APPENDIX A
Air Quality/Greenhouse Gas Study

Long Beach Cruise Terminal Improvement Project

AIR QUALITY AND GREENHOUSE GAS ASSESSMENT

Prepared for
The City of Long Beach

June 2019

Notice

This document was prepared for the City of Long Beach and amends a second draft document prepared for Carnival Corporation by Atkins Limited. Aspen Environmental Group provided the technical support to amend and finalize this document. The following amendments were made to the Carnival supplied draft document:

Chapter 1 - Introduction

Minimal edits were made to this section as necessary to make it consistent with the other changes made to the document/analysis.

Chapter 2 - Project Location and Description

This section was amended to provide additional project description information about the Proposed Project that relates to the project assumption information used to complete the air quality and greenhouse gas assessment. The applicant provided figures, Figures 2-1 to 2-3, are used as provided in its draft document.

Chapter 3 - Regulatory Setting

This section has been amended to identify additional regulations that apply directly or indirectly to the project, including marine diesel engine regulations such as the International Maritime Organization (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI emissions standards that have been approved by the United States Environmental Protection Agency (US EPA) in 40 CFR Part 1043. Also the regulatory setting for greenhouse gases/global climate change has been added.

Chapter 4 - Affected Environment

This section has primarily been amended to provide additional or corrected information related to the affected environment for ultrafine particulates, toxic air contaminants, greenhouse gases/climate change; and sensitive receptor locations.

Chapter 5 – Emissions Estimate Methodology

This section was revised to describe the final emissions estimate methods being used and to remove duplication of the detailed assumptions that are provided in Appendix A and B. Major issues include a simplification of the project baseline related to how the Proposed Project changes operation at the Long Beach Cruise Terminal (LBCT).

Chapter 6 – Project Impacts:

This chapter, which also integrates an amended mitigation measure discussion (Chapter 7 in the applicant's document), provides a revised assessment of the impacts based on differences in the emissions estimates and application of the significance thresholds used for the project. Specific differences include revisions to the distances from construction activities and sensitive and worker receptors.

The conclusions section that was contained in the applicant's document (Chapter 8), but which didn't include conclusions for greenhouse gas (GHG) emissions impacts, was removed. The project's CEQA document will use this technical assessment to determine final significance conclusions.

Appendices A through E

These appendices were combined into two appendices: Appendix A – Construction Emissions; Appendix B – Operation Emissions. Specific changes made to the draft Technical Report document appendices are as follows:

Appendix A – Construction Information. The tables in this appendix were removed. This appendix included construction assumptions information that is included, along with the emissions estimates output, in the current Appendix A materials.

Appendix B – CalEEMod Outputs. This appendix included a run log for the California Emissions Model (CalEEMod) construction and operation emissions modeling and the CalEEMod output files. The

CalEEMod run log page was removed as this run date information duplicates information provided in the CalEEMod output files. The CalEEMod construction emissions output was moved into "Appendix A – Construction Emissions". The CalEEMod operation emissions output was moved into "Appendix B – Operation Emissions". Other edits made to these two CalEEMod emissions estimates are as follows:

1) The terrestrial constructions emissions, calculated using CalEEMod were updated to better match the construction schedule and construction equipment list, including have overlapping north and south parking area construction phases (two concurrent construction crews) being active concurrently where appropriate. Off-road equipment changes included removing off-road trucks that were double counting emissions from on-road dump truck trips. On-road changes included adding import trips necessary for the fill material that will be used to decommissions/fill the no longer used passenger tunnel.

2) The operation CalEEMod file provided indirect GHG emissions for electricity use and criteria pollutant and GHG emissions for off-road equipment use (baggage carts, etc.). The output file was revised to only provide the off-road emissions estimates. The electricity use indirect GHG emissions calculation was completed separately by spreadsheet using what is considered to be a more appropriate emissions factor and that estimate is provided at the end of Appendix B.

Appendix C – Cruise Vessel and Harbor Craft Emissions. This appendix was separated as appropriate into the current Appendix A and B, with the following revisions:

1) The marine construction emissions, which were not changed other than adding the total construction period emissions calculations.

2) The cruise ship emissions were redone to include new information regarding ship speed and engine load from Carnival and used a more rigorous analysis of the daily ship routes within the South Coast Air Basin (SCAB) and California waters (for GHG emissions). The emissions factors used for each ship did not change; however, the time in mode and total energy consumption for each ship by trip were revised.

Appendix D – Comparison with POLB AEI. This appendix was removed. A comparison of the calculated cruise ship emissions in this report with the Port's air emissions inventory (AEI) is not relevant as the revised emissions calculations provided in this report includes an update of the ship speed and engine use assumptions and includes all emissions that would occur within the SCAB, including emissions at Avalon Harbor. The Port's air emissions inventory uses simplified assumptions on ship speeds, and engine use, and routes through the SCAB that are consistent for all ocean going vessels.

Appendix E – Modeling Methodology. This appendix was removed. The localized significance threshold (LST) analysis was revised and it was determined that the Proposed Project would not exceed the LST significance thresholds, so this modeling analysis was not required.

Contents

Tables

Figures

Appendices

List of Acronyms

AAQS	Ambient Air Quality Standards
AB	Assembly Bill
AEI	Air Emissions Inventory
AP-42	US EPA's Compilation of Air Emissions Factors (AP-42)
AQMP	Air Quality Management Plan
AR5	IPCC Fifth Assessment Report
ATCM	Air Toxic Control Measure
BHC	Board of Harbor Commissioners
BMP	Best Management Practices
CAA	Clean Air Act
CAAP	Clean Air Action Plan
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCAR	California Climate Action Registry
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	Community Grants Program
CH_4	Methane
CHE	Cargo Handling Equipment
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COLB	City of Long Beach
CRP	Coastal Resiliency Plan
CTP	Clean Trucks Program
DPM	Diesel Particulate Matter
ECA	Emissions Control Area
EEDI	Energy Efficiency Design Index
EMFAC2014	CARB's On-Road Emissions Factor Model (2014 version)
GCC	Global Climate Change
GHG	Greenhouse Gases
GIS	Graphic Information System
GWP	Global Warming Potential
HC	Hydrocarbons
HFC	Hydrofluorocarbons
HSC	Health and Safety Code
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt hour
LA-2	Offshore Disposal Location LA-2
LBCT	Long Beach Cruise Terminal
LED	Light Emitting Diode
LST	Localized Significance Threshold
MARPOL	International Convention for the Prevention of Pollution from Ships
MATES	Multiple Air Toxics Exposure Study
MDO	Marine Diesel Oil
MGO	Marine Gas Oil
MOU	Memorandum of Understanding
MRR	Mandatory Reporting Rule

MT	Metric Tons
NAAQS	National Ambient Air Quality Standards
NHTSA	National Highway Traffic Safety Administration
N_2O	Nitrous Oxide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
OFFROAD	CARB's Off-Road Emissions Factor Model
OGV	Ocean Going Vessel
PERP	Portable Equipment Registration Program
PFC	Perfluorocarbons
PM_{10}	Particulate Matter with aerodynamic diameter less than 10 micrometers
$PM_{2.5}$	Particulate Matter with aerodynamic diameter less than 2.5 micrometers
POLA	Port of Los Angeles
POLB	Port of Long Beach
RCP	Representative Concentration Pathway
RFS	Renewable Fuel Standard
RMS	Royal Mail Ship
ROG	Reactive Organic Gases
RPS	Renewables Portfolio Standard
SB	Senate Bill
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SEEMP	Ship Energy Efficiency Management Plan
SF_6	Sulfur Hexafluoride
SIP	State Implementation Plan
SLR	Sea Level Rise
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxides
SRA	Source Receptor Area
TAC	Toxic Air Contaminant
UFP	Ultrafine Particles
US EPA	United States Environmental Protection Agency
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compounds
VSRP	Vessel Speed Reduction Program

1. Introduction

Carnival Corporation & PLC ("Carnival") proposes to make improvements to its existing Long Beach Cruise Terminal (LBCT) located at Pier H in the Port of Long Beach (POLB), hereon referred to as 'the Proposed Project'.

The construction phase of the Proposed Project would involve both maritime and on-shore works. Maritime improvements are required to facilitate the safe mooring of Carnival's new 'Vista' class of cruise ships, as well as to improve vessel safety during swells. On-shore works include the expansion of the existing parking garage to accommodate additional vehicles associated with increasing Carnival customer numbers.

The operation phase of the Proposed Project would involve changing the specific cruise ships using the LBCT (including the addition of a new 'Vista' class cruise ship), together with an increase in road traffic movements associated with both increased passenger, employee and service vehicles accessing the LBCT.

The proposed activities constitute a "project" as defined by the California Environmental Quality Act (CEQA) and require discretionary approval; therefore, the Proposed Project requires an Air Quality and Greenhouse Gas assessment (AQ & GHG) to be undertaken, pursuant to CEQA Guidelines.

Emissions generated during the construction and operation phases of the Proposed Project have the potential to affect air quality in their immediate vicinity and the surrounding region. This AQ & GHG assessment will therefore identify potential impacts of the Proposed Project on criteria air pollutants (as defined within the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS)), toxic air contaminants (TACs), ultrafine particulates, and GHG emissions, during both project phases. Significant impacts will be identified (if relevant) and, where possible, mitigation measures will be recommended to reduce potential impacts below relevant significance thresholds.

2. Project Location and Description

2.1. Project Location

The Port of Long Beach (POLB) is located within the San Pedro Bay area in the southwest portion of the City of Long Beach in southern Los Angeles County, California. The Proposed Project site is located at the existing Long Beach Cruise Terminal at POLB Pier H, adjacent to the Royal Mail Ship (RMS) Queen Mary. State Route 47 (via Interstate 110 Freeway) and the Interstate 710 Freeway provide access to the site from the surrounding area. The POLB is the second-busiest container seaport in the United States and the LBCT is one of the busiest in North America, with ships docking at the facility five days per week.

2.2. Project Description

Carnival transports approximately 600,000 passengers a year at the LBCT for embarkation and debarkation. The Proposed Project aims to enable the growth of Carnival operations by facilitating safe mooring of Carnival's new Vista class cruise ship, the Carnival Panorama, which is first due to call at the POLB in December 2019. In addition, the larger vessel would generate greater demand for staff and customer parking facilities, and so expansion of the existing parking garage adjacent to the LBCT is proposed.

Improvements as a result of the Proposed Project have broadly been categorized into maritime improvements and onshore improvements at Pier H. Maritime improvements include the following:

- Dredging of approximately 30,000 cubic yards (cy) of material from the existing berth and immediate surrounding area;
- Disposal of the dredged material at sea;
- Installation of new high-capacity mooring dolphins (to address capacity issues faced by the dolphins currently installed);
- Replacement of worn existing fenders with new over-sized, high-density foam filled fenders; and
- Extension to the passenger bridge system including an added ramp section, a tower element on the existing wharf deck and a supplementary new tower on a supplementary new platform south of the existing wharf deck.

Proposed on-shore improvements include the following:

- Lateral extensions of the existing passenger parking structure to the north east over Queens Highway (North Garage) and south west over Windsor Way (South Garage);
- Reconfiguration of leasehold traffic lanes; and
- Filling/decommissioning of an abandoned passenger tunnel system.

Initial mobilization for maritime works is expected to begin in August 2019 and run for a period of approximately five months, completing in December 2019. Construction of both the North and South Garage extensions are expected to begin in October 2019, with completion expected 12 months later in October 2020.

Once the maritime construction improvements are completed the new larger Vista class cruise ship, the Carnival Panorama, will begin operation at the LBCT, replacing the existing Conquest class cruise ship, the Carnival Splendor that will then end service at the LBCT. Additionally, the Carnival Miracle, a Spirit class cruise ship, will have limited ship calls in 2019 until the Carnival Panorama begins service in late 2019. The two Fantasy class cruise ships, the Carnival Inspiration and the Carnival Imagination, that currently use the LBCT will continue operation in the same manner as before the project. The existing pattern of the cruise ship calls will not change, with these two smaller cruise ships calling at roughly three-day intervals, and the larger cruise ship calling every seven days (occasionally every fourteen days), for an average total of 5 ship calls per week.

Figure 2-1 - Site Location in State Context

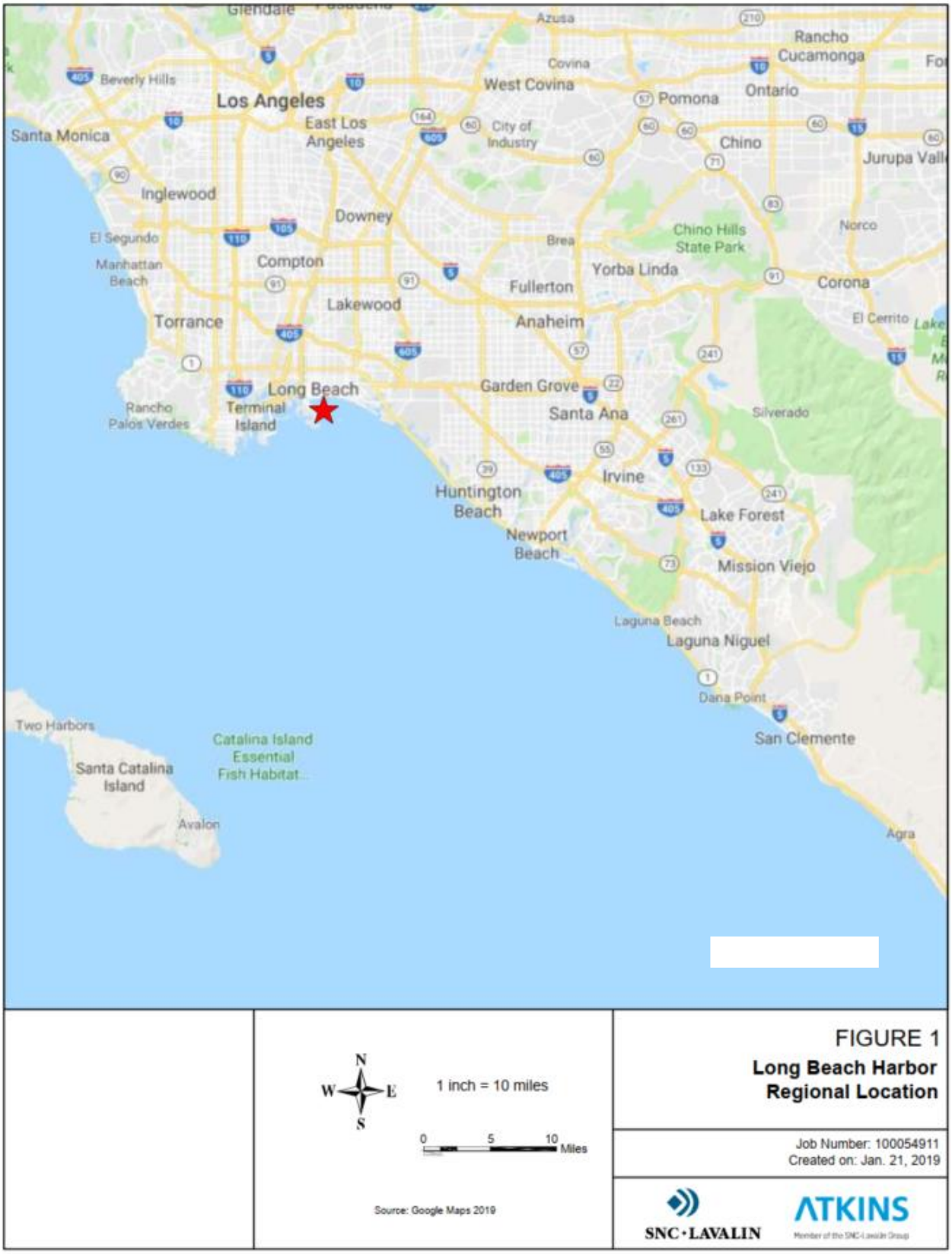
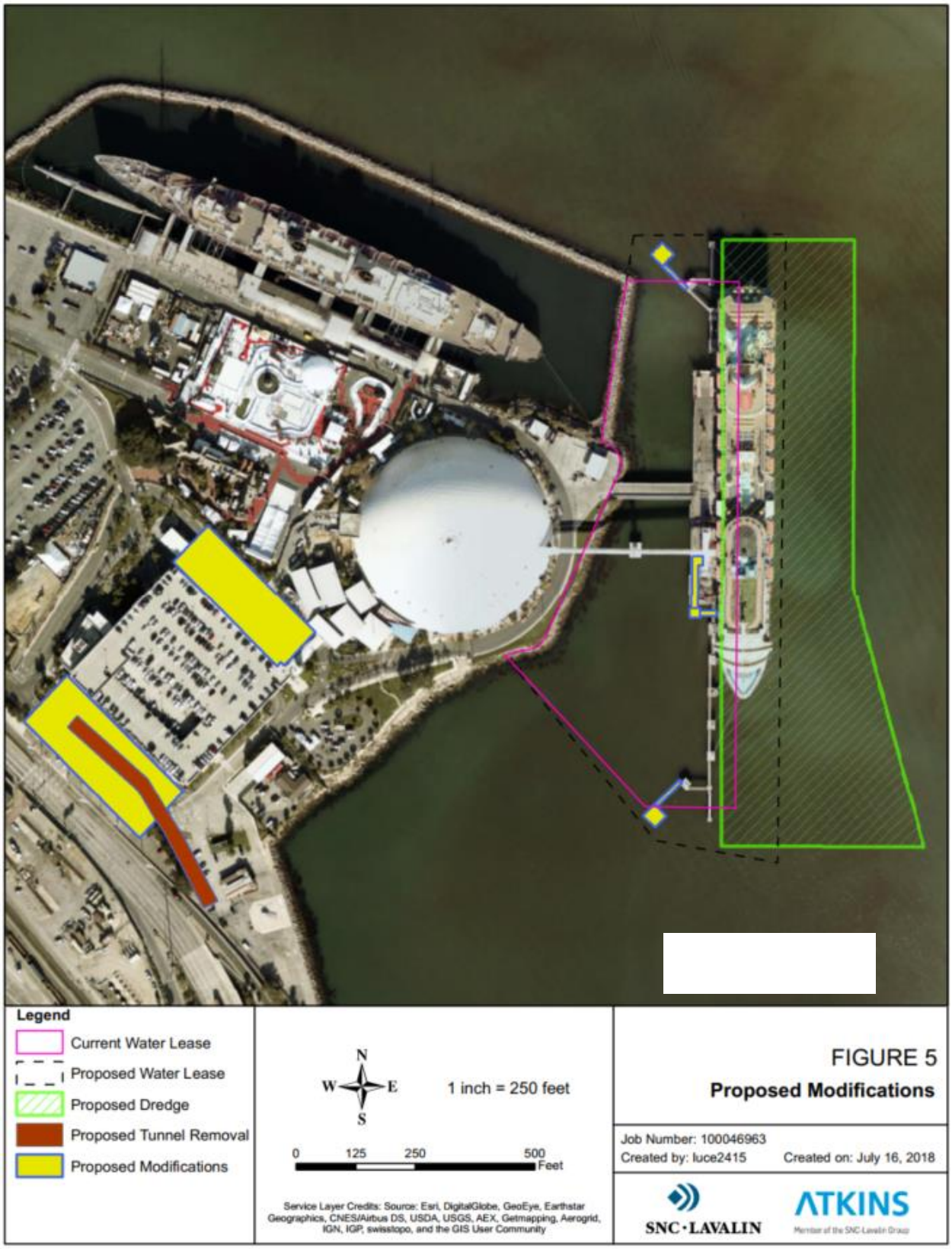


Figure 2-2 - Site Location in Port of Long Beach

Figure 2-3 - Proposed Construction Areas



3. Regulatory Setting

3.1. Federal Clean Air Act

The federal Clean Air Act (CAA), as amended, is the primary federal law that governs air quality in the United States. The CAA requires the United States Environmental Protection Agency (US EPA) to set National Ambient Air Quality Standards (NAAQS). These standards, which are summarized in Table 3-1, define the concentrations of air pollutants over specified time periods, which are considered harmful to public health and the environment. Compliance with the NAAQS is required in all areas of the United States.

The US EPA has set NAAQS for six principal pollutants, which are called "criteria" air pollutants. The main criteria pollutants of concern for the purposes of this assessment are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and particulate matter with an aerodynamic diameter of less than 10 micrometers (PM_{10}) and less than 2.5 micrometers ($PM_{2.5}$) respectively. A NAAQS exists for lead; however, releases of this pollutant are not anticipated to occur as a result of the Proposed Project and are not considered further.

The US EPA designates areas as either being in 'attainment' or 'non-attainment' for each criteria pollutant, based upon measured and/or modelled concentrations. If an area is designated as 'non-attainment' for a particular pollutant, this indicates that the corresponding NAAQS is exceeded in this area.

The Proposed Project is located within the South Coast Air Basin (SCAB), one of several regional air basins designated by the state of California for air quality management. The SCAB is currently designated as a non-attainment area for ozone, $PM_{2.5}$ (for both the 24-hour and annual standards), and lead[1]. The US EPA also currently classifies the severity of non-attainment for three pollutants (O_3, PM_{10}, and $PM_{2.5}$). The SCAB has been classified as an area of 'extreme nonattainment' for the 8-hour ozone NAAQS, as 'serious non-attainment' for the daily $PM_{2.5}$ NAAQS and as 'moderate non-attainment' for the annual mean $PM_{2.5}$ NAAQS[2]. The NAAQS for CO, NO_2, and PM_{10} are in 'maintenance', having previously been in non-attainment, whilst the remaining NAAQS for SO_2 is attained within the SCAB. Table 3-2 presents the current SCAB NAAQS attainment status.

3.2. California Clean Air Act

At the state level, the California Clean Air Act (CCAA) is administered by the California Air Resources Board (CARB), supported by air quality management districts and air pollution control districts at regional and local levels. The CARB is responsible for meeting the requirements of the CAA, administering the CCAA, and establishing the state's air quality standards known as the California Ambient Air Quality Standards (CAAQS)[3].

CAAQS for O_3, PM_{10}, $PM_{2.5}$, NO_2, CO and SO_2 are summarized in Table 3-1, alongside corresponding NAAQS. CAAQS are also set for sulfate, visibility reducing particles, lead, hydrogen sulfide and vinyl chloride, however, in line with previous Long Beach port assessments, the Proposed Project is considered unlikely to have a significant effect on these pollutants and as such they have not been considered within this study.

Unlike the NAAQS, for which areas are designated as non-attainment when an exceedance occurs in any given year, areas are designated as non-attainment if a CAAQS is exceeded more than once in a 3-year period. The SCAB is currently a CAAQS non-attainment area for ozone, PM_{10} and $PM_{2.5}$, and in attainment of CAAQS for CO, SO_2, NO_2, lead, and sulfates, and is currently unclassified for hydrogen sulfide and visibility reducing particles. Table 3-2 presents SCAB CAAQS attainment status.

[1] The main contributors to exceedances of the NAAQS for lead standard are lead-related industrial facilities, which are located within a 15-mile radius in the southern portion of Los Angeles County.

[2] https://www.epa.gov/green-book.

[3] https://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.

California law continues to mandate CAAQS, although attainment with NAAQS has precedence over attainment of the CAAQS due to federal penalties for failure to meet federal attainment deadlines. Furthermore, California law does not require that CAAQS be met by specified dates as is the case with NAAQS, instead, it requires incremental progress toward attainment.

The CARB is also responsible for setting the state's own stricter emissions standards for a range of state-wide pollution sources including vehicles, fuels and consumer products.

Table 3-1 - Federal and State Ambient Air Quality Standards

Pollutant	Averaging Times	California Standards	National Standards	
			Primary Standards [a]	Secondary Standards [b]
Ozone (O_3)	8-hour	0.070 ppm	0.070 ppm [d]	0.070 ppm [d]
	1-hour	0.09 ppm	—	—
Carbon Monoxide (CO)	8-hour	9 ppm	9 ppm	—
	1-hour	20 ppm	35 ppm	—
Nitrogen Dioxide (NO_2)	Annual	0.030 ppm	0.053 ppm [c]	0.053 ppm [c]
	1-hour	0.18 ppm	0.1 ppm [c,g]	—
Sulphur Dioxide (SO_2)	24-hour	0.04 ppm	—	—
	3-hour	—	—	0.5 ppm
	1-hour	0.25 ppm	0.075 ppm [c,h]	—
Lead	30-day	1.5 µg/m^3	—	—
	Rolling 3-Month Average	—	0.15 µg/m^3	0.15 µg/m^3
Respirable PM (PM_{10})	Annual	20 µg/m^3	—	—
	24-hour	50 µg/m^3	150 µg/m^3 [e]	150 µg/m^3 [e]
Fine PM ($PM_{2.5}$)	Annual	12 µg/m^3	12 µg/m^3 [i]	15.0 µg/m^3 [i]
	24-hour	—	35 µg/m^3	35 µg/m^3

[a] National Primary Standards: Levels of air quality necessary with an adequate margin of safety to protect public health.

[b] National Secondary Standards: Levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[c] The national standards are reported here as ppm for the purposes of clearer comparison to the state standards.

[d] The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard.

[e] For PM_{10}, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one.

[f] For $PM_{2.5}$, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[g] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb (i.e. 0.100 ppm).

[h] To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb (i.e. 0.075 ppm).

[i] The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

Table 3-2 - South Coast Air Basin Attainment Status

Criteria Pollutant	Standard	Averaging Time	Designation
Ozone (O_3)	State (CAAQS)	1-hour standard	**Nonattainment**
	Federal (NAAQS)	8-hour standard	**Nonattainment** (Extreme)
	State (CAAQS)		**Nonattainment**
Carbon Monoxide (CO)	Federal (NAAQS)	1-hour standard	Attainment (Maintenance)
	State (CAAQS)		Attainment
	Federal (NAAQS)	8-hour standard	Attainment (Maintenance)
	State (CAAQS)		Attainment
Nitrogen Dioxide (NO_2)	Federal (NAAQS)	1-hour standard	Unclassifiable/Attainment
	State (CAAQS)		Attainment
	Federal (NAAQS)	Annual standard	Attainment (Maintenance)
	State (CAAQS)		Attainment
Sulphur Dioxide (SO_2)	Federal (NAAQS)	1-hour standard	Designations Pending (expect Unclassifiable/Attainment)
		24-hour standard	Unclassifiable/Attainment
		Annual standard	Unclassifiable/Attainment
Respirable Particulate Matter (PM_{10})	Federal (NAAQS)	24-hour standard	Attainment (Maintenance)
	State (CAAQS)		**Nonattainment**
	State (CAAQS)	Annual standard	**Nonattainment**
Fine Particulate Matter ($PM_{2.5}$)	Federal (NAAQS)	24-hour standard	**Nonattainment** (Serious)
	Federal (NAAQS)	Annual standard	**Nonattainment** (Moderate)
	State (CAAQS)		**Nonattainment**

3.3. California State Implementation Plan

If an area is designated as "non-attainment", states must develop a State Implementation Plan (SIP) that details the path to attain and maintain the NAAQS. A SIP consists of a compilation of rules, regulations, plans, programs, controls, agreements, technical documentation and guidelines which are required to reduce and control air pollutants within a state and achieve attainment.

California's SIP is a compilation of region-specific plans that detail how each area will meet the air quality standards. Many of these plans rely on the same core set of control strategies, including those aimed at reducing emissions from cars, heavy duty trucks, marine vessels, aircraft and locomotives, fuel standards, and limits on emissions from consumer products.

Once a local element of the plan is adopted by the air district (see below) and other responsible local agencies, it is sent to CARB for adoption and then formally submitted to the United States Environmental Protection Agency (US EPA) for approval as a revision to the California SIP.

3.4. South Coast Air Quality Management District

The 1977 Lewis Air Quality Management Act created the South Coast Air Quality Management District (SCAQMD) to help coordinate air quality management within Southern California. Under the act, renamed the Lewis-Presley Air Quality Management Act in 1988, SCAQMD is defined as the agency principally responsible for managing air pollution in the region. Specifically, SCAQMD is responsible for monitoring air quality, as well as planning, implementing, and enforcing programs designed to attain and maintain state and federal ambient air quality standards. Programs that were developed include air quality rules and regulations that regulate stationary sources, area sources, point sources, and certain mobile source emissions (e.g. to reduce emissions from mobile sources associated with new developments, commercial marine ports, rail yards and intermodal facilities, warehouse distribution centers and commercial airports)[4]. SCAQMD is also responsible for establishing stationary source permitting requirements and ensuring that new, modified, or relocated stationary sources do not create net emission increases.

3.5. Air Quality Management Plan

The federal CAA requires areas which are not attaining NAAQS to develop and implement an emission reduction strategy that will bring the area into attainment in a timely manner. The SCAQMD prepares air quality management plans (AQMPs) that provide the AAQS attainment strategy that are then approved by CARB as part of the SIP, which are then approved by US EPA. The latest SCAQMD AQMP, the 2016 Air Quality Management Plan[5], prepared by the SCAQMD in collaboration with the Southern California Association of Governments and the CARB, provides policies and control measures that aim to reduce emissions so as to attain both state and federal ambient air quality standards by their applicable deadlines (where relevant).

To ensure air quality goals will be met while maximizing benefits and minimizing adverse impacts to the regional economy, the following policy objectives guided the development of the 2016 AQMP:

- Eliminate reliance on future technologies measures to the maximum extent feasible;
- Calculate and take credit for co-benefits from other planning efforts;
- Develop a strategy with fair-share emission reductions at the federal, state, and local levels;
- Invest in strategies and technologies meeting multiple objectives regarding air quality, climate change, air toxics exposure, energy, and transportation;
- Identify and secure significant funding for incentives to implement early deployment and commercial-ization of zero and near-zero technologies;
- Enhance the socioeconomic analysis and pursue the most efficient and cost-effective path to achieve multi-pollutant and multi-deadline targets; and
- Prioritize enforceable regulatory measures as well as non-regulatory, innovative and “win-win” approaches for emission reductions.

US EPA recently approved portions of the SCAQMD 2016 AQMP’s $PM_{2.5}$ attainment plan but has yet to approve the 2016 AQMP’s ozone attainment plan.

Within the context of an AQMP, environmental review of individual projects within the SCAB must demon-strate that daily construction and operation emissions thresholds, as established by the SCAQMD, would not be exceeded. The environmental review must also demonstrate that individual projects would not increase the number or severity of existing air quality violations.

[4] SCAQMD has limited authority to regulate individual mobile sources (e.g. private cars), but work closely with CARB and US EPA, which have primary authority over mobile sources, to ensure mobile sources perform their fair share of pollution reduction responsibilities.

[5] South Coast Air Quality Management District (2017), Final 2016 Air Quality Management Plan. Available at http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan.

3.6. Air Quality Regulations and Agreements

Federal Regulations

The federal Clean Air Act (CAA) of 1963 and its subsequent amendments form the basis for the nation's air pollution control effort. The US EPA is responsible for implementing most aspects of the CAA. Basic elements of the act include the NAAQS for major air pollutants, hazardous air pollutant standards, attainment plans, motor vehicle emission standards, stationary source emission standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions.

The CAA delegates the enforcement of the federal standards to the states. In California, the CARB is responsible for enforcing air pollution regulations. In the SCAB, the SCAQMD has this responsibility.

General Conformity Rule

Section 176(c) of the CAA states that a federal agency cannot issue a permit for, or support an activity within, a nonattainment or maintenance area unless the agency determines it will conform to the most recent US EPA-approved State Implementation Plan (SIP). This means that projects using federal funds or requiring federal approval must not: (1) cause or contribute to any new violation of a NAAQS; (2) increase the frequency or severity of any existing violation; or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. The General Conformity Rule was updated in March 2010. The revisions to the General Conformity Rule no longer require a regional significance determination to demonstrate that emissions do not exceed 10 percent of the regional emissions inventory.

Based on the present attainment status of the SCAB, a federal action would conform to the SIP if its annual emissions remain below 100 tons of CO, PM_{10}, $PM_{2.5}$, or SO_X, or 10 tons of NO_X or VOC. These de minimis levels apply to both construction and operation activities that are part of a federally approved action. SCAQMD Rule 1901 adopts the guidelines of the General Conformity Rule.

For the Proposed Project, federal approval, specifically United States Army Corps of Engineers approval, is only required for the construction dredging and other construction activities occurring within navigable waters. Such activities apply to the Proposed Project's construction. There are no federal approvals required for the Project's operating activities; as such, operating emissions are not subject to the General Conformity regulation

IMO MARPOL Annex VI

The International Maritime Organization (IMO) adopted NO_X and SO_X limits in MARPOL (Marine Pollution) Annex VI to the International Convention for the Prevention of Pollution from Ships in 1997 and amended standards in 2008, including stricter standards for locations within Emissions Control Areas (ECAs). The West Coast of the United States is within the North American ECA (SO_X and NO_X ECA). US EPA has adopted these emissions standards (40 CFR Part 1043).

The NOx emissions standards apply to each marine diesel engine, operating on liquid or dual fuel, with a power output of more than 130 kW installed on a ship. There are three engine Tier NOx control levels (Tier I through Tier III, where Tier III only applies within NOx ECAs) based on the ship's keel laid date, where Tier III is required for ships whose keel's were laid on or after January 1, 2016. The maximum allowable NOx emissions standard, for medium speed diesel engines, such as those that supply primary power for propulsion and other auxiliary energy needs on cruise ships, are based on the engine maximum operating speed (n, in revolutions per minute [rpm]) The emissions standards limits by Tier for engines that operate at 500 rpm[6] are as follows:

[6] The Man V48/60CR and Man L48/60CR engines proposed for the Panorama have a maximum rpm of approximately 500.

- Tier I – 45 x $n^{-0.2}$, at n=500 rpm = 12.98 grams per kilowatt hour (g/kWh)
- Tier II – 44 x $n^{-0.23}$, at n=500 rpm = 10.54 g/kWh
- Tier III – 9 x $n^{-0.2}$, at n=500 rpm = 2.60 g/kWh

The Tier III NOx emissions standard represents an 80 percent emissions control improvement compared to the Tier I NOx emissions standard.

The SOx emissions limits are based on fuel sulfur content limits. The current fuel sulfur content limit in effect in ECAs is 0.1 percent sulfur.

Emission Standards for Marine Diesel Engines

In December 2009, the US EPA adopted revisions to the CAA engine program to include two additional tiers of NOx standards for new Category 1, 2, and 3 marine diesel engines installed on vessels flagged or registered in the United States (40 CFR Part 1042). The NOx limits for Category 3 engines are the same as those imposed for ECAs under IMO MARPOL Annex VI (40 CFR Part 1043). Additionally, this regulation includes emissions standards for hydrocarbons (HC) at 2.0 g/kW-hr and CO at 5.0 g/kW-hr from newer Category 3 engines (Tier II and higher). The US EPA did not adopt a standard for PM emissions for new marine 3 engines. However, significant PM emissions benefits will be achieved through the ECA fuel sulfur requirements that will apply to ships that operate in areas that affect United States air quality. The US EPA is also requiring engine manufacturers to measure and report PM emissions.

To reduce emissions from Category 1 (at least 50 horsepower] but less than 7 liters per cylinder displacement) and Category 2 (7 to 30 liters per cylinder displacement) marine diesel engines, the US EPA has established emission standards for new engines, referred to as Tier 2 marine engine standards. The Tier 2 standards were phased in from 2004 to 2007 (year of manufacture), depending on the engine size. The 2008 final rule includes the first-ever national emission standards for existing marine diesel engines, applying to engines larger than 600 kilowatts (kW) when they are remanufactured. The rule also sets Tier 3 emissions standards for newly built engines that are phasing in from 2009. Finally, the rule establishes Tier 4 standards for newly built commercial marine diesel engines above 600 kW, based on the application of high-efficiency catalytic after-treatment technology, phasing in beginning in 2014.

The new diesel marine engine standards will reduce emissions of DPM by 90 percent and emissions of NOx by 80 percent for engines meeting Tier 4 standards, in comparison with engines meeting the current Tier 2 standards. The US EPA's three-part program: (1) tightened standards for existing marine diesel engines when they are remanufactured, taking effect as certified remanufacture systems are available starting in 2008; (2) sets near-term emission standards, referred to as Tier 3 standards, for newly built locomotive and diesel marine engines, which reflect the application of currently available technologies to reduce engine-out PM and NOx emissions and phase-in starting in 2009; and (3) applies the final long-term Tier 4 emissions standards to marine diesel engines. These standards are based on the application of high-efficiency catalytic after-treatment technology and would be phased in beginning in 2014 for marine diesel engines. These marine Tier 4 engine standards apply only to commercial marine diesel engines above 600 kW (800 horsepower).

The US EPA has also finalized a change to the diesel fuel program, consistent with the IMO MARPOL Annex VI, which will allow for the production and sale of 1,000 ppm sulfur fuel for use in Category 3 marine vessels. In addition, these new fuel requirements, approved in 2010, forbid the production and sale of marine fuel oil above 1,000 ppm sulfur for use in most United States waters, unless the vessel employs alternative devices, procedures, or compliance methods that achieve equivalent emission reductions. This fuel standard applies starting in 2015 and covers all areas with the ECAs in United States waters. For this Project the entire shipping route within the South Coast Air Basin is within the North American ECA, where this ECA extends 200 nautical miles from the coast.

Carnival's cruise ships are not flagged or registered in the United States, but these standards would apply to the tugs used during project construction.

Emission Standards for Non-Road Diesel Engines

The US EPA has established a series of cleaner emission standards for new off-road diesel engines culminating in the Tier 4 Final Rule of June 2004. The Tier 1, Tier 2, Tier 3, and Tier 4 standards require compliance with progressively more stringent emission standards. Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category. Tier 2 standards were phased in from 2001 to 2006, and the Tier 3 standards were phased in from 2006 to 2008. The Tier 4 standards that require an additional 90 percent reduction in DPM and NOx compared against Tier 3 standards are currently being phased in starting with smaller engines in 2008 until all but the very largest diesel engines meet NOx and PM standards in 2015.

Non-Road Diesel Fuel Rule

In May 2004, the US EPA set sulfur limits for non-road diesel fuel. Under this rule, starting January 1, 2012, diesel fuel used by all non-road equipment (not including marine and aircraft fuel) would be limited to 15 ppm sulfur (0.0015%), which would be equivalent to the sulfur content restrictions of the California Diesel Fuel Regulations.

All Project off-road equipment is assumed to comply with the requirements of this rule.

Emission Standards for On-Road Trucks

To reduce emissions from on-road, heavy-duty diesel trucks, the US EPA established a series of cleaner emission standards for new engines, starting in 1988. These emission standards regulations have been revised over time and the latest effective regulation, the 2007 Heavy-Duty Highway Rule, provides for reductions in PM, NOx, and non-methane hydrocarbon emissions that were phased in during the model years 2007 through 2010.

State Regulations and Agreements

In California, the CARB is designated as the responsible agency for all air quality regulations. The CARB, which became part of the California Environmental Protection Agency (Cal-EPA) in 1991, is responsible for implementing the requirements of the federal CAA, regulating emissions from motor vehicles and consumer products, and implementing the California Clean Air Act of 1988 (CCAA). The CCAA outlines a program to attain the CAAQS for O_3, NO_2, SO_2, and CO by the earliest practical date. Since the CAAQS are often more stringent than the NAAQS, attainment of the CAAQS will require more emission reductions than what is required to demonstrate attainment of the NAAQS. Similar to the federal requirements, the State requirements and compliance dates are based on the severity of the ambient air quality standard violation within a region.

Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in a California Port

This regulation requires certain Ocean Going Vessel (OGV) fleet types, including cruise vessels, to operate at increasingly limited onboard auxiliary diesel engine power generation limits. This regulation, as of January 2017 requires at least 70 percent of a subject OGV fleet to meet onboard auxiliary diesel engine operation time limits. This regulation essentially requires shore power for 70 percent of the OGV fleets shore visits. This requirement will go up to 80 percent starting in January 2020.

Airborne Toxic Control Measure for Fuel Sulfur and other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline

This regulation, since 2014 has required any main engine or auxiliary boiler, while the vessel is operating in Regulated California Waters, with marine gas oil (MGO) with a maximum of 0.1% sulfur by weight or marine diesel oil (MDO) with a maximum of 0.1% sulfur by weight.

Airborne Toxic Control Measure for Commercial Harbor Craft

This regulation stipulates the US EPA marine engine tier requirements for replacement engines on existing harbor craft; and the requirement that new harbor craft meet the US EPA emissions standards for marine diesel engines that is in effect at the time of vessel acquisition.

In-Use Off-Road Vehicle Regulation

The State has also enacted a regulation for the reduction of DPM and criteria pollutant emissions from in-use off-road diesel-fueled vehicles (Cal. Code Regs., Title 13, Article 4.8, Chapter 9, Section 2449). This regulation provides target emission rates for PM and NO_X emissions from owners of fleets of diesel-fueled off-road vehicles, and applies to off-road equipment fleets of three specific sizes, as follows:

- Small Fleet – Fleet or municipality with equipment totaling less than or equal to 2,500 hp, or municipal fleet in lower population area, captive attainment fleet, or non-profit training center regardless of hp.
- Medium Fleet – Fleet with equipment totaling 2,501 to 5,000 hp.
- Large Fleet – Fleet with equipment totaling more than 5,000 hp, or all state and federal government fleets regardless of total hp.

The target emission rates for these fleets are reduced over time. Specific regulation requirements include:

- Limit on idling, requiring a written idling policy, and disclosure when selling vehicles;
- Require all vehicles to be reported to CARB (using the Diesel Off-Road Online Reporting System) and labeled;
- Restrict the addition of older vehicles into fleets starting on January 1, 2014; and
- Require fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing Verified Diesel Emission Control Strategies (i.e., exhaust retrofits).

The construction contractor(s) who complete the construction activities for the Proposed Project, including the Applicant if it uses its own off-road equipment fleet, would have to comply with the requirements of this regulation.

On-Road Heavy-Duty Diesel Vehicle (In-Use) Regulation

This regulation requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses must meet PM filter requirements beginning January 1, 2012. Lighter and older heavier trucks must be replaced starting January 1, 2015. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent.

Heavy Duty Diesel Truck Idling Regulation

This CARB air toxic control measure (ATCM) rule became effective February 1, 2005, was last revised in 2014. This rule and prohibits heavy-duty diesel trucks from idling their main engines or auxiliary power system engines for longer than five minutes at a time, unless they are queuing, and provided the queue is located beyond 100 feet from any restricted areas. Restricted areas are defined as "…any real property zoned for individual or multifamily housing units, schools, hotels, or motels, hospitals, senior care facilities or child care facilities, that has one or more of such units on it".

California Diesel Fuel Regulations

In 2004, the CARB set limits on the sulfur content of diesel fuel sold in California for use in on-road and off-road motor vehicles. Harbor craft and intrastate locomotives were originally excluded from the rule, but were later included by a rule amendment that was adopted in 2005. Under this rule, diesel fuel used in motor vehicles, except harbor craft and intrastate locomotives, has been limited to 500 ppm sulfur since 1993. The sulfur limit was reduced to 15 ppm (0.0015%) beginning on September 1, 2006. Diesel fuel used in harbor craft in the SCAB also was limited to 500 ppm sulfur starting January 1, 2006 and was lowered to 15 ppm sulfur on September 1, 2006.

Statewide Portable Equipment Registration Program (PERP)

The PERP establishes a uniform program to regulate portable engines and portable engine-driven equipment. Once registered in the PERP, engines and equipment may operate throughout California without the need to obtain individual permits from local air districts, as long as the equipment is located at a single location for no more than 12 months.

Assembly Bill (AB) 1807 – Air Toxics Program

AB 1807 established California's Air Toxics Program in 1983. The Air Toxics Program is a two-phased program for the identification and control of air toxics. During the first phase (identification), the CARB and the Office of Environmental Health Hazard Assessment prepare draft reports on exposure assessment and health assessment. The draft reports are then distributed for public review and comment. Comments can be made in writing or at public workshops. Reports are then submitted to the independent scientific review panel, which reviews the reports for scientific accuracy and submits its findings to the CARB. The scientific review panel is a nine-member group of professionals with backgrounds in disciplines such as medicine, atmospheric science, statistics, and toxicology. The members are appointed by the Governor or the State legislature. At a public hearing, the CARB decides whether to list the substance as a TAC.

Once the CARB identifies a substance as a TAC, the CARB begins the second phase (control) of California's TAC program. In this phase, an assessment is conducted to determine the need for, and degree of, further controls. As in the identification phase, public outreach is an essential element in the development of a control plan and any control measures. The CARB works with air districts and holds numerous public workshops and individual meetings with stakeholders in an open public process. If appropriate, each air toxic control measure is then adopted by the CARB at a public hearing.

SCAQMD Rules and Regulations

SCAQMD develops rules and regulations to regulate sources of air pollution in the SCAB, however SCAQMD's regulatory authority applies primarily to stationary sources. The emission sources associated with the Proposed Project are mobile sources and as such are, for the most part, not subject to the SCAQMD rules that apply to stationary sources, such as Regulation XIII (New Source Review), Rule 1401 (New Source Review of Toxic Air Contaminants) and Rule 431.2 (Sulfur Content of Liquid Fuels). However, several of SCAQMD's prohibition rules do apply to the Proposed Project as listed below.

SCAQMD Rule 401 – Visible Emissions

This rule prohibits discharge of air contaminants or other material, which are as dark or darker in shade as that designated No. 1 on the Ringelmann Chart or obscure an observer's view.

Rule 402—Nuisance

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

Rule 403—Fugitive Dust

This rule prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area that remains visible beyond the emission source property line. During proposed construction, best available control measures identified in the rule would be required to minimize fugitive dust emissions from proposed earth-moving and grading activities. These measures would include site watering as necessary to maintain sufficient soil moisture content.

Rule 1113— Architectural Coatings

This rule limits the VOC contents of paints applied to various surfaces that would be applicable to any construction painting operation.

Rule 1166— Volatile Organic Compound Emissions from Decommissioning of Soils

This rule sets requirements to control emissions from excavating, grading, handling and treating VOC-contaminated soils that may be encountered during Project construction. The Proposed Project site does not have known contamination issues. Regardless if VOC contaminated soils are discovered during Project construction, this rule would apply and the Project would have to comply with applicable parts of this rule.

Port of Long Beach Emissions Reduction Measures

The Port of Long Beach has approved emission control measures for various Port emissions sources, including marine vessels and drayage trucks. The following summarizes the POLB approved applicable emission reduction measures.

POLA/POLB Vessel Speed Reduction Program

In May of 2001, the POLB, Port of Los Angeles (POLA), US EPA Region 9, CARB, SCAQMD, the Pacific Merchant Shipping Association, and the Marine Exchange of Southern California signed a Memorandum of Understanding (MOU) to voluntarily reduce the speed of OGV to 12 knots or less within 20 nautical miles of Point Fermin. Reduction in speed demands less power on the main engine, which in turn reduces fuel usage and emissions. The Clean Air Action Plan (CAAP) adopted the Vessel Speed Reduction Program (VSRP) as control measure OGV1 and expands the program out to 40 nautical miles from Point Fermin.

POLB Clean Trucks Program (CTP)

On February 19, 2008, the POLB approved the POLB version of the Clean Trucks Program developed with the POLA and created as part of the CAAP. The POLB CTP required that all drayage trucks serving the Port met 2007 US EPA emissions standards by January 2012 through a series of progressive bans. Trucks registered in the Port Drayage Trucks Registry after October 1, 2018 are required to be 2014 model or newer. The heavy-duty trucks used for bulk material deliveries and export during construction would be required to comply with this program.

San Pedro Bay Ports Clean Air Action Plan

The Ports of Los Angeles and Long Beach, with the participation and cooperation of EPA, CARB, and SCAQMD staff, developed the San Pedro Bay Ports CAAP, a planning and policy document that sets goals and implementation strategies to reduce air emissions and health risks associated with port operations while allowing port development to continue[7]. In addition, the CAAP seeks to achieve a proportionate reduction in criteria pollutant emissions associated with port activities to make a “fair share” contribution to reduced regional emissions, thereby enabling the state and federal ambient air quality standards to be attained within the SCAB. Each individual CAAP measure is a proposed strategy for contributing towards these emission reduction goals. The ports approved the first CAAP in November 2006, with updates subsequently approved in 2010[8] and 2017[9]. Specific strategies to significantly reduce the health risks posed by air pollution from port-related sources include:

- Aggressive milestones with measurable goals for air quality improvements;
- Specific goals set forth as standards for individual source categories to act as a guide for decision-making;

[7] Port of Los Angeles / Port of Long Beach (2006), San Pedro Bay Ports Clean Air Action Plan.

[8] Port of Los Angeles / Port of Long Beach (2010), San Pedro Bay Ports Clean Air Action Plan 2010 Update.

[9] Port of Los Angeles / Port of Long Beach (2017), San Pedro Bay Ports Clean Air Action Plan 2017 Update.

- Technology advancement programs to reduce emissions; and
- Public participation processes with environmental organizations and the business communities.

The CAAP focuses primarily on reducing emissions of Diesel Particulate Matter (DPM), as well as NO_X and SO_X emissions, and more recently GHG emissions. DPM reduction reduces emissions and health risks, thereby allowing for future port growth while progressively controlling associated impacts. The CAAP includes emission control measures as proposed strategies that are designed to further these goals, expressed as Source-Specific Performance Standards, which may be implemented through the environmental review process, or could be included in new leases or port-wide tariffs, MOUs, voluntary action, grants, or incentive programs.

The 2010 CAAP Update adopted in November 2010 include updated and new emission control measures as proposed strategies that support the goals expressed as the Source-Specific Performance Standards and the Project-Specific Standards. In addition, the 2010 CAAP Update included emission reduction targets and a health risk reduction goal (which remain unchanged in the 2017 CAAP Update). Ongoing port-wide CAAP progress and effectiveness is measured against these, which consist of the following reductions as compared to 2005 emissions levels:

- Health Risk Reduction Standard: 85 percent reduction in DPM by 2020.
- Emission Reduction Standards:
  - By 2014, reduce emissions by 72 percent for DPM, 22 percent for NO_X, and 93 percent for SO_X; and
  - By 2023, reduce emissions by 77 percent for DPM, 59 percent for NO_X, and 93 percent for SO_X.

The bulk of the 2017 CAAP Update strategies are designed to significantly advance the push toward zero emissions in support of the GHG reduction goals set by the State and the mayors of Long Beach and Los Angeles. To that end, the 2017 CAAP Update incorporates two new emission reduction targets:

- Reduce GHGs from port-related sources to 40% below 1990 levels by 2030; and
- Reduce GHGs from port-related sources to 80% below 1990 levels by 2050.

The goals set forth as the Source-Specific Performance Standards of the CAAP address a variety of port-related emission sources - ships, trucks, trains, Cargo Handling Equipment (CHE), and harbor craft and outline specific strategies to reduce emissions from each source category. The Source-Specific Performance Standards are detailed in Section 2 of the 2010 CAAP Update, and the applicable emission control measures detailed in Section 4 of the 2010 CAAP Update).

The 2010 CAAP Update also identified Air Quality Best Management Practices (BMPs) common to the San Pedro Bay Ports to reduce emissions from port-related construction activities. Each port has adopted BMPs that are evaluated on a project-specific basis. Applicable practices are incorporated into construction bid specifications and/or as mitigation measures or environmental special conditions. The following construction BMPs would apply to the Project:

- Use of electric powered dredging equipment
- Use of Tier 4 off-road construction equipment
- On-road heavy trucks must meet the requirements of the Clean Truck Program
- Full compliance with SCAQMD Rule 403, Fugitive Dust, including an approved Dust Control Plan.
- Compliance with all CARB engine idling time restrictions.

The following operation CAAP source specific performance standards and other regulations continue to apply to the Project:

- Clean Truck Program compliance (Port)
- Vessel Speed Reduction Program (as agreed to by Carnival on voluntary basis)
- Fuel sulfur limit compliance within North America ECA (US EPA)
- Compliance with CARB Shore Power Regulations.

POLB Green Port Policy

In November 2004, the Board of Harbor Commissioners directed Staff to develop a policy that would build on the existing Healthy Harbor Program to encompass wide-ranging environmental goals. In January 2005, the Board of Harbor Commissioners adopted the Green Port Policy, which serves as a guide for decision-making and establishes a framework for environmentally friendly Port operations. The goal of the air quality program element of the POLB Green Port Policy is to reduce harmful air emissions from Port-related activities[10].

3.7. Greenhouse Gas (GHG) Regulations

Federal Regulations

The U.S. government administers an array of programs designed to reduce U.S. GHG emissions. These programs focus on energy efficiency, renewable energy, non-CO_2 gases, and implementation of technologies designed to achieve GHG reductions[11].

The 2007 U.S. Supreme Court decision in Massachusetts et al. v. US EPA (549 U.S. 497 2007) gave the US EPA authority to regulate GHGs as air pollutants under the federal Clean Air Act (CAA). In addition, the US EPA implements several programs that serve to reduce GHG emissions.

Clean Air Act

Under the provisions of the CAA, US EPA has promulgated performance standards and emissions guidelines to focus on reducing GHG emissions from stationary sources, and to cover large stationary sources of GHG in the Prevention of Significant Deterioration Permit Program, and the federal operating permits program. Additionally, the US EPA implements the Mandatory GHG Reporting rule applicable to stationary sources. However, because the emissions sources associated with the Proposed Project are primarily mobile on-road vehicles and off-road equipment, the US EPA's regulations directed at mobile sources are of primary interest for this document.

Heavy Duty Vehicle National Program

In September 2011, the US EPA and the National Highway Traffic Safety Administration (NHTSA) developed the Heavy Duty Vehicle National Program, which was designed to reduce fuel consumption (and GHG emissions by association) from medium- and heavy-duty vehicles. The program was directed at model year 2014-2018 vehicles and is projected to reduce GHG emissions by approximately 270 million metric tons (MT).

In August 2016, the US EPA and the NHTSA adopted Phase 2 of the Heavy Duty Vehicle National Program. Phase 2 aims to set performance-based standards that would be met through wider deployment of existing and advanced technologies. For diesel engines, the proposed standards would begin for model year 2018 engines and phase in through 2027. Phase 2 is expected to reduce GHG emissions by an additional 10 percent.

Renewable Fuel Standard

The US EPA's Renewable Fuel Standard (RFS) established the first renewable fuel volume mandate in the U.S. in 2005. The original RFS program required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012. The program was expanded in 2007 and currently requires that 36 billion gallons of renewable fuel be blended into gasoline by 2022.

[10] Long Beach Harbor Department (2005), Green Port Policy - "White Paper".

[11] Currently US EPA is attempting to amend/roll-back a few of the regulations noted below, but the regulations as described were still in force at the time of the completion of this technical appendix.

Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards

In May 2010, the US EPA and the NHTSA developed a program designed to reduce fuel consumption (and GHG emissions by association) from light-duty vehicles. The program was directed at model year 2012-2016 vehicles and is projected to reduce GHG emissions by approximately 960 million MT.

In October 2012, the US EPA and the NHTSA expanded the program to vehicle model years 2017 through 2025.

IMO MARPOL Annex VI

The IMO MARPOL Annex VI standards, adopted by US EPA, include energy efficiency standards, which include two mandatory mechanisms intended to ensure an energy efficiency standard for regulated ships types above 400 gross tonnage:

- The Energy Efficiency Design Index (EEDI), which is a performance design measure that requires certain minimum energy efficiencies in new ships.
- The Ship Energy Efficiency Management Plan (SEEMP), which establishes mechanisms for operators to improve the operating energy efficiencies of ships.

Phase 1 requirement of the EEDI regulation for cruise ships[12] is triggered by actions (build contract or keel laying or delivery dates) occurring between 2015 and 2019. Phase 2 and 3 is triggered by keel laying date and start January 1, 2020 and January 2, 2025, respectively. The SEEMP has been required since January 1, 2013 for all regulated ship types over 400 gross tonnage.

Increases in ship efficiency reduce fuel use and resulting GHG emissions. The IMO is continuing to work on GHG emissions reductions from international shipping and has developed an initial IMO strategy that seeks to reduce total annual GHG emissions by at least 50% by 2050 compared to 2050; and strengthen the energy efficiency design requirement for ships to reduce CO_2 emission per transport work by at least 40% by 2030 and by 70% by 2050 compared to 2008 levels.

State Regulations

California Governor's Executive Orders on GHG Emissions

The California Governor's Executive Order S 3 05 (June 2005) declared California's particular vulnerability to climate change and sets a target of an 80 percent reduction of California greenhouse gas emissions from 1990 levels by 2050 and a target to achieve 1990 levels by 2020. In response to Executive Order S 3 05 and increasing societal concern about the effects of climate change, the California Legislature enacted California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32). In passing the bill, the California Legislature found that:

> *Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems [HSC Section 38501, Division 25.5, Part 1].*

In September 2018, Executive Order B-55-18 established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter. The CARB was directed to develop the framework for implementing the goal of carbon neutrality. Executive Order B 30 15 (April 2015) established a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. One purpose of this interim target is to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050. This executive order also specifically

[12] Defined as "Cruise ship with non-conventional propulsion", where diesel-electric engines are considered a non-conventional propulsion.

addresses the need for climate adaptation and directs state agencies to update the California Climate Adaptation Strategy to identify how climate change will affect California infrastructure and industry and what actions the state can take to reduce the risks posed by climate change. Senate Bill 32 (SB 32) of 2016 codified the GHG emissions target to 40 percent below the 1990 level by 2030.

California Renewables Portfolio Standard (RPS) Program

Electric utilities in California must procure a minimum quantity of the sales from eligible renewable energy resources as specified by RPS requirements. The Clean Energy and Pollution Reduction Act of 2015 (SB 350), signed into law on October 7, 2015, established California's state policy objectives on long-term energy planning and procurement. The 100 Percent Clean Energy Act of 2018 [Senate Bill 100 (SB 100)] revised the RPS targets to establish the policy that eligible renewable energy resources and zero-carbon resources supply 100 percent of retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045. With SB 350 and SB 100, California's renewable energy objectives include:

- To set the Renewable Portfolio Standard (RPS) for the procurement of California's electricity from renewable sources at 33 percent by 2020, 50 percent by 2026, and 60 percent by 2030;
- To plan for 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045; and
- To double the energy efficiency savings in electricity and natural gas end uses by retail customers by 2030.

The indirect GHG emissions from residential, commercial, and industrial electricity use will be reduced over time as utilities obtain increasing amounts of renewable energy.

AB 32 Climate Change Scoping Plan and Scoping Plan Updates

With AB 32, the 2020 GHG emissions reduction goal became law and requires California to maintain and continue reductions beyond 2020. AB 32 also directed the CARB to develop regulations and market mechanisms to reduce GHG and prepare a scoping plan to identify how best to reach the 2020 limit. The initial AB 32 Climate Change Scoping Plan identified the strategies for achieving the maximum technologically feasible and cost-effective GHG reductions by 2020, and to maintain and continue reductions beyond 2020. The first statewide AB 32 Scoping Plan was adopted by CARB in December 2008, and the CARB approved the First Update to the Scoping Plan in May 2014.

The 2017 Scoping Plan Update, approved on December 14, 2017, provides the strategy for achieving California's 2030 GHG emissions reduction target that was approved in SB 32. The major statewide emission reduction programs approved through these scoping plans includes the following:

- Double building efficiency
- 50% renewable power
- More clean, renewable fuels
- Cleaner and zero or near zero emissions cars, trucks, and buses
- Walkable/bikeable communities with transit
- Cleaner Freight and goods movement
- Slash potent "super-pollutants" from dairies, landfills, and refrigerants
- Cap emissions from transportation, industry, natural gas, and electricity
- Invest in communities to reduce emissions

These statewide programs wouldn't currently be directly applicable to the Proposed Project, but new requirements stemming from these programs could eventually influence the project GHG emissions directly or indirectly. Specifically, programs aiming to reduce the GHG emissions of producing transportation fuels or electricity and programs to improve energy efficiency would reduce the indirect GHG emissions of energy used by cars, trucks, and ships.

CARB Mandatory Reporting of Greenhouse Gas Emissions

The CARB Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, or mandatory reporting rule (MRR), applies to entities within certain regulated source categories, including refineries that provide California's supply of transportation fuels. Supplies of transportation fuels must report the GHG emissions resulting from the end-use combustion of the fuels, although fuels for use outside California and for aviation or marine use are excluded from the reporting of end-use GHG emissions [17 CCR 95121(a)(2)].

CARB Cap-and-Trade Program

The California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Trade Program) was approved by CARB in October 2011. The Cap-and-Trade Program applies to covered entities that fall within certain source categories, including petroleum refineries and fuel suppliers. Fuel suppliers became covered on January 1, 2015 and have a compliance obligation for the annual combustion emissions of the fuels delivered to end-users in California [17 CCR 95852(d)] that are not otherwise covered entities in the Cap-and-Trade Program, as demonstrated by quantities gathered through mandatory reporting. Since the Cap-and-Trade obligation applies to emissions quantified through the MRR, similar to the MRR, fuels for use outside California and for aviation or marine use are excluded from the Cap-and-Trade Program. The current version of the program, effective October 1, 2017, extends major elements beyond 2020 to continue reducing emissions and reduce the overall cap towards the 2030 target.

Local Regulations

City of Long Beach Construction and Demolition Recycling Program

The City of Long Beach Construction and Demolition Recycling Program, set forth in Municipal Code Section 18.67.090, encourages the use of green building techniques in new construction and promotes reuse or salvaging of recyclable materials in demolition, deconstruction, and construction projects. Much of the construction and demolition debris, which represents an estimated 22 percent of the total disposed waste stream in local landfills, can be reused or recycled, conserving natural resources and saving valuable landfill space. In response to State-mandated waste reduction goals, and as part of the City's commitment to sustainable development, the City adopted an ordinance that requires certain demolition and/or construction projects to divert at least 60 percent of waste either through recycling, salvage, or deconstruction.

City of Long Beach, Sustainable City Action Plan (2010)

The City of Long Beach, Sustainable City Action Plan is intended to guide operational, policy, and financial decisions to create a more sustainable Long Beach. Although the plan is mostly focused on city property, buildings and public transportation, some elements are indirectly relevant to the Project activities, such as:

- Action 1 of Transportation Initiative 4 that seeks to reduce emissions from Port mobile sources through implementing mitigation incentive measures to modernize fleets, retrofit older engines, and use cleaner fuels.

Port of Long Beach Green Port Policy (2005)

The POLB Green Port Policy includes initiatives that reduce emissions of criteria pollutants and TAC from operations at the Port. Many of these measures also result in GHG emission reductions.

San Pedro Bay Ports Clean Air Action Plan (2006) and Updates (2010 and 2017)

As a means to implement the Green Port Policy, POLB, in conjunction with the Port of Los Angeles (POLA), and with guidance from the South Coast Air Quality Management District (SCAQMD), CARB, and US EPA, adopted the Clean Air Action Plan (CAAP) on November 20, 2006, and updated the CAAP in 2010 and 2017.

The CAAP focuses on reducing emissions with two main goals:

- Reduce Port-related air emissions in the interest of public health; and
- Accommodate growth in trade.

Although the focus of the CAAP is on pollutants that affect localized public health risk, some of the measures implemented under the CAAP (in particular, the best management practices aimed at reducing construction emissions) also have the associated benefit of reducing GHG emissions from operations at the San Pedro Bay Ports (i.e., POLB and POLA).

Port of Long Beach Framework to Reduce Greenhouse Gas Emissions

The Port's commitment to protecting the environment from the harmful effects of Port operations, as stated in the Green Port Policy, addresses the development of programs and projects to reduce GHG emissions. In September 2008, the Port's Board of Harbor Commissioners (BHC) adopted a formal resolution establishing a framework for reducing GHG emissions. The framework outlined efforts that are already underway at the Port toward addressing the issue of climate change:

- The Port collaborated with other City departments to produce the City's first voluntary GHG emissions inventory (calendar year 2007), which was submitted to the California Climate Action Registry (CCAR), and continues to develop an annual inventory of GHG emissions as the Harbor Department. The CCAR has since transitioned over to The Climate Registry.
- The Port joined other City departments in preparing a plan to increase energy efficiency in City-owned facilities, in turn reducing indirect GHG emissions from energy generation. This initiative is known as the SCE 2009-2011 Local Government Partnership.
- In February 2010, the City of Long Beach (COLB) adopted the Long Beach Sustainable City Action Plan that includes initiatives, goals, and actions that will move Long Beach toward becoming a sustainable city. The Sustainable City Action Plan includes initiatives to reduce the City's carbon footprint and sets a goal to reduce GHG emissions from City facilities and operations 15 percent by 2020, relative to 2007 levels.
- The Port participates in tree planting and urban forest renewal efforts through its support of the COLB's Urban Forest Master Plan. Tree planting reduces GHG emissions by sequestering CO_2.
- Port staff consulted with the Long Beach Gas and Oil Department and Tidelands Oil Production Company to evaluate potential opportunities for capturing CO_2 produced by oil operations in the Harbor District and re-injecting (sequestration) it through wells at the Port back into the subsurface formations.
- Beginning with the 2006 POLB air pollutant emissions inventory, GHG emissions from ocean-going vessels, heavy-duty trucks, cargo-handling equipment, harbor craft, and locomotives are quantified.
- The Port's Renewable Energy Working Group has developed strategies to expand the use and production of renewable energy at the Port. Criteria for emerging technologies will be established so that the technologies can be evaluated in a manner similar to the existing CAAP Technology Advancement Program.
- The Port's Renewable Energy Working Group finalized a Solar Energy Technology and Siting Study (Solar Siting Study) that reviewed available solar technologies and the estimated solar energy generation potential for the entire Harbor District. The study determined that there are many sites within the Harbor District where solar energy technologies could be developed on building rooftops and at ground level.
- Based on the Solar Siting Study, Port staff is developing a program to provide incentive funding to Port tenants for the installation of solar panels on tenant-controlled facilities.
- In May 2013, the Port's BHC adopted the POLB Energy Policy to guide efforts to secure a more sustainable and resilient supply of power as demand grows. Under the Energy Policy, the Port will implement measures to increase efficiency, conservation, resiliency, and renewable energy in collaboration with various groups, including port tenants, utilities, other City departments, industry stakeholders, labor unions, universities, and the POLA.

The Port is developing a Greenhouse Gas Strategic Plan (GHG Plan). This plan will examine GHG impacts for all activities within the Harbor District and will identify strategies for reducing the overall carbon footprint of those activities. Similar to the CAAP, the Port's GHG Plan will identify strategies for activities under direct Port control and those that are controlled by third parties, such as tenants. The GHG Plan will also be used to mitigate potential project-specific and cumulative GHG impacts from future projects through modernization and/or upgrading of marine terminals and other facilities in the Harbor District.

Port of Long Beach Community Grants Program (2009 and 2016)

In 2009, the Port launched its Community Mitigation Grants Programs to reduce impacts arising from new development projects. Since establishing the Community Mitigation Grant Programs, the Port has funded nearly 120 community-based mitigation projects.

In 2016, the Port developed the Community Grants Program (CGP) to improve community health and reduce GHG emissions by lessening the impacts of Port-related air pollution. The CGP builds upon the 2009 Community Mitigation Grants Program by providing additional funding for community-based mitigation. The CGP allocates $46.4 million over the next 12 to 15 years in three categories: Community Health; Facility Improvements; and Community Infrastructure. The new program builds upon the $17.4 million the Port has awarded to community groups under the initial version of the Port's Community Mitigation Grants Program. An Investment Plan for the Community Grants Program identifies the framework for the Community Grants Program and defines grant funding monetization.

The CGP and Investment Plan (2016) establish the framework for the CGP, define grant funding monetization, and describe the procedures used by the Port to select emission reduction projects as mitigation.

Climate Adaptation and Coastal Resiliency Plan

The POLB has developed a Port-wide Climate Adaptation and Coastal Resiliency Plan (CRP) that will enable the Port to begin preparing for climate change and associated coastal hazards. Specifically, the CRP will provide a framework for identifying and managing risks associated with climate change in the Port's geographic jurisdiction (City of Long Beach Harbor District). The primary climate stressors evaluated for the study are sea level rise (SLR), storm surge, changes in precipitation, extreme temperatures, extreme winds, and ocean acidification. The CRP includes a climate science review, inventory of all Port assets, GIS mapping of projected SLR, storm surge and precipitation analyses, Port asset vulnerability profiles, and robust adaptation strategies. These strategies range from incorporating climate language into existing Port policies and plans to the actual conceptual design of physical structures to protect the Port from SLR and flooding.

Key components of the CRP include:

- A framework for the Port to incorporate adaptive measures related to projected climate change into its policymaking and planning processes, environmental documents, infrastructure design, and construction practices.
- Protecting the built environment of the Port, as the Port's terminals and associated goods movement infrastructure are critically important economic assets for the region.
- Requiring the engagement of all Port divisions and tenants, as well as industry, regulatory, and community stakeholders, in the Port's climate change preparedness efforts.
- Providing a framework for identifying and managing risks associated with climate change in the Harbor District to ensure resiliency and business continuity of Port operations, the supply chain, and other businesses that depend on the Port.

4. Affected Environment

4.1. Environmental Setting

4.1.1. South Coast Air Basin (SCAB)

The Proposed Project is located in the City of Long Beach, which in turn lies within the SCAB, which covers the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties and Orange County. SCAQMD is responsible for regulating air quality within the SCAB. The SCAB includes large coastal plain area with connecting broad valleys and low hills, bounded by the Pacific Ocean to the south and southwest and mountains to the north. Coastal areas of the SCAB have a mild climate, often tempered by cool sea breezes. This usually mild coastal weather pattern is occasionally, interrupted by periods of hot weather, winter storms, and Santa Ana winds.

The annual average temperature varies little in the coastal areas of the SCAB, ranging from the low to mid 60s, measured in degrees Fahrenheit (°F). Coastal areas show more moderation in annual minimum and maximum temperatures than inland areas due to the more pronounced influence of the Pacific Ocean. Average 2018 annual temperatures reported in Long Beach show a low of 55.4°F in January while the average high is 74.2°F in August. Rainfall is seasonal, with over 90 percent of all measured rain falling from November through April. Summer rainfall tends to occur in the form of scattered thundershowers in coastal areas and slightly heavier showers in the east and mountain regions. Annual rainfall averages 12.25 inches per year in the Proposed Project area[Error! Bookmark not defined.].

Although the SCAB has a semi-arid climate, the air near the earth's surface at the project site is normally moist due to the presence of a shallow marine layer. Except for infrequent periods when dry, continental air is brought into the SCAB by offshore winds, this "ocean effect" is dominant. Periods of heavy fog in the project area are common, and low clouds are a characteristic climatic feature.

Wind patterns in the project site area are characterized by strong southerly or south-westerly onshore winds during the day and weaker more variable offshore winds at night. Summer winds on average have a higher speed and are much more predominately onshore than winter winds.

4.2. Air Pollutants of Concern

Ambient air pollutants emitted from stationary and mobile sources are regulated by both federal and state law and can be categorized as primary or secondary pollutants. Primary pollutants are emitted directly from a source, while secondary pollutants form when other pollutants (primary pollutants) react in the atmosphere. Carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NO_X), sulfur dioxide (SO_2), coarse inhalable particulate matter (PM_{10}), fine inhalable particulate matter ($PM_{2.5}$), and lead (Pb) are primary air pollutants. Of these, CO, SO_2 PM_{10}, and $PM_{2.5}$ are "criteria air pollutants", which means that ambient air quality standards (AAQS) have been established for them. VOC and NOx are criteria pollutant precursors that form secondary criteria pollutants through chemical and photochemical reactions in the atmosphere, namely ozone (O_3) and nitrogen dioxide (NO_2), for which NAAQS have also been established.

4.2.1. Carbon Monoxide (CO)

CO is a colorless and odorless gas produced by the incomplete combustion of carbon, such as contained within diesel and gasoline. CO is primarily emitted from motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains. In the SCAB mobile sources create over 90 percent, and on-road mobile over 55 percent, of the CO emissions within the air basin. CO concentrations tend to be highest during winter mornings when wind speeds are low and temperature inversions trap the pollutant at ground levels. Ambient CO concentrations are generally highest near traffic-congested corridors and intersections. Adverse health effects of CO include interference with normal oxygen transfer to the blood, which can result

in tissue oxygen deprivation. As shown in Table 3-1 the SCAB is designated as an attainment area for CAAQS and NAAQS for CO. In addition, Table 4-1 and

Table 4-2 show that CO concentrations in the Proposed Project area have not exceeded federal or state standards in the three years 2015 to 2017.

4.2.2. Volatile Organic Compounds (VOC)

VOCs are compounds composed primarily of carbon and hydrogen atoms, often associated with emissions generated by the internal combustion processes during motor vehicle use. VOCs can also be generated though evaporative emissions from the use of paints and solvents, the application of asphalt paving and household and consumer products such as aerosols. Ambient air quality standards are not established for VOCs, nor does SCAQMD directly monitor VOCs, however due to their contribution to the formation of the secondary pollutant ozone, the SCAQMD has established a significance threshold for this pollutant (shown in **Error! Reference source not found.**). Other than de minimis emission levels defined under 40 CFR 93 § 153[13] (i.e. the minimum threshold for which a conformity determination must be performed, for various criteria pollutants in various areas), there are no specific state or federal VOC thresholds, as they are regulated by individual air districts as ozone precursors.

4.2.3. Oxides of Nitrogen (NO_X)

Oxides of nitrogen are the product of fuel combustion and contribute to the secondary formation of ozone, PM_{10}, and $PM_{2.5}$. The two major forms of NOx are nitric oxide (NO) and nitrogen dioxide (NO_2). The formation of NO_2 occurs directly as a combustion product and when NO, which is the predominate initial form of NOx emitted from fuel combustion, reacts with oxygen or ozone. In the daytime NO_2 contributes to the formation of ozone (and NO) through photochemical reactions, while at night ozone oxidizes NO back to NO_2. The health effects of NO_2 are more pronounced than that of NO, which unlike NO_2 does not have an ambient air quality standard. NO_2 absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility, while NO is a colorless, odorless gas. As presented in Table 3-2 , the SCAB is designated as an attainment (maintenance) area for NO_2 under the National AAQS and attainment under the California AAQS. Monitored concentrations of NO_2 closest to the Proposed Project site are presented in Table 4-1 and

Table 4-2, which indicate that levels of NO_2 have not exceeded federal or state AAQS in the three years 2015 to 2017.

4.2.4. Sulfur Dioxide (SO_2)

SO_2 is a colorless gas formed primarily during the combustion of sulfur-containing fossil fuels. Major sources of SO_2 in the SCAB include fuel combustion in power plants, other stationary sources such as petroleum refineries, and mobile sources. Emissions and concentrations of SO_2 have reduced significantly in recent years following the introduction of increasingly stringent controls on stationary source emissions of SO_2, primarily through the reduction in the use of high sulfur fuels, and limits on the sulfur content of mobile source fuels, including diesel and fuel oils used in ocean-going vessels. SO_2 is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. As identified in Table 4-1 and

Table 4-2, monitored SO_2 concentrations in the vicinity of the Proposed Project have not exceeded federal or state standards in the three years 2015 to 2017.

4.2.5. Coarse Particulate Matter (PM_{10})

Particulate matter (PM) consists of liquid and solid particles floating in air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industrial and vehicular sources undergo chemical reactions in the atmosphere. Inhalable particulate matter, or PM_{10},

[13] https://19january2017snapshot.epa.gov/general-conformity/de-minimis-emission-levels_.html

refers to particles with an aerodynamic diameter of less than 10 micrometers. Major sources of PM_{10} within the SCAB include; dust stirred up by vehicles traveling on roads, dust from construction, cooking, windblown dust from open lands and storage piles, and atmospheric chemical and photochemical reactions. Once inhaled, PM_{10} particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. PM_{10} can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. The SCAB is currently a nonattainment area for both 24-hour and annual CAAQS for PM_{10}, but is in attainment/maintenance of the 24-hour NAAQS. As presented in Table 4-1 and

Table 4-2, the state PM_{10} standards were exceeded at the Super Block monitoring site in the three 3 years 2015 to 2017, as well as at the Navy Mole/Gull Park Outer Harbor monitoring site (except for the 24-hour CAAQS in 2015).

4.2.6. Fine Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is liquid and solid particles with an aerodynamic diameter of less than 2.5 micrometers. Dominant sources of $PM_{2.5}$ in the SCAB are from fuel combustion such as motor vehicles, power generation, industrial facilities, cooking, paved road dust, residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ is formed through complex reactions in the atmosphere from gases, such as SO_2, NO_X, VOC, and ammonia. Very small particles of substances, such as lead, sulfates, and nitrates, within the $PM_{2.5}$ size fraction, can cause lung damage directly. These substances can be absorbed into the blood stream and cause damage elsewhere in the body. These substances can transport absorbed gases, such as chlorides or ammonium, into the lungs and cause injury. $PM_{2.5}$ is sufficiently small as to penetrate deeper than PM_{10} particles into the lungs, and damage lung tissues. The SCAB is designated as a 'serious nonattainment' area for the 24-hour NAAQS for $PM_{2.5}$ as a 'moderate nonattainment' area for the annual NAAQS for $PM_{2.5}$ and a nonattainment area for the annual CAAQS for $PM_{2.5}$. As identified in Table 4-1 and

Table 4-2, both state and federal $PM_{2.5}$ standards were achieved at the Super Block and Navy Mole/Gull Park Outer Harbor monitoring sites in the three years 2015 to 2017.

Secondary $PM_{2.5}$ Formation

Primary particles are emitted directly into the atmosphere by fossil fuel combustion sources, windblown soil and dust, and sea spray. Secondary $PM_{2.5}$ forms in the atmosphere by complex reactions of precursor emissions of gaseous pollutants, such as nitrogen oxides (NO_X), sulfur oxides (SO_X), volatile organic compounds (VOCs), and ammonia. Secondary $PM_{2.5}$ includes sulfates, nitrates, and complex carbon compounds.

Project-generated emissions of NO_X, SO_X, and VOCs would contribute to secondary $PM_{2.5}$ formation some distance downwind of the emission sources. However, since it is hard to predict secondary $PM_{2.5}$ formation from an individual project, the air quality analysis in this Technical Report focuses on the effects of direct $PM_{2.5}$ emissions generated by the Project.

Ultrafine Particles

Traditionally, health concerns and air quality standards for particulates have been focused on respirable particulate matter (i.e., PM_{10}) and fine particulate matter (i.e., $PM_{2.5}$). However, more recently there has been an increased level of interest in the smallest size fraction of particulate matter, referred to as ultrafine particles (UFP). UFP are generally defined as ambient air particles less than or equal to 0.1 µm in diameter (100 nanometers). Due to their small size and cumulative mass, UFP generally contribute a small fraction of the ambient concentrations of either PM_{10} or $PM_{2.5}$ (it takes approximately 15,000 UFP to equal the mass of a single $PM_{2.5}$ particle, and 1,000,000 UFP to equal the mass of a single PM_{10} particle). However, UFP are very numerous, particularly in urban atmospheres. For example, typical urban air contains 10,000 to 40,000 UFP/cubic centimeters (cm^3), while near highways there can be between 40,000 and 1,000,000 UFP/cm^3. UFP are not routinely measured in the United States, and there are no regulatory standards that address this category. The 2007 AQMP of the SCAQMD recommends that UFP issues be considered in

PM and air toxics control strategies and the 2012 AQMP has an entire chapter focused on UFP and near-roadway exposure (Chapter 9)[14].

In the urban environment, motor vehicles are a major source of UFP, and for that reason they are found in high numbers near highways. Measurements have shown that there is a sharp drop in UFP within 100 to 300 meters downwind of freeways, due to particle growth and accumulation processes in the atmosphere after they have been emitted from vehicles. Consequently, high particle concentrations are localized and tend to exhibit large geographical and temporal variations. Current research is underway to better characterize emissions and ambient levels of UFP in the environment. Other categories of internal combustion engines used in Port operations, such as trains and ships, may also be significant sources of UFP.

The high numbers of UFP found in the environment, especially in areas such as highways, have recently raised concerns about their health effects. There are two primary reasons for these concerns: (1) studies have shown that smaller particles, which tend to absorb higher fractions of trace metals and organic compounds because of their relatively high surface area, can be inhaled and deposited deeper into the lungs than larger particles; and, (2) UFP can be more easily transported from the lungs into the body, potentially increasing exposure to these particles and contaminants adsorbed on the particles. Information on UFP is limited at this time and is an area of active research.

4.2.7. Ozone (O_3)

Ozone is a pale blue gas that is formed when VOC, which includes reactive organic gases (ROG), reacts with atmospheric NO_X in the presence of ultraviolet sunlight. Ozone is therefore a secondary pollutant formed by complex interactions of two pollutants directly emitted into the atmosphere. The primary sources of ROG and NO_X are automobile exhaust and industrial sources. Meteorology and terrain play major roles in ozone formation. Ideal conditions occur during summer and early autumn, on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies. Short-term exposure (lasting for a few hours) to ozone at levels typically observed in the SCAB can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. The SCAB has been designated as an extreme nonattainment area for 1-hour and 8-hour NAAQS for ozone and a nonattainment area for CAAQS for ozone. As presented in Table 4-1 and Table 4-2, 1-hour and 8-hour ozone standards were however achieved at the Super Block and Navy Mole/Gull Park Outer Harbor monitoring sites in the three years 2015 to 2017.

4.2.8. Toxic Air Pollutants

TACs are compounds that are known or suspected to cause adverse long-term (cancer and chronic) and/or short-term (acute) health effects. TACs are emitted from mobile sources, including diesel particulate matter (DPM); industrial processes and stationary sources, such as dry cleaners, gasoline stations, paint and solvent operations; and stationary fossil fuel-burning combustion. The SCAQMD estimates in the Multiple Air Toxics Exposure Study IV[15] (MATES IV) that approximately 80 percent of the background airborne air toxics risk in the SCAB is due to diesel exhaust. Due to the prevalence of diesel-powered sources associated with operations at the San Pedro Bay ports, MATES IV identified that the ports area had the highest air toxics risks within the SCAB. DPM is a major air toxic concern for the Proposed Project, therefore this Technical Report focuses on the impacts of DPM caused by the Project. In addition to the risk from DPM, the exposure to elevated UFP emission also is known to cause a reduction in life span or premature death.

4.3. Monitored Air Quality Pollutants

The POLB operates two real-time air quality monitoring sites that collect measurements of O_3, CO, SO_2, NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) as well as other environmental data such as wind speed, wind direction, and temperature data. The nearest real-time monitoring site, Navy Mole / Gull Park Outer Harbor

[14] http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/aqmp-archive
[15] http://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iv

Station, under the management of the POLB is located approximately 2.5 kilometers south west of the Proposed Project site at the east end of Nimitz Road, on the peninsula that terminates at the Long Beach Main Channel. The second POLB real-time monitoring station, Super Block / Inner Harbor Station, is located approximately 4 kilometers north west of the Proposed Project site near the intersection of Canal Avenue and 12th Street. The location of the closest monitoring station, Navy Mole/Gull Park Outer Harbor Station, is such that monitored concentrations are typically lower than those monitored at the Super Block site. Monitored concentrations for the latest three years for which data are available are presented in Table 4-1 and

Table 4-2, for Super Block and Navy Mole sites, respectively.

Table 4-1 - Maximum Pollutant Concentrations measured at the Super Block/Inner Harbor Monitoring Station

Pollutant	Averaging Period	National Standard	State Standard	Highest Monitored Concentration		
				2015	2016	2017
Ozone (ppm)	1-hour	—	0.09	0.077	0.077	0.084
	8-hour National [a]	0.07	—	0.053	0.053	0.053
	8-hour State	—	0.07	0.056	0.056	0.064
CO (ppm)	1-hour	35	20	3.4	3.2	5.4
	8-hour	9	9	2.7	2.5	4.7
NO_2 (ppm)	1-hour National [b]	0.1	—	0.092	0.088	0.087
	1-hour State	—	0.18	0.096	0.115	0.179
	Annual	0.053	0.03	0.022	0.022	0.024
SO_2 (ppm)	1-hour National [c]	0.075	—	0.013	0.016	0.017
	1-hour State	—	0.25	0.020	0.068	0.025
	24-hour	—	0.04	0.004	0.007	0.006
PM_{10} ($\mu g/m^3$)	24-hour National [d]	150	—	67.7	78.3	85.5
	24-hour State	—	50	**88.0**	**87.0**	**102.3**
	Annual	—	20	**37.7**	**37.4**	**37.4**
$PM_{2.5}$ ($\mu g/m^3$)	24-hour [e]	35	—	24.5	22.8	22.6
	Annual	12	12	9.3	8.7	9.3

Data was taken from POLB Summary Annual Reports for 2015 – 2017[16,17,18].

Exceedances of state standards are shown in **bold** and exceedances of national standards underlined. All report values represent the highest recorded concentration during the year unless otherwise noted.

[a] The monitored concentrations reported for the national 8-hour ozone standard represent the 3-year average (including the reported year and the prior two years) of the fourth-highest 8-hour concentration each year.

[b] The monitored concentration reported for the national 1-hour NO_2 standard represent the 3-year average (including the reported year and the prior two years) of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations.

[c] The monitored concentrations reported for the national 1-hour SO_2 standard represent the 3-year average (including the reported year and the prior two years) of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

[d] The 24-hour PM_{10} NAAQS is attained when the number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. Thus, the 24-hour PM_{10} NAAQS allows for one exceedance of the standard per year and therefore the second highest 24-hour average PM_{10} concentrations are reported.

[e] The monitored concentrations reported for the national 24-hour $PM_{2.5}$ standard represent the 3-year average (including the reported year and the prior two years) of the 98th percentile of the annual distribution of daily average concentrations.

[16] Leidos (2016) *Air Quality Monitoring Program at the Port of Long Beach Annual Summary Report Calendar Year 2015.* [Online] Available at http://caap.airsis.com/ReportsPOLB.aspx [Accessed: January 2019].

[17] Leidos (2017) *Air Quality Monitoring Program at the Port of Long Beach Annual Summary Report Calendar Year 2016.* [Online] Available at http://caap.airsis.com/ReportsPOLB.aspx [Accessed: January 2019].

[18] Leidos (2018) *Air Quality Monitoring Program at the Port of Long Beach Annual Summary Report Calendar Year 2017.* [Online] Available at http://caap.airsis.com/ReportsPOLB.aspx [Accessed: January 2019].

Table 4-2 - Maximum Pollutant Concentrations measured at the Navy Mole/Gull Park Outer Harbor Monitoring Station

Pollutant	Averaging Period	National Standard	State Standard	Highest Monitored Concentration		
				2015	2016	2017
Ozone (ppm)	1-hour	—	0.09	0.078	0.071	0.081
	8-hour National [a]	0.07	—	0.056	0.056	0.054
	8-hour State	—	0.07	0.058	0.062	0.058
CO (ppm)	1-hour	35	20	2.3	2.0	2.1
	8-hour	9	9	2.0	1.7	1.7
NO_2 (ppm)	1-hour National [b]	0.1	—	0.078	0.078	0.077
	1-hour State	—	0.18	0.094	0.086	0.096
	Annual	0.053	0.03	0.021	0.018	0.018
SO_2 (ppm)	1-hour National [c]	0.075	—	0.020	0.013	0.011
	1-hour State	—	0.25	0.018	0.012	0.016
	24-hour	—	0.04	0.004	0.003	0.005
PM_{10} (µg/m^3)	24-hour National [d]	150	—	41.5	51.2	66.4
	24-hour State	—	50	47.9	**52.7**	**84.0**
	Annual	—	20	**24.9**	**25.3**	**27.2**
$PM_{2.5}$ (µg/m^3)	24-hour [e]	35	—	—	—	—
	Annual	12	12	—	—	—

Data was taken from POLB Summary Annual Reports for 2015 – 2017.

Exceedances of the standards are shown in **bold**. All report values represent the highest recorded concentration during the year unless otherwise noted.

[a] The monitored concentrations reported for the national 8-hour ozone standard represent the 3-year average (including the reported year and the prior two years) of the fourth-highest 8-hour concentration each year.

[b] The monitored concentration reported for the national 1-hour NO_2 standard represent the 3-year average (including the reported year and the prior two years) of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations.

[c] The monitored concentrations reported for the national 1-hour SO_2 standard represent the 3-year average (including the reported year and the prior two years) of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

[d] The 24-hour PM_{10} NAAQS is attained when the number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. Thus, the 24-hour PM_{10} NAAQS allows for one exceedance of the standard per year and therefore the second highest 24-hour average PM_{10} concentrations are reported.

[e] The monitored concentrations reported for the national 24-hour $PM_{2.5}$ standard represent the 3-year average (including the reported year and the prior two years) of the 98th percentile of the annual distribution of daily average concentrations.

4.4. Sensitive Receptors

National and state Ambient Air Quality Standards are established based on the potential for concentrations of certain pollutants to adversely affect sensitive receptors. Sensitive human receptors include children, senior citizens, pregnant women and the chronically or acutely ill. Locations where members of these groups may be present include residences, schools, playgrounds, child care centers, convalescent homes, retirement homes, hospitals, rehabilitation centers and athletic facilities.

The location of the Proposed Project within the POLB is not located near residences, schools, hospitals and other sensitive receptors. The closest sensitive residential properties are approximately 500 meters north of the Proposed Project site, at residential (liveaboard) vessels within the Long Beach Shoreline Marina, off Shoreline Village Drive. The closest school is Cesar Chavez Elementary located over 2,000 meters from the Proposed Project site. The nearest off-site workers are located at the RMS Queen Mary and at the City of Long Beach Fire Department Station 6.

4.5. Greenhouse Gases

It is well-documented that the Earth's climate has fluctuated throughout its history. However, scientific evidence now indicates a relationship between increasing global temperatures over the past century and the worldwide proliferation of GHG emissions by mankind.

Global Climate Change (GCC) is expressed as global changes in the average weather of the Earth, as measured by change in wind patterns, storms, precipitation, and temperature. GCC is predicted to produce negative environmental, economic, and social consequences across the globe and may, in turn, be manifested as impacts on resources and ecosystems in California and elsewhere.

Although GCC could affect a variety of environmental conditions in the future, SLR is the condition that has the greatest potential to affect the Port region. SLR is defined as the change in global mean sea level over time. Therefore, this section also includes an assessment of how future predictions of SLR would potentially affect operations of the Proposed Project.

4.5.1. GHG Emissions and Effects

GHGs trap heat in the atmosphere and are emitted from both natural processes and human activities. The State of California and United States Environmental Protection Agency (US EPA) have identified six GHGs generated by human activity that are believed to be the primary contributors to man-made global warming: CO_2, CH_4, N_2O, hydrofluorocarbons (HFC), perfluorocarbons (PFC), and SF_6. Examples of GHGs produced both by natural processes and human activity include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs emitted through human activities alone include fluorinated gases and sulfur hexafluoride (SF_6). Of these, CO_2, CH_4, and N_2O are GHGs of interest in this analysis; HFC, PFC, and SF_6 would not be emitted by Project activities.

The natural balance of GHGs in the atmosphere regulates the Earth's temperature; without this natural greenhouse effect, the earth's surface would be approximately 60 degrees Fahrenheit (°F) cooler[19]. However, emissions from fossil fuel combustion by humans and other industrial activities have elevated the concentration of GHGs in the atmosphere to above natural levels.

GHG emissions have varying global warming potential (GWP), which is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO_2 is assigned a GWP of one (1). In comparison, CH_4 has a GWP of 28, which means that it has a global warming effect 28 times greater than CO_2 on an equal-mass basis[20]. To account for their GWP, GHG emissions are often reported as carbon dioxide equivalent (CO_2e). CO_2e is calculated by multiplying each GHG emission by its GWP and adding the results together to produce a single, combined emission rate representing all GHG emissions.

Numerous studies document the recent trend of rising atmospheric concentrations of CO_2. The longest continuous record of CO_2 monitoring extends back to 1958[21,22]. These data show that atmospheric CO_2 levels have risen an average of 1.5 parts per million (ppm) per year over the last 55 years[23]. As of 2014, CO_2 levels are approximately 30 percent higher than the highest levels estimated for the 800,000 years

[19] Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2. https://nca2014.globalchange.gov/downloads.
[20] AR5 Synthesis Report Climate Change 2014, IPCC. https://www.ipcc.ch/report/ar5/syr/.
[21] The Concentration and Isotopic Abundances of Carbon Dioxide in the Atmosphere. 1960. http://www.tandfonline.com/doi/pdf/10.3402/ tellusa.v12i2.9366?needAccess=true.
[22] Scripps Institution of Oceanography. 2017. Atmospheric CO2. http://scrippsco2.ucsd.edu/data/atmospheric_co2/.
[23] NOAA (National Oceanic and Atmospheric Administration). 2017. Annual Mean Growth Rate of CO_2 at Mauna Loa, Hawaii. Earth System Research Laboratory, Global Monitoring Division. https://www.esrl.noaa.gov/gmd/ccgg/trends/gr.html.

preceding the industrial revolution, as determined from CO_2 concentrations analyzed from air bubbles in Antarctic ice core samples[24].

The effects of global climate change to California's public health, infrastructure and natural resources are described in the California's Fourth Climate Change Assessment Statewide Summary Report[25]. According to this report, which builds upon the first three climate change assessment reports, the updated projections reinforce past findings regarding the potential for more extreme events from heat waves, floods, droughts, wildfires. These extreme climate event impacts along with reduced improvements in air quality will create an increase in human mortality and damage to property that together will cost in the order of tens of billions of dollars.

In addition to the Statewide summary report, this fourth assessment report also includes regional reports. The Los Angeles Region Report provides the following specific regional effects of climate change:[26]

- Continued future warming over the LA region. Across the region, average maximum temperatures are projected to increase around 4-5 degrees F by the mid-century, and 5-8 degrees F by the late-century.
- Extreme temperatures are also expected to increase. The hottest day of the year may be up to 10 degrees F warmer for many locations across the LA region by the late-century under RCP8.5 ("business-as-usual" scenario where CO_2 emissions continue to rise through the 21st century). The number of extremely hot days is also expected to increase across the region.
- Despite small changes in average precipitation, dry and wet extremes are both expected to increase. By the late-21st century, the wettest day of the year is expected to increase across most of the LA region, with some locations experiencing 25-30% increases under RCP8.5. Increased frequency and severity of atmospheric river events are also projected to occur for this region.
- Sea levels are projected to continue to rise in the future, but there is a large range based on emissions scenario and uncertainty in feedbacks in the climate system. Roughly 1-2 feet of sea level rise is projected by the mid-century, and the most extreme projections lead to 8-10 feet of sea level rise by the end of the century.
- Projections indicate that wildfire may increase over southern California, but there remains uncertainty in quantifying future changes of burned area over the LA region.

Additional research by the CalEPA Office of Environmental Health Hazard Assessment (OEHHA) documented effects of climate change including impacts on terrestrial, marine, and freshwater biological systems, with resulting changes in habitat, agriculture, and food supply. These changes are occurring in conjunction with the potential to impact human well-being[27]. The OEHHA categorizes climate change indicators as: changes in California's climate; impacts to physical systems including oceans, lakes, rivers, and snowpack; and impacts to biological systems including humans, vegetation and wildlife. The primary observed changes in California's climate include increased annual average air temperatures, more-frequent extremely hot days and nights, and increasingly severity of drought. Impacts to physical systems affected by warming temperatures and changing precipitation patterns show decreasing snowmelt runoff, shrinking glaciers, and rising sea levels. Examples of the terrestrial effects include increasing tree mortality, large wildfires, and changes in vegetation density and distribution[28]. Land use planning decisions that take into account the effects of climate change would contemplate potential effects to biological resources, water resources, and agricultural resources.

4.5.2. Black Carbon

Black carbon (a.k.a. soot) is a component of diesel particulate matter (DPM) emissions. It is estimated that airborne emissions of black carbon soot contribute to global warming due to its ability to warm the

[24] Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2. https://nca2014.globalchange.gov/downloads.
[25] California's Fourth Climate Change Assessment. Statewide Summary Report. Publication number: SUM-CCCA4-2018-013. http://www.climateassessment.ca.gov/.
[26] California's Fourth Climate Change Assessment. Los Angeles Summary Report. Publication number: SUM-CCCA4-2018-007. http://www.climateassessment.ca.gov/regions/.
[27] Indicators of Climate Change in California. 2018. https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california.

atmosphere and melt snow packs and polar ice if deposited onto these surfaces. According to the International Polar Foundation, black carbon is a potent climate-warming aerosol. Black carbon particles absorb all wavelengths of sunlight and then re-emit this energy into the surrounding environment as infrared radiation. If produced continuously and in large quantities, black carbon can have a large impact on climate, especially in the cryosphere, the portion of the earth with sea ice, snow cover, glaciers, ice caps, and permafrost. Research shows that black carbon is second only to CO_2 in terms of major contributors to climate change. Soot produced by fossil fuels and biofuels combined may contribute to approximately 16 percent of gross global warming[28].

4.5.3. Direct Effects of Sea Level Rise on the California Coast

SLR is a longer-term potential environmental impact of GCC attributed to increasing average global temperature. SLR increases the likelihood and risk of coastal flooding. Over the past several decades, the sea level along the California coast has risen at a rate of approximately 17 to 20 centimeters (cm) per century[29]. The rate of SLR is predicted to increase in the future. The California Sea Level Rise Task Force recommends a range of future SLR estimates for state agencies to consider for planning future development projects[30]. These predictions identify that sea levels could rise an average of 7, 14, and 41 inches by years 2030, 2050, and 2100, respectively, compared to 2000 levels.

In addition to the physical problems such flooding may cause, the resultant economic impact could be important as well. SLR can reduce bridge clearance, thereby reducing the size of ships able to pass or restricting their movements to times of low tide. In addition, higher seas may cause ships to sit higher in the water, possibly resulting in less efficient port operations[31].

Although this is a coastal phenomenon affecting the entire 2,000 miles of California's coastline, the impacts and related economic costs of SLR and flooding may be site specific. Specifically, the area that could be affected by SLR impacts for the Project would be the inner and outer harbor waters of Long Beach Harbor. While mitigation is important to minimize and avoid the climatic and ecological effects related to GCC, adaptation, such as modifying facilities to account for SLR, may be the only feasible way to address the effects of SLR in this century. Typical adaptation strategies are presented in the California Climate Adaptation Strategy[32]. Port-specific adaptation strategies are also being developed in the Port Climate Adaptation and Coastal Resiliency Plan.

[28] Black Carbon Playing a Major Role in Arctic Climate Change. 2008. http://www.sciencepoles.org/article/black-carbon-playing-major-role-in-arctic-climate-change
[29] The Third Climate Change Assessment, Our Changing Climate 2012. http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf
[30] State of California Sea Level Rise Guidance Document. 2013. http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf
[31] The Third Climate Change Assessment, Our Changing Climate 2012. http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf
[32] California Climate Adaptation Strategy. http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf

5. Emissions Estimate Methodology

Both short term construction emissions and long-term operation emissions have been calculated for the Proposed Project using the methodologies described within this chapter.

5.1. Scope

5.1.1. Construction

Air quality impacts arising from construction processes associated with the Proposed Project could potentially occur as a result of: (1) emissions from internal combustion engines associated with off-road equipment, on-road vehicles and construction related harbor craft; (2) particulate emissions from brake, tire and paving wear generated by on-road vehicles; (3) fugitive dust emissions due to on-site demolition, grading and construction works, including re-entrainment of bulk material track-out.

Construction activities associated with the Proposed Project would involve the use of off-road onshore construction equipment, marine construction equipment (such as electric dredgers and pile drivers), on-road trucks, tugboats, and worker vehicles. Proposed construction activities are anticipated to last approximately fifteen months (from August 2019 to October 2020) and comprise the following phases:

- Berth Dredging
- Installation of Mooring Dolphins
- Garage Demolition
- Garage Site Preparation/Abandoned passenger tunnel decommissioning
- Grading
- Garage Construction
- Architectural Coating
- Paving

Detailed information on the construction process including schedule, equipment, material moved, and number of workers were provided by Carnival. A summary of the construction information used within this assessment is presented in Appendix A. The methods and assumptions used to calculate the construction emissions are discussed in more detail below.

5.1.2. Operation

The Proposed Project has the potential to result in long-term direct and indirect air pollutant emission impacts. The Proposed Project operation air quality impacts include those associated with: (a) changes to the number and type of Cruise ships accessing the LBCT (see further details below) and associated shoreside energy consumption by hoteling cruise vessels; (b) on-road mobile source emissions associated with increased vehicular trips and parking associated with the Proposed Project; and (c) changes to emissions from off-road sources associated with cruise vessel calls (e.g. luggage loading equipment).

Carnival currently operates four cruise ship vessels which together call at the LBCT five days per week (Thursday through Monday), although only three regularly call on the LBCT. In 2018, the cruise ships which called at the POLB terminal comprised the Carnival Imagination, Inspiration, Miracle and Splendor. The Carnival Imagination and Inspiration call at the LBCT twice per week, while the Carnival Splendor or occasionally the Carnival Miracle call once per week. With the Proposed Project in operation in 2020, the Carnival Miracle and Splendor will relocate to other global Ports and will be replaced by Carnival's new Vista class vessel, the Carnival Panorama.

5.2. Emission Estimation Methods

Emissions of criteria air pollutants and GHGs generated during both construction and operation phases of the Proposed Project have been estimated using available information provided by the client, project team and an experienced contractor working in the Port. Where project specific information was unavailable, the most appropriate substitute data has been used based on existing published data. Where specific assumptions have been made necessary to calculate emissions, these assumptions are clearly stated in the emissions appendices A and B. The methodologies and emission factors used to estimate emissions associated with each of the phases, activities and emission sources associated with the Proposed Project are summarized in Table 5-1, with further details provided in the following sections.

Table 5-1 - Emission Estimation Methods

Phase	Activity	Emission Source	Methodology
Construction	Parking Garage Construction	Off-road Construction Plant	CalEEMod (Version 2016.3.2)
	Parking Garage Construction	Fugitive Dust Emissions	
	Construction Traffic	On-road Motor Vehicles	
	Maritime Construction Activities	Construction Harbor Craft and onboard equipment	Port of Long Beach Air Emissions Inventory,[33] and CARB Emissions Estimation Methodology for Commercial Harbor Craft Operating in California[34]
Operation	Operation Road Traffic	On-road Motor Vehicles	EMFAC2014
		Parking Garage	CalEEMod (Version 2016.3.2)
	Shore-to-ship power consumption	Electricity Generation (GHG Emissions only)	The Climate Registry
	Cruise Ship Calls	Engine and boiler exhaust emissions for cruise vessels	Port of Long Beach Air Emissions Inventory, and Carnival vessel specific engine and operation data.
		Off Road sources (e.g. Cargo Handling Equipment)	CalEEMod (Version 2016.3.2)

5.2.1. Construction Emissions Estimate Methodology

Onshore Construction

The California Emissions Estimating Model (CalEEMod) has been used to estimate the Proposed Project's onshore construction emissions. CalEEMod (version 2016.3.2) is a state-wide land use emissions computer model, approved by the SCAQMD and designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG

[33] http://www.polb.com/civica/filebank/blobdload.asp?BlobID=13033

[34] https://ww3.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf

emissions associated with construction and operation activities from a variety of land use projects[35]. The model can be used for a variety of situations where an air quality analysis is necessary or desirable such as CEQA documents (as in this case), National Environmental Protection Act documents, pre-project planning, or compliance with local air quality rules and regulations.

The model uses widely accepted methodologies for estimating emissions combined with default data that can be used when site-specific information is not available. CalEEMod quantifies criteria pollutant emissions based on land use designations and size parameters, uses emission factors for off-road equipment and on-road vehicles using the CARB OFFROAD model and EMFAC2014 model, respectively, calculates fugitive dust emissions using US EPA AP-42 methods; and calculates the total criteria pollutant and GHG emissions associated with each construction phase; CalEEMod adds overlapping phases in calculating maximum day emissions for each pollutant. Project-specific onshore construction schedules, off-road equipment utilization, and heavy-truck trips (via haul quantity assumptions) were provided by Carnival and used as input into the CalEEMod. The site area is paved, so no unpaved road travel is assumed to be necessary for on-road vehicles. During garage improvement works, emissions of ROG/VOC would be generated by internal and external painting. CalEEMod calculates these emissions based on an assumed SCAQMD Rule 1113 compliant ROG/VOC content of paint in grams/liter and an estimate of the quantity of paint required based on the area of construction, This estimate is considered to be conservative considering the limited painting needs for a parking garage. The CalEEMod inputs and outputs for the onshore construction emissions estimate are provided in Appendix A.

The onshore emission calculations undertaken assume that the Proposed Project would comply with Port of Long Beach CAAP construction BMPs, specifically the requirement to use off-road equipment with Tier 4 engines, and SCAQMD's Rule 403 – Fugitive Dust requirements, specifically the requirement to use on-site water sprays twice daily. The emissions reduction associated with the construction BMP requirement to use haul heavy haul trucks that meet the Port's Clean Trucks Program requirements cannot be estimated by CalEEMod, so the emissions from the heavy haul trucks will be overestimated by a small amount.

The specific assumptions regarding construction schedules, off-road equipment types and use, and vehicle trips and trip distances are provided in Appendix A.

Maritime Construction

During the maritime construction works, seven vessels will be utilized, specifically; two derrick barges (Derrick 1 and Derrick 2), one dredge, two barges, one tender tug and one offshore tug. The two derricks would be used when undertaking; pipe pile driving, the installation of mooring dolphins, the installation of tower and passenger bridge; and the fixing of new high-density foam fenders. The dredge would be used for the purpose of dredging berth material. The dredge would be electrically powered from shoreside power and would not in-itself generate any emissions to air once connected to shore-power electric supply. No direct emissions were therefore estimated for the dredge in this study. During dredging activities, the dredge would however be assisted by two tugs which would be responsible for maintaining the dredge's position within the dredge template and maneuvering dredged material barges to the LA-2 ocean disposal site.

Emissions of NO_X, SO_2, CO, PM (used to represent both PM_{10} and $PM_{2.5}$) and hydrocarbons (used as a proxy for VOCs) for the maritime construction emissions sources were calculated following the methodology used in Chapter 3 of the POLB AEI 2013 (Section 3.5).

Information on architectural coatings required for the extension of the existing passenger bridge system, associated tower element on the existing wharf deck and new tower on a new platform deck, was unavailable. As such, ROG/VOC emissions associated with this element of the maritime construction have not been quantified in this assessment. It is anticipated that ROG/VOC emissions generated by architectural coatings during construction of these features would be small given the relatively small area in which they would take place.

Fugitive dust emissions generated during dredging activities have been scoped out of this assessment as material would be wet and therefore fugitive emissions are considered to be negligible.

[35] http://www.caleemod.com/

The specific assumptions regarding construction schedules, vessel operations, and derrick equipment use are provided in Appendix A.

5.2.2. Operations Emissions Estimate Methodology

Onshore Emissions

Emissions arising from increased passenger and worker trips once the Proposed Project is operational were calculated based on data provided by the Proposed Project transportation consultant. Details regarding the change in peak day vehicle trips associated with the Proposed Project were provided. The peak day was defined as Saturday in both the baseline and 2020 operation year as this is the day on which the largest Carnival vessels would arrive (Carnival Splendor in 2018 and Carnival Panorama in 2020). Given the increased passenger capacity of the Panorama compared to the Splendor, an increase in the number of passenger and worker trips would occur with the Proposed Project in operation.

Information on vehicle miles travelled (VMT) was estimated based on the assumed percentage of trips which would travel a specific route and the approximate number of miles along that route which would take place within the SCAB.

Emissions of criteria pollutants and GHGs were calculated using emission factors from EMFAC2014 (to be consistent with CalEEMod). Emissions were calculated for passenger cars using the emission rates for aggregated SCAB non-commercial truck/bus/motorhome vehicle categories in 2020. Emissions for heavy vehicles were calculated using emission factors for a selection of buses, coaches and heavy-duty diesel vehicles.

The CalEEMod model was used to calculate emissions generated by vessel servicing equipment and employee trips. Vehicles used in servicing the cruise ship include, tractor trailers, delivery vans, dumpsters, forklifts, luggage trains and electric golf carts. All equipment is assumed to be diesel powered, with the exception of a certain number of propane-powered forklifts and the electric golf carts. Information regarding the types of equipment, number of units, fuel types, model year, power rating, engine tier, emission control devices and operation hours for the 2018 baseline year and increases to service the Panorama in the 2020 operation year were all provided by Carnival.

The amount of electricity required for parking garage lighting, terminal lighting, and cruise ship hoteling was provided by Carnival for both the 2018 baseline and 2020 operation years. Electrical power requirements of the parking garage are expected to reduce annually by 100,000 kWhr, this is due to the replacement of existing fluorescent fixtures with energy efficient LED fixtures with the Proposed Project. Terminal lighting electrical power will remain unchanged with the Proposed Project. The existing Carnival vessel Splendor does not utilize shoreside power during hoteling, however Carnival Panorama, which is proposed to replace Splendor with the Proposed Project in operation, would be connect to shoreside power during hoteling. Therefore, Shoreside power requirements during cruise ship hoteling is expected to increase by 4.1 million kWhr with the Proposed Project in operation. Increased emissions associated with additional shoreside power provision in 2020 will however be offset by reduced emissions from auxiliary engines during hoteling.

The specific assumptions regarding incremental off-road equipment types and use, and vehicle trips and trip distances, and electrical use are provided in Appendix B.

Maritime Emissions

Emissions from cruise ship main engines, auxiliary engines and boilers were calculated using the methodology reported in the 2013 POLB AEI, supplemented by later AEI where relevant. Project specific information was provided by Carnival for each cruise ship vessel (e.g. engine Tier and energy consumption). The assumptions below were applied to estimate unmitigated emissions:

Emission Factors

- Emission factors for the cruise ship diesel-electric engines and boilers were taken from the POLB 2014 AEI Report (Chapter 2) based on the assumed IMO MARPOL Annex VI engine standards tier for each engine; and

- The emission factors used assume the use of MGO fuel with a sulfur content of <0.1%, which is consistent with the requirements within US EPA's ECA that apply within 200 nautical miles of the US coast.

Engine and Boiler Loads

- Main engine load factors (%) were estimated based on assumed speeds during each phase of movement relative to each vessel's maximum speed and using curve fits based on Carnival supplied load/speed data. The propeller law, which states that the engine load factor is proportional to the speed of the ship cubed (as per the methodology described in the 2013 POLB AEI), does not apply to engine loads for diesel-electric engines that are used both for propulsion and auxiliary loads. Vessel speeds used to determine engine loads were provided by Carnival for transit and maneuvering. Carnival also provided estimated hoteling engine loads when at berth.
- Default boiler loads (kW) for diesel electric cruise ships when at berth were taken from the POLB 2017 AEI report (Table 2.3). It is assumed that these engine loads are in addition to the at-berth auxiliary engine loads supplied by Carnival. Boilers are not assumed to operate during ship transit and maneuvering.
- Engine and boiler operation times were calculated based on the duration of each phase of movement activity within the SCAB for criteria pollutants and within California waters for GHG emissions. The specific detailed assumptions for each ship/cruise route are provided in Appendix B.
- Carnival vessels Imagination, Inspiration, and Panorama, utilize Shoreside electrical power when berthed at LBCT. These vessels would operate auxiliary engines for 30 minutes prior to and 45 minutes after hoteling while onshore power is being connected/disconnected. Auxiliary boilers would operate for the full duration of each call, as per the specific call duration information provided by Carnival.
- The existing vessel Carnival Splendor does not utilize shoreside electrical power when berthed at the LBCT. As such, emissions generated by Splendor during hoteling would arise from both auxiliary engines and boilers for the full duration of each call.
- A harbor pilot is ferried to the ships during each port call. This activity will not change as part of the Proposed Project, the emissions associated with this action are negligible in comparison to the cruise ship emissions, so these emissions have not been estimated.

The specific assumptions regarding cruise ship operation used in the emissions estimate are provided in Appendix B.

Cruise Ship Activity

Cruise ship calls will continue at the baseline rate of 5 calls per week, one per day Thursday through Monday. The Carnival cruise ship call history varies somewhat by year but has steadily ranged from 255 to 261 calls between 2015 and 2018. This minor variability in calls is likely related to which days of the week each year ends and starts, whether it is a leap year, and how many two week vs. the normal one week cruises are scheduled for the larger class ship. Since, the proposed changes to the LBCT do not impact the normal weekly ship call schedule the baseline and future case emissions will assume the same number of ship calls (259); with 104 calls each for the two Fantasy Class ships for baseline and future cases, and 51 calls for the Carnival Splendor for baseline and 51 calls for the Carnival Panorama for the future case.

6. Project Impacts

To assess the potential significance of the Proposed Project's impacts on air quality, in accordance with CEQA guidelines, this assessment is required to identify whether the Proposed Project would:

a. Conflict with or obstruct implementation of the applicable air quality plan;
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
c. Expose sensitive receptors to substantial pollutant concentrations; and / or
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

For greenhouse gas emissions in accordance with CEQA guidelines, and Port of Long Beach guidelines, this assessment is required to identify whether the Proposed Project would:

a. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment;
b. Conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing the emissions of GHGs;
c. Expose people and structures to a significant risk of loss, injury, or death involving flooding as a result of SLR

Based on the conclusions of this assessment, the Proposed Project's impact on each of the above will be determined as either:

- Potentially Significant Impact;
- Less Than Significant Impact with Mitigation Incorporated;
- Less Than Significant Impact; or
- No Impact.

6.1. Significance Thresholds

6.1.1. South Coast Air Quality Management District Guidelines

The SCAQMD provides guidance on the analysis of air quality impacts arising from proposed projects. A set of specific criteria for use when determining the significance of the potential air quality impacts of a project are outlined in the CEQA Air Quality Handbook. To determine the significance of a project's impacts, 'peak day' project construction and operation emissions are compared against these thresholds. The daily thresholds for construction and operation emissions established by the SCAQMD, which will be used to assess the significance of impacts of the Proposed Project, are presented in **Error! Reference source not found.**.

SCAQMD thresholds relevant to this Proposed Project are also defined for odor and construction/operation GHG emissions (expressed as tons of CO_2e per year, amortized over the life of the project).

Table 6-1 - SCAQMD Air Quality Significance Thresholds

Daily Emission Thresholds		
Air Pollutant	Construction Threshold (lbs/day)	Operation Threshold (lbs/day)
Oxides of Nitrogen (NO_X)	100	55
Volatile Organic Compounds (VOC)	75	55
PM_{10}	150	150

$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550
Toxic Air Contaminants (TAC), Odor, and GHG Thresholds		
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
GHG	10,000 MT/yr CO_2e for industrial facilities	

Source: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2

6.1.2. Localized Significance Thresholds

The SCAQMD developed the voluntary localized significance threshold (LST) methodology and associated mass rate look-up tables by source receptor area (SRA) that can be used by public agencies to determine whether or not a project may generate significant adverse localized air quality impacts. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard and are developed based on the ambient concentrations of that pollutant for each source receptor area. LST thresholds are established assuming the maximum allowable emissions from 1, 2 or 5 acres sites (with larger sites having higher thresholds to reflect the scale of operations). This approach has been used to assess whether proposed construction activities associated with the Proposed Project have the potential to generate significant adverse localized air quality impacts.

LSTs are derived based on the location of the Proposed Project (i.e. the SRA); project emission rates of NOx, CO, $PM_{2.5}$, and PM_{10}; the size of the Proposed Project works, and the distance to the nearest sensitive receptor and off-site worker. For maritime construction the total active construction working area was estimated at 5 acres, although on some days actual construction activities footprint may occur over a slightly larger area. For onshore construction the total active construction area was estimated at 2 acres based on the footprint size of the parking garage.

For the Proposed Project, the SRA for the LST is the South Coastal L.A. County area (Area 4). The nearest sensitive receptors are residential properties approximately 500 meters north of the Proposed Project site. Table 6-2 presents the LST emission rates derived for 2019 and 2020 for a 5-acre and 2-acre site, respectively, located approximately 500 meters from the closest sensitive receptor (the maximum distance for which LSTs are provided) and 25 meters from the nearest off-site worker. Note LSTs have not been determined for PM_{10} and $PM_{2.5}$ for off-site workers as such receptors will not be continuously present for the period over which air quality standards for these pollutants are set (i.e. 24 hours). The CO LST values are not presented as they are all above the CO regional threshold, which would not be exceeded, so the CO LSTs will also not be exceeded.

Table 6-2 - Proposed Project Localized Significance Thresholds

	Offshore Construction		Onshore Construction	
Pollutant	5-acre, at 500 meters to the nearest sensitive receptor (lbs/day)	5-acre, at 120 meters to the nearest off-site worker (lbs/day)	2-acre, at 500 meters to the nearest sensitive receptor (lbs/day)	2-acre, at 25 meters to the nearest off-site worker (lbs/day)
NO_X	179	133	151	83
PM_{10}	191	94[1]	167	29[1]
$PM_{2.5}$	120	47[1]	101	10[1]

Source: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/appendix-c-mass-rate-lst-look-up-tables.pdf?sfvrsn=2

[1]Thresholds for PM_{10} and $PM_{2.5}$ are relevant to sensitive receptors reasonably likely to be present for ≥24 hours, where the only offsite 24-hour workers are located at Long Beach Fire Station 6, which is located 235 meters from the offshore construction activity and 75 meters from the onshore construction activity.

6.1.3. Local Carbon Monoxide Concentrations

The significance of localized project impacts under CEQA depends on whether ambient CO levels in the vicinity of the Proposed Project are above or below state and federal CO standards. If ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, project emissions are considered significant if they increase 1-hour CO concentrations by 1.0 parts per million (ppm) or more or 8-hour CO concentrations by 0.45 ppm or more. The following are applicable CAAQS for CO:

- California state 1-hour CO standard of 20.0 ppm
- California state 8-hour CO standard of 9.0 ppm

6.2. Air Quality Impact Assessment

Emissions of air pollutants associated with the Proposed Project would arise as a result of short term construction activities, such as fugitive dust emissions during demolition, emissions from off-road construction equipment and exhaust emissions from on-road construction traffic and harbor craft. The Proposed Project would also generate emissions to air (including GHGs) during its operation, as a result of cruise vessel engine emissions, road traffic associated with passengers, staff and deliveries, as well as shoreside energy usage.

6.3. Construction Impacts

6.3.1. SCAQMD Regional Thresholds – Construction (Unmitigated)

The Proposed Project consists of two distinct, geographically separated construction areas;

1. onshore construction works, primarily associated with the extension of the existing parking garage; and
2. offshore construction works, which include the dredging of additional material within the berth and installation of sheet piles.

The maritime construction works are expected to take place between August and December 2019 and would predominantly be located within the dredge template and immediate docking facility as shown in Figure 2-3. Carnival has committed to using an electric powered dredge, per the San Pedro Bay Ports CAAP construction BMP. This commitment is included as an assumption in the unmitigated emissions estimate.

The onshore construction works will begin after the offshore construction activities are complete and would continue for a period of 12 months ending in October 2020 and would be largely centered around the existing parking garage.

Considering the above, for this assessment, peak day construction emissions have been estimated separately for the offshore and onshore construction periods, that is, 2019 for the offshore construction works and 2019-2020 for the onshore construction works. This has also allowed LST's to be generated for each construction activity, based on the different spatial extent of activities undertaken by the offshore and onshore construction works.

Table 6-3 - Peak Day Construction Emissions (lbs/day) - Unmitigated

Source Category	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO	VOC
Construction Year – 2019 Offshore Construction						
Dredge Tugs	6	6	157	<1	114	16
Derrick Barge 1	3	3	53	<1	19	5
Derrick Barge 2	1	1	25	<1	20	3
Total	9	9	**235**	<1	153	24
SCAQMD Significance Threshold	150	55	100	150	550	75
Threshold exceeded?	No	No	**Yes**	No	No	No
Construction Year – 2019-2020 Onshore Construction						
Total	24	14	70	<1	47	7
SCAQMD Significance Threshold	150	55	100	150	550	75
Threshold exceeded?	No	No	No	No	No	No

A detailed breakdown of calculated construction emissions is provided in Appendix A. Peak day unmitigated emissions are summarized in Table 6-3.

The results presented in Table 6-3 indicate that peak day unmitigated construction emissions, during the 2019 offshore construction works, specifically during the period when dredging activities occur, have the potential to exceed the SCAQMD threshold for NOx. It should be noted however that:

- Dredging activities would only occur for a total of 21 days during 2019 and would therefore be of very short duration. When dredging emissions are excluded, the NOx emissions threshold is not exceeded;
- Dredging activities would only occur during the nighttime (19:00–06:00) and would therefore be temporally separated from all other offshore construction activities, which would only occur during the daytime (07:00 - 17:00); and

Estimated emissions of all other pollutants in 2019, and all pollutants in 2020, however, are all below SCAQMD significance thresholds.

6.3.2. SCAQMD Regional Thresholds – Construction (Mitigated)

The following mitigation measures, which are consistent with the Air Quality Best Management Practices (BMPs) specified in the San Pedro Bay Ports CAAP, would be employed to reduce emissions associated with project construction activities:

- Onshore construction equipment will be equipped with engines that meet US EPA Tier 4 Final off-road emission standards.
- Fugitive dust emissions shall be controlled through compliance with SCAQMD Rule 403 requirements (watering, track-out control, etc.).
- Tug boats will meet Tier 3 emissions standards, if appropriate sized tugs are available.

The results presented in Table 6-4 show that, with recommended CAAP BMPs applied, peak day emissions of NOx would still exceed the NOx emission threshold during dredging activities (i.e. for 10 days) but would fall below the NOx emission threshold when dredging activities are not taking place. Furthermore, emissions of PM_{10}, $PM_{2.5}$, SOx and VOCs would be reduced and NOx emissions during onshore construction would be reduced to be even further below the relevant emissions thresholds.

Table 6-4 - Peak Day Construction Emissions (lbs/day) - Mitigated

Source Category	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO	VOC
Offshore Construction						
Dredge Tugs	6	6	157	<1	114	16
Derrick Barge 1	3	3	53	<1	19	5
Derrick Barge 2	1	1	25	<1	20	3
Total	9	9	**235**	<1	153	24
SCAQMD Significance Threshold	150	55	100	150	550	75
Threshold exceeded?	No	No	**Yes**	No	No	No
Onshore Construction						
Total	10	5	7	<1	53	3
SCAQMD Significance Threshold	150	55	100	150	550	75
Threshold Exceeded?	No	No	No	No	No	No

If appropriately sized tug boats with engines that meet Tier 3 standards can be acquired for use during construction the maximum daily NOx emissions could be reduced substantially, but would still be over the SCAQMD daily threshold of 100 pounds per day.

6.3.3. SCAQMD Localized Significance Thresholds (LSTs) – Construction (Unmitigated)

Table 6-5 and Table 6-6 show the construction-related emissions of NOx, PM_{10}, and $PM_{2.5}$ compared against the LSTs derived for a 5 acre offshore work site and a 2 acre onshore work site respectively[36], in Source Receptor Area (SRA) 4, South Los Angeles County Coast, with the following receptor distances:

- Offshore and onshore works sensitive receptor – 500 meters
- Offshore works daytime worker (NOx) – 120 meters
- Offshore works 24-hour worker (PM_{10}/$PM_{2.5}$) – 235 meters
- Onshore works daytime worker (NOx) – 25 meters
- Onshore works 24-hour worker (PM_{10}/$PM_{2.5}$) – 75 meters

Carbon Monoxide emissions, which also have SCAQMD LSTs, have been determined to be below the LSTs because the construction LST thresholds are all greater than the regional CO emissions threshold, which would not be exceeded during Project construction.

In accordance with SCAQMD's Localized Significance Threshold Methodology (2008), only 'on-site' construction emissions have been included in the peak day emissions presented in **Error! Reference source not found.** and **Error! Reference source not found.** (i.e. emissions from on-road vehicles were not included). The LST values used for each receptor distance are based on linear interpolation of the SCAQMD LST table values that are provided at distance intervals of 25, 50, 100, 200, and 500 meters.

Furthermore, in accordance with the SCAQMD methodology for Localized Significance Thresholds, on-site construction emissions generated by maritime works do not include emissions generated by tug vessels transporting dredged material to the LA-2 ocean disposal site. Emissions generated during this transfer

[36] The offshore work area is approximately 12 acres, with the extent of the working area used daily when the dredge and support tugs, derrick barge 1, and derrick barge 2 are all working is assumed to be 5 acres. The onshore work area, the extent of the new garage footprint is over three acres, rounded down to 2 acres for impact analysis purposes.

process are considered to take place 'off site'. The tug emissions that occur within the dredging area are included in the LST emissions, and all of the tug emissions are included in the regional emissions analysis.

The tables below show the unmitigated combined construction emissions. This shows that there is an exceedance of the threshold for NOx for both sensitive receptors and offsite workers in 2019, primarily as a result of maritime construction works, and for offsite workers in 2020.

Table 6-5 - Peak Daily Localized Construction Emissions (lbs/day) - Unmitigated

	Sensitive Receptors			Offsite Worker Receptors		
Construction Activity	PM_{10}	$PM_{2.5}$	NO_x	PM_{10}[a]	$PM_{2.5}$[a]	NO_x
Offshore	5	5	131	5	**5**	131
Localized Significance Threshold	191	120	179	94	47	133
Exceed Threshold?	No	No	No	No	No	No
Onshore[b]	24	14	70	24	**14**	70
Localized Significance Threshold	167	101	151	29	**10**	83
Exceed Threshold?	No	No	No	No	**Yes**	No

[a] Thresholds for PM_{10} and $PM_{2.5}$ are relevant to sensitive receptors reasonably likely to be present for ≥24 hours, where the only offsite worker receptors located near the construction activities are the firefighters of City of Long Beach Fire Station 6.
[b] Emissions shown are total emissions, the onsite emissions, which do not include the off-site motor vehicle emissions and road dust would be lower.

Table 6-5 indicates that the unmitigated onshore construction $PM_{2.5}$ emissions would exceed the significance threshold that relates to the firefighters stationed at City of Long Beach Fire Station 6. All other localized pollutant impacts were found to be below the LSTs.

6.3.4. SCAQMD Localized Significance Thresholds (LSTs) – Construction (Mitigated)

Table 6-6 shows the construction-related mitigated emissions of NOx, PM_{10}, and $PM_{2.5}$ compared against the LSTs derived for offshore and onshore construction.

Table 6-6 - Peak Daily Localized Construction Emissions (lbs/day) - Mitigated

	Sensitive Receptors			Offsite Worker Receptors		
Construction Activity	PM_{10}	$PM_{2.5}$	NO_x	PM_{10}[a]	$PM_{2.5}$[a]	NO_x
Offshore	5	5	131	5	**5**	131
Localized Significance Threshold	191	120	179	94	47	133
Exceed Threshold?	No	No	No	No	No	No
Onshore[b]	10	5	7	10	5	7
Localized Significance Threshold	167	101	151	29	10	83
Exceed Threshold?	No	No	No	No	No	No

[a] Thresholds for PM_{10} and $PM_{2.5}$ are relevant to sensitive receptors reasonably likely to be present for ≥24 hours, as offsite worker receptors are not expected to be present for this duration, significance of project impacts against LSTs for particulates have been omitted for offsite worker receptors.

Table 6-6 shows that, following mitigation, there are no exceedances of the LSTs during project construction. The Project's LST impacts are considered to be conservatively analyzed due to the following,

based on the LST analysis methodology for using the emissions threshold look-up table values that are described by SCAQMD[37]:

- Five acres or smaller in size – the Proposed Project's active work areas meet this requirement;
- Limited to eight-hours of operation per day, during the day – Not the case for the Proposed Project, which during offshore construction would operate over 24 hours a day (with dredging occurring overnight); and
- Emission sources are distributed evenly across proposed site – Not the case for the Proposed Project which consists of three discrete activity areas during the offshore construction, and two discrete areas during onshore construction.

On this basis, the LST methodology provides a conservative estimate of impacts for the offshore construction activities, which have been grouped into a single 5-acre area, and the onshore construction activities that have been grouped into a single 2-area area; and the offshore construction emissions are also evaluated against emissions thresholds developed based on shorter periods with higher peak emissions.

6.3.5. Odors

During the construction phase of the Proposed Project there would be a short-term increase in air pollutants primarily due to the combustion of diesel fuel from construction equipment and marine vessels, but also from the disturbance and movement of dredged material.

At the time of writing, it is understood that the dredging process is expected to take place on only 10 days within a 21-day span during the entire construction period. Dredged material would be transferred directly from the dredge, placed into an adjacent barge and transported out to the LA-2 ocean disposal site. During this process the distance between dredged material and the nearest sensitive receptor will be >500 meters. It is anticipated that any odors originating from dredged material would be short-term, limited in extent at any given time, and distributed throughout the area of proposed maritime works, and, therefore, dredge related odor emissions are not expected to affect a substantial number of individuals.

There is the potential for some individuals to find diesel combustion emissions an objectionable odor, however it is considered difficult to quantify such odorous impacts due to the complex mixture of chemicals in diesel exhaust fumes, the various odor thresholds of these constituent species, and the difficulty quantifying the potential for changes in perceived odors even when air contaminant concentrations are known. The mobile nature of odorous fumes would serve to disperse most Proposed Project emissions. Additionally, given the distance between Proposed Project emission sources and the nearest sensitive residential receptors (>500 meters), adequate dispersion of these emissions to below objectionable odor levels would be anticipated. Furthermore, the Proposed Project site is located within the POLB where existing industrial operations at nearby container terminals include freight and goods movement activities that use diesel trucks and diesel cargo-handling equipment generate similar diesel exhaust odors.

Within this context, the Proposed Project would not be likely to result in changes to the overall odor environment in the vicinity.

6.3.6. Toxic Air Contaminants (TACs)

The Project's primary source of air toxics emissions during construction is diesel particulate matter (DPM). From a health risk perspective, the quantity of DPM emissions and the related risk profile for DPM makes it the primary TAC of concern for the Project. The air toxics impacts are a long-term impact, so the DPM emissions for the entire Project period need to be considered. Due to the reduction in ship hoteling, above CARB regulatory requirements, the Project would reduce the overall long-term DPM emissions and TACs impacts. See Section 6.3.6 for additional information.

[37] SCAQMD (2008), Localized Significance Threshold Methodology.

6.4. Operation Impacts

6.4.1. SCAQMD Regional Thresholds - Operation

Table 6-7 summarizes estimated emissions during operation of the Proposed Project compared to CEQA baseline emissions. The Project's change to operation emissions is strictly based on the difference in the operation emissions of the existing/baseline cruise ship Splendor (existing worst-case day in SCAB waters) versus the operation emissions of the proposed cruise ship Panorama, including the associated incremental emissions from the increased traffic trips and parking garage use, and the increased on-site off-road equipment used for vessel loading/provisioning, These vessels arrive and leave on Saturdays, with all of the cruise ship SCAB emissions occurring during this one day each week, with no overlap with the Inspiration or Imagination which are not within SCAB waters on Saturdays. However, the Proposed Project would have a new worst-case day for emissions within SCAB waters, on Mondays where the Imagination cruises into Catalina, anchors/hotels for 9 hours, and then cruises down to Ensenada; and where the Inspiration cruises back to the LBCT from Ensenada, hotels at the LBCT for 12.5 hours (with 1.25 hours not on shore power), then cruises out towards Catalina. The detailed daily cruise ships activity assumptions at berth, anchorage, cruising in SCAB water, and cruising within State waters beyond the SCAB are provided in Appendix B.

The results presented indicate that the impact of the Proposed Project on peak daily operation emissions would not result in an exceedance of the SCAQMD thresholds for any pollutant. In fact, a decrease in emissions occurs as a result of the replacement of Carnival Splendor with the new Vista class vessel, the Carnival Panorama (see Table 6-7). The Panorama will utilize shoreside electrical power during berth hoteling where Splendor currently relies on power generated from the diesel electric engines for auxiliary and boilers loads.

Table 6-7 - Peak Daily Operation Emissions (lbs/day)

Source Category	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO	VOC
Baseline Cruise Ship Maximum Daily Emissions						
Splendor Max Day	141	130	6,607	217	596	271
Proposed Project						
Panorama Max Day	80	73	3,211	122	336	152
Insp./Imag. Max Day	113	104	5,308	174	479	218
Panorama Additional Incremental Emissions Sources						
On-Road Vehicles	9	3	13	<1	67	8
Off-road	<1	<1	1	<1	4	<1
Total other Panorama Incremental Emissions	9	3	14	<1	71	9
Net Maximum Day Change	-28	-26	-1,299	-43	-117	-53
Net Saturday Change	-52	-54	-3,382	-95	-189	-110
Significance Threshold	150	55	55	150	550	55
Threshold Exceeded?	No	No	No	No	No	No

Appendix B provides additional information regarding the estimated complete continuing emissions for the LBCT, including the total emissions from Carnival operations within the SCAB.

6.4.2. Localized Significance Thresholds - Operation

As total peak day project increment emissions during operation show a net reduction, including a large reduction in the Saturday at-berth emissions, the project could not result in increases of emissions near sensitive receptors and therefore comparison against LST operation thresholds has been scoped out.

6.4.3. Carbon Monoxide Hot Spot Analysis

Roads and intersections in the vicinity of the Proposed Project could experience an increase in congestion as a result of traffic generated by the operation phase of the Proposed Project, this in turn could generate localized increases in vehicular emissions. Congestion and idling vehicles are a primary source of increased CO concentrations. Under normal meteorological conditions, CO disperses rapidly with distance from the source. However, under certain meteorological conditions, CO concentrations in the vicinity of congested roads and intersections can reach levels of concern for sensitive receptors.

Modelling is often recommended to determine a projects potential CO effects where existing high ambient background CO concentrations have been monitored. Although existing CO concentrations in the immediate vicinity of the Proposed Project site are not available, ambient CO levels measured at both Port of Long Beach monitoring stations (Super Block and Gull Park) and the closest SCAQMD monitoring station (Webster) were well below the relevant NAAQS and CAAQS for CO. Table 6-8 presents maximum measured 1-hour and 8-hour concentrations of CO at these sites, which indicate the highest measured concentrations in CO in 2017, over both 1-hour and 8-hours periods, 5.4 and 4.7 ppm, respectively, occurred at the POLB Super Block site. These concentrations, which generally occur during peak traffic hours, are approximately 25% of the 1-hour and 50% of the 8-hour CO CAAQS.

Given that monitored CO concentrations in the vicinity of the Proposed Project site are well within NAAQS and CAAQS, and that CO emissions generated by project-related vehicles are not expected to result in CO concentrations that exceed state or federal CO standards, the impact of the Proposed Project on CO concentrations is not expected to be significant. Furthermore, increases to operation vehicle trips would occur on Saturdays and outside of the highest peak traffic hours on the local road network.

Table 6-8 - Measured CO Concentrations at POLB and Nearest SCAQMD Monitoring Stations

Averaging Time	Period	CO Concentration (ppm)				
		Super Block	Gull Park	Webster	NAAQS	CAAQS
1-hour	2017	5.4	2.1	3.9	35	20
8-hour	2017	4.7	1.7	2.6	9	9

6.4.4. Toxic Air Contaminants (TACs)

The Proposed Project is expected to result in a reduction in total SCAB and at-berth operation emissions of TACs, in the form of DPM emissions, due to the reduction of ship hoteling. This ship hoteling reduction would be at levels that are above the current and the currently proposed future CARB regulatory levels for shore power use. Additionally, this operation DPM emission reduction, at 1,800 pounds per year, would be at levels much higher than the one-time temporary construction DPM emissions, Therefore, the long-term impacts on concentrations of TACs at sensitive receptors resulting from Project operation is expected to be beneficial.

6.5. Greenhouse Gas Emissions Impact

The impact of the Proposed Project on GHG emissions has been estimated based on aggregated emissions from all sources over the duration of construction phase (i.e. the total number of days over which each item of construction equipment would in operation) combined with the incremental change to the annual operation emissions.

6.5.1. Construction Emissions

The construction phase of the Proposed Project would result in a temporary increase in GHG emissions. Construction-related GHG emissions include those associated with maritime works, site preparation, demolition, grading and associated garage construction. These emissions are associated with off-road diesel engine combustion from construction on-road vehicles and off-road equipment and construction harbor craft exhaust.

The most recent version of the CalEEMod model (Version 2016.3.2) was used to calculate onshore construction emissions, while maritime construction emissions were calculated following the methodology presented in the POLB AEI, as described in Section **Error! Reference source not found.**.

Table 6-9 quantifies the expected total unmitigated GHG emissions from construction activities, which indicates that construction of the Proposed Project would generate 885 MT of CO_2e. Amortized over a 30-year period, the approximate life of the project, the yearly contribution to GHG from the Proposed Project construction phase would be 30 MT of CO_2e per year.

Table 6-9 - Total Construction Phase GHG Emissions – Unmitigated

Source	CO_2e* (MT)
Offshore Construction	242
Onshore Construction	643
Total Construction Emissions	**885**

*CO_2e values have been calculated based on the Global Warming Potential (GWP) factors presented within the International Panel on Climate Change Assessment Report 5 (IPCC AR5). Factors used account for climate carbon feedback effects and are therefore considered conservative.

6.5.2. Operation Emissions

Operation GHG emissions have been estimated using combined outputs from emission calculations undertaken using CalEEMod, methodologies set out in the POLB AEI and EMFAC2014 on-road emission factors. The following activities associated with the Proposed Project could directly or indirectly contribute to the generation of GHG emissions:

- **Cruise Ship Emissions:** The Proposed Project would result in changes in GHG emissions from propulsion engines, auxiliary engines and auxiliary boilers. Project increment cruise ship emissions have been calculated based on the methodologies described in the POLB AEI (shown in Appendix C) and accounting for all emissions generated within the SCAB.
- **Electricity Consumption:** Annual emissions arising from garage lighting and cruise vessel shoreside electricity consumption were estimated using the reported GHG emissions per kilowatt-hour (kWh) for Southern California Edison; the supplier which would provide electricity for the Proposed Project. On-terminal electricity use was expected to remain unchanged with the project, while parking garage lighting electricity consumption is expected to reduce due to the introduction of more energy efficient lighting (LED); and shoreside power consumption for hoteling cruise ships was expected to increase due to the larger Panorama vessel.
- **Mobile Sources:** Transportation associated with the Proposed Project would result in GHG emissions from the combustion of fossil fuels during vehicle trips. Project generated vehicle trips include those associated with additional passenger and staff movements as well as additional supply trucks required to support the larger Panorama vessel. Mobile source emissions were calculated using the on-road emission factors from EMFAC2014 for project increment vehicle trips. For loading equipment, such as forklifts, emissions were calculated using CalEEMod.
- **Area and Off-road sources**: area sources include emissions generated by architectural coatings and landscaping equipment associated with the parking garage construction. Off-road emission sources were provided by Carnival and consist of additional forklifts required to support the larger

Panorama vessel. Emissions from both sources were calculated using CalEEMod and are established based on the Proposed Project parking garage land-use and additional information provided by Carnival.

As shown in Table 6-10, the annual GHG emissions would decrease as a result of the Proposed Project. Therefore, the Proposed Project would not exceed GHG emissions significance thresholds.

Table 6-10 - Construction and Project Incremental Operation GHG Emissions - Unmitigated

	Pollutant Emissions (metric tons/year)
Source	CO_2e
CEQA Baseline	
Cruise Ships	44,760
Electricity Use	2,440
Off-road Sources	229
Total CEQA Baseline	**47,429**
Proposed Project	
Amortized Construction Emissions	30
Operation Emissions	
Cruise Ships	39,482
Electricity Use	3,401
Incremental Traffic Increase	499
Off-road Sources	287
Total Operation Emissions	**43,699**
Total Emissions Increase/Decrease	**-3,730**
SCAQMD Incremental Threshold (mt/yr)	10,000
Threshold Exceeded?	No

6.6. Mitigation Measures

6.6.1. Standard Best Management Practices

The following emissions control measures are assumed to be implemented as standard best management practices (BMPs) during the construction phase of the Proposed Project. These include measures deemed compulsory in order for the Proposed Project to comply with relevant Port of Long Beach CAAP construction BMPs and SCAQMD rules and regulations.

Construction BMPs

Fugitive Dust Control: The project assumes that the Regulatory requirements for construction mitigation are not mitigation but are required control techniques to be indicated in Project specifications. These include:

- During clearing, grading, earthmoving, or excavation operations, excessive fugitive dust emissions will be controlled by regular watering or other dust preventive measures using the following procedures, as specified in the SCAQMD Rule 403.

- All material excavated or graded will be watered in sufficient quantities to prevent the generation of visible dust plumes. Watering will occur at least twice daily with complete coverage, preferably in the late morning and after construction work is complete for the day.
- All material transported on-site or off-site will be securely covered to prevent excessive amounts of dust.
- The area disturbed by clearing, grading, earth moving, or excavation operations will be minimized so as to prevent excessive amounts of dust.

In addition, where feasible, the following measures (the impacts of which has not been quantified within this assessment) will be implemented to reduce construction emissions;

- Minimize land disturbance
- Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas
- Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes
- Cover trucks when hauling dirt
- Stabilize the surface of dirt piles if not removed immediately
- Limit vehicular paths on unpaved surfaces and stabilize any temporary roads
- Minimize unnecessary vehicular and machinery activities
- Vacuum sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway
- Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities
- Ensure that all construction equipment is properly tuned and maintained
- Minimize idling time to 5 minutes, which saves fuel and reduces emissions
- Provide an operational water truck on-site at all times and use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas
- Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators

Off-road Engine Tier: It is assumed that the construction's terrestrial off-road equipment will be required to meet final Tier 4 emissions standards per the CAAP construction BMP.

Electric Dredges: It is assumed that the construction's dredge will be powered electrically by a shore power connection per the CAAP construction BMP.

Construction Tug Boat Engine Tier: It is assumed that if appropriately sized tug boats with Tier 3 or higher engines are available they will be used.

All of these standard BMPs may also be formalized as mitigation measures.

6.6.2. Project Specific Mitigation Measures

In addition to the standard best management practice measures described above, one additional project specific measure is recommended to ensure the Proposed Project would not result in exceedance of relevant air pollutant emission thresholds.

Construction Mitigation

The following mitigation measures, would be employed to reduce emissions associated with project construction activities:

Emissions Offsets: It is assumed that NOx emissions offsets will be obtained in sufficient quantities to reduce the maximum daily construction NOx emissions below the significance threshold of 100 pounds per day. The quantity of these offsets will be determined based on whether or not tug boats of appropriate size that meet Tier 3 standards would be used.

Operation Mitigation

Based on the results presented within this assessment, the incremental change in emissions generated by the Proposed Project in operation would result in impacts below the thresholds of significance. As such, no mitigation of the Proposed Project operation phase is considered necessary.

Appendix A

Construction Emissions

Long Beach Cruise Terminal Improvement Project

Construction - Offshore Construction Schedule and Equipment Assumptions

Construction Phase	Work Activity (subphase)	Start Date	End Date	No. Work Days	Shift Hours	Workers/Day	Equipment
Pile Driving							
	Mobilization - Pile Driving Barge/ Derrick 1	8/27/2019	9/15/2019	15 days	8	7	
	Pile Driving - Passenger Bridge Cap	9/16/2019	9/18/2019	3 days	10	7	Derrick 1
	Pile Driving - South Dolphin	9/19/2019	9/25/2019	5 days	10	7	Derrick 1
	Pile Driving - North Dolphin	9/26/2019	10/2/2019	5 days	10	7	Derrick 1
Construction							
	Mobilize Falsework Barge/ Derrick 2	9/13/2019	9/18/2019	5 days	8	7	
	Passenger Bridge Cap - Construction	9/19/2019	10/9/2019	15 days	10	7	Derrick 2
	Passenger Bridge - Install Transition Tower	8/23/2019	9/18/2019	20 days	8	7	Derrick 1
	Install Expansion Tower & Bridge	10/10/2019	11/6/2019	20 days	10	7	Derrick 2
	South Dolphin - Construction	11/7/2019	12/11/2019	25 days	10	7	Derrick 2
	North Dolphin - Construction	10/3/2019	11/6/2019	25 days	10	7	Derrick 1
	Other Work	11/7/2019	12/11/2019	25 days	8	7	Derrick 2
	Demobilize Derrick 1	12/12/2019	12/18/2019	5 days	8	7	
	Demobilize Derrick 2	12/12/2019	12/18/2019	5 days	8	7	
Dredging							
	Dredge - Mobilization	10/3/2019	10/9/2019	5 days	8	4	
	Dredge Template	10/10/2019	10/23/2019	10 days	12	4	Dredge, Tugs
	Offshore Placement	10/10/2019	10/23/2019	10 days	12	4	Harbor Tug
	Dredging - Demobilization	10/24/2019	10/30/2019	5 days	12	4	

Vessel	Engine Type	Engine Manufacturer	Engine Model	Engine Year	BHP	% Operating	Average Engine Operating Hours/Day
Derrick 2	Main Gen.	Detroit Diesel	S-60	2004	450	50%	4.8
Derrick 2	Auxiliary Gen.	John Deere	6068HF285	2008	235	25%	2.4
Derrick 2	Hydraulic	Caterpillar	C6.6	2007	202	25%	2.4
Dredge	Main Gen.	Caterpillar	3512C	2007	2206	0.75	9
Dredge	Auxiliary Gen.	John Deere	6068HF485	2009	485	0.25	3
Derrick 1	Main Gen.	Detroit Diesel	S-60	2002	500	50%	4.8
Derrick 1	Main Hoist	Detroit Diesel	S-60	2003	635	50%	4.8
Derrick 1	Auxiliary Gen.	John Deere	5030H 285	2008	80	25%	2.4
Derrick 1	Deck Winch #1	Caterpillar	C6.6	2008	173	25%	2.4
Derrick 1	Deck Winch #2	Caterpillar	C6.6	2008	173	25%	2.4

Long Beach Cruise Terminal Improvement Project

Construction - Offshore Construction Tug Activity Assumptions

	Tender Tug - 1000 HP					Harbor Tug - 1500 HP				
	Minutes at Specific RPM				Activity	Minutes at Specific RPM				Activity
Time	800	2000	3000	0	Description	800	1200	2800	0	Description
19:00	45	8	7		Position dredge	45	8	7		Position barges
20:00	60				Standby	60				Standby
21:00	55	3	2		Position dredge	60				Standby
22:00	55	3	2		Position dredge	60				Standby
23:00	55	3	2		Position dredge		30	30		Sail
0:00	55	3	2		Position dredge			60		Sail
1:00	55	3	2		Position dredge		30	30		Sail
2:00	55	3	2		Position dredge	60				Standby
3:00	55	3	2		Position dredge	60				Standby
4:00	55	3	2		Position dredge	60				Standby
5:00	45	8	7		Position dredge		30	30		Sail
6:00				60	Engines off		15	45		Sail
7:00				60	Engines off		30	30		Sail
8:00				60	Engines off				60	Engines off
9:00				60	Engines off				60	Engines off
10:00				60	Engines off				60	Engines off
11:00				60	Engines off				60	Engines off
12:00				60	Engines off				60	Engines off
13:00				60	Engines off				60	Engines off
14:00				60	Engines off				60	Engines off
15:00				60	Engines off				60	Engines off
16:00				60	Engines off				60	Engines off
17:00				60	Engines off				60	Engines off
18:00				60	Engines off				60	Engines off
Totals	590	40	30	780		405	143	232	660	
Load	10%	80%	100%			10%	30%	90%		

Avg Load	18%	
Hours	11	

On-Site	Avg Load	12%
	Hours	7
Off-Site	Average L	68%
	Hours	6

Long Beach Cruise Terminal Improvement Project

Construction - Harborcraft Emissions Factor References

Engine Tier Assumptions

POLB Air Emission Inventory 2014

Table 3.5: Harbor Craft Marine Engine EPA Tier Levels

EPA Tier Level	Marine Engine Model Year	Horsepower
Tier 0	1999 and older	All
Tier 1	2000 to 2003	< 500
	2000 to 2006	> 500
Tier 2	2004 up to Tier 3 below	< 500
	2007 up to Tier 3 below	> 500
Tier 3	2009 and newer	0 to 120
	2013 and newer	> 120 to 175
	2014 and newer	> 175 to 500
	2013 and newer	> 500 to 750
	2012 to 2017	> 750 to 1,900
	2013 to 2016	> 1,900 to 3,300
	2014 to 2016	> 3,300

Base Emissions Factor Source for Main and Auxilairy Engines

POLB Air Emission Inventory 2013

Appendix C: Harbor Craft

http://www.polb.com/environment/air/emissions.asp

(not reprinted due to length)

Engine Deterioration Assumption Sources.

POLB Air Emission Inventory 2013

Table 3.5: Engine Deterioration Factors for Harbor Craft Diesel Engines

Horsepower Range	PM	NO"	CO	HC
25-50	0.31	0.06	0.41	0.51
51-250	0.44	0.14	0.16	0.28
> 251	0.67	0.21	0.25	0.44

Long Beach Cruise Terminal Improvement Project

Construction - Harborcraft Emissions Factor References

Engine Deterioration Calculation Source

https://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf

Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

CARB 2012

B. Methodology

1. Overview

The basic equation for the estimating emissions from a commercial harbor craft engine is:

$$E = EF_0 \times F \times (1 + D \times \frac{A}{UL}) \times HP \times LF \times Hr$$

Where:

E is the amount of emissions of a pollutant (ROG, CO, NOx, or PM) emitted during one period;

EF₀ is the model year, horsepower and engine use (propulsion or auxiliary) specific zero hour emission factor (when engine is new);

F is the fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel;

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

A is the age of the engine when the emissions are estimated;

UL is the vessel type and engine use specific engine useful life;

HP is rated horsepower of the engine;

LF is the vessel type and engine use specific engine load factor;

Hr is the number of annual operating hours of the engine.

Engine Useful Life Assumption Source.

POLB Air Emission Inventory 2013

Table 3.6: Useful Llfe by Harbor Craft Type, years

Harbor Craft Type	Auxiliary Engines	Main Engines
Assist tug	23	21
Crew boat	28	28
Excursion.	20	20
Ferry	20	20
Government	25	19
Ocean tug	25	26
Tugboat	30	21
Work boat	28	28

Fuel Correction Factor Assumption Source
POLB Air Emission Inventory 2013

3.5.5 Fntl Com,t:tion Fae.tor,
Fuel correction factors developed for commercial harbor craft assume engines use diesel fuel with higher sulfur content. To account for the required use of ULSD in harbor craft engines, the fuel conection factors shown in Table 3.7 account for the use of ULSD in harbo.i: craft engines by equipment model year (i\IY). Tl1e fuel conection factor for SO= reflects the change from dieseil fl.1el with an aYerage su:lfur content of 350 parts per million (ppm) to ULSD (15 ppm). There is no aYailabHe data that reflects dle effect of different fuels on N10 and CH, emissions, so it is assumed that the fuel conection factor foi: NO= is also applicable to N!O emissions and the fuel correction factor for H C is also applicable to CH, emissions, since N10 is an oxide of nitrogen and CH, is a component of hydrocarbons.

Table3.7: Harbor Craft ULSD Fuel Correction Factors

Equipment MY	PM	NO"	SO.	CO	HC	CO_2	N_{20}	C
1995 and older	0.720	0.930	0.043	1	0.72	1	0.930	0.72
1996 to 2010	0.800	0.948	0.043	1	0.72	1	0.948	0.72
2011 and newer	0.852	0.948	0.043	1	0.72	1	0.948	0.72

Long Beach Cruise Terminal Improvement Project

Construction - Offshore Construction Emissions Calculations

Assumptions:

1) The dredge is electric powered, so no emissions are calculated for the dredge.

2) The propulsion engines from the tugboats and the derrick barges assume POLB EI emissions factors for harbor craft propulsion engines. The assumed engine year defines the Engine Tier assumption.

3) The derrick barge equipment engines are conservatively assumed to have the same emissions factors as those for harbor craft auxiliary engines provided in the POLB EI.

4) Engine deterioration factors is included in the determination of the emissions factors per POLB EI guidance.

5) Total Emissions are based on multiplying the number of days of operation of each vessel by that vessels daily emissions.

Vessel	Engine Type	Engine Manufacturer	Engine Model	Engine Year	BHP	kw	Engine Type	% Operating	PM	NOX	502	CO	HC	CO2	N20	CH4	
Derrick 2	Main Gen.	Detroit Diesel	S-60	2004	450	336	Main	0.5	0.20	6.84	0.17	5.00	0.91	652	0.031	0.018	
Derrick 2	Auxiliary Gen.	John Deere	6068HF285	2008	235	175	Aux	0.25	0.20	6.84	0.17	5.00	1.09	652	0.031	0.022	
Derrick 2	Hydraulic	Caterpillar	C6.6	2007	202	151	Aux	0.25	0.20	6.84	0.17	5.00	1.09	652	0.031	0.022	
Derrick 1	Main Gen.	Detroit Diesel	S-60	2002	500	373	Main	0.5	0.48	9.80	0.17	2.64	0.91	652	0.031	0.02	Tier 1 Used if pre 2014
Derrick 1	Main Hoist	Detroit Diesel	S-60	2003	635	474	Aux	0.5	0.43	9.80	0.17	3.73	1.09	652	0.031	0.022	Tier 1 Used if pre 2014
Derrick 1	Auxiliary Gen.	John Deere	5030H 285	2008	80	60	Aux	0.25	0.40	7.13	0.17	5.00	1.58	652	0.031	0.032	
Derrick 1	Deck Winch #1	Caterpillar	C6.6	2008	173	129	Aux	0.25	0.29	6.84	0.17	5.00	1.09	652	0.031	0.022	
Derrick 1	Deck Winch #2	Caterpillar	C6.6	2008	173	129	Aux	0.25	0.29	6.84	0.17	5.00	1.09	652	0.031	0.022	
Tug 1	Main	N/A	N/A	2009	2000	1491	Main	0.65	0.27	7.41	0.17	5.00	0.91	652	0.031	0.018	
Tug 1	Auxiliary Gen.	N/A	N/A	2009	78	58	Aux	0.25	0.29	7.13	0.17	5.00	1.58	652	0.031	0.032	
Tug 2	Main	N/A	N/A	2009	1200	895	Main	0.25	0.27	7.41	0.17	5.00	0.91	652	0.031	0.018	
Tug 2	Auxiliary Gen.	N/A	N/A	2009	78	58	Aux	0.25	0.29	7.13	0.17	5.00	1.58	652	0.031	0.032	

Long Beach Cruise Terminal Improvement Project

Construction - Offshore Construction Emissions Calculations

Vessel		Pollutant	Emission Factor - New	No. of units	Deterioration Rate	Age	Expected Life Time	Fuel Correction (ULSD)	Deterioration factor	Year	Horse Power	Kw	Load Factor	Operating time/ utilization	Emission / hour (g/h)	Emission/ hour (lb/h)	Hours	Emission /Day (lbid)
Derrick 2	Main Gen.	PM	0.20	1	0.67	15	28	0.8	1.36	2004	450	336	0.75	0.5	27.36	0.06	10	0.60
		NOX	6.84	1	0.21	15	28	0.948	1.11		450	336	0.75	0.5	907.78	2.00	10	20.01
		SO2	0.17	1		15	28	0.043	1.00		450	336	0.75	0.5	0.92	0.00	10	0.02
		CO	5.00	1	0.25	15	28	1	1.13		450	336	0.75	0.5	713.46	1.57	10	15.73
		HC	0.91	1	0.44	15	28	0.72	1.24		450	336	0.75	0.5	101.88	0.22	10	2.25
		CO2	652.00	1		15	28	1	1.00		450	336	0.75	0.5	82,046.98	180.88	10	1,808.82
		N2O	0.031	1		15	28	0.948	1.00		450	336	0.75	0.5	3.70	0.01	10	0.08
		CH4	0.018	1		15	28	0.72	1.00		450	336	0.75	0.5	1.63	0.00	10	0.04
Derrick 2	Auxiliary Gen.	PM	0.20	1	0.44	11	28	0.8	1.17	2008	235	175	0.32	0.25	2.63	0.01	10	0.06
		NOX	6.84	1	0.14	11	28	0.948	1.06		235	175	0.32	0.25	95.91	0.21	10	2.11
		SO2	0.17	1		11	28	0.043	1.00		235	175	0.32	0.25	0.10	0.00	10	0.00
		CO	5.00	1	0.16	11	28	1	1.06		235	175	0.32	0.25	74.50	0.16	10	1.64
		HC	1.09	1	0.28	11	28	0.72	1.11		235	175	0.32	0.25	12.21	0.03	10	0.27
		CO2	652.00	1		11	28	1	1.00		235	175	0.32	0.25	9,140.64	20.15	10	201.52
		N2O	0.031	1		11	28	0.948	1.00		235	175	0.32	0.25	0.41	0.00	10	0.01
		CH4	0.022	1		11	28	0.72	1.00		235	175	0.32	0.25	0.22	0.00	10	0.00
Derrick 2	Hydraulic	PM	0.2	1	0.44	12	28	0.8	1.19	2007	202	151	0.54	0.25	3.87	0.01	10	0.09
		NOX	6.84	1	0.14	12	28	0.948	1.06		202	151	0.54	0.25	139.77	0.31	10	3.08
		SO2	0.17	1		12	28	0.043	1.00		202	151	0.54	0.25	0.15	0.00	10	0.00
		CO	5	1	0.16	12	28	1	1.07		202	151	0.54	0.25	108.65	0.24	10	2.40
		HC	1.09	1	0.28	12	28	0.72	1.12		202	151	0.54	0.25	17.87	0.04	10	0.39
		CO2	652	1		12	28	1	1.00		202	151	0.54	0.25	13,258.79	29.23	10	292.31
		N2O	0.031	1		12	28	0.948	1.00		202	151	0.54	0.25	0.60	0.00	10	0.01
		CH4	0.022	1		12	28	0.72	1.00		202	151	0.54	0.25	0.32	0.00	10	0.01
Derrick 1	Main Gen.	PM	0.48	1	0.67	17	28	0.8	1.41	2002	500	373	0.75	0.5	75.5	0.2	10	1.7
		NOX	9.8	1	0.21	17	28	0.948	1.13		500	373	0.75	0.5	1,464.6	3.2	10	32.3
		SO2	0.17	1		17	28	0.043	1.00		500	373	0.75	0.5	1.0	0.0	10	0.0
		CO	2.64	1	0.25	17	28	1	1.15		500	373	0.75	0.5	425.2	0.9	10	9.4
		HC	0.91	1	0.44	17	28	0.72	1.27		500	373	0.75	0.5	116.1	0.3	10	2.6
		CO2	652	1		17	28	1	1.00		500	373	0.75	0.5	91,163.3	201.0	10	2,009.8
		N2O	0.031	1		17	28	0.948	1.00		500	373	0.75	0.5	4.1	0.0	10	0.1
		CH4	0.018	1		17	28	0.72	1.00		500	373	0.75	0.5	1.8	0.0	10	0.0
Derrick 1	Main Hoist	PM	0.43	1	0.67	16	28	0.8	1.38	2003	635	474	0.31	0.5	34.9	0.1	10	0.8
		NOX	9.8	1	0.21	16	28	0.948	1.12		635	474	0.31	0.5	763.7	1.7	10	16.8
		SO2	0.17	1		16	28	0.043	1.00		635	474	0.31	0.5	0.5	0.0	10	0.0
		CO	3.73	1	0.25	16	28	1	1.14		635	474	0.31	0.5	312.9	0.7	10	6.9
		HC	1.09	1	0.44	16	28	0.72	1.25		635	474	0.31	0.5	72.1	0.2	10	1.6
		CO2	652	1		16	28	1	1.00		635	474	0.31	0.5	47,854.7	105.5	10	1,055.0
		N2O	0.031	1		16	28	0.948	1.00		635	474	0.31	0.5	2.2	0.0	10	0.0
		CH4	0.022	1		16	28	0.72	1.00		635	474	0.31	0.5	1.2	0.0	10	0.0
Derrick 1	Auxiliary Gen.	PM	0.4	1	0.44	11	28	0.8	1.17	2008	80	60	0.32	0.25	1.8	0.0	10	0.0
		NOX	7.13	1	0.14	11	28	0.948	1.06		80	60	0.32	0.25	34.0	0.1	10	0.8
		SO2	0.17	1		11	28	0.043	1.00		80	60	0.32	0.25	0.0	0.0	10	0.0
		CO	5	1	0.16	11	28	1	1.06		80	60	0.32	0.25	25.4	0.1	10	0.6
		HC	1.58	1	0.28	11	28	0.72	1.11		80	60	0.32	0.25	6.0	0.0	10	0.1
		CO2	652	1		11	28	1	1.00		80	60	0.32	0.25	3,111.7	6.9	10	68.6
		N2O	0.031	1		11	28	0.948	1.00		80	60	0.32	0.25	0.1	0.0	10	0.0
		CH4	0.032	1		11	28	0.72	1.00		80	60	0.32	0.25	0.1	0.0	10	0.0
Derrick 1	Deck Winch #1	PM	0.29	1	0.44	11	28	0.8	1.17	2008	173	129	0.31	0.25	2.7	0.0	10	0.1
		NOX	6.84	1	0.14	11	28	0.948	1.06		173	129	0.31	0.25	68.4	0.2	10	1.5
		SO2	0.17	1		11	28	0.043	1.00		173	129	0.31	0.25	0.1	0.0	10	0.0
		CO	5	1	0.16	11	28	1	1.06		173	129	0.31	0.25	53.1	0.1	10	1.2
		HC	1.09	1	0.28	11	28	0.72	1.11		173	129	0.31	0.25	8.7	0.0	10	0.2
		CO2	652	1		11	28	1	1.00		173	129	0.31	0.25	6,518.8	14.4	10	143.7
		N2O	0.031	1		11	28	0.948	1.00		173	129	0.31	0.25	0.3	0.0	10	0.0
		CH4	0.022	1		11	28	0.72	1.00		173	129	0.31	0.25	0.2	0.0	10	0.0

Long Beach Cruise Terminal Improvement Project

Construction - Offshore Construction Emissions Calculations

Derrick 1	Deck Winch #2	PM	0.29	1	0.44	11	28	0.8	1.17	2008	173	129	0.31	0.25	2.7	0.0	10	0.1
		NOX	6.84	1	0.14	11	28	0.948	1.06		173	129	0.31	0.25	68.4	0.2	10	1.5
		SO2	0.17	1		11	28	0.043	1.00		173	129	0.31	0.25	0.1	0.0	10	0.0
		CO	5	1	0.16	11	28	1	1.06		173	129	0.31	0.25	53.1	0.1	10	1.2
		HC	1.09	1	0.28	11	28	0.72	1.11		173	129	0.31	0.25	8.7	0.0	10	0.2
		CO2	652	1		11	28	1	1.00		173	129	0.31	0.25	6,518.8	14.4	10	143.7
		N2O	0.031	1		11	28	0.948	1.00		173	129	0.31	0.25	0.3	0.0	10	0.0
		CH4	0.022	1		11	28	0.72	1.00		173	129	0.31	0.25	0.2	0.0	10	0.0
Harbor Tug	Main	PM	0.27	1	0.67	10	21	0.8	1.32	2009	2000	1491	12%	1	49.8	0.1	7	0.8
On-Site		NOX	7.41	1	0.21	10	21	0.948	1.10		2000	1491	12%	1	1,350.0	3.0	7	20.8
		SO2	0.17	1		10	21	0.043	1.00		2000	1491	12%	1	1.3	0.0	7	0.0
		CO	5	1	0.25	10	21	1	1.12		2000	1491	12%	1	977.5	2.2	7	15.1
		HC	0.91	1	0.44	10	21	0.72	1.21		2000	1491	12%	1	138.5	0.3	7	2.1
		CO2	652	1		10	21	1	1.00		2000	1491	12%	1	113,910.7	251.1	7	1,757.9
		N2O	0.031	1		10	21	0.948	1.00		2000	1491	12%	1	5.1	0.0	7	0.1
		CH4	0.018	1		10	21	0.72	1.00		2000	1491	12%	1	2.3	0.0	7	0.0
Harbor Tug	Auxiliary Gen.	PM	0.29	1	0.44	10	23	0.8	1.19	2009	78	58	0.43	0.25	1.7	0.0	7	0.0
On-Site		NOX	7.13	1	0.14	10	23	0.948	1.06		78	58	0.43	0.25	44.8	0.1	7	0.7
		SO2	0.17	1		10	23	0.043	1.00		78	58	0.43	0.25	0.0	0.0	7	0.0
		CO	5	1	0.16	10	23	1	1.07		78	58	0.43	0.25	33.4	0.1	7	0.5
		HC	1.58	1	0.28	10	23	0.72	1.12		78	58	0.43	0.25	8.0	0.0	7	0.1
		CO2	652	1		10	23	1	1.00		78	58	0.43	0.25	4,076.8	9.0	7	62.9
		N2O	0.031	1		10	23	0.948	1.00		78	58	0.43	0.25	0.2	0.0	7	0.0
		CH4	0.032	1		10	23	0.72	1.00		78	58	0.43	0.25	0.1	0.0	7	0.0
Harbor Tug	Main	PM	0.27	1	0.67	10	21	0.8	1.32	2009	2000	1491	68%	1	286.8	0.6	6	3.8
Off-Site		NOX	7.41	1	0.21	10	21	0.948	1.10		2000	1491	68%	1	7,779.0	17.1	6	102.9
		SO2	0.17	1		10	21	0.043	1.00		2000	1491	68%	1	7.4	0.0	6	0.1
		CO	5	1	0.25	10	21	1	1.12		2000	1491	68%	1	5,632.8	12.4	6	74.5
		HC	0.91	1	0.44	10	21	0.72	1.21		2000	1491	68%	1	797.8	1.8	6	10.6
		CO2	652	1		10	21	1	1.00		2000	1491	68%	1	656,375.8	1,447.1	6	8,682.4
		N2O	0.031	1		10	21	0.948	1.00		2000	1491	68%	1	29.6	0.1	6	0.4
		CH4	0.018	1		10	21	0.72	1.00		2000	1491	68%	1	13.0	0.0	6	0.2
Harbor Tug	Auxillary Gen.	PM	0.29	1	0.44	10	23	0.8	1.19	2009	78	58	0.43	0.25	1.7	0.0	6	0.0
Off-Site		NOX	7.13	1	0.14	10	23	0.948	1.06		78	58	0.43	0.25	44.8	0.1	6	0.6
		SO2	0.17	1		10	23	0.043	1.00		78	58	0.43	0.25	0.0	0.0	6	0.0
		CO	5	1	0.16	10	23	1	1.07		78	58	0.43	0.25	33.4	0.1	6	0.4
		HC	1.58	1	0.28	10	23	0.72	1.12		78	58	0.43	0.25	8.0	0.0	6	0.1
		CO2	652	1		10	23	1	1.00		78	58	0.43	0.25	4,076.8	9.0	6	53,9
		N2O	0.031	1		10	23	0.948	1.00		78	58	0.43	0.25	0.2	0.0	6	0.0
		CH4	0.032	1		10	23	0.72	1.00		78	58	0.43	0.25	0.1	0.0	6	0.0
Tender Tug	Main	PM	0.27	1	0.67	10	21	0.8	1.32	2009	1200	895	18%	1	46.7	0.1	11	1.1
		NOX	7.41	1	0.21	10	21	0.948	1.10		1200	895	18%	1	1,267.7	2.8	11	30.7
		SO2	0.17	1		10	21	0.043	1.00		1200	895	18%	1	1.2	0.0	11	0.0
		CO	5	1	0.25	10	21	1	1.12		1200	895	18%	1	917.9	2.0	11	22.3
		HC	0.91	1	0.44	10	21	0.72	1.21		1200	895	18%	1	130.0	0.3	11	3.2
		CO2	652	1		10	21	1	1.00		1200	895	18%	1	106,965.0	235.8	11	2,594.0
		N2O	0.031	1		10	21	0.948	1.00		1200	895	18%	1	4.8	0.0	11	0.1
		CH4	0.018	1		10	21	0.72	1.00		1200	895	18%	1	2.1	0.0	11	0.1
Tender Tug	Auxillary Gen.	PM	0.29	1	0.44	10	23	0.8	1.19	2009	78	58	0.43	0.25	1.7	0.0	11	0.0
		NOX	7.13	1	0.14	10	23	0.948	1.06		78	58	0.43	0.25	44.8	0.1	11	1.1
		SO2	0.17	1		10	23	0.043	1.00		78	58	0.43	0.25	0.0	0.0	11	0.0
		CO	5	1	0.16	10	23	1	1.07		78	58	0.43	0.25	33.4	0.1	11	0.8
		HC	1.58	1	0.28	10	23	0.72	1.12		78	58	0.43	0.25	8.0	0.0	11	0.2
		CO2	652	1		10	23	1	1.00		78	58	0.43	0.25	4,076.8	9.0	11	98.9
		N2O	0.031	1		10	23	0.948	1.00		78	58	0.43	0.25	0.2	0.0	11	0.0
		CH4	0.032	1		10	23	0.72	1.00		78	58	0.43	0.25	0.1	0.0	11	0.0

Total Construction Vessel Emissions (lbs/day)

Pollutant	All Emissions	SCAQMD Peak Day Threshold	On-Site Emissions
PM	9	150	5
NOX	235	100	131
SO2	0.21	150	0
CO	153	550	78
HC	24	75	13
CO2	18,973	–	10,237
N2O	0.86	–	–
CH4	0.39	--	--
CO2e	19,211	--	--

Emissions by Source (lbs/day)

Derrick 2	Derrick 1	Tugs On-Site	Tugs Off-Site
0.75	2.59	1.97	3.82
25.21	52.89	53.36	103.49
0.03	0.04	0.05	0.10
19.77	19.17	38.67	74.95
2.91	4.67	5.61	10.66
2,303	3,421	4,514	8,736
0.10	0.15	0.20	0.39
0.05	0.07	0.09	0.17
2,331	3,464	4,570	8,846

Total Emissions (tons, MT for CO2e)

Days	85	58	10	10	
	Derrick 2	**Derrick 1**	**Tugs On-Site**	**Tugs Off-Site**	Total
	0.03	0.08	0.01	0.02	0.14
	1.07	1.53	0.27	0.52	3.39
	0.00	0.00	0.00	0.00	0.00
	0.84	0.56	0.19	0.37	1.96
	0.12	0.14	0.03	0.05	0.34
	97.86	99.20	22.57	43.68	263.32
	0.00	0.00	0.00	0.00	0.01
	0.00	0.00	0.00	0.00	0.01
	90	91	21	40	241.88

Carnival Cruise

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Unenclosed Parking with Elevator	302.80	1000sqft	1.80	302,800.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	11			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - File edited to remove on-road equipment set as off-road equipment and add trips for the tunnel fill imports

Land Use - Lot Acreage based on development footprint as multi story

Construction Phase - Dates changed from default to reflect proposed schedule (edited to separate north and south work activities)

Off-road Equipment - Provided by Carnival (edited to remove off-road trucks, and scraper, replaced scraper cold planer (surfacing equipment) with horsepower of 325 [CAT PM312], and added grader)

Trips and VMT - No. of workers per day edited (edited to include an additional 250 import trips for tunnel fill in the site preparation phase, worker trip distance edited to one way distance of 15 miles per SCAG RTP)

Grading - Areas changed to reflect project (added tunnel fill to site preparation south)

Architectural Coating - No residential aspect - changed to zero, (distributed surface area originally estimated as 18,128 to interior and exterior (1/2 interior). May overestimate if zero VOC coatings are used.)

Construction Off-road Equipment Mitigation - POLB Commitment for tier 4 Final Construction Equipment. Water spray 2 x per day minimum in accordance with Rule 403 best practice.

Off-road Equipment - (Edited to match applicant construction equipment list)

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	4.8261	55.5801	29.4312	0.0695	12.0443	2.3025	14.3467	5.7950	2.1188	7.9139	0.0000	6,963.6463	6,963.6463	1.8785	0.0000	7,010.6097
2020	7.0619	69.6228	46.5990	0.0897	21.1702	3.0227	24.1929	11.0265	2.7813	13.8078	0.0000	8,729.5985	8,729.5985	2.0290	0.0000	8,780.3226
Maximum	**7.0619**	**69.6228**	**46.5990**	**0.0897**	**21.1702**	**3.0227**	**24.1929**	**11.0265**	**2.7813**	**13.8078**	**0.0000**	**8,729.5985**	**8,729.5985**	**2.0290**	**0.0000**	**8,780.3226**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.9352	6.9168	37.8350	0.0695	5.7900	0.1103	5.8989	2.7059	0.1095	2.8139	0.0000	6,963.6463	6,963.6463	1.8785	0.0000	7,010.6097
2020	2.7911	6.8288	52.7119	0.0897	9.8596	0.1336	9.9738	5.0503	0.1329	5.1640	0.0000	8,729.5985	8,729.5985	2.0290	0.0000	8,780.3226
Maximum	**2.7911**	**6.9168**	**52.7119**	**0.0897**	**9.8596**	**0.1336**	**9.9738**	**5.0503**	**0.1329**	**5.1640**	**0.0000**	**8,729.5985**	**8,729.5985**	**2.0290**	**0.0000**	**8,780.3226**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**68.65**	**89.02**	**-19.09**	**0.00**	**52.88**	**95.42**	**58.81**	**53.89**	**95.05**	**63.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition South	Demolition	10/19/2019	11/30/2019	5	30	
2	Demolition North	Demolition	11/23/2019	1/15/2020	5	38	
3	Site Preparation South	Site Preparation	12/2/2019	2/3/2020	5	46	
4	Grading South	Grading	12/2/2019	2/3/2020	5	46	
5	Site Preparation North	Site Preparation	1/16/2020	3/19/2020	5	46	
6	Grading North	Grading	1/16/2020	3/19/2020	5	46	
7	Building Construction South	Building Construction	2/4/2020	8/26/2020	5	147	
8	Building Construction North	Building Construction	3/20/2020	9/7/2020	5	122	
9	Architectural Coating South	Architectural Coating	7/7/2020	10/29/2020	5	83	
10	Architectural Coating North	Architectural Coating	7/20/2020	10/31/2020	5	75	
11	Arch Coating Ext. South	Architectural Coating	8/5/2020	9/22/2020	5	35	
12	Arch Coating Ext. North	Architectural Coating	8/17/2020	10/2/2020	5	35	
13	Paving	Paving	8/27/2020	10/18/2020	5	37	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 1.8

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 6,000 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition South	Excavators	2	8.00	158	0.73
Demolition South	Forklifts	1	6.00	89	0.20
Site Preparation South	Graders	1	8.00	187	0.41
Site Preparation South	Rubber Tired Dozers	1	7.00	247	0.40
Site Preparation South	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading South	Graders	1	6.00	187	0.41
Grading South	Rubber Tired Dozers	1	6.00	247	0.40
Grading South	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction South	Cranes	1	4.00	231	0.29
Building Construction South	Forklifts	3	8.00	89	0.20
Building Construction South	Pumps	1	8.00	84	0.74
Building Construction South	Sweepers/Scrubbers	1	4.00	64	0.46
Building Construction South	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating South	Air Compressors	1	6.00	78	0.48
Paving	Cranes	1	8.00	231	0.29
Paving	Forklifts	2	5.00	89	0.20
Paving	Pavers	4	8.00	130	0.42
Paving	Rollers	1	8.00	80	0.38
Paving	Surfacing Equipment	1	8.00	325	0.30
Paving	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Architectural Coating North	Air Compressors	1	6.00	78	0.48
Arch Coating Ext. North	Air Compressors	1	6.00	78	0.48
Arch Coating Ext. South	Air Compressors	1	6.00	78	0.48
Building Construction North	Cranes	1	4.00	231	0.29

Carnival Cruise - South Coast Air Basin, Summer

Building Construction North	Forklifts	3	8.00	89	0.20
Grading North	Graders	1	6.00	187	0.41
Site Preparation North	Graders	1	8.00	187	0.41
Grading North	Rubber Tired Dozers	1	6.00	247	0.40
Site Preparation North	Rubber Tired Dozers	1	7.00	247	0.40
Building Construction North	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading North	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation North	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition North	Excavators	2	8.00	158	0.38
Demolition North	Rubber Tired Loaders	2	8.00	203	0.36
Demolition North	Forklifts	1	6.00	89	0.20
Demolition South	Rubber Tired Loaders	2	8.00	203	0.36
Building Construction North	Pumps	1	8.00	84	0.74
Building Construction North	Sweepers/Scrubbers	1	4.00	64	0.46
Paving	Graders	1	4.00	187	0.41

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition South	5	13.00	2.00	180.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation South	3	8.00	2.00	310.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading South	3	8.00	2.00	0.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Building Construction South	7	15.00	2.00	300.00	14.70	6.90	15.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating South	1	6.00	2.00	16.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Paving	12	24.00	2.00	90.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating North	1	6.00	0.00	16.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Arch Coating Ext. North	1	6.00	0.00	20.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Arch Coating Ext. South	1	6.00	2.00	20.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Building Construction North	7	15.00	0.00	300.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Demolition North	5	13.00	0.00	180.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading North	3	8.00	0.00	0.00	14.70	6.90	10.00	LD_Mix	HDT_Mix	HHDT
Site Preparation North	3	8.00	0.00	60.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition South - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9259	0.0000	1.9259	0.2916	0.0000	0.2916			0.0000			0.0000
Off-Road	1.9192	21.0280	16.7908	0.0335		0.9036	0.9036		0.8313	0.8313		3,314.8997	3,314.8997	1.0488		3,341.1197
Total	**1.9192**	**21.0280**	**16.7908**	**0.0335**	**1.9259**	**0.9036**	**2.8295**	**0.2916**	**0.8313**	**1.1229**		**3,314.8997**	**3,314.8997**	**1.0488**		**3,341.1197**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0517	1.7865	0.3574	4.7100e-003	0.1048	6.6800e-003	0.1115	0.0287	6.3900e-003	0.0351		510.5398	510.5398	0.0366		511.4552
Vendor	7.7900e-003	0.2296	0.0566	5.1000e-004	0.0128	1.5200e-003	0.0143	3.6800e-003	1.4600e-003	5.1400e-003		54.9024	54.9024	3.6900e-003		54.9948
Worker	0.0631	0.0442	0.5823	1.5400e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		153.4470	153.4470	4.8100e-003		153.5672
Total	**0.1226**	**2.0602**	**0.9963**	**6.7600e-003**	**0.2629**	**9.3400e-003**	**0.2723**	**0.0709**	**8.9000e-003**	**0.0798**		**718.8893**	**718.8893**	**0.0451**		**720.0172**

3.2 Demolition South - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8667	0.0000	0.8667	0.1312	0.0000	0.1312			0.0000			0.0000
Off-Road	0.4129	1.7893	21.5958	0.0335		0.0551	0.0551		0.0551	0.0551	0.0000	3,314.8997	3,314.8997	1.0488		3,341.1197
Total	**0.4129**	**1.7893**	**21.5958**	**0.0335**	**0.8667**	**0.0551**	**0.9217**	**0.1312**	**0.0551**	**0.1863**	**0.0000**	**3,314.8997**	**3,314.8997**	**1.0488**		**3,341.1197**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0517	1.7865	0.3574	4.7100e-003	0.1048	6.6800e-003	0.1115	0.0287	6.3900e-003	0.0351		510.5398	510.5398	0.0366		511.4552
Vendor	7.7900e-003	0.2296	0.0566	5.1000e-004	0.0128	1.5200e-003	0.0143	3.6800e-003	1.4600e-003	5.1400e-003		54.9024	54.9024	3.6900e-003		54.9948
Worker	0.0631	0.0442	0.5823	1.5400e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		153.4470	153.4470	4.8100e-003		153.5672
Total	**0.1226**	**2.0602**	**0.9963**	**6.7600e-003**	**0.2629**	**9.3400e-003**	**0.2723**	**0.0709**	**8.9000e-003**	**0.0798**		**718.8893**	**718.8893**	**0.0451**		**720.0172**

3.3 Demolition North - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5205	0.0000	1.5205	0.2302	0.0000	0.2302			0.0000			0.0000
Off-Road	1.4390	16.0877	10.7796	0.0240		0.6653	0.6653		0.6121	0.6121		2,373.3526	2,373.3526	0.7509		2,392.1252
Total	**1.4390**	**16.0877**	**10.7796**	**0.0240**	**1.5205**	**0.6653**	**2.1858**	**0.2302**	**0.6121**	**0.8423**		**2,373.3526**	**2,373.3526**	**0.7509**		**2,392.1252**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0408	1.4104	0.2821	3.7200e-003	0.1083	5.2700e-003	0.1135	0.0289	5.0400e-003	0.0340		403.0578	403.0578	0.0289		403.7804
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0631	0.0442	0.5823	1.5400e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		153.4470	153.4470	4.8100e-003		153.5672
Total	**0.1039**	**1.4545**	**0.8645**	**5.2600e-003**	**0.2536**	**6.4100e-003**	**0.2600**	**0.0675**	**6.0900e-003**	**0.0736**		**556.5048**	**556.5048**	**0.0337**		**557.3477**

3.3 Demolition North - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6842	0.0000	0.6842	0.1036	0.0000	0.1036			0.0000			0.0000
Off-Road	0.2959	1.2821	14.3784	0.0240		0.0395	0.0395		0.0395	0.0395	0.0000	2,373.3526	2,373.3526	0.7509		2,392.1252
Total	**0.2959**	**1.2821**	**14.3784**	**0.0240**	**0.6842**	**0.0395**	**0.7237**	**0.1036**	**0.0395**	**0.1430**	**0.0000**	**2,373.3526**	**2,373.3526**	**0.7509**		**2,392.1252**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0408	1.4104	0.2821	3.7200e-003	0.1083	5.2700e-003	0.1135	0.0289	5.0400e-003	0.0340		403.0578	403.0578	0.0289		403.7804
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0631	0.0442	0.5823	1.5400e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		153.4470	153.4470	4.8100e-003		153.5672
Total	**0.1039**	**1.4545**	**0.8645**	**5.2600e-003**	**0.2536**	**6.4100e-003**	**0.2600**	**0.0675**	**6.0900e-003**	**0.0736**		**556.5048**	**556.5048**	**0.0337**		**557.3477**

3.3 Demolition North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5205	0.0000	1.5205	0.2302	0.0000	0.2302			0.0000			0.0000
Off-Road	1.3461	14.6175	10.6917	0.0240		0.5990	0.5990		0.5511	0.5511		2,321.5798	2,321.5798	0.7509		2,340.3510
Total	**1.3461**	**14.6175**	**10.6917**	**0.0240**	**1.5205**	**0.5990**	**2.1195**	**0.2302**	**0.5511**	**0.7813**		**2,321.5798**	**2,321.5798**	**0.7509**		**2,340.3510**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0377	1.3197	0.2744	3.6800e-003	0.2365	4.2700e-003	0.2407	0.0604	4.0900e-003	0.0645		399.0315	399.0315	0.0282		399.7372
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0583	0.0394	0.5299	1.4900e-003	0.1453	1.1100e-003	0.1464	0.0385	1.0200e-003	0.0396		148.6987	148.6987	4.2900e-003		148.8059
Total	**0.0960**	**1.3591**	**0.8043**	**5.1700e-003**	**0.3818**	**5.3800e-003**	**0.3871**	**0.0989**	**5.1100e-003**	**0.1041**		**547.7302**	**547.7302**	**0.0325**		**548.5430**

3.3 Demolition North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6842	0.0000	0.6842	0.1036	0.0000	0.1036			0.0000			0.0000
Off-Road	0.2959	1.2821	14.3784	0.0240		0.0395	0.0395		0.0395	0.0395	0.0000	2,321.5798	2,321.5798	0.7509		2,340.3510
Total	**0.2959**	**1.2821**	**14.3784**	**0.0240**	**0.6842**	**0.0395**	**0.7237**	**0.1036**	**0.0395**	**0.1430**	**0.0000**	**2,321.5798**	**2,321.5798**	**0.7509**		**2,340.3510**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0377	1.3197	0.2744	3.6800e-003	0.2365	4.2700e-003	0.2407	0.0604	4.0900e-003	0.0645		399.0315	399.0315	0.0282		399.7372
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0583	0.0394	0.5299	1.4900e-003	0.1453	1.1100e-003	0.1464	0.0385	1.0200e-003	0.0396		148.6987	148.6987	4.2900e-003		148.8059
Total	**0.0960**	**1.3591**	**0.8043**	**5.1700e-003**	**0.3818**	**5.3800e-003**	**0.3871**	**0.0989**	**5.1100e-003**	**0.1041**		**547.7302**	**547.7302**	**0.0325**		**548.5430**

3.4 Site Preparation South - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.2998	0.0000	5.2998	2.9001	0.0000	2.9001			0.0000			0.0000
Off-Road	1.7123	19.4821	7.8893	0.0172		0.8824	0.8824		0.8118	0.8118		1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**1.7123**	**19.4821**	**7.8893**	**0.0172**	**5.2998**	**0.8824**	**6.1821**	**2.9001**	**0.8118**	**3.7118**		**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0580	2.0065	0.4014	5.2900e-003	0.2149	7.5000e-003	0.2224	0.0561	7.1800e-003	0.0633		573.4324	573.4324	0.0411		574.4606
Vendor	7.7900e-003	0.2296	0.0566	5.1000e-004	0.0128	1.5200e-003	0.0143	3.6800e-003	1.4600e-003	5.1400e-003		54.9024	54.9024	3.6900e-003		54.9948
Worker	0.0388	0.0272	0.3584	9.5000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		94.4289	94.4289	2.9600e-003		94.5029
Total	**0.1047**	**2.2633**	**0.8164**	**6.7500e-003**	**0.3171**	**9.7200e-003**	**0.3269**	**0.0835**	**9.2800e-003**	**0.0928**		**722.7638**	**722.7638**	**0.0478**		**723.9583**

3.4 Site Preparation South - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3849	0.0000	2.3849	1.3050	0.0000	1.3050			0.0000			0.0000
Off-Road	0.2106	0.9126	8.6714	0.0172		0.0281	0.0281		0.0281	0.0281	0.0000	1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**0.2106**	**0.9126**	**8.6714**	**0.0172**	**2.3849**	**0.0281**	**2.4130**	**1.3050**	**0.0281**	**1.3331**	**0.0000**	**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0580	2.0065	0.4014	5.2900e-003	0.2149	7.5000e-003	0.2224	0.0561	7.1800e-003	0.0633		573.4324	573.4324	0.0411		574.4606
Vendor	7.7900e-003	0.2296	0.0566	5.1000e-004	0.0128	1.5200e-003	0.0143	3.6800e-003	1.4600e-003	5.1400e-003		54.9024	54.9024	3.6900e-003		54.9948
Worker	0.0388	0.0272	0.3584	9.5000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		94.4289	94.4289	2.9600e-003		94.5029
Total	**0.1047**	**2.2633**	**0.8164**	**6.7500e-003**	**0.3171**	**9.7200e-003**	**0.3269**	**0.0835**	**9.2800e-003**	**0.0928**		**722.7638**	**722.7638**	**0.0478**		**723.9583**

3.4 Site Preparation South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.2998	0.0000	5.2998	2.9001	0.0000	2.9001			0.0000			0.0000
Off-Road	1.6299	18.3464	7.7093	0.0172		0.8210	0.8210		0.7553	0.7553		1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**1.6299**	**18.3464**	**7.7093**	**0.0172**	**5.2998**	**0.8210**	**6.1207**	**2.9001**	**0.7553**	**3.6553**		**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0536	1.8776	0.3904	5.2300e-003	0.1994	6.0800e-003	0.2055	0.0523	5.8100e-003	0.0581		567.7043	567.7043	0.0402		568.7082
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0962**	**2.1125**	**0.7677**	**6.6600e-003**	**0.3016**	**7.8000e-003**	**0.3094**	**0.0797**	**7.4400e-003**	**0.0871**		**713.7694**	**713.7694**	**0.0463**		**714.9266**

3.4 Site Preparation South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3849	0.0000	2.3849	1.3050	0.0000	1.3050			0.0000			0.0000
Off-Road	0.2106	0.9126	8.6714	0.0172		0.0281	0.0281		0.0281	0.0281	0.0000	1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**0.2106**	**0.9126**	**8.6714**	**0.0172**	**2.3849**	**0.0281**	**2.4130**	**1.3050**	**0.0281**	**1.3331**	**0.0000**	**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0536	1.8776	0.3904	5.2300e-003	0.1994	6.0800e-003	0.2055	0.0523	5.8100e-003	0.0581		567.7043	567.7043	0.0402		568.7082
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0962**	**2.1125**	**0.7677**	**6.6600e-003**	**0.3016**	**7.8000e-003**	**0.3094**	**0.0797**	**7.4400e-003**	**0.0871**		**713.7694**	**713.7694**	**0.0463**		**714.9266**

3.5 Grading South - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.5512	0.0000	4.5512	2.4864	0.0000	2.4864			0.0000			0.0000
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775		1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**	**4.5512**	**0.7365**	**5.2876**	**2.4864**	**0.6775**	**3.1639**		**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	7.7900e-003	0.2296	0.0566	5.1000e-004	0.0128	1.5200e-003	0.0143	3.6800e-003	1.4600e-003	5.1400e-003		54.9024	54.9024	3.6900e-003		54.9948
Worker	0.0388	0.0272	0.3584	9.5000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		94.4289	94.4289	2.9600e-003		94.5029
Total	**0.0466**	**0.2568**	**0.4150**	**1.4600e-003**	**0.1022**	**2.2200e-003**	**0.1044**	**0.0274**	**2.1000e-003**	**0.0295**		**149.3314**	**149.3314**	**6.6500e-003**		**149.4977**

3.5 Grading South - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.0480	0.0000	2.0480	1.1189	0.0000	1.1189			0.0000			0.0000
Off-Road	0.1725	0.7475	7.1557	0.0141		0.0230	0.0230		0.0230	0.0230	0.0000	1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**0.1725**	**0.7475**	**7.1557**	**0.0141**	**2.0480**	**0.0230**	**2.0710**	**1.1189**	**0.0230**	**1.1419**	**0.0000**	**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	7.7900e-003	0.2296	0.0566	5.1000e-004	0.0128	1.5200e-003	0.0143	3.6800e-003	1.4600e-003	5.1400e-003		54.9024	54.9024	3.6900e-003		54.9948
Worker	0.0388	0.0272	0.3584	9.5000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		94.4289	94.4289	2.9600e-003		94.5029
Total	**0.0466**	**0.2568**	**0.4150**	**1.4600e-003**	**0.1022**	**2.2200e-003**	**0.1044**	**0.0274**	**2.1000e-003**	**0.0295**		**149.3314**	**149.3314**	**6.6500e-003**		**149.4977**

3.5 Grading South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.5512	0.0000	4.5512	2.4864	0.0000	2.4864			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.5512**	**0.6844**	**5.2355**	**2.4864**	**0.6296**	**3.1160**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0425**	**0.2349**	**0.3773**	**1.4300e-003**	**0.1022**	**1.7200e-003**	**0.1039**	**0.0274**	**1.6300e-003**	**0.0290**		**146.0652**	**146.0652**	**6.1300e-003**		**146.2184**

3.5 Grading South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.0480	0.0000	2.0480	1.1189	0.0000	1.1189			0.0000			0.0000
Off-Road	0.1725	0.7475	7.1557	0.0141		0.0230	0.0230		0.0230	0.0230	0.0000	1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**0.1725**	**0.7475**	**7.1557**	**0.0141**	**2.0480**	**0.0230**	**2.0710**	**1.1189**	**0.0230**	**1.1419**	**0.0000**	**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0425**	**0.2349**	**0.3773**	**1.4300e-003**	**0.1022**	**1.7200e-003**	**0.1039**	**0.0274**	**1.6300e-003**	**0.0290**		**146.0652**	**146.0652**	**6.1300e-003**		**146.2184**

3.6 Site Preparation North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.6299	18.3464	7.7093	0.0172		0.8210	0.8210		0.7553	0.7553		1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**1.6299**	**18.3464**	**7.7093**	**0.0172**	**5.7996**	**0.8210**	**6.6205**	**2.9537**	**0.7553**	**3.7090**		**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0104	0.3634	0.0756	1.0100e-003	0.0228	1.1800e-003	0.0240	6.2400e-003	1.1300e-003	7.3700e-003		109.8782	109.8782	7.7700e-003		110.0726
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0463**	**0.3877**	**0.4016**	**1.9300e-003**	**0.1122**	**1.8600e-003**	**0.1141**	**0.0300**	**1.7600e-003**	**0.0317**		**201.3852**	**201.3852**	**0.0104**		**201.6454**

3.6 Site Preparation North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.2106	0.9126	8.6714	0.0172		0.0281	0.0281		0.0281	0.0281	0.0000	1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**0.2106**	**0.9126**	**8.6714**	**0.0172**	**2.6098**	**0.0281**	**2.6379**	**1.3292**	**0.0281**	**1.3573**	**0.0000**	**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0104	0.3634	0.0756	1.0100e-003	0.0228	1.1800e-003	0.0240	6.2400e-003	1.1300e-003	7.3700e-003		109.8782	109.8782	7.7700e-003		110.0726
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0463**	**0.3877**	**0.4016**	**1.9300e-003**	**0.1122**	**1.8600e-003**	**0.1141**	**0.0300**	**1.7600e-003**	**0.0317**		**201.3852**	**201.3852**	**0.0104**		**201.6454**

3.7 Grading North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9143**	**0.6844**	**5.5986**	**2.5256**	**0.6296**	**3.1552**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0359**	**0.0243**	**0.3261**	**9.2000e-004**	**0.0894**	**6.8000e-004**	**0.0901**	**0.0237**	**6.3000e-004**	**0.0243**		**91.5069**	**91.5069**	**2.6400e-003**		**91.5728**

3.7 Grading North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.2114	0.0000	2.2114	1.1365	0.0000	1.1365			0.0000			0.0000
Off-Road	0.1725	0.7475	7.1557	0.0141		0.0230	0.0230		0.0230	0.0230	0.0000	1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**0.1725**	**0.7475**	**7.1557**	**0.0141**	**2.2114**	**0.0230**	**2.2344**	**1.1365**	**0.0230**	**1.1595**	**0.0000**	**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0359	0.0243	0.3261	9.2000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		91.5069	91.5069	2.6400e-003		91.5728
Total	**0.0359**	**0.0243**	**0.3261**	**9.2000e-004**	**0.0894**	**6.8000e-004**	**0.0901**	**0.0237**	**6.3000e-004**	**0.0243**		**91.5069**	**91.5069**	**2.6400e-003**		**91.5728**

3.8 Building Construction South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4264	13.3861	11.6344	0.0184		0.8349	0.8349		0.7847	0.7847		1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**1.4264**	**13.3861**	**11.6344**	**0.0184**		**0.8349**	**0.8349**		**0.7847**	**0.7847**		**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0130	0.4751	0.0944	1.2400e-003	0.0267	1.4000e-003	0.0282	7.3300e-003	1.3400e-003	8.6700e-003		134.6820	134.6820	0.0100		134.9326
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0673	0.0455	0.6114	1.7200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		171.5755	171.5755	4.9400e-003		171.6991
Total	**0.0869**	**0.7313**	**0.7570**	**3.4700e-003**	**0.2072**	**3.7200e-003**	**0.2109**	**0.0555**	**3.5200e-003**	**0.0590**		**360.8157**	**360.8157**	**0.0185**		**361.2772**

3.8 Building Construction South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2269	1.5594	12.1434	0.0184		0.0282	0.0282		0.0282	0.0282	0.0000	1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**0.2269**	**1.5594**	**12.1434**	**0.0184**		**0.0282**	**0.0282**		**0.0282**	**0.0282**	**0.0000**	**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0130	0.4751	0.0944	1.2400e-003	0.0267	1.4000e-003	0.0282	7.3300e-003	1.3400e-003	8.6700e-003		134.6820	134.6820	0.0100		134.9326
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0673	0.0455	0.6114	1.7200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		171.5755	171.5755	4.9400e-003		171.6991
Total	**0.0869**	**0.7313**	**0.7570**	**3.4700e-003**	**0.2072**	**3.7200e-003**	**0.2109**	**0.0555**	**3.5200e-003**	**0.0590**		**360.8157**	**360.8157**	**0.0185**		**361.2772**

3.9 Building Construction North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4264	13.3861	11.6344	0.0184		0.8349	0.8349		0.7847	0.7847		1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**1.4264**	**13.3861**	**11.6344**	**0.0184**		**0.8349**	**0.8349**		**0.7847**	**0.7847**		**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0196	0.6851	0.1425	1.9100e-003	0.0430	2.2200e-003	0.0452	0.0118	2.1200e-003	0.0139		207.1475	207.1475	0.0147		207.5138
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0673	0.0455	0.6114	1.7200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		171.5755	171.5755	4.9400e-003		171.6991
Total	**0.0869**	**0.7306**	**0.7538**	**3.6300e-003**	**0.2106**	**3.5000e-003**	**0.2141**	**0.0562**	**3.3000e-003**	**0.0595**		**378.7230**	**378.7230**	**0.0196**		**379.2129**

3.9 Building Construction North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2269	1.5594	12.1434	0.0184		0.0282	0.0282		0.0282	0.0282	0.0000	1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**0.2269**	**1.5594**	**12.1434**	**0.0184**		**0.0282**	**0.0282**		**0.0282**	**0.0282**	**0.0000**	**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0196	0.6851	0.1425	1.9100e-003	0.0430	2.2200e-003	0.0452	0.0118	2.1200e-003	0.0139		207.1475	207.1475	0.0147		207.5138
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0673	0.0455	0.6114	1.7200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		171.5755	171.5755	4.9400e-003		171.6991
Total	**0.0869**	**0.7306**	**0.7538**	**3.6300e-003**	**0.2106**	**3.5000e-003**	**0.2141**	**0.0562**	**3.3000e-003**	**0.0595**		**378.7230**	**378.7230**	**0.0196**		**379.2129**

3.10 Architectural Coating South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3351					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.5772**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.3000e-004	0.0361	6.6700e-003	8.0000e-005	1.6900e-003	9.0000e-005	1.7800e-003	4.6000e-004	9.0000e-005	5.5000e-004		9.2045	9.2045	7.4000e-004		9.2231
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0345**	**0.2649**	**0.3025**	**1.2800e-003**	**0.0816**	**1.6400e-003**	**0.0832**	**0.0219**	**1.5600e-003**	**0.0235**		**132.3930**	**132.3930**	**6.2100e-003**		**132.5483**

3.10 Architectural Coating South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3351					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.3648**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.3000e-004	0.0361	6.6700e-003	8.0000e-005	1.6900e-003	9.0000e-005	1.7800e-003	4.6000e-004	9.0000e-005	5.5000e-004		9.2045	9.2045	7.4000e-004		9.2231
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0345**	**0.2649**	**0.3025**	**1.2800e-003**	**0.0816**	**1.6400e-003**	**0.0832**	**0.0219**	**1.5600e-003**	**0.0235**		**132.3930**	**132.3930**	**6.2100e-003**		**132.5483**

3.11 Architectural Coating North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3708					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.6130**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0200e-003	0.0399	7.3800e-003	9.0000e-005	1.8700e-003	1.0000e-004	1.9700e-003	5.1000e-004	1.0000e-004	6.1000e-004		10.1863	10.1863	8.2000e-004		10.2069
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0279**	**0.0581**	**0.2519**	**7.8000e-004**	**0.0689**	**6.1000e-004**	**0.0696**	**0.0183**	**5.7000e-004**	**0.0189**		**78.8165**	**78.8165**	**2.8000e-003**		**78.8866**

3.11 Architectural Coating North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3708					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.4005**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0200e-003	0.0399	7.3800e-003	9.0000e-005	1.8700e-003	1.0000e-004	1.9700e-003	5.1000e-004	1.0000e-004	6.1000e-004		10.1863	10.1863	8.2000e-004		10.2069
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0279**	**0.0581**	**0.2519**	**7.8000e-004**	**0.0689**	**6.1000e-004**	**0.0696**	**0.0183**	**5.7000e-004**	**0.0189**		**78.8165**	**78.8165**	**2.8000e-003**		**78.8866**

3.12 Arch Coating Ext. South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.6527**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.7400e-003	0.1069	0.0198	2.5000e-004	5.0000e-003	2.7000e-004	5.2700e-003	1.3700e-003	2.6000e-004	1.6300e-003		27.2848	27.2848	2.2100e-003		27.3400
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0363**	**0.3357**	**0.3156**	**1.4500e-003**	**0.0849**	**1.8200e-003**	**0.0867**	**0.0228**	**1.7300e-003**	**0.0246**		**150.4732**	**150.4732**	**7.6800e-003**		**150.6652**

3.12 Arch Coating Ext. South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.4402**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.7400e-003	0.1069	0.0198	2.5000e-004	5.0000e-003	2.7000e-004	5.2700e-003	1.3700e-003	2.6000e-004	1.6300e-003		27.2848	27.2848	2.2100e-003		27.3400
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0363**	**0.3357**	**0.3156**	**1.4500e-003**	**0.0849**	**1.8200e-003**	**0.0867**	**0.0228**	**1.7300e-003**	**0.0246**		**150.4732**	**150.4732**	**7.6800e-003**		**150.6652**

3.13 Arch Coating Ext. North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.6527**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.7400e-003	0.1069	0.0198	2.5000e-004	5.0000e-003	2.7000e-004	5.2700e-003	1.3700e-003	2.6000e-004	1.6300e-003		27.2848	27.2848	2.2100e-003		27.3400
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0297**	**0.1251**	**0.2643**	**9.4000e-004**	**0.0721**	**7.8000e-004**	**0.0729**	**0.0192**	**7.3000e-004**	**0.0199**		**95.9150**	**95.9150**	**4.1900e-003**		**96.0196**

3.13 Arch Coating Ext. North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.4402**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.7400e-003	0.1069	0.0198	2.5000e-004	5.0000e-003	2.7000e-004	5.2700e-003	1.3700e-003	2.6000e-004	1.6300e-003		27.2848	27.2848	2.2100e-003		27.3400
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0182	0.2446	6.9000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		68.6302	68.6302	1.9800e-003		68.6796
Total	**0.0297**	**0.1251**	**0.2643**	**9.4000e-004**	**0.0721**	**7.8000e-004**	**0.0729**	**0.0192**	**7.3000e-004**	**0.0199**		**95.9150**	**95.9150**	**4.1900e-003**		**96.0196**

3.14 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.7987	30.8586	24.6372	0.0470		1.5042	1.5042		1.3839	1.3839		4,551.8834	4,551.8834	1.4722		4,588.6877
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.7987**	**30.8586**	**24.6372**	**0.0470**		**1.5042**	**1.5042**		**1.3839**	**1.3839**		**4,551.8834**	**4,551.8834**	**1.4722**		**4,588.6877**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0117	0.4549	0.0842	1.0700e-003	0.0213	1.1500e-003	0.0224	5.8300e-003	1.1000e-003	6.9300e-003		116.1447	116.1447	9.4000e-003		116.3797
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.1077	0.0728	0.9782	2.7600e-003	0.2683	2.0500e-003	0.2703	0.0711	1.8800e-003	0.0730		274.5207	274.5207	7.9100e-003		274.7185
Total	**0.1260**	**0.7384**	**1.1136**	**4.3400e-003**	**0.3023**	**4.2400e-003**	**0.3066**	**0.0807**	**3.9800e-003**	**0.0846**		**445.2237**	**445.2237**	**0.0208**		**445.7437**

3.14 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5773	2.5016	30.2372	0.0470		0.0770	0.0770		0.0770	0.0770	0.0000	4,551.8834	4,551.8834	1.4722		4,588.6877
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.5773**	**2.5016**	**30.2372**	**0.0470**		**0.0770**	**0.0770**		**0.0770**	**0.0770**	**0.0000**	**4,551.8834**	**4,551.8834**	**1.4722**		**4,588.6877**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0117	0.4549	0.0842	1.0700e-003	0.0213	1.1500e-003	0.0224	5.8300e-003	1.1000e-003	6.9300e-003		116.1447	116.1447	9.4000e-003		116.3797
Vendor	6.6400e-003	0.2106	0.0512	5.1000e-004	0.0128	1.0400e-003	0.0138	3.6800e-003	1.0000e-003	4.6800e-003		54.5583	54.5583	3.4900e-003		54.6456
Worker	0.1077	0.0728	0.9782	2.7600e-003	0.2683	2.0500e-003	0.2703	0.0711	1.8800e-003	0.0730		274.5207	274.5207	7.9100e-003		274.7185
Total	**0.1260**	**0.7384**	**1.1136**	**4.3400e-003**	**0.3023**	**4.2400e-003**	**0.3066**	**0.0807**	**3.9800e-003**	**0.0846**		**445.2237**	**445.2237**	**0.0208**		**445.7437**

Carnival Cruise

South Coast Air Basin, Winter

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	4.8433	55.6369	29.3776	0.0692	12.0443	2.3028	14.3470	5.7950	2.1191	7.9142	0.0000	6,927.7806	6,927.7806	1.8808	0.0000	6,974.8016
2020	7.0924	69.6616	46.4022	0.0892	21.1702	3.0229	24.1931	11.0265	2.7814	13.8079	0.0000	8,671.1636	8,671.1636	2.0298	0.0000	8,721.9099
Maximum	**7.0924**	**69.6616**	**46.4022**	**0.0892**	**21.1702**	**3.0229**	**24.1931**	**11.0265**	**2.7814**	**13.8079**	**0.0000**	**8,671.1636**	**8,671.1636**	**2.0298**	**0.0000**	**8,721.9099**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.9513	6.9736	37.7815	0.0692	5.7900	0.1105	5.8992	2.7059	0.1097	2.8141	0.0000	6,927.7806	6,927.7806	1.8808	0.0000	6,974.8016
2020	2.8216	6.8562	52.5151	0.0892	9.8596	0.1337	9.9739	5.0503	0.1330	5.1641	0.0000	8,671.1636	8,671.1636	2.0298	0.0000	8,721.9099
Maximum	**2.8216**	**6.9736**	**52.5151**	**0.0892**	**9.8596**	**0.1337**	**9.9739**	**5.0503**	**0.1330**	**5.1641**	**0.0000**	**8,671.1636**	**8,671.1636**	**2.0298**	**0.0000**	**8,721.9099**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**68.39**	**88.96**	**-19.16**	**0.00**	**52.88**	**95.41**	**58.81**	**53.89**	**95.05**	**63.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

3.2 Demolition South - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9259	0.0000	1.9259	0.2916	0.0000	0.2916			0.0000			0.0000
Off-Road	1.9192	21.0280	16.7908	0.0335		0.9036	0.9036		0.8313	0.8313		3,314.8997	3,314.8997	1.0488		3,341.1197
Total	**1.9192**	**21.0280**	**16.7908**	**0.0335**	**1.9259**	**0.9036**	**2.8295**	**0.2916**	**0.8313**	**1.1229**		**3,314.8997**	**3,314.8997**	**1.0488**		**3,341.1197**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0531	1.8108	0.3836	4.6300e-003	0.1048	6.8000e-003	0.1116	0.0287	6.5100e-003	0.0352		501.9560	501.9560	0.0381		502.9082
Vendor	8.1300e-003	0.2299	0.0627	5.0000e-004	0.0128	1.5500e-003	0.0143	3.6800e-003	1.4800e-003	5.1600e-003		53.4278	53.4278	3.9500e-003		53.5266
Worker	0.0693	0.0485	0.5291	1.4500e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		143.9318	143.9318	4.5100e-003		144.0446
Total	**0.1305**	**2.0892**	**0.9753**	**6.5800e-003**	**0.2629**	**9.4900e-003**	**0.2724**	**0.0709**	**9.0400e-003**	**0.0800**		**699.3155**	**699.3155**	**0.0466**		**700.4794**

3.2 Demolition South - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8667	0.0000	0.8667	0.1312	0.0000	0.1312			0.0000			0.0000
Off-Road	0.4129	1.7893	21.5958	0.0335		0.0551	0.0551		0.0551	0.0551	0.0000	3,314.8997	3,314.8997	1.0488		3,341.1197
Total	**0.4129**	**1.7893**	**21.5958**	**0.0335**	**0.8667**	**0.0551**	**0.9217**	**0.1312**	**0.0551**	**0.1863**	**0.0000**	**3,314.8997**	**3,314.8997**	**1.0488**		**3,341.1197**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0531	1.8108	0.3836	4.6300e-003	0.1048	6.8000e-003	0.1116	0.0287	6.5100e-003	0.0352		501.9560	501.9560	0.0381		502.9082
Vendor	8.1300e-003	0.2299	0.0627	5.0000e-004	0.0128	1.5500e-003	0.0143	3.6800e-003	1.4800e-003	5.1600e-003		53.4278	53.4278	3.9500e-003		53.5266
Worker	0.0693	0.0485	0.5291	1.4500e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		143.9318	143.9318	4.5100e-003		144.0446
Total	**0.1305**	**2.0892**	**0.9753**	**6.5800e-003**	**0.2629**	**9.4900e-003**	**0.2724**	**0.0709**	**9.0400e-003**	**0.0800**		**699.3155**	**699.3155**	**0.0466**		**700.4794**

3.3 Demolition North - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5205	0.0000	1.5205	0.2302	0.0000	0.2302			0.0000			0.0000
Off-Road	1.4390	16.0877	10.7796	0.0240		0.6653	0.6653		0.6121	0.6121		2,373.3526	2,373.3526	0.7509		2,392.1252
Total	**1.4390**	**16.0877**	**10.7796**	**0.0240**	**1.5205**	**0.6653**	**2.1858**	**0.2302**	**0.6121**	**0.8423**		**2,373.3526**	**2,373.3526**	**0.7509**		**2,392.1252**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0419	1.4296	0.3028	3.6600e-003	0.1083	5.3700e-003	0.1136	0.0289	5.1400e-003	0.0341		396.2810	396.2810	0.0301		397.0328
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0693	0.0485	0.5291	1.4500e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		143.9318	143.9318	4.5100e-003		144.0446
Total	**0.1112**	**1.4781**	**0.8319**	**5.1100e-003**	**0.2536**	**6.5100e-003**	**0.2601**	**0.0675**	**6.1900e-003**	**0.0737**		**540.2128**	**540.2128**	**0.0346**		**541.0774**

3.3 Demolition North - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6842	0.0000	0.6842	0.1036	0.0000	0.1036			0.0000			0.0000
Off-Road	0.2959	1.2821	14.3784	0.0240		0.0395	0.0395		0.0395	0.0395	0.0000	2,373.3526	2,373.3526	0.7509		2,392.1252
Total	**0.2959**	**1.2821**	**14.3784**	**0.0240**	**0.6842**	**0.0395**	**0.7237**	**0.1036**	**0.0395**	**0.1430**	**0.0000**	**2,373.3526**	**2,373.3526**	**0.7509**		**2,392.1252**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0419	1.4296	0.3028	3.6600e-003	0.1083	5.3700e-003	0.1136	0.0289	5.1400e-003	0.0341		396.2810	396.2810	0.0301		397.0328
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0693	0.0485	0.5291	1.4500e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		143.9318	143.9318	4.5100e-003		144.0446
Total	**0.1112**	**1.4781**	**0.8319**	**5.1100e-003**	**0.2536**	**6.5100e-003**	**0.2601**	**0.0675**	**6.1900e-003**	**0.0737**		**540.2128**	**540.2128**	**0.0346**		**541.0774**

3.3 Demolition North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.5205	0.0000	1.5205	0.2302	0.0000	0.2302			0.0000			0.0000
Off-Road	1.3461	14.6175	10.6917	0.0240		0.5990	0.5990		0.5511	0.5511		2,321.5798	2,321.5798	0.7509		2,340.3510
Total	**1.3461**	**14.6175**	**10.6917**	**0.0240**	**1.5205**	**0.5990**	**2.1195**	**0.2302**	**0.5511**	**0.7813**		**2,321.5798**	**2,321.5798**	**0.7509**		**2,340.3510**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0387	1.3370	0.2931	3.6100e-003	0.2365	4.3400e-003	0.2408	0.0604	4.1500e-003	0.0646		392.2165	392.2165	0.0293		392.9493
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0642	0.0433	0.4805	1.4000e-003	0.1453	1.1100e-003	0.1464	0.0385	1.0200e-003	0.0396		139.4707	139.4707	4.0100e-003		139.5710
Total	**0.1028**	**1.3803**	**0.7736**	**5.0100e-003**	**0.3818**	**5.4500e-003**	**0.3872**	**0.0989**	**5.1700e-003**	**0.1041**		**531.6872**	**531.6872**	**0.0333**		**532.5203**

3.3 Demolition North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6842	0.0000	0.6842	0.1036	0.0000	0.1036			0.0000			0.0000
Off-Road	0.2959	1.2821	14.3784	0.0240		0.0395	0.0395		0.0395	0.0395	0.0000	2,321.5798	2,321.5798	0.7509		2,340.3510
Total	**0.2959**	**1.2821**	**14.3784**	**0.0240**	**0.6842**	**0.0395**	**0.7237**	**0.1036**	**0.0395**	**0.1430**	**0.0000**	**2,321.5798**	**2,321.5798**	**0.7509**		**2,340.3510**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0387	1.3370	0.2931	3.6100e-003	0.2365	4.3400e-003	0.2408	0.0604	4.1500e-003	0.0646		392.2165	392.2165	0.0293		392.9493
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0642	0.0433	0.4805	1.4000e-003	0.1453	1.1100e-003	0.1464	0.0385	1.0200e-003	0.0396		139.4707	139.4707	4.0100e-003		139.5710
Total	**0.1028**	**1.3803**	**0.7736**	**5.0100e-003**	**0.3818**	**5.4500e-003**	**0.3872**	**0.0989**	**5.1700e-003**	**0.1041**		**531.6872**	**531.6872**	**0.0333**		**532.5203**

3.4 Site Preparation South - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.2998	0.0000	5.2998	2.9001	0.0000	2.9001			0.0000			0.0000
Off-Road	1.7123	19.4821	7.8893	0.0172		0.8824	0.8824		0.8118	0.8118		1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**1.7123**	**19.4821**	**7.8893**	**0.0172**	**5.2998**	**0.8824**	**6.1821**	**2.9001**	**0.8118**	**3.7118**		**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0596	2.0338	0.4308	5.2000e-003	0.2149	7.6400e-003	0.2226	0.0561	7.3100e-003	0.0634		563.7911	563.7911	0.0428		564.8607
Vendor	8.1300e-003	0.2299	0.0627	5.0000e-004	0.0128	1.5500e-003	0.0143	3.6800e-003	1.4800e-003	5.1600e-003		53.4278	53.4278	3.9500e-003		53.5266
Worker	0.0427	0.0299	0.3256	8.9000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		88.5734	88.5734	2.7800e-003		88.6428
Total	**0.1104**	**2.2936**	**0.8191**	**6.5900e-003**	**0.3171**	**9.8900e-003**	**0.3270**	**0.0835**	**9.4300e-003**	**0.0929**		**705.7923**	**705.7923**	**0.0495**		**707.0301**

3.4 Site Preparation South - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3849	0.0000	2.3849	1.3050	0.0000	1.3050			0.0000			0.0000
Off-Road	0.2106	0.9126	8.6714	0.0172		0.0281	0.0281		0.0281	0.0281	0.0000	1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**0.2106**	**0.9126**	**8.6714**	**0.0172**	**2.3849**	**0.0281**	**2.4130**	**1.3050**	**0.0281**	**1.3331**	**0.0000**	**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0596	2.0338	0.4308	5.2000e-003	0.2149	7.6400e-003	0.2226	0.0561	7.3100e-003	0.0634		563.7911	563.7911	0.0428		564.8607
Vendor	8.1300e-003	0.2299	0.0627	5.0000e-004	0.0128	1.5500e-003	0.0143	3.6800e-003	1.4800e-003	5.1600e-003		53.4278	53.4278	3.9500e-003		53.5266
Worker	0.0427	0.0299	0.3256	8.9000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		88.5734	88.5734	2.7800e-003		88.6428
Total	**0.1104**	**2.2936**	**0.8191**	**6.5900e-003**	**0.3171**	**9.8900e-003**	**0.3270**	**0.0835**	**9.4300e-003**	**0.0929**		**705.7923**	**705.7923**	**0.0495**		**707.0301**

3.4 Site Preparation South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.2998	0.0000	5.2998	2.9001	0.0000	2.9001			0.0000			0.0000
Off-Road	1.6299	18.3464	7.7093	0.0172		0.8210	0.8210		0.7553	0.7553		1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**1.6299**	**18.3464**	**7.7093**	**0.0172**	**5.2998**	**0.8210**	**6.1207**	**2.9001**	**0.7553**	**3.6553**		**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0550	1.9022	0.4170	5.1400e-003	0.1994	6.1700e-003	0.2056	0.0523	5.9000e-003	0.0582		558.0085	558.0085	0.0417		559.0511
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.1014**	**2.1394**	**0.7695**	**6.5000e-003**	**0.3016**	**7.9100e-003**	**0.3095**	**0.0797**	**7.5400e-003**	**0.0872**		**696.9121**	**696.9121**	**0.0479**		**698.1097**

3.4 Site Preparation South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3849	0.0000	2.3849	1.3050	0.0000	1.3050			0.0000			0.0000
Off-Road	0.2106	0.9126	8.6714	0.0172		0.0281	0.0281		0.0281	0.0281	0.0000	1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**0.2106**	**0.9126**	**8.6714**	**0.0172**	**2.3849**	**0.0281**	**2.4130**	**1.3050**	**0.0281**	**1.3331**	**0.0000**	**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0550	1.9022	0.4170	5.1400e-003	0.1994	6.1700e-003	0.2056	0.0523	5.9000e-003	0.0582		558.0085	558.0085	0.0417		559.0511
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.1014**	**2.1394**	**0.7695**	**6.5000e-003**	**0.3016**	**7.9100e-003**	**0.3095**	**0.0797**	**7.5400e-003**	**0.0872**		**696.9121**	**696.9121**	**0.0479**		**698.1097**

3.5 Grading South - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.5512	0.0000	4.5512	2.4864	0.0000	2.4864			0.0000			0.0000
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775		1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**	**4.5512**	**0.7365**	**5.2876**	**2.4864**	**0.6775**	**3.1639**		**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	8.1300e-003	0.2299	0.0627	5.0000e-004	0.0128	1.5500e-003	0.0143	3.6800e-003	1.4800e-003	5.1600e-003		53.4278	53.4278	3.9500e-003		53.5266
Worker	0.0427	0.0299	0.3256	8.9000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		88.5734	88.5734	2.7800e-003		88.6428
Total	**0.0508**	**0.2597**	**0.3883**	**1.3900e-003**	**0.1022**	**2.2500e-003**	**0.1045**	**0.0274**	**2.1200e-003**	**0.0295**		**142.0012**	**142.0012**	**6.7300e-003**		**142.1694**

3.5 Grading South - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.0480	0.0000	2.0480	1.1189	0.0000	1.1189			0.0000			0.0000
Off-Road	0.1725	0.7475	7.1557	0.0141		0.0230	0.0230		0.0230	0.0230	0.0000	1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**0.1725**	**0.7475**	**7.1557**	**0.0141**	**2.0480**	**0.0230**	**2.0710**	**1.1189**	**0.0230**	**1.1419**	**0.0000**	**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	8.1300e-003	0.2299	0.0627	5.0000e-004	0.0128	1.5500e-003	0.0143	3.6800e-003	1.4800e-003	5.1600e-003		53.4278	53.4278	3.9500e-003		53.5266
Worker	0.0427	0.0299	0.3256	8.9000e-004	0.0894	7.0000e-004	0.0901	0.0237	6.4000e-004	0.0244		88.5734	88.5734	2.7800e-003		88.6428
Total	**0.0508**	**0.2597**	**0.3883**	**1.3900e-003**	**0.1022**	**2.2500e-003**	**0.1045**	**0.0274**	**2.1200e-003**	**0.0295**		**142.0012**	**142.0012**	**6.7300e-003**		**142.1694**

3.5 Grading South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.5512	0.0000	4.5512	2.4864	0.0000	2.4864			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.5512**	**0.6844**	**5.2355**	**2.4864**	**0.6296**	**3.1160**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.0464**	**0.2372**	**0.3525**	**1.3600e-003**	**0.1022**	**1.7400e-003**	**0.1040**	**0.0274**	**1.6400e-003**	**0.0290**		**138.9036**	**138.9036**	**6.2000e-003**		**139.0586**

3.5 Grading South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.0480	0.0000	2.0480	1.1189	0.0000	1.1189			0.0000			0.0000
Off-Road	0.1725	0.7475	7.1557	0.0141		0.0230	0.0230		0.0230	0.0230	0.0000	1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**0.1725**	**0.7475**	**7.1557**	**0.0141**	**2.0480**	**0.0230**	**2.0710**	**1.1189**	**0.0230**	**1.1419**	**0.0000**	**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.0464**	**0.2372**	**0.3525**	**1.3600e-003**	**0.1022**	**1.7400e-003**	**0.1040**	**0.0274**	**1.6400e-003**	**0.0290**		**138.9036**	**138.9036**	**6.2000e-003**		**139.0586**

3.6 Site Preparation North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.6299	18.3464	7.7093	0.0172		0.8210	0.8210		0.7553	0.7553		1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**1.6299**	**18.3464**	**7.7093**	**0.0172**	**5.7996**	**0.8210**	**6.6205**	**2.9537**	**0.7553**	**3.7090**		**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0107	0.3682	0.0807	1.0000e-003	0.0228	1.1900e-003	0.0240	6.2400e-003	1.1400e-003	7.3800e-003		108.0017	108.0017	8.0700e-003		108.2034
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.0501**	**0.3948**	**0.3764**	**1.8600e-003**	**0.1122**	**1.8700e-003**	**0.1141**	**0.0300**	**1.7700e-003**	**0.0317**		**193.8298**	**193.8298**	**0.0105**		**194.0933**

3.6 Site Preparation North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.2106	0.9126	8.6714	0.0172		0.0281	0.0281		0.0281	0.0281	0.0000	1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**0.2106**	**0.9126**	**8.6714**	**0.0172**	**2.6098**	**0.0281**	**2.6379**	**1.3292**	**0.0281**	**1.3573**	**0.0000**	**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0107	0.3682	0.0807	1.0000e-003	0.0228	1.1900e-003	0.0240	6.2400e-003	1.1400e-003	7.3800e-003		108.0017	108.0017	8.0700e-003		108.2034
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.0501**	**0.3948**	**0.3764**	**1.8600e-003**	**0.1122**	**1.8700e-003**	**0.1141**	**0.0300**	**1.7700e-003**	**0.0317**		**193.8298**	**193.8298**	**0.0105**		**194.0933**

3.7 Grading North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9143**	**0.6844**	**5.5986**	**2.5256**	**0.6296**	**3.1552**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.0395**	**0.0267**	**0.2957**	**8.6000e-004**	**0.0894**	**6.8000e-004**	**0.0901**	**0.0237**	**6.3000e-004**	**0.0243**		**85.8281**	**85.8281**	**2.4700e-003**		**85.8899**

3.7 Grading North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.2114	0.0000	2.2114	1.1365	0.0000	1.1365			0.0000			0.0000
Off-Road	0.1725	0.7475	7.1557	0.0141		0.0230	0.0230		0.0230	0.0230	0.0000	1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**0.1725**	**0.7475**	**7.1557**	**0.0141**	**2.2114**	**0.0230**	**2.2344**	**1.1365**	**0.0230**	**1.1595**	**0.0000**	**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0395	0.0267	0.2957	8.6000e-004	0.0894	6.8000e-004	0.0901	0.0237	6.3000e-004	0.0243		85.8281	85.8281	2.4700e-003		85.8899
Total	**0.0395**	**0.0267**	**0.2957**	**8.6000e-004**	**0.0894**	**6.8000e-004**	**0.0901**	**0.0237**	**6.3000e-004**	**0.0243**		**85.8281**	**85.8281**	**2.4700e-003**		**85.8899**

3.8 Building Construction South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4264	13.3861	11.6344	0.0184		0.8349	0.8349		0.7847	0.7847		1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**1.4264**	**13.3861**	**11.6344**	**0.0184**		**0.8349**	**0.8349**		**0.7847**	**0.7847**		**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0134	0.4789	0.1026	1.2100e-003	0.0267	1.4300e-003	0.0282	7.3300e-003	1.3700e-003	8.7000e-003		131.7458	131.7458	0.0105		132.0081
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0740	0.0500	0.5544	1.6200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		160.9277	160.9277	4.6300e-003		161.0435
Total	**0.0944**	**0.7394**	**0.7138**	**3.3300e-003**	**0.2072**	**3.7700e-003**	**0.2110**	**0.0555**	**3.5600e-003**	**0.0590**		**345.7490**	**345.7490**	**0.0189**		**346.2204**

3.8 Building Construction South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2269	1.5594	12.1434	0.0184		0.0282	0.0282		0.0282	0.0282	0.0000	1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**0.2269**	**1.5594**	**12.1434**	**0.0184**		**0.0282**	**0.0282**		**0.0282**	**0.0282**	**0.0000**	**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0134	0.4789	0.1026	1.2100e-003	0.0267	1.4300e-003	0.0282	7.3300e-003	1.3700e-003	8.7000e-003		131.7458	131.7458	0.0105		132.0081
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0740	0.0500	0.5544	1.6200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		160.9277	160.9277	4.6300e-003		161.0435
Total	**0.0944**	**0.7394**	**0.7138**	**3.3300e-003**	**0.2072**	**3.7700e-003**	**0.2110**	**0.0555**	**3.5600e-003**	**0.0590**		**345.7490**	**345.7490**	**0.0189**		**346.2204**

3.9 Building Construction North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4264	13.3861	11.6344	0.0184		0.8349	0.8349		0.7847	0.7847		1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**1.4264**	**13.3861**	**11.6344**	**0.0184**		**0.8349**	**0.8349**		**0.7847**	**0.7847**		**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0201	0.6941	0.1522	1.8800e-003	0.0430	2.2500e-003	0.0452	0.0118	2.1500e-003	0.0139		203.6097	203.6097	0.0152		203.9901
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0740	0.0500	0.5544	1.6200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		160.9277	160.9277	4.6300e-003		161.0435
Total	**0.0941**	**0.7441**	**0.7065**	**3.5000e-003**	**0.2106**	**3.5300e-003**	**0.2141**	**0.0562**	**3.3300e-003**	**0.0596**		**364.5374**	**364.5374**	**0.0199**		**365.0336**

3.9 Building Construction North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2269	1.5594	12.1434	0.0184		0.0282	0.0282		0.0282	0.0282	0.0000	1,770.3786	1,770.3786	0.4084		1,780.5873
Total	**0.2269**	**1.5594**	**12.1434**	**0.0184**		**0.0282**	**0.0282**		**0.0282**	**0.0282**	**0.0000**	**1,770.3786**	**1,770.3786**	**0.4084**		**1,780.5873**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0201	0.6941	0.1522	1.8800e-003	0.0430	2.2500e-003	0.0452	0.0118	2.1500e-003	0.0139		203.6097	203.6097	0.0152		203.9901
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0740	0.0500	0.5544	1.6200e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1800e-003	0.0456		160.9277	160.9277	4.6300e-003		161.0435
Total	**0.0941**	**0.7441**	**0.7065**	**3.5000e-003**	**0.2106**	**3.5300e-003**	**0.2141**	**0.0562**	**3.3300e-003**	**0.0596**		**364.5374**	**364.5374**	**0.0199**		**365.0336**

3.10 Architectural Coating South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3351					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.5772**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.7000e-004	0.0361	7.4600e-003	8.0000e-005	1.6900e-003	9.0000e-005	1.7800e-003	4.6000e-004	9.0000e-005	5.5000e-004		8.9272	8.9272	7.9000e-004		8.9469
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0375**	**0.2666**	**0.2860**	**1.2300e-003**	**0.0816**	**1.6600e-003**	**0.0832**	**0.0219**	**1.5700e-003**	**0.0235**		**126.3737**	**126.3737**	**6.3700e-003**		**126.5331**

3.10 Architectural Coating South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3351					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.3648**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.7000e-004	0.0361	7.4600e-003	8.0000e-005	1.6900e-003	9.0000e-005	1.7800e-003	4.6000e-004	9.0000e-005	5.5000e-004		8.9272	8.9272	7.9000e-004		8.9469
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0375**	**0.2666**	**0.2860**	**1.2300e-003**	**0.0816**	**1.6600e-003**	**0.0832**	**0.0219**	**1.5700e-003**	**0.0235**		**126.3737**	**126.3737**	**6.3700e-003**		**126.5331**

3.11 Architectural Coating North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3708					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.6130**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0700e-003	0.0399	8.2500e-003	9.0000e-005	1.8700e-003	1.0000e-004	1.9700e-003	5.1000e-004	1.0000e-004	6.1000e-004		9.8794	9.8794	8.7000e-004		9.9012
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0307**	**0.0599**	**0.2300**	**7.4000e-004**	**0.0689**	**6.1000e-004**	**0.0696**	**0.0183**	**5.7000e-004**	**0.0189**		**74.2505**	**74.2505**	**2.7200e-003**		**74.3186**

3.11 Architectural Coating North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.3708					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.4005**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0700e-003	0.0399	8.2500e-003	9.0000e-005	1.8700e-003	1.0000e-004	1.9700e-003	5.1000e-004	1.0000e-004	6.1000e-004		9.8794	9.8794	8.7000e-004		9.9012
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0307**	**0.0599**	**0.2300**	**7.4000e-004**	**0.0689**	**6.1000e-004**	**0.0696**	**0.0183**	**5.7000e-004**	**0.0189**		**74.2505**	**74.2505**	**2.7200e-003**		**74.3186**

3.12 Arch Coating Ext. South - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.6527**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.8600e-003	0.1069	0.0221	2.4000e-004	5.0000e-003	2.8000e-004	5.2700e-003	1.3700e-003	2.7000e-004	1.6300e-003		26.4627	26.4627	2.3400e-003		26.5212
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0394**	**0.3374**	**0.3006**	**1.3900e-003**	**0.0849**	**1.8500e-003**	**0.0867**	**0.0228**	**1.7500e-003**	**0.0246**		**143.9092**	**143.9092**	**7.9200e-003**		**144.1073**

3.12 Arch Coating Ext. South - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.4402**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.8600e-003	0.1069	0.0221	2.4000e-004	5.0000e-003	2.8000e-004	5.2700e-003	1.3700e-003	2.7000e-004	1.6300e-003		26.4627	26.4627	2.3400e-003		26.5212
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0394**	**0.3374**	**0.3006**	**1.3900e-003**	**0.0849**	**1.8500e-003**	**0.0867**	**0.0228**	**1.7500e-003**	**0.0246**		**143.9092**	**143.9092**	**7.9200e-003**		**144.1073**

3.13 Arch Coating Ext. North - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2422	1.6838	1.8314	2.9700e-003		0.1109	0.1109		0.1109	0.1109		281.4481	281.4481	0.0218		281.9928
Total	**0.6527**	**1.6838**	**1.8314**	**2.9700e-003**		**0.1109**	**0.1109**		**0.1109**	**0.1109**		**281.4481**	**281.4481**	**0.0218**		**281.9928**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.8600e-003	0.1069	0.0221	2.4000e-004	5.0000e-003	2.8000e-004	5.2700e-003	1.3700e-003	2.7000e-004	1.6300e-003		26.4627	26.4627	2.3400e-003		26.5212
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0325**	**0.1268**	**0.2439**	**8.9000e-004**	**0.0721**	**7.9000e-004**	**0.0729**	**0.0192**	**7.4000e-004**	**0.0199**		**90.8337**	**90.8337**	**4.1900e-003**		**90.9386**

3.13 Arch Coating Ext. North - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.4105					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0218		281.9928
Total	**0.4402**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0218**		**281.9928**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.8600e-003	0.1069	0.0221	2.4000e-004	5.0000e-003	2.8000e-004	5.2700e-003	1.3700e-003	2.7000e-004	1.6300e-003		26.4627	26.4627	2.3400e-003		26.5212
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0296	0.0200	0.2218	6.5000e-004	0.0671	5.1000e-004	0.0676	0.0178	4.7000e-004	0.0183		64.3711	64.3711	1.8500e-003		64.4174
Total	**0.0325**	**0.1268**	**0.2439**	**8.9000e-004**	**0.0721**	**7.9000e-004**	**0.0729**	**0.0192**	**7.4000e-004**	**0.0199**		**90.8337**	**90.8337**	**4.1900e-003**		**90.9386**

3.14 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.7987	30.8586	24.6372	0.0470		1.5042	1.5042		1.3839	1.3839		4,551.8834	4,551.8834	1.4722		4,588.6877
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.7987**	**30.8586**	**24.6372**	**0.0470**		**1.5042**	**1.5042**		**1.3839**	**1.3839**		**4,551.8834**	**4,551.8834**	**1.4722**		**4,588.6877**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0122	0.4549	0.0941	1.0400e-003	0.0213	1.1800e-003	0.0225	5.8300e-003	1.1300e-003	6.9600e-003		112.6451	112.6451	9.9600e-003		112.8941
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.1184	0.0799	0.8870	2.5800e-003	0.2683	2.0500e-003	0.2703	0.0711	1.8800e-003	0.0730		257.4843	257.4843	7.4100e-003		257.6696
Total	**0.1375**	**0.7454**	**1.0379**	**4.1200e-003**	**0.3023**	**4.2900e-003**	**0.3066**	**0.0807**	**4.0200e-003**	**0.0847**		**423.2049**	**423.2049**	**0.0211**		**423.7325**

3.14 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.5773	2.5016	30.2372	0.0470		0.0770	0.0770		0.0770	0.0770	0.0000	4,551.8834	4,551.8834	1.4722		4,588.6877
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.5773**	**2.5016**	**30.2372**	**0.0470**		**0.0770**	**0.0770**		**0.0770**	**0.0770**	**0.0000**	**4,551.8834**	**4,551.8834**	**1.4722**		**4,588.6877**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0122	0.4549	0.0941	1.0400e-003	0.0213	1.1800e-003	0.0225	5.8300e-003	1.1300e-003	6.9600e-003		112.6451	112.6451	9.9600e-003		112.8941
Vendor	6.9400e-003	0.2106	0.0568	5.0000e-004	0.0128	1.0600e-003	0.0139	3.6800e-003	1.0100e-003	4.7000e-003		53.0755	53.0755	3.7300e-003		53.1688
Worker	0.1184	0.0799	0.8870	2.5800e-003	0.2683	2.0500e-003	0.2703	0.0711	1.8800e-003	0.0730		257.4843	257.4843	7.4100e-003		257.6696
Total	**0.1375**	**0.7454**	**1.0379**	**4.1200e-003**	**0.3023**	**4.2900e-003**	**0.3066**	**0.0807**	**4.0200e-003**	**0.0847**		**423.2049**	**423.2049**	**0.0211**		**423.7325**

Carnival Cruise

2.0 Emissions Summary

South Coast Air Basin, Annual

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0876	1.0042	0.5959	1.4300e-003	0.1703	0.0407	0.2110	0.0700	0.0375	0.1074	0.0000	130.0022	130.0022	0.0349	0.0000	130.8733
2020	0.4468	3.9981	2.9640	5.7600e-003	0.4267	0.2097	0.6364	0.2062	0.1962	0.4023	0.0000	509.4412	509.4412	0.1159	0.0000	512.3381
Maximum	**0.4468**	**3.9981**	**2.9640**	**5.7600e-003**	**0.4267**	**0.2097**	**0.6364**	**0.2062**	**0.1962**	**0.4023**	**0.0000**	**509.4412**	**509.4412**	**0.1159**	**0.0000**	**512.3381**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0193	0.1433	0.7312	1.4300e-003	0.0831	2.2800e-003	0.0854	0.0332	2.2600e-003	0.0355	0.0000	130.0020	130.0020	0.0349	0.0000	130.8732
2020	0.1235	0.5202	3.2146	5.7600e-003	0.2212	8.5800e-003	0.2297	0.1006	8.5300e-003	0.1091	0.0000	509.4407	509.4407	0.1159	0.0000	512.3376
Maximum	**0.1235**	**0.5202**	**3.2146**	**5.7600e-003**	**0.2212**	**8.5800e-003**	**0.2297**	**0.1006**	**8.5300e-003**	**0.1091**	**0.0000**	**509.4407**	**509.4407**	**0.1159**	**0.0000**	**512.3376**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**73.28**	**86.74**	**-10.84**	**0.00**	**49.03**	**95.66**	**62.81**	**51.55**	**95.38**	**71.64**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Appendix B

Operation Emissions

Long Beach Cruise Terminal Improvement Project

Operation - Cruise Ship Speed Assumptions

Notes:

1) All speeds are in knots averaged in the distance interval

2) The berth to pilot service (PS) distance is assumed to be 2 nautical miles (nm).

3) The SCAB border is 40 NM from Port and 20 NM from Avalon.

4) The California/Mexico border is 48 NM past SCAB Border

3) All ship speed data is from Carnival.

Imagination Speed Assumptions

Departing				Approach			
Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth
5.7	10.4	9.5	8.6	10.5	10.3	9.6	5.4

Inspiration Speed Assumptions

Departing				Approach			
Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth
3.8	9.4	8.2	7.4	9.5	8.8	8.4	4.8

Splendor Speed Assumptions

Departing				Approach			
Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth
4.1	15.9	20.5	20.5	17.5	16.5	13.5	4.7

Panorama Speed Assumptions

Departing				Approach			
Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth
4.1	12	15	17	17.5	16.5	12	4.7

Long Beach Cruise Terminal Improvement Project

Operation - Cruise Ship Route Assumptions

Route Assumptions

Imagination - Baseline and Project

Mon	Day 2	Cruise for 7.5 hours at low speed, Hotel at Avalon for 9 hours, cruise out to SCAB limit (9.5 kts), cruise down to Mexico for (8.6 kts)
Tues	Day 3	Mexico, in CA waters for limited time
Wed	Day 4	Return, assume in CA waters as needed to reach port by 7 am next day
Thur	Day 5 (1)	Cruise in for 7 hours, then at port for 12.5 hours, then cruise out for 4.5 hours to Ensenada.
Fri	Day 6 (2)	Continue cruise to Mexico, some time in CA waters, day in Ensenada
Sat	Day 7 (3)	Return, assume in CA waters as needed to reach port by 7 am next day
Sun	Day 1/Day 8	Cruise in for 7 hours, then at port for 12.5 hours, then cruise out for 4.5 hours to Catalina.

Route Assumptions

Inspiration - Baseline and Project

Mon	Day 1/Day 8	Cruise in for 7 hours, then at port for 12.5 hours, then cruise out for 4.5 hours to Catalina.
Tues	Day 2	Cruise for 7.5 hours at low speed, Hotel at Avalon for 9 hours, cruise out to SCAB limit (9.5 kts), cruise down to Mexico for (8.6 kts)
Wed	Day 3	Mexico, in CA waters for limited time
Thurs	Day 4	Return, assume in CA waters as needed to reach port by 7 am next day
Fri	Day 5 (1)	Cruise in for 7 hours, then at port for 12.5 hours, then cruise out for 4.5 hours to Ensenada.
Sat	Day 6 (2)	Continue cruise to Mexico, some time in CA waters, day in Ensenada
Sun	Day 7 (3)	Return, assume in CA waters as needed to reach port by 7 am next day

Route Assumptions

Splendor - Baseline

Mon	Day 3	Mexico waters only
Tues	Day 4	Mexico waters only
Wed	Day 5	Mexico waters only
Thurs	Day 6	Mexico waters only
Fri	Day 7	Mexico waters only
Sat	Day 1/Day 8	Cruise in for 9 hours, 9 hours at berth, cruise out for 6 hours
Sun	Day 2	Mexico waters only

Route Assumptions

Panorama - Project

Mon	Day 3	Mexico waters only
Tues	Day 4	Mexico waters only
Wed	Day 5	Mexico waters only
Thurs	Day 6	Mexico waters only
Fri	Day 7	Mexico waters only
Sat	Day 1/Day 8	Cruise in for 9 hours, 9.5 hours at berth, cruise out for 5.5 hours
Sun	Day 2	Mexico waters only

Long Beach Cruise Terminal Improvement Project

Operation - Imagination and Inspiration Baseline/Project Vessel Engine Energy Use Calculations

Assumptions:

1) kWh at different speeds determined through curve fitting data provided by Carnival for 8 kts, 11 kts and full speed (22.1 kts) operations. The curve fits equation was determined to be y=53.388x^2-171.66x+4200, where y = kWh energy use and x = speed in kts.

2) The carnival supplied engine energy use data was as follows:

For Imagination and Inspiration

- At Berth - 4,200 kWh
- At 8 kts - 6,000 kWh
- At 11 kts - 9,000 kWh
- At 21.4 kts - 24,950 kWh

3) 52 Trips per year per ship per destination (104 trips per ship and 104 trips per destination. 208 total)

4) Maximum daily energy use for these two ships occurs on Mondays per the current ship schedule assumptions.

Imagination to Ensenada kWh

	Departing				Approach					
	Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth	At berth	Boiler
Speed (kts)	5.7	10.4	9.5	8.6	10.5	10.3	9.6	5.4	--	--
kW/hr	4,956	8,189	7,387	6,672	8,284	8,096	7,472	4,830	4,200	1,414

For SCAB Emissions

Time in Mode (hrs)	0.35	1.73	2.11	1.94	1.88	0.37	1.25	12.5
Energy (kWh)	1,739	14,174	15,553	15,720	14,011	1,789	5,250	17,675

For GHG Emissions to CA Border

Time in mode (hrs)	5.58	4.57
Energy (kWh)	37,241	37,868

Per Trip Energy Use (kWh)

At berth	22,925
SCAB	85,910
Cal Waters	161,018

Long Beach Cruise Terminal Improvement Project

Operation - Imagination and Inspiration Baseline/Project Vessel Engine Energy Use Calculations

Imagination to Catalina/Ensenada kWh

	Departing				Approach					
	Berth to PS	PS to Cat	Cat to SCAB	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth	At berth/Anch	Boiler
Speed (kts)	5.7	10.4	9.5	8.6	10.5	10.3	9.6	5.4	--	--
kW/hr	4,956	8,189	7,387	6,672	8,284	8,096	7,472	4,830	4,200	1,414

For SCAB Emissions

Time in Mode (hrs)	0.70	11.28	2.11	1.94	1.88	0.74	10.25	21.5
Energy (kWh)	3,478	92,364	15,553	15,720	14,011	3,578	43,050	30,401

For GHG Emissions to CA Border

Time in mode (hrs)	5.58139535	4.57142857
Energy (kWh)	37,241	37,868

Per Trip Energy Use (kWh)

At berth/Anchorage	73,451
SCAB	218,154
Cal Waters	293,262

Inspiration to Ensenada kWh

	Departing				Approach					
	Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth	At berth	Boiler
Speed (kts)	3.8	9.4	8.2	7.4	9.5	8.8	8.4	4.8	--	--
kW/hr	4,319	7,304	6,382	5,853	7,387	6,824	6,525	4,606	4,200	1,414

For SCAB Emissions

Time in Mode (hrs)	0.53	1.91	2.44	2.27	2.14	0.42	1.25	12.50
Energy (kWh)	2,273	13,986	15,566	15,509	13,982	1,919	5,250	17,675

For GHG Emissions to CA Border

Time in mode (hrs)	6.49	5.05
Energy (kWh)	37,967	37,326

Per Trip Energy Use (kWh)

At berth	22,925
SCAB	86,160
Cal Waters	161,454

Long Beach Cruise Terminal Improvement Project

Operation - Imagination and Inspiration Baseline/Project Vessel Engine Energy Use Calculations

Inspiration to Catalina kWh

	Departing				Approach					
	Berth to PS	PS to Cat	Cat to SCAB	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth	At berth/Anch	Boiler
Speed (kts)	3.8	9.4	8.2	7.4	9.5	8.8	8.4	4.8	--	--
kW/hr	4,319	7,304	6,382	5,853	7,387	6,824	6,525	4,606	4,200	1,414

For SCAB Emissions

Time in Mode (hrs)	1.05	11.06	2.44	2.27	2.14	0.83	10.25	21.5
Energy (kWh)	4,546	80,758	15,566	15,509	13,982	3,838	43,050	30,401

For GHG Emissions to CA Border

Time in mode (hrs)	6.49	5.05
Energy (kWh)	37,967	37,326

Per Trip Energy Use (kWh)

At berth/Anchorage	73,451
SCAB	207,650
Cal Waters	282,944

Maximum Daily Energy Use in SCAB

Mondays	kWh
Imagination	110,155
Inspiration	99,928
Total	210,083

Annual Energy Use (kWh)

	Imagination	Inspiration	Total
At berth (POLB)	2,384,200	2,384,200	4,768,400
At Anch (Catalina)	2,627,352	2,627,352	5,254,704
SCAB	15,811,292	15,278,158	31,089,449
Cal Waters	23,622,588	23,108,659	46,731,247

Long Beach Cruise Terminal Improvement Project

Operation - Splendor Baseline Vessel Engine Energy Use Calculations

Assumptions:

1) kWh at different speeds determined through curve fitting data provided by Carnival for 8 kts, 11 kts and full speed (22.1 kts) operations. The curve fits equation was determined to be y=77.628x^2+182.39x+8107, where y = kWh energy use and x = speed in kts.

2) The carnival supplied engine energy use data was as follows:

At Berth - 8,200 kWh
At 8 kts - 14,000 kWh
At 11 kts - 20,000 kWh
At 22.1 kts - 50,000 kWh

3) Daily kWh in SCAB is the same as the per round trip energy use in SCAB.

4) 51 Trips per year

Splendor kWh

	Departing				Approach					
	Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth	At berth	Boiler
Speed (kts)	4.1	15.9	20.5	20.5	17.5	16.5	13.5	4.7	--	--
kW/hr	10,070	30,542	44,379	44,379	34,982	32,161	24,627	10,589	8,200	1,414

For SCAB Emissions

Time in Mode (hrs)	0.49	1.13	0.98	1.21	1.33	0.43	9	9
Energy (kWh)	4,912	34,576	43,297	38,983	32,836	4,506	73,800	12,726

For GHG Emissions to CA Border

Time in mode (hrs)	2.34	2.74
Energy (kWh)	103,912	95,952

Engine Energy Totals (kWh)

	Daily	Annual
At Berth	86,526	4,412,826
SCAB	245,635	12,527,403
Cal Waters	445,499	22,720,462

Long Beach Cruise Terminal Improvement Project

Operation - Panorama Project Vessel Engine Energy Use Calculations

Assumptions:

1) All ship speed and engine energy requirement information is from Carnival
2) Daily kWh in SCAB is the same as the per round trip energy use in SCAB.
3) 51 Trips per year

Panorama kWh

	Departing					Approach				
	Berth to PS	PS to 20 nm	20 to 40 nm	>40 nm	>40 nm	40 to 20 nm	20 nm to PS	PS to Berth	At berth	Boiler
Speed (kts)	4.1	12	15	17	17.5	16.5	12	4.7	--	--
kW/hr	9,625	16,189	21,216	26,123	27,519	24,797	16,189	9,820	7,600	1,414

For SCAB Emissions

Time in mode (hrs)	0.49	1.50	1.33		1.21	1.50	0.43	1.25	9.50
Energy (kWh)	4,695	24,284	28,288		30,057	24,284	4,179	9,500	13,433

For GHG Emissions to CA Border

Time in mode (hrs)	2.82	2.74
Energy (kWh)	73,759	75,481

Engine Energy Totals (kWh)

	Daily	Annual
At Berth	22,933	1,169,583
SCAB	138,719	7,074,660
Cal Waters	287,959	14,685,887

Long Beach Cruise Terminal Improvement Project

Operation - Cruise Ship Emissions

	POLB 2014 AEI - OGV Emission Factors - Table 2.13 (gram/kWh)								
Medium Speed Engines	PM10	PM2.5	NOx	SOx	CO	HC	CO2	N2O	CH4
Tier 0 - Propulsion	0.26	0.24	13.2	0.4	1.1	0.5	649	0.029	0.01
Tier 1 - Propulsion	0.26	0.24	12.2	0.4	1.1	0.5	649	0.029	0.01
Tier 2 - Propulsion	0.26	0.24	10.5	0.4	1.1	0.5	649	0.029	0.01
Tier 3 - Propulsion	0.26	0.24	2.6	0.4	1.1	0.5	649	0.029	0.01

Baseline Cruise Ship Emissions

Maximum Daily Emissions

		kWH	Maximum Daily Emissions (pounds/day)									
		At Berth	PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Splendor	Tier 1 - Propulsion	86,526	49.60	45.78	2,327.24	76.30	209.83	95.38	123,802	5.53	1.91	125,321

		kWH	Maximum Daily Emissions (pounds/day)									
		In SCAB	PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Splendor	Tier 1 - Propulsion	245,635	140.80	129.97	6,606.71	216.61	595.69	270.77	351,455	15.70	5.42	355,769

Annual Emissions

		kWH	Annual Emissions (tons/year)									
		At Berth	PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	2,384,200	0.68	0.63	32.06	1.05	2.89	1.31	1,706	0.08	0.03	1,727
Imagination	Tier 1 - Propulsion	2,384,200	0.68	0.63	32.06	1.05	2.89	1.31	1,706	0.08	0.03	1,727
Splendor	Tier 1 - Propulsion	4,412,826	1.26	1.17	59.34	1.95	5.35	2.43	3,157	0.14	0.05	3,196
		Total Emissions	2.63	2.43	123.47	4.05	11.13	5.06	6,568	0.29	0.10	6,649

		kWH	Annual Emissions (tons/year)									
		In SCAB	PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	14,616,406	4.19	3.87	196.56	6.44	17.72	8.06	10,457	0.47	0.16	10,585
Imagination	Tier 1 - Propulsion	15,149,540	4.34	4.01	203.73	6.68	18.37	8.35	10,838	0.48	0.17	10,971
Splendor	Tier 1 - Propulsion	12,527,403	3.59	3.31	168.47	5.52	15.19	6.90	8,962	0.40	0.14	9,072
		Total Emissions	12.12	11.19	568.77	18.65	51.28	23.31	30,257	1.35	0.47	30,628

		kWH	Annual Emissions (tons/year)									
		In Cal Waters	PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	22,960,836	6.58	6.07	308.78	10.12	27.84	12.66	16,426	0.73	0.25	16,628
Imagination	Tier 1 - Propulsion	22,446,907	6.43	5.94	301.87	9.90	27.22	12.37	16,059	0.72	0.25	16,256
Splendor	Tier 1 - Propulsion	22,720,462	6.51	6.01	305.55	10.02	27.55	12.52	16,254	0.73	0.25	16,454
		Total Emissions	19.53	18.02	916.20	30.04	82.61	37.55	48,739	2.18	0.75	49,337
											Total MT	44,760

Long Beach Cruise Terminal Improvement Project

Operation - Cruise Ship Emissions

Proposed Project Cruise Ship Emissions

Maximum Daily Comparison Emissions

Maximum Scenario (except NOx)		kWH At Berth	Maximum Daily Emissions (pounds/day)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Panorama	Tier 2 - Propulsion	22,933	13.15	12.13	530.87	20.22	55.61	25.28	32,813	1.47	0.51	33,215

For comparison with Splendor		kWH In SCAB	Maximum Daily Emissions (pounds/day)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Panorama	Tier 2 - Propulsion	138,719	79.51	73.40	3,211.14	122.33	336.41	152.91	198,479	8.87	3.06	200,915

Proposed Project Maximum Daily Emissions Scenario

Maximum NOx Scenario		kWH At Berth	Maximum Daily Emissions (pounds/day)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Insp. or Imag.	Tier 1 - Propulsion	22,925	13.14	12.13	616.60	20.22	55.60	25.27	32,801	1.47	0.51	33,204

Maximum Scenario		kWH In SCAB	Maximum Daily Emissions (pounds/day)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	87,202	49.98	46.14	2,345.42	76.90	211.47	96.12	124,769	5.58	1.92	126,300
Imagination	Tier 1 - Propulsion	110,155	63.14	58.28	2,962.78	97.14	267.14	121.43	157,610	7.04	2.43	159,544
		Total Emissions	113.13	104.42	5,308.20	174.04	478.61	217.55	282,379	12.62	4.35	285,845

Annual Emissions

		kWH At Berth	Annual Emissions (tons/year)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	2,384,200	0.68	0.63	32.06	1.05	2.89	1.31	1,706	0.08	0.03	1,727
Imagination	Tier 1 - Propulsion	2,384,200	0.68	0.63	32.06	1.05	2.89	1.31	1,706	0.08	0.03	1,727
Panorama	Tier 2 - Propulsion	1,169,583	0.34	0.31	13.54	0.52	1.42	0.64	837	0.04	0.01	847
		Total Emissions	1.70	1.57	77.66	2.62	7.20	3.27	4,248	0.19	0.07	4,300.17

		kWH In SCAB	Annual Emissions (tons/year)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	14,616,406	4.19	3.87	196.56	6.44	17.72	8.06	10,457	0.47	0.16	10,585
Imagination	Tier 1 - Propulsion	15,149,540	4.34	4.01	203.73	6.68	18.37	8.35	10,838	0.48	0.17	10,971
Panorama	Tier 2 - Propulsion	7,074,660	2.03	1.87	81.88	3.12	8.58	3.90	5,061	0.23	0.08	5,123
		Total Emissions	10.56	9.75	482.18	16.24	44.67	20.30	26,356	1.18	0.41	26,679

		kWH In Cal Waters	Annual Emissions (tons/year)									
			PM10	PM2.5	NOX	SOX	CO	VOC	CO2	N2O	CH4	CO2e
Inspiration	Tier 1 - Propulsion	22,960,836	6.58	6.07	308.78	10.12	27.84	12.66	16,426	0.73	0.25	16,628
Imagination	Tier 1 - Propulsion	22,446,907	6.43	5.94	301.87	9.90	27.22	12.37	16,059	0.72	0.25	16,256
Panorama	Tier 2 - Propulsion	14,685,887	4.21	3.89	169.98	6.48	17.81	8.09	10,506	0.47	0.16	10,635
		Total Emissions	17.22	15.90	780.63	26.50	72.87	33.12	42,991	1.92	0.66	43,519
											Total MT	39,482

Long Beach Cruise Terminal Improvement Project

Operation - Incremental Traffic Trips and VMT

Assumptions

1) Trip numbers reflect the increased trips on Saturday for the new Panorama vessel, on 51 Saturdays per year, no changes occur on other days of the week.

2) Trip and VMT/Trip estimates provided by the Carnival/Carnival's Traffic Consultant in their Traffic Study

3) Employee one-way trip distance is assumed to be the average for the LA area in the SCAG RTP (~15 miles)

4) Average occupancy for passenger shuttle buses, given PCE of 1.5, adjusted from 2.2 to 22 passenger average occupancy.

Incremental number of one-way trips (in Passenger Car Equivalents - PCE)

Saturday	2018	2020	Net Change	PCE
Passenger Autos	2644	3518	874	1
Passenger Shuttle Buses	44	57	13.5	1.5
Supply Trucks-Light Duty Truck/Delivery Van	6	6	0	1
Supply Trucks Box Trucks/Heavy Vehicles	58	70	12	1.2 to 2
Employee Autos	378	435	57	1

One-way Trip Length for Passengers and Buses/Shuttles		
Percentage of Trips	**Route**	**Miles**
58.7%	LAX	22
1.6%	Local	20
5.9%	North/other airports	40
33.8%	North East	40
	Average	29.1

One-way Incremental Trips for Trucks (not PCE)

	Route	Mi/Trip	One-Way Trips
Tractor Trailer	Local	20	6
Tractor Trailer	Out of State	100	2
Box Truck (LHDT2)	Local	25	4

Total Incremental VMT by vehicle category

Vehicle Category	Incremental VMT
Passenger/Employee	26,301
Buses/Shuttles	262
Heavy Trucks	320
Light Heavy Trucks	100

Long Beach Cruise Terminal Improvement Project

Operation - Incremental Traffic Emissions

Assumptions

1) Current and project traffic estimates are provided by Carnival.
2) Emissions factors are from EMFAC2014, to be consistent with the other estimates that use CalEEMod.
3) Emissions factors for passenger/employee VMT are based on air basin average emissions per vehicle mile traveled (VMT) for 2020 (to determine post project incremental emissions) using mile weighted averages of the following EMFAC2011 vehicle categories: LDA. LDT1, LDT2, and LHDT1.
4) EMFAC2014 does not provide emissions factors for methane or nitrous oxide, and those emissions in terms of CO_2e are very low in comparison with the CO_2 emissions, so only the CO_2 emissions are provided.

Project Incremental Traffic Emissions

Vehicle Type	Incremental VMT	Emissions Factors lbs/VMT						
		PM10	PM2.5	NOx	SOx	CO	VOC	CO_2
Passenger/Employee	26,301	3.28E-04	9.98E-05	2.89E-04	7.42E-06	2.47E-03	3.11E-04	0.74
Buses/Shuttles	262	5.57E-04	2.05E-04	5.33E-03	2.78E-05	4.65E-03	4.63E-04	2.85
Box Trucks	100	4.81E-04	1.80E-04	3.55E-03	1.14E-05	8.91E-04	1.58E-04	1.19
Heavy Trucks	320	4.77E-04	1.73E-04	1.11E-02	3.54E-05	1.88E-03	3.38E-04	3.84

	Emissions lbs/day						
	PM10	PM2.5	NOx	SOx	CO	VOC	CO_2
Passenger/Employee	8.62	2.63	7.61	0.20	64.88	8.18	19,457
Buses/Shuttles	0.15	0.05	1.40	0.01	1.22	0.12	746
Box Trucks	0.05	0.02	0.35	0.00	0.09	0.02	119
Heavy Trucks	0.15	0.06	3.56	0.01	0.60	0.11	1,230
Total	**8.96**	**2.75**	**12.92**	**0.21**	**66.79**	**8.43**	**21,552**

	Emissions tons/year						
	PM10	PM2.5	NOx	SOx	CO	VOC	CO_2
Passenger/Employee	0.22	0.07	0.19	0.00	1.65	0.21	496
Buses/Shuttles	0.00	0.00	0.04	0.00	0.03	0.00	19
Box Trucks	0.00	0.00	0.01	0.00	0.00	0.00	3
Heavy Trucks	0.00	0.00	0.09	0.00	0.02	0.00	31
Total	**0.23**	**0.07**	**0.33**	**0.01**	**1.70**	**0.21**	**550**

Carnival Cruise - unmitigated

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Unenclosed Parking with Elevator	541.00	1000sqft	2.50	541,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	11			**Operational Year**	2018
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Construction Phase - Operational Phase Model - Construction phase dealt with in isolation

Operational Off-Road Equipment - Data provided by Carnival

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Offroad	1.8204	17.3630	12.0779	0.0192		1.1040	1.1040		1.0157	1.0157		1,928.2924	1,928.2924	0.6003		1,943.3000

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Forklifts	11	5.50	260	59	0.20	CNG
Forklifts	2	9.40	260	148	0.20	Diesel
Forklifts	1	1.70	260	89	0.20	Diesel
Off-Highway Trucks	4	1.60	260	200	0.38	CNG

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Forklifts	1.4551	13.6627	10.4230	0.0140		0.9526	0.9526		0.8764	0.8764		1,405.3872	1,405.3872	0.4375		1,416.3252
Off-Highway Trucks	0.3653	3.7003	1.6549	5.2000e-003		0.1515	0.1515		0.1394	0.1394		522.9052	522.9052	0.1628		526.9749
Total	**1.8204**	**17.3630**	**12.0779**	**0.0192**		**1.1040**	**1.1040**		**1.0157**	**1.0157**		**1,928.2924**	**1,928.2924**	**0.6003**		**1,943.3000**

Carnival Cruise - unmitigated
South Coast Air Basin, Annual

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Offroad	0.2367	2.2572	1.5701	2.4900e-003		0.1435	0.1435		0.1320	0.1320	0.0000	227.4113	227.4113	0.0708	0.0000	229.1812

Carnival Cruise - unmitigated

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Unenclosed Parking with Elevator	843.80	1000sqft	2.50	843,800.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	11			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Construction Phase - Operational Phase Model - Construction phase dealt with in isolation

Operational Off-Road Equipment - Data provided by Carnival

Carnival Cruise - unmitigated
South Coast Air Basin, Summer

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Offroad	1.9652	18.1718	15.9381	0.0250		1.1514	1.1514		1.0593	1.0593		2,418.1984	2,418.1984	0.7821		2,437.7508

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Forklifts	11	7.30	260	59	0.20	CNG
Forklifts	1	8.00	260	148	0.20	Diesel
Forklifts	2	8.00	260	150	0.20	Diesel
Forklifts	1	8.00	260	110	0.20	Diesel
Off-Highway Trucks	4	1.60	260	200	0.38	CNG

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Forklifts	1.6705	15.4832	14.4464	0.0198		1.0466	1.0466		0.9629	0.9629		1,914.0244	1,914.0244	0.6190		1,929.5002
Off-Highway Trucks	0.2947	2.6886	1.4917	5.2100e-003		0.1048	0.1048		0.0964	0.0964		504.1740	504.1740	0.1631		508.2505
Total	**1.9652**	**18.1718**	**15.9381**	**0.0250**		**1.1514**	**1.1514**		**1.0593**	**1.0593**		**2,418.1984**	**2,418.1984**	**0.7821**		**2,437.7508**

Carnival Cruise - unmitigated
South Coast Air Basin, Annual

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Offroad	0.2555	2.3623	2.0720	3.2400e-003		0.1497	0.1497		0.1377	0.1377	0.0000	285.1879	285.1879	0.0922	0.0000	287.4937

Long Beach Cruise Terminal Improvement Project

Operation - Electricity Indirect GHG Emissions

Assumptions

1) Current and project operation electricity use is provided by Carnival.

2) GHG emissions are calculated using Western Electricity Coordinating Council (WECC) 2016 emissions factors for the California (CAMX) area provided by The Climate Registry's 2018 default emissions factor document (Table 14.1). GHG emissions will go down as renewable energy production increases, lowering the difference in the GHG emissions from baseline to project from year to year. However, for simplicity the GHG indirect annual emissions from operation electricity use for this assessment are estimated using the 2016 default rates.

3) Conversion of Methane (CH_4) and nitrous oxide (N_2O) are based on the IPCC AR5 carbon dioxide equivalent (CO_2e) conversions factors of 28 and 265, respectively.

4) kWh = Kilowatt hours, MWh = Megawatt hours, GWh = Gigawatt hours.

Carnival Electricity Use Estimate (kWh/year)

Source	Baseline	Project
Garage Lighting	650,000	550,000
Terminal Lighting	900,000	900,000
Hoteling	8,600,000	12,700,000
Total	10,150,000	14,150,000

Indirect GHG Emissions

		Emissions Factors			Emissions
Emissions	Use	CO2	CH4	N20	CO2e
Baseline	10,150	527.9	33	4	2,440
Project	14,150	527.9	33	4	3,401
	MWh/year	lbs/MWh	lbs/GWh	lbs/GWh	MT/Year