Pipeline System LLC	5900 Cherry Ave	Long Beach, CA 90805	
		LA/LB Division Manager	Pacific Tugboat Service	1512 W Pier C Street	Long Beach, CA 90813	
			Patriot Environmental Services	P.O. Box 1091	Long Beach, CA 90801-1091	
Steven	Ascenio		PCMC	250 W. Wardlow Rd	Long Beach, CA 90807	
Robert	Puertas		PCMC	19 Willowbrook	Irvine, CA 92604-3616	
Pat	Kennedy		Petro Diamond	1920 Lugger Way	Long Beach, CA 90813	
Eric	Conard		Petro Diamond Inc	1100 Main Fl 2	Irvine, CA 92614	
Greg	Phillips		Phillips Steel Co	1368 W Anaheim St	Long Beach, CA 90813-2730	daryl@phillipssteel.com
Ngiabi	Gicuhi		Plains West Coast Terminals, LLC	5900 Cherry Ave	Long Beach, CA 90805	ngicuhi@paalp.com

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Thomas	Jelenić		PMSA	One World Trade Center, Ste 1700	Long Beach, CA 90831	tjelenic@pmsaship.com
			Polar Tankers Inc	600 N. Dairy Ashford/Mo2026	Houston, TX 77079	
Steven	Debaun		RCTC Legal Counsel Best Best & Krieger LLP	P.O. Box 1028	Riverside, CA 92502-2208	
Shannon	Walker		Residence Inn	600 Queensway Drive	Long Beach, CA 90802	shannon.walker@marriott.com
John	Dougherty		Ribost terminal	1405 Pier C Street	Long Beach, CA 90813	jdougherty@worldoil.com
John	Standiford		Riverside County Transportation Commission	4080 Lemon St, 3rd Floor	Riverside, CA 92502-2208	jstandiford@rctc.org
			Robertson's Cement	1602 W. Pier D St	Long Beach, CA 90802	jackiem@rrmca.com
Moises	Figueroa		SA Recycling	482 Pier T Berth 118	Long Beach, CA 90802	mfigueroa@sarecycling.com
Mark	Tabbert		SA Recycling	901 New Dock St	Terminal Island, CA 90731	
Richard	Averett		San Bernardino County Transportation Authority	1170 W. 3Rd St., 2Nd Floor	San Bernardino, CA 92410-1715	
Christina S.	Casgar		San Diego Association of Governments (SANDAG)	401 B Street, Suite 800	San Diego, CA 92101-4231	CCA@Sandag.org, christina.casgar@sandag.org
Katheen	Woodfield		San Pedro Peninsula Home Owners Coalition	505 South Bandini Street	San Pedro, CA 90731	
Clay	Sandidge		Sandidge Consulting/Muni-Fed Energy	192 Marina Drive	Long Beach, CA 90803	csandidge@munifedenergy.com; clay@sandidgeconsulting.com
			Santa Fe Importers	1401 Santa Fe Ave	Long Beach, CA 90813	vince@santafeimporters.com
			Sause Bros.	1607 W. Pier D St	Long Beach, CA 90802	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Save The Queen	1126 Queensway Dr	Long Beach, CA 90802	
			SERRF	118 Pier S Avenue	Long Beach, CA 90802	
Don	Herman		Shell	20945 S Wilmington Ave	Carson, CA 90810	
			Sherwin Williams	1168 Harbor Ave	Long Beach, CA, 90813	
Patty	Allen		Shippers Transport	1150 E. Sepulveda Blvd	Carson, CA 90745	pallen@shipperstransport.com
John	Hinz		Sierra Club of Long Beach	Po Box 91301	Long Beach, CA 90809	
			Spun Products Inc-MLZ INC	1800 W 9th St	Long Beach, CA 90813	
Rebecca	Maehara		SRM Corporation	555 Pico Ave	Long Beach, CA 90802	queenswharf@gmail.com
Tony	Liberatore		SSA Crescent Terminals Inc	50 W Pier D St	Long Beach, CA 90802	
Janaya	Nichols		SSA LB Terminal	700 Pier A Ave	Long Beach, CA 90813	
Don	Kee		SSA Marine	1160 Pier F Ave	Long Beach, CA 90802	
Ryan	Baird		Pacific Container Terminal	1521 Pier J Avenue	Long Beach, CA 90802	
			SSA Matson Terminal	1521 Pier C St	Long Beach, CA 90813	
Paul	Gagnon		SSA Terminals	700 Pier A Plz	Long Beach, CA 90802	paul.gagnon@ssamarine.com
			St. Mary Medical Center	1050 Linden Ave	Long Beach, CA 90813	
			Stapleton Technologies	1350 W. 12th St	Long Beach, CA 90813	phil@stapletontech.com
Wayne	Wilms		Sundown Fox & Co/LB Boat Movers, Jones G&H Trust	1769 W 9th St	Long Beach, CA 90813-2611	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Stan	Janocha		Superior Electrical Advertising	1700 W Anaheim St	Long Beach, CA 90813-1102	stanjj@superiorsigns.com
Eric	Tate		Teamsters Local Union No. 848	731 East Arrow Highway	Glendora, CA 91740	
Donna	Dirocco		Tesoro	1300 Pier B St	Long Beach, CA 90813	donna.m.dirocco@tsocorp.com
Scott	Gooden		Tesoro	820 Carrack Ave.	Long Beach, CA 90813	
Yung	Chung		Tesoro Calciner Barns	1301 Pier G Ave	Long Beach, CA 90802	yung.s.chung@tsocorp.com
Chris	Maudlin		Tesoro Socal Pipeline Company, LLC	6 Centerpointe Drive, Suite 500	La Palma, CA 90623	
Elisa	Nicholas		The Children's Clinic	455 E Columbia St	Long Beach, CA 90806	
Kristi	Allen		The Hotel Maya	700 Queensway Dr	Long Beach, CA 90802	
Robert	Rodine		The Polaris Group	14649 Tustin Street	Sherman Oaks, CA 91403	polarisrlr@sbcglobal.net
Trent	Rosenlieb		The Reef Restaurant	880 S Harbor Scenic Dr	Long Beach, CA 90802	
			The Termo Company	3275 Cherry Ave	Long Beach, CA 90807	
Frank	Komin		Thums Long Beach Company	111 W Ocean Blvd, Ste 800	Long Beach, CA 90802	
Cindi	Alvitre		Ti'at Society	3094 Mace Ave, Apt B	Costa Mesa, CA 92626	calvitre@yahoo.com
Michael	Mirelez		Torres Martinez Desert Cahuilla Indians	Po Box 1160	Thermal, CA 92274	mmirelez@tmdci.org
Gerry	Tintle		Tosco Refining Company	3900 Kilroy Airport Way, Ste 210	Long Beach, CA 90806-6817	
Phillip T.	Wright		Total Terminals International	301 Mediterranean Way	Long Beach, CA 90802	phillipwr@totalterminals.com
Audie	Freeman		Toyota Logistics Services	785 Edison Ave	Long Beach, CA 90813	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
		Safety & Environmental Mgr	Toyota Motor Sales USA	19001 S Western Ave	Torrance, CA 90509-2991	
			Tran Harbor Inc.	222 E. G St.	Wilmington, CA 90744	
Dj Auto Body			Trans Harbor Inc.	1130 Santa Fe Ave	Long Beach, CA 90813	dae@djautobody.com
Chris	Balden		Trans Harbor Investments, Inc	2501 N. Rosemead Blvd	South El Monte, CA 91733-1531	baldenca@gmail.com
			Trans Ocean Carrier Inc	1650 Harbor Ave., Ste. B	Long Beach, CA 90813	
			Transportation 4 America	1152 15th St. Nw, Ste 450	Washington, DC 20005	
Jeff	Asay		Union Pacific Railroad	10031 Foothills Blvd, Rm 200	Roseville, CA 95747	
andrea M.	Hricko		USC	2001 Soto St. (SSB) 225R MC9237	Los Angeles, CA 90033	Ahricko@usc.edu
Mark	Phair		Valero Wilmington Refinery	2402 E Anaheim St	Wilmington, CA 90744	mark.phair@valero.com
Mario	DeLaura		Vnamar Inc	1280 W. 12th Street	Long beach, CA 90813	mdelaura@vinamarinc.com, sdelaura@vinamarinc.com
Michael	La Cavera		Vopak	3601 Dock St	San Pedro, CA 90731	
Louis	Warschaw		Warland Investments Co	1299 Ocean Ave, Ste 300	Santa Monica, CA 90401	
			Waterman Family Trust	Po Box 596	Wilmington, CA 90748	
Steve	Dickson		Wayne Electric Company /Horace Sherer Trust	1560 W. Anaheim St	Long Beach, CA 90813-2644	wayneelectric@yahoo.com
			Wayne Electric Company /Horace Sherer Trust	421 Daroca Ave	Long Beach, CA 90803-2104	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
Frank	Murphy		Weighmaster Murphy	1601 W. 12th St	Long Beach, CA 90812	frank@weighmastersmurphy.com
Paul	Collins		Westside Project Area Council	1415 Cota Ave.	Long Beach, CA 90813	pacdesign88@gmail.com
Wayne	Driggers		Westway Trading Group	2701 Taleyrand Ave	Jacksonville, FL 32206	
Don	Peters		Weyerhaeuser Company	800 Pier T Ave	Long Beach, CA 90802	
			Wilmington Chamber of Commerce	P.O. Box 90	Wilmington, CA 90744	info@wilmington-chamber.com
Valerie	Contreras		Wilmington Neighborhood Council	544 N. Avalon Blvd, Suite 103	Wilmington, CA 90744	wilmingtonnc@empowerlala.org
Nayomi	De Silva		World Oil Corporation	9302 Garfield Ave	South Gate, CA 90280	
Legacy Partners			World Trade Center	One World Trade Center, Ste 198	Long Beach, CA 90801	
Linda	Frame		Yusen Terminals Inc	701 New Dock St	Terminal Island, CA 90731	linda.frame@yti.com
Lawrence	Maehara		Berth 55 Seafood	555 Pico Ave	Long Beach, CA 90802	queenswharf@gmail.com
Taylor	Thomas		East Yard Communities For Environmental Justice	2448 Santa Fe Ave.	Long Beach, CA 90810	tbthomas@eycej.org
Jan Victor	Andasan		East Yard Communities For Environmental Justice	2448 Santa Fe Ave.	Long Beach, CA 90810	jandasan@eycej.org
Devin	Hanson		International Bird Rescue	3601 S. Gaffey St., Box 3	San Pedro, CA 90731	devin.hanson@bird-rescue.org
Julie	Skogland		International Bird Rescue	3601 S. Gaffey St., Box 3	San Pedro, CA 90731	julie.skogland@bird-rescue.org
Thomas	Jelenić		PMSA	One World Trade Center, Ste 1700	Long Beach, CA 90831	tjelenic@pmsaship.com
Nathan	Francis		Rio Tinto - US Borax	300 Falcon St.	Wilmington, CA 90744	nathan.francis@riotinto.com

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Golden Shore RV Resort	101 Golden Shore	Long Beach, CA 90802	
			Annie Nam Southern California Council of Governments	900 Wilshire Blvd., Ste. 1700	Los Angeles, CA 90017	
			5000 Spring, LLC c/o Jamison Services	4811 Airport Plaza Drive, Suite #300	Long Beach, CA 90815	
			Oryx Energy Company	Four North Park East, P.O. Box 2880	Dallas, TX 75221	
			Kinder Morgan Liquids Terminals LLC	200 Dallas Street, Suite 100	Houston, TX 77002	
			CEMEX Construction Materials Pacific, LLC	840 Gessner, Suite 1400	Houston, TX 77024	
			Air Products and Chemicals, Inc.	12600 Northborough, Suite 196	Houston, TX 77067	
			Tesoro Refining & Marketing Company LLC	19100 Ridgewood Parkway	San Antonio, TX 78259	
			Garrett Freight Lines, Inc.	12136 West Bayard Ave.	Lakewood, CO 80228	
			MCC Terminal, Inc.	151 Cassia Way	Henderson, NV 89014	
			Eller Media, Inc.	1550 West Washington Blvd	Los Angeles, CA 90007	
			Patrick Media Group, Inc.	1550 West Washington Blvd	Los Angeles, CA 90007	
			California State Department of Public Works	120 South Spring Street	Los Angeles, CA 90012	
			City of Los Angeles	200 North Spring Street, Room 395	Los Angeles, CA 90012	
			General Exploration Company of California	417 South Hill Street	Los Angeles, CA 90013	
			MacMillan Ring-Free Oil Co., Inc.	911 Wilshire Blvd, Suite 1680	Los Angeles, CA 90017	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Western Union Telegraph	745 South Flower Street	Los Angeles, CA 90017	
			Bruck, William W.	1200 Santa Fe Avenue	Los Angeles, CA 90021	
			Signal Trucking Service Ltd.	3770 East 26th Street	Vernon, CA 90023	
			Atlantic Richfield Company	P.O. Box 2679	Los Angeles, CA 90051	
			Los Angeles County Internal Services Department	1100 North Eastern Avenue	Los Angeles, CA 90063	
			MacLeod Metals Company	731 West 182nd Street	Gardena, CA 90248	
			Industrial Steel Treating Company	3370 Benedict Way	Huntington Park, CA 90255	
			Quality Wood Products, Inc.	6203 Maywood Avenue	Huntington Park, CA 90255	
			Dayton Foundry Company	P.O. Box 2008	South Gate, CA 90280	
			Ruchti Bros. Inc.	10600 Ruchti Road	South Gate, CA 90280	
			County Sanitation District No. 3 of Los Angeles County	1955 Workman Mill Road	Whittier, CA 90607	
			Fremont Forest Group Corporation	P.O. Box 4129	Whittier, CA 90607	
			Gulf Oil Corporation	P.O. Box 2109	Santa Fe Springs, CA 90670	
			Torrance Basin Pipeline Company	12851 East 166th Street	Cerritos, CA 90703	
			Water Replenishment District of Southern California	4040 Paramount Blvd.	Lakewood, CA 90712	
			Consolidated Fabricators Corporation	7815 East Compton Boulevard	Paramount, CA 90723	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Pacific Finishing Company	16200 Illinois	Paramount, CA 90723	
			Paramount Perlite Company	16236 South Illinois St.	Paramount, CA 90723	
			Paramount Petroleum Corporation	14700 Downey Avenue	Paramount, CA 90723	
			John S. Meek Company, Inc.	1931 North Gaffey Street, Suite C	San Pedro, CA 90732	
			National Metal & Steel Corp.	P.O. Box 3406	Terminal Island, CA 90731	
			Murat Mischel, Susan & Mary Murat	1748 El Rey Road	San Pedro, CA 90732	
			Rollins, Robert W. Jr, Robert W. Sr & Donald, GP	1313 Mt. Rainier	San Pedro, CA 90732	
			Equilon Enterprises, LLC	2101 E. Pacific Coast Highway	Wilmington, CA 90744	
			Marcus Trucking Company	1017 North Foote Avenue	Wilmington, CA 90744	
			O'Donnell Oil, LLC	246 N. Fries Avenue	Wilmington, CA 90744	
			Stevedoring Services of America, Inc.	1001 New Dock Street	Wilmington, CA 90744	
			Ultramar Inc., dba Valero Wilmington Refinery	2402 East Anaheim Street	Wilmington, CA 90744	
			Ultramar, Inc.	2402 East Anaheim Street	Wilmington, CA 90744	
			Alameda Corridor Transportation Authority (ACTA)	One Civic Plaza, Suite 650	Carson, CA 90745	
			California Sulphur Company	P.O. Box 176	Wilmington, CA 90748	
			Oil Operators Incorporated	2852 Gundry Ave	Signal Hill, CA 90755	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			CSA Equipment Company, LLC	P.O. Box 229	Long Beach, CA 90801	
			International City Theatre	P.O. Box 1690	Long Beach, CA 90801	
			Long Beach Community TV & Media	P.O. Box 1468	Long Beach, CA 90801	
			City of Long Beach	333 W. Ocean Blvd	Long Beach, CA 90802	
			Crescent Terminals, Inc.	1160 Pier F Ave	Long Beach, CA 90802	
			Crescent Warehouse Company, Ltd.	Berth D50, Pier D Street	Long Beach, CA 90802	
			GENERAL TELEPHONE COMPANY OF CALIFORNIA	200 W. Ocean Blvd.	Long Beach, CA 90802	
			LBCT LLC	1171 Pier F Ave	Long Beach, CA 90802	
			Maehara, Samuel and Rebecca	555 N. Pico Ave	Long Beach, CA 90802	
			Mixton Transport Corp.	1409 E. 4th Street, #G	Long Beach, CA 90802	
			OOCL LLC	1171 Pier F Ave	Long Beach, CA 90802	
			Pacific Maritime Services, LLC/Pacific Container Terminal	1521 Pier J Ave	Long Beach, CA 90802	
			PierPass Inc.	444 W. Ocean Blvd, Suite 700	Long Beach, CA 90802	
			Port of Long Beach	415 W. Ocean Blvd	Long Beach, CA 90802	
			Queensbay Hotel, LLC	700 Queensway Drive	Long Beach, CA 90802	
			S7 Sea Launch Limited	2700 Nimitz Road	Long Beach, CA 90802	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			San Pedro Bay Pipeline Company	111 W. Ocean Blvd, Suite 1240	Long Beach, CA 90802	
			Southeast Resource Recovery Facility	120 Pier S Ave	Long Beach, CA 90802	
			State Lands Commission	245 West Broadway, Suite 425	Long Beach, CA 90802	
			United States of America - Department of the Navy	3500 Nimitz Road	Long Beach, CA 90802	
			Desiderata Homes, Ltd.	4700 Long Beach Blvd.	Long Beach, CA 90805	
			Lorenz, Ed and Glo	6046 Orange Avenue, Apt 1	Long Beach, CA 90805	
			Cardinal Pipeline, L.P.	2459 Redondo Avenue	Long Beach, CA 90806	
			Long Beach Acquisition Corp/Charter Communications	2931 Redondo Avenue	Long Beach, CA 90806	
			Long Beach Gas & Oil	2400 E. Spring Street	Long Beach, CA 90806	
			Phillips 66 Pipeline LLC	3900 Kilroy Airport Way, Suite 210	Long Beach, CA 90806	
			Xtra Energy Corporation	717 Walton Street	Long Beach, CA 90807	
			Chief Oil Company, Inc.	4235 Country Club Drive	Long Beach, CA 90808	
			Bowers, William A.	3846 Gondar Ave	Long Beach, CA 90810	
			Evanculla, Isidro	2033 Arlington Street	Long Beach, CA 90810	
			Martin Magdaleno	1955 W. Cameron St.	Long Beach, CA 90810	
			Ojedo, Melesio	2011 West Lincoln St.	Long Beach, CA 90810	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Songcayauon, Vincent	2301 W. Arlington Street	Long Beach, CA 90810	
			Villarael, Silverio	2000 West Cameron Street	Long Beach, CA 90810	
			ARCO Terminal Services Corporation	1300 Pier B Street	Long Beach, CA 90813	
			Pacific Maritime Services, L.L.C.	700 Pier A Plaza	Long Beach, CA 90813	
			Wilms, Wayne	4290 E. Patero Way	Long Beach, CA 90815	
			Legacy Partners II LB World Trade, LLC	One World Trade Center, Suite 198	Long Beach, CA 90831	
			Sun Oil Company	23928 Lyons Avenue	Newhall, CA 91321	
			United Ready Mixed Concrete Company, Inc.	13131 Los Angeles Street	Irwindale, CA 91706	
			Insight Cablevision of Los Angeles	212 South Indian Hill Blvd.	Claremont, CA 91711	
			Southern California Gas Company	488 8th Ave, HQ06N1	San Diego, CA 92101	
			MCM Construction, Inc.	19010 Slover Ave	Bloomington, CA 92316	
			Modern Development Company	3152 Redhill Ave, Suite 100	Costa Mesa, CA 92626	
			PsomasFMG Long Beach Port Solar I, LLC	7777 Center Avenue, Suite 200	Huntington Beach, CA 92647	
			Group W Cable TV of South Gate	2734 Susan	Santa Ana, CA 92704	
			XO California, Inc.	1924 East Deere Avenue	Santa Ana, CA 92705	
			Western Exterminator Company	P.O. Box C11881	Santa Ana, CA 92711	
			Texaco Trading and Transportation, Inc.	P.O. Box 2087	Bakersfield, CA 93303	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Texaco, Inc.	5005 Business Park North, Suite 200	Bakersfield, CA 93309	
			Standard Gas Company	9525 Camino Media, E-2037	Bakersfield, CA 93311	
			Chemoil Corporation	4 Embarcadero Center, Suite 1800	San Francisco, CA 94111	
			California State Division of Highways	P.O. Box 1499	Sacramento, CA 95801	
			California Geological Survey - State of California	801 K Street, MS 13-35	Sacramento, CA 95814	
			Praxair, Inc.	P.O. Box 44	Tonawanda, NY 14150-7891	
			The Sherwin-Williams Company	101 Prospect Avenue NW, 920 M, Store Real Estate Dept.	Cleveland, OH 44225-1075	
			Los Angeles County Hall of Records	500 West Temple Street, 11th Floor	Los Angeles, CA 90012-2770	
			Los Angeles County Weights & Measures	222 South Hill Street, 3rd Floor	Los Angeles, CA 90012-3506	
			Alfred-Dixon Properties	380 South Beverly Drive, Suite 411	Beverly Hills, CA 90212-3904	
			City of Downey	11111 Brookshire Avenue	Downey, CA 90241-3898	
			Pacific Bell Telephone Company	100 West Alondra Boulevard, Room A207	Gardena, CA 90248-2702	
			Dynamic Machine, Inc.	3470 Randolph Street	Huntington Park, CA 90255-3259	
			WC Auto Body of South Gate, Inc.	8648 Atlantic Avenue	South Gate, CA 90280-3502	
			W. A. Woods Industries, Inc.	10120 West Frontage Road	South Gate, CA 90280-5433	
			ConocoPhillips Company	9645 Santa Fe Springs Road	Santa Fe Springs, CA 90670-2900	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Harbor Land Company, LLC	c/o Martin Container, Inc., 1402 East Lomita Blvd	Wilmington, CA 90744-1611	
			Texaco Refining and Marketing, Inc.	2101 East Pacific Coast Highway	Wilmington, CA 90744-2914	
			Union Pacific Resources Company	420 Henry Ford Avenue, P.O. Box 1317	Wilmington, CA 90748-1317	
			Crimson California Pipeline, L.P.	2459 Redondo Avenue	Long Beach, CA 90755-4020	
			Lomita Gasoline Company, Inc.	P.O. Box 851	Long Beach, CA 90801-0851	
			Pacific Towboat & Salvage Company	P.O. Box 1940	Long Beach, CA 90801-1940	
			U.S. Coast Guard	501 West Ocean Boulevard, Suite 6200	Long Beach, CA 90802-4222	
			Tidelands Oil Production Company	301 East Ocean Boulevard, Suite 300	Long Beach, CA 90802-4830	
			R.M.S. Foundation, Inc.	1126 Queens Highway	Long Beach, CA 90802-6390	
			The Dow Chemical Company	6754 North Paramount Boulevard	Long Beach, CA 90805-1902	
			American Transportation Services, Inc.	P.O. Box 9993	Long Beach, CA 90810-0993	
			Verizon California, Inc.	6220 East Spring Street	Long Beach, CA 90815-1422	
			Livingston-Graham, Inc.	13550 Live Oak Lane	Baldwin Park, CA 91706-1318	
			SBC California	100 North Stoneman Avenue, Room 265	Alhambra, CA 91801-3521	
			Los Angeles County Flood Control District	P.O. Box 1460	Alhambra, CA 91801-1460	
			BNSF Railway Company	740 East Carnegie Drive	San Bernardino, CA 92408-3571	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			Pleasantville 27, LLC	1306 Sandcastle Drive	Corona Del Mar, CA 92625-1217	
			Anthem Telecom, LLC	436 Prospect Street	Newport Beach, CA 92663-1918	
			Production Operators, Inc.	P.O. Box 40262	Houston, TX 97240-0262	
			HCC Holdings LLC	PO Box 9100	Long Beach, CA 90810-0100	
			MLZ Inc.	1800 W 9th St	Long Beach, CA 90813-2614	
			Berns Bros Inc.	1250 W 17th St	Long Beach, CA 90813-1310	
			Harrison Pacific LLC	1326 W. 12th St	Long Beach, CA 90813-2721	
			Legend Thirteen 26 LLC	1140 Highland Ave, #112	Manhattan Beach, CA 90266	
			Allied Packing and Rubber Inc	1335 W 11th St	Long Beach, CA 90813-2714	
			Bernal Holding Company	29723 Knoll View Dr	Rancho Palos Verdes, CA 90275-6435	
			1556 W 11th Street LLC	2600 Michelson Dr, #850	Irvine, CA 92612-6504	
			KASCO	1458 El Monte Dr	Thousand Oaks, CA 91362-2124	
			TRANS Harbor Inc	2501 Rosemead Blvd	South El Monte, CA 91733-1531	
			BUEHLER ET AL TR/ BLACKWEILER ET AL TR	420 W. 42nd St, Apt 38E	New York, NY 10036-6866	
			Church of the Good Shepherd	400 W Duarte Rd	Arcadia, CA 91007-6819	

RECIPIENT		TITLE	ORGANIZATION	STREET	CITY, STATE, ZIP	EMAIL
			1220 9th Street LLC	18303 Gridley Rd	Cerritos, CA 90703-5401	
			Deep Pacific	250 W Wardlow Rd	Long Beach, CA 90807-4429	

DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT (EIS/EIR)

APPENDIX K: EJSCREEN REPORTS

PORT OF LONG BEACH
DEEP DRAFT NAVIGATION STUDY
Los Angeles County, California

October 2019



EJSCREEN Report (Version 2018)

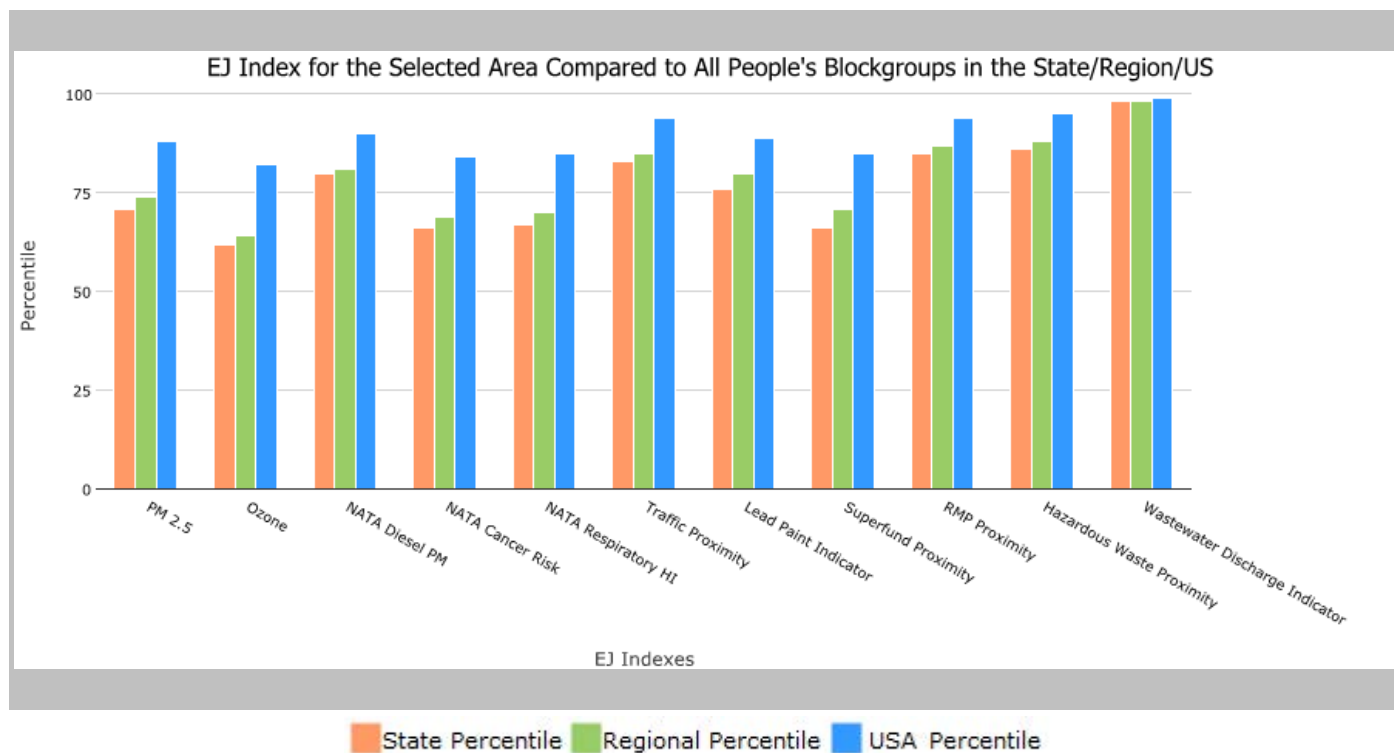
City: Long Beach, CALIFORNIA, EPA Region 9

Approximate Population: 469,743

Input Area (sq. miles): 51.44

(The study area contains 6 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	71	74	88
EJ Index for Ozone	62	64	82
EJ Index for NATA* Diesel PM	80	81	90
EJ Index for NATA* Air Toxics Cancer Risk	66	69	84
EJ Index for NATA* Respiratory Hazard Index	67	70	85
EJ Index for Traffic Proximity and Volume	83	85	94
EJ Index for Lead Paint Indicator	76	80	89
EJ Index for Superfund Proximity	66	71	85
EJ Index for RMP Proximity	85	87	94
EJ Index for Hazardous Waste Proximity	86	88	95
EJ Index for Wastewater Discharge Indicator	98	98	99



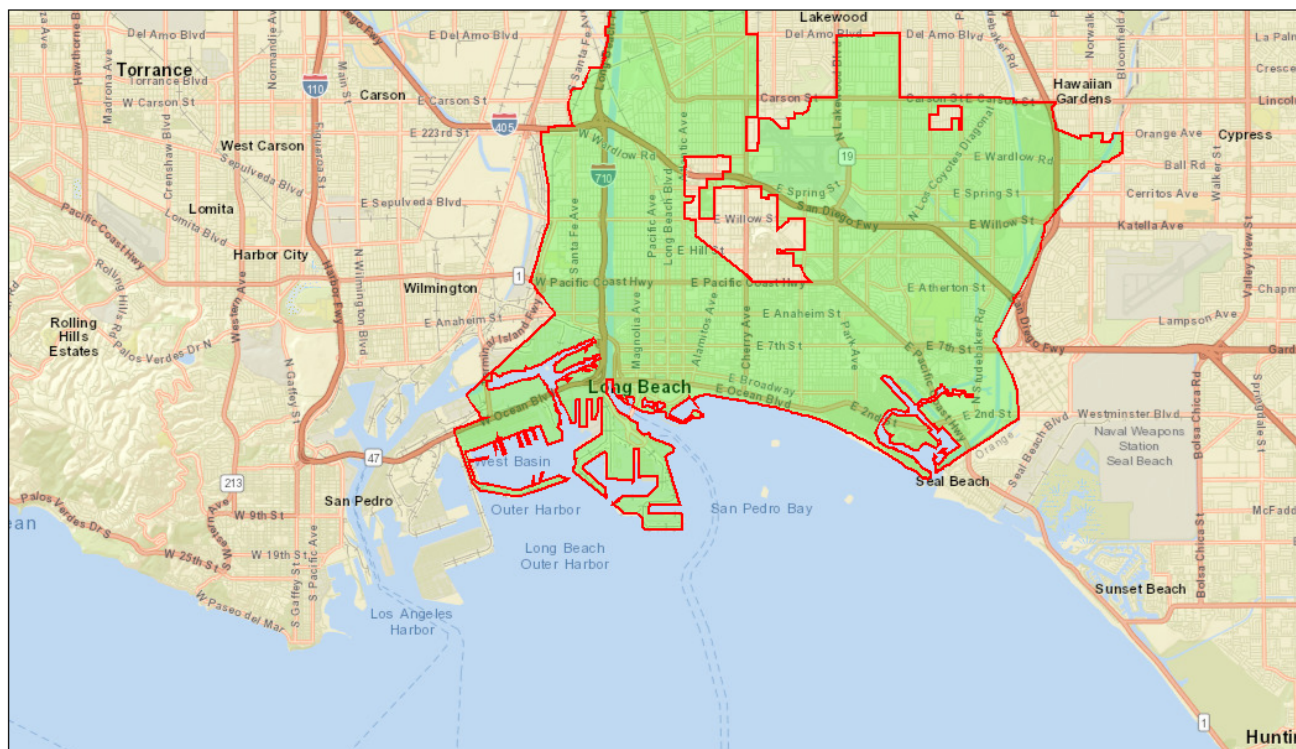
This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

City: Long Beach, CALIFORNIA, EPA Region 9

Approximate Population: 469,743

Input Area (sq. miles): 51.44

(The study area contains 6 blockgroup(s) with zero population.)



August 19, 2019

Known Geography

1:144,448
0 1.25 2.5 5 mi
0 2 4 8 km

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Sites reporting to EPA

Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	26

EJSCREEN Report (Version 2018)

City: Long Beach, CALIFORNIA, EPA Region 9

Approximate Population: 469,743

Input Area (sq. miles): 51.44

(The study area contains 6 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	13.4	10.7	82	10.1	86	9.53	97
Ozone (ppb)	40.3	47.4	26	48.3	20	42.5	30
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	1.64	0.972	87	0.978	80-90th	0.938	80-90th
NATA* Cancer Risk (lifetime risk per million)	45	44	56	43	50-60th	40	60-70th
NATA* Respiratory Hazard Index	2.2	2.1	57	2	60-70th	1.8	70-80th
Traffic Proximity and Volume (daily traffic count/distance to road)	1900	1200	82	1100	83	600	93
Lead Paint Indicator (% Pre-1960 Housing)	0.56	0.29	78	0.24	82	0.29	80
Superfund Proximity (site count/km distance)	0.075	0.17	52	0.14	58	0.12	63
RMP Proximity (facility count/km distance)	2.1	1.1	84	0.97	87	0.72	91
Hazardous Waste Proximity (facility count/km distance)	6.1	3.3	82	2.8	85	4.3	92
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	21	16	97	12	97	30	98
Demographic Indicators							
Demographic Index	57%	48%	63	47%	65	36%	79
Minority Population	72%	62%	57	59%	61	38%	80
Low Income Population	42%	35%	64	35%	64	34%	67
Linguistically Isolated Population	8%	9%	55	8%	59	4%	80
Population With Less Than High School Education	21%	18%	63	17%	66	13%	78
Population Under 5 years of age	7%	6%	59	6%	60	6%	63
Population over 64 years of age	10%	13%	46	13%	45	14%	35

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

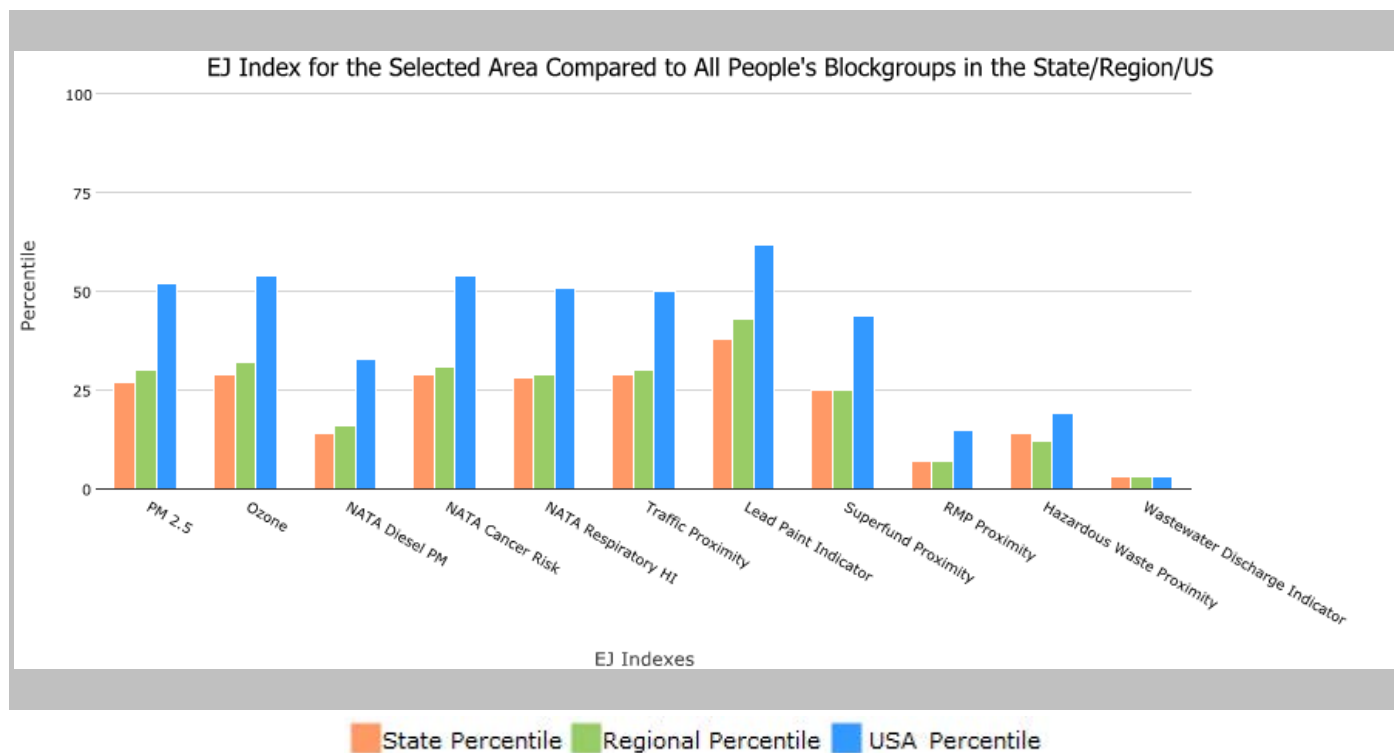
1 mile Ring around the Area, CALIFORNIA, EPA Region 9

Approximate Population: 3

Input Area (sq. miles): 15.79

(The study area contains 3 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	27	30	52
EJ Index for Ozone	29	32	54
EJ Index for NATA* Diesel PM	14	16	33
EJ Index for NATA* Air Toxics Cancer Risk	29	31	54
EJ Index for NATA* Respiratory Hazard Index	28	29	51
EJ Index for Traffic Proximity and Volume	29	30	50
EJ Index for Lead Paint Indicator	38	43	62
EJ Index for Superfund Proximity	25	25	44
EJ Index for RMP Proximity	7	7	15
EJ Index for Hazardous Waste Proximity	14	12	19
EJ Index for Wastewater Discharge Indicator	3	3	3



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

1 mile Ring around the Area, CALIFORNIA, EPA Region 9

Approximate Population: 3

Input Area (sq. miles): 15.79

(The study area contains 3 blockgroup(s) with zero population.)



August 19, 2019

Buffer Area

Digitized Polygon

1:72,224

0 0.5 1 2 mi
0 1 2 4 km

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Sites reporting to EPA

Superfund NPL

0

Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)

4

EJSCREEN Report (Version 2018)

1 mile Ring around the Area, CALIFORNIA, EPA Region 9

Approximate Population: 3

Input Area (sq. miles): 15.79

(The study area contains 3 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	12.2	10.7	67	10.1	73	9.53	93
Ozone (ppb)	38.3	47.4	19	48.3	15	42.5	21
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	2.44	0.972	97	0.978	95-100th	0.938	95-100th
NATA* Cancer Risk (lifetime risk per million)	34	44	17	43	<50th	40	<50th
NATA* Respiratory Hazard Index	1.9	2.1	43	2	<50th	1.8	60-70th
Traffic Proximity and Volume (daily traffic count/distance to road)	17	1200	13	1100	17	600	24
Lead Paint Indicator (% Pre-1960 Housing)	0	0.29	10	0.24	16	0.29	10
Superfund Proximity (site count/km distance)	0.074	0.17	51	0.14	58	0.12	63
RMP Proximity (facility count/km distance)	2.8	1.1	90	0.97	91	0.72	95
Hazardous Waste Proximity (facility count/km distance)	3.3	3.3	66	2.8	72	4.3	85
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0.99	16	90	12	90	30	95
Demographic Indicators							
Demographic Index	32%	48%	26	47%	28	36%	52
Minority Population	63%	62%	49	59%	52	38%	75
Low Income Population	0%	35%	0	35%	0	34%	0
Linguistically Isolated Population	0%	9%	16	8%	19	4%	44
Population With Less Than High School Education	12%	18%	47	17%	49	13%	59
Population Under 5 years of age	2%	6%	8	6%	8	6%	9
Population over 64 years of age	9%	13%	37	13%	36	14%	28

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT (EIS/EIR)

APPENDIX L: APPLICATION SUMMARY REPORT

DEEP DRAFT NAVIGATION STUDY
Los Angeles County, California

October 2019



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APPLICATION SUMMARY REPORT

1.1 Introduction

The California Coastal Act of 1976 (CCA or Coastal Act) requires the Port of Long Beach (Port or POLB) to prepare and adopt master plans for land and water areas within its boundaries that are located within the coastal zone. The Port's most recent plan to be comprehensively updated and certified was the 1990 Port Master Plan (PMP). The Port adopted Guidelines for Implementation of the Port of Long Beach Certified Port Master Plan in July 1996 (Guidelines). Adopted as Ordinance HD-1701, the purpose of the Guidelines is to provide the Board of Harbor Commissioners (BHC or Board) with the necessary procedures, objectives, and criteria for the implementation of City Charter Section 1215 and the PMP in accordance with provisions of the CCA. Section 3 of the Guidelines, states that the Board shall not approve or grant an application for a permit unless a determination has been made by the Board that either the project conforms with the Certified Port Master Plan, or the project is exempt from the provisions of the Coastal Act and a permit is not required. POLB is currently updating its PMP, and expects certification of the update next year (the 2020 PMP update).

Section 6.5 of the Guidelines requires the preparation of a summary report of each application filed. The Application Summary Report (ASR) requires presentation of a description of the significant features of the proposed project, applicable policies of the Port Master Plan and Coastal Act, as well as summaries of environmental impact reports and other environmental and geotechnical evaluations. This ASR, in conjunction with the environmental impact report (EIR), is prepared in accordance with the Port PMP, as amended, and the CCA.

The proposed Deep Draft Navigation and Channel Deepening Project (proposed Project), which would be undertaken jointly by the U.S. Army Corps of Engineers and the POLB, would deepen the approach channel to -80 feet (ft) mean lower low water (MLLW), bend-easing sections of the main channel to a depth of -76 ft MLLW, construct an approach channel to Pier J to an authorized depth of -55 ft MLLW, and deepen the West Basin to -55 ft MLLW. The proposed Project comprises feasible dredging and disposal measures, in accordance with federal and state guidelines, including the POLB's environmental protection guidelines.

In addition to the activities listed above, the POLB would also deepen two additional locations within the harbor to an authorized depth of -55 MLLW: the Pier J slip, including berths J266–J270, and berth T140 on Pier T. Structural improvements would also be performed on the Pier J breakwaters at the entrance to the Pier J slip to accommodate deepening of the slip and approach channel to -55 ft MLLW. These activities would be undertaken solely by the POLB.

As discussed below, the proposed Project is in conformance with the stated policies of the PMP and the CCA. The ASR and proposed staff recommendations have been prepared to evaluate the proposed Project for consistency with both the certified 1990 PMP, as amended, as well as the 2020 PMP update. In the consistency analysis discussed below, the proposed Project is demonstrated to be in conformance with the stated policies of both PMPs and the CCA. In addition, this document will be circulated for public review and will become effective upon certification by the Board of Harbor Commissioners. Section 6.3 contains the special conditions that would be imposed upon the proposed Project or any of the build alternatives.

1.2 Consistency with the California Coastal Act

Relevant sections of the CCA are listed below, with a brief discussion of each.

1.2.1 Chapter 3 (Coastal Resources Planning and Management Policies)

As discussed below, Section 30715 of Chapter 8 of the CCA may result in an interpretation by the California Coastal Commission (CCC) that the proposed Project represents an appealable development. The policies of Chapter 3 constitute the standards by which the adequacy of local coastal programs and the permissibility of proposed developments subject to the provisions are determined. These policies relate to:

- Public Access (Article 2: Sections 30210 – 30214)
- Recreation (Article 3: Sections 30220 – 30224)
- Marine Environment (Article 4: Sections 30230 – 30236)
- Land Resources (Article 5: Sections 30240 – 30244)
- Development (Article 6: Sections 30250 – 30255)
- Industrial Development (Article 7: Section 30260 – 30265.5)

The proposed Project would not restrict public access or recreational opportunities. No new development or activities would occur that would affect access or recreation within the harbor. Marine resources, such as biological and water quality would be temporarily impacted during dredging. However, there are no environmentally sensitive habitat areas that would be impacted, and nominal impacts have been determined to be less than significant in the EIR. Improvements to the Pier J breakwaters would occur to reinforce the structure as a result of deeper dredging, and not result in new or expansion of uses or alteration of the natural shoreline. Commercial fishing and boating would not be affected as a result of the proposed Project. No agricultural or timberland areas are located within the project area that would be affected. No scenic resources are located within the vicinity of the project area, and existing visual conditions would be maintained without significantly impacting the project area. The proposed Project would not increase risks to life, property, or structural integrity, or otherwise result in adverse impacts other than air quality, which have been analyzed in the EIR. Mitigation in the form of an electric clam shell dredge will be incorporated to reduce air emissions. The proposed project does not propose any new industrial development. Therefore, for the reasons discussed above, the proposed Project would be consistent with Chapter 3 of the CCA.

1.2.2 Chapter 8 (Ports)

In accordance with the CCA, the coastal zone includes all areas within 3 miles seaward and approximately 1,000 yards inland, depending on the level of existing inland development. Chapter 8 of the CCA recognizes California ports, including the POLB, as primary economic and coastal resources that are essential elements of the national maritime industry (Section 30701[a]). Relevant Chapter 8 sections of the CCA are listed below, and their relationship to the proposed Project is discussed.

1.2.2.1 Section 30705

(a) *Water areas may be diked, filled, or dredged when consistent with a certified Port master plan only for the following:*

1. *Such construction, deepening, widening, lengthening, or maintenance of ship channel approaches, ship channels, turning basins, berthing areas, and facilities that are required for the safety and the accommodation of commerce and vessels to be served by port facilities.*

The Port currently experiences navigational challenges, including existing channel depths that do not meet the draft requirements of the current and future fleet of larger container and liquid bulk vessels. Tide restrictions, light loading, lightering, and other operational inefficiencies result in economic inefficiencies that translate into increased costs for the national economy. Container movements along the secondary channels serving Pier J and Pier T/West Basin, as well as liquid bulk vessel movements along the main channel, have been identified as constrained by current conditions. The proposed Project would increase transportation efficiencies for container and liquid bulk vessels operating in the POLB for both the current and future fleet and improve conditions for vessel operations and safety by dredging several areas of the harbor and the approach channel. This change would continue efforts to improve navigational efficiency and vessel safety throughout the POLB.

Dredging would be planned, scheduled, and carried out to minimize disruptions to fish and bird breeding and migration, marine habitats, and water circulation. Bottom sediments or sediment elutriate would be analyzed for toxicants prior to dredging; where water quality standards are met, dredged spoils may be deposited in open coastal water sites designated to minimize potential adverse impacts on marine organisms or in confined coastal waters designated as fill sites, in accordance with regulatory permits and the master plan, where the spoil can be isolated and contained or in fill basins on upland sites. Dredged material would not be transported from coastal waters into estuarine or freshwater areas for disposal. Excavated materials would be hauled by barge and disposed of at permitted ocean disposal facilities or nearby borrow pits.

1.2.2.2 Section 30708

All port-related developments shall be located, designed, and constructed so as to:

(a) Minimize substantial adverse environmental impacts.

The proposed Project would reduce wait times within the harbor and reduce loading and unloading delays for deeper-drafting liquid bulk vessels. The proposed Project would incorporate several minimization measures to avoid or reduce impacts on water quality and biological resources. The proposed Project would result in significant impacts on air quality from emissions associated with dredging activities. Although several mitigation measures have been identified and incorporated that would reduce impacts, including the use of an electric dredge, impacts would remain significant and unavoidable.

(c) Give highest priority to the use of existing land space within harbors for Port purposes.

The proposed Project would not involve the use of existing land space. The proposed Project would improve existing navigation channels within the Port complex and would not require zone changes or changes to existing land uses. The dredging and deepening of harbor waters would allow the terminals to continue to operate efficiently for Port purposes related to national and regional goods movement, thereby promoting maritime commerce. Container movements along the secondary channels serving Pier J and Pier T/West Basin and liquid bulk vessel movements along the main channel would be improved, thereby reducing transportation costs and vessel congestion and increasing the Port's competitiveness. Removing channel and berth restrictions so as to increase the vessels' maximum practicable loading capacity, would result in fewer vessel trips to transport the forecast cargo, and the proposed Project would contribute to the efficient functioning of the Port. While the proposed Project could accommodate larger ships, larger ships alone do not drive growth for the harbor. Many factors may influence the growth of a particular harbor, and harbor depth is just one of many involved in determining growth and market share for a particular port. The economic analysis for the proposed Project was conducted with the historical cargo share at the POLB remaining the same in both the future without-project and future with-

project conditions. Cargo may vary in the future as investments are made in port facilities and supporting infrastructure, and long-term leases are renewed or changed at individual terminals; however, the POLB's share of cargo is expected to remain relatively consistent with growth in the future being attributed to GDP growth for the U.S. West Coast and associated hinterland based on the information provided in the commodity forecast conducted for the IFR study (Mercator 2016). Based on that evaluation, the analysis assumes that the POLB will receive a relatively similar share of regional cargo volumes with or without navigation improvements. Thus, since the proposed Project would not accommodate an increase in throughput, the efficiencies gained by the proposed Project would result in fewer, but larger, vessels within the harbor.

1.2.2.3 Section 30715

Section 30715 identifies the California Coastal Commission's permit authority and the process for appealable approvals, as follows:

(a) Until such time as a port master plan or any portion thereof has been certified, the commission shall permit developments within ports as provided for in Chapter 7 (commencing with Section 30600). After a port master plan or any portion thereof has been certified, the permit authority of the commission provided in Chapter 7 (commencing with Section 30600) shall no longer be exercised by the commission over any new development contained in the certified plan or any portion thereof and shall at that time be delegated to the appropriate port governing body, except that approvals of any of the following categories of development by the port governing body may be appealed to the commission:

(1) Developments for the storage, transmission, and processing of liquefied natural gas and crude oil in such quantities as would have a significant impact upon the oil and gas supply of the state or nation or both the state and nation. A development which has a significant impact shall be defined in the master plans.

(2) Waste water treatment facilities, except for those facilities which process waste water discharged incidental to normal port activities or by vessels.

(3) Roads or highways which are not principally for internal circulation within the port boundaries.

(4) Office and residential buildings not principally devoted to the administration of activities within the port; hotels, motels, and shopping facilities not principally devoted to the sale of commercial goods utilized for water-oriented purposes; commercial fishing facilities; and recreational small craft marina related facilities.

(5) Oil refineries.

(6) Petrochemical production plants.

(b) If maintenance dredging is part of, or is associated with, any category of development specified in paragraphs (1) to (6), inclusive, of subdivision (a), the commission shall not consider that maintenance dredging in its review and approval of those categories.

The proposed Project involves dredging to improve the navigation by liquid bulk vessels, which transport crude oil. The CCC may interpret Section (a)(1) to apply to the proposed project, in which case the project may be characterized as an appealable project under the CCA.

1.2.2.4 Section 30233

Any offshore disposal of dredged materials that is to occur outside of the Port would be subject to the standard of review for dredged material disposal in Section 30233 of the CCA. The relevant sections are presented below.

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

2. Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

6. Restoration purposes.

7. Nature study, aquaculture, or similar resource dependent activities.

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredged spoils suitable for beach replenishment should be transported for these purposes to appropriate beaches or into suitable longshore current systems.

The proposed Project comprises feasible dredging and placement/disposal measures, in accordance with federal and state guidelines, including POLB environmental protection guidelines. Dredged material would be disposed of at a nearshore placement site (Surfside Borrow Site), an ocean-dredged material disposal site (LA-2 and/or LA-3), or a combination of the two. The nearshore placement site (Surfside Borrow Area) can accommodate about 2.5 million cubic yards (mcy) of dredged material. LA-2 and LA-3 have annual disposal volumes of 1.0 and 2.5 mcy, respectively, from all sources. It is assumed that 0.9 mcy for LA-2 and 2.2 mcy for LA-3 is available for use by the proposed Project annually. It is assumed that dredging would be performed using a hopper dredge as well as a clamshell dredge. To minimize transit time, the disposal of material from the hopper dredge would maximize use of the nearshore site, while a clamshell dredge would be evaluated for disposal at an ocean-dredged material disposal site. All disposal options have been previously analyzed and permitted.

1.3 Consistency with the Port Master Plans

As discussed above, this ASR has been prepared to evaluate the proposed Project for consistency with both the certified 1990 PMP, as amended, as well as the 2020 PMP update. Both are described below.

1.3.1 1990 PMP

Under the 1990 PMP, the proposed Project site is within Harbor Planning District 4 (Terminal Island Planning District), District 5 (Middle Harbor Planning District), District 6 (Southwest Harbor Planning District), District 7 (Navigation Planning District), District 8 (Southeast Harbor Planning District), and District 10 (Outer Harbor Planning District). The proposed Project is consistent with (a) permitted Port-related industrial and navigation uses associated with the harbor planning districts and (b) overall goals stipulated in the PMP and the long-range planning goals for the Terminal Island, Middle Harbor, and Southwest Harbor Planning Districts to increase primary Port use, as well as the navigation goal, and the Outer Harbor Planning District's goal to help navigation.

1.3.1.1 1990 PMP Goals and Objectives

The 1990 PMP identifies six long-range planning goals and objectives for developing Port policies involving future Port development and expansion. Among the goals for Port development in Chapter IV of the PMP, the proposed Project would support the relevant goals summarized below.

Goal 2: Encourage maximum use of facilities.

The proposed Project would allow more efficient use of navigational channels and existing terminals within the Port. However, the proposed Project would not result in increased use or throughput of the terminal facilities because of existing backland constraints. Objectives under Goal 2 would be met by the proposed Project.

Goal 4: Provide for the safe cargo handling and movement of vessels within the Port.

The objectives of Goal 4 are to deepen channels and basins to accommodate supertanker and post-panamax vessels, and separation of ocean-going vessels and recreational small craft. The need for the project is to address transportation inefficiencies at the POLB, which occur when channels and maneuvering areas do not fully accommodate the vessels using them. Existing channel depths, and in some areas, channel widths, do not meet the draft requirements of the current and future fleet of larger container and liquid bulk vessels that call on POLB. Tide restrictions, light loading, lightering, and other operational inefficiencies result in vessel congestion, increased wait times, and delays in loading and unloading. The increased channel depths would allow for shippers to replace smaller, less efficient vessels with larger, more efficient vessels that are not subject to these restrictions. Thus, the proposed Project would reduce vessel congestion, and the number of vessels calling at the Port, thereby improving safety and allowing for better separation between ocean-going vessels and recreational small craft. The proposed Project would be consistent with Goal 4 by improving the movement of vessels within the Port.

Goal 5: Develop land for primary Port facilities and Port-related uses.

Although the proposed Project would not involve land development, the dredging and deepening of harbor waters would allow the terminals to continue to operate efficiently for Port purposes related to national and regional goods movement, thereby promoting maritime commerce. Container movements along the secondary channels serving Pier J and Pier T/West Basin and liquid bulk vessel movements along the main channel would be improved, thereby reducing transportation costs and vessel congestion and increasing the Port's competitiveness. By recognizing the importance of removing channel and berth restrictions so as to increase the vessels' maximum practicable loading capacity, accommodating larger vessels, and resulting in fewer vessel trips to transport the forecast cargo, the proposed Project would contribute to the efficient functioning of the Port and would use the site in accordance with its highest priority. Objectives under Goal 5 would be met by the proposed Project.

1.3.1.2 1990 PMP Elements

In addition to the long-range planning goals addressed above, the 1990 PMP also identifies plan elements that focus on specific areas where a Port-wide review is pertinent compared to individual district plans. Plan elements identified in the PMP are listed below.

- A. Public Access, Visual Quality, and Recreation/Tourism
- B. Navigation
- C. Environmental

D. Vehicular Transportation/Circulation

E. Intermodal Rail Facilities

F. Oil Production and Operations

For each of these plan elements, the PMP identifies planning goals, issues or areas of controversy, and recommendations for implementation, including a course of action for correcting, alleviating, and/or necessitating further study of the issue (POLB 1990). Of these, Elements B and C are applicable to the proposed Project, as discussed below.

1.3.1.2.1 Element B: Navigation Element

In addition to the general planning goals identified in the PMP, the Navigation Element details the need for developing and supporting a world fleet, including liquid bulk, dry bulk, and post-Panamax container vessels; maintaining navigational capabilities within the harbor district; and minimizing vessel congestion.

The proposed Project would support the following Navigation Element goals:

Goal 1: Remain current to the changing needs of the maritime industry with respect to deep water access to commercial berths and anchorage areas by deepening channels to accommodate the existing and future tanker, dry bulk, and general cargo fleet.

Goal 3: Continue to facilitate access to anchorage areas within and adjacent to the harbor.

Goal 4: Minimize vessel congestion possibilities by properly coordinating and arranging ancillary Port uses (i.e., sport fishing; marine contracting, etc.) to complement primary Port activities.

The proposed Project would help the Port attain these goals by allowing for a more efficient future fleet mix, reducing vessel congestion, increasing the reliability of the channel depth to encourage more efficient vessels, and removing channel restrictions to increase the vessels' maximum practicable loading capacity to transport forecast cargo. The proposed Project would help the Port attain these goals by improving the existing navigation channels within the POLB, which, in turn, would allow greater efficiency of current and future container and liquid bulk vessel operations. The proposed Project would be implemented in accordance with the Navigation Element and consistent with the PMP.

1.3.1.2.2 Element C: Environmental Element

The Environmental Element details the Port's environmental objective to protect, maintain, enhance, and restore the overall quality of both the human-made and the natural coastal environment. The Environmental Element encompasses the need for careful planning for Port development and implementation of environmental regulatory compliance. The issues of concern for this element are as follows: air quality, habitat preservation/marine mitigation, hazardous waste, and permit processing.

Of the five goals identified in the Environmental Element, the proposed Project would support the following:

Goal 1: Minimize pollutant levels from existing and future sources.

The proposed Project would minimize pollutant levels by mitigating air emissions from dredging activities. In addition, a reduction in vessel congestion through the channel would help minimize pollutant levels from existing and future resources. With implementation of the proposed Project's features and improvements, existing channel congestion would be reduced along with its associated pollutants.

Goal 2: Minimize habitat loss within Port boundaries.

Although the proposed Project could result in some impacts on benthic habitat in regards to turbidity and water quality, impacts would be localized and temporary. Water quality monitoring would be performed in accordance with regulatory permits during dredging activities. Therefore, the proposed Project would be implemented in accordance with the Environmental Element and consistent with the PMP.

1.3.1.3 1990 PMP District Goals

The proposed Project area is large and covers several planning districts within the Port. The proposed improvements at Pier T/West Basin would occur primarily in District 4, Terminal Island Planning District, which is designated for primary Port facilities, Port-related industries and facilities, ancillary Port facilities, federal uses, utilities, hazardous cargo facilities, navigation, and oil and gas production. The proposed main channel bend-easing improvements would occur within District 5, Middle Harbor Planning District, which is designated for primary Port facilities, Port-related, oil production, and ancillary Port facilities, and District 7, Navigation Planning District, which is designated for navigation uses. Deepening of the channel to Pier J would occur in District 8, Southeast Harbor Planning District. The proposed improvements at the Pier J approach would be located in District 10, Outer Harbor Planning District, which is designated for navigation and maneuvering.

The proposed Project's consistency with each of these planning districts from the 1990 PMP is described below.

1.3.1.3.1 District 4 – Terminal Island Planning District

Goal 1: Acquire excess Navy property as it becomes available.

Goal 2: Redevelop excess Navy property for development of Port facilities.

1.3.1.3.1.1 Permitted Uses

Permitted uses for the Terminal Island Planning District include the following: primary Port facilities, Port-related industries and facilities, ancillary Port facilities, hazardous cargo facilities, navigation, and oil and gas production.

The proposed Project would improve the Port's ability to support Port-related uses and therefore would be consistent with the permitted uses within the Terminal Island Planning District.

1.3.1.3.2 District 5 – Middle Harbor

Goal 1: Expand primary Port facilities.

Goal 2: Consolidate and abandon oil wells whenever possible.

1.3.1.3.2.1 Permitted Uses

This district's permitted uses are primary Port facilities, Port-related, oil production, and ancillary Port facilities. The proposed channel bend easing would benefit the primary and ancillary Port uses within District 5.

1.3.1.3.3 District 7 – Navigation Area

Goal 1: Maintain and improve access for vessels entering and leaving the Port.

1.3.1.3.3.1 Permitted Uses

The permitted use for the Navigation Planning District is navigation.

The proposed Project would provide deepening and bend-easing improvements to the main channel, which would be consistent with the permitted uses within the Navigation Planning District.

1.3.1.3.4 District 8 – Southeast Harbor Planning District

The PMP identifies one goal for this district:

Goal 1: Modernize and maximize use of existing and future facilities.

The proposed Project would be consistent with the goals of District 8 because the primary components of the proposed Project would dredge Port facilities to accommodate deep-draft berthing, support a more efficient future fleet mix, and reduce vessel congestion.

1.3.1.3.4.1 Permitted Uses

The permitted uses for the Southeast Harbor Planning District include the following: primary Port facilities, Port-related operations, oil production, and ancillary Port facilities.

The proposed Project would be consistent with the designated uses of this district because would support primary Port facilities and include improvements to Port-related operations by bend-easing the channel.

1.3.1.3.5 District 10 – Outer Harbor

The PMP identifies one goal for this district:

Goal 1: Maintain and improve vessel access and manageability.

The proposed Project would be consistent with Goal 1 of District 10 because it would modernize Port facilities to maximize uses and cargo support.

1.3.1.3.5.1 Permitted Uses

The permitted uses for the Southeast Harbor Planning District include the following: navigation and maneuvering.

The proposed Project would be consistent with the designated uses of District 10 because it would provide improvements to the Pier J approach channel, which would be consistent with navigation and maneuvering uses.

1.3.2 2020 PMP Update

Under the PMP update (certification anticipated 2020), the proposed Project site is within Harbor Planning District 4 (West Basin) and District 5 (Southeast).

The proposed Project would be consistent with (a) permitted primary Port facilities use, maritime support facilities use, navigable corridor use, and maneuvering and berthing use associated with these harbor planning districts and (b) overall goals stipulated in the 2020 PMP update.

1.3.2.1 2020 PMP Goals and Objectives

The 2020 PMP update identifies four long-range planning goals and corresponding objectives for Port development that are designed to maintain flexibility, respond to Port tenant needs, and allow the Port

to respond effectively to requirements dictated by national and international economic trends. Among the proposed goals for Port development in the 2020 PMP update, the proposed Project would support the following:

Goal 1: Accommodate Forecasted Demand for Diverse Cargoes

The proposed Project would reduce vessel congestion, increase the opportunity for a more efficient fleet mix, and reduce loading and unloading delays for deeper drafting liquid bulk vessels, providing more efficient operations on existing terminals to accommodate existing and forecasted demand. Objectives under Goal 1 would be met by the proposed Project.

Goal 2: Develop Modern Terminal Facilities with Efficient Operations

The proposed Project would not directly develop terminal facilities but would be designed to support ongoing and future operations within the harbor and at terminal facilities for current and future container vessels and deeper drafting liquid bulk vessels. Objectives under Goal 2 would be met by the proposed Project.

Goal 3: Integrate Green Port Policy and Land Use Planning

The proposed Project would help the Port attain Goal 3 by increasing the reliability of the channel depth, which would encourage shippers to replace smaller, less efficient vessels with larger, more efficient vessels, which would reduce the number of smaller ships in the channel and result in fewer environmental impacts on the channel. Existing channel depths, and in some areas, channel widths, do not meet the draft requirements of the current and future fleet of larger container and liquid bulk vessels that call on POLB. Tide restrictions, light loading, lightering, and other operational inefficiencies result in vessel congestion, increased wait times, and delays in loading and unloading. The increased channel depths would allow for shippers to replace smaller, less efficient vessels with larger, more efficient vessels that are not subject to these restrictions. In addition, the proposed Project would minimize pollutant levels by mitigating air emissions from dredging activities through the use of electric dredging equipment. Therefore, the proposed Project would be implemented in accordance with Goal 3 and consistent with the PMP.

1.3.2.2 2020 PMP Update District Elements

In addition to the long-range planning goals addressed above, the 2020 PMP update also includes Plan elements, which provide the policy framework for future POLB development and Port-wide guidance on major operational/functional areas and policy areas. The PMP update includes eight plan elements:

1. Public Access and Recreation
2. Environment and Sustainability
3. Climate Change Adaptation
4. Transportation and Circulation
5. Navigation
6. Terminal Operations
7. Intermodal Rail
8. Oil Operations

Each of these plan elements consists of planning goals and issues and recommended actions. Of these elements, Element 2, Environment and Sustainability; Element 5, Navigation; and Element 6, Terminal Operations, are relevant to the proposed Project, as discussed below.

1.3.2.2.1 Element 2: Environment and Sustainability Element

The Environment and Sustainability Element embodies the Port's ongoing efforts to preserve and enhance the environment through innovative goods movement, natural resources stewardship, and sustainable Port operations and policy. The Environment and Sustainability Element is complementary to the Green Port Policy, which was adopted by the Board of Harbor Commissioners in January 2005.

Of the six goals identified for the Environment and Sustainability Element, the proposed Project would support the following planning goal:

Goal 1: Reduce environmental and health impacts from Port operations.

The proposed Project would help the Port attain this element goal by increasing the reliability of the channel depth, which would encourage shippers to replace smaller, less efficient vessels with larger, more efficient vessels, which would reduce the number of smaller ships in the channel and result in fewer environmental impacts on the channel. In addition, the proposed Project would minimize pollutant levels by mitigating air emissions from dredging activities through the use of electric dredging equipment.

1.3.2.2.2 Element 5: Navigation Element

The Navigation Element details the need for accommodation of diverse fleets, including liquid bulk, dry bulk, and post-Panamax container vessels within the harbor district. The Navigation Element also includes the need for proper sediment management and navigational safety within the harbor district.

The proposed Project would support the following planning goals under the Navigation Element:

Goal 1: Provide deep-water access to commercial berths and anchorage areas to accommodate existing and future vessels.

Goal 2: Enhance navigation capabilities for vessel safety while transiting or maneuvering within the harbor.

Goal 3: Improve access to anchorage areas within and adjacent to the harbor's main channel.

The proposed Project would help the Port attain these goals by allowing for a more efficient future fleet mix, reducing vessel congestion, increasing the reliability of channel depths to encourage more efficient vessels, and improving the existing navigation channels within the POLB, which, in turn, would allow greater efficiency of current and future container and liquid bulk vessel operations.

1.3.2.2.3 Element 6: Terminal Operations Element

The Terminal Operations Element is a new plan element that details the Port's need to accommodate forecast demand for containerized and non-containerized cargo as well as updates to terminal operational elements to accommodate changes in vessel sizes, increases in terminal capacities, the intermodal supply chain, and advances in technology. The proposed Project would support the following planning goals under the Terminal Operations Element:

Goal 1: Enhance the capacities of container terminals to accommodate future demand.

Goal 2: Promote cargo diversity.

Goal 3: Streamline the movement of cargo within the Port complex.

Goal 4: Modernize container terminals to improve operational efficiency.

Goal 5: Transition to cleaner operations consistent with the Clean Air Action Plan.

Although the proposed Project would not directly develop terminal facilities, it would help the Port attain these goals with the proposed Project's improvements at Pier T/West Basin, improving conditions and transportation efficiencies for container and liquid bulk vessels, and removing channel restrictions to increase vessels' maximum loading capacity for transporting the forecast cargo of the present and future.

The proposed Project would be implemented in accordance with all plan elements and consistent with the PMP, as summarized above.

1.3.2.3 2020 PMP Update District Goals

The proposed Project is within Districts 4 (West Basin), 5 (Southeast), and 6 (Anchorage and Open Water). The 2020 PMP update identifies goals and permitted uses for each planning district. The goals and permitted uses relevant to the proposed Project are described below.

1.3.2.3.1 District 4 – West Basin

Goal 1: Accommodate container cargo forecast associated with international container market demands.

Goal 5: Provide safe navigation for bigger liquid bulk vessels to Pier T.

The proposed Project would be consistent with Goals 1 and 5. The project would deepen channels, maneuvering areas, and berths to accommodate the current and future fleet of larger container and liquid bulk vessels that call on POLB. The project would also alleviate restrictions on vessel calls and maneuvers that are currently constrained by tidal fluctuations, light loading, lightering, and other operational inefficiencies result in vessel congestion, increased wait times, and delays in loading and unloading. Furthermore, the project includes bend-easing portions of the Main Channel (bend easing) to a depth of -76 ft MLLW to improve navigation of larger liquid bulk vessels calling at Pier T. These improvements would be consistent with Goals 1 and 5 in District 4.

1.3.2.3.1.1 Permitted Land and Water Uses

The permitted uses for the West Basin Planning District include the following: primary Port facilities and Port-related facilities, hazardous cargo facilities, maritime support facilities, institutional facilities, oil and gas production, renewable energy resources, environmental protection, utilities, navigable corridor, maneuvering and berthing, and sediment management areas.

The proposed Project would improve maneuvering and berthing in the channels and support primary Port facilities. The proposed Project would therefore be consistent with permitted land and water uses for the West Basin Planning District.

1.3.2.3.2 District 5 – Southeast

Goal 1: Accommodate container cargo forecast associated with international container market demands.

Goal 5: Provide safe navigation for larger ships in the Main Channel, turning basins, and berths and while maneuvering.

The project would deepen channels, maneuvering areas, and berths to accommodate the current and future fleet of larger container and liquid bulk vessels that call on POLB. The project would also alleviate

restrictions on vessel calls and maneuvers that are currently constrained by tidal fluctuations, light loading, lightering, and other operational inefficiencies result in vessel congestion, increased wait times, and delays in loading and unloading. Furthermore, the project includes bend-easing portions of the Main Channel (bend easing) to a depth of -76 ft MLLW to improve navigation of larger liquid build vessels calling at Pier T. These improvements would be consistent with Goals 1 and 5 in District 5.

1.3.2.3.2.1 Permitted Land and Water Uses

The permitted uses for the Southeast Planning District include the following: primary Port facilities and Port-related facilities, maritime support facilities, oil and gas production, hazardous cargo facilities, institutional facilities, environmental protection, navigable corridor, maneuvering and berthing, and sediment management areas.

The proposed Project would improve the navigable corridor and maneuvering and berthing in the channels and support primary Port facilities. The proposed Project would therefore be consistent with permitted land and water uses for District 5.

1.4 Special Conditions

In some instances where the proposed Project presents no significant impact and no mitigation is required, there may be additional “Special Conditions” imposed on the Project by the Port that would further lessen a “no significant impact” finding to a level below a significance threshold or potentially eliminate an impact. These Special Conditions would be implemented as required in the Harbor Development Permit, proposed Project specifications, or other applicable documents governing site use and or facility operations. Special Conditions are consistent with the Green Port Policy, Clean Air Action Plan, and the Water Resources Action Plan.

The following describes the Special Conditions that would be incorporated as part of the proposed Project. The various means used to implement the Special Conditions, as well as their timing, are also provided.

1.4.1 Water Resource Protection

Special Condition: The Permittee shall complete the provided stormwater BMP checklist for small construction projects (under 1 acre in total disturbed area) and implement those best management practices (BMPs) as identified in the checklist. A copy of the completed stormwater BMP checklist shall be submitted to the Director of Environmental Planning fourteen (14) days prior to the start of construction activities for approval. Upon approval of the stormwater BMP checklist, the Permittee shall be responsible for installing, constructing and implementing all control measure requirements described in the stormwater BMP checklist and other stormwater BMPs that may be appropriate during construction. The Permittee shall perform visual observations to verify that all control measures are implemented and performing properly. If control measures being implemented by the Permittee are inadequate to control water pollution effectively, the Port may require the Permittee to revise the operations and amend the stormwater BMP checklist. The Port’s review and approval of the Permittee’s stormwater BMP checklist shall not waive any contractual requirements and shall not relieve the Permittee from achieving and maintaining compliance with all Federal, State, and local laws, ordinances, statutes, rules and regulations. All records shall remain on site and readily accessible for review by the Port and any responsible agencies.

In the event that the proposed project scope changes and the landside disturbed area is greater than 1 acre, the Permittee shall work with the Port to obtain coverage under the Los Angeles Regional Water Quality Control Board's General Permit for Storm Water Discharges Associated with Construction and Land Disturbing Activities (CAS000002). A copy of the Notice of Intent (NOI) and Storm Water Pollution

Prevention Plan (SWPPP) shall be provided to the Director of Environmental Planning prior to the start of construction.

1.4.2 Transportation

Special Condition. Transportation Management Plan (TMP). The Permittee shall coordinate with the POLB Traffic Engineering Bureau during the development of the Project to determine if a TMP is warranted, and if yes, what it needs to address. Permittee shall coordinate with adjacent construction projects at the time, if any, to ensure proper traffic circulation in the area is maintained. If a TMP is warranted during any phase of the project, the Permittee shall submit a Transportation Management Plan to POLB Traffic Engineering for review and approval.

1.4.3 Cultural Resources

Special Condition. Discovery of Archaeological Materials or Human Remains. In the unlikely event that any archaeological material is discovered during construction, construction activities are to be halted, archeological experts are to be notified, and the USACE/Port will complete an evaluation of the significance of those resources and will determine the appropriate resolution of any potential adverse effects.

Permittee shall immediately notify the Director of Environmental Planning of any discoveries.

1.4.4 Air Quality

Special Condition. Community Grants Program (CGP). In 2016, the Port adopted a Community Grants Program (CGP) following a public hearing process. The CGP contains mitigation measures for environmental impacts as policies and requirements within the program. As applied to projects within the Harbor District, projects must mitigate environmental impacts to the extent feasible, and when impacts remain, compliance with the CGP can be a condition of project approval such that the project must provide funding to future projects that apply to the CGP for such grant awards. The Port will participate and fund the CGP, as determined by the methodology described below. The timing of the payment will be made by the later of the following two dates: (a) the date that the Port issues a Notice to Proceed (NTP) or otherwise authorizes commencement of construction; or (b) the date that the Final EIS/EIR is conclusively determined to be valid, either by operation of PRC Section 21167.2 or by final judgment or final adjudication.

Contribution to the CGP was considered for pollutants that would exceed the SCAQMD peak day significance thresholds, following mitigation. Emissions greater than the threshold were multiplied by the cost per ton of emissions, per SCAQMD Rule 301, July 1, 2019. Table III. The CGP funding contribution for the proposed Project is expected to be \$146,753. The plan is, in short, a firm commitment to future mitigation of significant impacts. The Port ensures compliance with the CGP.

DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT (EIS/EIR)

APPENDIX M: TRAFFIC PORT OF LONG BEACH DEEP DRAFT NAVIGATION STUDY Los Angeles County, California

October 2019



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Traffic Technical Memorandum

Date: September 25, 2019
To: Chad Beckstrom, ICF
From: Ribeka Toda and Netai Basu, Fehr & Peers
Subject: **Traffic Impact Analysis for Deep Draft Navigation Study and Deepening Project**

LA19-3125

Fehr & Peers conducted a traffic impact analysis for the proposed Deep Draft Navigation Feasibility Study and Deepening project. The study presents estimates of trip generation over the course of the entire project and available data on existing and future intersection operations along key access routes to the various sites where construction would occur. Based on the analysis, this memo summarizes conclusions regarding the significance of the temporary project-related traffic impacts.

Project Description

The Port of Long Beach (POLB, the applicant) proposes to widen and deepen existing navigation channels to better accommodate container and liquid bulk vessels. The project is comprised of several components that would be conducted over a period of approximately five years from 2024 to 2029.

- Dredging would occur at five locations throughout the harbor as shown in Figure 1, including in the West Basin, the Pier J Turning Basin and approach; a new Standby Area adjacent to the Main Channel; along the Main Channel; and along the Approach Channel through Queen's Gate. Up to approximately 8.3 million cubic yards of material would be dredged and transported by barge to an approved offshore location.
- To power the dredging equipment, the POLB proposes to build an electric substation in the southeast area of Pier J.
- Underwater bulkheads would be constructed, and other structural modifications made to portions of the existing wharves on Pier J and Pier T to improve their strength near areas proposed for dredging.



The following phases or activities are required for the proposed project:

1. Landside Work: Construction of new electric substation (10/1/24 to 12/31/24)
2. Landside Work: Construction of finger dike at Pier J (1/1/24 to 3/2/24)
3. Landside Work: Upgrade of Pier J Wharf (1/1/24 to 6/24/24)
4. Landside Work: Upgrade of Pier T Wharf (1/1/24 to 11/16/24)
5. In-Water Work: Dredging of approach channel (1/1/25 to 2/4/26)
6. In-Water Work: Dredging of main channel for deepening and widening (1/1/26 to 6/28/26)
7. In-Water Work: Dredging of West Basin, part one (6/29/26 to 12/9/26)
8. In-Water Work: Dredging of West Basin, part two (1/1/27 to 3/28/27)
9. In-Water Work: Dredging of Pier T berths (3/29/27 to 4/5/27)
10. In-Water Work: Dredging of Pier J Basin (4/6/27 to 6/13/27)
11. In-Water Work: Dredging of Pier J approach, part one, (6/14/27 to 12/9/27)
12. In-Water Work: Dredging of Pier J approach, part two, (1/1/28 to 12/6/28)
13. In-Water Work: Dredging of Pier J approach, part three (1/1/29 to 2/20/29)

Trip Generation Estimates

Information on the project schedule, number of workers, equipment, and number of truck trips required for different activities during construction of the project was obtained from ICF and Port staff. Maximum daily project trips were estimated for each activity or phase and then put into a table to identify the changes in daily trip-making over the course of the project. The following assumptions were considered in the estimation of total daily and peak hour project trips:

- Number of daily workers during different phases of the project were estimated by the applicant. To be conservative, the peak number of daily workers within each month is assumed for every day of that month.
- Work on the landside construction at Pier T and Pier J will be done in one 8-hour to 10-hour shift, which may include Saturdays. Access routes were identified for each location.

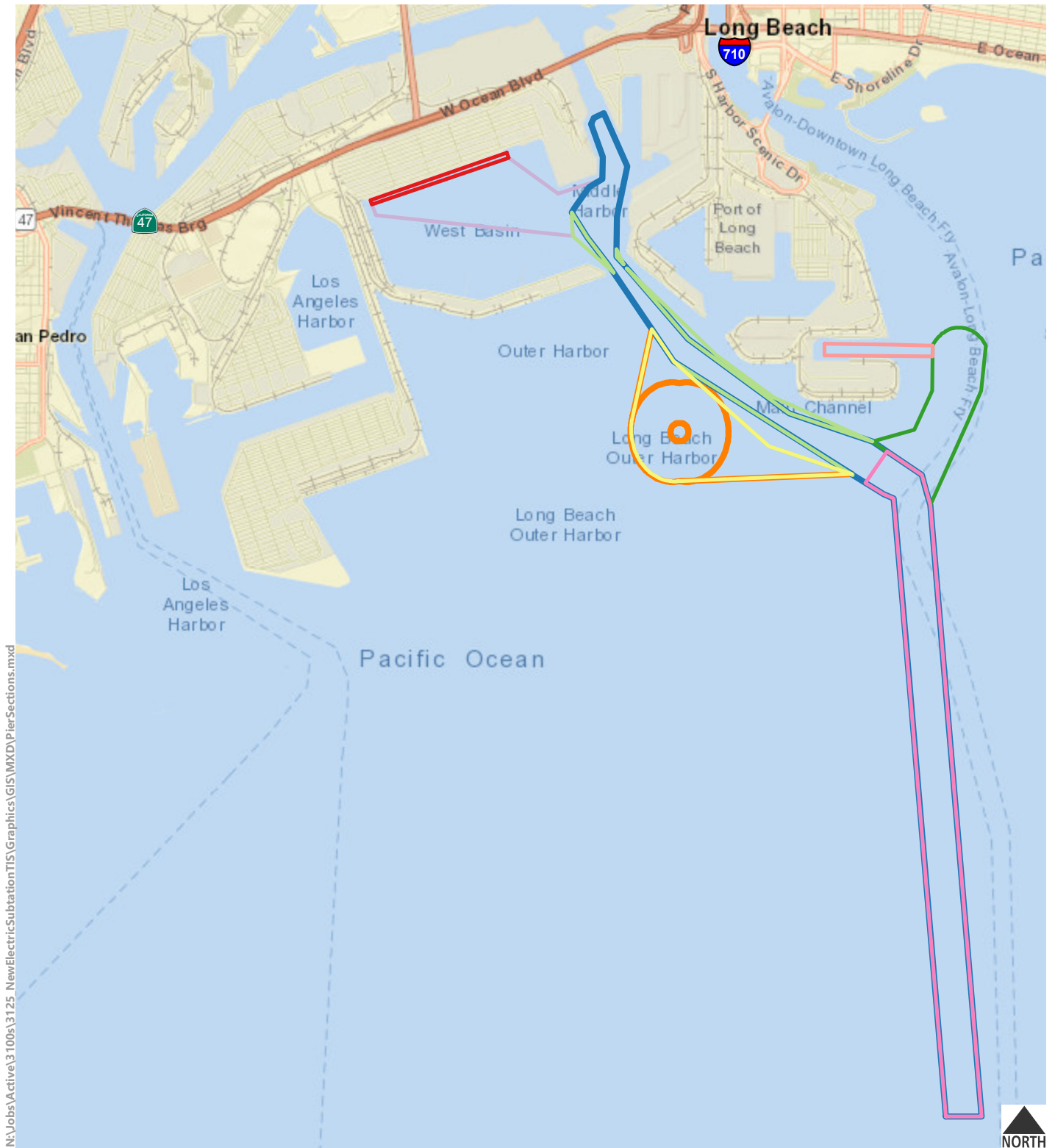


Figure 1

Areas within the Port Under Study



- There are three potential launch sites for the workers on barges for the dredging activity: Pier S, Pier T, and a site near Pier D Street & Pico Avenue. Dredging activity will be a 24-hour operation, including weekends, with three 8-hour to 10-hour shifts. Access routes were identified for each option.
- Vehicular trip generation closely relates to the number of employee trips to and from the project site. Because the project site is not served by public transit, all employees were assumed to travel by private automobile. Consistent with Port practices and to provide a conservative analysis, it was assumed that no carpooling would occur. All workers were assumed to arrive at the project site during weekday morning peak hour and depart the project site during the afternoon peak hour. Trips by dredging workers at the beginning and end of their shifts were assumed to potentially occur during any of the three analyzed peak hours.
- One quarter of the workers on the land-side elements of the project were assumed to travel off-site during a lunch break.
- Trucks delivering material for the construction of the electric substation were assumed to make up to 4 round trips a day, with one trip occurring in the morning peak hour, one occurring in the midday peak hour, one trip occurring in the afternoon peak hour, and one trip during an off-peak period.
- A passenger car equivalent (PCE) factor of 2.0 is assumed for heavy duty trucks.
- Estimated daily trips are rounded to nearest even number.

Table 1 shows the estimated number of workers needed each month by activity/phase and the periods when simultaneous construction activities would occur. Truck trips are also included in the resulting total daily trips by activity/phase. The month representing peak traffic activity associated with the construction and demolition phase was selected for detailed traffic impact analysis. As shown in Table 1, the total daily trips range from a low of 54 to a high of 240. The highest number of daily trips is expected to occur in February 2024 (162 daily trips) and the first two months of year 2026 (240 daily trips).

The morning, midday, and afternoon peak hours, for traffic impact analysis purposes, are defined as occurring between 7:00 and 8:00 AM, 2:00 PM and 3:00 PM, and 4:00 and 5:00 PM, respectively. As shown in Table 1, the project would generate a maximum of approximately 240 daily trips during the first and second month of 2026, during which there is planned dredging over three shifts at the approach channel with the hopper dredger and the main channel widening with the clam shell dredge. Because it is not known when shift changes would occur, these estimates



assume that they could coincide with the peak hours of traffic within the Port. Of the 240 daily trips, 80 trips would occur in the AM peak hour, 80 trips would occur in the midday peak hour, and 80 trips would occur in the PM peak hour. The 80 trips during each peak hour includes 40 inbound trips and 40 outbound trips. The peak hour trips are estimated based on assumptions set forth above.

Project Site Access

The substation construction and wharf improvements will be located on Pier J and Pier T. For dredging activity, workers will travel by water taxi from one of three potential launch sites: Pier T, and Pier S or a location near Pier D Street & Pico Avenue. Primary access routes connecting the regional freeway system with each landside work site and each launch site under consideration were identified and are shown in Figures 2A through 2E. The main access routes are via Ocean Boulevard, the Long Beach Freeway (I-710), the Harbor Freeway (I-110), and the Terminal Island Freeway (SR-47/SR-103). These access routes would be for both truck access and for workers commuting to the project site.

Table 1: Schedule of Daily Workers and Trips

Activity	Location	2024												2025												2026												
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1. Electrical Substation Construction at Pier J	Pier J										15	15	15																									
2. Finger Dike Construction	Pier J	25	25	7																																		
3. Pier J Wharf Upgrade	Pier J	15	25	25	25	25	25																															
4. Pier T Wharf Upgrade	Pier T	15	15	25	25	25	25	25	25	25	25	25																										
5. Approach Channel (hopper dredge 5,447,000 CY)	In water													66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66									
6. Main Channel Widening (clam shell dredge 1,065,000 CY)	In water																									54	54	54	54	54	54							
7. West Basin (clam shell dredge 975,000 CY)	In water																															54	54	54	54	54	54	
Total Workers		55	65	57	50	50	50	25	25	25	40	40	15	66	66	66	66	66	66	66	66	66	66	66	66	120	120	54	54	54	54	54	54	54	54	54	54	
Total Trips		138	162	142	126	126	126	62	62	62	116	116	54	132	132	132	132	132	132	132	132	132	132	132	132	240*	240*	108	108	108	108	108	108	108	108	108	108	

Activity	Location	2027												2028												2029	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2
8. West Basin (Clam shell dredge 513,000 CY)	In water	54	54	54																							
9. Pier T Berths (clam shell dredge Berths T132 to T140, 44,000 CY)	In water				54																						
10. Pier J Basin (clam shell dredge 408,000 CY)	In water					54	54																				
11. Pier J Approach (clam shell dredge 1,066,00 CY)	In water							54	54	54	54	54	54														
12. Pier J Approach (clam shell dredge 2,040,000 CY)	In water													54	54	54	54	54	54	54	54	54	54	54			
13. Pier J Approach (clam shell dredge 297,000 CY)	In water																								54	54	
Total Workers		54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	
Total Trips		108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108	

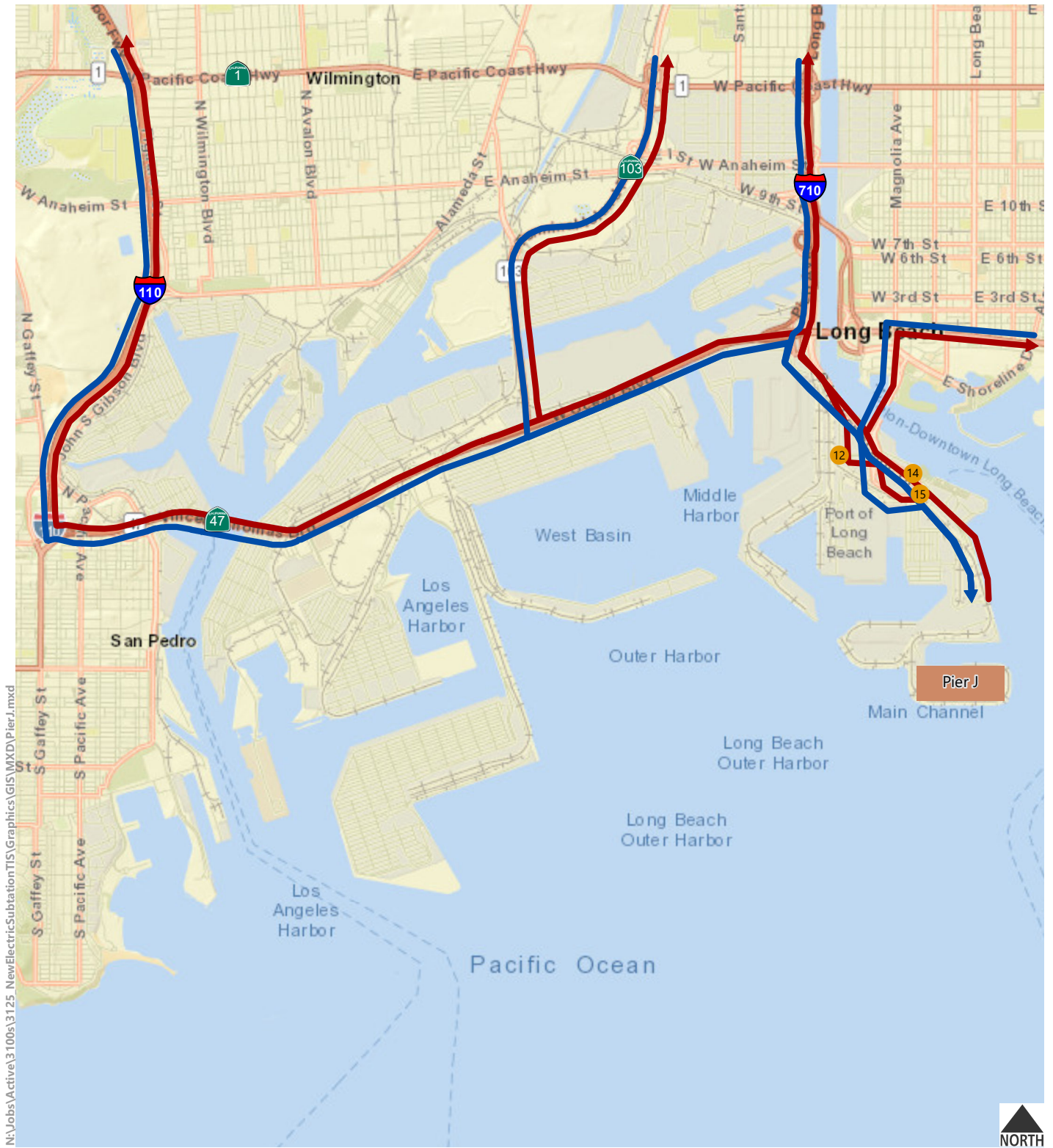
Notes:

The total trips for the electrical substation construction phase includes the trips associated with one truck making 4 round trips a day, with a passenger car equivalent (PCE) of 2.




The dredging work is consecutive and the activities do not overlap, other than in early 2026. The schedule calendar has been simplified to show this.

For example, the dredging of the Pier T Berths is projected to end on April 5th and is projected to to start at the Pier J Basin on April 6th. The calendar has been simplified to show that only one activity - Pier T Berths - occurs in April 2027, to avoid double-counting activities that are consecutive, and not overlapping.

*The maximum number of daily trips, 240, was used for the analysis.



Access Routes

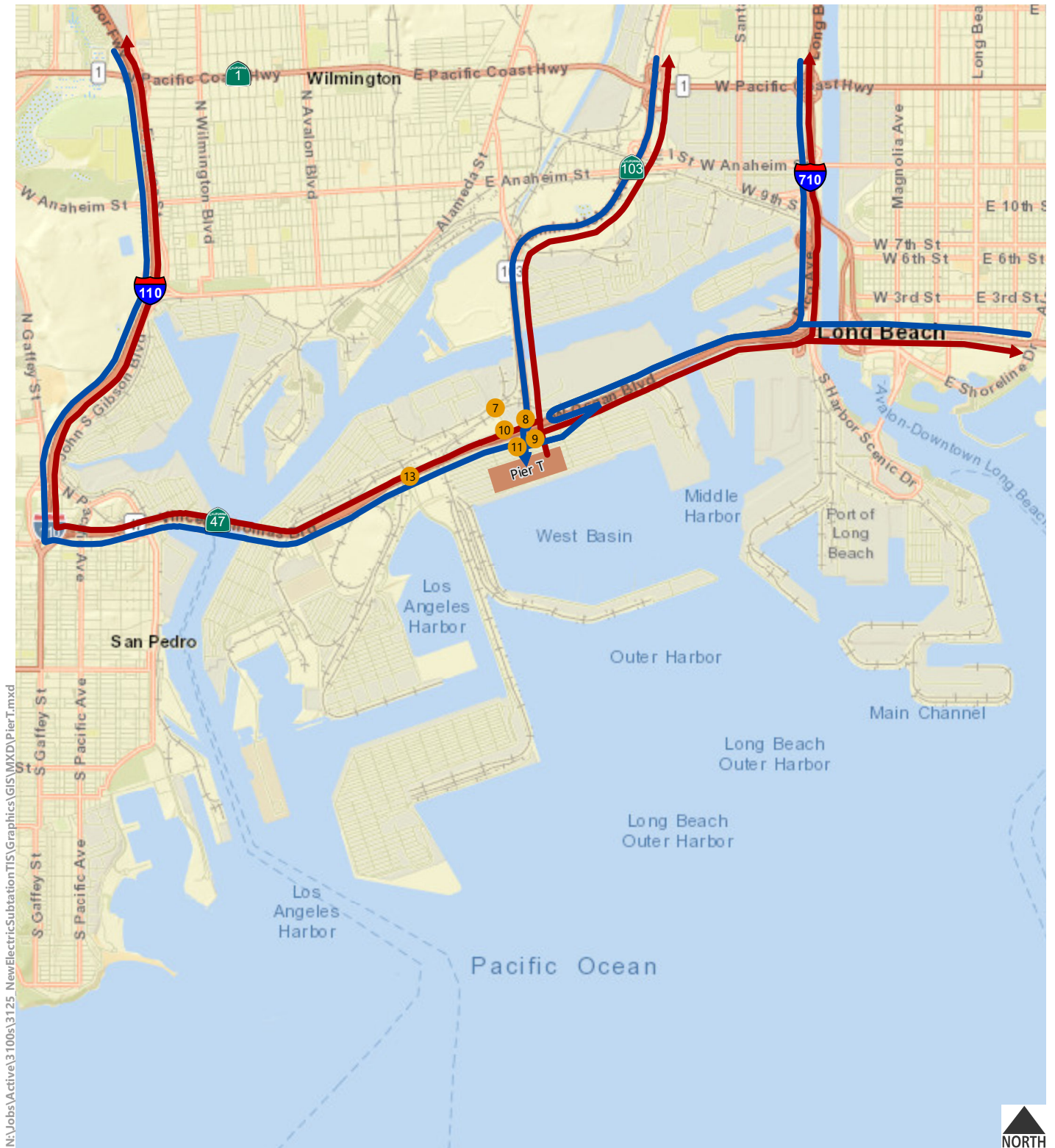
-  Inbound
-  Outbound
-  Study Intersections

Peak Hour Trips	AM	MD	PM	Total
Inbound	50	13	0	63
Outbound	0	13	50	63

Figure 2A

Access Routes to Pier J Landside Work Site





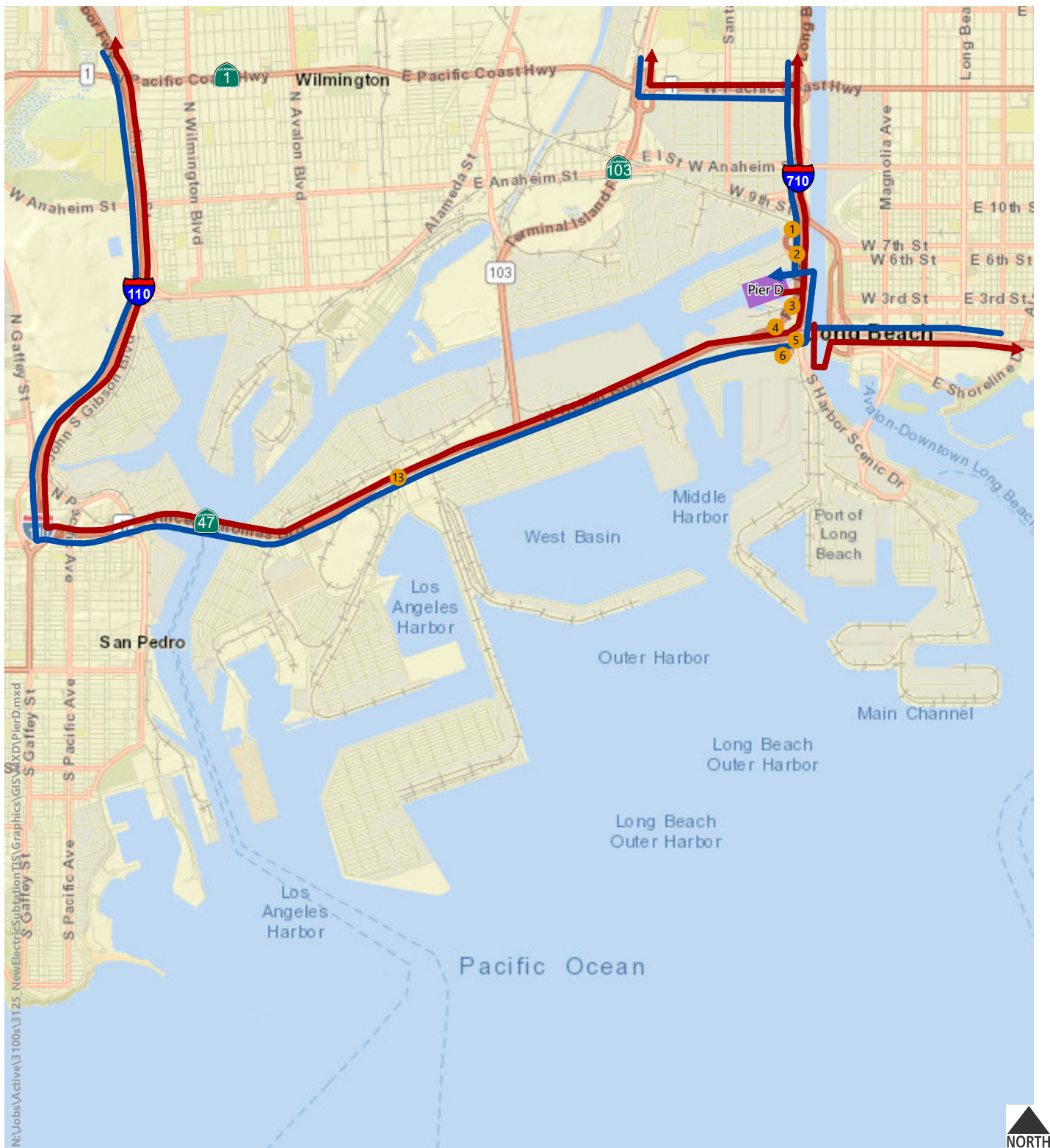
Access Routes

- Inbound
- ← Outbound
- Study Intersections

Peak Hour Trips	AM	MD	PM	Total
Inbound	25	6	0	31
Outbound	0	6	25	31

Figure 2B

Access Routes to Pier T Landside Work Site



Access Routes

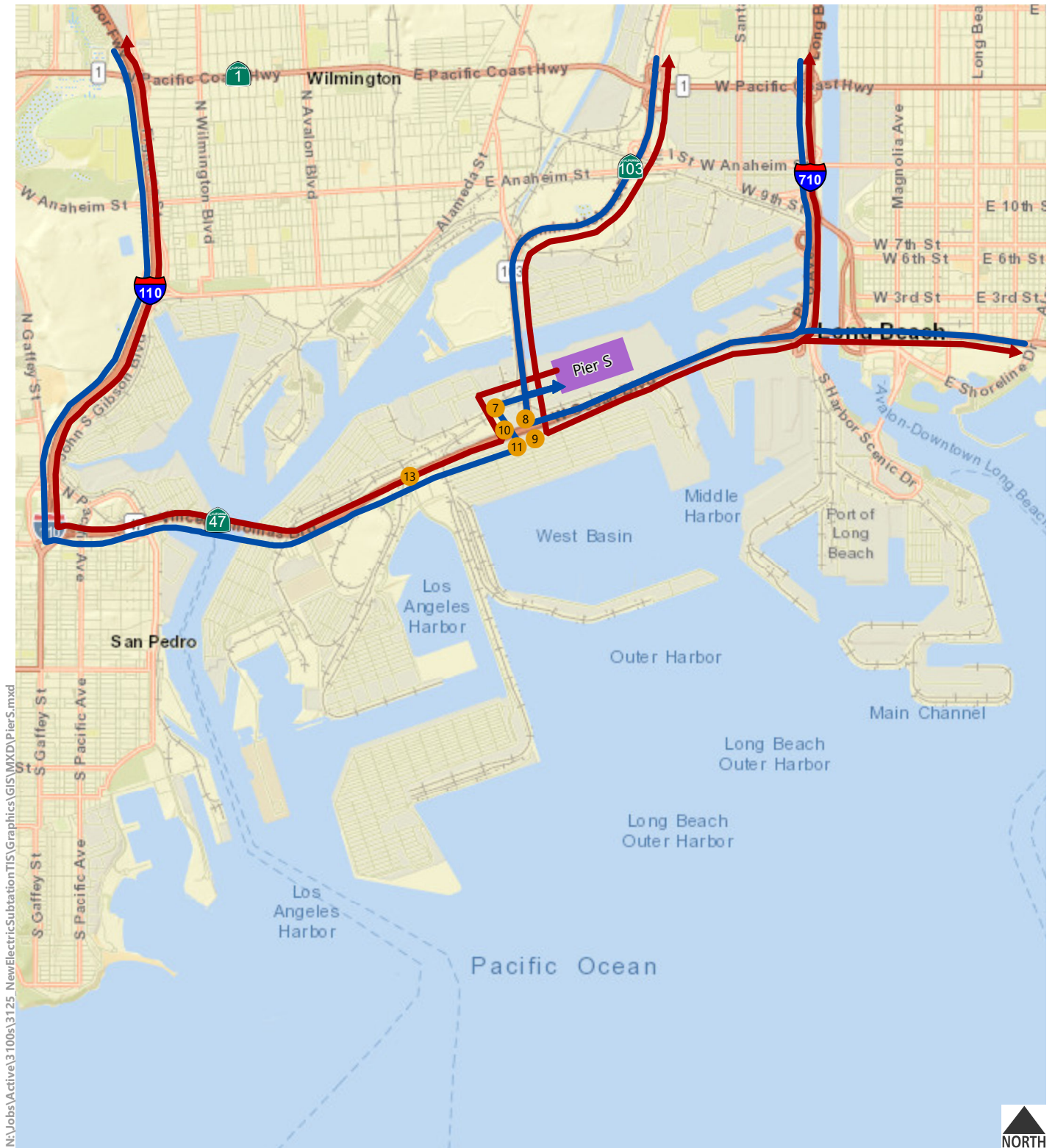
- Inbound
- ← Outbound
- Study Intersections

Peak Hour Trips	AM	MD	PM	Total
Inbound	40	40	40	120
Outbound	40	40	40	120



Figure 2C

Access Routes to Potential Launch Site for In-Water Work on Pier D



Access Routes

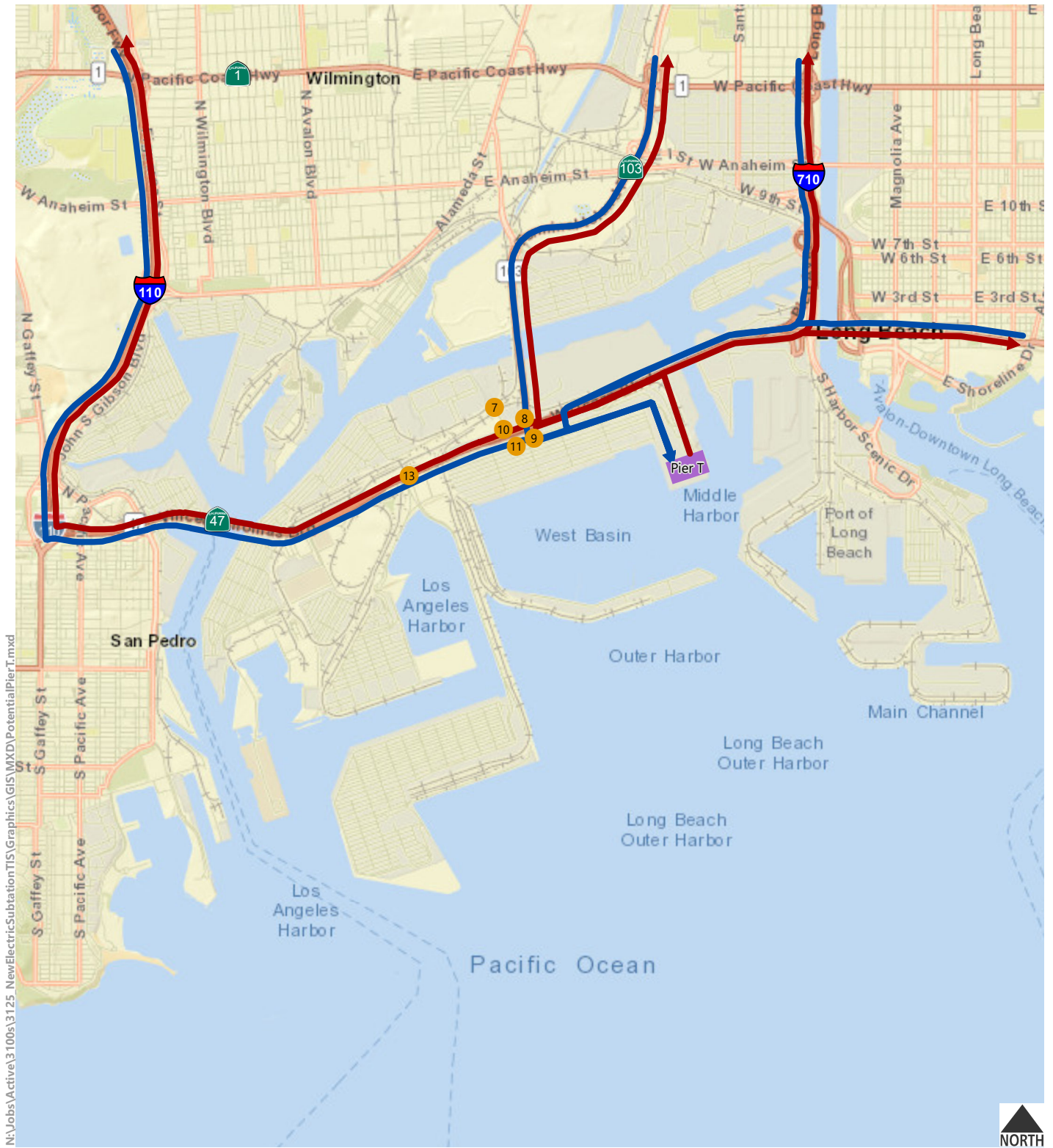
- Inbound
- ← Outbound
- Study Intersections

Peak Hour Trips	AM	MD	PM	Total
Inbound	40	40	40	120
Outbound	40	40	40	120

Figure 2D

Access Routes to Potential Launch Site for In-Water Work on Pier S





Access Routes

- Inbound
- ← Outbound
- Study Intersections

Peak Hour Trips	AM	MD	PM	Total
Inbound	40	40	40	120
Outbound	40	40	40	120

Figure 2E

Access Routes to Potential Launch Site for In-Water Work on Pier T





Existing Traffic Conditions

Available information on current and future (2040) traffic operations at 15 intersections in the vicinity of the proposed land-side work sites and potential launch sites was taken from a recent study published by the Port (Port Master Plan Update Draft Program Environmental Impact Report [PMP EIR], August 2019). The intersections are shown on Figure 3. The analysis presents information on Existing Baseline conditions rather than simply Existing (2018) conditions, to account for the completion of the Gerald Desmond Bridge Replacement and Middle Harbor Terminal Redevelopment projects. The traffic counts were collected in 2018 when there were detour routes in place for the construction of these two major projects. The Existing Baseline conditions reflect the post-construction conditions in which the vehicles that were using the detour routes during construction would use the new Gerald Desmond Bridge. The PMP EIR projected 105,110 daily trips under the proposed master plan, of which 62,305 were trucks and 42,805 were autos associated with the Port of Long Beach. These locations are shown in Figures 2A through 2E and listed Table 2. As shown, good levels of service (LOS D or better) are shown under existing baseline and future conditions for the three analyzed weekday peak hours. Construction of the proposed project would occur between 2024 and 2029, ending approximately midway between the two horizon years for which LOS data is available.

Impact Analysis

Significant Impact Thresholds

The City of Long Beach considers LOS D as the upper limit of satisfactory operations for intersections. A significant impact is identified where project traffic causes the intersection to deteriorate from LOS D to LOS E or F and increases the V/C ratio by 0.02 or more, or if the project traffic causes an increase in V/C ratio of 0.02 or greater when the intersection is operating at LOS E or F in the baseline condition.

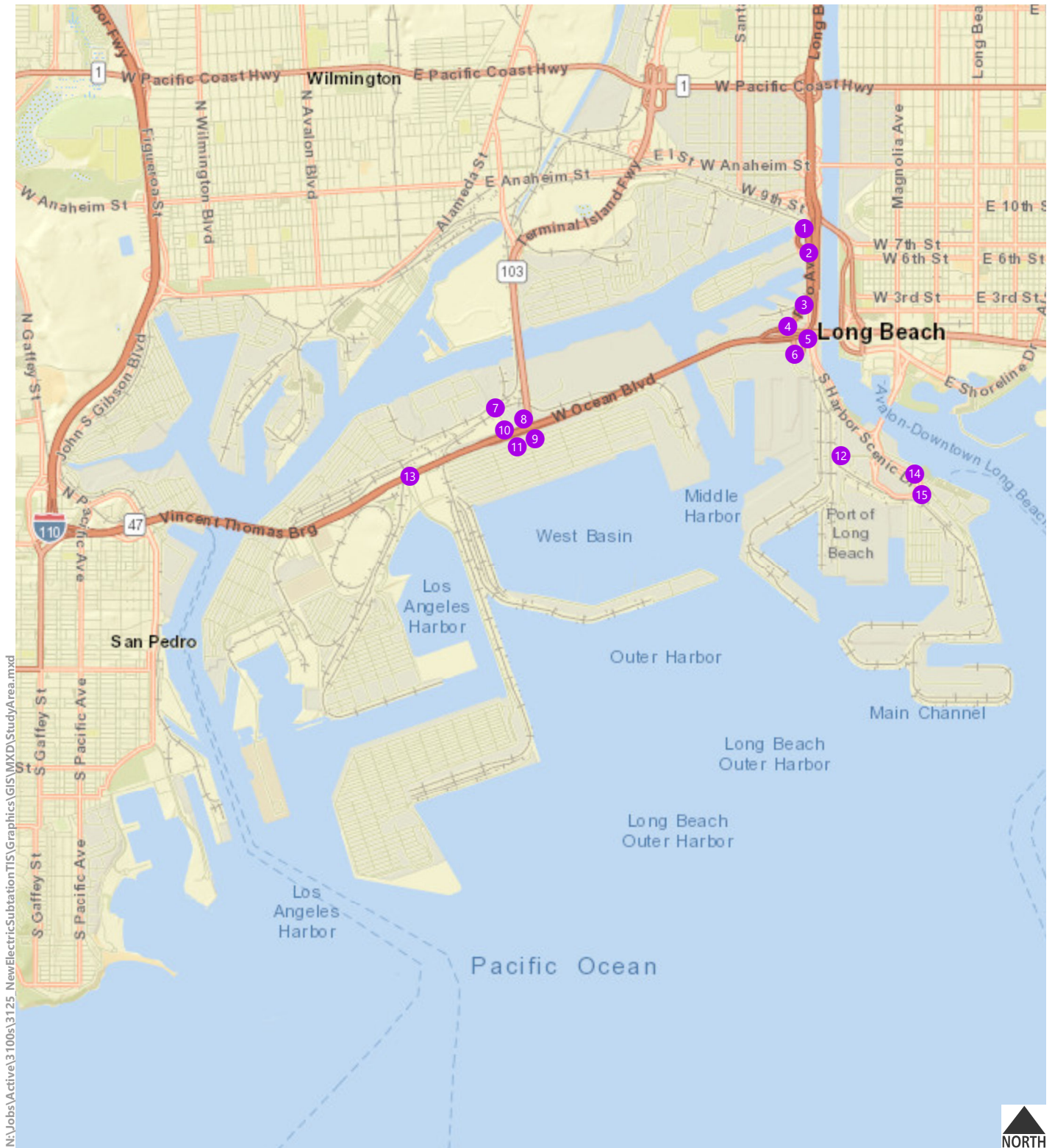
As shown in Table 2, acceptable levels of service (LOS D or better) are shown under existing baseline and future conditions for the three analyzed weekday peak hours. Construction of the proposed project would occur between 2024 and 2029, ending approximately midway between the two horizon years for which LOS data is available. Because workers would travel between their homes and the different project work sites over various access routes, the project trips would be broadly distributed. During the peak of construction activity, estimated to occur over a period of two months, up to 80 trips would occur in any one-hour period (40 inbound and 40 outbound). Given the moderate peak hour trip generation, the various access sites, and the different sites that the workers would be travelling to and from, the trips would be distributed



broadly across the study area, it can be concluded that the additional project traffic would result in less than significant impacts according to the City's criteria.

While other project alternatives are studied under NEPA, the construction impact analysis for each alternative was not analyzed because this analysis is conducted for the peak day and the peak day is the same for all alternatives.

Upon completion of construction, there would be no traffic-related operational impacts as a result of this project. The purpose of this project is to increase safety and efficiency for in-water facilities and would not increase throughput capacity of the terminals. There would a nominal increase in vehicle trips per year for routine maintenance of the electrical substation, which would not be anticipated to impact traffic conditions.



● Study Intersections



Figure 3

Study Intersections

Table 2: Intersection Level of Service Summary

	Intersection	Peak Hour	Existing Baseline		Future (2040)	
			V/C	LOS	V/C	LOS
1	PICO AVE & PIER B ST	AM	0.327	A	0.479	A
		MID	0.390	A	0.546	A
		PM	0.417	A	0.493	A
2	PICO AVE & PIER C ST	AM	0.178	A	0.544	A
		MID	0.295	A	0.576	A
		PM	0.287	A	0.6	A
3	PICO AVE & PIER D ST	AM	0.235	A	0.443	A
		MID	0.363	A	0.519	A
		PM	0.241	A	0.486	A
4	PICO AVE & WESTBOUND OCEAN BLVD ON-RAMP	AM	0.272	A	0.44	A
		MID	0.492	A	0.697	B
		PM	0.308	A	0.443	A
5	PICO AVE & WESTBOUND OCEAN BLVD OFF-RAMP	AM	0.172	A	0.525	A
		MID	0.206	A	0.594	A
		PM	0.207	A	0.494	A
6	PICO AVE & PIER E ST/EASTBOUND OCEAN BLVD RAMP	AM	0.378	A	0.616	B
		MID	0.340	A	0.672	B
		PM	0.314	A	0.55	A
7	PIER S AVE & NEW DOCK ST	AM	0.339	A	0.622	B
		MID	0.328	A	0.664	B
		PM	0.328	A	0.569	A
8	TERMINAL ISLAND FWY & SR-47 WESTBOUND	AM	0.420	A	0.709	C
		MID	0.469	A	0.757	C
		PM	0.469	A	0.703	C
9	TERMINAL ISLAND FWY & SR-47 EASTBOUND	AM	0.362	A	0.714	C
		MID	0.387	A	0.805	D
		PM	0.434	A	0.757	C
10	PIER S AVE & SR-47 WESTBOUND	AM	0.346	A	0.819	D
		MID	0.336	A	0.691	B
		PM	0.361	A	0.578	A
11	PIER S AVE & SR-47 EASTBOUND	AM	0.340	A	0.505	A
		MID	0.369	A	0.622	B
		PM	0.300	A	0.484	A
12	PICO AVE/PIER G AVE & HARBOR PLAZA	AM	0.519	A	0.881	D
		MID	0.592	A	0.819	D
		PM	0.592	A	0.812	D
13	NAVY WAY & SEASIDE AVE	AM	0.436	A	Not an intersection in the future*	
		MID	0.340	A		
		PM	0.554	A		
14	HARBOR PLAZA & QUEENSWAY DR	AM	0.275	A	0.609	B
		MID	0.387	A	0.863	D
		PM	0.390	A	0.701	C
15	HARBOR PLAZA & HARBOR SCENIC DR	AM	0.449	A	0.723	C
		MID	0.442	A	0.897	D
		PM	0.434	A	0.585	A

* The intersection of Navy Way & Seaside Avenue, in Los Angeles, is planned for full grade separation in the future.



VMT Analysis

The following discussion is only relevant to CEQA. Since this is also a NEPA document the VMT discussion has no bearing on NEPA.

On September 27, 2013, Governor Brown signed SB 743, which mandated a change in the way that transportation impacts of projects are evaluated under CEQA. The legislation requires the OPR to amend the CEQA guidelines to use VMT as a criterion for determining significant transportation impacts rather than LOS. Instead of promoting mitigation that involves increasing capacity (i.e., the width of a roadway or size of an intersection), which may increase auto use and emissions, and discourage alternative forms of transportation, the new VMT criterion would support reduction of GHG emissions, creation of multimodal networks, and promotion of a mix of land uses. Section 15064.3 in the current (2018) CEQA Guidelines states: "For the purposes of this section, 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to the project."

OPR published a preliminary evaluation of possible metrics to replace LOS in transportation analyses in December 2013 and, following substantial public input, released the final guidelines in December 2018. While the new analysis rules are now in effect, local agencies have until July 1, 2020, to develop and adopt new analytical procedures and threshold criteria.

The estimation of project-related daily vehicles miles of travel (VMT) is based on the trip generation estimates presented earlier over the course of the project. Average VMT per day and average VMT per year for automobile commute trips, excluding truck trips, were estimated based on information from POLB.

POLB estimates that the commute trip lengths to the construction site could be up to 50 miles. This analysis assumes that one-way commute trips to and from the construction site would average 25 miles.

Based on the estimate 240 daily one-way trips, the highest project-related daily VMT is estimated to be approximately 6,000 miles. The 240 daily one-way trips estimated for the first two months of 2026 do not include truck trips nor midday lunch trips since the activities are in-water dredging work that do not involve trucks and workers are on the barge for the whole shift.

To estimate the VMT per year, the total number of round trips per year was multiplied by the assumed average round-trip length of 50 miles. Table 3 shows the VMT estimates for each year of construction. Of the five full years of construction, Year 2 (2025) has the highest annual average



VTM with an estimated 1,204,500 miles. During this year, there is planned dredging every day for the approach channel.

The City of Long Beach has not yet adopted thresholds for VMT impacts. As such, this VMT analysis is for informational purposes only and no conclusions regarding project-generated VMT impact can be made at this point.

Conclusions

Based on the quantitative and qualitative analysis presented in this memorandum, it is concluded that the temporary traffic impacts related to the construction of the proposed Deep Draft Navigation project would result in less than significant traffic impacts on the surrounding street network.

Table 3: VMT Analysis

Year 1 (2024) Daily Round				Year 2 (2025) Daily Round			Year 3 (2026) Daily Round			Year 4 (2027) Daily Round			Year 5 (2028) Daily Round			Year 6 (2029) Daily Round		
Activity	Days	Trips	VMT	Days	Trips	VMT	Days	Trips	VMT	Days	Trips	VMT	Days	Trips	VMT	Days	Trips	VMT
1. Electric Substation				5. Approach Channel			5. Approach Channel			8. West Basin, Part 2			12. Pier J Approach, Part 2			13. Pier J Approach, Part 3		
Subtask 1	5	4	1,000	365	66	1,204,500	34	66	112,200	86	54	232,200	340	54	918,000	50	54	135,000
Subtask 2	15	4	3,000															
Subtask 3	5	2	500															
Subtask 4	20	15	15,000															
Subtask 5	26	8	10,400															
Subtask 6	2	8	800															
Subtotal			30,700															
2. Pier J Finger Dike							6. Main Channel			9. Pier T Berths								
Subtask 1	3	8	1,200				178	54	480,600	7	54	18,900						
Subtask 2	2	11	1,100															
Subtask 3	45	21	47,250															
Subtask 4	40	4	8,000															
Subtask 5	2	7	700															
Subtotal			58,250															
3. Pier J Wharf Improvements							7. West Basin, Part 1			10. Pier J Basin								
Subtask 1	5	8	2,000				163	54	440,100	68	54	183,600						
Subtask 2	10	8	4,000															
Subtask 3	20	15	15,000															
Subtask 4	135	21	141,750															
Subtask 5	130	4	26,000															
Subtask 6	5	3	750															
Subtotal			189,500															
4. Pier T Wharf Improvements										11. Pier J Approach, Part 1								
Subtask 1	5	8	2,000							178	54	480,600						
Subtask 2	20	8	8,000															
Subtask 3	35	15	26,250															
Subtask 4	250	21	262,500															
Subtask 5	245	4	49,000															
Subtask 6	10	3	1,500															
Subtotal			349,250															
Total Annual VMT			627,700			1,204,500			1,032,900			434,700			918,000			135,000

Year 1 Activities and Subtasks:

1. Electric substation activities: 1) Demolish asphalt, 2) Cut trench for ducts and foundation for substation, 3) Removal of demlshed material to disposal site, 4) Construct manholes, ducts, foundations, 5) New asphalt and paving, 6) Install transformer and heavy electrical equipment
2. Pier J Finger Pier Activities: 1) Mobilize/demobilize, 2) Clearing of seabed of any obstruction prior to pile driving, 3) Driving of bulkhead wall, 4) Installation of anti-scour rock in front of new bulkhead wall, 5) Survey of installed bulkhead wall
3. Pier J Wharf Improvements Activities: 1) Mobilize/demobilize, 2) Sheet pile delivery, 3) Clearing of seabed of any obstruction prior to pile driving, 4) Driving of bulkhead wall, 5) Installation of anti-scour rock in front of new bulkhead wall, 6) Survey of installed bulkhead wall
4. Pier T Wharf Improvements Activities: 1) Mobilize/demobilize, 2) Sheet pile delivery, 3) Clearing of seabed of any obstruction prior to pile driving, 4) Driving of bulkhead wall, 5) Installation of anti-scour rock in front of new bulkhead wall, 6) Survey of installed bulkhead wall