Appendix P

Air Quality Technical Memorandum

APPENDIX P
AIR QUALITY TECHNICAL MEMORANDUM
PORT OF GULFPORT EXPANSION PROJECT

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Acronyms and Abbreviations

ARM2	Ambient Ratio Method 2
CBSA	Core Based Statistical Area
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CWA	Clean Water Act
cy	cubic yard
DA	Department of the Army
DEIS	Draft Environmental Impact Statement
EF	emission factor
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FNC	Federal Navigation Channel
g	gram
GHG	greenhouse gas
GIS	geographic information system
GIWW	Gulf Intracoastal Waterway
Gulf	Gulf of Mexico
GWP	global warming potential
HAP	hazardous air pollutant
hp	horsepower
hr	hour
I	Interstate
IPCC	Intergovernmental Panel on Climate Change
KCS	Kansas City Southern
km	kilometer
kWh	kilowatt hour
lb	pound
LF	load factor
m	meter
MDEQ	Mississippi Department of Environmental Quality
MOVES	Motor Vehicle Emissions Stimulator
MPRSA	Marine Protection, Research, and Sanctuaries Act
mph	miles per hour
msl	mean sea level
MT	metric ton

N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standard
NED	National Elevation Dataset
NO_x	nitrogen oxide
NO_2	nitrogen dioxide
O_3	ozone
PAH	polycyclic aromatic hydrocarbons
PGEP	Port of Gulfport Expansion Project
PM	particulate matter
PM_{10}	particulate matter of 10 micrometers or less
$PM_{2.5}$	particle diameters of 2.5 micrometers or less
Port	Port of Gulfport
ppm	parts per million
RH	Relative humidity
RVP	Reid Vapor Pressure
SCRAM	Support Center for Regulatory Atmospheric Modeling
SO_2	sulfur dioxide
Tech Memo	Technical Memorandum
TEU	Twenty-foot Equivalent Unit
$\mu g/m^3$	micrograms per cubic meter
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
VMT	vehicle miles traveled
VOC	volatile organic compound

1.0 INTRODUCTION

This Air Quality Technical Memorandum (Tech Memo) provides the documentation and support for the discussions and findings within the Proposed Port of Gulfport Expansion Project (PGEP) Environmental Impact Statement (EIS), Section 4.5, Environmental Consequences—Air Quality. This report focuses on documenting the quantification of air emission inventories, as well as the modeling and resulting pollutant concentrations, for the No-Action Alternative and the Proposed Project Alternative. Regulatory and environmental settings, as well as impact assessments and determinations with regard to air quality, are addressed in Sections 3.5 and 4.5 of the PGEP EIS, respectively.

The emission estimates provided in this document represent the increase in criteria pollutant, hazardous air pollutants (HAP), and greenhouse gas (GHG) emissions that would result from the No-Action Alternative and the Proposed Project Alternative. Criteria pollutants of concern for this project include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), fine particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 microns ($PM_{2.5}$), inhalable particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns (PM_{10}), and sulfur dioxide (SO_2). NO_2 impacts are commonly evaluated by analyzing nitrogen oxides (NO_x), which is done in this analysis. O_3 is not directly emitted, but rather formed in the air through a photochemical reaction of NO_x and volatile organic compounds (VOC), referred to as O_3 precursors. O_3 impacts are evaluated by analyzing NO_x and VOC emissions. GHGs considered in this analysis include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHG emissions are presented as CO_2 equivalents (CO_2e), which is a consistent methodology for comparing GHG emissions as it normalizes various GHG emissions to a consistent measure. HAPs represent a sum of a variety of pollutants and can include benzene, toluene, xylenes, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, napthalene, diesel particulate matter, polycyclic organic matter, and polycyclic aromatic hydrocarbons (PAH).

For the purpose of this air impact assessment, the regional area is considered to include Harrison County; the Proposed Project Alternative is located at the southern end of Harrison County. The impact assessment addresses the projected incremental increase in air emissions associated with the No-Action Alternative and Proposed Project Alternative in the years 2020 and 2060, as representative years for analysis.

Air emissions are considered for Port of Gulfport (Port) expansion construction activities and placement of dredged material as well as emissions from vehicular traffic and maintenance dredging. Project emissions are estimated based on the construction and equipment schedule developed for each alternative as well as associated increased truck, rail, and ship traffic rates resulting from Port operations. The off-site traffic would be distributed over the Gulfport urban area, primarily along U.S. Highway (US) 49 between US 90 and Interstate (I)-10 and along the Federal Navigation Channel (FNC) leading up to the Port. Emissions evaluated were those that would primarily result from off-road and on-road mobile sources associated with construction of the Proposed Project Alternative. There would also be regional emission increases from

marine, rail, and roadway traffic traveling to and from the terminal site (i.e., off-site emissions) associated with the operation of the No-Action Alternative and the Proposed Project Alternative.

Air dispersion modeling was performed in response to comments from the U.S. Environmental Protection Agency (EPA) on the Draft EIS (DEIS) and was meant to provide information about potential hot spot impacts due to the additional line haul locomotive and cargo (container) truck activity in the No-Action Alternative and the Proposed Project Alternative. EPA's comments specified the following National Ambient Air Quality Standards (NAAQS) pollutants of concern for modeled impacts: CO, NO_2, PM_{10}, and $PM_{2.5}$. The predicted concentrations of these criteria pollutants emitted from the operation of the No-Action Alternative and the Proposed Project Alternative were estimated using the AERMOD Dispersion Model.

1.1 SUMMARY OF PROJECT

The current proposal being evaluated for a Department of the Army (DA) permit is expansion of the Port via modifications to the West Pier, East Pier, North Harbor, and Turning Basin, and includes construction of a breakwater on the eastern side of the FNC. The Port is located south of the City of Gulfport in Harrison County, Mississippi, within city limits and is approximately 7 miles south of I-10, approximately 80 miles west of Mobile, Alabama, and 80 miles east of New Orleans, Louisiana. The Port encompasses approximately 369 acres and is located on the north shore of the Mississippi Sound within 5 miles of the Gulf Intracoastal Waterway (GIWW) and 10 miles from the Gulf of Mexico (Gulf) and Gulf Island National Seashore.

The proposed action evaluated in this EIS is to expand the facilities at the Port to provide appropriate infrastructure for handling 1.7 million Twenty-foot Equivalent Units (TEUs) annually by 2060. Such an effort involves the dredging and filling of estuarine mud and sand bottom in the Mississippi Sound; construction of wharfs, bulkheads, terminal facilities, container storage areas, and intermodal container transfer facilities; placement of new-work and maintenance dredged material; and construction of a breakwater. The proposed expanded Port facility would be elevated to up to +25 feet mean sea level (msl) to provide protection against future tropical storm surge events.

As a result of the alternatives development, screening, and further refinement, there are two alternatives to be carried forward for evaluation in the EIS: the No-Action Alternative and the Proposed Project Alternative.

1.1.1 No-Action Alternative

The No-Action Alternative provides a means to evaluate the environmental impacts that would occur if no construction requiring a U.S. Army Corps of Engineers (USACE) permit is performed; work that does not require a USACE permit may be implemented. Since the PGEP requires dredging activities in navigable waters subject to Section 10 of the Rivers and Harbors Act, and fill activities subject to Section 404 of the Clean Water Act (CWA) (33 USC 1344), and Section 103 of the Marine Protection, Research, and

Sanctuaries Act (MPRSA) of 1972, as amended (33 USC 1413), construction activities involving dredge and fill would not proceed without a permit from the USACE.

While the PGEP would not occur under the No-Action Alternative, it is assumed that previously permitted actions at the Port and in the vicinity of the Port (e.g., Restoration Project) would continue and are assumed as complete during the environmental consequences evaluation. The Restoration Project (which is under construction and will be completed in 2017, see Section 1.3.1 of the EIS), is reflected as complete in the No-Action Alternative.

Following completion of the Restoration Project, the Port facilities would include a footprint of approximately 264 acres and the currently federally authorized FNC and turning basin. Immediately following completion of the Restoration Project, an annual throughput of between 250,000 and 400,000 TEUs is anticipated due to tenant configuration and cargo handling practices. Thus, under the No-Action Alternative, the Port would continue to operate without the proposed expanded facilities, and Port activities would be limited by the existing, post-Restoration Project facility configuration. The Port has been constructed within the Mississippi Sound on estuarine mud and sand bottom and all backlands space is generated from filling of estuarine mud and sand bottom (with proper permits and approvals). It is expected that over time, improved economic conditions, improvements in Port efficiencies, changes in tenant configuration and automation, and other unforeseeable changes in Port practices or economic conditions would allow the Port to achieve an annual throughput up to 1.0 million TEUs by 2060. This assumption allows a worst-case scenario with regard to the maximum potential throughput under the No-Action Alternative for comparison purposes with the Proposed Project Alternative. It is assumed that space constraints would limit throughput to 1.0 million TEUs annually. The No-Action Alternative is carried forward in this EIS (per 40 CFR section 1502.14(d)) to provide a means by which to compare potential future conditions for action alternatives. In other words, the potential environmental effects of the future *without* the Project are compared to the effects of the future *with* the Project.

No construction or new operating emission sources are associated with the No-Action Alternative. However, it would be expected that over time, the Port would achieve an annual throughput of up to 1.0 million TEUs by 2060. Thus, it is expected that air contaminant emissions within the Project area would increase within the operational constraints on the existing system due to increased truck, rail, and ship traffic resulting both from growth of existing business and new business at the Port.

1.1.2 Proposed Project Alternative

The Proposed Project Alternative is to expand the Port facility, including:

- Expansion of the West Pier
- Expansion of the East Pier
- Fill in the North Harbor
- Expansion of the federally authorized Gulfport Turning Basin (at 36-foot depth)
- Construction of an eastern breakwater

- Placement of dredged material
- Site configuration and automation

As noted for the No-Action Alternative, the Proposed Project Alternative assumes that the Restoration Project has been completed. The proposed PGEP features would be added to the post-Restoration Project footprint, with a few exceptions.

The proposed expansion features (not including the post-Restoration Project footprint) would be elevated up to +25 feet msl to provide protection against future tropical storm surge events. The post-Restoration Project footprint would be elevated up to +14 feet msl, with the proposed expansion footprint elevated up to +25 feet msl. Fill material would be obtained from permitted sites along the Tennessee-Tombigbee River and transported into the Port via barge for construction.

2.0 METHODOLOGY

Impacts on Air Quality by the No-Action Alternative and Proposed Project Alternative were evaluated by estimating the criteria pollutant, HAPs, and GHG emissions associated with the construction and operation of the No-Action Alternative and Proposed Project Alternative. Air dispersion modeling was also performed for CO, NO_2, PM_{10}, and $PM_{2.5}$ in response to comments from EPA on the DEIS.

HAPs represent a sum of a variety of pollutants and can include benzene, toluene, xylenes, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, napthalene, diesel particulate matter, polycyclic organic matter, and PAHs. Emission calculation information was not available for each of the HAPs listed above. HAP emission totals shown in this analysis include the listed HAPs where emissions calculation information was available.

Individual GHGs have varying heat-trapping properties and atmospheric lifetimes. Each GHG is compared to CO_2 with respect to its ability to trap infrared radiation, its atmospheric lifetime, and its chemical structure, or its global warming potential (GWP). The CO_2e is a consistent methodology for comparing GHG emissions since it normalizes various GHG emissions to a consistent measure. CH_4 is 25 times more potent than CO_2; therefore, one metric ton (MT) of CH_4 is equal to 25 MTs CO_2e and the GWP of CH_4 is 25. N_2O is 298 times more potent than CO_2; therefore, one MT of N_2O is equal to 298 MTs CO_2e and the GWP of N_2O is 298 (Intergovernmental Panel on Climate Change [IPCC] 2007). When direct calculation to MTs of CO_2e was not available, GWPs were used to convert calculated CH_4 and N_2O emissions into CO_2e.

All sources of criteria pollutant, HAPs, and GHG emissions that were reasonably foreseeable were included in this analysis. Air emissions were evaluated for the analysis years 2020 and 2060. Methodology is outlined below.

2.1 CONSTRUCTION EMISSIONS INVENTORY

No construction emission sources are associated with the No-Action Alternative. Thus, a construction emissions inventory was not quantified for the No-Action Alternative. The methodology presented here for the construction emissions inventory reflects the Proposed Project Alternative.

Temporary increases in air pollution would result from the equipment associated with construction of the Proposed Project Alternative. These air contaminant emissions would result from the use of marine vessel and land-based mobile sources that would be used during the expansion activities, including:

- Dredge & Support Equipment – dredging vessels and tugboats;
- Non-Road Construction Equipment – land-based equipment such as bulldozers and graders;
- On-Road and Employee Vehicles – land-based equipment such as cars and trucks; and
- Maintenance Dredging – dredging vessels for maintenance such as hopper dredges.

Air contaminant emissions associated with the expansion activities would be primarily combustion products from fuel burned in equipment used for Project dredging, support vessels, and dredged material placement equipment. Equipment such as excavators, backhoes, and front-end loaders would also be required. The marine vessel emission sources would be primarily diesel-powered engines. The off-road and on-road equipment may be assumed to be a mix of gasoline and diesel powered vehicles. These construction activities would be considered one-time activities, i.e., the construction activities would not continue past the date of completion. For purposes of estimating emissions, the construction activities were projected to occur from 2018 through 2024.

A summary of the total estimated emissions resulting from the use of dredging equipment, non-road equipment, and on-road equipment for the construction of the Proposed Project Alternative is presented in Section 3.1. Detailed construction emissions calculations are shown in Appendix P-1.

2.1.1 Dredge and Support Equipment

Dredge and support equipment emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = Hr x HP x LF x EF / (453.59 g/pound [lb]) / (2000 lb/ton)

Where:

Hr	=	Annual Operating Hours (hr/year)
HP	=	Horsepower (hp)
LF	=	Load Factor (unitless)
EF	=	Emission Factor (g/hphr)

Dredge and support equipment list, monthly operating hours per equipment type and activity, hp, and engine tier were provided by the Port for the Proposed Project Alternative. Load factors were taken from Table 3-3 in *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). Emission factors were developed from Table 3-8 in *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). The emission factors in the table were presented in units of grams (g)/kilowatt hour (kWh). These were converted to units of g/hphr using a conversion factor of 1.341022 kWh/hphr.

GHG emissions were estimated for CO_2, CH_4, and N_2O and converted to CO_2e using GWPs. HAP emission factors for engines less than 600 hp were taken from AP-42, Compilation of Emission Factors, Tables 3.3-1 and 3.3-2 (EPA 1996a). HAP emission factors for engines greater than 600 hp were taken from AP-42, Compilation of Emission Factors, Tables 3.4-3 and 3.4-4 (EPA 1996b). HAP emissions represent a sum of the following pollutants: benzene, toluene, xylenes, formaldehyde, acetaldehyde, acrolein, napthalene, diesel particulate matter, and PAHs. HAP emissions for dredging and support vessels with over 600 hp do not include 1,3-butadiene because emission factors were not available from AP-42 for this pollutant.

2.1.2 Non-Road Construction Equipment

Non-road construction equipment emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = Hr x HP x LF x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

Hr	=	Annual Operating Hours (hr/year)
HP	=	Horsepower (hp)
LF	=	Load Factor (unitless)
EF	=	Emission Factor (g/hphr)

A non-road construction equipment list, monthly operating hours per equipment type and activity, and hp were provided by the Port for the Proposed Project Alternative. Load factors were taken from EPA's *Median Life, Annual Activity, and Load Factor Values for Non-road Engine Emissions Modeling* (EPA 2004a). Emission factors were developed in the EPA Motor Vehicle Emissions Simulator (MOVES) model, version 2014a.

The MOVES model was used to produce emission factors in units of g/hphr for peak winter (January 7 a.m.-8 a.m.) and peak summer (July 5 p.m.-6 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For construction years 2018–2024, 2017 emission factors were used. Typically, a single year is used for construction emission factors because the same construction fleet tends to be used throughout the full construction schedule. Tier 3 emission standards phase in starting in 2017 and 2017 emission factors would be more conservative than 2018 emission factors due to fleet turnover assumptions in the MOVES model. The 2017 emission factors were also used for the non-road fleets to provide consistency.

The non-road model within MOVES does not include emission factors for N_2O or HAPs. N_2O emission factors were developed by multiplying the CO_2 emission factor with a ratio, 0.0000697 (Climate Registry [CRIS], 2014). HAP emission factors for non-road vehicles were taken from AP-42, Compilation of Emission Factors, Tables 3.3-1 and 3.3-2 (EPA 1996a). A sum of the following pollutant emission factors was used: benzene, toluene, xylenes, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, napthalene, PAHs, and diesel-PM_{10}.

2.1.3 On-Road and Employee Vehicles

On-road and employee vehicle emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = VMT x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

VMT = Annual Vehicle Miles Traveled (miles/year)
EF = Emission Factor (g/VMT)

Annual VMT was calculated by multiplying the number of vehicles per day, the daily travel distance per vehicle, and the number of travel days per year. The number of vehicles per day and number of travel days per year were provided by the Port. The daily travel distance was assumed. Emission factors were developed in the MOVES model, version 2014a.

The MOVES model was used to produce emission factors in units of g/VMT for peak winter (January 7 a.m.-8 a.m.) and peak summer (July 5 p.m.-6 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For construction years 2018–2024, 2017 emission factors were used. Typically, a single year is used for construction emission factors because the same construction fleet tends to be used throughout the full construction schedule. Tier 3 emission standards phase in starting in 2017 and 2017 emission factors would be more conservative than 2018 emission factors due to fleet turnover assumptions in the MOVES model. Therefore, 2017 emission factors were used. The posted speed limit for US 49 and US 90 is 45 miles per hour (mph); however, a speed of 35 mph was assumed, as slower speeds have higher emission factors and therefore provide a more conservative estimate of emissions.

MOVES 2014a on-road model CO_2e emission factors were used for estimating emissions of GHGs. The HAP emission factors for on-road vehicles were a sum of the following pollutant emission factors: benzene, 1,3-butadiene, formaldehyde, acrolein, napthalene, and polycyclic organic matter.

2.1.4 Maintenance Dredging

Maintenance dredging equipment emissions were calculated the same way as the dredge and support equipment emissions were calculated.

2.2 OPERATIONAL EMISSIONS INVENTORY

No new operating emission sources are associated with the No-Action Alternative. However, it would be expected that over time, the Port would achieve an annual throughput of up to approximately 1.0 million TEUs by 2060. Thus, it is expected that air contaminant emissions within the Project area would increase within the operational constraints on the existing system due to increased truck, rail, and ship traffic resulting both from growth of existing business and new business at the Port. Day-to-day operations on the

Port are expected to have minimal contribution to air quality within the study area. However, potential changes in the transport of goods to and from the Port via truck, rail, and ship are expected to vary with changes in throughput. Therefore, the analysis of air emissions focuses on these aspects of operation rather than on emissions associated with general activity on the Port. Additionally, air emissions associated with maintenance dredging of the existing berths along the north and south harbor, the Commercial Small Craft Harbor, and the entrance channel are provided as a means of comparison with the maintenance dredging projected for the Proposed Project Alternative.

The estimate of air emissions for the No-Action Alternative was based on the assessment of potential growth in freight and container shipping as discussed in Appendix I of the EIS. In this analysis, the estimate in emissions was based specifically on the anticipated freight truck, rail car, and employee and supplier traffic volumes projected for the No-Action Alternative for the years 2020 and 2060, as summarized in Table 1.

An increase in air emissions from container ships for the No-Action Alternative was based on the assessment of potential growth in shipping container traffic as discussed in Appendix I of the EIS. Under the No-Action Alternative scenario and with the previously permitted actions, an annual throughput of up to 287,732 TEUs is anticipated by 2020. It is expected that over time, improved economic conditions, improvements in Port efficiencies, changes in tenant configuration and automation, and other unforeseeable changes in Port practices or economic conditions would allow the Port to achieve an annual throughput up to 1,049,631 million TEUs by 2060.

Under the Proposed Project Alternative, operation of the expanded Port facilities is anticipated to result in an estimated throughput of up to 487,732 TEUs by 2020. An annual throughput of 1,725,215 TEUs is expected by 2060. As such, it would be expected that air contaminant emissions would increase due to increased truck, rail, and ship traffic resulting from growth of existing business and from new business at the Port.

The estimate of air emissions from the increased freight, rail, employee and supplier traffic associated with the Proposed Project Alternative was based on the assessment of potential growth in freight and container shipping as discussed in Appendix I of the EIS. In this analysis, the estimate of emissions was based specifically on the anticipated freight truck, rail car, and employee and supplier traffic volumes projected for the Proposed Project Alternative for the years 2020 and 2060, as summarized in Table 2. As derived in Section 4.14 of the EIS, 600 TEUs per vessel trip was used to determined annual vessel trips from the projected throughput in TEUs.

Table 1: Freight Truck, Rail Car, and Employee and Supplier Traffic Volumes – 2020 and 2060– No-Action Alternative

	Annual Vessel Trips (round trip)		**Daily Freight Truck (one way)**		**Daily Rail Car (round trip)**		**Daily Employee and Supplier (one way)**	
Year	2020	2060	2020	2060	2020	2060	2020	2060
Projected Volume	480	1,750	508	1,235	72	525	2,187	7,977

Table 2: Freight Truck, Rail Car, and Employee and Supplier Traffic Volumes – 2020 and 2060– Proposed Project Alternative

	Annual Vessel Trips (round trip)		**Daily Freight Truck (one way)**		**Daily Rail Car (round trip)**		**Daily Employee and Supplier (one way)**	
Year	2020	2060	2020	2060	2020	2060	2020	2060
Projected Volume	812	2,876	861	2,030	122	865	3,707	13,112

Increases in air pollution would result from the equipment associated with operation of the No-Action Alternative and Proposed Project Alternative. These air contaminant emissions would result from the use of marine vessel and land-based mobile sources during the operation of the Port, including:

- Trucks – trucks transporting the shipped containers;
- Railroad – line haul locomotive activity transporting the containers to and north of the Gulfport Rail Yard;
- Employee Vehicles – employees and suppliers commuting to and from the Port via cars and trucks; and
- Container/Tugboat – marine vessels for transporting containers such as container vessels and tugboats.

Other potential air pollution could come from the operation of switch locomotive engines and cargo handling equipment; however, since the Port would operate electric switch locomotives and cargo handling equipment, there would be no direct emissions from these activities. Maintenance dredging would occur for both alternatives and result in emissions. While maintenance dredging would require removal of 200,000 cubic yards (cy) of material every 10 years under the No-Action Alternative, between 486,000 cy and 1.3 mcy of material would need to be removed annually under the Proposed Project Alternative. Detailed operational emissions calculations are shown in Appendix P-2.

2.2.1 Trucks

On-road cargo and supply vehicle truck emissions were estimated for each year using the following equation:

Annual Emissions, tons/year = VMT x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

VMT	=	Annual Vehicle Miles Traveled (miles/year)
EF	=	Emission Factor (g/VMT)

Annual VMT was calculated by multiplying the number of vehicles per day, the daily travel distance per vehicle, and the number of travel days per year. The number of vehicles per day and number of travel days per year were taken from Appendix I of the EIS. The daily travel distance is the maximum distance from the Port to the Harrison County boundary taking US 49 to I-10. Emission factors were developed in the MOVES model, 2014a.

The MOVES model was used to produce emission factors in units of g/VMT for peak winter (January 7 a.m.-8 a.m.) and peak summer (July 5 p.m.-6 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For operational year 2020, 2020 emission factors were used. For operational year 2060, 2050 emission factors were used. Emission factors from MOVES 2014a are only available up to year 2050; therefore, 2050 emission factors were used as a proxy to 2060. The posted speed limit for US 49 and US 90 is 45 mph; however, a speed of 35 mph was assumed, as slower speeds have higher emission factors and therefore provide a more conservative estimate of emissions. The use of diesel fuel was assumed.

MOVES 2014a on-road model CO_2e emission factors were used for GHGs. The HAP emission factors for on-road vehicles were a sum of the following pollutant emission factors: benzene, 1,3-butadiene, formaldehyde, acrolein, napthalene, and polycyclic organic matter.

2.2.2 Railroad

Emissions from trains were estimated for each year using the following equation:

Annual Emissions, tons/year = Hr x HP x LF x ($Trips_{In}$ + $Trips_{out}$) x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

Hr	=	Hours of travel per train trip (hours)
HP	=	Horsepower (hp)
LF	=	Load Factor (unitless)
Trips	=	Inbound or outbound train trips (trips/year)
EF	=	Emission Factor (g/hphr)

Train emissions represent line haul train activity between US 90 and the Gulfport Rail Yard and also north of the Gulfport Rail Yard to the Harrison County boundary. The hours of travel per train trip was calculated by dividing the length of the train trip by the average train speed on that segment. The train hp was determined by multiplying the assumed number of locomotive engines per train and the assumed hp per locomotive engine. The average load factor and emission factors were taken from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). Surrogate emission factors were used for estimating 2020 emissions and Tier 4 emission factors were assumed for estimating 2060 emissions. The inbound and outbound train trips were taken from Appendix I of the EIS.

GHG emissions were found for CO_2, CH_4, and N_2O and converted to CO_2e using GWPs. HAP emissions were not calculated for railroad activity because HAP emission factors were not available from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories*.

2.2.3 Employee Vehicles

On-road passenger car and passenger truck emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = VMT x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

VMT = Annual Vehicle Miles Traveled (miles/year)
EF = Emission Factor (g/VMT)

Annual VMT was calculated by multiplying the number of vehicles per day, the daily travel distance per vehicle, and the number of travel days per year. The vehicle type, number of vehicles per day, and number of travel days per year were taken from Appendix I of the EIS. The daily travel distance was assumed. Emission factors were developed in the MOVES model, version 2014a.

The MOVES model was used to produce emission factors in units of g/VMT for peak winter (January 7 a.m.–8 a.m.) and peak summer (July 5 p.m.–6 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For operational year 2020, 2020 emission factors were used. For operational year 2060, 2050 emission factors were used. Emission factors from MOVES 2014a are only available up to year 2050; therefore, 2050 emission factors were used as a proxy to 2060. The posted speed limit for US 49 and US 90 is 45 mph; however, a speed of 35 mph was assumed, as slower speeds have higher emission factors and therefore provide a more conservative estimate of emissions. The use of gasoline fuel was assumed.

MOVES 2014a on-road model CO_2e emission factors were used for GHGs. The HAP emission factors for on-road vehicles were a sum of the following pollutant emission factors: benzene, 1,3-butadiene, formaldehyde, acrolein, napthalene, and polycyclic organic matter.

2.2.4 Container/Tugboats

Container vessels and tugboat emissions were calculated using the following equation:

Annual Emissions, tons/year = Trips x Hr x HP x LF x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

Trips	=	Number of Annual Vessel Trips (trips/year)
Hr	=	Hours operating per call (hours/trip)
HP	=	Horsepower (hp)
LF	=	Load factor (unitless)
EF	=	Emission Factor (g/hphr)

Number of annual vessel trips were based on TEU throughput projections taken from Appendix I of the EIS. The hp and load factor were taken from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). Hours of operation per call were assumed for each vessel and tug assist activity and summed. Emission factors were taken from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* and converted to g/hphr units (EPA 2009).

GHG emissions were estimated for CO_2, CH_4, and N_2O and converted to CO_2e using GWPs. HAP emission factors were taken from AP-42. HAP emissions represent a sum of a variety of the following pollutants: benzene, toluene, xylenes, formaldehyde, acetaldehyde, acrolein, napthalene, diesel particulate matter, and PAHs.

2.2.5 Maintenance Dredging

Maintenance dredging emissions were calculated using the following equation:

Annual Emissions, tons/year = N x Hr x HP x LF x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

N	=	Number of maintenance dredge vessels (vessels)
Hr	=	Annual operating Hours (hours/year)
HP	=	Horsepower (hp)
LF	=	Load factor (unitless)
EF	=	Emission Factor (g/hphr)

Number of maintenance dredge vessels and hp were provided by the Port. Load factor and emission factors were taken from *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* and converted to g/hphr units (EPA 2009). Annual operating hours were calculated using dredge volume and dredge capacity. Dredge volume was provided by the Port. Dredge capacity was developed from information provided by the Port, including bucket size and cycle time.

GHG emissions were estimated for CO_2, CH_4, and N_2O and converted to CO_2e using GWPs. HAP emission factors were taken from AP-42. HAP emissions represent a sum of a variety of the following pollutants: benzene, toluene, xylenes, formaldehyde, acetaldehyde, acrolein, napthalene, diesel particulate matter, and PAHs.

2.3 AIR DISPERSION MODELING

The purpose of the air quality modeling is to provide an estimate of the projected near-road and near-rail impacts on ambient air quality from line haul locomotives and container trucks operating off-property from the Port of Gulfport traveling north to Creosote Road just south of I-10. The Gulfport Mississippi area is in attainment of all of the NAAQS, and therefore this air quality modeling is not required for transportation or general conformity purposes, nor for air quality permitting purposes.

Air quality modeling was performed in response to comments from EPA on the DEIS and was meant to provide information about potential hot spot impacts due to the line haul locomotive and container truck activity in the No-Action Alternative and Proposed Project Alternative. EPA's comments specified the following NAAQS pollutants of concern for modeled impacts: CO, NO_2, PM_{10} and $PM_{2.5}$.

The following air quality modeling tasks were completed:

1. The EPA MOVES model (version 2014a) was run to generate on-road emissions factors for 2020 and 2050 for all pollutants of concern (CO, NO_x, PM_{10} and $PM_{2.5}$). The 2050 emissions factors (the last available year in the MOVES 2014a model) were used for evaluating 2060 Project impacts.
2. The EPA AERMOD model was run for off-property line haul locomotive (rail) and container truck (combined long-haul truck) emissions for 2020 and 2060 using the locomotive emissions factors in grams per horsepower hour (g/hphr) from EPA's *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories* (EPA 2009) and MOVES 2014a emission factors developed in Task 1 for container trucks. AERMOD Tier 2 methods were used as recommended by EPA in the *Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 NAAQS* (EPA 2014) to estimate modeled NO_2 concentrations.

The first step in the air quality modeling study was the development of applicable operating scenarios that adequately characterize the anticipated Project operations for both the No-Action and Proposed Project Alternatives. These scenarios include the number and characteristics of truck trips and locomotive movements that could occur hourly, daily, and annually for comparison to hourly, 8-hour, 24-hour, and annual ambient air quality standards. Emissions factors from MOVES 2014a for container trucks and emissions factors for line haul locomotives from *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories* were used for the analysis. AERMOD was run to predict the impact of emissions of CO, NO_x, PM_{10} and $PM_{2.5}$ for the No-Action Alternative and Proposed Project Alternative in 2020 and 2060. The MOVES 2014a model is the most recent version available, and represents the current technology and regulations applicable to diesel engines and diesel fuel formulas. Detailed calculations and files are shown in Appendix P-3.

2.3.1 MOVES 2014a Modeling

MOVES 2014a was used to develop the on-road vehicle emissions factors for diesel-powered Combination Long Haul Trucks (MOVES Source Type ID 62) in grams per vehicle mile (g/mile). Emission factors for 2020 and 2050 were developed by running MOVES 2014a using speeds ranging from idle to 55 mph in 5 mph increments, assuming unrestricted urban access roads and a default age distribution of vehicles. Because MOVES 2014a does not predict emissions for vehicles in the year 2060, 2050 was conservatively used as a surrogate. Model inputs included default MOVES 2014a fuel data, inspection/maintenance information (none available), and temperature and humidity data for Harrison County, MS. MOVES 2014a model runs generated on-road emissions factors for 2020 and 2050 for CO, NO_x, PM_{10}, and $PM_{2.5}$ for AERMOD inputs. A summary of the input and output data selections for the MOVES 2014a model is shown in Table 3 below.

Emission factors were modeled for 2020 and 2050 using two scenarios. Scenarios were:

- Scenario 1: January morning: temperature and humidity of 41.2°F and 83.9% relative humidity (RH), respectively; gas Reid Vapor Pressure (RVP) of 11.82; diesel sulfur level of 15 parts per million (ppm).
- Scenario 2: July afternoon: temperature and humidity of 87.7°F and 65.5% RH, respectively; gas RVP of 9.7; diesel sulfur level of 15 ppm.

Table 3: MOVES 2014a Model – Container Truck Selections

MOVES RunSpec	Selection
Model	MOVES 2014a
Domain/Scale	Project
Calculation Type	Link
Years	2020 and 2050
Months/Hours	January 7 a.m., July 4 p.m.
Days	Weekdays
Geographic Bounds	Mississippi - Harrison County
Fuel – Source Type	Diesel Fuel-Combination Long Haul Truck
Road Type	Urban Unrestricted Access
Management Input Data Sets	None
Rate of Progress	0 miles per hour (mph) – 55 mph (5 mph increment)
General Output	Mass Units: Grams (g) Distance Units: Miles
Output Emissions Detail	None
Advanced Performance Features	Not Selected

2.3.2 AERMOD Modeling

AERMOD (version 15181) was used with the FASTAREA option as recommended in the EPA *Addendum User's Guide for the AMS/EPA Regulatory Model – AERMOD* (EPA 2004b). Five years of meteorological data (2011 to 2015) were used in AERMOD modeling. The meteorological data were from the Gulfport-Biloxi International Airport station and were preprocessed by the Mississippi Department of Environmental Quality (MDEQ) for AERMOD modeling. Meteorology has a significant impact on modeled pollutant concentrations, especially related to the prevailing wind directions.

AERMOD is a steady-state plume model that simulates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. This model is recommended for short-range (< 50 kilometers [km]) dispersion from the source. Source locations (US 49 and railroad tracks) were based on a geographic information system (GIS) map. Receptor locations started at 5 meters (m) from the highway or railroad tracks. Use of the finer receptor grid nearest the sources is based on guidance provided in the most recent AERMOD Implementation Guide (EPA 2015a).

This ambient air modeling study assumed US 49 to be the primary path for container trucks based on Appendix I of the EIS. The evaluation focused on that corridor for approximately 4.6 miles north of the Port to Creosote Road. The Kansas City Southern (KCS) rail line is directly west and within 0.1 mile of US 49. The modeling assumption was that all rail freight would travel on the KCS railroad tracks traveling to and from the Port. Emissions from locomotives traveling north of the Gulfport Rail Yard are assumed to be lower than the emissions south of the Gulfport Rail Yard due to reduced number of train trips and faster speeds. Both of these segments (US 90 to Gulfport Rail Yard and Gulfport Rail Yard to Creosote Road) were modeled.

Extra care must be taken when dealing with contaminants and pollutants in close proximity to areas recognized as sensitive receptors. Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, and elderly housing and convalescent facilities (EPA 2016). These are areas where the occupants are more susceptible to the adverse effects of air pollutants. Sensitive receptors near the modeled US 49 and railroad tracks are shown on Figure 1. The receptor grid in AERMOD was setup as follows to cover sensitive receptors near the modeled sources and is shown in Figure 2:

- Receptor grid starts at 5 m from the edge of the roadway and the railroad track,
- 50 m grid spacing starting at 5 m from the east side of the roadway and the west side of the railroad tracks out to 150 m,
- 100 m grid spacing between 150 m and 1,000 m from the edge of each side of the roadways and railroad tracks.

School
Convalescence Facility
Daycare
Hospital
Park
Sensitive Receptors Area Boundary
Environmental Justice Community

0 0.5 1 Miles

Figure 1

Port of Gulfport Expansion Project

Sensitive Receptors in Gulfport Area

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Sensitive_Receptors_Map_11x17_vr2.mxd

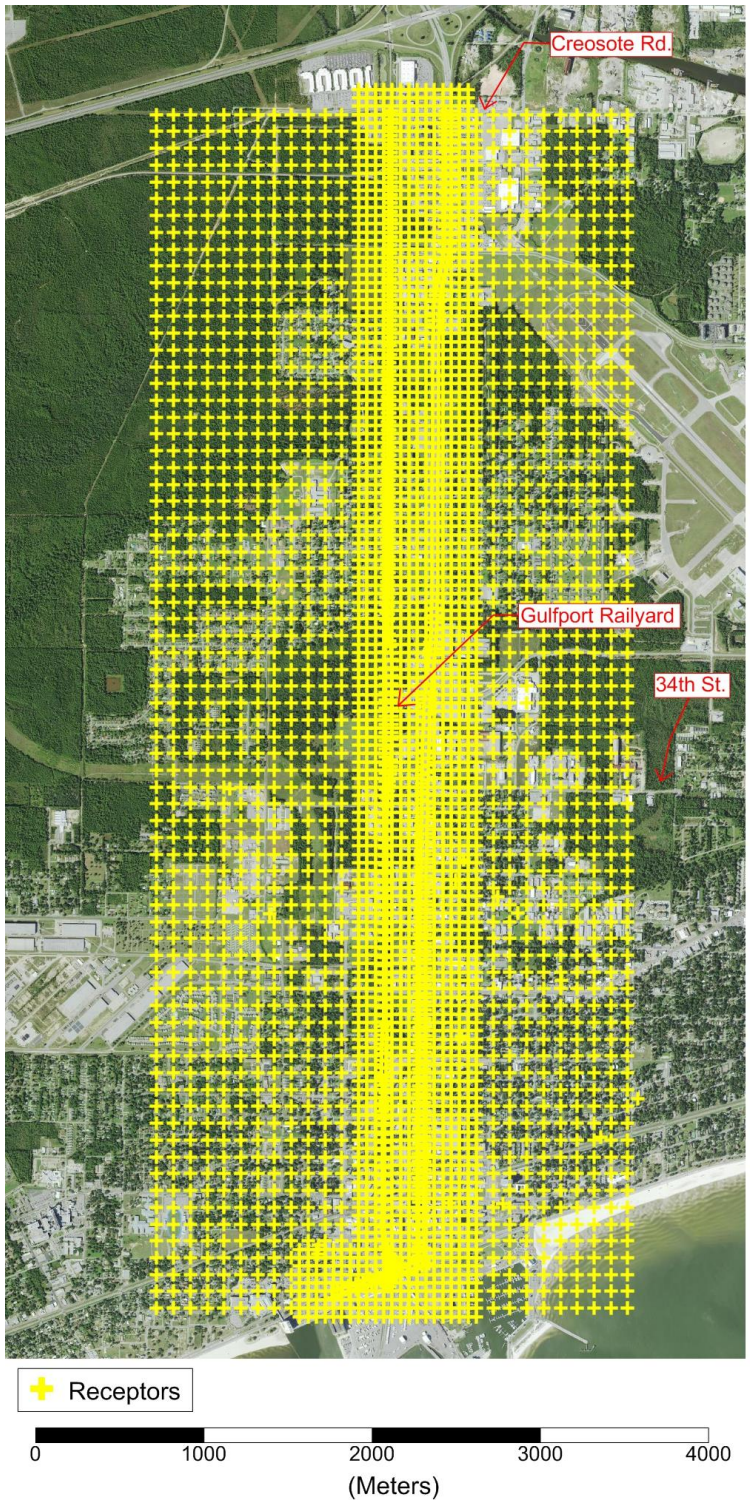

Figure 2: AERMOD Receptor Grid

The modeling boundary covers 1,000 meters on each side of US 49 and the railroad tracks since the emissions from the locomotives and trucks would generally result in a negligible impact beyond this distance. The container trucks and locomotives were modeled as area sources, following the EPA's *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (EPA 2015b).

The AERMOD air dispersion analysis included modeling the container truck and locomotive impacts for the criteria pollutant emissions of CO, NO_x, PM_{10}, and $PM_{2.5}$, for the years 2020 and 2060. The model design value for each pollutant and averaging period were consistent with the Guideline on Air Quality Models or applicable clarification memorandums from EPA available on the EPA Support Center for Regulatory Atmospheric Modeling (SCRAM) webpage.

A Tier 2 analysis of NO_2 was completed using Ambient Ratio Method 2 (ARM2) following EPA's *Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 NAAQS* (EPA 2014). EPA has noted that using AERMOD for demonstrating compliance with the 1-hour NO_2 standard has been challenging (EPA 2011). The alternative in-stack ratio method for 1-hour NO_2 was not used.

There currently are no nonattainment areas in the U.S. for 1-hour NO_2. Furthermore, recently EPA has scaled back on their near-road monitoring program for NO_2 since not even the highest traffic areas in the largest U.S. cities monitored any exceedance of the NO_2 NAAQS (EPA 2015c):

> Current near-road NO_2 monitoring data indicate air quality in the near-road environment to be well below the NAAQS for the oxides of nitrogen. In light of this information, and due to the correspondence between population, traffic, and expected NO_2 concentrations in the near-road environment, it is anticipated that measured near-road NO_2 concentrations in relatively smaller Core Based Statistical Areas (CBSAs) (e.g., CBSAs with populations less than 1,000,000 persons) would exhibit similar, and more likely lower concentrations than what is being measured in larger urban areas. As a result, the EPA is seeking to reduce additional burden on state and local air monitoring agencies by removing monitoring requirements in smaller CBSAs where measured NO_2 air quality is expected to be well below the NAAQS.

A summary of the input/output data selections used for the NO_2 ARM2 modeling is shown in Table 4 below.

Table 4: AERMOD Data Selections – Nitrogen Dioxide (NO_2) 1-Hour Tier 2

AERMOD Options	Selection
Model	AERMOD Version 15181
Pollutant	NO_2
Averaging Time Options	1-Hour
Regulatory Option	NO_2 – ARM2 (1-Hour NO_2/NOx Ratio: Range of 0.2 to 0.9 ambient ratio)
Meteorological Data	2011, 2012, 2013, 2014, 2015 (Mississippi Department of Environmental Quality)
Terrain Data	AERMAP Receptor Output File National Elevation Dataset (NED)
Output	Highest 8th-high of the daily maximum 1-hour values averaged over 5 years.

Note: Compliance with the 1-hour NO_2 NAAQS is based on the multiyear average of the 98th percentile of the annual distribution of daily maximum 1-hour values not exceeding 100 parts per billion (ppb) (188 micrograms per cubic meter [ug/m^3]).

NO_2 = nitrogen dioxide

NO_x = nitrogen oxides

2.3.2.1 Container Truck Assumptions

The following assumptions were used for AERMOD inputs for container trucks, based on Appendix I of the EIS.

The segment of the US 49 corridor included in the modeling is approximately 4.6 miles (7,408 m). For 2020, the estimated truck trip rate for the Proposed Project Alternative is 861 trips per day; the No-Action Alternative estimated rate is 508 trips per day. For 2060, the estimated truck trip rate is 2,030 trips per day (Proposed Project Alternative) and 1,235 trips per day (No-Action Alternative) (see Table 5). The truck trips would occur on 250 working days per year.

Table 5: Daily Container Truck Traffic Volumes – 2020 and 2060

Year	Projected Daily Volume	Distance/Trip	Daily VMT
	Trips/day	Miles/trips	Miles/day
2020 Proposed Project Alternative	861	4.6	3,963
2020 No-Action Alternative	508	4.6	2,337
2060 Proposed Project Alternative	2,030	4.6	9,344
2060 No-Action Alternative	1,235	4.6	5,681

Emissions factors for container trucks in g/mile for 2020 and 2060 are from the MOVES 2014a output files. The speed for container trucks was conservatively assumed to be 35 mph (highlighted in Appendix P-3), with a posted speed limit of 45 mph. Because emission factors for 2060 are not available from MOVES 2014a, the 2060 vehicle emission factors were assumed to be the same as in 2050.

Detailed emission calculations are shown in Appendix P-3. Although truck travel could occur 24 hours per day, the maximum hourly emission rate was conservatively estimated by averaging the daily emissions over 16 hours instead of 24 hours. Note that the emissions factor for NO_x in 2020 is much higher than in 2050, because the emissions standards included in MOVES 2014a would slowly impact the fleet of container trucks due to fleet turnover. Emissions in g/mile were converted to pounds per hour for input to AERMOD.

2.3.2.2 Locomotive Assumptions

The estimated number of train trips are shown in Table 6. Each train would have four locomotives for a total of 16,000 brake horsepower per train. The one way distance of the train to Creosote Road is approximately 4.35 miles, and each trip would take approximately 0.34 hours. There are fewer, longer trains going north from the Gulfport Rail Yard to Creosote Road, and those trains travel faster, so the model input values were different for the two segments (US 90 to Gulfport Rail Yard, and Gulfport Rail Yard to Creosote Road).

Table 6: Number of Train Trips – 2020 and 2060 by Segment

US 90 to Gulfport Rail Yard	2020 Proposed Project Alternative	2020 No-Action Alternative	2060 Proposed Project Alternative	2060 No-Action Alternative
max train trips/hour	1	1	3	2
max train trips/8 hours	7	4	16	10
train trips/day	7	4	47	29
train trips/year	1,650	950	11,675	7,100
Gulfport Rail Yard to Creosote Road	**2020 Proposed Project Alternative**	**2020 No-Action Alternative**	**2060 Proposed Project Alternative**	**2060 No-Action Alternative**
max train trips/hour	1	1	3	1
max train trips/8 hours	5	3	10	6
train trips/day	5	3	29	18
train trips/year	1,025	600	7,200	4,375

Locomotive emissions factors were obtained from *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories* (EPA 2009). It was assumed that the locomotive emissions in 2060 would meet the Tier 4 emission standards. An average line haul locomotive load factor of 0.28 (EPA, 2009) was used in the emission estimate. Detailed emission calculations are shown in Appendix P-3.

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3.0 ANALYSIS RESULTS

This Tech Memo provides the documentation and support of the discussions and findings within the PGEP EIS, Section 4.5, Environmental Consequences—Air Quality. This report focused on documenting the quantification of air emission inventories, as well as the modeling and results of pollutant concentrations, for the No-Action and Proposed Project Alternatives. Regulatory and environmental settings, as well as impact assessments and determinations are addressed in Sections 3.5 and 4.5 of the PGEP EIS, respectively.

3.1 CONSTRUCTION EMISSIONS INVENTORY

No construction emission sources are associated with the No-Action Alternative. Thus, construction emissions inventory was not quantified for the No-Action Alternative. The construction emissions inventory presented here reflects the Proposed Project Alternative.

Temporary increases in air pollution would result from the equipment associated with construction of the Proposed Project Alternative. These air contaminant emissions would result from the use of marine vessel and land-based mobile sources that would be used during the expansion activities, including dredge and support equipment (i.e., equipment used for dredging, filling, wharf construction, and shoreline protection activities), non-road construction equipment, on-road and employee vehicles, and maintenance dredging.

These construction activities would be considered one-time activities, i.e., the construction activities would not continue past the date of completion. A summary of the total estimated emissions in tons, with the exception of CO_2e which is presented in MT, resulting from the construction of the Proposed Project Alternative is presented in Table 7. Detailed construction emissions calculations are shown in Appendix P-1.

Table 7: Estimated Construction Emissions by Source – Proposed Project Alternative

Year 2018	VOC (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (MT)	Total HAP (tons)
Dredge & Support Equipment	10.83	10.35	10.04	200.63	272.86	0.261	25,416	2.99
Non-road Construction Equipment	0.28	0.15	0.15	1.69	2.17	0.003	536	0.01
On-Road and Employee Vehicles	0.03	0.02	0.01	0.38	0.23	0.001	61	0.00
Maintenance Dredging	0.00	0.00	0.00	0.00	0.00	0.000	0	0.00
Subtotal	**11.14**	**10.52**	**10.20**	**202.70**	**275.26**	**0.265**	**26,013**	**3.00**
Year 2019								
Dredge & Support Equipment	15.04	14.37	13.94	278.55	378.83	0.362	35,287	4.35
Non-road Construction Equipment	1.85	1.00	0.97	10.73	14.57	0.022	3,586	0.05
On-Road and Employee Vehicles	0.15	0.13	0.08	2.31	1.33	0.003	353	0.02
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**17.39**	**15.83**	**15.31**	**297.98**	**403.41**	**0.395**	**40,036**	**4.46**
Year 2020								
Dredge & Support Equipment	6.98	6.67	6.47	129.27	175.81	0.168	16,376	1.99
Non-road Construction Equipment	1.46	0.78	0.75	8.58	11.39	0.017	2,825	0.04
On-Road and Employee Vehicles	0.09	0.09	0.06	0.90	0.93	0.002	198	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**8.88**	**7.86**	**7.60**	**145.15**	**196.82**	**0.195**	**20,209**	**2.09**
Year 2021								
Dredge & Support Equipment	9.43	9.02	8.75	174.72	237.62	0.227	22,134	2.89
Non-road Construction Equipment	1.36	0.81	0.79	11.76	12.07	0.018	2,849	0.04
On-Road and Employee Vehicles	0.12	0.08	0.04	2.17	0.79	0.002	260	0.01
Maintenance Dredging	0.61	0.58	0.56	11.25	15.30	0.015	1,426	0.14
Subtotal	**11.52**	**10.49**	**10.14**	**199.90**	**265.78**	**0.261**	**26,669**	**3.08**
Year 2022								
Dredge & Support Equipment	0.07	0.07	0.06	1.27	1.72	0.002	161	0.00
Non-road Construction Equipment	0.78	0.34	0.33	13.39	4.95	0.009	1,438	0.02
On-Road and Employee Vehicles	0.14	0.10	0.06	1.61	0.93	0.002	245	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**1.33**	**0.83**	**0.77**	**22.66**	**16.30**	**0.021**	**2,653**	**0.09**

Table 7, cont'd

Year 2023	VOC	PM_{10}	$PM_{2.5}$	CO	NO_X	SO_2	CO_2e (MT)	Total HAP (tons)
Dredge & Support Equipment	0.05	0.04	0.04	0.84	1.14	0.001	106	0.00
Non-road Construction Equipment	0.37	0.11	0.11	9.30	1.95	0.004	579	0.008
On-Road and Employee Vehicles	0.08	0.06	0.04	0.84	0.55	0.001	137	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**0.84**	**0.54**	**0.50**	**17.37**	**12.32**	**0.014**	**1,631**	**0.07**
Year 2024								
Dredge & Support Equipment	0.00	0.00	0.00	0.00	0.00	0.000	0	0.00
Non-road Construction Equipment	0.11	0.04	0.04	1.43	0.67	0.001	186	0.002
On-Road and Employee Vehicles	0.39	0.58	0.39	2.66	6.81	0.013	1,336	0.05
Maintenance Dredging	0.83	0.79	0.77	15.30	20.81	0.020	1,939	0.13
Subtotal	**1.33**	**1.41**	**1.20**	**19.39**	**28.29**	**0.034**	**3,461**	**0.18**
TOTAL (ALL YEARS)								
Dredge & Support Equipment	42.40	40.52	39.30	785.28	1,067.98	1.02	99,480	12.22
Non-road Construction Equipment	6.22	3.23	3.13	56.88	47.76	0.07	11,997	0.17
On-Road and Employee Vehicles	1.01	1.05	0.69	10.92	11.60	0.02	2,592	0.11
Maintenance Dredging	2.81	2.69	2.61	52.12	70.88	0.07	6,603	0.48
	52.44	**47.49**	**45.73**	**905.14**	**1,198.19**	**1.186**	**120,672**	**12.97**

CO = carbon monoxide

NO_x = nitrogen oxides

PM_{10} particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compounds

CO_{2e} = Carbon Dioxide Equivalents

HAP = hazardous air pollutants

3.2 OPERATIONAL EMISSIONS INVENTORY

A summary of the total estimated emissions in tons, with the exception of CO_2e which is presented in MT, resulting from the operation of the No-Action and Proposed Project Alternatives for years 2020 and 2060 is presented in Tables 8 and 10, respectively.

Additionally, air emissions associated with maintenance dredging of the existing berths along the north and south harbor, the Commercial Small Craft Harbor, and the entrance channel are provided as a means of comparison for the maintenance dredging projected for the No-Action Alternative and Proposed Project Alternative. Maintenance dredging under the No-Action Alternative would occur approximately every 10 years. A summary of the estimated emissions in tons resulting from one year of maintenance for the No-Action Alternative is shown in tons in Table 9. Maintenance dredging under the Proposed Project Alternative would occur annually. A summary of the estimated emissions in tons resulting from the annual maintenance for the Proposed Project Alternative is shown in Table 11. Detailed operational emissions calculations are shown in Appendix P-2.

Table 8: Estimated Operational Emissions by Source – No-Action Alternative

Year 2020	VOC (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (MT)	Total HAP (tons)
Container Truck Emissions (on and off Port to Harrison County Boundary)	1.16	1.88	1.21	6.24	21.13	0.05	4,791	0.14
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.18	0.11	0.11	1.02	4.83	0.00	358	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.31	0.19	0.18	1.71	8.08	0.01	599	--
Employee Vehicle Emissions	4.00	1.93	0.41	165.57	12.89	0.10	13,097	0.23
Container/Tugboat Emissions	11.61	5.78	5.44	42.15	335.26	8.65	17,636	2.59
Subtotal	**17.26**	**9.89**	**7.35**	**216.69**	**382.19**	**8.80**	**36,481**	**2.97**
Year 2060								
Container Truck Emissions (on and off Port to Harrison County Boundary)	0.34	1.84	0.44	2.61	9.27	0.10	11,118	0.09
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.25	0.09	0.09	7.63	5.96	0.03	2,700	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.41	0.15	0.14	12.44	9.72	0.05	4,403	--
Employee Vehicle Emissions	2.72	6.66	1.14	143.22	8.06	0.27	37,179	0.18
Container/Tugboat Emissions	41.01	20.19	19.00	213.15	797.14	30.45	61,895	9.11
Subtotal	**44.73**	**28.93**	**20.82**	**379.05**	**830.15**	**30.90**	**117,296**	**9.37**

CO = carbon monoxide

NO_x = nitrogen oxides

PM_{10} particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compounds

CO_2e = Carbon Dioxide Equivalents

HAP = hazardous air pollutants

Table 9: Estimated Maintenance Dredging Emissions – No-Action Alternative

Every Ten Years	VOC (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (MT)	Total HAP (tons)
Maintenance Dredging Emissions	1.2	1.4	1.3	13.8	18.8	0.02	1,751	0.23

CO = carbon monoxide

NO_x = nitrogen oxides

PM_{10} particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compounds

CO_2e = Carbon Dioxide Equivalents

HAP = hazardous air pollutants

Table 10: Estimated Operational Emissions by Source – Proposed Project Alternative

Year 2020	VOC (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO (tons)	NO_X (tons)	SO_2 (tons)	CO_2e (MT)	Total HAP (tons)
Container Truck Emissions (on and off Port to Harrison County Boundary)	1.97	3.18	2.05	10.58	35.82	0.08	8,120	0.24
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.32	0.19	0.19	1.77	8.39	0.01	622	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.53	0.32	0.31	2.92	13.80	0.01	1,023	--
Employee Vehicle Emissions	6.79	3.28	0.69	280.64	21.84	0.16	22,200	0.40
Container/Tugboat Emissions	18.61	8.55	8.01	59.54	526.15	14.82	26,934	3.97
Subtotal	**28.21**	**15.52**	**11.25**	**355.45**	**606.01**	**15.08**	**58,900**	**4.61**
Year 2060								
Container Truck Emissions (on and off Port to Harrison County Boundary)	0.56	3.03	0.72	4.29	15.24	0.17	18,276	0.14
Railroad Emissions (US 90 to Gulfport Rail Yard)	0.41	0.15	0.14	12.55	9.80	0.05	4,439	--
Railroad Emissions (North of Gulfport Rail Yard to Harrison County Boundary)	0.67	0.24	0.23	20.48	16.00	0.08	7,247	--
Employee Vehicle Emissions	4.47	10.95	1.88	235.42	13.25	0.45	61,113	0.29
Container/Tugboat Emissions	69.71	34.33	32.31	362.35	1355.14	51.76	105,221	15.48
Subtotal	**75.83**	**48.69**	**35.29**	**635.09**	**1,409.43**	**52.51**	**196,295**	**15.92**

CO = carbon monoxide

NO_x = nitrogen oxides

PM_{10} particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compounds

CO_2e = Carbon Dioxide Equivalents

HAP = hazardous air pollutants

Table 11: Estimated Maintenance Dredging Emissions – Proposed Project Alternative

Annually	**VOC (tons)**	**PM_{10} (tons)**	**$PM_{2.5}$ (tons)**	**CO (tons)**	**NO_X (tons)**	**SO_2 (tons)**	**CO_2e (MT)**	**Total HAP (tons)**
Maintenance Dredging Emissions	7.6	9.0	8.7	89.8	122.2	0.12	11,378	1.5

CO = carbon monoxide

NO_x = nitrogen oxides

PM_{10} particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

SO_2 = sulfur dioxide

VOC = volatile organic compounds

CO_2e = Carbon Dioxide Equivalents

HAP = hazardous air pollutants

3.3 AIR DISPERSION MODELING

The AERMOD results of CO, NO_2, PM_{10}, and $PM_{2.5}$ concentrations and the comparison to the NAAQS in 2020 and 2060 for the No-Action Alternative and Proposed Project Alternative are shown in Tables 12–15. Worst-case results of the dispersion modeling are shown in Figures 4–10 for the No-Action Alternative and Proposed Project Alternative in 2020 and 2060. All other dispersion modeling results are shown in Appendix P-3. The predicted NO_2 concentrations are higher along the railroad tracks and close to the Port than the locations along US 49. This is due, at least in part, to the assumption that rail traffic in 2020 would be restricted to the 10 p.m. to 7 a.m. time frame, and prevailing winds during those overnight hours are from the north, resulting in higher concentrations in the south near the Port (see Figure 3). NO_2 concentrations along the railroad tracks are similar for both the No-Action Alternative and Proposed Project Alternative, approximately 140 micrograms per cubic meter ($\mu g/m^3$) in 2060, and approximately 162 $\mu g/m^3$ in 2020. The concentrations drop quickly at receptor locations away from the railroad tracks. Modeled concentrations of all pollutants for all scenarios are below the corresponding NAAQS.

Table 12: AERMOD Modeling Results – 2020 No-Action Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	44.3
	1-hour	40,000	165.6
NO_2	Annual	100	14.7
	1-hour	188	161.5
PM_{10}	24-hour	150	1.8
$PM_{2.5}$	Annual	12	0.5
	24-hour	35	1.3

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide

NO_2 = nitrogen dioxide

PM_{10} = particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

NAAQS = National Ambient Air Quality Standard

$\mu g/m^3$ = micrograms per cubic meter

Table 13: AERMOD Modeling Results – 2060 No-Action Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	110.2
	1-hour	40,000	323.8
NO_2	Annual	100	7.0
	1-hour	188	135.6
PM_{10}	24-hour	150	1.0
$PM_{2.5}$	Annual	12	0.2
	24-hour	35	0.5

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide

NO_2 = nitrogen dioxide

PM_{10} = particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

NAAQS = National Ambient Air Quality Standards

$\mu g/m^3$ = micrograms per cubic meter

Table 14: AERMOD Modeling Results – 2020 Proposed Project Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	77.8
	1-hour	40,000	167.4
NO_2	Annual	100	25.6
	1-hour	188	162.2
PM_{10}	24-hour	150	3.2
$PM_{2.5}$	Annual	12	0.8
	24-hour	35	2.3

Note:

h. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.

i. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.

j. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.

k. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.

l. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.

m. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.

n. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide

NO_2 = nitrogen dioxide

PM_{10} = particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

NAAQS = National Ambient Air Quality Standards

$\mu g/m^3$ = micrograms per cubic meter

Table 15: AERMOD Modeling Results – 2060 Proposed Project Alternative

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)
CO	8-hour	10,000	176.2
	1-hour	40,000	493.7
NO_2	Annual	100	11.5
	1-hour	188	142.5
PM_{10}	24-hour	150	1.6
$PM_{2.5}$	Annual	12	0.3
	24-hour	35	0.9

Note:

a. The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 to 0.9 and annual NO_2 includes the ARM ratio of 0.75.
b. Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.
c. Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.
d. Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.
e. Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.
f. Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.
g. Total predicted concentration for the Annual $PM_{2.5}$ standard is the five year average of the annual concentrations.

CO = carbon monoxide

NO_2 = nitrogen dioxide

PM_{10} = particulate matter of 10 micrometers or less

$PM_{2.5}$ = particulate matter of 2.5 micrometers or less

NAAQS = National Ambient Air Quality Standards

$\mu g/m^3$ = micrograms per cubic meter

The modeled concentrations for the No-Action Alternative scenarios in 2020 and 2060 were relatively low for CO, PM_{10}, and $PM_{2.5}$ compared to the corresponding standard and averaging times, and all modeled concentrations for all scenarios were below the NAAQS. The highest concentration modeled for 1-hour NO_2 was in 2020 for the Proposed Project Alternative at 162.2 $\mu g/m^3$.

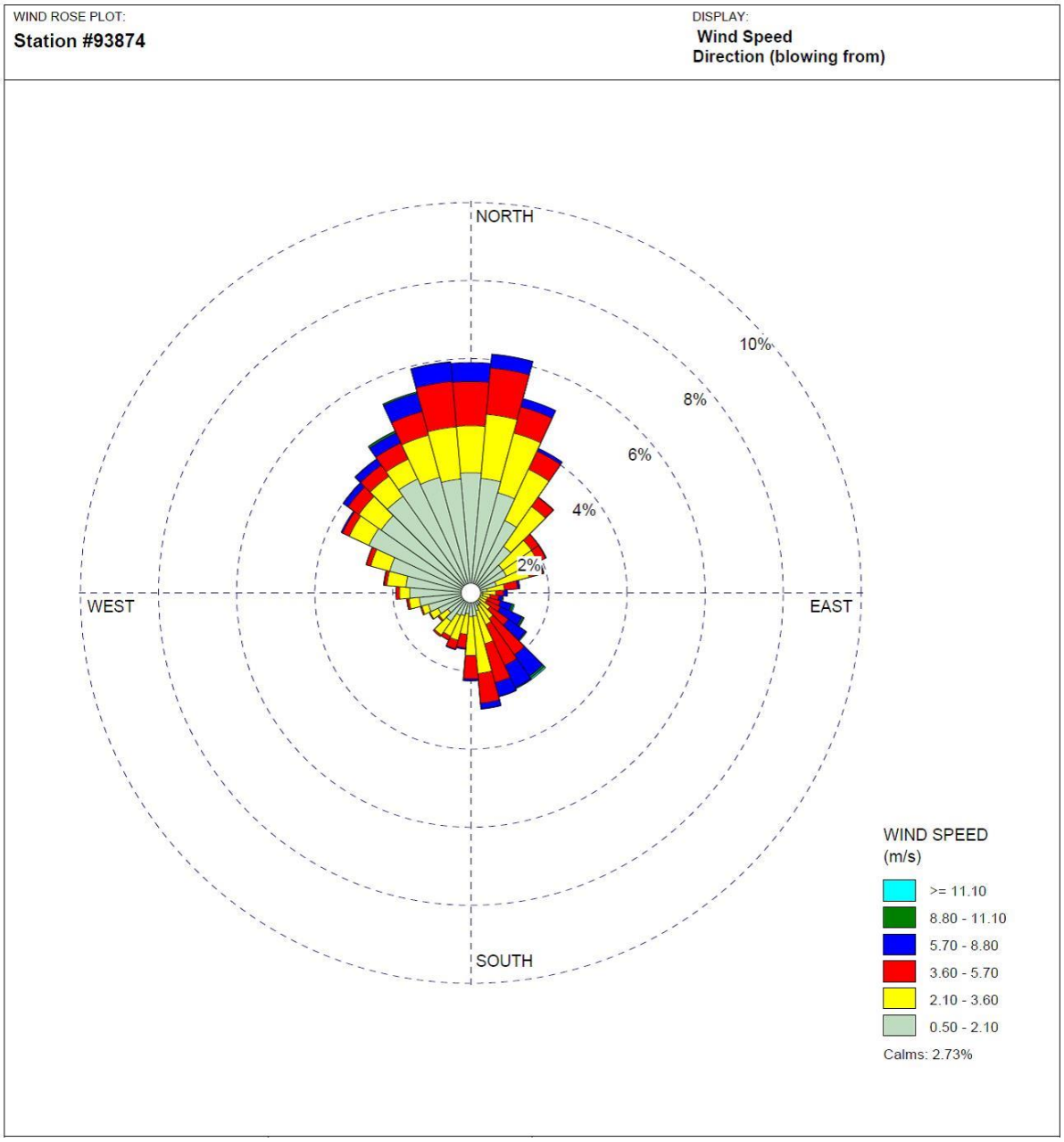

Figure 3: Wind Rose for Gulfport, Mississippi, based on 2011–2015 Meteorology Data, Hours 10 p.m. to 7 a.m. Only

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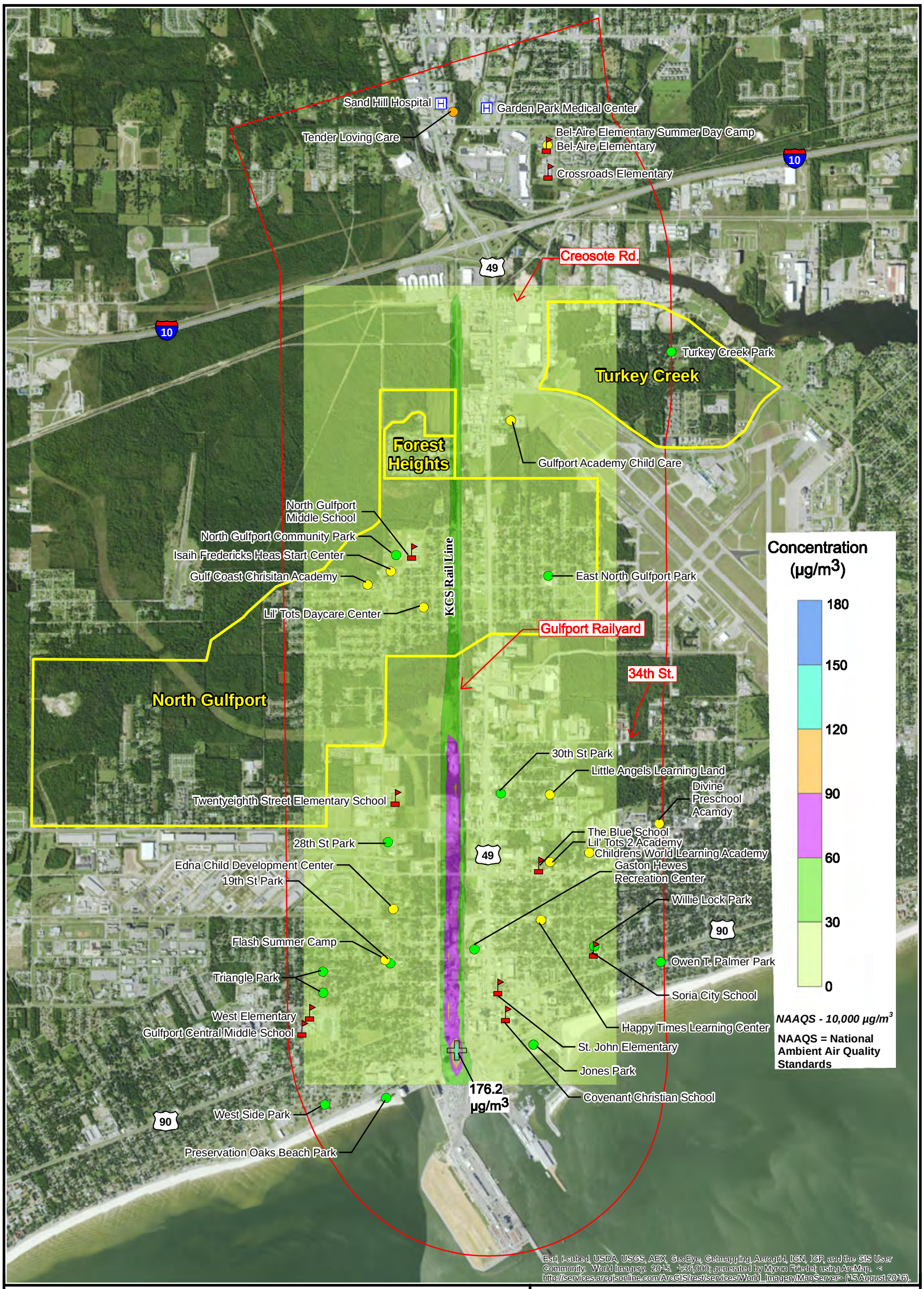

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 4

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case CO 8-hour
Proposed Project 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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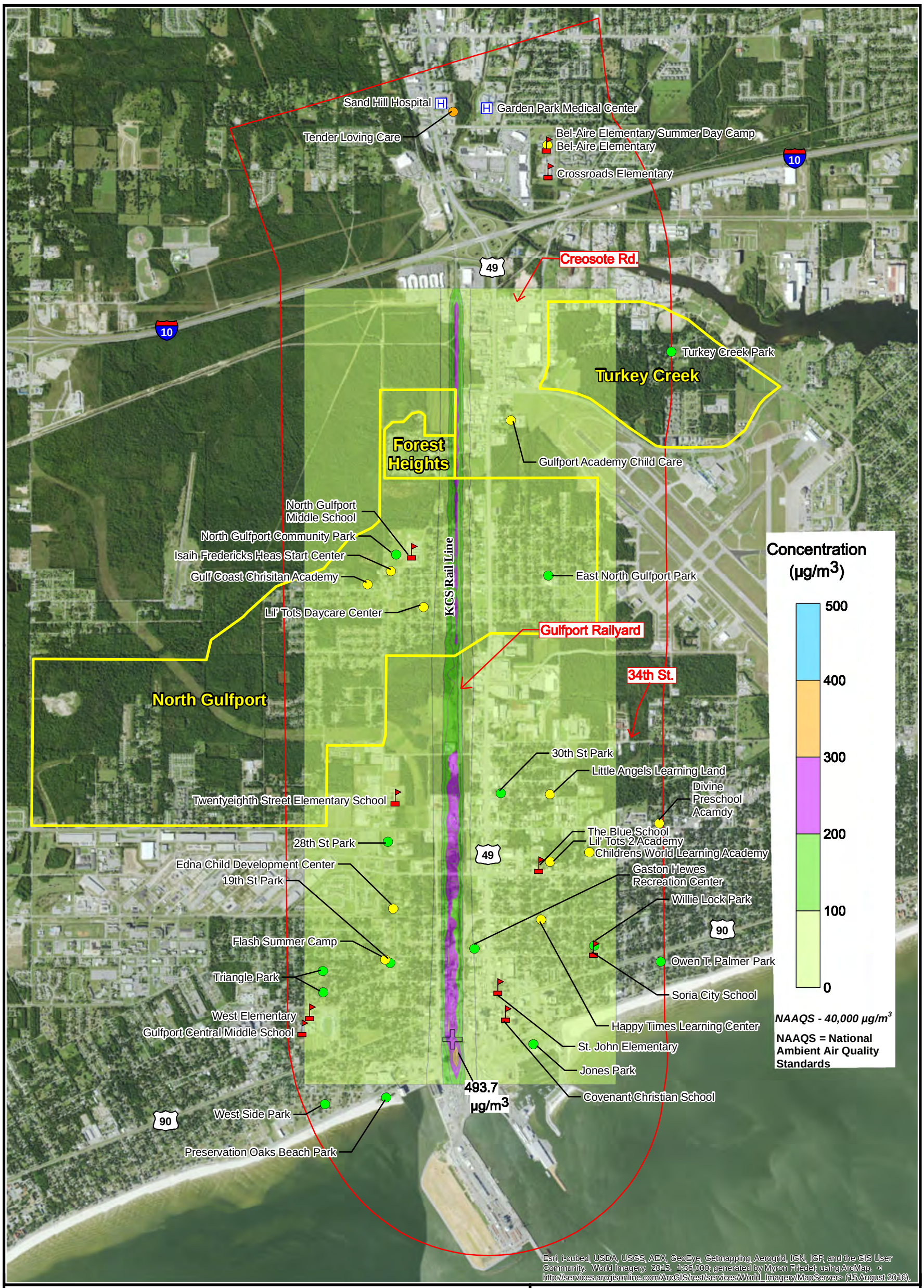

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 5

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case CO 1-hour
Proposed Project 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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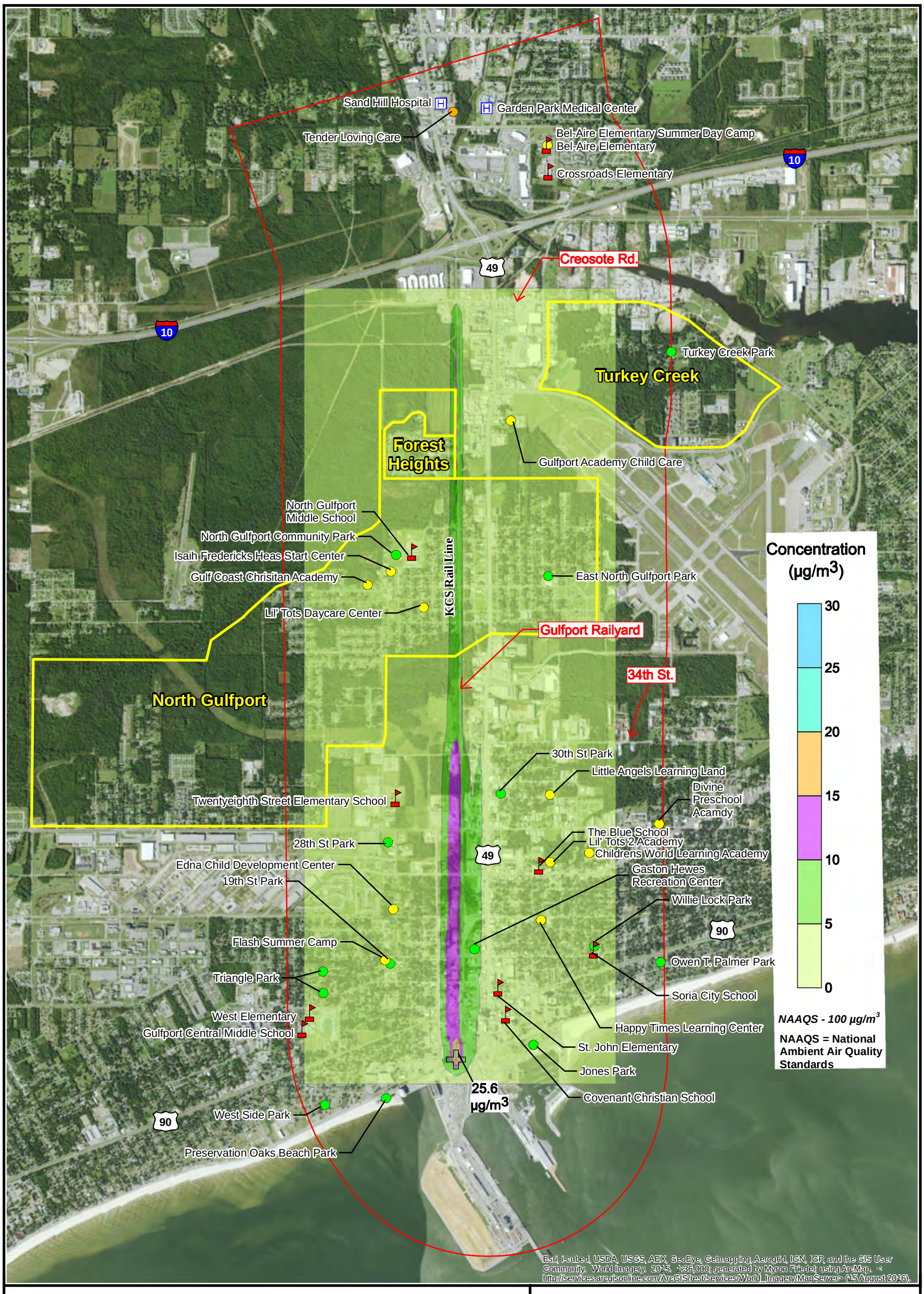

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 6

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case NO_2 Annual
Proposed Project 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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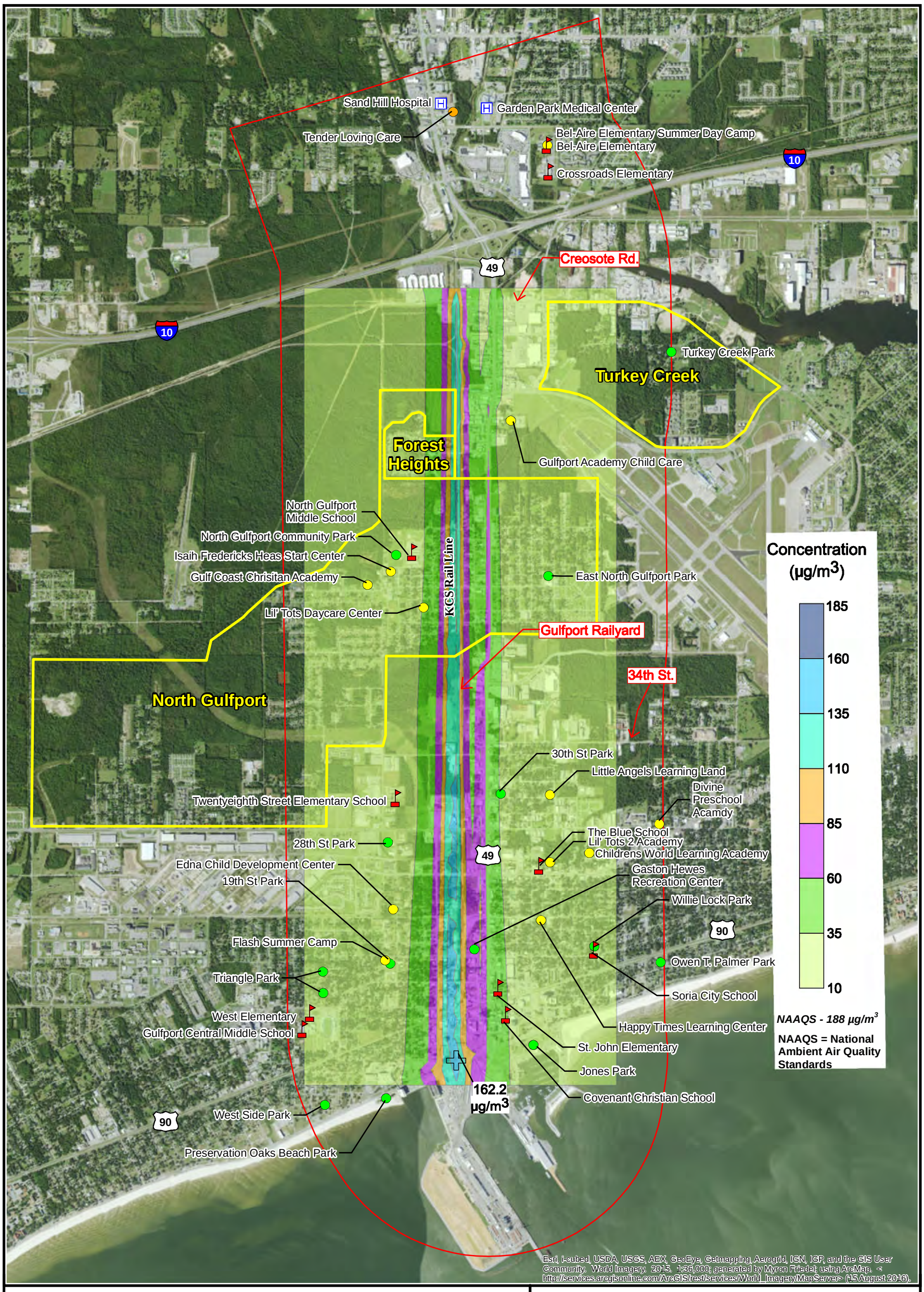

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 7

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case NO_2 1-hour
Proposed Project 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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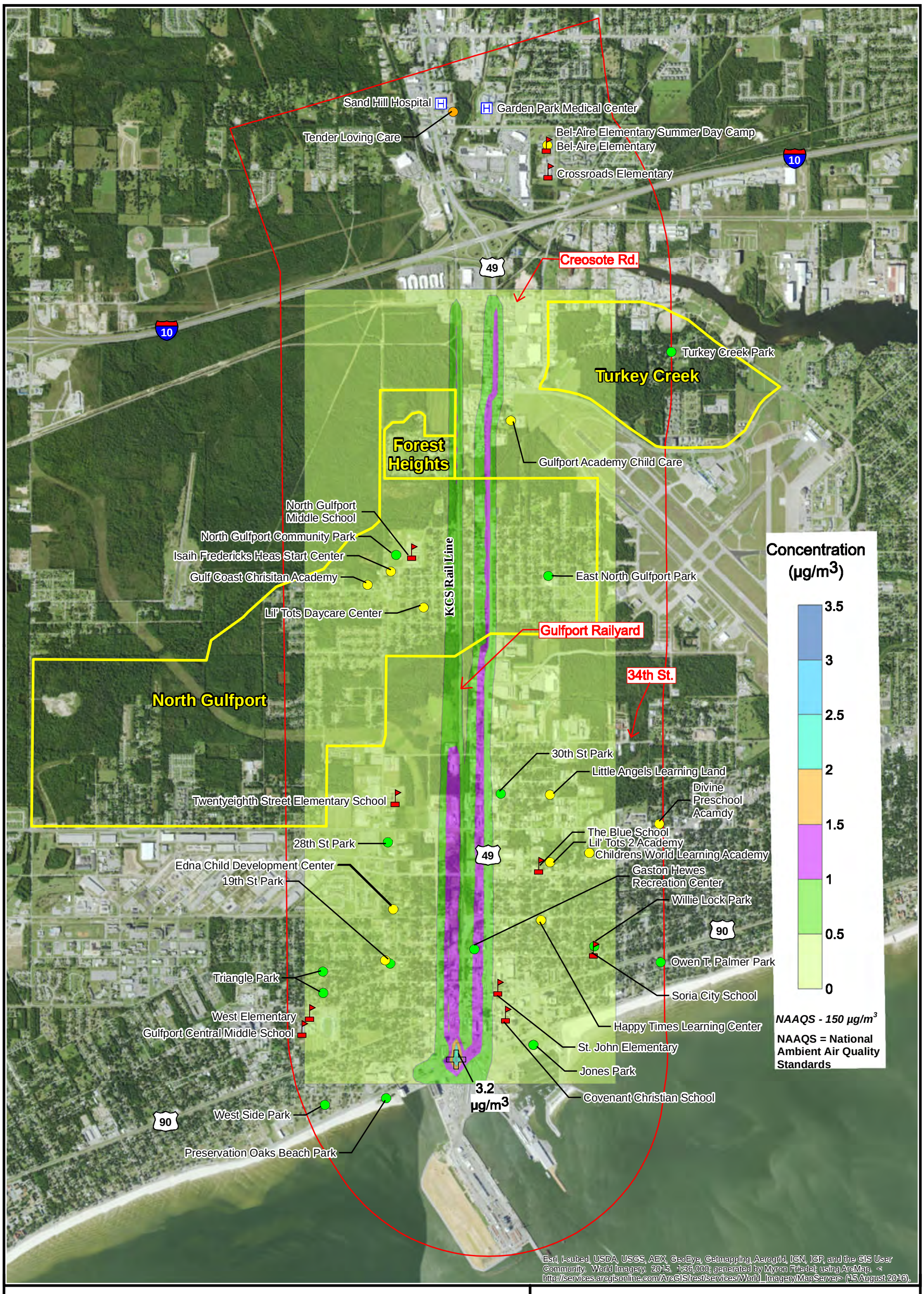

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 8

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case PM_{10} 24-hour
Proposed Project 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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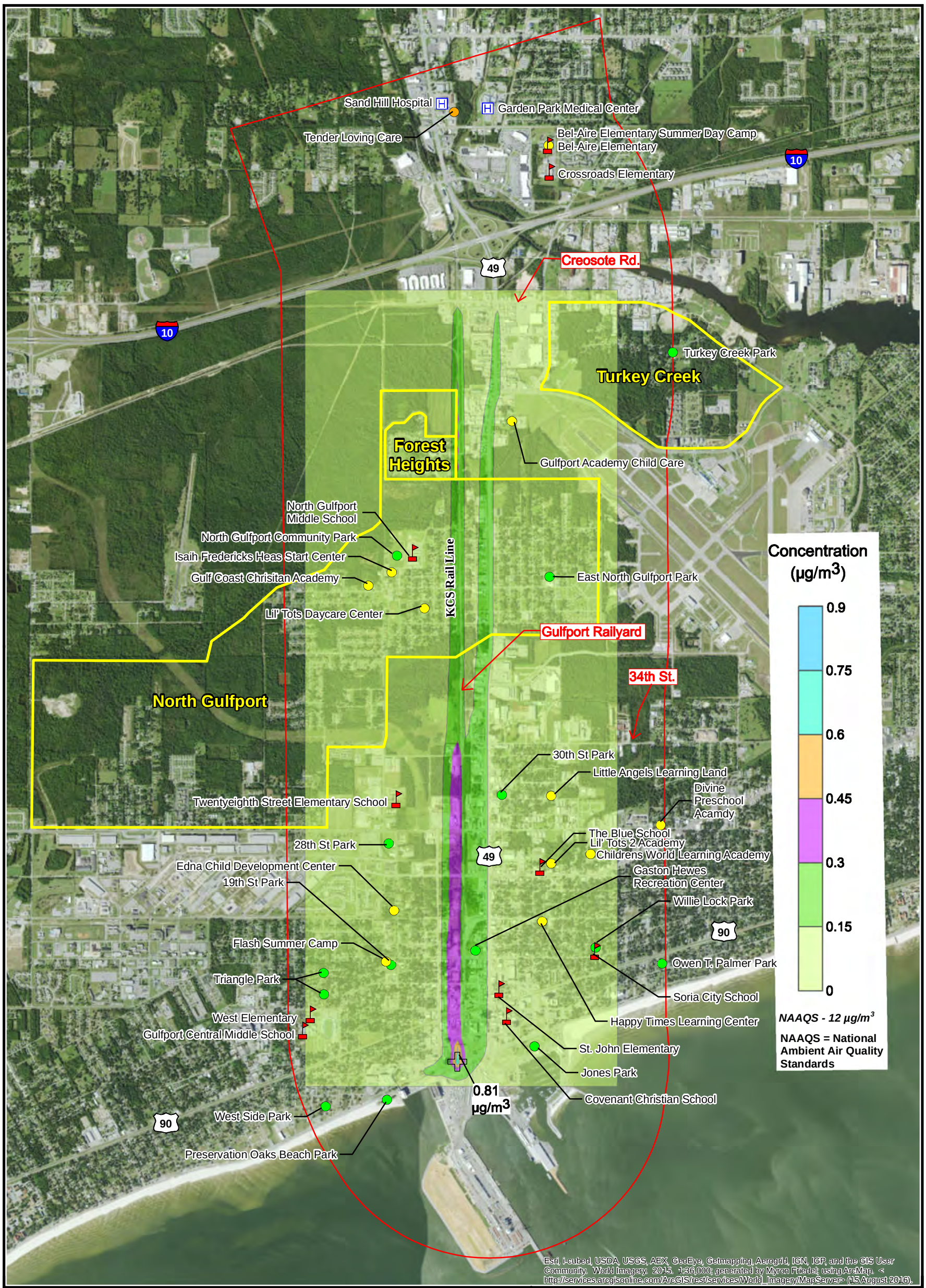

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 9

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case $PM_{2.5}$ Annual
Proposed Project 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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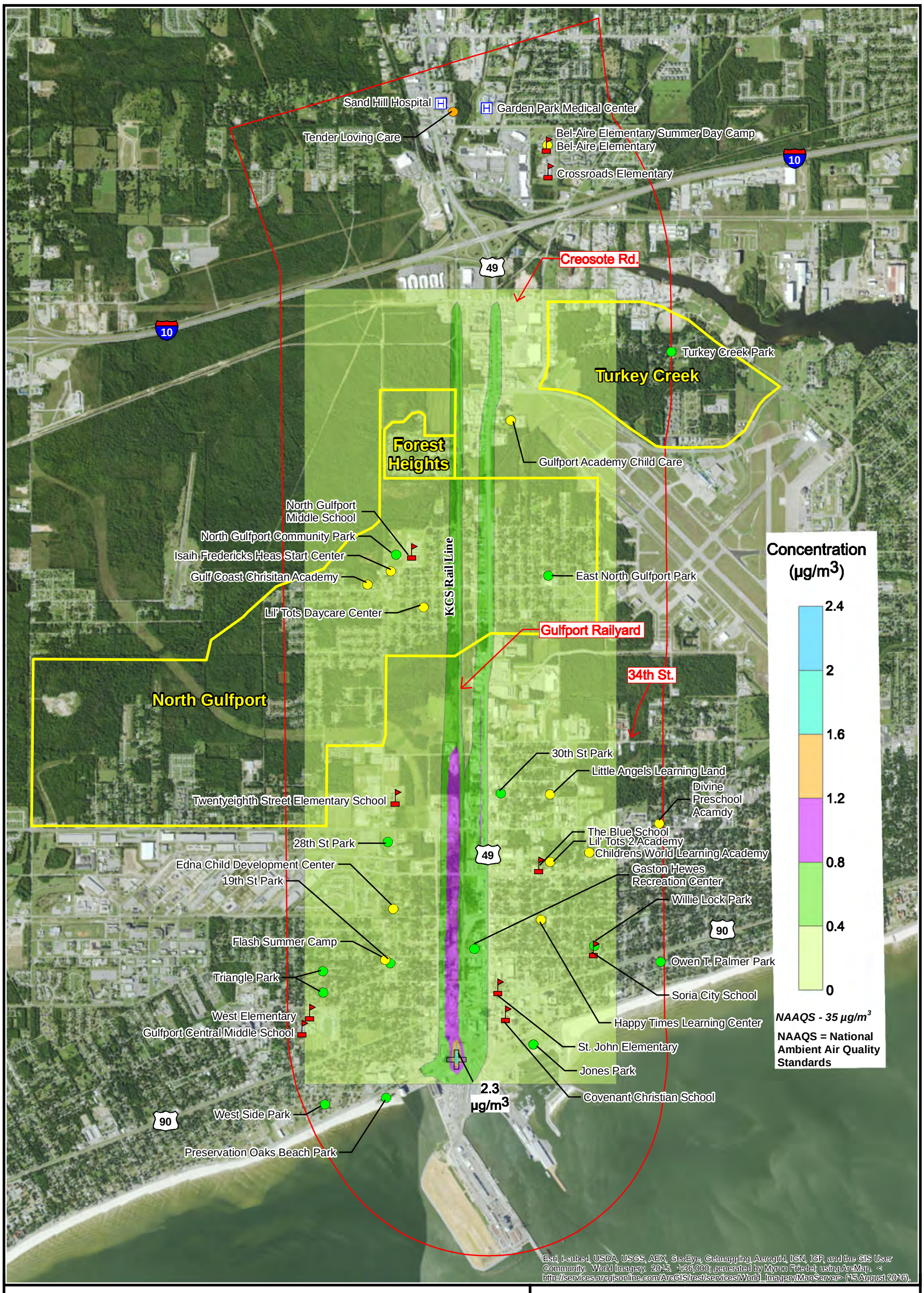

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure 10

Port of Gulfport Expansion Project

Dispersion Modeling Results
Worst-case $PM_{2.5}$ 24-hour
Proposed Project 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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APPENDIX P-1
CONSTRUCTION EMISSIONS INVENTORY FILES

Annual Construction Emissions Summary
Port of Gulfport Expansion Project
Gulfport, Harrison County, Mississippi

Proposed Project Alternative

	TONS PER YEAR							
Year 2018	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	10.83	10.35	10.04	200.63	272.86	0.261	25,416	2.99
Non-Road Construction Equipment	0.28	0.15	0.15	1.69	2.17	0.003	536	0.01
On-Road and Employee Vehicles	0.03	0.02	0.01	0.38	0.23	0.001	61	0.00
Maintenance Dredging	0.00	0.00	0.00	0.00	0.00	0.000	0	0.00
Subtotal	**11.14**	**10.52**	**10.20**	**202.70**	**275.26**	**0.265**	**26,013**	**3.00**
Year 2019	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	15.04	14.37	13.94	278.55	378.83	0.362	35,287	4.35
Non-Road Construction Equipment	1.85	1.00	0.97	10.73	14.57	0.022	3,586	0.05
On-Road and Employee Vehicles	0.15	0.13	0.08	2.31	1.33	0.003	353	0.02
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**17.39**	**15.83**	**15.31**	**297.98**	**403.41**	**0.395**	**40,036**	**4.46**
Year 2020	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	6.98	6.67	6.47	129.27	175.81	0.168	16,376	1.99
Non-Road Construction Equipment	1.46	0.78	0.75	8.58	11.39	0.017	2,825	0.04
On-Road and Employee Vehicles	0.09	0.09	0.06	0.90	0.93	0.002	198	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**8.88**	**7.86**	**7.60**	**145.15**	**196.82**	**0.195**	**20,209**	**2.09**
Year 2021	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	9.43	9.02	8.75	174.72	237.62	0.227	22,134	2.89
Non-Road Construction Equipment	1.36	0.81	0.79	11.76	12.07	0.018	2,849	0.04
On-Road and Employee Vehicles	0.12	0.08	0.04	2.17	0.79	0.002	260	0.01
Maintenance Dredging	0.61	0.58	0.56	11.25	15.30	0.015	1,426	0.14
Subtotal	**11.52**	**10.49**	**10.14**	**199.90**	**265.78**	**0.261**	**26,669**	**3.08**
Year 2022	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	0.07	0.07	0.06	1.27	1.72	0.002	161	0.00
Non-Road Construction Equipment	0.78	0.34	0.33	13.39	4.95	0.009	1,438	0.02
On-Road and Employee Vehicles	0.14	0.10	0.06	1.61	0.93	0.002	245	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**1.33**	**0.83**	**0.77**	**22.66**	**16.30**	**0.021**	**2,653**	**0.09**
Year 2023	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	0.05	0.04	0.04	0.84	1.14	0.001	106	0.00
Non-Road Construction Equipment	0.37	0.11	0.11	9.30	1.95	0.004	579	0.008
On-Road and Employee Vehicles	0.08	0.06	0.04	0.84	0.55	0.001	137	0.01
Maintenance Dredging	0.35	0.33	0.32	6.39	8.69	0.008	810	0.05
Subtotal	**0.84**	**0.54**	**0.50**	**17.37**	**12.32**	**0.014**	**1,631**	**0.07**
Year 2024	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	0.00	0.00	0.00	0.00	0.00	0.000	0	0.00
Non-Road Construction Equipment	0.11	0.04	0.04	1.43	0.67	0.001	186	0.002
On-Road and Employee Vehicles	0.39	0.58	0.39	2.66	6.81	0.013	1,336	0.05
Maintenance Dredging	0.83	0.79	0.77	15.30	20.81	0.020	1,939	0.13
Subtotal	**1.33**	**1.41**	**1.20**	**19.39**	**28.29**	**0.034**	**3,461**	**0.18**

TOTAL (ALL YEARS)	**VOC**	**PM10**	**$PM_{2.5}$**	**CO**	**NO_x**	**SO_2**	**CO_2e (MT)**	**Total HAPs**
Dredge & Support Equipment	42.40	40.52	39.30	785.28	1,067.98	1.02	99,480	12.22
Non-Road Construction Equipment	6.22	3.23	3.13	56.88	47.76	0.07	11,997	0.17
On-Road and Employee Vehicles	1.00	1.05	0.69	10.87	11.57	0.02	2,592	0.11
Maintenance Dredging	2.81	2.69	2.61	52.12	70.88	0.07	6,603	0.48
	52.44	**47.49**	**45.73**	**905.14**	**1,198.19**	**1.186**	**120,672**	**12.97**
Peak Annual Emissions	**17.39**	**15.83**	**15.31**	**297.98**	**403.41**	**0.40**	**40,036**	**4.46**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2018

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	187.25	9363	0.0155	0.0029	0.0343	0.0001	0.0008	0.0012	0.0000	6.4561	0.0002	6.4610	0.0003
BUS (CREW)	210	diesel	3	1	160	12	1920	0.0159	0.0011	0.0062	0.0000	0.0006	0.0010	0.0000	2.4188	0.0001	2.4201	0.0001
SUPERINTENDENT (Truck)		gasoline	3	1	50	26	1314	0.0007	0.0002	0.0076	0.0000	0.0000	0.0001	0.0000	0.6292	0.0000	0.6294	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS	210	diesel	3	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	62	9920	0.0992	0.0054	0.0292	0.0002	0.0057	0.0084	0.0000	20.7951	0.0004	20.8044	0.0006
DUMP TRUCKS	550	diesel	32	4	50	62	12400	0.0784	0.0102	0.0316	0.0001	0.0057	0.0080	0.0000	15.0690	0.0004	15.0800	0.0012
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	62	3100	0.0065	0.0023	0.0649	0.0000	0.0001	0.0004	0.0000	3.5094	0.0001	3.5113	0.0001
2- 7 passenger van		gasoline	0.17/3	2	20/160	65	3834	0.0018	0.0005	0.0216	0.0000	0.0001	0.0002	0.0000	1.8397	0.0000	1.8403	0.0000
8- cars		gasoline	0.17/3	8	20/160	65	15337	0.0046	0.0011	0.0559	0.0000	0.0002	0.0008	0.0000	5.6299	0.0001	5.6315	0.0001
8- trucks		gasoline	0.17/3	8	20/160	65	15337	0.0082	0.0022	0.0881	0.0000	0.0002	0.0009	0.0000	7.3430	0.0001	7.3453	0.0001
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	31	1550	0.0008	0.0002	0.0089	0.0000	0.0000	0.0001	0.0000	0.7421	0.0000	0.7423	0.0000
3- cars		gasoline	0.17/3	3	20/160	33	2923	0.0009	0.0002	0.0107	0.0000	0.0000	0.0002	0.0000	1.0729	0.0000	1.0732	0.0000
3- trucks		gasoline	0.17/3	3	20/160	33	2923	0.0016	0.0004	0.0168	0.0000	0.0000	0.0002	0.0000	1.3994	0.0000	1.3998	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- cars		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- trucks		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS	210	diesel	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**0.2342**	**0.026745**	**0.375786**	**0.000534**	**0.013417**	**0.02140742**	**0**	**66.90464**	**0.001375**	**66.93885**	**0.0027**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2019

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	59	2950	0.0049	0.0009	0.0108	0.0000	0.0002	0.0004	0.0000	2.0342	0.0001	2.0358	0.0001
BUS (CREW)	210	diesel	3	1	160	4	640	0.0053	0.0004	0.0021	0.0000	0.0002	0.0003	0.0000	0.8063	0.0000	0.8067	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	8	421	0.0002	0.0001	0.0024	0.0000	0.0000	0.0000	0.0000	0.2018	0.0000	0.2018	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	18	888	0.0015	0.0003	0.0033	0.0000	0.0001	0.0001	0.0000	0.6120	0.0000	0.6125	0.0000
BUS	210	diesel	3	1	160	1	160	0.0013	0.0001	0.0005	0.0000	0.0000	0.0001	0.0000	0.2016	0.0000	0.2017	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	4	221	0.0001	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.1060	0.0000	0.1060	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	366	58560	0.5859	0.0321	0.1723	0.0011	0.0339	0.0498	0.0000	122.7583	0.0022	122.8131	0.0038
DUMP TRUCKS	550	diesel	32	4	50	366	73200	0.4630	0.0605	0.1865	0.0008	0.0334	0.0472	0.0000	88.9555	0.0026	89.0208	0.0069
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	366	18300	0.0381	0.0135	0.3829	0.0001	0.0006	0.0026	0.0000	20.7169	0.0005	20.7281	0.0008
2- 7 passenger van		gasoline	0.17/3	2	20/160	391	22943	0.0109	0.0027	0.1295	0.0001	0.0003	0.0013	0.0000	11.0081	0.0001	11.0118	0.0002
8- cars		gasoline	0.17/3	8	20/160	391	91771	0.0277	0.0063	0.3346	0.0002	0.0011	0.0047	0.0000	33.6872	0.0004	33.6966	0.0004
8- trucks		gasoline	0.17/3	8	20/160	391	91771	0.0494	0.0130	0.5274	0.0003	0.0012	0.0051	0.0000	43.9375	0.0006	43.9516	0.0007
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	305	15250	0.0082	0.0022	0.0876	0.0000	0.0002	0.0009	0.0000	7.3013	0.0001	7.3036	0.0001
3- cars		gasoline	0.17/3	3	20/160	326	28663	0.0087	0.0020	0.1045	0.0001	0.0004	0.0015	0.0000	10.5215	0.0001	10.5244	0.0001
3- trucks		gasoline	0.17/3	3	20/160	326	28663	0.0154	0.0041	0.1647	0.0001	0.0004	0.0016	0.0000	13.7229	0.0002	13.7273	0.0002
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	65	5751	0.0017	0.0004	0.0210	0.0000	0.0001	0.0003	0.0000	2.1112	0.0000	2.1118	0.0000
3- trucks		gasoline	0.17/3	3	20/160	65	5751	0.0031	0.0008	0.0331	0.0000	0.0001	0.0003	0.0000	2.7536	0.0000	2.7545	0.0000
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	248	12400	0.0784	0.0102	0.0316	0.0001	0.0057	0.0080	0.0000	15.0690	0.0004	15.0800	0.0012
5- cars		gasoline	0.17/3	5	20/160	66	9743	0.0029	0.0007	0.0355	0.0000	0.0001	0.0005	0.0000	3.5764	0.0000	3.5774	0.0000
5- trucks		gasoline	0.17/3	5	20/160	66	9743	0.0052	0.0014	0.0560	0.0000	0.0001	0.0005	0.0000	4.6646	0.0001	4.6661	0.0001
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- cars		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- trucks		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	120	6000	0.0099	0.0019	0.0220	0.0000	0.0005	0.0008	0.0000	4.1374	0.0001	4.1406	0.0002
BUS	210	diesel	3	1	50	8	400	0.0033	0.0002	0.0013	0.0000	0.0001	0.0002	0.0000	0.5039	0.0000	0.5042	0.0000
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**1.325192**	**0.153651**	**2.310988**	**0.00306**	**0.078779**	**0.126224**	**0**	**389.3871**	**0.007618**	**389.5765**	**0.015**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2020

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS (CREW)	210	diesel	3	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	18	888	0.0015	0.0003	0.0033	0.0000	0.0001	0.0001	0.0000	0.6120	0.0000	0.6125	0.0000
BUS	210	diesel	3	1	160	1	160	0.0013	0.0001	0.0005	0.0000	0.0000	0.0001	0.0000	0.2016	0.0000	0.2017	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	4	221	0.0001	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.1060	0.0000	0.1060	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	304	48640	0.4866	0.0266	0.1431	0.0009	0.0281	0.0413	0.0000	101.9632	0.0018	102.0087	0.0031
DUMP TRUCKS	550	diesel	32	4	50	304	60800	0.3846	0.0502	0.1549	0.0006	0.0278	0.0392	0.0000	73.8865	0.0022	73.9408	0.0058
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	304	15200	0.0317	0.0112	0.3181	0.0001	0.0005	0.0022	0.0000	17.2075	0.0004	17.2168	0.0006
2- 7 passenger van		gasoline	0.17/3	2	20/160	293	3834	0.0018	0.0005	0.0216	0.0000	0.0001	0.0002	0.0000	1.8397	0.0000	1.8403	0.0000
8- cars		gasoline	0.17/3	8	20/160	293	15337	0.0046	0.0011	0.0559	0.0000	0.0002	0.0008	0.0000	5.6299	0.0001	5.6315	0.0001
8- trucks		gasoline	0.17/3	8	20/160	293	15337	0.0082	0.0022	0.0881	0.0000	0.0002	0.0009	0.0000	7.3430	0.0001	7.3453	0.0001
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	304	15200	0.0082	0.0022	0.0874	0.0000	0.0002	0.0009	0.0000	7.2773	0.0001	7.2796	0.0001
3- cars		gasoline	0.17/3	3	20/160	39	2923	0.0009	0.0002	0.0107	0.0000	0.0000	0.0002	0.0000	1.0729	0.0000	1.0732	0.0000
3- trucks		gasoline	0.17/3	3	20/160	39	2923	0.0016	0.0004	0.0168	0.0000	0.0000	0.0002	0.0000	1.3994	0.0000	1.3998	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- cars		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- trucks		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS	210	diesel	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**0.931092**	**0.09495**	**0.901701**	**0.001808**	**0.057262**	**0.08593462**	**0**	**218.5389**	**0.004717**	**218.6563**	**0.01**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2021

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS (CREW)	210	diesel	3	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	44	2213	0.0037	0.0007	0.0081	0.0000	0.0002	0.0003	0.0000	1.5257	0.0000	1.5268	0.0001
BUS	210	diesel	3	1	160	4	640	0.0053	0.0004	0.0021	0.0000	0.0002	0.0003	0.0000	0.8063	0.0000	0.8067	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	9	429	0.0002	0.0001	0.0025	0.0000	0.0000	0.0000	0.0000	0.2052	0.0000	0.2053	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DUMP TRUCKS	550	diesel	32	4	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2- 7 passenger van		gasoline	0.17/3	2	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	328	28851	0.0087	0.0020	0.1052	0.0001	0.0004	0.0015	0.0000	10.5907	0.0001	10.5937	0.0001
3- trucks		gasoline	0.17/3	3	20/160	328	28851	0.0155	0.0041	0.1658	0.0001	0.0004	0.0016	0.0000	13.8132	0.0002	13.8176	0.0002
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	860	43000	0.2720	0.0355	0.1096	0.0005	0.0196	0.0277	0.0000	52.2553	0.0015	52.2936	0.0041
5- cars		gasoline	0.17/3	5	20/160	229	33629	0.0102	0.0023	0.1226	0.0001	0.0004	0.0017	0.0000	12.3443	0.0001	12.3477	0.0001
5- trucks		gasoline	0.17/3	5	20/160	229	33629	0.0181	0.0048	0.1933	0.0001	0.0005	0.0019	0.0000	16.1004	0.0002	16.1055	0.0003
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	366	18300	0.0098	0.0026	0.1052	0.0001	0.0002	0.0010	0.0000	8.7615	0.0001	8.7643	0.0001
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	366	18300	0.0087	0.0022	0.1033	0.0001	0.0002	0.0010	0.0000	8.7805	0.0001	8.7834	0.0001
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	366	18300	0.0098	0.0026	0.1052	0.0001	0.0002	0.0010	0.0000	8.7615	0.0001	8.7643	0.0001
6- cars		gasoline	0.17/3	6	20/160	391	68829	0.0208	0.0047	0.2510	0.0002	0.0009	0.0035	0.0000	25.2654	0.0003	25.2725	0.0003
6- trucks		gasoline	0.17/3	6	20/160	391	68829	0.0370	0.0097	0.3956	0.0002	0.0009	0.0039	0.0000	32.9531	0.0004	32.9637	0.0006
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	65	19171	0.1213	0.0158	0.0489	0.0002	0.0088	0.0124	0.0000	23.2979	0.0007	23.3150	0.0018
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	307	15350	0.0253	0.0048	0.0563	0.0001	0.0013	0.0020	0.0000	10.5849	0.0003	10.5929	0.0006
BUS	210	diesel	3	1	50	307	15350	0.1274	0.0091	0.0494	0.0002	0.0047	0.0077	0.0000	19.3378	0.0004	19.3483	0.0010
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	215	10750	0.0680	0.0089	0.0274	0.0001	0.0049	0.0069	0.0000	13.0638	0.0004	13.0734	0.0010
5- cars		gasoline	0.17/3	5	20/160	229	33629	0.0102	0.0023	0.1226	0.0001	0.0004	0.0017	0.0000	12.3443	0.0001	12.3477	0.0001
5- trucks		gasoline	0.17/3	5	20/160	229	33629	0.0181	0.0048	0.1933	0.0001	0.0005	0.0019	0.0000	16.1004	0.0002	16.1055	0.0003
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**0.789995**	**0.117308**	**2.167097**	**0.002149**	**0.044626**	**0.07815823**	**0**	**286.8921**	**0.005476**	**287.0282**	**0.011**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2022

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS (CREW)	210	diesel	3	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	18	888	0.0015	0.0003	0.0033	0.0000	0.0001	0.0001	0.0000	0.6120	0.0000	0.6125	0.0000
BUS	210	diesel	3	1	160	1	160	0.0013	0.0001	0.0005	0.0000	0.0000	0.0001	0.0000	0.2016	0.0000	0.2017	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	4	221	0.0001	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.1060	0.0000	0.1060	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DUMP TRUCKS	550	diesel	32	4	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2- 7 passenger van		gasoline	0.17/3	2	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	852	42600	0.2694	0.0352	0.1086	0.0004	0.0195	0.0274	0.0000	51.7692	0.0015	51.8072	0.0040
5- cars		gasoline	0.17/3	5	20/160	228	33471	0.0101	0.0023	0.1220	0.0001	0.0004	0.0017	0.0000	12.2866	0.0001	12.2900	0.0001
5- trucks		gasoline	0.17/3	5	20/160	228	33471	0.0180	0.0047	0.1924	0.0001	0.0005	0.0019	0.0000	16.0252	0.0002	16.0303	0.0003
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	367	18350	0.0099	0.0026	0.1055	0.0001	0.0002	0.0010	0.0000	8.7854	0.0001	8.7883	0.0001
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	367	18350	0.0087	0.0022	0.1036	0.0001	0.0002	0.0010	0.0000	8.8044	0.0001	8.8074	0.0001
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	367	18350	0.0099	0.0026	0.1055	0.0001	0.0002	0.0010	0.0000	8.7854	0.0001	8.7883	0.0001
6- cars		gasoline	0.17/3	6	20/160	392	69017	0.0208	0.0047	0.2517	0.0002	0.0009	0.0035	0.0000	25.3347	0.0003	25.3417	0.0003
6- trucks		gasoline	0.17/3	6	20/160	392	69017	0.0371	0.0098	0.3966	0.0002	0.0009	0.0039	0.0000	33.0434	0.0004	33.0540	0.0006
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	294	86114	0.5447	0.0711	0.2194	0.0009	0.0393	0.0555	0.0000	104.6494	0.0031	104.7263	0.0082
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS	210	diesel	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**0.93154**	**0.135652**	**1.610248**	**0.002114**	**0.06229**	**0.09722515**	**0**	**270.4033**	**0.006049**	**270.5536**	**0.0139**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2023

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	\	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS (CREW)	210	diesel	3	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	18	888	0.0015	0.0003	0.0033	0.0000	0.0001	0.0001	0.0000	0.6120	0.0000	0.6125	0.0000
BUS	210	diesel	3	1	160	1	160	0.0013	0.0001	0.0005	0.0000	0.0000	0.0001	0.0000	0.2016	0.0000	0.2017	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	4	214	0.0001	0.0000	0.0012	0.0000	0.0000	0.0000	0.0000	0.1026	0.0000	0.1026	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DUMP TRUCKS	550	diesel	32	4	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2- 7 passenger van		gasoline	0.17/3	2	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	243	12150	0.0065	0.0017	0.0698	0.0000	0.0002	0.0007	0.0000	5.8171	0.0001	5.8189	0.0001
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	243	12150	0.0058	0.0015	0.0686	0.0000	0.0002	0.0007	0.0000	5.8296	0.0001	5.8316	0.0001
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	243	12150	0.0065	0.0017	0.0698	0.0000	0.0002	0.0007	0.0000	5.8171	0.0001	5.8189	0.0001
6- cars		gasoline	0.17/3	6	20/160	261	46011	0.0139	0.0032	0.1678	0.0001	0.0006	0.0024	0.0000	16.8898	0.0002	16.8945	0.0002
6- trucks		gasoline	0.17/3	6	20/160	261	46011	0.0247	0.0065	0.2644	0.0001	0.0006	0.0026	0.0000	22.0289	0.0003	22.0360	0.0004
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	263	77000	0.4870	0.0636	0.1962	0.0008	0.0352	0.0496	0.0000	93.5734	0.0028	93.6421	0.0073
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS	210	diesel	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.5	8	20/50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**0.547404**	**0.078571**	**0.841653**	**0.001193**	**0.036964**	**0.0568014**	**0**	**150.872**	**0.003492**	**150.9588**	**0.008177**

Proposed Project Alternative - On-Road Construction Equipment Emissions 2024

Equipment Type	Engine Horsepower	Type of fuel	Hours/ Day	Number of Vehicles per Day	Daily Travel Per Vehicle	Number of Travel Days per year	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)										
		Primary Engine						NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	PM	CO_2	CH_4	CO_2e	HAPs
DREDGING EQUIPMENT																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS (CREW)	210	diesel	3	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	44	2213	0.0037	0.0007	0.0081	0.0000	0.0002	0.0003	0.0000	1.5257	0.0000	1.5268	0.0001
BUS	210	diesel	3	1	160	4	640	0.0053	0.0004	0.0021	0.0000	0.0002	0.0003	0.0000	0.8063	0.0000	0.8067	0.0000
SUPERINTENDENT (Truck)		gasoline	3	1	50	9	443	0.0002	0.0001	0.0025	0.0000	0.0000	0.0000	0.0000	0.2120	0.0000	0.2121	0.0000
FILL EQUIPMENT																		
18 WHEEL WITH FLATBED	335	diesel	4	1	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DUMP TRUCKS	550	diesel	32	4	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1500 GLN WATER TRUCK, 4×2	410	gasoline	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2- 7 passenger van		gasoline	0.17/3	2	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- trucks		gasoline	0.17/3	8	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																		
PICKUP TRUCKS	350	gasoline	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																		
3- cars		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3- trucks		gasoline	0.17/3	3	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																		
DUMP TRUCKS	550	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																		
PILING																		
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																		
REG SRVC TRUCK, W/EQUIPMENT	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TRAILERS	NA	NA	0				0											
PICKUP TRUCKS	350	gas	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- cars		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6- trucks		gasoline	0.17/3	6	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																		
CONCRETE TRUCKS	400	gasoline	10	10	50	64	18857	0.1193	0.0156	0.0481	0.0002	0.0086	0.0122	0.0000	22.9159	0.0007	22.9328	0.0018
SHORELINE PROTECTION																		
MEDIUM DUTY TRUCK	250	diesel	4	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS	210	diesel	3	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																		
18 WHEEL WITH FLATBED	400	diesel	10	1	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- cars		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5- trucks		gasoline	0.17/3	5	20/160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT																		
18 WHEEL WITH FLATBED	NA	NA	0	0	160	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8- cars		gasoline	0.5	8	20/50	295	69143	0.0209	0.0047	0.2521	0.0002	0.0009	0.0036	0.0000	25.3808	0.0003	25.3879	0.0003
8- trucks		gasoline	0.5	8	20/50	295	69143	0.0372	0.0098	0.3974	0.0002	0.0009	0.0039	0.0000	33.1036	0.0004	33.1142	0.0006
DELIVERY VEHICLES																		
DUMP TRUCKS	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18 WHEEL WITH FLATBED	400	diesel	7.5	15	160	276	662400	6.6272	0.3629	1.9493	0.0120	0.3833	0.5630	0.0000	1388.5771	0.0249	1389.1978	0.0429
WATER TRUCK	NA	NA	0	0	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BUS		diesel	0	0	10	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EMPLOYEE VEHICLES	350	gasoline	5.1	30	50	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
							Totals	**6.813778**	**0.394116**	**2.659538**	**0.012627**	**0.39408**	**0.58318801**	**0**	**1472.52141**	**0.026356**	**1473.17824**	**0.0456**

Non-Road Construction Equipment Emission Factors 2017 - MOVES2014a

HP	Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Primary Exhaust PM_{10} - Total	Primary Exhaust $PM_{2.5}$ - Total	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2
175 < hp <= 300	Tractors / Loaders / Backhoes	January	8	7	2	1.77	0.026	3.45	0.33	0.32	0.00	0.56	624.96
		July	17	8	2	1.77	0.026	3.45	0.33	0.32	0.004	0.56	625
		Maximum	--	--	--	**1.77**	**0.026**	**3.45**	**0.33**	**0.32**	**0.004**	**0.56**	**625**
		Average	--	--	--	**1.77**	**0.026**	**3.45**	**0.33**	**0.32**	**0.004**	**0.56**	**625**
75 < hp <= 100	Crawler Tractor / Dozers	January	8	7	2	1.67	0.016	1.68	0.21	0.21	0.003	0.20	596
		July	17	8	2	1.67	0.016	1.68	0.21	0.21	0.003	0.20	596
		Maximum	--	--	--	**1.67**	**0.016**	**1.68**	**0.21**	**0.21**	**0.003**	**0.20**	**596**
		Average	--	--	--	**1.67**	**0.016**	**1.68**	**0.21**	**0.21**	**0.003**	**0.20**	**596**
175 < hp <= 300	Crawler Tractor / Dozers	January	8	7	2	0.42	0.015	1.28	0.08	0.07	0.003	0.18	536
		July	17	8	2	0.42	0.015	1.28	0.08	0.07	0.003	0.18	536
		Maximum	--	--	--	**0.42**	**0.015**	**1.28**	**0.08**	**0.07**	**0.003**	**0.18**	**536**
		Average	--	--	--	**0.42**	**0.015**	**1.28**	**0.08**	**0.07**	**0.003**	**0.18**	**536**
75 < hp <= 100	Gen Set	January	8	7	2	2.19	0.015	3.97	0.38	0.37	0.004	0.49	589
		July	17	8	2	2.19	0.015	3.97	0.38	0.37	0.004	0.49	589
		Maximum	--	--	--	**2.19**	**0.015**	**3.97**	**0.38**	**0.37**	**0.004**	**0.49**	**589**
		Average	--	--	--	**2.19**	**0.015**	**3.97**	**0.38**	**0.37**	**0.004**	**0.49**	**589**
75 < hp <= 100	Forklift	January	8	7	2	0.62	0.013	0.73	0.05	0.05	0.003	0.16	596
		July	17	8	2	0.62	0.013	0.73	0.05	0.05	0.003	0.16	596
		Maximum	--	--	--	**0.62**	**0.013**	**0.73**	**0.05**	**0.05**	**0.003**	**0.16**	**596**
		Average	--	--	--	**0.62**	**0.013**	**0.73**	**0.05**	**0.05**	**0.003**	**0.16**	**596**
6 < hp <= 11	Other General Ind. Eq.	January	8	7	1	262.48	0.803	2.37	0.14	0.13	0.006	4.75	1044
		July	17	8	1	282.68	0.771	1.77	0.14	0.13	0.006	4.56	1044
		Maximum	--	--	--	**282.68**	**0.803**	**2.37**	**0.14**	**0.13**	**0.006**	**4.75**	**1044**
		Average	--	--	--	**272.58**	**0.787**	**2.07**	**0.14**	**0.13**	**0.006**	**4.65**	**1044**
100 < hp <= 175	Rollers	January	8	7	2	0.74	0.016	1.74	0.17	0.17	0.003	0.20	536
		July	17	8	2	0.74	0.016	1.74	0.17	0.17	0.003	0.20	536
		Maximum	--	--	--	**0.74**	**0.016**	**1.74**	**0.17**	**0.17**	**0.003**	**0.20**	**536**
		Average	--	--	--	**0.74**	**0.016**	**1.74**	**0.17**	**0.17**	**0.003**	**0.20**	**536**
175 < hp <= 300	Pumps	January	8	7	2	1.00	0.013	3.66	0.20	0.19	0.003	0.34	530
		July	17	8	2	1.00	0.013	3.66	0.20	0.19	0.003	0.34	530
		Maximum	--	--	--	**1.00**	**0.013**	**3.66**	**0.20**	**0.19**	**0.003**	**0.34**	**530**
		Average	--	--	--	**1.00**	**0.013**	**3.66**	**0.20**	**0.19**	**0.003**	**0.34**	**530**
175 < hp <= 300	Cranes	January	8	7	2	0.37	0.015	1.67	0.07	0.07	0.003	0.19	531
		July	17	8	2	0.37	0.015	1.67	0.07	0.07	0.003	0.19	531
		Maximum	--	--	--	**0.37**	**0.015**	**1.67**	**0.07**	**0.07**	**0.003**	**0.19**	**531**
		Average	--	--	--	**0.37**	**0.015**	**1.67**	**0.07**	**0.07**	**0.003**	**0.19**	**531**
175 < hp <= 300	Excavators	January	8	7	2	0.32	0.014	1.07	0.05	0.05	0.003	0.17	536
		July	17	8	2	0.32	0.014	1.07	0.05	0.05	0.003	0.17	536
		Maximum	--	--	--	**0.32**	**0.014**	**1.07**	**0.05**	**0.05**	**0.003**	**0.17**	**536**
		Average	--	--	--	**0.32**	**0.014**	**1.07**	**0.05**	**0.05**	**0.003**	**0.17**	**536**
300 < hp <= 600	Other Construction Equip	January	8	7	2	1.29	0.013	3.00	0.18	0.17	0.003	0.23	536
		July	17	8	2	1.29	0.013	3.00	0.18	0.17	0.003	0.23	536
		Maximum	--	--	--	**1.29**	**0.013**	**3.00**	**0.18**	**0.17**	**0.003**	**0.23**	**536**
		Average	--	--	--	**1.29**	**0.013**	**3.00**	**0.18**	**0.17**	**0.003**	**0.23**	**536**
16 < hp <= 25	Excavators	January	8	7	2	2.38	0.044	4.46	0.36	0.35	0.004	0.50	595
		July	17	8	2	2.38	0.044	4.46	0.36	0.35	0.004	0.50	595
		Maximum	--	--	--	**2.38**	**0.044**	**4.46**	**0.36**	**0.35**	**0.004**	**0.50**	**595**
		Average	--	--	--	**2.38**	**0.044**	**4.46**	**0.36**	**0.35**	**0.004**	**0.50**	**595**
50 < hp <= 75	Tractors / Loaders / Backhoes	January	8	7	2	4.25	0.028	4.60	0.60	0.58	0.004	0.79	694
		July	17	8	2	4.25	0.028	4.60	0.60	0.58	0.004	0.79	694
		Maximum	--	--	--	**4.25**	**0.028**	**4.60**	**0.60**	**0.58**	**0.004**	**0.79**	**694**
		Average	--	--	--	**4.25**	**0.028**	**4.60**	**0.60**	**0.58**	**0.004**	**0.79**	**694**

Non-Road Construction Equipment Emission Factors 2017 - MOVES2014a

HP	Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Primary Exhaust PM_{10} - Total	Primary Exhaust $PM_{2.5}$ - Total	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2
100 < hp <= 175	Pavers	January	8	7	2	0.69	0.016	1.61	0.16	0.16	0.003	0.20	536
		July	17	8	2	0.69	0.016	1.61	0.16	0.16	0.003	0.20	536
		Maximum	--	--	--	**0.69**	**0.016**	**1.61**	**0.16**	**0.16**	**0.003**	**0.20**	**536**
		Average	--	--	--	**0.69**	**0.016**	**1.61**	**0.16**	**0.16**	**0.003**	**0.20**	**536**
175 < hp <= 300	Other Construction Equip	January	8	7	2	0.68	0.016	2.03	0.13	0.12	0.003	0.22	536
		July	17	8	2	0.68	0.016	2.03	0.13	0.12	0.003	0.22	536
		Maximum	--	--	--	**0.68**	**0.016**	**2.03**	**0.13**	**0.12**	**0.003**	**0.22**	**536**
		Average	--	--	--	**0.68**	**0.016**	**2.03**	**0.13**	**0.12**	**0.003**	**0.22**	**536**
75 < hp <= 100	Hydro Power Units	January	8	7	2	1.56	0.018	2.66	0.23	0.22	0.003	0.29	590
		July	17	8	2	1.56	0.018	2.66	0.23	0.22	0.003	0.29	590
		Maximum	--	--	--	**1.56**	**0.018**	**2.66**	**0.23**	**0.22**	**0.003**	**0.29**	**590**
		Average	--	--	--	**1.56**	**0.018**	**2.66**	**0.23**	**0.22**	**0.003**	**0.29**	**590**
100 < hp <= 175	Crawler Tractor / Dozers	January	8	7	2	0.61	0.016	1.41	0.14	0.14	0.003	0.19	536
		July	17	8	2	0.61	0.016	1.41	0.14	0.14	0.003	0.19	536
		Maximum	--	--	--	**0.61**	**0.016**	**1.41**	**0.14**	**0.14**	**0.003**	**0.19**	**536**
		Average	--	--	--	**0.61**	**0.016**	**1.41**	**0.14**	**0.14**	**0.003**	**0.19**	**536**
175 < hp <= 300	Graders	January	8	7	2	0.41	0.015	1.25	0.07	0.07	0.003	0.18	536
		July	17	8	2	0.41	0.015	1.25	0.07	0.07	0.003	0.18	536
		Maximum	--	--	--	**0.41**	**0.015**	**1.25**	**0.07**	**0.07**	**0.003**	**0.18**	**536**
		Average	--	--	--	**0.41**	**0.015**	**1.25**	**0.07**	**0.07**	**0.003**	**0.18**	**536**
16 < hp <= 25	Cement & Mortar Mixers	January	8	7	2	3.06	0.031	5.39	0.49	0.48	0.004	0.81	588
		July	17	8	2	3.06	0.031	5.39	0.49	0.48	0.004	0.81	588
		Maximum	--	--	--	**3.06**	**0.031**	**5.39**	**0.49**	**0.48**	**0.004**	**0.81**	**588**
		Average	--	--	--	**3.06**	**0.031**	**5.39**	**0.49**	**0.48**	**0.004**	**0.81**	**588**
100 < hp <= 175	Air Compressors	January	8	7	2	0.58	0.017	2.23	0.14	0.13	0.003	0.23	530
		July	17	8	2	0.58	0.017	2.23	0.14	0.13	0.003	0.23	530
		Maximum	--	--	--	**0.58**	**0.017**	**2.23**	**0.14**	**0.13**	**0.003**	**0.23**	**530**
		Average	--	--	--	**0.58**	**0.017**	**2.23**	**0.14**	**0.13**	**0.003**	**0.23**	**530**
25 < hp <= 40	Welders	January	8	7	2	3.59	0.027	4.72	0.57	0.56	0.004	0.88	693
		July	17	8	2	3.59	0.027	4.72	0.57	0.56	0.004	0.88	693
		Maximum	--	--	--	**3.59**	**0.027**	**4.72**	**0.57**	**0.56**	**0.004**	**0.88**	**693**
		Average	--	--	--	**3.59**	**0.027**	**4.72**	**0.57**	**0.56**	**0.004**	**0.88**	**693**
6 < hp <= 11	Gen Set	January	8	7	2	4.52	0.044	5.12	0.50	0.49	0.004	0.78	588
		July	17	8	2	4.52	0.044	5.12	0.50	0.49	0.004	0.78	588
		Maximum	--	--	--	**4.52**	**0.044**	**5.12**	**0.50**	**0.49**	**0.004**	**0.78**	**588**
		Average	--	--	--	**4.52**	**0.044**	**5.12**	**0.50**	**0.49**	**0.004**	**0.78**	**588**
11 < hp <= 16	Pumps	January	8	7	1	257.35	0.715	2.24	0.12	0.11	0.006	4.23	1046
		July	17	8	1	277.15	0.686	1.67	0.12	0.11	0.006	4.05	1046
		Maximum	--	--	--	**277.15**	**0.715**	**2.24**	**0.12**	**0.11**	**0.006**	**4.23**	**1046**
		Average	--	--	--	**267.25**	**0.700**	**1.96**	**0.12**	**0.11**	**0.006**	**4.14**	**1046**
3 < hp <= 6	Tamper / Rammers	January	8	7	2	4.46	0.050	4.64	0.44	0.42	0.004	0.68	588
		July	17	8	2	4.46	0.050	4.64	0.44	0.42	0.004	0.68	588
		Maximum	--	--	--	**4.46**	**0.050**	**4.64**	**0.44**	**0.42**	**0.004**	**0.68**	**588**
		Average	--	--	--	**4.46**	**0.050**	**4.64**	**0.44**	**0.42**	**0.004**	**0.68**	**588**
50 < hp <= 75	Other General Ind. Eq.	January	8	7	1	17.32	0.086	1.84	0.07	0.07	0.004	0.51	702
		July	17	8	1	18.65	0.083	1.37	0.07	0.07	0.004	0.49	702
		Maximum	--	--	--	**18.65**	**0.086**	**1.84**	**0.07**	**0.07**	**0.004**	**0.51**	**702**
		Average	--	--	--	**17.98**	**0.085**	**1.60**	**0.07**	**0.07**	**0.004**	**0.50**	**702**
175 < hp <= 300	Rubber Tire Loader	January	8	7	2	0.54	0.015	1.60	0.10	0.10	0.003	0.19	536
		July	17	8	2	0.54	0.015	1.60	0.10	0.10	0.003	0.19	536
		Maximum	--	--	--	**0.54**	**0.015**	**1.60**	**0.10**	**0.10**	**0.003**	**0.19**	**536**
		Average	--	--	--	**0.54**	**0.015**	**1.60**	**0.10**	**0.10**	**0.003**	**0.19**	**536**
100 < hp <= 175	Tractors / Loaders / Backhoes	January	8	7	2	2.13	0.030	3.66	0.43	0.42	0.004	0.63	625
		July	17	8	2	2.13	0.030	3.66	0.43	0.42	0.004	0.63	625
		Maximum	--	--	--	**2.13**	**0.030**	**3.66**	**0.43**	**0.42**	**0.004**	**0.63**	**625**
		Average	--	--	--	**2.13**	**0.030**	**3.66**	**0.43**	**0.42**	**0.004**	**0.63**	**625**
300 < hp <= 600	Excavators	January	8	7	2	1.29	0.013	3.00	0.18	0.17	0.003	0.23	536
		July	17	8	2	1.29	0.013	3.00	0.18	0.17	0.003	0.23	536
		Maximum	--	--	--	**1.29**	**0.013**	**3.00**	**0.18**	**0.17**	**0.003**	**0.23**	**536**
		Average	--	--	--	**1.29**	**0.013**	**3.00**	**0.18**	**0.17**	**0.003**	**0.23**	**536**

Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2018

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0201	0.01199	0.01163	0.06385	0.12466	22.6031	0.00014	0.00094	0.00158	0.00026
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0201	0.0120	0.0116	0.0638	0.1247	22.6031	0.0001	0.0009	0.0016	0.0003
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0287	0.0171	0.0166	0.0912	0.1781	32.2901	0.0002	0.0013	0.0023	0.0004
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0078	0.0082	0.0080	0.0645	0.0651	23.0556	0.0001	0.0006	0.0016	0.0003
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374	0.00710759	0.0198	0.0084	0.0082	0.0467	0.1423	59.6899	0.0003	0.0016	0.0042	0.0008
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.0172	0.0135	0.0131	0.0772	0.1401	20.7697	0.0001	0.0005	0.0014	0.0003
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0051	0.0016	0.0015	0.0199	0.0233	19.0247	0.0001	0.0004	0.0013	0.0002
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0150	0.0004	0.0004	0.8793	0.0067	3.3679	0.0000	0.0025	0.0002	0.0000
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0119	0.0101	0.0098	0.0431	0.1015	31.3543	0.0002	0.0009	0.0022	0.0004
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0119	0.0101	0.0098	0.0431	0.1015	31.3543	0.0002	0.0009	0.0022	0.0004
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.0281	0.0163	0.0159	0.0825	0.3033	43.9288	0.0003	0.0011	0.0031	0.0006
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0404	0.0156	0.0151	0.0784	0.3538	112.2524	0.0006	0.0032	0.0078	0.0015
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0404	0.0156	0.0151	0.0784	0.3538	112.2524	0.0006	0.0032	0.0078	0.0015
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0080	0.0026	0.0025	0.0153	0.0507	25.4127	0.0001	0.0007	0.0018	0.0003
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0078	0.0059	0.0057	0.0436	0.1015	18.1206	0.0001	0.0004	0.0013	0.0002
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZER		105	type 2	diesel	10	Crawler Tractor/Dozers	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																	Totals	**0.2825**	**0.1496**	**0.1451**	**1.6912**	**2.1709**	**578.0798**	**0.0033**	**0.0194**	**0.0403**	**0.0075**

Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2019

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.1187	0.07078	0.06865	0.37690	0.73592	133.4311	0.00080	0.00556	0.00930	0.00152
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.1187	0.0708	0.0687	0.3769	0.7359	133.4311	0.0008	0.0056	0.0093	0.0015
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.1696	0.1011	0.0981	0.5384	1.0513	190.6158	0.0011	0.0079	0.0133	0.0022
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0460	0.0485	0.0470	0.3806	0.3846	136.1026	0.0007	0.0036	0.0095	0.0016
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374	0.00710759	0.1169	0.0498	0.0483	0.2759	0.8399	352.3628	0.0019	0.0097	0.0246	0.0047
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.1018	0.0797	0.0773	0.4557	0.8273	122.6085	0.0008	0.0032	0.0085	0.0015
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0302	0.0092	0.0089	0.1177	0.1376	112.3074	0.0006	0.0025	0.0078	0.0013
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0886	0.0026	0.0024	5.1906	0.0394	19.8816	0.0001	0.0150	0.0014	0.0001
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0705	0.0599	0.0581	0.2546	0.5990	185.0916	0.0011	0.0056	0.0129	0.0025
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0705	0.0599	0.0581	0.2546	0.5990	185.0916	0.0011	0.0056	0.0129	0.0025
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.1658	0.0965	0.0936	0.4872	1.7903	259.3215	0.0016	0.0063	0.0181	0.0035
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.2385	0.0922	0.0894	0.4630	2.0883	662.6515	0.0037	0.0186	0.0462	0.0089
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.2385	0.0922	0.0894	0.4630	2.0883	662.6515	0.0037	0.0186	0.0462	0.0089
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0790	0.0256	0.0248	0.1510	0.4986	250.0278	0.0013	0.0066	0.0174	0.0033
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0766	0.0582	0.0564	0.4289	0.9987	178.2837	0.0011	0.0043	0.0124	0.0024
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0034	0.0025	0.0024	0.0164	0.0308	4.1054	0.0000	0.0003	0.0003	0.0000
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0084	0.0063	0.0061	0.0451	0.0487	7.3468	0.0000	0.0003	0.0005	0.0001
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0335	0.0254	0.0246	0.1873	0.4361	77.8535	0.0005	0.0019	0.0054	0.0010
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0113	0.0093	0.0090	0.0395	0.0920	30.7067	0.0002	0.0009	0.0021	0.0004
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0148	0.0088	0.0085	0.0465	0.1382	36.5596	0.0002	0.0011	0.0025	0.0005
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0084	0.0068	0.0066	0.0457	0.0781	17.3259	0.0001	0.0005	0.0012	0.0002
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0144	0.0122	0.0119	0.0521	0.1225	37.8414	0.0002	0.0011	0.0026	0.0005
BULLDOZER		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0080	0.0060	0.0059	0.0259	0.0598	22.7069	0.0001	0.0007	0.0016	0.0003
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0153	0.0063	0.0061	0.0353	0.1080	46.4980	0.0002	0.0013	0.0032	0.0006
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0059	0.0036	0.0035	0.0224	0.0396	4.3201	0.0000	0.0002	0.0003	0.0001
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																	Totals	**1.8535**	**1.0041**	**0.9739**	**10.7315**	**14.5678**	**3869.1248**	**0.0218**	**0.1270**	**0.2697**	**0.0500**

Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2020

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0986	0.05879	0.05702	0.31305	0.61126	110.8280	0.00066	0.00461	0.00772	0.00126
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0986	0.0588	0.0570	0.3131	0.6113	110.8280	0.0007	0.0046	0.0077	0.0013
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.1409	0.0840	0.0815	0.4472	0.8732	158.3257	0.0009	0.0066	0.0110	0.0018
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0382	0.0403	0.0391	0.3162	0.3194	113.0469	0.0006	0.0030	0.0079	0.0013
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374	0.00710759	0.0971	0.0414	0.0401	0.2292	0.6976	292.6730	0.0016	0.0080	0.0204	0.0039
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.0845	0.0662	0.0642	0.3785	0.6871	101.8388	0.0006	0.0026	0.0071	0.0012
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0251	0.0076	0.0074	0.0977	0.1143	93.2826	0.0005	0.0021	0.0065	0.0011
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0736	0.0022	0.0020	4.3113	0.0327	16.5137	0.0001	0.0124	0.0012	0.0001
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0586	0.0498	0.0483	0.2115	0.4975	153.7373	0.0009	0.0047	0.0107	0.0020
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0586	0.0498	0.0483	0.2115	0.4975	153.7373	0.0009	0.0047	0.0107	0.0020
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.1377	0.0801	0.0777	0.4047	1.4871	215.3928	0.0013	0.0053	0.0150	0.0029
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.1981	0.0766	0.0743	0.3846	1.7346	550.3991	0.0031	0.0155	0.0384	0.0074
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.1981	0.0766	0.0743	0.3846	1.7346	550.3991	0.0031	0.0155	0.0384	0.0074
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0787	0.0255	0.0247	0.1505	0.4969	249.2081	0.0013	0.0066	0.0174	0.0033
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0764	0.0580	0.0563	0.4275	0.9954	177.6991	0.0011	0.0043	0.0124	0.0024
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZER		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																	Totals	**1.4628**	**0.7755**	**0.7521**	**8.5811**	**11.3905**	**3047.9095**	**0.0172**	**0.1004**	**0.2124**	**0.0394**

Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2021

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.00000	0.00000	0.00000	0.00000	0.0000	0.00000	0.00000	0.00000	0.00000
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0173	0.0126	0.0122	0.0826	0.1551	20.6617	0.0001	0.0015	0.0014	0.0002
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0421	0.0318	0.0309	0.2267	0.2450	36.9749	0.0002	0.0015	0.0026	0.0004
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.1684	0.1279	0.1240	0.9427	2.1948	391.8203	0.0023	0.0094	0.0273	0.0052
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0392	0.0322	0.0312	0.1371	0.3191	106.4831	0.0006	0.0032	0.0074	0.0014
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0513	0.0304	0.0295	0.1611	0.4791	126.7794	0.0007	0.0038	0.0088	0.0017
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0292	0.0234	0.0227	0.1586	0.2709	60.0818	0.0004	0.0018	0.0042	0.0007
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0500	0.0425	0.0412	0.1805	0.4246	131.2243	0.0007	0.0040	0.0091	0.0017
BULLDOZER		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0276	0.0209	0.0203	0.0899	0.2072	78.7416	0.0004	0.0023	0.0055	0.0010
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0531	0.0220	0.0213	0.1224	0.3745	161.2431	0.0009	0.0044	0.0112	0.0021
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0206	0.0126	0.0122	0.0778	0.1374	14.9811	0.0001	0.0008	0.0010	0.0002
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0934	0.0361	0.0350	0.1814	0.8179	259.5385	0.0014	0.0073	0.0181	0.0035
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0284	0.0092	0.0089	0.0543	0.1795	90.0100	0.0005	0.0024	0.0063	0.0012
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0867	0.0514	0.0498	0.2719	0.8085	213.9593	0.0012	0.0063	0.0149	0.0028
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0139	0.0083	0.0080	0.0350	0.1334	31.7448	0.0002	0.0010	0.0022	0.0004
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0073	0.0048	0.0046	0.0298	0.0392	5.7635	0.0000	0.0002	0.0004	0.0001
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0119	0.0077	0.0074	0.0690	0.0782	8.9786	0.0001	0.0007	0.0006	0.0001
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0924	0.0026	0.0024	5.9669	0.0437	23.3600	0.0001	0.0156	0.0016	0.0002
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0036	0.0023	0.0022	0.0233	0.0243	3.0791	0.0000	0.0003	0.0002	0.0000
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.0267	0.0038	0.0035	0.9629	0.0859	37.5774	0.0002	0.0045	0.0026	0.0004
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0531	0.0220	0.0213	0.1224	0.3745	161.2431	0.0009	0.0044	0.0112	0.0021
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0276	0.0209	0.0203	0.0899	0.2072	78.7416	0.0004	0.0023	0.0055	0.0010
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0500	0.0425	0.0412	0.1805	0.4246	131.2243	0.0007	0.0040	0.0091	0.0017
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0805	0.0434	0.0421	0.2274	0.6711	224.9708	0.0012	0.0064	0.0157	0.0030
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0911	0.0540	0.0524	0.2859	0.8500	224.9394	0.0013	0.0067	0.0157	0.0030
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.1933	0.1468	0.1424	1.0823	2.5198	449.8390	0.0027	0.0108	0.0314	0.0060
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																	Totals	**1.3588**	**0.8119**	**0.7872**	**11.7624**	**12.0659**	**3073.9606**	**0.0176**	**0.1054**	**0.2143**	**0.0403**

Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2022

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.00000	0.00000	0.00000	0.00000	0.0000	0.00000	0.00000	0.00000	0.00000
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0389	0.0319	0.0309	0.1358	0.3161	105.4925	0.0006	0.0031	0.0074	0.0014
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0509	0.0301	0.0292	0.1596	0.4746	125.6001	0.0007	0.0037	0.0088	0.0017
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0289	0.0232	0.0225	0.1571	0.2684	59.5229	0.0003	0.0018	0.0041	0.0007
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0495	0.0421	0.0408	0.1788	0.4207	130.0036	0.0007	0.0039	0.0091	0.0017
BULLDOZER		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0273	0.0207	0.0201	0.0890	0.2053	78.0091	0.0004	0.0023	0.0054	0.0010
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0526	0.0218	0.0211	0.1213	0.3711	159.7432	0.0008	0.0044	0.0111	0.0021
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0204	0.0124	0.0121	0.0771	0.1361	14.8417	0.0001	0.0008	0.0010	0.0002
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0937	0.0362	0.0351	0.1819	0.8202	260.2476	0.0014	0.0073	0.0181	0.0035
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0285	0.0092	0.0090	0.0545	0.1800	90.2559	0.0005	0.0024	0.0063	0.0012
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0869	0.0515	0.0499	0.2727	0.8107	214.5439	0.0012	0.0064	0.0150	0.0028
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0140	0.0083	0.0080	0.0351	0.1338	31.8316	0.0002	0.0010	0.0022	0.0004
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0073	0.0048	0.0046	0.0299	0.0393	5.7792	0.0000	0.0002	0.0004	0.0001
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0119	0.0077	0.0075	0.0692	0.0785	9.0031	0.0001	0.0007	0.0006	0.0001
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0922	0.0026	0.0024	5.9507	0.0436	23.2965	0.0001	0.0156	0.0016	0.0002
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0213	0.0136	0.0132	0.1391	0.1445	18.3406	0.0001	0.0016	0.0013	0.0002
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.1593	0.0228	0.0209	5.7358	0.5115	223.8306	0.0014	0.0270	0.0156	0.0023
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																	Totals	**0.7836**	**0.3389**	**0.3274**	**13.3875**	**4.9543**	**1550.3423**	**0.0088**	**0.0821**	**0.1081**	**0.0196**

Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2023

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.00000	0.00000	0.00000	0.00000	0.0000	0.00000	0.00000	0.00000	0.00000
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZER		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0620	0.0240	0.0233	0.1204	0.5430	172.3166	0.0010	0.0048	0.0120	0.0023
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0189	0.0061	0.0059	0.0361	0.1192	59.7608	0.0003	0.0016	0.0042	0.0008
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0575	0.0341	0.0331	0.1806	0.5368	142.0549	0.0008	0.0042	0.0099	0.0019
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0092	0.0055	0.0053	0.0232	0.0886	21.0765	0.0001	0.0007	0.0015	0.0003
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0048	0.0032	0.0031	0.0198	0.0261	3.8266	0.0000	0.0001	0.0003	0.0000
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0079	0.0051	0.0049	0.0458	0.0519	5.9612	0.0000	0.0004	0.0004	0.0001
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0610	0.0017	0.0016	3.9401	0.0289	15.4252	0.0001	0.0103	0.0011	0.0001
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0179	0.0114	0.0110	0.1167	0.1213	15.3954	0.0001	0.0013	0.0011	0.0002
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.1337	0.0191	0.0176	4.8147	0.4294	187.8870	0.0011	0.0226	0.0131	0.0019
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																	Totals	**0.3731**	**0.1102**	**0.1058**	**9.2974**	**1.9451**	**623.7041**	**0.0036**	**0.0462**	**0.0435**	**0.0076**

4Proposed Project Alternative - Nonroad Construction Equipment Emissions - 2024

Equipment Type	Equipment Rating	Engine Horsepower	Type 1 or 2 Engine	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
				Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
FILL EQUIPMENT																											
CAT 973 3.8CY, 210 HP (placing)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.00000	0.00000	0.00000	0.00000	0.0000	0.00000	0.00000	0.00000	0.00000
CAT 973 3.8CY, 210 HP (wick)		210	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 980GN, 7.0, 300HP(rip rap)		300	type 2	diesel	12	Tractors/Loaders/Backhoes	0.21	0.56	0.33	0.32	1.77	3.45	625	0.0037	0.026	0.0436	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D4C 80HP, 8MT		80	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.20	0.21	0.21	1.67	1.68	596	0.0033	0.016	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT D7R 230 HP, 25MT		230	type 2	diesel	12	Crawler Tractor/Dozers	0.59	0.18	0.08	0.07	0.42	1.28	536	0.0029	0.0147	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gen Set 100 KW, DSL		100	type 2	diesel	12	Gen Set	0.43	0.49	0.38	0.37	2.19	3.97	589	0.0036	0.0152	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4 TON EXT.BOOM FORKLIFT		99	type 2	diesel	8	Forklift	0.59	0.16	0.05	0.05	0.62	0.73	596	0.0029	0.0133	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULE KAWASAKI 550 W/TOPS	3600	10	type 2	gas	8	Other General Industrial Equipment	0.59	4.65	0.14	0.13	272.58	2.07	1044	0.0063	0.7869	0.0728	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CP, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CAT 563CS, 145 HP		145	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BOOSTER PUMP		235	type 2	diesel	12	Pumps	0.43	0.34	0.20	0.19	1.00	3.66	530	0.0032	0.0129	0.0369	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH FILL		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CRANE BARGES WITH ROCK		300	type 2	diesel	24	Cranes	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WICK DRAIN INSTALLATION																											
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	10	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UTILITY INFRASTRUCTURE EQUIPMENT																											
EXCAVATOR		17.4	type 2	diesel	10	Excavators	0.59	0.50	0.36	0.35	2.38	4.46	595	0.004	0.0439	0.0415	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BACKHOE		75	type 2	diesel	10	Tractor/Loader/Backhoe	0.21	0.79	0.60	0.58	4.25	4.60	694	0.0043	0.0282	0.0484	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PIPE LAYER		366	type 2	diesel	10	Other Construction Equipment	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROAD CONSTRUCTION EQUIPMENT																											
PAVER		142	type 2	diesel	10	Pavers	0.59	0.20	0.16	0.16	0.69	1.61	536	0.003	0.016	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SOIL COMPACTOR		232	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HYDRAULIC SWEEPER		100	type 2	diesel	10	Hydro Power Units	0.43	0.29	0.23	0.22	1.56	2.66	590	0.0035	0.0181	0.0411	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZER		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GRADER		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIXER		25	type 2	diesel	10	Cement & Mortar Mixers	0.43	0.81	0.49	0.48	3.06	5.39	588	0.004	0.0309	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BATCHING PLANT		1																									
WHARF CONSTRUCTION EQUIPMENT																											
PILING																											
150 TN CRWLER CRANE		282	type 2	diesel	10	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EXCAVATOR-JD 330LC 2.3 CY		235	type 2	diesel	3	Excavators	0.59	0.17	0.05	0.05	0.32	1.07	536	0.0028	0.0141	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ATE D46-32 DIESEL HAMMER		230	type 2	diesel	10	Other Construction Equipment	0.43	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIR COMPRESSORS																											
375 CFM, PORT.DSL		115	type 2	diesel	3	Air Compressors	0.43	0.23	0.14	0.13	0.58	2.23	530	0.0031	0.0169	0.037	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WELDING EQUIPMENT																											
300 AMP DC DIESEL	1800	32.7	type 2	diesel	3	Welders	0.21	0.88	0.57	0.56	3.59	4.72	693	0.0043	0.0271	0.0483	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MISC JOB EQUIPMENT																											
GEN SET 6-10 KW, DSL		11	type 2	diesel	8	Gen Set	0.43	0.78	0.50	0.49	4.52	5.12	588	0.004	0.0437	0.041	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CENT TRASH PUMP 4" W/TRL		16	type 2	gas	8	Pumps	0.43	4.14	0.12	0.11	267.25	1.96	1046	0.0064	0.7003	0.0729	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CUTTING EQUIPMENT																											
Torch Cutting Machine		70	type 2	MAPP	4	AP-42 Emission Factors-LPG		0.0102	0.0091	0.0091	0.0951	0.1699	162	0.0010	0.0101	0.0113	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CONCRETE EQUIPMENT																											
TAMPER (JAMPING JACK) WAC		6	type 2	diesel	10	Tampers/Rammers	0.43	0.68	0.44	0.42	4.46	4.64	588	0.004	0.0505	0.041	0.00710759	0.0046	0.0029	0.0028	0.0299	0.0311	3.9493	0.0000	0.0003	0.0003	0.0000
TROWEL MARCH 48"		55	type 2	gas	10	Other General Industrial Equipment	0.48	0.50	0.07	0.07	17.98	1.60	702	0.0043	0.0845	0.0489	0.00710759	0.0343	0.0049	0.0045	1.2351	0.1101	48.1971	0.0003	0.0058	0.0034	0.0005
RAIL CONSTRUCTION EQUIPMENT																											
GRADERS		215	type 2	diesel	10	Graders	0.59	0.18	0.07	0.07	0.41	1.25	536	0.0028	0.0146	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BULLDOZERS		105	type 2	diesel	10	Crawler Dozers/Tractor	0.59	0.19	0.14	0.14	0.61	1.41	536	0.0029	0.0156	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ROLLER		175	type 2	diesel	10	Rollers	0.59	0.20	0.17	0.17	0.74	1.74	536	0.003	0.0162	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GANTRY CRANES				na	10																						
SWING LOADER		300	type 2	diesel	10	Rubber Tire Loader	0.59	0.19	0.10	0.10	0.54	1.60	536	0.003	0.0152	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RAIL THREADER		300	type 2	diesel	10	Other Construction Equipment	0.59	0.22	0.13	0.12	0.68	2.03	536	0.0031	0.0159	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
UNDER CUTTER		600	type 2	diesel	10	Excavators	0.59	0.23	0.18	0.17	1.29	3.00	536	0.0032	0.0129	0.0374	0.00710759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERMINAL/FACILITIES EQUIPMENT	10																										
CRANE 80 TON CRLR,LS138		230	type 2	diesel	8	Crane	0.43	0.19	0.07	0.07	0.37	1.67	531	0.003	0.0149	0.037	0.00710759	0.0460	0.0178	0.0172	0.0892	0.4024	127.7022	0.0007	0.0036	0.0089	0.0017
DELIVERY VEHICLES																											
TRACTOR		130	type 2	diesel	4	Tractors/Loaders/Backhoes	0.21	0.63	0.43	0.42	2.13	3.66	625	0.0038	0.03	0.0435	0.00710759	0.0208	0.0142	0.0138	0.0709	0.1215	20.7562	0.0001	0.0010	0.0014	0.0002
																	Totals	**0.1056**	**0.0398**	**0.0384**	**1.4252**	**0.6652**	**200.6048**	**0.0012**	**0.0107**	**0.0140**	**0.0025**

Emission Factors

Offroad Diesel Fuel [3]

Pollutant	g/kW-hr	g/bhp-hr
NO_X	9.80	7.31
VOC	0.50	0.37
CO	5.00	3.73
SO_2	1.30	0.97
PM_{10}	0.72	0.54
CO_2	970.71	723.86
CH_4	0.002	0.001
N_2O	0.08	0.06

HAP Emission Factors [4]

HAP	(lb/MMBtu)	(g/HP-hr)	Emissions (tpy)
Benzene	7.76E-04	8.96E-04	**0.00000**
Toluene	2.81E-04	3.24E-04	**0.00000**
Xylenes	1.93E-04	2.23E-04	**0.00000**
Formaldehyde	7.89E-05	9.11E-05	**0.00000**
Acetaldehyde	2.52E-05	2.91E-05	**0.00000**
Acrolein	7.88E-06	9.09E-06	**0.00000**
Naphthalene	1.30E-04	1.50E-04	**0.00000**
TOTAL PAH	2.12E-04	2.45E-04	**0.00000**
Diesel-PM_{10}	5.73E-02	6.61E-02	**0.00000**
		TOTAL	**0.0000**

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

HAP Emission Factors [3]

HAP	(lb/MMBtu)	(g/HP-hr)
Benzene	9.33E-04	1.08E-03
Toluene	4.09E-04	4.72E-04
Xylenes	2.85E-04	3.29E-04
1,3-Butadiene	3.91E-05	4.51E-05
Formaldehyde	1.18E-03	1.36E-03
Acetaldehyde	7.67E-04	8.85E-04
Acrolein	9.25E-05	1.07E-04
Naphthalene	8.48E-05	9.79E-05
TOTAL PAH	1.68E-04	1.94E-04
Diesel-PM_{10}	2.20E-03	2.54E-03

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

3. Hazardous Air Pollutant (HAP) emission factors for Uncontrolled Diesel Engines (<600 hp) from Tables 3.3-1 and 3.3-2; AP-42, *Compilation of Emission Factors* , U.S. Environmental Protection Agency, October 1996.

HAP	(lb/MMBtu)	(g/HP-hr)	
Benzene	7.76E-04	8.96E-04	1.57E-04
Toluene	2.81E-04	3.24E-04	1.28E-04
Xylenes	1.93E-04	2.23E-04	9.20E-05
Formaldehyde	7.89E-05	9.11E-05	-3.98E-05
Acetaldehyde	2.52E-05	2.91E-05	1.15E-03
Acrolein	7.88E-06	9.09E-06	7.59E-04
Naphthalene	1.30E-04	1.50E-04	-3.75E-05
TOTAL PAH	2.12E-04	2.45E-04	-1.27E-04
Diesel-PM_{10}	5.73E-02	6.61E-02	-5.71E-02

3. Hazardous Air Pollutant (HAP) emission factors for Large Uncontrolled Stationary Diesel Engines (>600 hp) from Tables 3.3-2; AP-42, *Compilation of Emission Factors* , U.S. Environmental Protection Agency, October 1996.

Proposed Project Alternative - Dredging Emissions Summary 2018

Equipment Type	Quantity	Engine Horsepower	Type of Fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	2.7379	2.6162	2.5377	50.7011	68.9536	6997	0.0659	0.9126	0.2028	0.9268
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.6720	0.6422	0.6229	12.4452	16.9254	1717	0.0162	0.2240	0.0498	0.0237
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0665	0.0636	0.0617	1.2318	1.6752	170	0.0016	0.0222	0.0049	0.0024
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	3.8924	3.7194	3.6078	72.0810	98.0301	9947	0.0937	1.2975	0.2883	1.3177
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.5047	0.4823	0.4678	9.3463	12.7110	1290	0.0122	0.1682	0.0374	0.0178
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.3892	0.3719	0.3608	7.2081	9.8030	995	0.0094	0.1297	0.0288	0.1318
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0868	0.0829	0.0805	1.6074	2.1861	222	0.0021	0.0289	0.0064	0.0031
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.3892	0.3719	0.3608	7.2081	9.8030	995	0.0094	0.1297	0.0288	0.1318
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.6717	0.6418	0.6226	12.4385	16.9163	1717	0.0162	0.2239	0.0498	0.0237
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	1.0436	0.9972	0.9673	19.3255	26.2827	2666.9184	0.0251	0.3479	0.0773	0.3533
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.2219	0.2121	0.2057	4.1097	5.5892	567.1422	0.0053	0.0740	0.0164	0.0078
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.1304	0.1246	0.1209	2.4157	3.2853	333.3648	0.0031	0.0435	0.0097	0.0442
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0277	0.0265	0.0257	0.5137	0.6987	70.8928	0.0007	0.0092	0.0021	0.0010
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																Totals	**10.83**	**10.35**	**10.04**	**200.63**	**272.86**	**27687.23**	**0.26**	**3.61**	**0.80**	**2.99**

Proposed Project Alternative - Dredging Emissions Summary 2019

Equipment Type	Quantity	Engine Horsepower	Type of fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.8650	0.8265	0.8017	16.0180	21.7845	2210	0.0208	0.2883	0.0641	0.2928
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.2112	0.2018	0.1957	3.9109	5.3188	540	0.0051	0.0704	0.0156	0.0075
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0212	0.0203	0.0197	0.3928	0.5343	54	0.0005	0.0071	0.0016	0.0007
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	1.2414	1.1862	1.1506	22.9880	31.2637	3172	0.0299	0.4138	0.0920	0.4202
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1584	0.1514	0.1468	2.9332	3.9891	405	0.0038	0.0528	0.0117	0.0056
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.1241	0.1186	0.1151	2.2988	3.1264	317	0.0030	0.0414	0.0092	0.0420
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0264	0.0252	0.0245	0.4889	0.6648	67	0.0006	0.0088	0.0020	0.0009
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.1241	0.1186	0.1151	2.2988	3.1264	317	0.0030	0.0414	0.0092	0.0420
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.2043	0.1952	0.1893	3.7828	5.1447	522	0.0049	0.0681	0.0151	0.0072
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0623	0.0595	0.0578	1.1538	1.5692	159	0.0015	0.0208	0.0046	0.0211
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0430	0.0410	0.0398	0.7954	1.0818	110	0.0010	0.0143	0.0032	0.0015
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0061	0.0058	0.0057	0.1132	0.1539	16	0.0001	0.0020	0.0005	0.0002
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1192	0.1139	0.1105	2.2079	3.0027	305	0.0029	0.0397	0.0088	0.0042
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0215	0.0205	0.0199	0.3977	0.5409	55	0.0005	0.0072	0.0016	0.0008
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	6.1605	5.8867	5.7101	114.0828	155.1526	15743.4218	0.1483	2.0535	0.4563	2.0855
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	1.3101	1.2518	1.2143	24.2606	32.9945	3347.9682	0.0315	0.4367	0.0970	0.0463
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.7701	0.7358	0.7138	14.2603	19.3941	1967.9277	0.0185	0.2567	0.0570	0.2607
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1638	0.1565	0.1518	3.0326	4.1243	418.4960	0.0039	0.0546	0.0121	0.0058
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.4398	0.4203	0.4077	8.1448	11.0769	1123.9771	0.0106	0.1466	0.0326	0.1489
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0537	0.0513	0.0498	0.9943	1.3522	137.2118	0.0013	0.0179	0.0040	0.0019
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0431	0.0412	0.0400	0.7990	1.0866	110.2595	0.0010	0.0144	0.0032	0.0015
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	1.6832	1.6084	1.5601	31.1702	42.3914	4301.4814	0.0405	0.5611	0.1247	0.5698
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.2148	0.2052	0.1991	3.9772	5.4089	548.8472	0.0052	0.0716	0.0159	0.0076
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.2525	0.2413	0.2340	4.6755	6.3587	645.2222	0.0061	0.0842	0.0187	0.0855
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0537	0.0513	0.0498	0.9943	1.3522	137.2118	0.0013	0.0179	0.0040	0.0019
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.5050	0.4825	0.4680	9.3510	12.7174	1290.4444	0.0122	0.1683	0.0374	0.1709
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.4155	0.3970	0.3851	7.6939	10.4637	1061.7581	0.0100	0.1385	0.0308	0.1406
																Totals	**15.39**	**14.70**	**14.26**	**284.94**	**387.52**	**39321.60**	**0.37**	**5.13**	**1.14**	**4.40**

Proposed Project Alternative - Dredging Emissions Summary 2020

Equipment Type	Quantity	Engine Horsepower	Type of fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0623	0.0595	0.0578	1.1538	1.5692	159	0.0015	0.0208	0.0046	0.0211
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0430	0.0410	0.0398	0.7954	1.0818	110	0.0010	0.0143	0.0032	0.0015
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0061	0.0058	0.0057	0.1132	0.1539	16	0.0001	0.0020	0.0005	0.0002
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1192	0.1139	0.1105	2.2079	3.0027	305	0.0029	0.0397	0.0088	0.0042
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0215	0.0205	0.0199	0.3977	0.5409	55	0.0005	0.0072	0.0016	0.0008
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	5.1169	4.8895	4.7428	94.7573	128.8699	13076.5033	0.1232	1.7056	0.3790	1.7322
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	1.0881	1.0398	1.0086	20.1509	27.4052	2780.8260	0.0262	0.3627	0.0806	0.0384
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.6396	0.6112	0.5928	11.8447	16.1087	1634.5629	0.0154	0.2132	0.0474	0.2165
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1360	0.1300	0.1261	2.5189	3.4257	347.6033	0.0033	0.0453	0.0101	0.0048
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																Totals	**7.33**	**7.00**	**6.79**	**135.66**	**184.50**	**18721.39**	**0.18**	**2.44**	**0.54**	**2.04**

Proposed Project Alternative - Dredging Emissions Summary 2021

Equipment Type	Quantity	Engine Horsepower	Type of fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.1539	0.1471	0.1427	2.8507	3.8769	393.39	0.0037	0.0513	0.0114	0.0521
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0949	0.0906	0.0879	1.7566	2.3889	242.41	0.0023	0.0316	0.0070	0.0034
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0151	0.0144	0.0140	0.2796	0.3803	38.59	0.0004	0.0050	0.0011	0.0005
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0621	0.0593	0.0575	1.1494	1.5632	158.62	0.0015	0.0207	0.0046	0.0022
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0004	0.0004	0.0004	0.0083	0.0113	1.14	0.0000	0.0001	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.1473	0.1407	0.1365	2.7274	3.7092	376.38	0.0035	0.0491	0.0109	0.0499
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0228	0.0218	0.0212	0.4226	0.5747	58.32	0.0005	0.0076	0.0017	0.0008
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0884	0.0844	0.0819	1.6364	2.2255	225.83	0.0021	0.0295	0.0065	0.0299
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0228	0.0218	0.0212	0.4226	0.5747	58.32	0.0005	0.0076	0.0017	0.0008
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0682	0.0652	0.0632	1.2636	1.7185	174.37	0.0016	0.0227	0.0051	0.0024
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	1.1252	1.0752	1.0429	20.8370	28.3383	2875.51	0.0271	0.3751	0.0833	0.3809
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1374	0.1313	0.1273	2.5437	3.4595	351.03	0.0033	0.0458	0.0102	0.0049
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1104	0.1055	0.1023	2.0441	2.7799	282.08	0.0027	0.0368	0.0082	0.0039
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	4.3062	4.1148	3.9913	79.7436	108.4514	11004.62	0.1037	1.4354	0.3190	1.4578
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.5494	0.5250	0.5093	10.1749	13.8378	1404.13	0.0132	0.1831	0.0407	0.0194
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.6459	0.6172	0.5987	11.9615	16.2677	1650.69	0.0156	0.2153	0.0478	0.2187
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1374	0.1313	0.1273	2.5437	3.4595	351.03	0.0033	0.0458	0.0102	0.0049
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	1.2918	1.2344	1.1974	23.9231	32.5354	3301.39	0.0311	0.4306	0.0957	0.4373
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	1.0629	1.0157	0.9852	19.6836	26.7696	2716.33	0.0256	0.3543	0.0787	0.3598
																Totals	**10.04**	**9.60**	**9.31**	**185.97**	**252.92**	**25664.19**	**0.24**	**3.35**	**0.74**	**3.03**

Proposed Project Alternative - Dredging Emissions Summary 2022

Equipment Type	Quantity	Engine Horsepower	Type of fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0623	0.0595	0.0578	1.1538	1.5692	159	0.0015	0.0208	0.0046	0.0211
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0430	0.0410	0.0398	0.7954	1.0818	110	0.0010	0.0143	0.0032	0.0015
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0061	0.0058	0.0057	0.1132	0.1539	16	0.0001	0.0020	0.0005	0.0002
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1192	0.1139	0.1105	2.2079	3.0027	305	0.0029	0.0397	0.0088	0.0042
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0215	0.0205	0.0199	0.3977	0.5409	55	0.0005	0.0072	0.0016	0.0008
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0684	0.0654	0.0634	1.2670	1.7232	174.8498	0.0016	0.0228	0.0051	0.0024
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																Totals	**0.41**	**0.40**	**0.38**	**7.66**	**10.41**	**1056.74**	**0.01**	**0.14**	**0.03**	**0.06**

Proposed Project Alternative - Dredging Emissions Summary 2023

Equipment Type	Quantity	Engine Horsepower	Type of fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0623	0.0595	0.0578	1.1538	1.5692	159	0.0015	0.0208	0.0046	0.0211
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0430	0.0410	0.0398	0.7954	1.0818	110	0.0010	0.0143	0.0032	0.0015
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0061	0.0058	0.0057	0.1132	0.1539	16	0.0001	0.0020	0.0005	0.0002
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.1192	0.1139	0.1105	2.2079	3.0027	305	0.0029	0.0397	0.0088	0.0042
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0215	0.0205	0.0199	0.3977	0.5409	55	0.0005	0.0072	0.0016	0.0008
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0358	0.0342	0.0332	0.6624	0.9008	91	0.0009	0.0119	0.0026	0.0121
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0107	0.0103	0.0100	0.1989	0.2704	27	0.0003	0.0036	0.0008	0.0004
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0453	0.0433	0.0420	0.8389	1.1409	115.7725	0.0011	0.0151	0.0034	0.0016
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																Totals	**0.39**	**0.37**	**0.36**	**7.23**	**9.83**	**997.66**	**0.01**	**0.13**	**0.03**	**0.05**

Proposed Project Alternative - Dredging Emissions Summary 2024

Equipment Type	Quantity	Engine Horsepower	Type of fuel	Hours/ Day	Equipment Type	Operating Load (%)	Emission Factors (grams per horsepower hour)										Air Contaminant Emissions (tons per year)									
			Primary Engine				VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs	VOC	PM_{10}	$PM_{2.5}$	CO	NO_x	CO_2	SO_2	CH_4	N_20	Total HAPs
MECHANICAL DREDGING EQUIPMENT																										
BUCKET DREDGE	2	1742	diesel	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	600	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	3	300	diesel	20		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	3	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	12		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24		0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000	0.0000
MAINTENANCE DREDGING EQUIPMENT (MECH)																										
BUCKET DREDGE	1	1,742	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.1539	0.1471	0.1427	2.8507	3.8769	393	0.0037	0.0513	0.0114	0.0521
DREDGE AUXILLARY ENGINES	1	600	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0949	0.0906	0.0879	1.7566	2.3889	242	0.0023	0.0316	0.0070	0.0034
MULTIPURPOSE VESSEL	1	300	diesel		Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0151	0.0144	0.0140	0.2796	0.3803	39	0.0004	0.0050	0.0011	0.0005
TWIN SCREW TUGBOAT (PRIMARY HAULER)	1	2,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.2946	0.2815	0.2730	5.4548	7.4185	753	0.0071	0.0982	0.0218	0.0104
AUXILLARY ENGINES	1	300	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0456	0.0436	0.0423	0.8451	1.1494	117	0.0011	0.0152	0.0034	0.0016
SINGLE SCREW TUGBOAT (TENDER)	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0884	0.0844	0.0819	1.6364	2.2255	226	0.0021	0.0295	0.0065	0.0299
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0228	0.0218	0.0212	0.4226	0.5747	58	0.0005	0.0076	0.0017	0.0008
SINGLE SCREW TUGBOAT	1	1,000	diesel		Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0884	0.0844	0.0819	1.6364	2.2255	226	0.0021	0.0295	0.0065	0.0299
AUXILLARY ENGINES	1	150	diesel			0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0228	0.0218	0.0212	0.4226	0.5747	58	0.0005	0.0076	0.0017	0.0008
FILL EQUIPMENT	1																									
TWIN SCREW TUGBOAT	4	2000	diesel (4)	48	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	4	300	diesel	48		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24		0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WHARF CONSTRUCTION EQUIPMENT																										
WORK BARGES (no fuel consumption)	NA	NA	NA	0	Type 2																					
SINGLE SCREW TUGBOAT	1	1000	diesel	10	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SHORELINE PROTECTION																										
DRAGLINE BARGE	1	1742	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARGE AUXILLARY ENGINES	1	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MULTIPURPOSE VESSEL	1	300	diesel	12	Type 2	0.45	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TWIN SCREW TUGBOAT (PRIMARY HAULER)	2	2000	diesel	20	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	2	300	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	150	diesel	24	Type 2	0.56	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.00711392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE SCREW TUGBOAT	1	2000	diesel	12	Type 2	0.79	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUXILLARY ENGINES	1	1000	diesel	24	Type 2	0.65	0.20	0.19	0.19	3.73	5.07	515	0.005	0.067	0.015	0.06815887	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
																Totals	**0.83**	**0.79**	**0.77**	**15.30**	**20.81**	**2112.07**	**0.02**	**0.28**	**0.06**	**0.13**

Table D-A-7. Marine Engine Emission Factors

Harbor Craft Emission Factors[1]

TIER 1

kW	37	75	130	225-560	1,000	Category 2
	g/kWh					
CO	2	1.7	1.5	1.5	2.5	1.1
NO_X	9.8	9.8	9.8	9.8	9.8	9.8
PM	0.774	0.344	0.344	0.258	0.258	0.6192
$PM_{2.5}$	0.75078	0.33368	0.33368	0.25026	0.25026	0.600624
PM_{10}	0.774	0.344	0.344	0.258	0.258	0.6192
SO_X	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
VOC (HC)	0.27	0.27	0.27	0.27	0.27	0.5
CO_2	690	690	690	690	690	690
CH_4	0.09	0.09	0.09	0.09	0.09	0.09
N_2O	0.02	0.02	0.02	0.02	0.02	0.02

HP	50	101	174	302-751	1,341	Category 2
	g/hp-hr					
CO	1.49	1.27	1.12	1.12	1.86	0.82
NO_X	7.31	7.31	7.31	7.31	7.31	7.31
PM	0.58	0.26	0.26	0.19	0.19	0.46
$PM_{2.5}$	0.56	0.25	0.25	0.19	0.19	0.45
PM10	0.58	0.26	0.26	0.19	0.19	0.46
SO_X	0.00	0.00	0.00	0.00	0.00	0.00
VOC (HC)	0.20	0.20	0.20	0.20	0.20	0.37
CO_2	515	515	515	515	515	515
CH_4	0.07	0.07	0.07	0.07	0.07	0.07
N_2O	0.01	0.01	0.01	0.01	0.01	0.01

TIER 2

kW	37	75	130	225-560	1,000	Category 2
	g/kWh					
CO	5	5	5	5	5	5
NO_X	6.8	6.8	6.8	6.8	6.8	6.8
PM	0.344	0.258	0.258	0.258	0.258	0.6192
$PM_{2.5}$	0.33368	0.25026	0.25026	0.25026	0.25026	0.600624
PM_{10}	0.344	0.258	0.258	0.258	0.258	0.6192
SO_X	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
VOC (HC)	0.27	0.27	0.27	0.27	0.27	0.5
CO_2	690	690	690	690	690	690
CH_4	0.09	0.09	0.09	0.09	0.09	0.09
N_2O	0.02	0.02	0.02	0.02	0.02	0.02

HP	**50**	**101**	**174**	**302-751**	**1,341**	Category 2
	g/hp-hr					
CO	3.73	3.73	3.73	3.73	3.73	3.73
NO_X	5.07	5.07	5.07	5.07	5.07	5.07
PM	0.26	0.19	0.19	0.19	0.19	0.46
$PM_{2.5}$	0.25	0.19	0.19	0.19	0.19	0.45
PM10	0.26	0.19	0.19	0.19	0.19	0.46
SO_X	0.005	0.005	0.005	0.005	0.005	0.005
VOC (HC)	0.20	0.20	0.20	0.20	0.20	0.37
CO_2	515	515	515	515	515	515
CH_4	0.07	0.07	0.07	0.07	0.07	0.07
N_2O	0.01	0.01	0.01	0.01	0.01	0.01

Ref: Table 3-8: Harbor Craft Emission Factors; U.S. EPA "Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories (April 2009)."

Hazardous Air Pollutant (HAP) Emission Factors

Diesel Engines <600 hp [2]

HAP	(lb/MMBtu)	(g/HP-hr)
Benzene	9.33E-04	1.08E-03
Toluene	4.09E-04	4.72E-04
Xylenes	2.85E-04	3.29E-04
1,3-Butadiene	3.91E-05	4.52E-05
Formaldehyde	1.18E-03	1.36E-03
Acetaldehyde	7.67E-04	8.86E-04
Acrolein	9.25E-05	1.07E-04
Naphthalene	8.48E-05	9.80E-05
TOTAL PAH	1.68E-04	1.94E-04
Diesel-PM_{10}	2.20E-03	2.54E-03

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

Diesel Engines >600 hp [3]

HAP	(lb/MMBtu)	(g/HP-hr)
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.25E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyde	7.89E-05	9.11E-05
Acetaldehyde	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.10E-06
Naphthalene	1.30E-04	1.50E-04
TOTAL PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.62E-02

2. HAP emission factors for Uncontrolled Diesel Engines (<600 hp) from Tables 3.3-1 and 3.3-2; AP-42, *Compilation of Emission Factors* , U.S. Environmental Protection Agency, October 1996.

3. HAP emission factors for Large Uncontrolled Stationary Diesel Engines (>600 hp) from Tables 3.4-3 and 3.4-4; AP-42, *Compilation of Emission Factors* , U.S. Environmental Protection Agency, October 1996.

TABLE 39
EMISSION FACTORS FOR DAILY COMMUTE AND DELIVERY VEHICLES - CY 2017

					Emission Factor[1] (g/mile)														
Year	Equipment Description	Type of Vehicle	SourceType ID	Fuel Type	NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	CO_2	CH_4	CO_2e	HAPs	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	Polycyclic Organic Matter
2017	Employee Vehicles	Passenger Car	21	Gasoline	0.273918	0.0621131	3.307925	0.00221298	0.01125237	0.04659109	333.0055	0.00378572	333.0985	0.0035	0.000040174	0.00208996	0.000328023	0.000859325	0.0001	0.0001
2017	Pickup Trucks	Passenger Truck	31	Gasoline	0.48795	0.1284035	5.21359	0.00288635	0.01222639	0.05077341	434.3315	0.00561674	434.4705	0.0073	8.41055E-05	0.00442703	0.000630753	0.001785315	0.0003	0.0001
2017	Reg Srvc Truck	Light Commercial Truck	32	Gasoline	0.429929	0.10845535	5.12049	0.00289259	0.01184563	0.05075784	435.2705	0.0059115	435.4165	0.0063	7.26116E-05	0.00390539	0.000463887	0.00152237	0.0002	0.0001
2017	Medium Duty Truck	Light Commercial Truck	32	Diesel	1.497755	0.2848425	3.325175	0.00536621	0.07405443	0.1201643	625.5645	0.0190093	626.0395	0.0334	0.001943685	0.00231815	0.000795025	0.02465295	0.0027	0.0010
2017	Employee Bus	Transit Bus	42	Diesel	7.526565	0.538034	2.9207	0.0098966	0.2771359	0.4566051	1142.86	0.024708	1143.48	0.0616	0.00363654	0.00432647	0.00152355	0.0451308	0.0050	0.0019
2017	1500 GLN Water Truck, 4 x 2	Single Unit Short-haul Truck	52	Gasoline	1.88921	0.669934	18.98325	0.00682485	0.02981555	0.1303833	1026.9905	0.0224295	1027.546	0.0385	0.000446509	0.02382015	0.002928945	0.009387785	0.0014	0.0005
2017	Dump Trucks	Single Unit Short-haul Truck	52	Diesel	5.737925	0.749453	2.31174	0.00954946	0.41427377	0.5845212	1102.44	0.0325291	1103.25	0.0860	0.00506016	0.00601851	0.00212559	0.0626441	0.0070	0.0032
2017	18 Wheel Truck	Combination Long-haul Truck	62	Diesel	9.076235	0.496976	2.66961	0.01645925	0.52493927	0.7710167	1901.705	0.0340974	1902.555	0.0587	0.0033942	0.00404902	0.00138525	0.0431355	0.0047	0.0021

Key:
1. Emission factors derived from EPA's mobile source emission model, MOVES2014a.
2. Emission factors are an average of winter (January morning) and summer (July afternoon) emission factors at 35 mph speed.
3. Polycyclic Organic Matter is calculated using the sum of all polycyclic aromatic compounds within moves with the exception of napthalene which is provided seperately . This is because there is no polycyclic organic matter pollutant option in MOVES2014a

APPENDIX P-2
OPERATIONAL EMISSIONS INVENTORY FILES

No-Action Alternative – Estimated Roadway, Rail, and Marine Traffic Emissions – Year 2020

Air Contaminant	Truck Emissions (On and Off Port to Harrison County Boundary) (tons)	Railroad Emissions (US 90 to Rail Yard) (tons)	Railroad Emissions (North of Rail Yard to Harrison County Boundary) (tons)	Employee Vehicle Emissions (tons)	Container/ Tugboat Emissions (tons)	Total Emissions (tons)
NO_X	21.13	4.83	8.08	12.89	335.26	382.19
CO	6.24	1.02	1.71	165.57	42.15	216.69
PM_{10}	1.88	0.11	0.19	1.93	5.78	9.89
$PM_{2.5}$	1.21	0.11	0.18	0.41	5.44	7.35
VOC	1.16	0.18	0.31	4.00	11.61	17.26
SO_2	0.05	0.004	0.007	0.10	8.65	8.80
CO_2e (MT)	4,791	358	599	13,097	17,636	36,481
HAPs	0.14	--	--	0.23	2.59	2.97

No-Action Alternative – Estimated Roadway, Rail, and Marine Traffic Emissions – Year 2060

Air Contaminant	Truck Emissions (On and Off Port to Harrison County Boundary) (tons)	Railroad Emissions (US 90 to Rail Yard) (tons)	Railroad Emissions (North of Rail Yard to Harrison County Boundary) (tons)	Employee Vehicle Emissions (tons)	Container/ Tugboat Emissions (tons)	Total Emissions (tons)
NO_X	9.27	5.96	9.72	8.06	797.14	830.15
CO	2.61	7.63	12.44	143.22	213.15	379.05
PM_{10}	1.84	0.09	0.15	6.66	20.19	28.93
$PM_{2.5}$	0.44	0.09	0.14	1.14	19.00	20.82
VOC	0.34	0.25	0.41	2.72	41.01	44.73
SO_2	0.10	0.03	0.05	0.27	30.45	30.90
CO_2e (MT)	11,118	2,700	4,403	37,179	61,895	117,296
HAPs	0.09	--	--	0.18	9.11	9.37

Proposed Project Alternative – Estimated Roadway, Rail, and Marine Traffic Emissions – Year 2020

Air Contaminant	Truck Emissions (On and Off Port to Harrison County Boundary) (tons)	Railroad Emissions (US 90 to Rail Yard) (tons)	Railroad Emissions (North of Rail Yard to Harrison County Boundary) (tons)	Employee Vehicle Emissions (tons)	Container/ Tugboat Emissions (tons)	Total Emissions (tons)
NO_X	35.82	8.39	13.80	21.84	526.15	606.01
CO	10.58	1.77	2.92	280.64	59.54	355.45
PM_{10}	3.18	0.19	0.32	3.28	8.55	15.52
$PM_{2.5}$	2.05	0.19	0.31	0.69	8.01	11.25
VOC	1.97	0.32	0.53	6.79	18.61	28.21
SO_2	0.08	0.007	0.011	0.16	14.82	15.08
CO_2e (MT)	8,120	622	1,023	22,200	26,934	58,900
HAPs	0.24	--	--	0.40	3.97	4.61

Proposed Project Alternative – Estimated Roadway, Rail, and Marine Traffic Emissions – Year 2060

Air Contaminant	Truck Emissions (On and Off Port to Harrison County Boundary) (tons)	Railroad Emissions (US 90 to Rail Yard) (tons)	Railroad Emissions (North of Rail Yard to Harrison County Boundary) (tons)	Employee Vehicle Emissions (tons)	Container/ Tugboat Emissions (tons)	Total Emissions (tons)
NO_X	15.24	9.80	16.00	13.25	1355.14	1409.43
CO	4.29	12.55	20.48	235.42	362.35	635.09
PM_{10}	3.03	0.15	0.24	10.95	34.33	48.69
$PM_{2.5}$	0.72	0.14	0.23	1.88	32.31	35.29
VOC	0.56	0.41	0.67	4.47	69.71	75.83
SO_2	0.168	0.048	0.079	0.45	51.76	52.51
CO_2e (MT)	18,276	4,439	7,247	61,113	105,221	196,295
HAPs	0.14	--	--	0.29	15.48	15.92

PROJECTED LINE HAUL LOCOMOTIVE ACTIVITY
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Assumptions:

Workdays per Year	250	
Containers per Railcar	4	
Containers per Train (US 90 to Gulfport Rail Yard)	148	
Containers per Train (North of Gulfport Rail Yard)	240	
Railcars per Train (US 90 to Gulfport Rail Yard)	37	
Railcars per Train (North of Gulfport Rail Yard)	60	
One-way Distance (US 90 to Gulfport Rail Yard)	1.7	miles
One-way Distance (North of Gulfport Rail Yard to Harrison County Boundary)	20.3	miles

No Action Alternative

	2020	2060
	Total	Total
Rail Cars per Weekday (Between US 90 to Gulfport Rail Yard)	148	1073
Rail Cars per Weekday (North of Gulfport Rail Yard)	180	1080
Trains per Week Day (Between US 90 to Gulfport Rail Yard)	4	29
Trains per Week Day (North of Gulfport Rail Yard)	3	18
Trains per Year (US 90 to Gulfport Rail Yard)	950	7100
Trains per Year (North of Gulfport Rail Yard)	600	4375
Locomotives per Train	4	4

Proposed Project Alternative - Port Expansion

	2020	2060
	Total	Total
Rail Cars per Weekday (Between US 90 to Gulfport Rail Yard)	259	1739
Rail Cars per Weekday (North of Gulfport Rail Yard)	300	1740
Trains per Week Day (US 90 to Gulfport Rail Yard)	7	47
Trains per Week Day (North of Gulfport Rail Yard)	5	29
Trains per Year (US 90 to Gulfport Rail Yard)	1650	11675
Trains per Year (North of Gulfport Rail Yard)	1025	7200
Locomotives per Train	4	4

LINE-HAUL LOCOMOTIVE EMISSION ESTIMATES
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Air Emission Factors, grams per horsepower-hour

Tier	MY	Date	HC	VOC	CO	NOx	PM10	PM2.5	SO2	CO2	CH4	NO2
Tier 0	1973 - 1992	2010	0.30	0.32	1.28	7.20	0.20	0.19	0.0049	487	0.013	0.04
Tier 1	1993 - 2004	2010	0.29	0.31	1.28	6.70	0.20	0.19	0.0049	487	0.013	0.04
Tier 2	2005 - 2011	2013	0.13	0.14	1.28	4.95	0.08	0.08	0.0049	487	0.013	0.04
Tier 3	2012 - 2014	2012	0.13	0.14	1.28	4.95	0.08	0.08	0.0049	487	0.013	0.04
Tier 4	2015 or Later	2015	0.04	0.04	1.28	1.00	0.015	0.01	0.0049	487	0.013	0.04
Surrogate	2015 or Later	2020	0.22	0.23	1.28	6.06	0.14	0.14	0.0049	483	0.013	0.04

Ref: "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories", Tables 5-8 and 5-9, U.S. Environmental Protection Agency, April 2009.
Surrogate emission factors were used for estimating 2020 air emissions.
Tier 4 emission factors were used for estimating 2060 air emissions.

No Action Alternative - US 90 to Gulfport Rail Yard

	Engine Tier	Engine Horsepower	Number of Locomotives	Horsepower in Use (Total)	Trains per Year	Hours per One-way Trip	Engine Load Factor %
2020	Surrogate	4000	4	16000	950	0.17	0.28
2060	4	4000	4	16000	7100	0.17	0.28

* Without more specific data, the average line-haul locomotive load factor was taken from "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories", Tables 5-2, U.S. Environmental Protection Agency, April 2009.

No Action Alternative - North of Gulfport Rail Yard

	Engine Tier	Engine Horsepower	Number of Locomotives	Horsepower in Use (Total)	Trains per Year	Hours per One-way Trip	Engine Load Factor %
2020	Surrogate	4000	4	16000	600	0.45	0.28
2060	4	4000	4	16000	4375	0.45	0.28

Estimated Air Emissions, tons per year - US 90 to Gulfport Rail Yard

	HC	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	NO_2	CO_2e
2020	0.18	0.18	1.02	4.83	0.11	0.11	0.004	385	0.01	0.03	395
2060	0.24	0.25	7.63	5.96	0.09	0.09	0.03	2,903	0.08	0.24	2,976

Estimated Air Emissions, tons per year - North of Gulfport Rail Yard

	HC	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	NO_2	CO_2e
2020	0.29	0.31	1.71	8.08	0.19	0.18	0.007	644	0.02	0.05	660
2060	0.39	0.41	12.44	9.72	0.15	0.14	0.05	4,735	0.13	0.39	4,854

Proposed Project Alternative - Port Expansion - US 90 to Gulfport Rail Yard

	Engine Tier	Engine Horsepower	Number of Locomotives	Horsepower in Use (Total)	Trains per Year	Hours per One-way Trip	Engine Load Factor %
2020	3	4000	4	16000	1650	0.17	0.28
2060	4	4000	4	16000	11675	0.17	0.28

Proposed Project Alternative - Port Expansion - North of Gulfport Rail Yard

	Engine Tier	Engine Horsepower	Number of Locomotives	Horsepower in Use (Total)	Trains per Year	Hours per One-way Trip	Engine Load Factor %
2020	3	4000	4	16000	1025	0.45	0.28
2060	4	4000	4	16000	7200	0.45	0.28

Estimated Air Emissions, tons per year - US 90 to Gulfport Rail Yard

	HC	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	NO_2	CO_2e
2020	0.30	0.32	1.77	8.39	0.19	0.19	0.01	669	0.02	0.06	686
2060	0.39	0.41	12.55	9.80	0.15	0.14	0.05	4,773	0.13	0.39	4,893

Estimated Air Emissions, tons per year - North of Gulfport Rail Yard

	HC	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	NO_2	CO_2e
2020	0.50	0.53	2.92	13.80	0.32	0.31	0.01	1,100	0.03	0.09	1,128
2060	0.64	0.67	20.48	16.00	0.24	0.23	0.08	7,792	0.21	0.64	7,988

ON-ROAD FREIGHT AND EMPLOYEE VEHICLE EMISSIONS
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY, MISSISSIPPI

No-Action Alternative

Equipment Type	Type of fuel	Projected Daily Vehicle Volume	Number of Vehicles per Year	Daily Travel Per Vehicle*	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)											
						NO_x	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	PM	CO_2	CH_4	N_2O	CO_2e	HAPs
2020																	
Combination Long-haul Truck	Diesel	508	127,000	20	2,540,000	21.13	6.24	1.88	1.21	1.16	0.05		5,279	0.11		5,281	0.14
Passenger Car	Gasoline	1,662	415,530	50	20,776,500	3.55	62.81	1.03	0.22	0.75	0.05		7,095	0.07		7,097	0.04
Single Unit Short-Haul Truck	Gasoline	525	131,220	50	6,561,000	9.34	102.76	0.91	0.18	3.25	0.05		7,338	0.09		7,340	0.19
					Totals	**34.02**	**171.81**	**3.81**	**1.62**	**5.16**	**0.14**	**0.00**	**19,712**	**0.27**	**0.00**	**19,718**	**0.37**
2060																	
Combination Long-haul Truck	Diesel	1,235	308,750	20	6,175,000	9.27	2.61	1.84	0.44	0.34	0.10		12,247	0.37		12,256	0.09
Passenger Car	Gasoline	6,063	1,515,630	50	75,781,500	1.14	65.05	3.48	0.58	0.31	0.10		15,550	0.07		15,552	0.02
Single Unit Short-Haul Truck	Gasoline	1,914	478,620	50	23,931,000	6.92	78.17	3.18	0.57	2.41	0.17		25,430	0.04		25,431	0.16
					Totals	**17.33**	**145.83**	**8.50**	**1.58**	**3.06**	**0.38**	**0.00**	**53,227**	**0.48**	**0.00**	**53,239**	**0.27**

ON-ROAD FREIGHT AND EMPLOYEE VEHICLE EMISSIONS
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY, MISSISSIPPI

Proposed Project Alternative

Equipment Type	Type of fuel	Projected Daily Vehicle Volume	Number of Vehicles per Year	Daily Travel Per Vehicle	Annual Vehicle Miles Traveled	Air Contaminant Emissions (tons per year)											
						NO_x	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	PM	CO_2	CH_4	N_2O	CO_2e	HAPs
2020																	
Combination Long-haul Truck	Diesel	861	215,250	20	4,305,000	35.82	10.58	3.18	2.05	1.97	0.08		8,947	0.18		8,951	0.24
Passenger Car	Gasoline	2,817	704,330	50	35,216,500	6.01	106.46	1.74	0.38	1.27	0.08		12,027	0.11		12,030	0.07
Single Unit Short-Haul Truck	Gasoline	890	222,420	50	11,121,000	15.83	174.18	1.54	0.31	5.51	0.08		12,438	0.16		12,442	0.32
					Totals	**57.66**	**291.22**	**6.46**	**2.74**	**8.75**	**0.24**	**0.00**	**33,411**	**0.45**	**0.00**	**33,422**	**0.64**
2060																	
Combination Long-haul Truck	Diesel	2,030	507,500	20	10,150,000	15.24	4.29	3.03	0.72	0.56	0.17		20,130	0.60		20,145	0.14
Passenger Car	Gasoline	9,965	2,491,280	50	124,564,000	1.87	106.93	5.72	0.95	0.51	0.17		25,560	0.12		25,564	0.03
Single Unit Short-Haul Truck	Gasoline	3,147	786,720	50	39,336,000	11.38	128.49	5.23	0.93	3.96	0.28		41,800	0.06		41,802	0.26
					Totals	**28.48**	**239.71**	**13.98**	**2.60**	**5.03**	**0.62**	**0.00**	**87,491**	**0.78**	**0.00**	**87,511**	**0.44**

* Assumes Port operates 5 days per week.

TABLE 39
EMISSION FACTORS FOR DAILY COMMUTE AND DELIVERY VEHICLES - CY 2050

					Emission Factor[1] (g/mile)															
Year	Equipment Description	Type of Vehicle	SourceType ID	Fuel Type	NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}	CO_2	CH_4	CO_2e	HAPs	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	Polycyclic Organic Matter
2050	Employee Vehicles	Passenger Car	21	Gasoline	0.01	0.003709	0.78	0.001242	0.01	0.04	186	0.000897	186	0.0002	2.84E-06	0.000171	0.00000	0.000056077	0.0000	0.0000
2050	Pickup Trucks	Passenger Truck	31	Gasoline																
2050	Reg Srvc Truck	Light Commercial Truck	32	Gasoline																
2050	Medium Duty Truck	Light Commercial Truck	32	Diesel																
2050	Employee Bus	Transit Bus	42	Diesel																
2050	1500 GLN Water Truck, 4 x 2	Single Unit Short-haul Truck	52	Gasoline	0.26	0.09	2.96	0.01	0.02	0.12	964.01	0.00	964.05	0.0059	7E-05	0.0042	0	0.00138788	0.0002	0.0001
2050	Dump Trucks	Single Unit Short-haul Truck	52	Diesel																
2050	18 Wheel Truck	Combination Long-haul Truck	62	Diesel	1.36	0.050012	0.38	0.015	0.06	0.27	1799	0.053901	1801	0.0129	0.0005	0.000645	4.00099E-05	0.0108727	0.0008	0.0001

Key:
1. Emission factors derived from EPA's mobile source emission model, MOVES2014a.
2. Emission factors are an average of winter (January morning) and summer (July afternoon) emission factors at 35 mph speed.
3. Polycyclic Organic Matter is calculated using the sum of all polycyclic aromatic compounds within moves with the exception of napthalene which is provided seperately . This is because there is no polycyclic organic matter pollutant option in MOVES2014a

TABLE 39
EMISSION FACTORS FOR DAILY COMMUTE AND DELIVERY VEHICLES - CY 2020

					Emission Factor[1] (g/mile)															
Year	**Equipment Description**	**Type of Vehicle**	**SourceType ID**	**Fuel Type**	**NO_x**	**VOC**	**CO**	**SO_2**	**$PM_{2.5}$**	**PM_{10}**	**CO_2**	**CH_4**	**CO_2e**	**HAPs**	**Acrolein**	**Benzene**	**1,3-Butadiene**	**Formaldehyde**	**Naphthalene**	**Polycyclic Organic Matter**
2020	Employee Vehicles	Passenger Car	21	Gasoline	0.15	0.03	2.74	0.00206	0.01	0.04	310	0.002901	310	0.0019	2.19E-05	0.001166	0.000143932	0.000459809	0.0001	0.0000
2020	Pickup Trucks	Passenger Truck	31	Gasoline																
2020	Reg Srvc Truck	Light Commercial Truck	32	Gasoline																
2020	Medium Duty Truck	Light Commercial Truck	32	Diesel																
2020	Employee Bus	Transit Bus	42	Diesel																
2020	1500 GLN Water Truck, 4 x 2	Single Unit Short-haul Truck	52	Gasoline	1.29	0.45	14.21	0.006746	0.03	0.13	1015	0.012825	1015	0.0263	0.000307	0.016732	0.00162274	0.00637731	0.0009	0.0004
2020	Dump Trucks	Single Unit Short-haul Truck	52	Diesel																
2020	18 Wheel Truck	Combination Long-haul Truck	62	Diesel	7.55	0.41	2.23	0.016211	0.43	0.67	1885	0.038028	1886	0.0503	0.00286	0.003421	0.0011359	0.037202	0.0040	0.0017

Key:
1. Emission factors derived from EPA's mobile source emission model, MOVES2014a.
2. Emission factors are an average of winter (January morning) and summer (July afternoon) emission factors at 35 mph speed.
3. Polycyclic Organic Matter is calculated using the sum of all polycyclic aromatic compounds within moves with the exception of napthalene which is provided seperately . This is because there is no polycyclic organic matter pollutant option in MOVES2014a

Note:
Link Names relate to vehicle type and operational speed (MPH
ST21 - Passenger Car
ST31 - Passenger Truck
ST32 - Light Commerical Truck
ST42 - Transit Bus
ST52 - Single Unit Short-Haul Truck
ST62 - Combined Long Haul Truck
Fuel ID 1 is gasoline
Fuel ID 2 is diesel fuel
Idle emission factors are in units of g/vehicle-hour
Running emission factors are in units of g/vehicle-mile
Idle energy consumption is in units of MMBtu/vehicle-hour
Running energy consumption is in units of MMBtu/vehicle-mile
POM is polycyclic organic matter and is calculated using the sum of all polycyclic aromatic compounds within moves with the exception of napthalene which is provided seperately . This is because there is no polycyclic organic matter pollutant option in MOVES 2014a

Vehicle Emission Factors

Passenger Car (gasoline) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST21_Idle	January	8	20	1	5.18	0.020	0.39	0.06	0.05	0.019	0.41	2803	2803	0.037	0.022	0.000	0.006	0.002	0.013	0.001	0.000
	July	17	17	1	5.37	0.022	1.31	0.05	0.04	0.024	0.45	3589	3589	0.047	0.026	0.000	0.006	0.003	0.015	0.001	0.000
	Maximum	--	--	--	**5.37**	**0.022**	**1.31**	**0.06**	**0.05**	**0.024**	**0.45**	**3589**	**3589**	**0.047**	**0.026**	**0.000**	**0.006**	**0.003**	**0.015**	**0.001**	**0.000**
	Average	--	--	--	**5.28**	**0.021**	**0.85**	**0.06**	**0.05**	**0.021**	**0.43**	**3196**	**3196**	**0.042**	**0.024**	**0.000**	**0.006**	**0.002**	**0.014**	**0.001**	**0.000**
ST21_5	January	8	20	1	4.90	0.006	0.25	0.19	0.04	0.006	0.10	930	930	0.012	0.006	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	17	1	8.68	0.008	0.31	0.19	0.03	0.008	0.12	1129	1129	0.015	0.007	0.000	0.002	0.001	0.004	0.000	0.000
	Maximum	--	--	--	**8.68**	**0.008**	**0.31**	**0.19**	**0.04**	**0.008**	**0.12**	**1129**	**1129**	**0.015**	**0.007**	**0.000**	**0.002**	**0.001**	**0.004**	**0.000**	**0.000**
	Average	--	--	--	**6.79**	**0.007**	**0.28**	**0.19**	**0.04**	**0.007**	**0.11**	**1029**	**1029**	**0.014**	**0.006**	**0.000**	**0.002**	**0.001**	**0.004**	**0.000**	**0.000**
ST21_10	January	8	20	1	3.56	0.004	0.21	0.12	0.02	0.004	0.06	569	569	0.008	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	6.41	0.006	0.22	0.12	0.02	0.004	0.08	675	675	0.009	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**6.41**	**0.006**	**0.22**	**0.12**	**0.02**	**0.004**	**0.08**	**675**	**675**	**0.009**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**4.99**	**0.005**	**0.22**	**0.12**	**0.02**	**0.004**	**0.07**	**622**	**622**	**0.008**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST21_15	January	8	20	1	3.11	0.004	0.20	0.10	0.02	0.003	0.05	449	449	0.006	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	5.66	0.005	0.20	0.09	0.02	0.003	0.06	524	524	0.007	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**5.66**	**0.005**	**0.20**	**0.10**	**0.02**	**0.003**	**0.06**	**524**	**524**	**0.007**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**4.38**	**0.004**	**0.20**	**0.09**	**0.02**	**0.003**	**0.06**	**486**	**486**	**0.006**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST21_20	January	8	20	1	2.75	0.003	0.20	0.08	0.02	0.003	0.04	386	386	0.005	0.002	0.000	0.001	0.000	0.001	0.000	0.000
	July	17	17	1	5.02	0.004	0.18	0.08	0.01	0.003	0.05	446	446	0.006	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**5.02**	**0.004**	**0.20**	**0.08**	**0.02**	**0.003**	**0.05**	**446**	**446**	**0.006**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**3.88**	**0.004**	**0.19**	**0.08**	**0.02**	**0.003**	**0.05**	**416**	**416**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST21_25	January	8	20	1	2.25	0.003	0.19	0.07	0.01	0.002	0.04	344	344	0.005	0.002	0.000	0.001	0.000	0.001	0.000	0.000
	July	17	17	1	4.11	0.004	0.17	0.07	0.01	0.003	0.04	394	394	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**4.11**	**0.004**	**0.19**	**0.07**	**0.01**	**0.003**	**0.04**	**394**	**394**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**3.18**	**0.003**	**0.18**	**0.07**	**0.01**	**0.002**	**0.04**	**369**	**369**	**0.005**	**0.002**	**0.000**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_30	January	8	20	1	2.14	0.003	0.17	0.06	0.01	0.002	0.03	307	308	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	17	1	3.94	0.004	0.15	0.06	0.01	0.002	0.04	351	351	0.005	0.002	0.000	0.001	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**3.94**	**0.004**	**0.17**	**0.06**	**0.01**	**0.002**	**0.04**	**351**	**351**	**0.005**	**0.002**	**0.000**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**3.04**	**0.003**	**0.16**	**0.06**	**0.01**	**0.002**	**0.04**	**329**	**329**	**0.004**	**0.002**	**0.000**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_35	January	8	20	1	1.93	0.003	0.16	0.05	0.01	0.002	0.03	290	290	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	17	1	3.56	0.003	0.15	0.04	0.01	0.002	0.04	330	330	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**3.56**	**0.003**	**0.16**	**0.05**	**0.01**	**0.002**	**0.04**	**330**	**330**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**2.74**	**0.003**	**0.15**	**0.04**	**0.01**	**0.002**	**0.03**	**310**	**310**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_40	January	8	20	1	1.73	0.002	0.16	0.04	0.01	0.002	0.03	279	279	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	17	1	3.20	0.003	0.14	0.04	0.01	0.002	0.03	316	316	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**3.20**	**0.003**	**0.16**	**0.04**	**0.01**	**0.002**	**0.03**	**316**	**316**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**2.47**	**0.003**	**0.15**	**0.04**	**0.01**	**0.002**	**0.03**	**297**	**297**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_45	January	8	20	1	1.61	0.002	0.16	0.03	0.01	0.002	0.03	271	271	0.004	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	17	1	2.99	0.003	0.14	0.03	0.01	0.002	0.03	305	305	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**2.99**	**0.003**	**0.16**	**0.03**	**0.01**	**0.002**	**0.03**	**305**	**305**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**2.30**	**0.003**	**0.15**	**0.03**	**0.01**	**0.002**	**0.03**	**288**	**288**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_50	January	8	20	1	1.58	0.002	0.16	0.02	0.01	0.002	0.02	265	265	0.003	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	17	1	2.92	0.003	0.14	0.02	0.01	0.002	0.03	298	298	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**2.92**	**0.003**	**0.16**	**0.02**	**0.01**	**0.002**	**0.03**	**298**	**298**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**2.25**	**0.003**	**0.15**	**0.02**	**0.01**	**0.002**	**0.03**	**281**	**281**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_55	January	8	20	1	1.58	0.002	0.17	0.02	0.01	0.002	0.02	262	262	0.003	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	17	1	2.93	0.003	0.15	0.02	0.01	0.002	0.03	293	293	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**2.93**	**0.003**	**0.17**	**0.02**	**0.01**	**0.002**	**0.03**	**293**	**293**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**2.25**	**0.003**	**0.16**	**0.02**	**0.01**	**0.002**	**0.03**	**277**	**277**	**0.004**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**

Passenger Truck (gasoline) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST31_Idle	January	8	20	1	9.83	0.025	0.60	0.03	0.03	0.024	0.73	3577	3578	0.047	0.039	0.000	0.010	0.004	0.023	0.002	0.001
	July	17	17	1	10.12	0.028	1.93	0.03	0.02	0.030	0.80	4548	4549	0.060	0.046	0.001	0.011	0.005	0.028	0.002	0.001
	Maximum	--	--	--	**10.12**	**0.028**	**1.93**	**0.03**	**0.03**	**0.030**	**0.80**	**4548**	**4549**	**0.060**	**0.046**	**0.001**	**0.011**	**0.005**	**0.028**	**0.002**	**0.001**
	Average	--	--	--	**9.98**	**0.026**	**1.26**	**0.03**	**0.03**	**0.027**	**0.76**	**4063**	**4063**	**0.054**	**0.043**	**0.000**	**0.011**	**0.004**	**0.025**	**0.002**	**0.001**
ST31_5	January	8	20	1	7.27	0.009	0.44	0.21	0.04	0.008	0.22	1163	1163	0.015	0.012	0.000	0.003	0.001	0.007	0.000	0.000
	July	17	17	1	12.36	0.011	0.51	0.21	0.03	0.009	0.26	1404	1404	0.019	0.015	0.000	0.004	0.001	0.009	0.001	0.000
	Maximum	--	--	--	**12.36**	**0.011**	**0.51**	**0.21**	**0.04**	**0.009**	**0.26**	**1404**	**1404**	**0.019**	**0.015**	**0.000**	**0.004**	**0.001**	**0.009**	**0.001**	**0.000**
	Average	--	--	--	**9.82**	**0.010**	**0.47**	**0.21**	**0.04**	**0.009**	**0.24**	**1283**	**1283**	**0.017**	**0.013**	**0.000**	**0.003**	**0.001**	**0.008**	**0.000**	**0.000**
ST31_10	January	8	20	1	5.25	0.006	0.38	0.13	0.03	0.005	0.14	718	718	0.009	0.007	0.000	0.002	0.001	0.004	0.000	0.000
	July	17	17	1	9.13	0.008	0.39	0.13	0.02	0.006	0.16	848	848	0.011	0.009	0.000	0.002	0.001	0.006	0.000	0.000
	Maximum	--	--	--	**9.13**	**0.008**	**0.39**	**0.13**	**0.03**	**0.006**	**0.16**	**848**	**848**	**0.011**	**0.009**	**0.000**	**0.002**	**0.001**	**0.006**	**0.000**	**0.000**
	Average	--	--	--	**7.19**	**0.007**	**0.39**	**0.13**	**0.02**	**0.005**	**0.15**	**783**	**783**	**0.010**	**0.008**	**0.000**	**0.002**	**0.001**	**0.005**	**0.000**	**0.000**
ST31_15	January	8	20	1	4.57	0.005	0.37	0.10	0.02	0.004	0.11	570	570	0.008	0.006	0.000	0.002	0.000	0.004	0.000	0.000
	July	17	17	1	8.05	0.007	0.35	0.10	0.02	0.004	0.13	662	662	0.009	0.008	0.000	0.002	0.001	0.005	0.000	0.000
	Maximum	--	--	--	**8.05**	**0.007**	**0.37**	**0.10**	**0.02**	**0.004**	**0.13**	**662**	**662**	**0.009**	**0.008**	**0.000**	**0.002**	**0.001**	**0.005**	**0.000**	**0.000**
	Average	--	--	--	**6.31**	**0.006**	**0.36**	**0.10**	**0.02**	**0.004**	**0.12**	**616**	**616**	**0.008**	**0.007**	**0.000**	**0.002**	**0.001**	**0.004**	**0.000**	**0.000**
ST31_20	January	8	20	1	4.06	0.005	0.36	0.09	0.02	0.003	0.09	493	494	0.007	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	17	1	7.18	0.006	0.33	0.09	0.02	0.004	0.11	567	568	0.007	0.007	0.000	0.002	0.001	0.004	0.000	0.000
	Maximum	--	--	--	**7.18**	**0.006**	**0.36**	**0.09**	**0.02**	**0.004**	**0.11**	**567**	**568**	**0.007**	**0.007**	**0.000**	**0.002**	**0.001**	**0.004**	**0.000**	**0.000**
	Average	--	--	--	**5.62**	**0.006**	**0.34**	**0.09**	**0.02**	**0.004**	**0.10**	**530**	**531**	**0.007**	**0.006**	**0.000**	**0.001**	**0.000**	**0.004**	**0.000**	**0.000**
ST31_25	January	8	20	1	3.39	0.004	0.35	0.08	0.02	0.003	0.08	443	443	0.006	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	17	1	6.01	0.006	0.31	0.08	0.01	0.003	0.10	506	506	0.007	0.006	0.000	0.001	0.000	0.004	0.000	0.000
	Maximum	--	--	--	**6.01**	**0.006**	**0.35**	**0.08**	**0.02**	**0.003**	**0.10**	**506**	**506**	**0.007**	**0.006**	**0.000**	**0.001**	**0.000**	**0.004**	**0.000**	**0.000**
	Average	--	--	--	**4.70**	**0.005**	**0.33**	**0.08**	**0.02**	**0.003**	**0.09**	**475**	**475**	**0.006**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST31_30	January	8	20	1	3.19	0.004	0.32	0.06	0.01	0.003	0.07	396	396	0.005	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	5.69	0.005	0.29	0.06	0.01	0.003	0.09	450	451	0.006	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**5.69**	**0.005**	**0.32**	**0.06**	**0.01**	**0.003**	**0.09**	**450**	**451**	**0.006**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**4.44**	**0.005**	**0.30**	**0.06**	**0.01**	**0.003**	**0.08**	**423**	**423**	**0.006**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST31_35	January	8	20	1	2.96	0.004	0.32	0.05	0.01	0.003	0.07	377	377	0.005	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	5.30	0.005	0.28	0.05	0.01	0.003	0.08	426	426	0.006	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**5.30**	**0.005**	**0.32**	**0.05**	**0.01**	**0.003**	**0.08**	**426**	**426**	**0.006**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**4.13**	**0.004**	**0.30**	**0.05**	**0.01**	**0.003**	**0.07**	**401**	**401**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST31_40	January	8	20	1	2.76	0.004	0.32	0.04	0.01	0.002	0.06	365	365	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.96	0.005	0.29	0.04	0.01	0.003	0.08	412	412	0.005	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**4.96**	**0.005**	**0.32**	**0.04**	**0.01**	**0.003**	**0.08**	**412**	**412**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**3.86**	**0.004**	**0.30**	**0.04**	**0.01**	**0.003**	**0.07**	**388**	**389**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST31_45	January	8	20	1	2.63	0.004	0.33	0.03	0.01	0.002	0.06	357	357	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.75	0.005	0.29	0.03	0.01	0.003	0.07	400	400	0.005	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**4.75**	**0.005**	**0.33**	**0.03**	**0.01**	**0.003**	**0.07**	**400**	**400**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**3.69**	**0.004**	**0.31**	**0.03**	**0.01**	**0.003**	**0.07**	**379**	**379**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST31_50	January	8	20	1	2.58	0.004	0.33	0.03	0.01	0.002	0.06	350	351	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.65	0.005	0.30	0.02	0.01	0.003	0.07	392	392	0.005	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**4.65**	**0.005**	**0.33**	**0.03**	**0.01**	**0.003**	**0.07**	**392**	**392**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**3.61**	**0.004**	**0.31**	**0.03**	**0.01**	**0.002**	**0.06**	**371**	**371**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST31_55	January	8	20	1	2.62	0.004	0.34	0.02	0.01	0.002	0.06	348	348	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.72	0.005	0.31	0.02	0.01	0.003	0.07	388	388	0.005	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**4.72**	**0.005**	**0.34**	**0.02**	**0.01**	**0.003**	**0.07**	**388**	**388**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**3.67**	**0.004**	**0.32**	**0.02**	**0.01**	**0.002**	**0.06**	**368**	**368**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**

Light Commercial Truck (diesel fuel) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST32_Idle	January	8	20	2	13.96	0.33	12.04	1.12	1.03	0.04	2.86	5063.22	5071.40	0.065	0.357	0.020	0.266	0.008	0.024	0.028	0.012
	July	17	17	2	15.31	0.35	45.41	1.12	1.03	0.05	3.03	6442.55	6451.23	0.083	0.377	0.021	0.281	0.008	0.025	0.030	0.012
	Maximum	--	--	--	**15.31**	**0.348**	**45.41**	**1.12**	**1.03**	**0.055**	**3.03**	**6443**	**6451**	**0.083**	**0.377**	**0.021**	**0.281**	**0.008**	**0.025**	**0.030**	**0.012**
	Average	--	--	--	**14.63**	**0.338**	**28.73**	**1.12**	**1.03**	**0.049**	**2.95**	**5753**	**5761**	**0.074**	**0.367**	**0.021**	**0.273**	**0.008**	**0.025**	**0.029**	**0.012**
ST32_5	January	8	20	2	5.78	0.09	3.63	0.43	0.24	0.01	0.76	1605.32	1607.53	0.021	0.094	0.005	0.070	0.002	0.006	0.007	0.003
	July	17	17	2	9.45	0.10	6.64	0.43	0.24	0.02	0.85	1937.17	1939.66	0.025	0.106	0.006	0.079	0.002	0.007	0.008	0.003
	Maximum	--	--	--	**9.45**	**0.100**	**6.64**	**0.43**	**0.24**	**0.016**	**0.85**	**1937**	**1940**	**0.025**	**0.106**	**0.006**	**0.079**	**0.002**	**0.007**	**0.008**	**0.003**
	Average	--	--	--	**7.62**	**0.094**	**5.14**	**0.43**	**0.24**	**0.015**	**0.80**	**1771**	**1774**	**0.023**	**0.100**	**0.006**	**0.075**	**0.002**	**0.007**	**0.008**	**0.003**
ST32_10	January	8	20	2	3.67	0.05	2.25	0.25	0.13	0.01	0.41	1023.82	1025.05	0.013	0.052	0.003	0.039	0.001	0.003	0.004	0.002
	July	17	17	2	6.18	0.06	3.40	0.25	0.13	0.01	0.47	1206.05	1207.45	0.016	0.058	0.003	0.044	0.001	0.004	0.005	0.002
	Maximum	--	--	--	**6.18**	**0.056**	**3.40**	**0.25**	**0.13**	**0.010**	**0.47**	**1206**	**1207**	**0.016**	**0.058**	**0.003**	**0.044**	**0.001**	**0.004**	**0.005**	**0.002**
	Average	--	--	--	**4.93**	**0.053**	**2.82**	**0.25**	**0.13**	**0.009**	**0.44**	**1115**	**1116**	**0.014**	**0.055**	**0.003**	**0.041**	**0.001**	**0.004**	**0.004**	**0.002**
ST32_15	January	8	20	2	2.97	0.04	1.78	0.19	0.10	0.01	0.30	829.98	830.89	0.011	0.038	0.002	0.028	0.001	0.003	0.003	0.001
	July	17	17	2	5.09	0.04	2.32	0.19	0.10	0.01	0.34	962.34	963.38	0.012	0.043	0.002	0.032	0.001	0.003	0.003	0.001
	Maximum	--	--	--	**5.09**	**0.042**	**2.32**	**0.19**	**0.10**	**0.008**	**0.34**	**962**	**963**	**0.012**	**0.043**	**0.002**	**0.032**	**0.001**	**0.003**	**0.003**	**0.001**
	Average	--	--	--	**4.03**	**0.039**	**2.05**	**0.19**	**0.10**	**0.008**	**0.32**	**896**	**897**	**0.012**	**0.040**	**0.002**	**0.030**	**0.001**	**0.003**	**0.003**	**0.001**
ST32_20	January	8	20	2	2.53	0.03	1.53	0.16	0.08	0.01	0.24	729.17	729.91	0.009	0.030	0.002	0.023	0.001	0.002	0.002	0.001
	July	17	17	2	4.39	0.03	1.78	0.16	0.08	0.01	0.27	836.34	837.19	0.011	0.034	0.002	0.026	0.001	0.002	0.003	0.001
	Maximum	--	--	--	**4.39**	**0.034**	**1.78**	**0.16**	**0.08**	**0.007**	**0.27**	**836**	**837**	**0.011**	**0.034**	**0.002**	**0.026**	**0.001**	**0.002**	**0.003**	**0.001**
	Average	--	--	--	**3.46**	**0.032**	**1.66**	**0.16**	**0.08**	**0.007**	**0.26**	**783**	**784**	**0.010**	**0.032**	**0.002**	**0.024**	**0.001**	**0.002**	**0.003**	**0.001**
ST32_25	January	8	20	2	2.09	0.03	1.33	0.13	0.07	0.01	0.20	660.83	661.46	0.009	0.026	0.001	0.019	0.001	0.002	0.002	0.001
	July	17	17	2	3.64	0.03	1.45	0.13	0.07	0.01	0.23	752.37	753.09	0.010	0.029	0.002	0.022	0.001	0.002	0.002	0.001
	Maximum	--	--	--	**3.64**	**0.029**	**1.45**	**0.13**	**0.07**	**0.006**	**0.23**	**752**	**753**	**0.010**	**0.029**	**0.002**	**0.022**	**0.001**	**0.002**	**0.002**	**0.001**
	Average	--	--	--	**2.87**	**0.027**	**1.39**	**0.13**	**0.07**	**0.006**	**0.22**	**707**	**707**	**0.009**	**0.027**	**0.002**	**0.020**	**0.001**	**0.002**	**0.002**	**0.001**
ST32_30	January	8	20	2	1.96	0.02	1.17	0.11	0.05	0.01	0.18	588.57	589.14	0.008	0.023	0.001	0.017	0.000	0.002	0.002	0.001
	July	17	17	2	3.44	0.03	1.22	0.11	0.05	0.01	0.21	668.21	668.86	0.009	0.026	0.001	0.019	0.001	0.002	0.002	0.001
	Maximum	--	--	--	**3.44**	**0.026**	**1.22**	**0.11**	**0.05**	**0.006**	**0.21**	**668**	**669**	**0.009**	**0.026**	**0.001**	**0.019**	**0.001**	**0.002**	**0.002**	**0.001**
	Average	--	--	--	**2.70**	**0.024**	**1.20**	**0.11**	**0.05**	**0.005**	**0.19**	**628**	**629**	**0.008**	**0.024**	**0.001**	**0.018**	**0.001**	**0.002**	**0.002**	**0.001**
ST32_35	January	8	20	2	1.78	0.02	1.06	0.09	0.05	0.00	0.16	553.88	554.41	0.007	0.021	0.001	0.015	0.000	0.001	0.002	0.001
	July	17	17	2	3.17	0.02	1.08	0.09	0.05	0.01	0.19	626.09	626.70	0.008	0.024	0.001	0.018	0.001	0.002	0.002	0.001
	Maximum	--	--	--	**3.17**	**0.024**	**1.08**	**0.09**	**0.05**	**0.005**	**0.19**	**626**	**627**	**0.008**	**0.024**	**0.001**	**0.018**	**0.001**	**0.002**	**0.002**	**0.001**
	Average	--	--	--	**2.47**	**0.023**	**1.07**	**0.09**	**0.05**	**0.005**	**0.18**	**590**	**591**	**0.008**	**0.022**	**0.001**	**0.017**	**0.000**	**0.001**	**0.002**	**0.001**
ST32_40	January	8	20	2	1.63	0.02	0.98	0.08	0.05	0.00	0.15	532.10	532.59	0.007	0.019	0.001	0.014	0.000	0.001	0.002	0.001
	July	17	17	2	2.92	0.02	0.98	0.08	0.05	0.01	0.18	599.00	599.58	0.008	0.022	0.001	0.017	0.000	0.001	0.002	0.001
	Maximum	--	--	--	**2.92**	**0.023**	**0.98**	**0.08**	**0.05**	**0.005**	**0.18**	**599**	**600**	**0.008**	**0.022**	**0.001**	**0.017**	**0.000**	**0.001**	**0.002**	**0.001**
	Average	--	--	--	**2.28**	**0.021**	**0.98**	**0.08**	**0.05**	**0.005**	**0.16**	**566**	**566**	**0.007**	**0.021**	**0.001**	**0.016**	**0.000**	**0.001**	**0.002**	**0.001**
ST32_45	January	8	20	2	1.53	0.02	0.92	0.07	0.04	0.00	0.14	516.38	516.85	0.007	0.018	0.001	0.014	0.000	0.001	0.001	0.000
	July	17	17	2	2.74	0.02	0.92	0.07	0.04	0.00	0.17	579.14	579.69	0.007	0.021	0.001	0.016	0.000	0.001	0.002	0.001
	Maximum	--	--	--	**2.74**	**0.022**	**0.92**	**0.07**	**0.04**	**0.005**	**0.17**	**579**	**580**	**0.007**	**0.021**	**0.001**	**0.016**	**0.000**	**0.001**	**0.002**	**0.001**
	Average	--	--	--	**2.13**	**0.020**	**0.92**	**0.07**	**0.04**	**0.005**	**0.15**	**548**	**548**	**0.007**	**0.020**	**0.001**	**0.015**	**0.000**	**0.001**	**0.002**	**0.000**
ST32_50	January	8	20	2	1.46	0.02	0.89	0.06	0.04	0.00	0.14	505.88	506.33	0.007	0.017	0.001	0.013	0.000	0.001	0.001	0.000
	July	17	17	2	2.62	0.02	0.90	0.06	0.04	0.00	0.16	565.31	565.84	0.007	0.020	0.001	0.015	0.000	0.001	0.002	0.000
	Maximum	--	--	--	**2.62**	**0.021**	**0.90**	**0.06**	**0.04**	**0.005**	**0.16**	**565**	**566**	**0.007**	**0.020**	**0.001**	**0.015**	**0.000**	**0.001**	**0.002**	**0.000**
	Average	--	--	--	**2.04**	**0.019**	**0.89**	**0.06**	**0.04**	**0.005**	**0.15**	**536**	**536**	**0.007**	**0.018**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
ST32_55	January	8	20	2	1.43	0.02	0.87	0.06	0.04	0.00	0.13	501.13	501.56	0.006	0.016	0.001	0.012	0.000	0.001	0.001	0.000
	July	17	17	2	2.58	0.02	0.88	0.06	0.04	0.00	0.15	558.19	558.70	0.007	0.019	0.001	0.014	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**2.58**	**0.020**	**0.88**	**0.06**	**0.04**	**0.005**	**0.15**	**558**	**559**	**0.007**	**0.019**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**2.01**	**0.019**	**0.88**	**0.06**	**0.04**	**0.005**	**0.14**	**530**	**530**	**0.007**	**0.018**	**0.001**	**0.013**	**0.000**	**0.001**	**0.001**	**0.000**

Light Commercial Truck (gasoline) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST32_Idle	January	8	20	1	8.52	0.025	0.61	0.03	0.03	0.024	0.59	3634	3634	0.048	0.033	0.000	0.008	0.003	0.019	0.001	0.001
	July	17	17	1	8.90	0.028	2.03	0.03	0.02	0.031	0.66	4622	4622	0.061	0.038	0.000	0.009	0.003	0.024	0.001	0.001
	Maximum	--	--	--	**8.90**	**0.028**	**2.03**	**0.03**	**0.03**	**0.031**	**0.66**	**4622**	**4622**	**0.061**	**0.038**	**0.000**	**0.009**	**0.003**	**0.024**	**0.001**	**0.001**
	Average	--	--	--	**8.71**	**0.026**	**1.32**	**0.03**	**0.03**	**0.027**	**0.63**	**4128**	**4128**	**0.054**	**0.035**	**0.000**	**0.009**	**0.003**	**0.021**	**0.001**	**0.001**
ST32_5	January	8	20	1	7.16	0.010	0.42	0.21	0.04	0.008	0.19	1180	1180	0.016	0.011	0.000	0.003	0.001	0.006	0.000	0.000
	July	17	17	1	12.40	0.012	0.51	0.21	0.03	0.009	0.22	1426	1426	0.019	0.013	0.000	0.003	0.001	0.008	0.000	0.000
	Maximum	--	--	--	**12.40**	**0.012**	**0.51**	**0.21**	**0.04**	**0.009**	**0.22**	**1426**	**1426**	**0.019**	**0.013**	**0.000**	**0.003**	**0.001**	**0.008**	**0.000**	**0.000**
	Average	--	--	--	**9.78**	**0.011**	**0.46**	**0.21**	**0.04**	**0.009**	**0.21**	**1303**	**1303**	**0.017**	**0.012**	**0.000**	**0.003**	**0.001**	**0.007**	**0.000**	**0.000**
ST32_10	January	8	20	1	5.24	0.007	0.36	0.13	0.03	0.005	0.12	727	727	0.010	0.007	0.000	0.002	0.000	0.004	0.000	0.000
	July	17	17	1	9.25	0.009	0.37	0.13	0.02	0.006	0.14	859	859	0.011	0.009	0.000	0.002	0.001	0.005	0.000	0.000
	Maximum	--	--	--	**9.25**	**0.009**	**0.37**	**0.13**	**0.03**	**0.006**	**0.14**	**859**	**859**	**0.011**	**0.009**	**0.000**	**0.002**	**0.001**	**0.005**	**0.000**	**0.000**
	Average	--	--	--	**7.24**	**0.008**	**0.37**	**0.13**	**0.02**	**0.005**	**0.13**	**793**	**793**	**0.010**	**0.008**	**0.000**	**0.002**	**0.001**	**0.005**	**0.000**	**0.000**
ST32_15	January	8	20	1	4.60	0.006	0.34	0.10	0.02	0.004	0.10	576	576	0.008	0.006	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	17	1	8.20	0.007	0.33	0.10	0.02	0.004	0.12	670	670	0.009	0.007	0.000	0.002	0.000	0.004	0.000	0.000
	Maximum	--	--	--	**8.20**	**0.007**	**0.34**	**0.10**	**0.02**	**0.004**	**0.12**	**670**	**670**	**0.009**	**0.007**	**0.000**	**0.002**	**0.000**	**0.004**	**0.000**	**0.000**
	Average	--	--	--	**6.40**	**0.007**	**0.33**	**0.10**	**0.02**	**0.004**	**0.11**	**623**	**623**	**0.008**	**0.006**	**0.000**	**0.002**	**0.000**	**0.004**	**0.000**	**0.000**
ST32_20	January	8	20	1	4.10	0.005	0.33	0.09	0.02	0.003	0.08	498	498	0.007	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	17	1	7.34	0.007	0.30	0.09	0.02	0.004	0.10	573	574	0.008	0.006	0.000	0.001	0.000	0.004	0.000	0.000
	Maximum	--	--	--	**7.34**	**0.007**	**0.33**	**0.09**	**0.02**	**0.004**	**0.10**	**573**	**574**	**0.008**	**0.006**	**0.000**	**0.001**	**0.000**	**0.004**	**0.000**	**0.000**
	Average	--	--	--	**5.72**	**0.006**	**0.32**	**0.09**	**0.02**	**0.004**	**0.09**	**536**	**536**	**0.007**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST32_25	January	8	20	1	3.43	0.005	0.32	0.08	0.02	0.003	0.07	447	447	0.006	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	17	1	6.15	0.006	0.29	0.08	0.01	0.003	0.09	511	511	0.007	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**6.15**	**0.006**	**0.32**	**0.08**	**0.02**	**0.003**	**0.09**	**511**	**511**	**0.007**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**4.79**	**0.005**	**0.30**	**0.08**	**0.02**	**0.003**	**0.08**	**479**	**479**	**0.006**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST32_30	January	8	20	1	3.24	0.004	0.29	0.06	0.01	0.003	0.06	399	399	0.005	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	5.84	0.006	0.26	0.06	0.01	0.003	0.08	454	454	0.006	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**5.84**	**0.006**	**0.29**	**0.06**	**0.01**	**0.003**	**0.08**	**454**	**454**	**0.006**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**4.54**	**0.005**	**0.28**	**0.06**	**0.01**	**0.003**	**0.07**	**427**	**427**	**0.006**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST32_35	January	8	20	1	3.00	0.004	0.29	0.05	0.01	0.003	0.06	379	379	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	5.44	0.005	0.26	0.05	0.01	0.003	0.07	429	429	0.006	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**5.44**	**0.005**	**0.29**	**0.05**	**0.01**	**0.003**	**0.07**	**429**	**429**	**0.006**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**4.22**	**0.005**	**0.28**	**0.05**	**0.01**	**0.003**	**0.06**	**404**	**404**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST32_40	January	8	20	1	2.80	0.004	0.30	0.04	0.01	0.002	0.05	367	367	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	5.09	0.005	0.26	0.04	0.01	0.003	0.07	413	414	0.005	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**5.09**	**0.005**	**0.30**	**0.04**	**0.01**	**0.003**	**0.07**	**413**	**414**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**3.94**	**0.004**	**0.28**	**0.04**	**0.01**	**0.003**	**0.06**	**390**	**390**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST32_45	January	8	20	1	2.66	0.004	0.30	0.03	0.01	0.002	0.05	358	358	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.86	0.005	0.27	0.03	0.01	0.003	0.06	401	402	0.005	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**4.86**	**0.005**	**0.30**	**0.03**	**0.01**	**0.003**	**0.06**	**401**	**402**	**0.005**	**0.004**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**3.76**	**0.004**	**0.28**	**0.03**	**0.01**	**0.003**	**0.06**	**380**	**380**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST32_50	January	8	20	1	2.59	0.004	0.31	0.03	0.01	0.002	0.05	351	351	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.73	0.004	0.27	0.02	0.01	0.003	0.06	392	392	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**4.73**	**0.004**	**0.31**	**0.03**	**0.01**	**0.003**	**0.06**	**392**	**392**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**3.66**	**0.004**	**0.29**	**0.03**	**0.01**	**0.002**	**0.05**	**371**	**371**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST32_55	January	8	20	1	2.61	0.004	0.32	0.02	0.01	0.002	0.05	348	348	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	17	1	4.76	0.005	0.28	0.02	0.01	0.003	0.06	388	388	0.005	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**4.76**	**0.005**	**0.32**	**0.02**	**0.01**	**0.003**	**0.06**	**388**	**388**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**3.68**	**0.004**	**0.30**	**0.02**	**0.01**	**0.002**	**0.05**	**368**	**368**	**0.005**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**

Transit Bus (diesel fuel) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST42_Idle	January	8	20	2	22.81	0.537	98.96	2.17	2.00	0.066	9.35	7676	7690	0.099	1.086	0.064	0.798	0.026	0.076	0.088	0.034
	July	17	17	2	22.81	0.537	77.57	2.17	2.00	0.083	9.35	9730	9743	0.125	1.086	0.064	0.798	0.026	0.076	0.088	0.034
	Maximum	--	--	--	**22.81**	**0.537**	**98.96**	**2.17**	**2.00**	**0.083**	**9.35**	**9730**	**9743**	**0.125**	**1.086**	**0.064**	**0.798**	**0.026**	**0.076**	**0.088**	**0.034**
	Average	--	--	--	**22.81**	**0.537**	**88.26**	**2.17**	**2.00**	**0.075**	**9.35**	**8703**	**8716**	**0.112**	**1.086**	**0.064**	**0.798**	**0.026**	**0.076**	**0.088**	**0.034**
ST42_5	January	8	20	2	9.52	0.166	26.50	1.71	0.77	0.031	2.39	3671	3675	0.047	0.281	0.016	0.207	0.007	0.019	0.023	0.008
	July	17	17	2	9.52	0.166	20.77	1.71	0.77	0.037	2.39	4339	4343	0.056	0.281	0.016	0.207	0.007	0.019	0.023	0.008
	Maximum	--	--	--	**9.52**	**0.166**	**26.50**	**1.71**	**0.77**	**0.037**	**2.39**	**4339**	**4343**	**0.056**	**0.281**	**0.016**	**0.207**	**0.007**	**0.019**	**0.023**	**0.008**
	Average	--	--	--	**9.52**	**0.166**	**23.63**	**1.71**	**0.77**	**0.034**	**2.39**	**4005**	**4009**	**0.052**	**0.281**	**0.016**	**0.207**	**0.007**	**0.019**	**0.023**	**0.008**
ST42_10	January	8	20	2	5.28	0.093	14.30	0.92	0.42	0.018	1.28	2071	2074	0.027	0.151	0.009	0.112	0.004	0.010	0.012	0.004
	July	17	17	2	5.28	0.093	11.21	0.92	0.42	0.021	1.28	2444	2446	0.031	0.151	0.009	0.112	0.004	0.010	0.012	0.004
	Maximum	--	--	--	**5.28**	**0.093**	**14.30**	**0.92**	**0.42**	**0.021**	**1.28**	**2444**	**2446**	**0.031**	**0.151**	**0.009**	**0.112**	**0.004**	**0.010**	**0.012**	**0.004**
	Average	--	--	--	**5.28**	**0.093**	**12.75**	**0.92**	**0.42**	**0.019**	**1.28**	**2258**	**2260**	**0.029**	**0.151**	**0.009**	**0.112**	**0.004**	**0.010**	**0.012**	**0.004**
ST42_15	January	8	20	2	2.81	0.052	8.02	0.53	0.23	0.009	0.76	1023	1024	0.013	0.090	0.005	0.066	0.002	0.006	0.007	0.003
	July	17	17	2	2.81	0.052	6.29	0.53	0.23	0.010	0.76	1222	1223	0.016	0.090	0.005	0.066	0.002	0.006	0.007	0.003
	Maximum	--	--	--	**2.81**	**0.052**	**8.02**	**0.53**	**0.23**	**0.010**	**0.76**	**1222**	**1223**	**0.016**	**0.090**	**0.005**	**0.066**	**0.002**	**0.006**	**0.007**	**0.003**
	Average	--	--	--	**2.81**	**0.052**	**7.15**	**0.53**	**0.23**	**0.010**	**0.76**	**1123**	**1124**	**0.014**	**0.090**	**0.005**	**0.066**	**0.002**	**0.006**	**0.007**	**0.003**
ST42_20	January	8	20	2	2.59	0.043	7.23	0.47	0.21	0.009	0.61	1060	1061	0.014	0.072	0.004	0.053	0.002	0.005	0.006	0.002
	July	17	17	2	2.59	0.043	5.67	0.47	0.21	0.011	0.61	1242	1243	0.016	0.072	0.004	0.053	0.002	0.005	0.006	0.002
	Maximum	--	--	--	**2.59**	**0.043**	**7.23**	**0.47**	**0.21**	**0.011**	**0.61**	**1242**	**1243**	**0.016**	**0.072**	**0.004**	**0.053**	**0.002**	**0.005**	**0.006**	**0.002**
	Average	--	--	--	**2.59**	**0.043**	**6.45**	**0.47**	**0.21**	**0.010**	**0.61**	**1151**	**1152**	**0.015**	**0.072**	**0.004**	**0.053**	**0.002**	**0.005**	**0.006**	**0.002**
ST42_25	January	8	20	2	2.46	0.037	6.76	0.43	0.20	0.009	0.52	1082	1083	0.014	0.062	0.004	0.046	0.001	0.004	0.005	0.002
	July	17	17	2	2.46	0.037	5.30	0.43	0.20	0.011	0.52	1254	1254	0.016	0.062	0.004	0.046	0.001	0.004	0.005	0.002
	Maximum	--	--	--	**2.46**	**0.037**	**6.76**	**0.43**	**0.20**	**0.011**	**0.52**	**1254**	**1254**	**0.016**	**0.062**	**0.004**	**0.046**	**0.001**	**0.004**	**0.005**	**0.002**
	Average	--	--	--	**2.46**	**0.037**	**6.03**	**0.43**	**0.20**	**0.010**	**0.52**	**1168**	**1169**	**0.015**	**0.062**	**0.004**	**0.046**	**0.001**	**0.004**	**0.005**	**0.002**
ST42_30	January	8	20	2	2.37	0.034	6.44	0.40	0.19	0.009	0.46	1097	1098	0.014	0.055	0.003	0.041	0.001	0.004	0.004	0.002
	July	17	17	2	2.37	0.034	5.05	0.40	0.19	0.011	0.46	1261	1262	0.016	0.055	0.003	0.041	0.001	0.004	0.004	0.002
	Maximum	--	--	--	**2.37**	**0.034**	**6.44**	**0.40**	**0.19**	**0.011**	**0.46**	**1261**	**1262**	**0.016**	**0.055**	**0.003**	**0.041**	**0.001**	**0.004**	**0.004**	**0.002**
	Average	--	--	--	**2.37**	**0.034**	**5.74**	**0.40**	**0.19**	**0.010**	**0.46**	**1179**	**1180**	**0.015**	**0.055**	**0.003**	**0.041**	**0.001**	**0.004**	**0.004**	**0.002**
ST42_35	January	8	20	2	2.20	0.030	6.12	0.36	0.19	0.009	0.41	1057	1058	0.014	0.048	0.003	0.036	0.001	0.003	0.004	0.001
	July	17	17	2	2.20	0.030	4.80	0.36	0.19	0.010	0.41	1209	1210	0.016	0.048	0.003	0.036	0.001	0.003	0.004	0.001
	Maximum	--	--	--	**2.20**	**0.030**	**6.12**	**0.36**	**0.19**	**0.010**	**0.41**	**1209**	**1210**	**0.016**	**0.048**	**0.003**	**0.036**	**0.001**	**0.003**	**0.004**	**0.001**
	Average	--	--	--	**2.20**	**0.030**	**5.46**	**0.36**	**0.19**	**0.010**	**0.41**	**1133**	**1134**	**0.015**	**0.048**	**0.003**	**0.036**	**0.001**	**0.003**	**0.004**	**0.001**
ST42_40	January	8	20	2	2.07	0.027	5.88	0.33	0.18	0.009	0.37	1027	1028	0.013	0.044	0.003	0.032	0.001	0.003	0.004	0.001
	July	17	17	2	2.07	0.027	4.61	0.33	0.18	0.010	0.37	1170	1171	0.015	0.044	0.003	0.032	0.001	0.003	0.004	0.001
	Maximum	--	--	--	**2.07**	**0.027**	**5.88**	**0.33**	**0.18**	**0.010**	**0.37**	**1170**	**1171**	**0.015**	**0.044**	**0.003**	**0.032**	**0.001**	**0.003**	**0.004**	**0.001**
	Average	--	--	--	**2.07**	**0.027**	**5.24**	**0.33**	**0.18**	**0.009**	**0.37**	**1098**	**1099**	**0.014**	**0.044**	**0.003**	**0.032**	**0.001**	**0.003**	**0.004**	**0.001**
ST42_45	January	8	20	2	1.97	0.025	5.69	0.30	0.18	0.009	0.34	1004	1004	0.013	0.040	0.002	0.029	0.001	0.003	0.003	0.001
	July	17	17	2	1.97	0.025	4.46	0.30	0.18	0.010	0.34	1139	1140	0.015	0.040	0.002	0.029	0.001	0.003	0.003	0.001
	Maximum	--	--	--	**1.97**	**0.025**	**5.69**	**0.30**	**0.18**	**0.010**	**0.34**	**1139**	**1140**	**0.015**	**0.040**	**0.002**	**0.029**	**0.001**	**0.003**	**0.003**	**0.001**
	Average	--	--	--	**1.97**	**0.025**	**5.08**	**0.30**	**0.18**	**0.009**	**0.34**	**1072**	**1072**	**0.014**	**0.040**	**0.002**	**0.029**	**0.001**	**0.003**	**0.003**	**0.001**
ST42_50	January	8	20	2	2.28	0.026	6.47	0.24	0.16	0.010	0.40	1174	1174	0.015	0.047	0.003	0.035	0.001	0.003	0.004	0.001
	July	17	17	2	2.28	0.026	5.07	0.24	0.16	0.011	0.40	1322	1323	0.017	0.047	0.003	0.035	0.001	0.003	0.004	0.001
	Maximum	--	--	--	**2.28**	**0.026**	**6.47**	**0.24**	**0.16**	**0.011**	**0.40**	**1322**	**1323**	**0.017**	**0.047**	**0.003**	**0.035**	**0.001**	**0.003**	**0.004**	**0.001**
	Average	--	--	--	**2.28**	**0.026**	**5.77**	**0.24**	**0.16**	**0.011**	**0.40**	**1248**	**1248**	**0.016**	**0.047**	**0.003**	**0.035**	**0.001**	**0.003**	**0.004**	**0.001**
ST42_55	January	8	20	2	2.53	0.027	7.10	0.19	0.14	0.011	0.46	1313	1313	0.017	0.053	0.003	0.039	0.001	0.004	0.004	0.002
	July	17	17	2	2.53	0.027	5.57	0.19	0.14	0.013	0.46	1472	1472	0.019	0.053	0.003	0.039	0.001	0.004	0.004	0.002
	Maximum	--	--	--	**2.53**	**0.027**	**7.10**	**0.19**	**0.14**	**0.013**	**0.46**	**1472**	**1472**	**0.019**	**0.053**	**0.003**	**0.039**	**0.001**	**0.004**	**0.004**	**0.002**
	Average	--	--	--	**2.53**	**0.027**	**6.33**	**0.19**	**0.14**	**0.012**	**0.46**	**1392**	**1393**	**0.018**	**0.053**	**0.003**	**0.039**	**0.001**	**0.004**	**0.004**	**0.002**

Single Unit Short Haul (diesel fuel) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST52_Idle	January	8	20	2	15.26	0.53	43.14	3.82	3.51	0.06	7.84	7560.06	7573.19	0.097	0.926	0.054	0.679	0.022	0.064	0.074	0.033
	July	17	17	2	15.26	0.53	33.82	3.82	3.51	0.08	7.84	9590.94	9604.08	0.123	0.926	0.054	0.679	0.022	0.064	0.074	0.033
	Maximum	--	--	--	**15.26**	**0.526**	**43.14**	**3.82**	**3.51**	**0.082**	**7.84**	**9591**	**9604**	**0.123**	**0.926**	**0.054**	**0.679**	**0.022**	**0.064**	**0.074**	**0.033**
	Average	--	--	--	**15.26**	**0.526**	**38.48**	**3.82**	**3.51**	**0.073**	**7.84**	**8576**	**8589**	**0.110**	**0.926**	**0.054**	**0.679**	**0.022**	**0.064**	**0.074**	**0.033**
ST52_5	January	8	20	2	6.58	0.21	17.22	2.42	1.33	0.03	2.70	3565.57	3570.89	0.046	0.323	0.019	0.238	0.007	0.022	0.026	0.011
	July	17	17	2	6.58	0.21	13.50	2.42	1.33	0.04	2.70	4285.34	4290.67	0.055	0.323	0.019	0.238	0.007	0.022	0.026	0.011
	Maximum	--	--	--	**6.58**	**0.213**	**17.22**	**2.42**	**1.33**	**0.037**	**2.70**	**4285**	**4291**	**0.055**	**0.323**	**0.019**	**0.238**	**0.007**	**0.022**	**0.026**	**0.011**
	Average	--	--	--	**6.58**	**0.213**	**15.36**	**2.42**	**1.33**	**0.034**	**2.70**	**3925**	**3931**	**0.051**	**0.323**	**0.019**	**0.238**	**0.007**	**0.022**	**0.026**	**0.011**
ST52_10	January	8	20	2	3.75	0.11	10.02	1.35	0.74	0.02	1.45	2132.70	2135.49	0.027	0.173	0.010	0.127	0.004	0.012	0.014	0.006
	July	17	17	2	3.75	0.11	7.86	1.35	0.74	0.02	1.45	2535.61	2538.40	0.033	0.173	0.010	0.127	0.004	0.012	0.014	0.006
	Maximum	--	--	--	**3.75**	**0.112**	**10.02**	**1.35**	**0.74**	**0.022**	**1.45**	**2536**	**2538**	**0.033**	**0.173**	**0.010**	**0.127**	**0.004**	**0.012**	**0.014**	**0.006**
	Average	--	--	--	**3.75**	**0.112**	**8.94**	**1.35**	**0.74**	**0.020**	**1.45**	**2334**	**2337**	**0.030**	**0.173**	**0.010**	**0.127**	**0.004**	**0.012**	**0.014**	**0.006**
ST52_15	January	8	20	2	2.89	0.08	7.77	0.95	0.54	0.01	1.05	1688.54	1690.52	0.022	0.125	0.007	0.092	0.003	0.009	0.010	0.004
	July	17	17	2	2.89	0.08	6.09	0.95	0.54	0.02	1.05	1989.99	1991.98	0.026	0.125	0.007	0.092	0.003	0.009	0.010	0.004
	Maximum	--	--	--	**2.89**	**0.079**	**7.77**	**0.95**	**0.54**	**0.017**	**1.05**	**1990**	**1992**	**0.026**	**0.125**	**0.007**	**0.092**	**0.003**	**0.009**	**0.010**	**0.004**
	Average	--	--	--	**2.89**	**0.079**	**6.93**	**0.95**	**0.54**	**0.016**	**1.05**	**1839**	**1841**	**0.024**	**0.125**	**0.007**	**0.092**	**0.003**	**0.009**	**0.010**	**0.004**
ST52_20	January	8	20	2	2.46	0.06	6.48	0.74	0.43	0.01	0.84	1433.82	1435.37	0.018	0.100	0.006	0.073	0.002	0.007	0.008	0.003
	July	17	17	2	2.46	0.06	5.08	0.74	0.43	0.01	0.84	1676.28	1677.84	0.022	0.100	0.006	0.073	0.002	0.007	0.008	0.003
	Maximum	--	--	--	**2.46**	**0.062**	**6.48**	**0.74**	**0.43**	**0.014**	**0.84**	**1676**	**1678**	**0.022**	**0.100**	**0.006**	**0.073**	**0.002**	**0.007**	**0.008**	**0.003**
	Average	--	--	--	**2.46**	**0.062**	**5.78**	**0.74**	**0.43**	**0.013**	**0.84**	**1555**	**1557**	**0.020**	**0.100**	**0.006**	**0.073**	**0.002**	**0.007**	**0.008**	**0.003**
ST52_25	January	8	20	2	2.10	0.05	5.59	0.57	0.35	0.01	0.68	1243.10	1244.35	0.016	0.081	0.005	0.060	0.002	0.006	0.007	0.003
	July	17	17	2	2.10	0.05	4.38	0.57	0.35	0.01	0.68	1448.34	1449.60	0.019	0.081	0.005	0.060	0.002	0.006	0.007	0.003
	Maximum	--	--	--	**2.10**	**0.050**	**5.59**	**0.57**	**0.35**	**0.012**	**0.68**	**1448**	**1450**	**0.019**	**0.081**	**0.005**	**0.060**	**0.002**	**0.006**	**0.007**	**0.003**
	Average	--	--	--	**2.10**	**0.050**	**4.98**	**0.57**	**0.35**	**0.012**	**0.68**	**1346**	**1347**	**0.017**	**0.081**	**0.005**	**0.060**	**0.002**	**0.006**	**0.007**	**0.003**
ST52_30	January	8	20	2	1.91	0.04	5.23	0.51	0.32	0.01	0.60	1179.29	1180.38	0.015	0.071	0.004	0.052	0.002	0.005	0.006	0.002
	July	17	17	2	1.91	0.04	4.10	0.51	0.32	0.01	0.60	1363.92	1365.00	0.018	0.071	0.004	0.052	0.002	0.005	0.006	0.002
	Maximum	--	--	--	**1.91**	**0.043**	**5.23**	**0.51**	**0.32**	**0.012**	**0.60**	**1364**	**1365**	**0.018**	**0.071**	**0.004**	**0.052**	**0.002**	**0.005**	**0.006**	**0.002**
	Average	--	--	--	**1.91**	**0.043**	**4.66**	**0.51**	**0.32**	**0.011**	**0.60**	**1272**	**1273**	**0.016**	**0.071**	**0.004**	**0.052**	**0.002**	**0.005**	**0.006**	**0.002**
ST52_35	January	8	20	2	1.71	0.04	4.43	0.43	0.27	0.01	0.54	1003.48	1004.48	0.013	0.064	0.004	0.047	0.001	0.004	0.005	0.002
	July	17	17	2	1.71	0.04	3.47	0.43	0.27	0.01	0.54	1161.25	1162.25	0.015	0.064	0.004	0.047	0.001	0.004	0.005	0.002
	Maximum	--	--	--	**1.71**	**0.040**	**4.43**	**0.43**	**0.27**	**0.010**	**0.54**	**1161**	**1162**	**0.015**	**0.064**	**0.004**	**0.047**	**0.001**	**0.004**	**0.005**	**0.002**
	Average	--	--	--	**1.71**	**0.040**	**3.95**	**0.43**	**0.27**	**0.009**	**0.54**	**1082**	**1083**	**0.014**	**0.064**	**0.004**	**0.047**	**0.001**	**0.004**	**0.005**	**0.002**
ST52_40	January	8	20	2	1.60	0.04	4.03	0.37	0.25	0.01	0.49	924.08	924.98	0.012	0.058	0.003	0.043	0.001	0.004	0.005	0.002
	July	17	17	2	1.60	0.04	3.16	0.37	0.25	0.01	0.49	1065.31	1066.21	0.014	0.058	0.003	0.043	0.001	0.004	0.005	0.002
	Maximum	--	--	--	**1.60**	**0.036**	**4.03**	**0.37**	**0.25**	**0.009**	**0.49**	**1065**	**1066**	**0.014**	**0.058**	**0.003**	**0.043**	**0.001**	**0.004**	**0.005**	**0.002**
	Average	--	--	--	**1.60**	**0.036**	**3.60**	**0.37**	**0.25**	**0.009**	**0.49**	**995**	**996**	**0.013**	**0.058**	**0.003**	**0.043**	**0.001**	**0.004**	**0.005**	**0.002**
ST52_45	January	8	20	2	1.50	0.03	3.71	0.32	0.22	0.01	0.45	860.48	861.30	0.011	0.054	0.003	0.040	0.001	0.004	0.004	0.002
	July	17	17	2	1.50	0.03	2.91	0.32	0.22	0.01	0.45	988.64	989.46	0.013	0.054	0.003	0.040	0.001	0.004	0.004	0.002
	Maximum	--	--	--	**1.50**	**0.033**	**3.71**	**0.32**	**0.22**	**0.008**	**0.45**	**989**	**989**	**0.013**	**0.054**	**0.003**	**0.040**	**0.001**	**0.004**	**0.004**	**0.002**
	Average	--	--	--	**1.50**	**0.033**	**3.31**	**0.32**	**0.22**	**0.008**	**0.45**	**925**	**925**	**0.012**	**0.054**	**0.003**	**0.040**	**0.001**	**0.004**	**0.004**	**0.002**
ST52_50	January	8	20	2	1.41	0.03	3.39	0.28	0.20	0.01	0.42	794.66	795.42	0.010	0.050	0.003	0.037	0.001	0.003	0.004	0.002
	July	17	17	2	1.41	0.03	2.65	0.28	0.20	0.01	0.42	910.65	911.40	0.012	0.050	0.003	0.037	0.001	0.003	0.004	0.002
	Maximum	--	--	--	**1.41**	**0.030**	**3.39**	**0.28**	**0.20**	**0.008**	**0.42**	**911**	**911**	**0.012**	**0.050**	**0.003**	**0.037**	**0.001**	**0.003**	**0.004**	**0.002**
	Average	--	--	--	**1.41**	**0.030**	**3.02**	**0.28**	**0.20**	**0.007**	**0.42**	**853**	**853**	**0.011**	**0.050**	**0.003**	**0.037**	**0.001**	**0.003**	**0.004**	**0.002**
ST52_55	January	8	20	2	1.33	0.03	3.12	0.25	0.19	0.01	0.39	740.81	741.51	0.010	0.046	0.003	0.034	0.001	0.003	0.004	0.002
	July	17	17	2	1.33	0.03	2.44	0.25	0.19	0.01	0.39	846.84	847.54	0.011	0.046	0.003	0.034	0.001	0.003	0.004	0.002
	Maximum	--	--	--	**1.33**	**0.028**	**3.12**	**0.25**	**0.19**	**0.007**	**0.39**	**847**	**848**	**0.011**	**0.046**	**0.003**	**0.034**	**0.001**	**0.003**	**0.004**	**0.002**
	Average	--	--	--	**1.33**	**0.028**	**2.78**	**0.25**	**0.19**	**0.007**	**0.39**	**794**	**795**	**0.010**	**0.046**	**0.003**	**0.034**	**0.001**	**0.003**	**0.004**	**0.002**

Single Unit Short Haul (gasoline) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST52_Idle	January	8	20	1	23.25	0.099	4.61	0.08	0.07	0.045	3.14	6814	6816	0.090	0.178	0.002	0.045	0.011	0.110	0.007	0.002
	July	17	17	1	22.18	0.104	3.23	0.05	0.05	0.057	3.34	8645	8647	0.114	0.198	0.002	0.046	0.014	0.126	0.007	0.002
	Maximum	--	--	--	**23.25**	**0.104**	**4.61**	**0.08**	**0.07**	**0.057**	**3.34**	**8645**	**8647**	**0.114**	**0.198**	**0.002**	**0.046**	**0.014**	**0.126**	**0.007**	**0.002**
	Average	--	--	--	**22.71**	**0.101**	**3.92**	**0.07**	**0.06**	**0.051**	**3.24**	**7729**	**7732**	**0.102**	**0.188**	**0.002**	**0.046**	**0.013**	**0.118**	**0.007**	**0.002**
ST52_5	January	8	20	1	33.09	0.055	3.71	0.84	0.14	0.019	2.12	2915	2916	0.038	0.123	0.001	0.031	0.006	0.078	0.004	0.002
	July	17	17	1	32.17	0.058	2.59	0.82	0.12	0.023	2.27	3500	3502	0.046	0.136	0.002	0.032	0.008	0.089	0.005	0.002
	Maximum	--	--	--	**33.09**	**0.058**	**3.71**	**0.84**	**0.14**	**0.023**	**2.27**	**3500**	**3502**	**0.046**	**0.136**	**0.002**	**0.032**	**0.008**	**0.089**	**0.005**	**0.002**
	Average	--	--	--	**32.63**	**0.057**	**3.15**	**0.83**	**0.13**	**0.021**	**2.20**	**3207**	**3209**	**0.042**	**0.130**	**0.002**	**0.031**	**0.007**	**0.084**	**0.005**	**0.002**
ST52_10	January	8	20	1	23.15	0.034	2.45	0.48	0.08	0.012	1.29	1806	1806	0.024	0.075	0.001	0.019	0.004	0.048	0.003	0.001
	July	17	17	1	22.41	0.035	1.71	0.47	0.07	0.014	1.38	2139	2140	0.028	0.083	0.001	0.019	0.005	0.054	0.003	0.001
	Maximum	--	--	--	**23.15**	**0.035**	**2.45**	**0.48**	**0.08**	**0.014**	**1.38**	**2139**	**2140**	**0.028**	**0.083**	**0.001**	**0.019**	**0.005**	**0.054**	**0.003**	**0.001**
	Average	--	--	--	**22.78**	**0.034**	**2.08**	**0.47**	**0.08**	**0.013**	**1.34**	**1972**	**1973**	**0.026**	**0.079**	**0.001**	**0.019**	**0.004**	**0.051**	**0.003**	**0.001**
ST52_15	January	8	20	1	20.99	0.026	2.07	0.33	0.06	0.010	0.98	1469	1469	0.019	0.057	0.001	0.014	0.003	0.036	0.002	0.001
	July	17	17	1	20.33	0.027	1.45	0.32	0.05	0.011	1.05	1724	1724	0.023	0.063	0.001	0.015	0.004	0.041	0.002	0.001
	Maximum	--	--	--	**20.99**	**0.027**	**2.07**	**0.33**	**0.06**	**0.011**	**1.05**	**1724**	**1724**	**0.023**	**0.063**	**0.001**	**0.015**	**0.004**	**0.041**	**0.002**	**0.001**
	Average	--	--	--	**20.66**	**0.027**	**1.76**	**0.32**	**0.05**	**0.011**	**1.01**	**1596**	**1597**	**0.021**	**0.060**	**0.001**	**0.014**	**0.003**	**0.038**	**0.002**	**0.001**
ST52_20	January	8	20	1	20.00	0.022	1.85	0.25	0.04	0.009	0.80	1284	1285	0.017	0.046	0.001	0.012	0.002	0.029	0.002	0.001
	July	17	17	1	19.37	0.023	1.29	0.24	0.04	0.010	0.85	1496	1497	0.020	0.051	0.001	0.012	0.003	0.033	0.002	0.001
	Maximum	--	--	--	**20.00**	**0.023**	**1.85**	**0.25**	**0.04**	**0.010**	**0.85**	**1496**	**1497**	**0.020**	**0.051**	**0.001**	**0.012**	**0.003**	**0.033**	**0.002**	**0.001**
	Average	--	--	--	**19.69**	**0.022**	**1.57**	**0.24**	**0.04**	**0.009**	**0.82**	**1390**	**1391**	**0.018**	**0.048**	**0.001**	**0.012**	**0.003**	**0.031**	**0.002**	**0.001**
ST52_25	January	8	20	1	17.86	0.017	1.61	0.18	0.03	0.007	0.63	1107	1108	0.015	0.036	0.000	0.009	0.002	0.023	0.001	0.000
	July	17	17	1	17.32	0.018	1.13	0.17	0.03	0.009	0.67	1286	1287	0.017	0.040	0.000	0.009	0.003	0.026	0.001	0.000
	Maximum	--	--	--	**17.86**	**0.018**	**1.61**	**0.18**	**0.03**	**0.009**	**0.67**	**1286**	**1287**	**0.017**	**0.040**	**0.000**	**0.009**	**0.003**	**0.026**	**0.001**	**0.000**
	Average	--	--	--	**17.59**	**0.018**	**1.37**	**0.17**	**0.03**	**0.008**	**0.65**	**1197**	**1197**	**0.016**	**0.038**	**0.000**	**0.009**	**0.002**	**0.024**	**0.001**	**0.000**
ST52_30	January	8	20	1	17.94	0.016	1.64	0.15	0.03	0.007	0.57	1082	1082	0.014	0.032	0.000	0.008	0.002	0.020	0.001	0.000
	July	17	17	1	17.36	0.017	1.14	0.15	0.03	0.008	0.60	1247	1248	0.016	0.036	0.000	0.008	0.002	0.023	0.001	0.000
	Maximum	--	--	--	**17.94**	**0.017**	**1.64**	**0.15**	**0.03**	**0.008**	**0.60**	**1247**	**1248**	**0.016**	**0.036**	**0.000**	**0.008**	**0.002**	**0.023**	**0.001**	**0.000**
	Average	--	--	--	**17.65**	**0.016**	**1.39**	**0.15**	**0.03**	**0.008**	**0.58**	**1165**	**1165**	**0.015**	**0.034**	**0.000**	**0.008**	**0.002**	**0.022**	**0.001**	**0.000**
ST52_35	January	8	20	1	14.42	0.012	1.52	0.13	0.03	0.006	0.44	942	942	0.012	0.025	0.000	0.006	0.001	0.016	0.001	0.000
	July	17	17	1	13.99	0.013	1.06	0.12	0.02	0.007	0.46	1087	1088	0.014	0.028	0.000	0.006	0.002	0.018	0.001	0.000
	Maximum	--	--	--	**14.42**	**0.013**	**1.52**	**0.13**	**0.03**	**0.007**	**0.46**	**1087**	**1088**	**0.014**	**0.028**	**0.000**	**0.006**	**0.002**	**0.018**	**0.001**	**0.000**
	Average	--	--	--	**14.21**	**0.013**	**1.29**	**0.13**	**0.03**	**0.007**	**0.45**	**1015**	**1015**	**0.013**	**0.026**	**0.000**	**0.006**	**0.002**	**0.017**	**0.001**	**0.000**
ST52_40	January	8	20	1	13.13	0.011	1.53	0.10	0.03	0.006	0.36	898	898	0.012	0.020	0.000	0.005	0.001	0.013	0.001	0.000
	July	17	17	1	12.74	0.011	1.07	0.10	0.02	0.007	0.38	1033	1034	0.014	0.023	0.000	0.005	0.002	0.015	0.001	0.000
	Maximum	--	--	--	**13.13**	**0.011**	**1.53**	**0.10**	**0.03**	**0.007**	**0.38**	**1033**	**1034**	**0.014**	**0.023**	**0.000**	**0.005**	**0.002**	**0.015**	**0.001**	**0.000**
	Average	--	--	--	**12.94**	**0.011**	**1.30**	**0.10**	**0.02**	**0.006**	**0.37**	**966**	**966**	**0.013**	**0.022**	**0.000**	**0.005**	**0.001**	**0.014**	**0.001**	**0.000**
ST52_45	January	8	20	1	12.11	0.009	1.53	0.08	0.02	0.006	0.30	863	863	0.011	0.017	0.000	0.004	0.001	0.011	0.001	0.000
	July	17	17	1	11.75	0.009	1.07	0.08	0.02	0.007	0.32	991	992	0.013	0.019	0.000	0.004	0.001	0.012	0.001	0.000
	Maximum	--	--	--	**12.11**	**0.009**	**1.53**	**0.08**	**0.02**	**0.007**	**0.32**	**991**	**992**	**0.013**	**0.019**	**0.000**	**0.004**	**0.001**	**0.012**	**0.001**	**0.000**
	Average	--	--	--	**11.93**	**0.009**	**1.30**	**0.08**	**0.02**	**0.006**	**0.31**	**927**	**927**	**0.012**	**0.018**	**0.000**	**0.004**	**0.001**	**0.011**	**0.001**	**0.000**
ST52_50	January	8	20	1	11.12	0.008	1.55	0.07	0.02	0.006	0.24	834	834	0.011	0.014	0.000	0.003	0.001	0.009	0.001	0.000
	July	17	17	1	10.80	0.008	1.08	0.07	0.02	0.006	0.26	956	956	0.013	0.015	0.000	0.004	0.001	0.010	0.001	0.000
	Maximum	--	--	--	**11.12**	**0.008**	**1.55**	**0.07**	**0.02**	**0.006**	**0.26**	**956**	**956**	**0.013**	**0.015**	**0.000**	**0.004**	**0.001**	**0.010**	**0.001**	**0.000**
	Average	--	--	--	**10.96**	**0.008**	**1.31**	**0.07**	**0.02**	**0.006**	**0.25**	**895**	**895**	**0.012**	**0.015**	**0.000**	**0.004**	**0.001**	**0.009**	**0.001**	**0.000**
ST52_55	January	8	20	1	10.32	0.007	1.56	0.06	0.02	0.005	0.20	810	811	0.011	0.011	0.000	0.003	0.001	0.007	0.000	0.000
	July	17	17	1	10.01	0.007	1.09	0.06	0.02	0.006	0.21	928	928	0.012	0.012	0.000	0.003	0.001	0.008	0.000	0.000
	Maximum	--	--	--	**10.32**	**0.007**	**1.56**	**0.06**	**0.02**	**0.006**	**0.21**	**928**	**928**	**0.012**	**0.012**	**0.000**	**0.003**	**0.001**	**0.008**	**0.000**	**0.000**
	Average	--	--	--	**10.16**	**0.007**	**1.32**	**0.06**	**0.02**	**0.006**	**0.21**	**869**	**869**	**0.011**	**0.012**	**0.000**	**0.003**	**0.001**	**0.007**	**0.000**	**0.000**

Combination Long Haul (diesel fuel) - 2020

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST62_Idle	January	8	20	2	16.50	0.502	55.95	4.29	3.95	0.066	6.37	7694	7707	0.099	0.767	0.044	0.562	0.018	0.052	0.061	0.031
	July	17	17	2	16.50	0.502	43.85	4.29	3.95	0.084	6.37	9766	9779	0.126	0.767	0.044	0.562	0.018	0.052	0.061	0.031
	Maximum	--	--	--	**16.50**	**0.502**	**55.95**	**4.29**	**3.95**	**0.084**	**6.37**	**9766**	**9779**	**0.126**	**0.767**	**0.044**	**0.562**	**0.018**	**0.052**	**0.061**	**0.031**
	Average	--	--	--	**16.50**	**0.502**	**49.90**	**4.29**	**3.95**	**0.075**	**6.37**	**8730**	**8743**	**0.112**	**0.767**	**0.044**	**0.562**	**0.018**	**0.052**	**0.061**	**0.031**
ST62_5	January	8	20	2	7.97	0.221	24.03	3.52	1.58	0.037	2.20	4353	4358	0.056	0.270	0.015	0.200	0.006	0.018	0.021	0.010
	July	17	17	2	7.97	0.221	18.84	3.52	1.58	0.045	2.20	5177	5182	0.067	0.270	0.015	0.200	0.006	0.018	0.021	0.010
	Maximum	--	--	--	**7.97**	**0.221**	**24.03**	**3.52**	**1.58**	**0.045**	**2.20**	**5177**	**5182**	**0.067**	**0.270**	**0.015**	**0.200**	**0.006**	**0.018**	**0.021**	**0.010**
	Average	--	--	--	**7.97**	**0.221**	**21.44**	**3.52**	**1.58**	**0.041**	**2.20**	**4765**	**4770**	**0.061**	**0.270**	**0.015**	**0.200**	**0.006**	**0.018**	**0.021**	**0.010**
ST62_10	January	8	20	2	4.75	0.118	14.69	2.03	0.94	0.024	1.17	2831	2834	0.036	0.144	0.008	0.107	0.003	0.010	0.011	0.005
	July	17	17	2	4.75	0.118	11.51	2.03	0.94	0.028	1.17	3308	3311	0.043	0.144	0.008	0.107	0.003	0.010	0.011	0.005
	Maximum	--	--	--	**4.75**	**0.118**	**14.69**	**2.03**	**0.94**	**0.028**	**1.17**	**3308**	**3311**	**0.043**	**0.144**	**0.008**	**0.107**	**0.003**	**0.010**	**0.011**	**0.005**
	Average	--	--	--	**4.75**	**0.118**	**13.10**	**2.03**	**0.94**	**0.026**	**1.17**	**3070**	**3073**	**0.039**	**0.144**	**0.008**	**0.107**	**0.003**	**0.010**	**0.011**	**0.005**
ST62_15	January	8	20	2	3.70	0.079	12.47	1.43	0.77	0.022	0.80	2561	2563	0.033	0.098	0.006	0.073	0.002	0.007	0.008	0.003
	July	17	17	2	3.70	0.079	9.77	1.43	0.77	0.025	0.80	2939	2941	0.038	0.098	0.006	0.073	0.002	0.007	0.008	0.003
	Maximum	--	--	--	**3.70**	**0.079**	**12.47**	**1.43**	**0.77**	**0.025**	**0.80**	**2939**	**2941**	**0.038**	**0.098**	**0.006**	**0.073**	**0.002**	**0.007**	**0.008**	**0.003**
	Average	--	--	--	**3.70**	**0.079**	**11.12**	**1.43**	**0.77**	**0.024**	**0.80**	**2750**	**2752**	**0.035**	**0.098**	**0.006**	**0.073**	**0.002**	**0.007**	**0.008**	**0.003**
ST62_20	January	8	20	2	3.06	0.059	10.90	1.09	0.66	0.019	0.61	2266	2267	0.029	0.075	0.004	0.055	0.002	0.005	0.006	0.003
	July	17	17	2	3.06	0.059	8.55	1.09	0.66	0.022	0.61	2582	2584	0.033	0.075	0.004	0.055	0.002	0.005	0.006	0.003
	Maximum	--	--	--	**3.06**	**0.059**	**10.90**	**1.09**	**0.66**	**0.022**	**0.61**	**2582**	**2584**	**0.033**	**0.075**	**0.004**	**0.055**	**0.002**	**0.005**	**0.006**	**0.003**
	Average	--	--	--	**3.06**	**0.059**	**9.72**	**1.09**	**0.66**	**0.021**	**0.61**	**2424**	**2425**	**0.031**	**0.075**	**0.004**	**0.055**	**0.002**	**0.005**	**0.006**	**0.003**
ST62_25	January	8	20	2	2.75	0.050	9.93	0.98	0.60	0.018	0.52	2116	2117	0.027	0.063	0.004	0.047	0.001	0.004	0.005	0.002
	July	17	17	2	2.75	0.050	7.78	0.98	0.60	0.021	0.52	2397	2399	0.031	0.063	0.004	0.047	0.001	0.004	0.005	0.002
	Maximum	--	--	--	**2.75**	**0.050**	**9.93**	**0.98**	**0.60**	**0.021**	**0.52**	**2397**	**2399**	**0.031**	**0.063**	**0.004**	**0.047**	**0.001**	**0.004**	**0.005**	**0.002**
	Average	--	--	--	**2.75**	**0.050**	**8.86**	**0.98**	**0.60**	**0.019**	**0.52**	**2257**	**2258**	**0.029**	**0.063**	**0.004**	**0.047**	**0.001**	**0.004**	**0.005**	**0.002**
ST62_30	January	8	20	2	2.52	0.042	9.65	0.85	0.55	0.018	0.45	2081	2082	0.027	0.055	0.003	0.041	0.001	0.004	0.004	0.002
	July	17	17	2	2.52	0.042	7.56	0.85	0.55	0.020	0.45	2342	2343	0.030	0.055	0.003	0.041	0.001	0.004	0.004	0.002
	Maximum	--	--	--	**2.52**	**0.042**	**9.65**	**0.85**	**0.55**	**0.020**	**0.45**	**2342**	**2343**	**0.030**	**0.055**	**0.003**	**0.041**	**0.001**	**0.004**	**0.004**	**0.002**
	Average	--	--	--	**2.52**	**0.042**	**8.61**	**0.85**	**0.55**	**0.019**	**0.45**	**2211**	**2212**	**0.028**	**0.055**	**0.003**	**0.041**	**0.001**	**0.004**	**0.004**	**0.002**
ST62_35	January	8	20	2	2.23	0.038	8.46	0.67	0.43	0.015	0.41	1772	1773	0.023	0.050	0.003	0.037	0.001	0.003	0.004	0.002
	July	17	17	2	2.23	0.038	6.63	0.67	0.43	0.017	0.41	1999	2000	0.026	0.050	0.003	0.037	0.001	0.003	0.004	0.002
	Maximum	--	--	--	**2.23**	**0.038**	**8.46**	**0.67**	**0.43**	**0.017**	**0.41**	**1999**	**2000**	**0.026**	**0.050**	**0.003**	**0.037**	**0.001**	**0.003**	**0.004**	**0.002**
	Average	--	--	--	**2.23**	**0.038**	**7.55**	**0.67**	**0.43**	**0.016**	**0.41**	**1885**	**1886**	**0.024**	**0.050**	**0.003**	**0.037**	**0.001**	**0.003**	**0.004**	**0.002**
ST62_40	January	8	20	2	2.09	0.034	8.24	0.58	0.39	0.015	0.38	1737	1737	0.022	0.046	0.003	0.034	0.001	0.003	0.004	0.002
	July	17	17	2	2.09	0.034	6.46	0.58	0.39	0.017	0.38	1951	1951	0.025	0.046	0.003	0.034	0.001	0.003	0.004	0.002
	Maximum	--	--	--	**2.09**	**0.034**	**8.24**	**0.58**	**0.39**	**0.017**	**0.38**	**1951**	**1951**	**0.025**	**0.046**	**0.003**	**0.034**	**0.001**	**0.003**	**0.004**	**0.002**
	Average	--	--	--	**2.09**	**0.034**	**7.35**	**0.58**	**0.39**	**0.016**	**0.38**	**1844**	**1844**	**0.024**	**0.046**	**0.003**	**0.034**	**0.001**	**0.003**	**0.004**	**0.002**
ST62_45	January	8	20	2	1.98	0.030	8.08	0.51	0.36	0.015	0.36	1709	1710	0.022	0.043	0.002	0.032	0.001	0.003	0.003	0.001
	July	17	17	2	1.98	0.030	6.33	0.51	0.36	0.016	0.36	1913	1914	0.025	0.043	0.002	0.032	0.001	0.003	0.003	0.001
	Maximum	--	--	--	**1.98**	**0.030**	**8.08**	**0.51**	**0.36**	**0.016**	**0.36**	**1913**	**1914**	**0.025**	**0.043**	**0.002**	**0.032**	**0.001**	**0.003**	**0.003**	**0.001**
	Average	--	--	--	**1.98**	**0.030**	**7.20**	**0.51**	**0.36**	**0.016**	**0.36**	**1811**	**1812**	**0.023**	**0.043**	**0.002**	**0.032**	**0.001**	**0.003**	**0.003**	**0.001**
ST62_50	January	8	20	2	1.88	0.028	7.87	0.42	0.31	0.014	0.34	1648	1649	0.021	0.041	0.002	0.030	0.001	0.003	0.003	0.001
	July	17	17	2	1.88	0.028	6.17	0.42	0.31	0.016	0.34	1842	1843	0.024	0.041	0.002	0.030	0.001	0.003	0.003	0.001
	Maximum	--	--	--	**1.88**	**0.028**	**7.87**	**0.42**	**0.31**	**0.016**	**0.34**	**1842**	**1843**	**0.024**	**0.041**	**0.002**	**0.030**	**0.001**	**0.003**	**0.003**	**0.001**
	Average	--	--	--	**1.88**	**0.028**	**7.02**	**0.42**	**0.31**	**0.015**	**0.34**	**1745**	**1746**	**0.022**	**0.041**	**0.002**	**0.030**	**0.001**	**0.003**	**0.003**	**0.001**
ST62_55	January	8	20	2	1.78	0.026	7.66	0.33	0.26	0.014	0.33	1575	1576	0.020	0.039	0.002	0.029	0.001	0.003	0.003	0.001
	July	17	17	2	1.78	0.026	6.00	0.33	0.26	0.015	0.33	1760	1761	0.023	0.039	0.002	0.029	0.001	0.003	0.003	0.001
	Maximum	--	--	--	**1.78**	**0.026**	**7.66**	**0.33**	**0.26**	**0.015**	**0.33**	**1760**	**1761**	**0.023**	**0.039**	**0.002**	**0.029**	**0.001**	**0.003**	**0.003**	**0.001**
	Average	--	--	--	**1.78**	**0.026**	**6.83**	**0.33**	**0.26**	**0.014**	**0.33**	**1668**	**1668**	**0.021**	**0.039**	**0.002**	**0.029**	**0.001**	**0.003**	**0.003**	**0.001**

Note:
Link Names relate to vehicle type and operational speed (MPH)
ST21 - Passenger Car
ST31 - Passenger Truck
ST32 - Light Commerical Truck
ST42 - Transit Bus
ST52 - Single Unit Short-Haul Truck
ST62 - Combined Long Haul Truck
Fuel ID 1 is gasoline
Fuel ID 2 is diesel fuel
Idle emission factors are in units of g/vehicle-hour
Running emission factors are in units of g/vehicle-mile
Idle energy consumption is in units of MMBtu/vehicle-hour
Running energy consumption is in units of MMBtu/vehicle-mile
POM is polycyclic organic matter and is calculated using the sum of all polycyclic aromatic compounds within moves with the exception of napthalene which is provided seperately . This is because there is no polycyclic organic matter pollutant option in MOVES 2014a

Vehicle Emission Factors

Passenger Car (gasoline) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST21_Idle	January	8	18	1	0.28	0.003	0.00	0.02	0.02	0.011	0.011	1684	1684	0.022	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	19	1	0.32	0.003	0.01	0.03	0.02	0.014	0.013	2159	2159	0.028	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**0.32**	**0.003**	**0.01**	**0.03**	**0.02**	**0.014**	**0.013**	**2159**	**2159**	**0.028**	**0.001**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**0.30**	**0.003**	**0.01**	**0.02**	**0.02**	**0.013**	**0.012**	**1922**	**1922**	**0.025**	**0.001**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST21_5	January	8	18	1	1.14	0.001	0.01	0.18	0.03	0.004	0.006	560	560	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	2.16	0.002	0.01	0.18	0.03	0.005	0.007	680	680	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**2.16**	**0.002**	**0.01**	**0.18**	**0.03**	**0.005**	**0.007**	**680**	**680**	**0.009**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.65**	**0.002**	**0.01**	**0.18**	**0.03**	**0.004**	**0.007**	**620**	**620**	**0.008**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_10	January	8	18	1	0.92	0.001	0.01	0.11	0.02	0.002	0.005	342	342	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.74	0.001	0.01	0.11	0.02	0.003	0.006	406	406	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.74**	**0.001**	**0.01**	**0.11**	**0.02**	**0.003**	**0.006**	**406**	**406**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.33**	**0.001**	**0.01**	**0.11**	**0.02**	**0.002**	**0.005**	**374**	**374**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_15	January	8	18	1	0.84	0.001	0.01	0.09	0.01	0.002	0.004	269	269	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.60	0.001	0.01	0.09	0.01	0.002	0.006	315	315	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.60**	**0.001**	**0.01**	**0.09**	**0.01**	**0.002**	**0.006**	**315**	**315**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.22**	**0.001**	**0.01**	**0.09**	**0.01**	**0.002**	**0.005**	**292**	**292**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_20	January	8	18	1	0.75	0.001	0.01	0.07	0.01	0.002	0.004	232	232	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.42	0.001	0.01	0.08	0.01	0.002	0.005	268	268	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.42**	**0.001**	**0.01**	**0.08**	**0.01**	**0.002**	**0.005**	**268**	**268**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.08**	**0.001**	**0.01**	**0.08**	**0.01**	**0.002**	**0.005**	**250**	**250**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_25	January	8	18	1	0.57	0.001	0.01	0.07	0.01	0.001	0.004	206	206	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.09	0.001	0.01	0.07	0.01	0.002	0.005	237	237	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.09**	**0.001**	**0.01**	**0.07**	**0.01**	**0.002**	**0.005**	**237**	**237**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.83**	**0.001**	**0.01**	**0.07**	**0.01**	**0.001**	**0.004**	**221**	**221**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_30	January	8	18	1	0.58	0.001	0.01	0.05	0.01	0.001	0.003	185	185	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.11	0.001	0.01	0.05	0.01	0.001	0.004	211	211	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.11**	**0.001**	**0.01**	**0.05**	**0.01**	**0.001**	**0.004**	**211**	**211**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.84**	**0.001**	**0.01**	**0.05**	**0.01**	**0.001**	**0.004**	**198**	**198**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_35	January	8	18	1	0.54	0.001	0.01	0.04	0.01	0.001	0.003	174	174	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.02	0.001	0.01	0.04	0.01	0.001	0.004	198	198	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.02**	**0.001**	**0.01**	**0.04**	**0.01**	**0.001**	**0.004**	**198**	**198**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.78**	**0.001**	**0.01**	**0.04**	**0.01**	**0.001**	**0.004**	**186**	**186**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_40	January	8	18	1	0.49	0.001	0.01	0.03	0.01	0.001	0.003	168	168	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	0.93	0.001	0.01	0.03	0.01	0.001	0.004	190	190	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.93**	**0.001**	**0.01**	**0.03**	**0.01**	**0.001**	**0.004**	**190**	**190**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.71**	**0.001**	**0.01**	**0.03**	**0.01**	**0.001**	**0.003**	**179**	**179**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_45	January	8	18	1	0.47	0.001	0.02	0.03	0.00	0.001	0.003	163	163	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	0.89	0.001	0.01	0.03	0.00	0.001	0.004	184	184	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.89**	**0.001**	**0.02**	**0.03**	**0.00**	**0.001**	**0.004**	**184**	**184**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.68**	**0.001**	**0.02**	**0.03**	**0.00**	**0.001**	**0.003**	**173**	**173**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_50	January	8	18	1	0.47	0.001	0.02	0.02	0.00	0.001	0.003	159	159	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	0.90	0.001	0.02	0.02	0.00	0.001	0.004	179	179	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.90**	**0.001**	**0.02**	**0.02**	**0.00**	**0.001**	**0.004**	**179**	**179**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.69**	**0.001**	**0.02**	**0.02**	**0.00**	**0.001**	**0.003**	**169**	**169**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST21_55	January	8	18	1	0.49	0.001	0.02	0.02	0.00	0.001	0.003	157	157	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	0.94	0.001	0.02	0.02	0.00	0.001	0.004	176	176	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.94**	**0.001**	**0.02**	**0.02**	**0.00**	**0.001**	**0.004**	**176**	**176**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.71**	**0.001**	**0.02**	**0.02**	**0.00**	**0.001**	**0.004**	**167**	**167**	**0.002**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Passenger Truck (gasoline) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST31_Idle	January	8	18	1	0.50	0.003	0.00	0.01	0.01	0.015	0.012	2195	2195	0.029	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	19	1	0.57	0.003	0.01	0.02	0.01	0.019	0.014	2794	2794	0.037	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**0.57**	**0.003**	**0.01**	**0.02**	**0.01**	**0.019**	**0.014**	**2794**	**2794**	**0.037**	**0.001**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**0.54**	**0.003**	**0.01**	**0.02**	**0.01**	**0.017**	**0.013**	**2495**	**2495**	**0.033**	**0.001**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST31_5	January	8	18	1	1.26	0.001	0.01	0.20	0.03	0.005	0.006	715	715	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	2.33	0.002	0.01	0.20	0.03	0.006	0.008	864	864	0.011	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**2.33**	**0.002**	**0.01**	**0.20**	**0.03**	**0.006**	**0.008**	**864**	**864**	**0.011**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.80**	**0.002**	**0.01**	**0.20**	**0.03**	**0.005**	**0.007**	**790**	**790**	**0.010**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_10	January	8	18	1	1.02	0.001	0.01	0.12	0.02	0.003	0.005	441	441	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.89	0.001	0.01	0.12	0.02	0.003	0.007	521	522	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.89**	**0.001**	**0.01**	**0.12**	**0.02**	**0.003**	**0.007**	**521**	**522**	**0.007**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.45**	**0.001**	**0.01**	**0.12**	**0.02**	**0.003**	**0.006**	**481**	**481**	**0.006**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_15	January	8	18	1	0.93	0.001	0.02	0.10	0.02	0.002	0.005	350	350	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.74	0.001	0.01	0.10	0.02	0.003	0.006	407	407	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.74**	**0.001**	**0.02**	**0.10**	**0.02**	**0.003**	**0.006**	**407**	**407**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.34**	**0.001**	**0.01**	**0.10**	**0.02**	**0.003**	**0.006**	**379**	**379**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_20	January	8	18	1	0.84	0.001	0.02	0.08	0.01	0.002	0.005	303	303	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.57	0.001	0.01	0.08	0.01	0.002	0.006	349	349	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.57**	**0.001**	**0.02**	**0.08**	**0.01**	**0.002**	**0.006**	**349**	**349**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.21**	**0.001**	**0.02**	**0.08**	**0.01**	**0.002**	**0.005**	**326**	**326**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_25	January	8	18	1	0.68	0.001	0.02	0.07	0.01	0.002	0.004	272	272	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.27	0.001	0.01	0.07	0.01	0.002	0.006	311	311	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.27**	**0.001**	**0.02**	**0.07**	**0.01**	**0.002**	**0.006**	**311**	**311**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.98**	**0.001**	**0.02**	**0.07**	**0.01**	**0.002**	**0.005**	**292**	**292**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_30	January	8	18	1	0.67	0.001	0.02	0.06	0.01	0.002	0.004	243	243	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.26	0.001	0.02	0.06	0.01	0.002	0.005	277	277	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.26**	**0.001**	**0.02**	**0.06**	**0.01**	**0.002**	**0.005**	**277**	**277**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.97**	**0.001**	**0.02**	**0.06**	**0.01**	**0.002**	**0.005**	**260**	**260**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_35	January	8	18	1	0.64	0.001	0.02	0.05	0.01	0.002	0.004	231	231	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.20	0.001	0.02	0.05	0.01	0.002	0.005	262	262	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.20**	**0.001**	**0.02**	**0.05**	**0.01**	**0.002**	**0.005**	**262**	**262**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.92**	**0.001**	**0.02**	**0.05**	**0.01**	**0.002**	**0.005**	**247**	**247**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_40	January	8	18	1	0.61	0.001	0.02	0.04	0.01	0.001	0.004	225	225	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.15	0.001	0.02	0.04	0.01	0.002	0.005	253	253	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.15**	**0.001**	**0.02**	**0.04**	**0.01**	**0.002**	**0.005**	**253**	**253**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.88**	**0.001**	**0.02**	**0.04**	**0.01**	**0.002**	**0.005**	**239**	**239**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_45	January	8	18	1	0.59	0.001	0.02	0.03	0.01	0.001	0.004	220	220	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.12	0.001	0.02	0.03	0.01	0.002	0.005	246	246	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.12**	**0.001**	**0.02**	**0.03**	**0.01**	**0.002**	**0.005**	**246**	**246**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.86**	**0.001**	**0.02**	**0.03**	**0.01**	**0.002**	**0.004**	**233**	**233**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_50	January	8	18	1	0.59	0.001	0.02	0.02	0.00	0.001	0.004	216	216	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.12	0.001	0.02	0.02	0.00	0.002	0.005	241	241	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.12**	**0.001**	**0.02**	**0.02**	**0.00**	**0.002**	**0.005**	**241**	**241**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.86**	**0.001**	**0.02**	**0.02**	**0.00**	**0.002**	**0.004**	**228**	**228**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST31_55	January	8	18	1	0.62	0.001	0.03	0.02	0.00	0.001	0.004	214	214	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.17	0.001	0.02	0.02	0.00	0.002	0.005	239	239	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.17**	**0.001**	**0.03**	**0.02**	**0.00**	**0.002**	**0.005**	**239**	**239**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.90**	**0.001**	**0.03**	**0.02**	**0.00**	**0.002**	**0.005**	**227**	**227**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Light Commercial Truck (diesel fuel) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST32_Idle	January	8	18	2	2.89	0.385	1.67	0.24	0.22	0.033	0.357	3983	3992	0.051	0.092	0.004	0.078	0.000	0.005	0.006	0.001
	July	17	19	2	3.18	0.407	6.47	0.24	0.22	0.042	0.378	5070	5080	0.065	0.098	0.004	0.082	0.000	0.005	0.006	0.001
	Maximum	--	--	--	**3.18**	**0.407**	**6.47**	**0.24**	**0.22**	**0.042**	**0.378**	**5070**	**5080**	**0.065**	**0.098**	**0.004**	**0.082**	**0.000**	**0.005**	**0.006**	**0.001**
	Average	--	--	--	**3.04**	**0.396**	**4.07**	**0.24**	**0.22**	**0.038**	**0.367**	**4526**	**4536**	**0.058**	**0.095**	**0.004**	**0.080**	**0.000**	**0.005**	**0.006**	**0.001**
ST32_5	January	8	18	2	1.30	0.101	0.60	0.23	0.06	0.011	0.093	1260	1263	0.016	0.024	0.001	0.020	0.000	0.001	0.002	0.000
	July	17	19	2	2.17	0.114	1.03	0.23	0.06	0.013	0.105	1522	1525	0.020	0.027	0.001	0.023	0.000	0.001	0.002	0.000
	Maximum	--	--	--	**2.17**	**0.114**	**1.03**	**0.23**	**0.06**	**0.013**	**0.105**	**1522**	**1525**	**0.020**	**0.027**	**0.001**	**0.023**	**0.000**	**0.001**	**0.002**	**0.000**
	Average	--	--	--	**1.73**	**0.107**	**0.82**	**0.23**	**0.06**	**0.012**	**0.099**	**1391**	**1394**	**0.018**	**0.026**	**0.001**	**0.022**	**0.000**	**0.001**	**0.002**	**0.000**
ST32_10	January	8	18	2	0.86	0.055	0.38	0.14	0.03	0.007	0.051	801	802	0.010	0.013	0.001	0.011	0.000	0.001	0.001	0.000
	July	17	19	2	1.47	0.062	0.54	0.14	0.03	0.008	0.057	944	945	0.012	0.015	0.001	0.012	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**1.47**	**0.062**	**0.54**	**0.14**	**0.03**	**0.008**	**0.057**	**944**	**945**	**0.012**	**0.015**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**1.16**	**0.058**	**0.46**	**0.14**	**0.03**	**0.007**	**0.054**	**872**	**874**	**0.011**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
ST32_15	January	8	18	2	0.71	0.039	0.30	0.11	0.03	0.005	0.036	647	648	0.008	0.009	0.000	0.008	0.000	0.000	0.001	0.000
	July	17	19	2	1.23	0.045	0.38	0.11	0.03	0.006	0.041	751	752	0.010	0.011	0.000	0.009	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**1.23**	**0.045**	**0.38**	**0.11**	**0.03**	**0.006**	**0.041**	**751**	**752**	**0.010**	**0.011**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.97**	**0.042**	**0.34**	**0.11**	**0.03**	**0.006**	**0.039**	**699**	**700**	**0.009**	**0.010**	**0.000**	**0.008**	**0.000**	**0.001**	**0.001**	**0.000**
ST32_20	January	8	18	2	0.61	0.031	0.26	0.09	0.02	0.005	0.029	568	569	0.007	0.008	0.000	0.006	0.000	0.000	0.000	0.000
	July	17	19	2	1.06	0.036	0.29	0.09	0.02	0.005	0.033	652	653	0.008	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**1.06**	**0.036**	**0.29**	**0.09**	**0.02**	**0.005**	**0.033**	**652**	**653**	**0.008**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.83**	**0.034**	**0.27**	**0.09**	**0.02**	**0.005**	**0.031**	**610**	**611**	**0.008**	**0.008**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
ST32_25	January	8	18	2	0.49	0.026	0.22	0.08	0.02	0.004	0.024	514	515	0.007	0.006	0.000	0.005	0.000	0.000	0.000	0.000
	July	17	19	2	0.86	0.030	0.24	0.08	0.02	0.005	0.028	586	587	0.008	0.007	0.000	0.006	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.86**	**0.030**	**0.24**	**0.08**	**0.02**	**0.005**	**0.028**	**586**	**587**	**0.008**	**0.007**	**0.000**	**0.006**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.67**	**0.028**	**0.23**	**0.08**	**0.02**	**0.005**	**0.026**	**550**	**551**	**0.007**	**0.007**	**0.000**	**0.006**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_30	January	8	18	2	0.47	0.023	0.20	0.07	0.01	0.004	0.021	458	458	0.006	0.006	0.000	0.005	0.000	0.000	0.000	0.000
	July	17	19	2	0.84	0.027	0.20	0.07	0.01	0.004	0.025	520	521	0.007	0.006	0.000	0.005	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.84**	**0.027**	**0.20**	**0.07**	**0.01**	**0.004**	**0.025**	**520**	**521**	**0.007**	**0.006**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.65**	**0.025**	**0.20**	**0.07**	**0.01**	**0.004**	**0.023**	**489**	**490**	**0.006**	**0.006**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_35	January	8	18	2	0.44	0.021	0.17	0.05	0.01	0.004	0.020	431	431	0.006	0.005	0.000	0.004	0.000	0.000	0.000	0.000
	July	17	19	2	0.78	0.024	0.17	0.05	0.01	0.004	0.023	487	488	0.006	0.006	0.000	0.005	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.78**	**0.024**	**0.17**	**0.05**	**0.01**	**0.004**	**0.023**	**487**	**488**	**0.006**	**0.006**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.61**	**0.023**	**0.17**	**0.05**	**0.01**	**0.004**	**0.021**	**459**	**460**	**0.006**	**0.005**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_40	January	8	18	2	0.40	0.020	0.15	0.04	0.01	0.003	0.018	414	414	0.005	0.005	0.000	0.004	0.000	0.000	0.000	0.000
	July	17	19	2	0.73	0.023	0.15	0.04	0.01	0.004	0.021	466	467	0.006	0.006	0.000	0.005	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.73**	**0.023**	**0.15**	**0.04**	**0.01**	**0.004**	**0.021**	**466**	**467**	**0.006**	**0.006**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.57**	**0.021**	**0.15**	**0.04**	**0.01**	**0.004**	**0.020**	**440**	**441**	**0.006**	**0.005**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_45	January	8	18	2	0.38	0.019	0.14	0.03	0.01	0.003	0.017	402	402	0.005	0.004	0.000	0.004	0.000	0.000	0.000	0.000
	July	17	19	2	0.69	0.022	0.14	0.03	0.01	0.004	0.020	451	451	0.006	0.005	0.000	0.004	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.69**	**0.022**	**0.14**	**0.03**	**0.01**	**0.004**	**0.020**	**451**	**451**	**0.006**	**0.005**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.54**	**0.020**	**0.14**	**0.03**	**0.01**	**0.004**	**0.019**	**426**	**427**	**0.005**	**0.005**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_50	January	8	18	2	0.37	0.017	0.14	0.03	0.01	0.003	0.016	393	394	0.005	0.004	0.000	0.004	0.000	0.000	0.000	0.000
	July	17	19	2	0.67	0.020	0.14	0.03	0.01	0.004	0.019	440	440	0.006	0.005	0.000	0.004	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.67**	**0.020**	**0.14**	**0.03**	**0.01**	**0.004**	**0.019**	**440**	**440**	**0.006**	**0.005**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.52**	**0.019**	**0.14**	**0.03**	**0.01**	**0.003**	**0.018**	**416**	**417**	**0.005**	**0.005**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_55	January	8	18	2	0.37	0.017	0.13	0.02	0.01	0.003	0.015	389	390	0.005	0.004	0.000	0.003	0.000	0.000	0.000	0.000
	July	17	19	2	0.68	0.019	0.13	0.02	0.01	0.004	0.018	434	434	0.006	0.005	0.000	0.004	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**0.68**	**0.019**	**0.13**	**0.02**	**0.01**	**0.004**	**0.018**	**434**	**434**	**0.006**	**0.005**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.53**	**0.018**	**0.13**	**0.02**	**0.01**	**0.003**	**0.017**	**412**	**412**	**0.005**	**0.004**	**0.000**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**

Light Commercial Truck (gasoline) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST32_Idle	January	8	18	1	1.08	0.00	0.01	0.02	0.01	0.02	0.01	2298.94	2298.99	0.030	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	July	17	19	1	1.23	0.00	0.02	0.02	0.02	0.02	0.01	2926.45	2926.52	0.039	0.001	0.000	0.000	0.000	0.001	0.000	0.000
	Maximum	--	--	--	**1.23**	**0.003**	**0.02**	**0.02**	**0.02**	**0.020**	**0.013**	**2926**	**2927**	**0.039**	**0.001**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
	Average	--	--	--	**1.16**	**0.003**	**0.01**	**0.02**	**0.02**	**0.017**	**0.012**	**2613**	**2613**	**0.034**	**0.001**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**
ST32_5	January	8	18	1	1.35	0.00	0.02	0.20	0.03	0.00	0.01	748.02	748.06	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	2.46	0.00	0.02	0.20	0.03	0.01	0.01	904.20	904.25	0.012	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**2.46**	**0.002**	**0.02**	**0.20**	**0.03**	**0.006**	**0.008**	**904**	**904**	**0.012**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.90**	**0.002**	**0.02**	**0.20**	**0.03**	**0.006**	**0.008**	**826**	**826**	**0.011**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_10	January	8	18	1	1.08	0.00	0.02	0.12	0.02	0.00	0.01	460.58	460.61	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.98	0.00	0.02	0.12	0.02	0.00	0.01	544.47	544.51	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.98**	**0.002**	**0.02**	**0.12**	**0.02**	**0.004**	**0.007**	**544**	**545**	**0.007**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.53**	**0.001**	**0.02**	**0.12**	**0.02**	**0.003**	**0.007**	**503**	**503**	**0.007**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_15	January	8	18	1	0.98	0.00	0.02	0.10	0.02	0.00	0.01	364.76	364.79	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.83	0.00	0.02	0.10	0.02	0.00	0.01	424.57	424.60	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.83**	**0.001**	**0.02**	**0.10**	**0.02**	**0.003**	**0.007**	**425**	**425**	**0.006**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.41**	**0.001**	**0.02**	**0.10**	**0.02**	**0.003**	**0.006**	**395**	**395**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_20	January	8	18	1	0.88	0.00	0.02	0.08	0.01	0.00	0.01	315.46	315.49	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.64	0.00	0.02	0.08	0.01	0.00	0.01	363.19	363.22	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.64**	**0.001**	**0.02**	**0.08**	**0.01**	**0.002**	**0.007**	**363**	**363**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.26**	**0.001**	**0.02**	**0.08**	**0.01**	**0.002**	**0.006**	**339**	**339**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_25	January	8	18	1	0.71	0.00	0.02	0.07	0.01	0.00	0.00	283.07	283.10	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.33	0.00	0.02	0.07	0.01	0.00	0.01	323.50	323.54	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.33**	**0.001**	**0.02**	**0.07**	**0.01**	**0.002**	**0.006**	**324**	**324**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.02**	**0.001**	**0.02**	**0.07**	**0.01**	**0.002**	**0.005**	**303**	**303**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_30	January	8	18	1	0.71	0.00	0.02	0.06	0.01	0.00	0.00	252.65	252.68	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.33	0.00	0.02	0.06	0.01	0.00	0.01	287.74	287.77	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.33**	**0.001**	**0.02**	**0.06**	**0.01**	**0.002**	**0.006**	**288**	**288**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**1.02**	**0.001**	**0.02**	**0.06**	**0.01**	**0.002**	**0.005**	**270**	**270**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_35	January	8	18	1	0.67	0.00	0.02	0.05	0.01	0.00	0.00	239.84	239.86	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.26	0.00	0.02	0.05	0.01	0.00	0.01	271.77	271.80	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.26**	**0.001**	**0.02**	**0.05**	**0.01**	**0.002**	**0.006**	**272**	**272**	**0.004**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.97**	**0.001**	**0.02**	**0.05**	**0.01**	**0.002**	**0.005**	**256**	**256**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_40	January	8	18	1	0.64	0.00	0.03	0.04	0.01	0.00	0.00	232.38	232.40	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.20	0.00	0.02	0.04	0.01	0.00	0.01	262.09	262.12	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.20**	**0.001**	**0.03**	**0.04**	**0.01**	**0.002**	**0.005**	**262**	**262**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.92**	**0.001**	**0.02**	**0.04**	**0.01**	**0.002**	**0.005**	**247**	**247**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_45	January	8	18	1	0.62	0.00	0.03	0.03	0.01	0.00	0.00	226.67	226.69	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.16	0.00	0.02	0.03	0.01	0.00	0.01	254.59	254.61	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.16**	**0.001**	**0.03**	**0.03**	**0.01**	**0.002**	**0.005**	**255**	**255**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.89**	**0.001**	**0.03**	**0.03**	**0.01**	**0.002**	**0.005**	**241**	**241**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_50	January	8	18	1	0.61	0.00	0.03	0.02	0.00	0.00	0.00	222.25	222.28	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.16	0.00	0.03	0.02	0.01	0.00	0.01	248.63	248.65	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.16**	**0.001**	**0.03**	**0.02**	**0.01**	**0.002**	**0.005**	**249**	**249**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.89**	**0.001**	**0.03**	**0.02**	**0.01**	**0.002**	**0.005**	**235**	**235**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
ST32_55	January	8	18	1	0.64	0.00	0.03	0.02	0.00	0.00	0.00	220.61	220.63	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	July	17	19	1	1.20	0.00	0.03	0.02	0.00	0.00	0.01	245.91	245.94	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Maximum	--	--	--	**1.20**	**0.001**	**0.03**	**0.02**	**0.00**	**0.002**	**0.005**	**246**	**246**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	Average	--	--	--	**0.92**	**0.001**	**0.03**	**0.02**	**0.00**	**0.002**	**0.005**	**233**	**233**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Transit Bus (diesel fuel) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST42_Idle	January	8	18	2	3.97	0.728	15.83	0.26	0.24	0.061	0.676	7348	7366	0.095	0.175	0.007	0.147	0.001	0.009	0.011	0.001
	July	17	19	2	3.97	0.728	12.41	0.26	0.24	0.078	0.676	9349	9367	0.120	0.175	0.007	0.147	0.001	0.009	0.011	0.001
	Maximum	--	--	--	**3.97**	**0.728**	**15.83**	**0.26**	**0.24**	**0.078**	**0.676**	**9349**	**9367**	**0.120**	**0.175**	**0.007**	**0.147**	**0.001**	**0.009**	**0.011**	**0.001**
	Average	--	--	--	**3.97**	**0.728**	**14.12**	**0.26**	**0.24**	**0.070**	**0.676**	**8348**	**8367**	**0.107**	**0.175**	**0.007**	**0.147**	**0.001**	**0.009**	**0.011**	**0.001**
ST42_5	January	8	18	2	1.16	0.227	4.51	1.11	0.21	0.029	0.211	3514	3519	0.045	0.055	0.002	0.046	0.000	0.003	0.003	0.000
	July	17	19	2	1.16	0.227	3.53	1.11	0.21	0.035	0.211	4165	4171	0.054	0.055	0.002	0.046	0.000	0.003	0.003	0.000
	Maximum	--	--	--	**1.16**	**0.227**	**4.51**	**1.11**	**0.21**	**0.035**	**0.211**	**4165**	**4171**	**0.054**	**0.055**	**0.002**	**0.046**	**0.000**	**0.003**	**0.003**	**0.000**
	Average	--	--	--	**1.16**	**0.227**	**4.02**	**1.11**	**0.21**	**0.032**	**0.211**	**3839**	**3845**	**0.049**	**0.055**	**0.002**	**0.046**	**0.000**	**0.003**	**0.003**	**0.000**
ST42_10	January	8	18	2	0.64	0.127	2.44	0.58	0.11	0.017	0.118	1983	1986	0.026	0.031	0.001	0.026	0.000	0.002	0.002	0.000
	July	17	19	2	0.64	0.127	1.91	0.58	0.11	0.020	0.118	2346	2349	0.030	0.031	0.001	0.026	0.000	0.002	0.002	0.000
	Maximum	--	--	--	**0.64**	**0.127**	**2.44**	**0.58**	**0.11**	**0.020**	**0.118**	**2346**	**2349**	**0.030**	**0.031**	**0.001**	**0.026**	**0.000**	**0.002**	**0.002**	**0.000**
	Average	--	--	--	**0.64**	**0.127**	**2.17**	**0.58**	**0.11**	**0.018**	**0.118**	**2164**	**2168**	**0.028**	**0.031**	**0.001**	**0.026**	**0.000**	**0.002**	**0.002**	**0.000**
ST42_15	January	8	18	2	0.35	0.071	1.37	0.35	0.07	0.008	0.066	979	981	0.013	0.017	0.001	0.014	0.000	0.001	0.001	0.000
	July	17	19	2	0.35	0.071	1.07	0.35	0.07	0.010	0.066	1173	1175	0.015	0.017	0.001	0.014	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.35**	**0.071**	**1.37**	**0.35**	**0.07**	**0.010**	**0.066**	**1173**	**1175**	**0.015**	**0.017**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.35**	**0.071**	**1.22**	**0.35**	**0.07**	**0.009**	**0.066**	**1076**	**1078**	**0.014**	**0.017**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
ST42_20	January	8	18	2	0.31	0.059	1.23	0.30	0.06	0.008	0.054	1015	1016	0.013	0.014	0.001	0.012	0.000	0.001	0.001	0.000
	July	17	19	2	0.31	0.059	0.97	0.30	0.06	0.010	0.054	1192	1193	0.015	0.014	0.001	0.012	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.31**	**0.059**	**1.23**	**0.30**	**0.06**	**0.010**	**0.054**	**1192**	**1193**	**0.015**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.31**	**0.059**	**1.10**	**0.30**	**0.06**	**0.009**	**0.054**	**1103**	**1105**	**0.014**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
ST42_25	January	8	18	2	0.28	0.051	1.15	0.27	0.05	0.009	0.047	1036	1037	0.013	0.012	0.000	0.010	0.000	0.001	0.001	0.000
	July	17	19	2	0.28	0.051	0.90	0.27	0.05	0.010	0.047	1203	1204	0.015	0.012	0.000	0.010	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.28**	**0.051**	**1.15**	**0.27**	**0.05**	**0.010**	**0.047**	**1203**	**1204**	**0.015**	**0.012**	**0.000**	**0.010**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.28**	**0.051**	**1.03**	**0.27**	**0.05**	**0.009**	**0.047**	**1119**	**1121**	**0.014**	**0.012**	**0.000**	**0.010**	**0.000**	**0.001**	**0.001**	**0.000**
ST42_30	January	8	18	2	0.27	0.046	1.10	0.24	0.05	0.009	0.043	1050	1051	0.014	0.011	0.000	0.009	0.000	0.001	0.001	0.000
	July	17	19	2	0.27	0.046	0.86	0.24	0.05	0.010	0.043	1210	1211	0.016	0.011	0.000	0.009	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.27**	**0.046**	**1.10**	**0.24**	**0.05**	**0.010**	**0.043**	**1210**	**1211**	**0.016**	**0.011**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.27**	**0.046**	**0.98**	**0.24**	**0.05**	**0.009**	**0.043**	**1130**	**1131**	**0.015**	**0.011**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
ST42_35	January	8	18	2	0.25	0.041	1.03	0.20	0.05	0.008	0.038	1012	1013	0.013	0.010	0.000	0.008	0.000	0.000	0.001	0.000
	July	17	19	2	0.25	0.041	0.80	0.20	0.05	0.010	0.038	1160	1161	0.015	0.010	0.000	0.008	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.25**	**0.041**	**1.03**	**0.20**	**0.05**	**0.010**	**0.038**	**1160**	**1161**	**0.015**	**0.010**	**0.000**	**0.008**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.25**	**0.041**	**0.91**	**0.20**	**0.05**	**0.009**	**0.038**	**1086**	**1087**	**0.014**	**0.010**	**0.000**	**0.008**	**0.000**	**0.000**	**0.001**	**0.000**
ST42_40	January	8	18	2	0.23	0.037	0.97	0.18	0.04	0.008	0.034	983	984	0.013	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	July	17	19	2	0.23	0.037	0.76	0.18	0.04	0.009	0.034	1122	1123	0.014	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.23**	**0.037**	**0.97**	**0.18**	**0.04**	**0.009**	**0.034**	**1122**	**1123**	**0.014**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.23**	**0.037**	**0.87**	**0.18**	**0.04**	**0.009**	**0.034**	**1053**	**1054**	**0.014**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
ST42_45	January	8	18	2	0.22	0.034	0.93	0.15	0.04	0.008	0.031	961	962	0.012	0.008	0.000	0.007	0.000	0.000	0.001	0.000
	July	17	19	2	0.22	0.034	0.73	0.15	0.04	0.009	0.031	1093	1094	0.014	0.008	0.000	0.007	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.22**	**0.034**	**0.93**	**0.15**	**0.04**	**0.009**	**0.031**	**1093**	**1094**	**0.014**	**0.008**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.22**	**0.034**	**0.83**	**0.15**	**0.04**	**0.009**	**0.031**	**1027**	**1028**	**0.013**	**0.008**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
ST42_50	January	8	18	2	0.27	0.035	1.07	0.10	0.03	0.009	0.033	1123	1124	0.014	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	July	17	19	2	0.27	0.035	0.84	0.10	0.03	0.011	0.033	1268	1269	0.016	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.27**	**0.035**	**1.07**	**0.10**	**0.03**	**0.011**	**0.033**	**1268**	**1269**	**0.016**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.27**	**0.035**	**0.95**	**0.10**	**0.03**	**0.010**	**0.033**	**1196**	**1197**	**0.015**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
ST42_55	January	8	18	2	0.30	0.037	1.18	0.07	0.02	0.010	0.034	1256	1257	0.016	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	July	17	19	2	0.30	0.037	0.93	0.07	0.02	0.012	0.034	1411	1412	0.018	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.30**	**0.037**	**1.18**	**0.07**	**0.02**	**0.012**	**0.034**	**1411**	**1412**	**0.018**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.30**	**0.037**	**1.05**	**0.07**	**0.02**	**0.011**	**0.034**	**1334**	**1335**	**0.017**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**

Single Unit Short Haul (diesel fuel) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST52_Idle	January	8	18	2	3.96	0.728	5.88	0.28	0.25	0.058	0.676	7010	7028	0.090	0.175	0.007	0.147	0.001	0.009	0.011	0.001
	July	17	19	2	3.96	0.728	4.61	0.28	0.25	0.074	0.676	8922	8940	0.115	0.175	0.007	0.147	0.001	0.009	0.011	0.001
	Maximum	--	--	--	**3.96**	**0.728**	**5.88**	**0.28**	**0.25**	**0.074**	**0.676**	**8922**	**8940**	**0.115**	**0.175**	**0.007**	**0.147**	**0.001**	**0.009**	**0.011**	**0.001**
	Average	--	--	--	**3.96**	**0.728**	**5.24**	**0.28**	**0.25**	**0.066**	**0.676**	**7966**	**7984**	**0.103**	**0.175**	**0.007**	**0.147**	**0.001**	**0.009**	**0.011**	**0.001**
ST52_5	January	8	18	2	1.31	0.296	2.96	1.14	0.20	0.028	0.275	3306	3314	0.043	0.071	0.003	0.060	0.000	0.004	0.004	0.000
	July	17	19	2	1.31	0.296	2.32	1.14	0.20	0.033	0.275	3984	3991	0.051	0.071	0.003	0.060	0.000	0.004	0.004	0.000
	Maximum	--	--	--	**1.31**	**0.296**	**2.96**	**1.14**	**0.20**	**0.033**	**0.275**	**3984**	**3991**	**0.051**	**0.071**	**0.003**	**0.060**	**0.000**	**0.004**	**0.004**	**0.000**
	Average	--	--	--	**1.31**	**0.296**	**2.64**	**1.14**	**0.20**	**0.030**	**0.275**	**3645**	**3652**	**0.047**	**0.071**	**0.003**	**0.060**	**0.000**	**0.004**	**0.004**	**0.000**
ST52_10	January	8	18	2	0.72	0.155	1.75	0.65	0.11	0.016	0.144	1978	1981	0.025	0.037	0.001	0.031	0.000	0.002	0.002	0.000
	July	17	19	2	0.72	0.155	1.37	0.65	0.11	0.020	0.144	2357	2361	0.030	0.037	0.001	0.031	0.000	0.002	0.002	0.000
	Maximum	--	--	--	**0.72**	**0.155**	**1.75**	**0.65**	**0.11**	**0.020**	**0.144**	**2357**	**2361**	**0.030**	**0.037**	**0.001**	**0.031**	**0.000**	**0.002**	**0.002**	**0.000**
	Average	--	--	--	**0.72**	**0.155**	**1.56**	**0.65**	**0.11**	**0.018**	**0.144**	**2167**	**2171**	**0.028**	**0.037**	**0.001**	**0.031**	**0.000**	**0.002**	**0.002**	**0.000**
ST52_15	January	8	18	2	0.55	0.110	1.36	0.43	0.08	0.013	0.102	1566	1568	0.020	0.027	0.001	0.022	0.000	0.001	0.002	0.000
	July	17	19	2	0.55	0.110	1.06	0.43	0.08	0.015	0.102	1850	1852	0.024	0.027	0.001	0.022	0.000	0.001	0.002	0.000
	Maximum	--	--	--	**0.55**	**0.110**	**1.36**	**0.43**	**0.08**	**0.015**	**0.102**	**1850**	**1852**	**0.024**	**0.027**	**0.001**	**0.022**	**0.000**	**0.001**	**0.002**	**0.000**
	Average	--	--	--	**0.55**	**0.110**	**1.21**	**0.43**	**0.08**	**0.014**	**0.102**	**1708**	**1710**	**0.022**	**0.027**	**0.001**	**0.022**	**0.000**	**0.001**	**0.002**	**0.000**
ST52_20	January	8	18	2	0.47	0.087	1.11	0.33	0.06	0.011	0.080	1329	1332	0.017	0.021	0.001	0.017	0.000	0.001	0.001	0.000
	July	17	19	2	0.47	0.087	0.87	0.33	0.06	0.013	0.080	1558	1560	0.020	0.021	0.001	0.017	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.47**	**0.087**	**1.11**	**0.33**	**0.06**	**0.013**	**0.080**	**1558**	**1560**	**0.020**	**0.021**	**0.001**	**0.017**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.47**	**0.087**	**0.99**	**0.33**	**0.06**	**0.012**	**0.080**	**1444**	**1446**	**0.019**	**0.021**	**0.001**	**0.017**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_25	January	8	18	2	0.42	0.070	0.94	0.23	0.05	0.010	0.065	1153	1154	0.015	0.017	0.001	0.014	0.000	0.001	0.001	0.000
	July	17	19	2	0.42	0.070	0.74	0.23	0.05	0.011	0.065	1346	1348	0.017	0.017	0.001	0.014	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.42**	**0.070**	**0.94**	**0.23**	**0.05**	**0.011**	**0.065**	**1346**	**1348**	**0.017**	**0.017**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.42**	**0.070**	**0.84**	**0.23**	**0.05**	**0.010**	**0.065**	**1249**	**1251**	**0.016**	**0.017**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_30	January	8	18	2	0.38	0.060	0.88	0.20	0.04	0.009	0.056	1093	1095	0.014	0.014	0.001	0.012	0.000	0.001	0.001	0.000
	July	17	19	2	0.38	0.060	0.69	0.20	0.04	0.011	0.056	1267	1269	0.016	0.014	0.001	0.012	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.38**	**0.060**	**0.88**	**0.20**	**0.04**	**0.011**	**0.056**	**1267**	**1269**	**0.016**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.38**	**0.060**	**0.79**	**0.20**	**0.04**	**0.010**	**0.056**	**1180**	**1182**	**0.015**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_35	January	8	18	2	0.35	0.056	0.77	0.16	0.03	0.008	0.052	930	932	0.012	0.013	0.001	0.011	0.000	0.001	0.001	0.000
	July	17	19	2	0.35	0.056	0.60	0.16	0.03	0.009	0.052	1079	1080	0.014	0.013	0.001	0.011	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.35**	**0.056**	**0.77**	**0.16**	**0.03**	**0.009**	**0.052**	**1079**	**1080**	**0.014**	**0.013**	**0.001**	**0.011**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.35**	**0.056**	**0.68**	**0.16**	**0.03**	**0.008**	**0.052**	**1005**	**1006**	**0.013**	**0.013**	**0.001**	**0.011**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_40	January	8	18	2	0.33	0.050	0.71	0.13	0.03	0.007	0.046	857	858	0.011	0.012	0.000	0.010	0.000	0.001	0.001	0.000
	July	17	19	2	0.33	0.050	0.55	0.13	0.03	0.008	0.046	990	991	0.013	0.012	0.000	0.010	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.33**	**0.050**	**0.71**	**0.13**	**0.03**	**0.008**	**0.046**	**990**	**991**	**0.013**	**0.012**	**0.000**	**0.010**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.33**	**0.050**	**0.63**	**0.13**	**0.03**	**0.008**	**0.046**	**923**	**925**	**0.012**	**0.012**	**0.000**	**0.010**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_45	January	8	18	2	0.32	0.046	0.66	0.10	0.02	0.007	0.042	798	799	0.010	0.011	0.000	0.009	0.000	0.001	0.001	0.000
	July	17	19	2	0.32	0.046	0.52	0.10	0.02	0.008	0.042	919	920	0.012	0.011	0.000	0.009	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.32**	**0.046**	**0.66**	**0.10**	**0.02**	**0.008**	**0.042**	**919**	**920**	**0.012**	**0.011**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.32**	**0.046**	**0.59**	**0.10**	**0.02**	**0.007**	**0.042**	**858**	**859**	**0.011**	**0.011**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_50	January	8	18	2	0.30	0.042	0.62	0.08	0.02	0.006	0.039	737	738	0.009	0.010	0.000	0.008	0.000	0.001	0.001	0.000
	July	17	19	2	0.30	0.042	0.48	0.08	0.02	0.007	0.039	846	847	0.011	0.010	0.000	0.008	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.30**	**0.042**	**0.62**	**0.08**	**0.02**	**0.007**	**0.039**	**846**	**847**	**0.011**	**0.010**	**0.000**	**0.008**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.30**	**0.042**	**0.55**	**0.08**	**0.02**	**0.007**	**0.039**	**791**	**792**	**0.010**	**0.010**	**0.000**	**0.008**	**0.000**	**0.001**	**0.001**	**0.000**
ST52_55	January	8	18	2	0.29	0.039	0.58	0.07	0.02	0.006	0.036	687	688	0.009	0.009	0.000	0.008	0.000	0.000	0.001	0.000
	July	17	19	2	0.29	0.039	0.46	0.07	0.02	0.007	0.036	787	788	0.010	0.009	0.000	0.008	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.29**	**0.039**	**0.58**	**0.07**	**0.02**	**0.007**	**0.036**	**787**	**788**	**0.010**	**0.009**	**0.000**	**0.008**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.29**	**0.039**	**0.52**	**0.07**	**0.02**	**0.006**	**0.036**	**737**	**738**	**0.009**	**0.009**	**0.000**	**0.008**	**0.000**	**0.000**	**0.001**	**0.000**

Single Unit Short Haul (gasoline) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST52_Idle	January	8	18	1	3.25	0.01	1.19	0.05	0.04	0.04	0.55	6466.94	6467.15	0.085	0.036	0.000	0.009	0.000	0.025	0.001	0.001
	July	17	19	1	3.36	0.01	0.84	0.05	0.05	0.05	0.60	8231.06	8231.29	0.109	0.039	0.000	0.009	0.000	0.028	0.001	0.001
	Maximum	--	--	--	**3.36**	**0.01**	**1.19**	**0.05**	**0.05**	**0.05**	**0.60**	**8231.06**	**8231.29**	**0.109**	**0.039**	**0.000**	**0.009**	**0.000**	**0.028**	**0.001**	**0.001**
	Average	--	--	--	**3.30**	**0.01**	**1.02**	**0.05**	**0.05**	**0.05**	**0.58**	**7349.00**	**7349.22**	**0.097**	**0.037**	**0.000**	**0.009**	**0.000**	**0.026**	**0.001**	**0.001**
ST52_5	January	8	18	1	6.99	0.01	0.75	0.81	0.12	0.02	0.48	2766.32	2766.49	0.036	0.032	0.000	0.008	0.000	0.022	0.001	0.000
	July	17	19	1	7.22	0.01	0.53	0.82	0.12	0.02	0.53	3330.69	3330.88	0.044	0.034	0.000	0.008	0.000	0.024	0.001	0.000
	Maximum	--	--	--	**7.22**	**0.01**	**0.75**	**0.82**	**0.12**	**0.02**	**0.53**	**3330.69**	**3330.88**	**0.044**	**0.034**	**0.000**	**0.008**	**0.000**	**0.024**	**0.001**	**0.000**
	Average	--	--	--	**7.10**	**0.01**	**0.64**	**0.81**	**0.12**	**0.02**	**0.51**	**3048.51**	**3048.69**	**0.040**	**0.033**	**0.000**	**0.008**	**0.000**	**0.023**	**0.001**	**0.000**
ST52_10	January	8	18	1	4.45	0.00	0.49	0.46	0.07	0.01	0.29	1713.66	1713.76	0.023	0.019	0.000	0.005	0.000	0.013	0.001	0.000
	July	17	19	1	4.59	0.00	0.35	0.46	0.07	0.01	0.32	2035.12	2035.24	0.027	0.021	0.000	0.005	0.000	0.015	0.001	0.000
	Maximum	--	--	--	**4.59**	**0.00**	**0.49**	**0.46**	**0.07**	**0.01**	**0.32**	**2035.12**	**2035.24**	**0.027**	**0.021**	**0.000**	**0.005**	**0.000**	**0.015**	**0.001**	**0.000**
	Average	--	--	--	**4.52**	**0.00**	**0.42**	**0.46**	**0.07**	**0.01**	**0.31**	**1874.39**	**1874.50**	**0.025**	**0.020**	**0.000**	**0.005**	**0.000**	**0.014**	**0.001**	**0.000**
ST52_15	January	8	18	1	4.08	0.00	0.40	0.31	0.05	0.01	0.22	1393.94	1394.02	0.018	0.014	0.000	0.004	0.000	0.010	0.000	0.000
	July	17	19	1	4.22	0.00	0.29	0.31	0.05	0.01	0.24	1639.49	1639.58	0.022	0.015	0.000	0.003	0.000	0.011	0.000	0.000
	Maximum	--	--	--	**4.22**	**0.00**	**0.40**	**0.31**	**0.05**	**0.01**	**0.24**	**1639.49**	**1639.58**	**0.022**	**0.015**	**0.000**	**0.004**	**0.000**	**0.011**	**0.000**	**0.000**
	Average	--	--	--	**4.15**	**0.00**	**0.35**	**0.31**	**0.05**	**0.01**	**0.23**	**1516.72**	**1516.80**	**0.020**	**0.015**	**0.000**	**0.003**	**0.000**	**0.011**	**0.000**	**0.000**
ST52_20	January	8	18	1	3.88	0.00	0.36	0.24	0.04	0.01	0.17	1218.98	1219.04	0.016	0.011	0.000	0.003	0.000	0.008	0.000	0.000
	July	17	19	1	4.01	0.00	0.26	0.24	0.04	0.01	0.19	1423.25	1423.32	0.019	0.012	0.000	0.003	0.000	0.009	0.000	0.000
	Maximum	--	--	--	**4.01**	**0.00**	**0.36**	**0.24**	**0.04**	**0.01**	**0.19**	**1423.25**	**1423.32**	**0.019**	**0.012**	**0.000**	**0.003**	**0.000**	**0.009**	**0.000**	**0.000**
	Average	--	--	--	**3.95**	**0.00**	**0.31**	**0.24**	**0.04**	**0.01**	**0.18**	**1321.12**	**1321.18**	**0.017**	**0.012**	**0.000**	**0.003**	**0.000**	**0.008**	**0.000**	**0.000**
ST52_25	January	8	18	1	3.56	0.00	0.31	0.17	0.03	0.01	0.13	1051.11	1051.16	0.014	0.009	0.000	0.002	0.000	0.006	0.000	0.000
	July	17	19	1	3.67	0.00	0.22	0.17	0.03	0.01	0.14	1223.24	1223.29	0.016	0.009	0.000	0.002	0.000	0.007	0.000	0.000
	Maximum	--	--	--	**3.67**	**0.00**	**0.31**	**0.17**	**0.03**	**0.01**	**0.14**	**1223.24**	**1223.29**	**0.016**	**0.009**	**0.000**	**0.002**	**0.000**	**0.007**	**0.000**	**0.000**
	Average	--	--	--	**3.61**	**0.00**	**0.27**	**0.17**	**0.03**	**0.01**	**0.14**	**1137.18**	**1137.23**	**0.015**	**0.009**	**0.000**	**0.002**	**0.000**	**0.006**	**0.000**	**0.000**
ST52_30	January	8	18	1	3.44	0.00	0.32	0.15	0.02	0.01	0.12	1026.65	1026.70	0.014	0.008	0.000	0.002	0.000	0.005	0.000	0.000
	July	17	19	1	3.56	0.00	0.23	0.15	0.02	0.01	0.13	1186.26	1186.30	0.016	0.008	0.000	0.002	0.000	0.006	0.000	0.000
	Maximum	--	--	--	**3.56**	**0.00**	**0.32**	**0.15**	**0.02**	**0.01**	**0.13**	**1186.26**	**1186.30**	**0.016**	**0.008**	**0.000**	**0.002**	**0.000**	**0.006**	**0.000**	**0.000**
	Average	--	--	--	**3.50**	**0.00**	**0.28**	**0.15**	**0.02**	**0.01**	**0.12**	**1106.46**	**1106.50**	**0.015**	**0.008**	**0.000**	**0.002**	**0.000**	**0.006**	**0.000**	**0.000**
ST52_35	January	8	18	1	2.91	0.00	0.31	0.12	0.02	0.01	0.09	893.80	893.83	0.012	0.006	0.000	0.001	0.000	0.004	0.000	0.000
	July	17	19	1	3.01	0.00	0.22	0.12	0.02	0.01	0.10	1034.23	1034.27	0.014	0.006	0.000	0.001	0.000	0.004	0.000	0.000
	Maximum	--	--	--	**3.01**	**0.00**	**0.31**	**0.12**	**0.02**	**0.01**	**0.10**	**1034.23**	**1034.27**	**0.014**	**0.006**	**0.000**	**0.001**	**0.000**	**0.004**	**0.000**	**0.000**
	Average	--	--	--	**2.96**	**0.00**	**0.26**	**0.12**	**0.02**	**0.01**	**0.09**	**964.01**	**964.05**	**0.013**	**0.006**	**0.000**	**0.001**	**0.000**	**0.004**	**0.000**	**0.000**
ST52_40	January	8	18	1	2.66	0.00	0.31	0.09	0.02	0.01	0.07	851.96	851.99	0.011	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	July	17	19	1	2.75	0.00	0.22	0.10	0.02	0.01	0.08	982.82	982.85	0.013	0.005	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**2.75**	**0.00**	**0.31**	**0.10**	**0.02**	**0.01**	**0.08**	**982.82**	**982.85**	**0.013**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**2.71**	**0.00**	**0.27**	**0.10**	**0.02**	**0.01**	**0.07**	**917.39**	**917.42**	**0.012**	**0.005**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST52_45	January	8	18	1	2.46	0.00	0.32	0.08	0.02	0.01	0.05	819.25	819.27	0.011	0.004	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	19	1	2.54	0.00	0.23	0.08	0.02	0.01	0.06	942.68	942.71	0.012	0.004	0.000	0.001	0.000	0.003	0.000	0.000
	Maximum	--	--	--	**2.54**	**0.00**	**0.32**	**0.08**	**0.02**	**0.01**	**0.06**	**942.68**	**942.71**	**0.012**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
	Average	--	--	--	**2.50**	**0.00**	**0.27**	**0.08**	**0.02**	**0.01**	**0.06**	**880.97**	**880.99**	**0.012**	**0.004**	**0.000**	**0.001**	**0.000**	**0.003**	**0.000**	**0.000**
ST52_50	January	8	18	1	2.27	0.00	0.33	0.06	0.02	0.01	0.04	791.75	791.76	0.010	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	July	17	19	1	2.34	0.00	0.23	0.07	0.02	0.01	0.05	909.39	909.40	0.012	0.003	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**2.34**	**0.00**	**0.33**	**0.07**	**0.02**	**0.01**	**0.05**	**909.39**	**909.40**	**0.012**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**2.30**	**0.00**	**0.28**	**0.07**	**0.02**	**0.01**	**0.04**	**850.57**	**850.58**	**0.011**	**0.003**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
ST52_55	January	8	18	1	2.11	0.00	0.33	0.06	0.02	0.01	0.03	769.25	769.26	0.010	0.002	0.000	0.001	0.000	0.001	0.000	0.000
	July	17	19	1	2.18	0.00	0.24	0.06	0.02	0.01	0.04	882.15	882.16	0.012	0.002	0.000	0.001	0.000	0.002	0.000	0.000
	Maximum	--	--	--	**2.18**	**0.00**	**0.33**	**0.06**	**0.02**	**0.01**	**0.04**	**882.15**	**882.16**	**0.012**	**0.002**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**
	Average	--	--	--	**2.14**	**0.00**	**0.28**	**0.06**	**0.02**	**0.01**	**0.03**	**825.70**	**825.71**	**0.011**	**0.002**	**0.000**	**0.001**	**0.000**	**0.002**	**0.000**	**0.000**

Combination Long Haul (diesel fuel) **2050**

Link Name	Month	Hour	Run ID	Fuel ID	Carbon Monoxide (CO)	Methane (CH_4)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$	Sulfur Dioxide (SO_2)	Volatile Organic Compounds	Atmospheric CO_2	CO_2 Equivalent	Total Energy Consumption	HAPS	Acrolein	Formaldehyde	1,3-Butadiene	Benzene	Total Naphthalene	POM (PAH)
ST62_Idle	January	8	18	2	3.86	0.709	8.81	0.29	0.26	0.061	0.658	7338	7356	0.094	0.170	0.007	0.143	0.001	0.008	0.011	0.001
	July	17	19	2	3.86	0.709	6.90	0.29	0.26	0.078	0.658	9333	9351	0.120	0.170	0.007	0.143	0.001	0.008	0.011	0.001
	Maximum	--	--	--	**3.86**	**0.709**	**8.81**	**0.29**	**0.26**	**0.078**	**0.658**	**9333**	**9351**	**0.120**	**0.170**	**0.007**	**0.143**	**0.001**	**0.008**	**0.011**	**0.001**
	Average	--	--	--	**3.86**	**0.709**	**7.86**	**0.29**	**0.26**	**0.069**	**0.658**	**8336**	**8354**	**0.107**	**0.170**	**0.007**	**0.143**	**0.001**	**0.008**	**0.011**	**0.001**
ST62_5	January	8	18	2	1.39	0.314	4.67	2.19	0.36	0.035	0.292	4151	4159	0.053	0.075	0.003	0.063	0.000	0.004	0.005	0.000
	July	17	19	2	1.39	0.314	3.66	2.19	0.36	0.041	0.292	4945	4953	0.064	0.075	0.003	0.063	0.000	0.004	0.005	0.000
	Maximum	--	--	--	**1.39**	**0.314**	**4.67**	**2.19**	**0.36**	**0.041**	**0.292**	**4945**	**4953**	**0.064**	**0.075**	**0.003**	**0.063**	**0.000**	**0.004**	**0.005**	**0.000**
	Average	--	--	--	**1.39**	**0.314**	**4.17**	**2.19**	**0.36**	**0.038**	**0.292**	**4548**	**4556**	**0.059**	**0.075**	**0.003**	**0.063**	**0.000**	**0.004**	**0.005**	**0.000**
ST62_10	January	8	18	2	0.79	0.167	2.88	1.24	0.21	0.023	0.155	2700	2704	0.035	0.040	0.002	0.034	0.000	0.002	0.003	0.000
	July	17	19	2	0.79	0.167	2.26	1.24	0.21	0.026	0.155	3160	3164	0.041	0.040	0.002	0.034	0.000	0.002	0.003	0.000
	Maximum	--	--	--	**0.79**	**0.167**	**2.88**	**1.24**	**0.21**	**0.026**	**0.155**	**3160**	**3164**	**0.041**	**0.040**	**0.002**	**0.034**	**0.000**	**0.002**	**0.003**	**0.000**
	Average	--	--	--	**0.79**	**0.167**	**2.57**	**1.24**	**0.21**	**0.024**	**0.155**	**2930**	**2934**	**0.038**	**0.040**	**0.002**	**0.034**	**0.000**	**0.002**	**0.003**	**0.000**
ST62_15	January	8	18	2	0.60	0.112	2.41	0.75	0.14	0.020	0.104	2443	2445	0.031	0.027	0.001	0.023	0.000	0.001	0.002	0.000
	July	17	19	2	0.60	0.112	1.89	0.75	0.14	0.023	0.104	2806	2809	0.036	0.027	0.001	0.023	0.000	0.001	0.002	0.000
	Maximum	--	--	--	**0.60**	**0.112**	**2.41**	**0.75**	**0.14**	**0.023**	**0.104**	**2806**	**2809**	**0.036**	**0.027**	**0.001**	**0.023**	**0.000**	**0.001**	**0.002**	**0.000**
	Average	--	--	--	**0.60**	**0.112**	**2.15**	**0.75**	**0.14**	**0.022**	**0.104**	**2624**	**2627**	**0.034**	**0.027**	**0.001**	**0.023**	**0.000**	**0.001**	**0.002**	**0.000**
ST62_20	January	8	18	2	0.52	0.084	2.06	0.49	0.11	0.018	0.078	2161	2163	0.028	0.020	0.001	0.017	0.000	0.001	0.001	0.000
	July	17	19	2	0.52	0.084	1.62	0.49	0.11	0.021	0.078	2466	2468	0.032	0.020	0.001	0.017	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.52**	**0.084**	**2.06**	**0.49**	**0.11**	**0.021**	**0.078**	**2466**	**2468**	**0.032**	**0.020**	**0.001**	**0.017**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.52**	**0.084**	**1.84**	**0.49**	**0.11**	**0.019**	**0.078**	**2313**	**2315**	**0.030**	**0.020**	**0.001**	**0.017**	**0.000**	**0.001**	**0.001**	**0.000**
ST62_25	January	8	18	2	0.47	0.071	1.85	0.43	0.10	0.017	0.066	2018	2020	0.026	0.017	0.001	0.014	0.000	0.001	0.001	0.000
	July	17	19	2	0.47	0.071	1.45	0.43	0.10	0.019	0.066	2289	2291	0.029	0.017	0.001	0.014	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.47**	**0.071**	**1.85**	**0.43**	**0.10**	**0.019**	**0.066**	**2289**	**2291**	**0.029**	**0.017**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.47**	**0.071**	**1.65**	**0.43**	**0.10**	**0.018**	**0.066**	**2154**	**2155**	**0.028**	**0.017**	**0.001**	**0.014**	**0.000**	**0.001**	**0.001**	**0.000**
ST62_30	January	8	18	2	0.42	0.060	1.76	0.34	0.08	0.017	0.055	1984	1986	0.026	0.014	0.001	0.012	0.000	0.001	0.001	0.000
	July	17	19	2	0.42	0.060	1.38	0.34	0.08	0.019	0.055	2236	2238	0.029	0.014	0.001	0.012	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.42**	**0.060**	**1.76**	**0.34**	**0.08**	**0.019**	**0.055**	**2236**	**2238**	**0.029**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.42**	**0.060**	**1.57**	**0.34**	**0.08**	**0.018**	**0.055**	**2110**	**2112**	**0.027**	**0.014**	**0.001**	**0.012**	**0.000**	**0.001**	**0.001**	**0.000**
ST62_35	January	8	18	2	0.38	0.054	1.53	0.27	0.06	0.014	0.050	1690	1691	0.022	0.013	0.001	0.011	0.000	0.001	0.001	0.000
	July	17	19	2	0.38	0.054	1.20	0.27	0.06	0.016	0.050	1908	1910	0.025	0.013	0.001	0.011	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.38**	**0.054**	**1.53**	**0.27**	**0.06**	**0.016**	**0.050**	**1908**	**1910**	**0.025**	**0.013**	**0.001**	**0.011**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.38**	**0.054**	**1.36**	**0.27**	**0.06**	**0.015**	**0.050**	**1799**	**1801**	**0.023**	**0.013**	**0.001**	**0.011**	**0.000**	**0.001**	**0.001**	**0.000**
ST62_40	January	8	18	2	0.36	0.048	1.46	0.21	0.06	0.014	0.044	1656	1658	0.021	0.011	0.000	0.010	0.000	0.001	0.001	0.000
	July	17	19	2	0.36	0.048	1.14	0.21	0.06	0.016	0.044	1862	1864	0.024	0.011	0.000	0.010	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.36**	**0.048**	**1.46**	**0.21**	**0.06**	**0.016**	**0.044**	**1862**	**1864**	**0.024**	**0.011**	**0.000**	**0.010**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.36**	**0.048**	**1.30**	**0.21**	**0.06**	**0.015**	**0.044**	**1759**	**1761**	**0.023**	**0.011**	**0.000**	**0.010**	**0.000**	**0.001**	**0.001**	**0.000**
ST62_45	January	8	18	2	0.34	0.043	1.41	0.17	0.05	0.014	0.040	1630	1631	0.021	0.010	0.000	0.009	0.000	0.001	0.001	0.000
	July	17	19	2	0.34	0.043	1.10	0.17	0.05	0.015	0.040	1827	1828	0.024	0.010	0.000	0.009	0.000	0.001	0.001	0.000
	Maximum	--	--	--	**0.34**	**0.043**	**1.41**	**0.17**	**0.05**	**0.015**	**0.040**	**1827**	**1828**	**0.024**	**0.010**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
	Average	--	--	--	**0.34**	**0.043**	**1.26**	**0.17**	**0.05**	**0.014**	**0.040**	**1728**	**1729**	**0.022**	**0.010**	**0.000**	**0.009**	**0.000**	**0.001**	**0.001**	**0.000**
ST62_50	January	8	18	2	0.32	0.039	1.35	0.12	0.04	0.013	0.036	1572	1573	0.020	0.009	0.000	0.008	0.000	0.000	0.001	0.000
	July	17	19	2	0.32	0.039	1.06	0.12	0.04	0.015	0.036	1759	1760	0.023	0.009	0.000	0.008	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.32**	**0.039**	**1.35**	**0.12**	**0.04**	**0.015**	**0.036**	**1759**	**1760**	**0.023**	**0.009**	**0.000**	**0.008**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.32**	**0.039**	**1.20**	**0.12**	**0.04**	**0.014**	**0.036**	**1665**	**1666**	**0.021**	**0.009**	**0.000**	**0.008**	**0.000**	**0.000**	**0.001**	**0.000**
ST62_55	January	8	18	2	0.31	0.036	1.30	0.08	0.03	0.013	0.034	1503	1504	0.019	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	July	17	19	2	0.31	0.036	1.02	0.08	0.03	0.014	0.034	1680	1681	0.022	0.009	0.000	0.007	0.000	0.000	0.001	0.000
	Maximum	--	--	--	**0.31**	**0.036**	**1.30**	**0.08**	**0.03**	**0.014**	**0.034**	**1680**	**1681**	**0.022**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**
	Average	--	--	--	**0.31**	**0.036**	**1.16**	**0.08**	**0.03**	**0.013**	**0.034**	**1591**	**1592**	**0.020**	**0.009**	**0.000**	**0.007**	**0.000**	**0.000**	**0.001**	**0.000**

SUMMARY OF EMISSIONS - CONTAINER VESSEL EMISSIONS INCREASE
NO ACTION ALTERNATIVE - 2020
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	Max HP [1]	Load [1] Factor	HP	Hr/Call (average)	NO_x		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
					g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Diesel (MDO)																										
Cruise/ RSZ / Maneuvering																										
Cruise (FNC Entrance to RSZ)	41,438	0.83	34,393	0.6	11.28	215,900	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Reduced Speed Zone - Incoming	41,438	0.10	4,112	2.3	11.28	108,847	1.04	10,072	0.14	1,362	0.13	1,253	0.45	4,316	0.27	2,602	439	4.2E+06	0.0045	43	0.023	223	446	4.3E+06	0.068	657
Maneuvering - Inbound	41,438	0.03	1,410	0.5	11.28	7,956	1.04	736	0.14	100	0.13	92	0.45	316	0.27	190	439	3.1E+05	0.0045	3	0.023	16	446	3.1E+05	0.068	48
Loading/Hotelling	41,438	-	-	23.0	11.28	-	1.04	-	0.14	-	0.13	-	0.45	-	0.27	-	439	0.0E+00	0.0045	-	0.023	-	446	0.0E+00	0.068	-
Maneuvering - Outgoing	41,438	0.05	2,105	0.5	11.28	11,876	1.04	1,099	0.14	149	0.13	137	0.45	471	0.27	284	439	4.6E+05	0.0045	5	0.023	24	446	4.7E+05	0.068	72
Reduced Speed Zone - Outbound	41,438	0.10	4,112	2.3	11.28	108,847	1.04	10,072	0.14	1,362	0.13	1,253	0.45	4,316	0.27	2,602	439	4.2E+06	0.0045	43	0.023	223	446	4.3E+06	0.068	657
Cruise (RSZ to FNC Entrance)	41,438	0.83	34,393	0.6	11.28	215,900	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Cruise/ RSZ /Hotelling/ Maneuvering Total				29.8		669,326		61,934		8,373		7,703		26,543		16,000		2.6E+07		266		1,372.4		2.6E+07		4,039.8
Auxiliary Engines (MGO) [2]																										
Cruise/ RSZ / Maneuvering																										
Cruise (9 nautical mile CZB to RSZ)	9,116	0.13	1,185	1.0	9.23	10,933	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Reduced Speed Zone - Incoming	9,116	0.25	2,279	2.9	9.23	61,662	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Maneuvering - Incoming	9,116	0.48	4,376	0.5	9.23	20,184	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Loading/Hotelling	9,116	0.19	1,732	23.0	9.23	367,515	0.82	32,679	0.13	5,347	0.13	5,050	3.0E-01	11,883	0.31	12,477	515	2.1E+07	3.0E-03	119	2.3E-02	922	522	2.1E+07	0.068	2,713
Maneuvering - Outgoing	9,116	0.48	4,376	0.5	9.23	20,184	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Reduced Speed Zone - Outgoing	9,116	0.25	2,279	2.9	9.23	61,662	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Cruise (RSZ to FNC Entrance)	9,116	0.13	1,185	1.0	9.23	10,933	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Cruise/ RSZ / Maneuvering Total				31.9		553,071		49,178		8,047		7,600		17,883		18,777		3.1E+07		179		1,387.0		3.1E+07		4,082.6
Auxiliary Boiler (MGO)																										
Maneuvering - Incoming	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Loading/Hotelling	679	0.85	577	23.0	1.49	19,785	0.15	1,978	0.13	1,682	0.11	1,484	0.07	989	0.43	5,639	688	9.1E+06	0.001	20	0.060	792	706	9.4E+06	0.068	903
Maneuvering - Outgoing	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Auxiliary Boiler Total				24.0		20,645		2,065		1,755		1,548		1,032		5,884		9.5E+06		21		826		9.8E+06		943

Assist Activity	Miles	Speed (kn	Time (Hours)
Cruise (FNC Entrance to RSZ)	13	20.3	0.6
Reduced Speed Zone	27	10	2.3
Maneuver (Inbound)	0	7	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	8	0.5
Reduced Speed Zone	27	10	2.3
Cruise (RSZ to FNC Entrance)	13	20.3	0.6
Total			**29.8**

Fuel	% Calls	Mode	Calls/Year	Emissions (Tons Per Year)										
				NO_x	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
MDO	100%	Diesel Engine	**192**	141.53	13.10	1.77	1.63	5.61	3.38	5,508	0.06	0.29	5,076	0.85
MGO	100%	Auxiliary Engines	**192**	116.95	10.399	1.70	1.61	3.78	3.97	6,529	0.04	0.29	6,003.55	0.86
MGO	100%	Auxiliary Boiler	**192**	4.37	0.44	0.37	0.33	0.22	1.24	2,015	0.00	0.17	1,874.91	0.20
		Total		**262.84**	**23.93**	**3.84**	**3.56**	**9.61**	**8.60**	**14,052**	**0.10**	**0.76**	**12,955**	**1.92**
		Container Plus Tugboat Emissions Total		**335.26**	**42.15**	**5.78**	**5.44**	**11.61**	**8.65**	**19,151**	**0.76**	**0.91**	**17,636**	**2.59**

Marine Diesel Oil (0.10 % Sulfur)			Marine Gas Oil (0.10% Sulfur)		
Pollutant	**g/kw-hr [3]**	**g/hp-hr**	**Pollutant**	**g/kw-hr [4]**	**g/hp-hr**
NOx	15.13	11.28	NOx	12.37	9.23
CO	1.40	1.04	CO	1.10	0.82
PM_{10}	0.19	0.14	PM_{10}	0.18	0.13
$PM_{2.5}$	0.17	0.13	$PM_{2.5}$	0.17	0.13
VOC	0.60	0.45	VOC	0.40	0.30
SO_2	0.36	0.27	SO_2	0.42	0.31
CO_2	589	439	CO_2	691	515
CH_4	0.006	0.0045	CH_4	0.004	0.003
N_2O	0.031	0.023	N_2O	0.031	0.02

Auxiliary Boiler Emission Factors**		
Pollutant	**g/kw-hr [5]**	**g/hp-hr**
NOx	2.00	1.49
CO	0.20	0.15
PM_{10}	0.17	0.13
$PM_{2.5}$	0.15	0.11
VOC	0.10	0.07
SO_2	0.57	0.43
CO_2	923	688
CH_4	0.002	0.001
N_2O	0.080	0.06

** Steam Turbine Emission Factors
Marine Gas Oil (0.10% Sulfur)

HAP Emission Factors [6]		
HAP*	**lb/MMBtu**	**g/HP-hr**
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyd	7.89E-05	9.11E-05
Acetaldehyd	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower rating and load factors for auxiliary engines are based on U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009, Tables 2-4 and 2-7.
2. Auxiliary Engine horsepower is assumed to be 22% of main propulsion engine based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 2-4.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Tables 2-9 & 2-13 (assumes Slow Speed Diesel (SSD) engine model year 2000 or later).
4. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-13 & 2-16
5. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-9 & 2-13 (emission factor for Steam Turbine).
6. Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.

SUMMARY OF EMISSIONS - ASSIST TUGBOAT EMISSIONS
NO ACTION ALTERNATIVE - 2020
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	No. of Tugs	Engine /Tug	HP/ Engine [1]	Load Factor[2]	Hr/Call (average)	NOx		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
						g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Main Engines																											
Cruise	-	2	2,065			7.3		1.9		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	2,065	0.79	2.9	7.3	139,879	1.9	35,683	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Maneuvering	2	2	2,065	0.79	0.5	7.3	23,847	1.9	6,083	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Maneuvering	2	2	2,065	0.79	0.5	7.3	23,847	1.9	6,083	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Reduced Speed Zone	2	2	2,065	0.79	2.9	7.3	139,879	1.9	35,683	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Loading/Hotelling		2	2,065			7.3		1.9		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Total					6.9		327,452		83,534		8,621		8,362		9,022		217		23,055,270		3,009		669		23,329,799		3,051
Auxiliary Engines																											
Cruise	-	2	134			7.3		1.3		0.26		0.25		0.20		0.00		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	134	0.56	2.9	7.3	6,438	1.3	1,117	0.26	226	0.25	219	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Maneuvering	2	2	134	0.56	0.5	7.3	1,098	1.3	190	0.26	39	0.25	37	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Maneuvering	2	2	134	0.56	0.5	7.3	1,098	1.3	190	0.26	39	0.25	37	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Reduced Speed Zone	2	2	134	0.56	2.9	7.3	6,438	1.3	1,117	0.26	226	0.25	219	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Loading/Hotelling		2	134			7.3		1.3		0.26		0.25		0.20		0.00		515		0.07		0.01		521		0.07	
Total					6.9		15,072		2,614		529		513		415		10		1,061,163		139		31		1,073,799		140

Assist Activity	Miles	Speed (knots)	Time (Hours)
Cruise (FNC Entrance to RSZ)	13		
Reduced Speed Zone	27	8	2.9
Maneuver (Inbound)	0	0	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	0	0.5
Reduced Speed Zone	27	8	2.9
Cruise (RSZ to FNC Entrance)	13		
Total			**29.9**

Pollutant	Main Engines[3]		Auxiliary Engines[3]	
	g/kw-hr	g/hp-hr	g/kw-hr	g/hp-hr
NOx	9.8	7.3	9.8	7.31
CO	2.5	1.9	1.7	1.27
PM_{10}[4]	0.26	0.19	0.34	0.26
$PM_{2.5}$[5]	0.25	0.19	0.33	0.25
VOC	0.27	0.20	0.27	0.20
SO_2[4]	0.01	0.00	0.01	0.005
CO_2	690	515	690	515
CH_4	0.09	0.07	0.09	0.07
N_2O	0.02	0.01	0.02	0.01

Calls/Year	Mode	Emissions (Tons Per Year)										
		NOx	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
192	Main Engines	69.24	17.66	1.82	1.77	1.91	4.6E-02	4,875	6.4E-01	1.4E-01	4,475	6.5E-01
	Auxiliary Engines	3.19	0.55	0.11	0.11	0.09	2.1E-03	224	2.9E-02	6.5E-03	206	3.0E-02
	Total	**72.43**	**18.22**	**1.93**	**1.88**	**2.00**	**0.05**	**5,099**	**0.67**	**0.15**	**4,681**	**0.67**

HAP Emission Factors [6]

HAP*	lb/MMBtu	g/HP-hr
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyde	7.89E-05	9.11E-05
Acetaldehyde	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower ratings are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventori* es, ICF International, April 2009, Table 3-10.
2. Load factors are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-3.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-8 (assumes the use of Category 1, Tier 1 engines built after 2000).
4. Corrected per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-9 (assumes the use of only ULSD fuel).
5. $PM_{2.5}$ = 0.97 x PM_{10} per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Page 3-9
6. *Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.*

SUMMARY OF EMISSIONS - CONTAINER VESSEL EMISSIONS INCREASE
NO ACTION ALTERNATIVE - 2060
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	Max HP [1]	Load [1] Factor	HP	Hr/Call (average)	NO_x		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
					g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Diesel (MDO)																										
Cruise/ RSZ / Maneuvering																										
Cruise (FNC Entrance to RSZ)	41,438	0.83	34,393	0.6	7.55	144,532	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Reduced Speed Zone - Incoming	41,438	0.10	4,112	2.3	7.55	72,866	1.04	10,072	0.14	1,362	0.13	1,253	0.45	4,316	0.27	2,602	439	4.2E+06	0.0045	43	0.023	223	446	4.3E+06	0.068	657
Maneuvering - Inbound	41,438	0.03	1,410	0.5	7.55	5,326	1.04	736	0.14	100	0.13	92	0.45	316	0.27	190	439	3.1E+05	0.0045	3	0.023	16	446	3.1E+05	0.068	48
Loading/Hotelling	41,438	-	-	23.0	7.55	-	1.04	-	0.14	-	0.13	-	0.45	-	0.27	-	439	0.0E+00	0.0045	-	0.023	-	446	0.0E+00	0.068	-
Maneuvering - Outgoing	41,438	0.05	2,105	0.5	7.55	7,950	1.04	1,099	0.14	149	0.13	137	0.45	471	0.27	284	439	4.6E+05	0.0045	5	0.023	24	446	4.7E+05	0.068	72
Reduced Speed Zone - Outbound	41,438	0.13	5,473	2.1	7.55	88,168	1.04	12,187	0.14	1,647	0.13	1,516	0.45	5,223	0.27	3,148	439	5.1E+06	0.0045	52	0.023	270	446	5.2E+06	0.068	795
Cruise (RSZ to FNC Entrance)	41,438	0.83	34,393	0.6	7.55	144,532	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Cruise/ RSZ /Hotelling/ Maneuvering Total				29.6		463,374		64,049		8,659		7,966		27,449		16,547		2.7E+07		275		1,419.3		2.7E+07		4,177.8
Auxiliary Engines (MGO) [2]																										
Cruise/ RSZ / Maneuvering																										
Cruise (9 nautical mile CZB to RSZ)	9,116	0.13	1,185	1.0	6.06	7,176	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Reduced Speed Zone - Incoming	9,116	0.25	2,279	2.9	6.06	40,475	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Maneuvering - Incoming	9,116	0.48	4,376	0.5	6.06	13,249	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Loading/Hotelling	9,116	0.19	1,732	23.0	6.06	241,238	0.82	32,679	0.13	5,347	0.13	5,050	3.0E-01	11,883	0.31	12,477	515	2.1E+07	3.0E-03	119	2.3E-02	922	522	2.1E+07	0.068	2,713
Maneuvering - Outgoing	9,116	0.48	4,376	0.5	6.06	13,249	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Reduced Speed Zone - Outgoing	9,116	0.25	2,279	2.9	6.06	40,475	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Cruise (RSZ to FNC Entrance)	9,116	0.13	1,185	1.0	6.06	7,176	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Cruise/ RSZ / Maneuvering Total				31.9		363,039		49,178		8,047		7,600		17,883		18,777		3.1E+07		179		1,387.0		3.1E+07		4,082.6
Auxiliary Boiler (MGO)																										
Maneuvering - Incoming	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Loading/Hotelling	679	0.85	577	23.0	1.49	19,785	0.15	1,978	0.13	1,682	0.11	1,484	0.07	989	0.43	5,639	688	9.1E+06	0.001	20	0.060	792	706	9.4E+06	0.068	903
Maneuvering - Outgoing	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Auxiliary Boiler Total				24.0		20,645		2,065		1,755		1,548		1,032		5,884		9.5E+06		21		826		9.8E+06		943

Assist Activity	Miles	Speed (kn	Time (Hours)
Cruise (FNC Entrance to RSZ)	13	20.3	0.6
Reduced Speed Zone	27	10	2.3
Maneuver (Inbound)	0	7	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	8	0.5
Reduced Speed Zone	27	11	2.1
Cruise (RSZ to FNC Entrance)	13	20.3	0.6
Total			**29.6**

Fuel	% Calls	Mode	Calls/Year	Emissions (Tons Per Year)										
				NO_x	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
MDO	100%	Diesel Engine	**667**	340.52	47.07	6.36	5.85	20.17	12.16	19,795	0.20	1.04	18,244	3.07
MGO	100%	Auxiliary Engines	**667**	266.79	36.140	5.91	5.59	13.14	13.80	22,693	0.13	1.02	20,865.06	3.00
MGO	100%	Auxiliary Boiler	**667**	15.17	1.52	1.29	1.14	0.76	4.32	7,001	0.02	0.61	6,516.18	0.69
		Total		**622.48**	**84.72**	**13.57**	**12.58**	**34.07**	**30.28**	**49,489**	**0.35**	**2.67**	**45,626**	**6.76**
		Container Plus Tugboat Emissions Total		**797.14**	**213.15**	**20.19**	**19.00**	**41.01**	**30.45**	**67,212**	**2.66**	**3.18**	**61,895**	**9.11**

Marine Diesel Oil (0.10 % Sulfur)			Marine Gas Oil (0.10% Sulfur)		
Pollutant	**g/kw-hr** [3, 4]	**g/hp-hr**	**Pollutant**	**g/kw-hr** [4, 5]	**g/hp-hr**
NOx	10.13	7.55	NOx	8.12	6.06
CO	1.40	1.04	CO	1.10	0.82
PM_{10}	0.19	0.14	PM_{10}	0.18	0.13
$PM_{2.5}$	0.17	0.13	$PM_{2.5}$	0.17	0.13
VOC	0.60	0.45	VOC	0.40	0.30
SO_2	0.36	0.27	SO_2	0.42	0.31
CO_2	589	439	CO_2	691	515
CH_4	0.006	0.0045	CH_4	0.004	0.003
N_2O	0.031	0.023	N_2O	0.031	0.02

Auxiliary Boiler Emission Factors**		
Pollutant	**g/kw-hr** [6]	**g/hp-hr**
NOx	2.00	1.49
CO	0.20	0.15
PM_{10}	0.17	0.13
$PM_{2.5}$	0.15	0.11
VOC	0.10	0.07
SO_2	0.57	0.43
CO_2	923	688
CH_4	0.002	0.001
N_2O	0.080	0.06

** Steam Turbine Emission Factors
Marine Gas Oil (0.10% Sulfur)

HAP Emission Factors [7]		
HAP*	**lb/MMBtu**	**g/HP-hr**
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyd	7.89E-05	9.11E-05
Acetaldehyd	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower rating and load factors for auxiliary engines are based on U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009, Tables 2-4 and 2-7.
2. Auxiliary Engine horsepower is assumed to be 22% of main propulsion engine based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 2-4.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Tables 2-9 & 2-13 (assumes Slow Speed Diesel (SSD).
4. Corrected for Emission Area Control Standards and International Ship Engine and Fuel Standards (MARPOL Annex VI). Assumes engine model year 2020.
5. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-13 & 2-16
6. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-9 & 2-13 (emission factor for Steam Turbine).
7. Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.

SUMMARY OF EMISSIONS - ASSIST TUGBOAT EMISSIONS
NO ACTION ALTERNATIVE - 2060
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	No. of Tugs	Engine /Tug	HP/ Engine [1]	Load Factor[2]	Hr/Call (average)	NOx		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
						g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Main Engines																											
Cruise	-	2	2,065			5.1		3.7		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	2,065	0.79	2.9	5.1	97,059	3.7	71,367	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Maneuvering	2	2	2,065	0.79	0.5	5.1	16,547	3.7	12,167	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Maneuvering	2	2	2,065	0.79	0.5	5.1	16,547	3.7	12,167	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Reduced Speed Zone	2	2	2,065	0.79	2.9	5.1	97,059	3.7	71,367	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Loading/Hotelling		2	2,065			5.1		3.7		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Total					6.9		227,211		167,067		8,621		8,362		9,022		217		23,055,270		3,009		669		23,329,799		3,051
Auxiliary Engines																											
Cruise	-	2	134			5.1		3.7		0.19		0.19		0.20		0.00		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	134	0.56	2.9	5.1	4,467	3.7	3,285	0.19	169	0.19	164	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Maneuvering	2	2	134	0.56	0.5	5.1	762	3.7	560	0.19	29	0.19	28	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Maneuvering	2	2	134	0.56	0.5	5.1	762	3.7	560	0.19	29	0.19	28	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Reduced Speed Zone	2	2	134	0.56	2.9	5.1	4,467	3.7	3,285	0.19	169	0.19	164	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Loading/Hotelling		2	134			5.1		3.7		0.19		0.19		0.20		0.00		515		0.07		0.01		521		0.07	
Total					6.9		10,458		7,690		397		385		415		10		1,061,163		139		31		1,073,799		140

Assist Activity	Miles	Speed (knots)	Time (Hours)
Cruise (FNC Entrance to RSZ)	13		
Reduced Speed Zone	27	8	2.9
Maneuver (Inbound)	0	0	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	0	0.5
Reduced Speed Zone	27	8	2.9
Cruise (RSZ to FNC Entrance)	13		
Total			**29.9**

Pollutant	Main Engines[3]		Auxiliary Engines[3]	
	g/kw-hr	g/hp-hr	g/kw-hr	g/hp-hr
NOx	6.8	5.1	6.8	5.07
CO	5.0	3.7	5.0	3.73
PM_{10}[4]	0.26	0.19	0.26	0.19
$PM_{2.5}$[5]	0.25	0.19	0.25	0.19
VOC	0.27	0.20	0.27	0.20
SO_2[4]	0.01	0.00	0.01	0.00
CO_2	690	515	690	515
CH_4	0.09	0.07	0.09	0.07
N_2O	0.02	0.01	0.02	0.01

Calls/Year	Mode	Emissions (Tons Per Year)										
		NOx	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
667	Main Engines	166.97	122.77	6.34	6.15	6.63	1.6E-01	16,943	2.2E+00	4.9E-01	15,553	2.2E+00
	Auxiliary Engines	7.69	5.65	0.29	0.28	0.31	7.3E-03	780	1.0E-01	2.3E-02	716	1.0E-01
	Total	**174.66**	**128.42**	**6.63**	**6.43**	**6.93**	**0.17**	**17,723**	**2.31**	**0.51**	**16,269**	**2.35**

HAP Emission Factors [6]

HAP*	lb/MMBtu	g/HP-hr
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyde	7.89E-05	9.11E-05
Acetaldehyde	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower ratings are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventori* es, ICF International, April 2009, Table 3-10.
2. Load factors are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-3.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-8 (assumes the use of Category 1, Tier 2 engines).
4. Corrected per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-9 (assumes the use of only ULSD fuel).
5. $PM_{2.5}$ = 0.97 x PM_{10} per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Page 3-9
6. *Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.*

SUMMARY OF EMISSIONS - CONTAINER VESSEL EMISSIONS INCREASE
PROPOSED PROJECT ALTERNATIVE - 2020
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	Max HP [1]	Load [1] Factor	HP	Hr/Call (average)	NO_x		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
					g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Diesel (MDO)																										
Cruise/ RSZ / Maneuvering																										
Cruise (FNC Entrance to RSZ)	41,438	0.83	34,393	0.6	11.28	215,900	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Reduced Speed Zone - Incoming	41,438	0.10	4,112	2.3	11.28	108,847	1.04	10,072	0.14	1,362	0.13	1,253	0.45	4,316	0.27	2,602	439	4.2E+06	0.0045	43	0.023	223	446	4.3E+06	0.068	657
Maneuvering - Inbound	41,438	0.03	1,410	0.5	11.28	7,956	1.04	736	0.14	100	0.13	92	0.45	316	0.27	190	439	3.1E+05	0.0045	3	0.023	16	446	3.1E+05	0.068	48
Loading/Hotelling	41,438	-	-	23.0	11.28	-	1.04	-	0.14	-	0.13	-	0.45	-	0.27	-	439	0.0E+00	0.0045	-	0.023	-	446	0.0E+00	0.068	-
Maneuvering - Outgoing	41,438	0.05	2,105	0.5	11.28	11,876	1.04	1,099	0.14	149	0.13	137	0.45	471	0.27	284	439	4.6E+05	0.0045	5	0.023	24	446	4.7E+05	0.068	72
Reduced Speed Zone - Outbound	41,438	0.13	5,473	2.1	11.28	131,704	1.04	12,187	0.14	1,647	0.13	1,516	0.45	5,223	0.27	3,148	439	5.1E+06	0.0045	52	0.023	270	446	5.2E+06	0.068	795
Cruise (RSZ to FNC Entrance)	41,438	0.83	34,393	0.6	11.28	215,900	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Cruise/ RSZ /Hotelling/ Maneuvering Total				29.6		692,184		64,049		8,659		7,966		27,449		16,547		2.7E+07		275		1,419.3		2.7E+07		4,177.8
Auxiliary Engines (MGO) [2]																										
Cruise/ RSZ / Maneuvering																										
Cruise (9 nautical mile CZB to RSZ)	9,116	0.13	1,185	1.0	9.23	10,933	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Reduced Speed Zone - Incoming	9,116	0.25	2,279	2.9	9.23	61,662	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Maneuvering - Incoming	9,116	0.48	4,376	0.5	9.23	20,184	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Loading/Hotelling	9,116	0.19	1,732	23.0	9.23	367,515	0.82	32,679	0.13	5,347	0.13	5,050	3.0E-01	11,883	0.31	12,477	515	2.1E+07	3.0E-03	119	2.3E-02	922	522	2.1E+07	0.068	2,713
Maneuvering - Outgoing	9,116	0.48	4,376	0.5	9.23	20,184	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Reduced Speed Zone - Outgoing	9,116	0.25	2,279	2.9	9.23	61,662	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Cruise (RSZ to FNC Entrance)	9,116	0.13	1,185	1.0	9.23	10,933	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Cruise/ RSZ / Maneuvering Total				31.9		553,071		49,178		8,047		7,600		17,883		18,777		3.1E+07		179		1,387.0		3.1E+07		4,082.6
Auxiliary Boiler (MGO)																										
Maneuvering - Incoming	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Loading/Hotelling	679	0.85	577	23.0	1.49	19,785	0.15	1,978	0.13	1,682	0.11	1,484	0.07	989	0.43	5,639	688	9.1E+06	0.001	20	0.060	792	706	9.4E+06	0.068	903
Maneuvering - Outgoing	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Auxiliary Boiler Total				24.0		20,645		2,065		1,755		1,548		1,032		5,884		9.5E+06		21		826		9.8E+06		943

Assist Activity	Miles	Speed (kn	Time (Hours)
Cruise (FNC Entrance to RSZ)	13	20.3	0.6
Reduced Speed Zone	27	10	2.3
Maneuver (Inbound)	0	7	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	8	0.5
Reduced Speed Zone	27	11	2.1
Cruise (RSZ to FNC Entrance)	13	20.3	0.6
Total			**29.6**

Fuel	% Calls	Mode	Calls/Year	Emissions (Tons Per Year)										
				NO_x	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
MDO	100%	Diesel Engine	**325**	248.09	22.96	3.10	2.86	9.84	5.93	9,655	0.10	0.51	8,898	1.50
MGO	100%	Auxiliary Engines	**325**	198.23	17.626	2.88	2.72	6.41	6.73	11,068	0.06	0.50	10,176.56	1.46
MGO	100%	Auxiliary Boiler	**325**	7.40	0.74	0.63	0.55	0.37	2.11	3,415	0.01	0.30	3,178.15	0.34
		Total		**453.73**	**41.32**	**6.62**	**6.13**	**16.62**	**14.77**	**24,138**	**0.17**	**1.30**	**22,253**	**3.30**
		Container Plus Tugboat Emissions Total		**526.15**	**59.54**	**8.55**	**8.01**	**18.61**	**14.82**	**29,237**	**0.84**	**1.45**	**26,934**	**3.97**

Marine Diesel Oil (0.10 % Sulfur)			Marine Gas Oil (0.10% Sulfur)		
Pollutant	**g/kw-hr [3]**	**g/hp-hr**	**Pollutant**	**g/kw-hr [4]**	**g/hp-hr**
NOx	15.13	11.28	NOx	12.37	9.23
CO	1.40	1.04	CO	1.10	0.82
PM_{10}	0.19	0.14	PM_{10}	0.18	0.13
$PM_{2.5}$	0.17	0.13	$PM_{2.5}$	0.17	0.13
VOC	0.60	0.45	VOC	0.40	0.30
SO_2	0.36	0.27	SO_2	0.42	0.31
CO_2	589	439	CO_2	691	515
CH_4	0.006	0.0045	CH_4	0.004	0.003
N_2O	0.031	0.023	N_2O	0.031	0.02

Auxiliary Boiler Emission Factors**		
Pollutant	**g/kw-hr [5]**	**g/hp-hr**
NOx	2.00	1.49
CO	0.20	0.15
PM_{10}	0.17	0.13
$PM_{2.5}$	0.15	0.11
VOC	0.10	0.07
SO_2	0.57	0.43
CO_2	923	688
CH_4	0.002	0.001
N_2O	0.080	0.06

** Steam Turbine Emission Factors
Marine Gas Oil (0.10% Sulfur)

HAP Emission Factors [6]		
HAP*	**lb/MMBtu**	**g/HP-hr**
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyd	7.89E-05	9.11E-05
Acetaldehyd	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower rating and load factors for auxiliary engines are based on U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009, Tables 2-4 and 2-7.
2. Auxiliary Engine horsepower is assumed to be 22% of main propulsion engine based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 2-4.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Tables 2-9 & 2-13 (assumes Slow Speed Diesel (SSD) engine model year 2000 or later).
4. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-13 & 2-16
5. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-9 & 2-13 (emission factor for Steam Turbine).
6. Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.

SUMMARY OF EMISSIONS - ASSIST TUGBOAT EMISSIONS
PROPOSED PROJECT ALTERNATIVE - 2020
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	No. of Tugs	Engine /Tug	HP/ Engine [1]	Load Factor[2]	Hr/Call (average)	NOx		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
						g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Main Engines																											
Cruise	-	2	2,065			7.3		1.9		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	2,065	0.79	2.9	7.3	139,879	1.9	35,683	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Maneuvering	2	2	2,065	0.79	0.5	7.3	23,847	1.9	6,083	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Maneuvering	2	2	2,065	0.79	0.5	7.3	23,847	1.9	6,083	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Reduced Speed Zone	2	2	2,065	0.79	2.9	7.3	139,879	1.9	35,683	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Loading/Hotelling		2	2,065			7.3		1.9		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Total					6.9		327,452		83,534		8,621		8,362		9,022		217		23,055,270		3,009		669		23,329,799		3,051
Auxiliary Engines																											
Cruise	-	2	134			7.3		1.3		0.26		0.25		0.20		0.00		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	134	0.56	2.9	7.3	6,438	1.3	1,117	0.26	226	0.25	219	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Maneuvering	2	2	134	0.56	0.5	7.3	1,098	1.3	190	0.26	39	0.25	37	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Maneuvering	2	2	134	0.56	0.5	7.3	1,098	1.3	190	0.26	39	0.25	37	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Reduced Speed Zone	2	2	134	0.56	2.9	7.3	6,438	1.3	1,117	0.26	226	0.25	219	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Loading/Hotelling		2	134			7.3		1.3		0.26		0.25		0.20		0.00		515		0.07		0.01		521		0.07	
Total					6.9		15,072		2,614		529		513		415		10		1,061,163		139		31		1,073,799		140

Assist Activity	Miles	Speed (knots)	Time (Hours)
Cruise (FNC Entrance to RSZ)	13		
Reduced Speed Zone	27	8	2.9
Maneuver (Inbound)	0	0	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	0	0.5
Reduced Speed Zone	27	8	2.9
Cruise (RSZ to FNC Entrance)	13		
Total			**29.9**

Pollutant	Main Engines[3]		Auxiliary Engines[3]	
	g/kw-hr	g/hp-hr	g/kw-hr	g/hp-hr
NOx	9.8	7.3	9.8	7.31
CO	2.5	1.9	1.7	1.27
PM_{10}[4]	0.26	0.19	0.34	0.26
$PM_{2.5}$[5]	0.25	0.19	0.33	0.25
VOC	0.27	0.20	0.27	0.20
SO_2[4]	0.01	0.00	0.01	0.00
CO_2	690	515	690	515
CH_4	0.09	0.07	0.09	0.07
N_2O	0.02	0.01	0.02	0.01

Calls/Year	Mode	Emissions (Tons Per Year)										
		NOx	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
325	Main Engines	117.37	29.94	3.09	3.00	3.23	7.8E-02	8,264	1.1E+00	2.4E-01	7,586	1.1E+00
	Auxiliary Engines	5.40	0.94	0.19	0.18	0.15	3.6E-03	380	5.0E-02	1.1E-02	349	5.0E-02
	Total	**122.77**	**30.88**	**3.28**	**3.18**	**3.38**	**0.08**	**8,644**	**1.13**	**0.25**	**7,935**	**1.14**

HAP Emission Factors [6]

HAP*	lb/MMBtu	g/HP-hr
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyde	7.89E-05	9.11E-05
Acetaldehyde	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower ratings are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventori* es, ICF International, April 2009, Table 3-10.
2. Load factors are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-3.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-8 (assumes the use of Category 1, Tier 1 engines built after 2000).
4. Corrected per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-9 (assumes the use of only ULSD fuel).
5. $PM_{2.5}$ = 0.97 x PM_{10} per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Page 3-9
6. *Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.*

SUMMARY OF EMISSIONS - CONTAINER VESSEL EMISSIONS INCREASE
PROPOSED PROJECT ALTERNATIVE - 2060
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	Max HP [1]	Load Factor [1]	HP	Hr/Call (average)	NO_x		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
					g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Diesel (MDO)																										
Cruise/ RSZ / Maneuvering																										
Cruise (FNC Entrance to RSZ)	41,438	0.83	34,393	0.6	7.55	144,532	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Reduced Speed Zone - Incoming	41,438	0.10	4,112	2.3	7.55	72,866	1.04	10,072	0.14	1,362	0.13	1,253	0.45	4,316	0.27	2,602	439	4.2E+06	0.0045	43	0.023	223	446	4.3E+06	0.068	657
Maneuvering - Inbound	41,438	0.03	1,410	0.5	7.55	5,326	1.04	736	0.14	100	0.13	92	0.45	316	0.27	190	439	3.1E+05	0.0045	3	0.023	16	446	3.1E+05	0.068	48
Loading/Hotelling	41,438	-	-	23.0	7.55	-	1.04	-	0.14	-	0.13	-	0.45	-	0.27	-	439	0.0E+00	0.0045	-	0.023	-	446	0.0E+00	0.068	-
Maneuvering - Outgoing	41,438	0.05	2,105	0.5	7.55	7,950	1.04	1,099	0.14	149	0.13	137	0.45	471	0.27	284	439	4.6E+05	0.0045	5	0.023	24	446	4.7E+05	0.068	72
Reduced Speed Zone - Outbound	41,438	0.13	5,473	2.1	7.55	88,168	1.04	12,187	0.14	1,647	0.13	1,516	0.45	5,223	0.27	3,148	439	5.1E+06	0.0045	52	0.023	270	446	5.2E+06	0.068	795
Cruise (RSZ to FNC Entrance)	41,438	0.83	34,393	0.6	7.55	144,532	1.04	19,978	0.14	2,701	0.13	2,485	0.45	8,562	0.27	5,161	439	8.4E+06	0.0045	86	0.023	443	446	8.5E+06	0.068	1,303
Cruise/ RSZ /Hotelling/ Maneuvering Total				29.6		463,374		64,049		8,659		7,966		27,449		16,547		2.7E+07		275		1,419.3		2.7E+07		4,177.8
Auxiliary Engines (MGO) [2]																										
Cruise/ RSZ / Maneuvering																										
Cruise (9 nautical mile CZB to RSZ)	9,116	0.13	1,185	1.0	6.06	7,176	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Reduced Speed Zone - Incoming	9,116	0.25	2,279	2.9	6.06	40,475	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Maneuvering - Incoming	9,116	0.48	4,376	0.5	6.06	13,249	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Loading/Hotelling	9,116	0.19	1,732	23.0	6.06	241,238	0.82	32,679	0.13	5,347	0.13	5,050	3.0E-01	11,883	0.31	12,477	515	2.1E+07	3.0E-03	119	2.3E-02	922	522	2.1E+07	0.068	2,713
Maneuvering - Outgoing	9,116	0.48	4,376	0.5	6.06	13,249	0.82	1,795	0.13	294	0.13	277	3.0E-01	653	0.31	685	515	1.1E+06	3.0E-03	7	2.3E-02	51	522	1.1E+06	0.068	149
Reduced Speed Zone - Outgoing	9,116	0.25	2,279	2.9	6.06	40,475	0.82	5,483	0.13	897	0.13	847	3.0E-01	1,994	0.31	2,093	515	3.4E+06	3.0E-03	20	2.3E-02	155	522	3.5E+06	0.068	455
Cruise (RSZ to FNC Entrance)	9,116	0.13	1,185	1.0	6.06	7,176	0.82	972	0.13	159	0.13	150	3.0E-01	354	0.31	371	515	6.1E+05	3.0E-03	4	2.3E-02	27	522	6.2E+05	0.068	81
Cruise/ RSZ / Maneuvering Total				31.9		363,039		49,178		8,047		7,600		17,883		18,777		3.1E+07		179		1,387.0		3.1E+07		4,082.6
Auxiliary Boiler (MGO)																										
Maneuvering - Incoming	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Loading/Hotelling	679	0.85	577	23.0	1.49	19,785	0.15	1,978	0.13	1,682	0.11	1,484	0.07	989	0.43	5,639	688	9.1E+06	0.001	20	0.060	792	706	9.4E+06	0.068	903
Maneuvering - Outgoing	679	0.85	577	0.5	1.49	430	0.15	43	0.13	37	0.11	32	0.07	22	0.43	123	688	2.0E+05	0.001	0	0.060	17	706	2.0E+05	0.068	20
Auxiliary Boiler Total				24.0		20,645		2,065		1,755		1,548		1,032		5,884		9.5E+06		21		826		9.8E+06		943

Assist Activity	Miles	Speed (kn	Time (Hours)
Cruise (FNC Entrance to RSZ)	13	20.3	0.6
Reduced Speed Zone	27	10	2.3
Maneuver (Inbound)	0	7	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	8	0.5
Reduced Speed Zone	27	11	2.1
Cruise (RSZ to FNC Entrance)	13	20.3	0.6
Total			**29.6**

Fuel	% Calls	Mode	Calls/Year	Emissions (Tons Per Year)										
				NO_x	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
MDO	100%	Diesel Engine	**1,133**	578.89	80.02	10.82	9.95	34.29	20.67	33,652	0.34	1.77	31,015	5.22
MGO	100%	Auxiliary Engines	**1,133**	453.54	61.437	10.05	9.49	22.34	23.46	38,578	0.22	1.73	35,470.60	5.10
MGO	100%	Auxiliary Boiler	**1,133**	25.79	2.58	2.19	1.93	1.29	7.35	11,903	0.03	1.03	11,077.50	1.18
		Total		**1,058.22**	**144.03**	**23.06**	**21.38**	**57.92**	**51.48**	**84,132**	**0.59**	**4.54**	**77,564**	**11.50**
		Container Plus Tugboat Emissions Total		**1,355.14**	**362.35**	**34.33**	**32.31**	**69.71**	**51.76**	**114,260**	**4.53**	**5.41**	**105,221**	**15.48**

Marine Diesel Oil (0.10 % Sulfur)			Marine Gas Oil (0.10% Sulfur)		
Pollutant	g/kw-hr [3, 4]	g/hp-hr	Pollutant	g/kw-hr [4, 5]	g/hp-hr
NOx	10.13	7.55	NOx	8.12	6.06
CO	1.40	1.04	CO	1.10	0.82
PM_{10}	0.19	0.14	PM_{10}	0.18	0.13
$PM_{2.5}$	0.17	0.13	$PM_{2.5}$	0.17	0.13
VOC	0.60	0.45	VOC	0.40	0.30
SO_2	0.36	0.27	SO_2	0.42	0.31
CO_2	589	439	CO_2	691	515
CH_4	0.006	0.0045	CH_4	0.004	0.003
N_2O	0.031	0.023	N_2O	0.031	0.02

Auxiliary Boiler Emission Factors**		
Pollutant	g/kw-hr [6]	g/hp-hr
NOx	2.00	1.49
CO	0.20	0.15
PM_{10}	0.17	0.13
$PM_{2.5}$	0.15	0.11
VOC	0.10	0.07
SO_2	0.57	0.43
CO_2	923	688
CH_4	0.002	0.001
N_2O	0.080	0.06

** Steam Turbine Emission Factors
Marine Gas Oil (0.10% Sulfur)

HAP Emission Factors [7]		
HAP*	lb/MMBtu	g/HP-hr
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyd	7.89E-05	9.11E-05
Acetaldehyd	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower rating and load factors for auxiliary engines are based on U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009, Tables 2-4 and 2-7.
2. Auxiliary Engine horsepower is assumed to be 22% of main propulsion engine based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 2-4.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Tables 2-9 & 2-13 (assumes Slow Speed Diesel (SSD).
4. Corrected for Emission Area Control Standards and International Ship Engine and Fuel Standards (MARPOL Annex VI). Assumes engine model year 2020.
5. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-13 & 2-16
6. U. S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, ICF International, April 2009 Tables 2-9 & 2-13 (emission factor for Steam Turbine).
7. Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.

SUMMARY OF EMISSIONS - ASSIST TUGBOAT EMISSIONS
PROPOSED PROJECT ALTERNATIVE - 2060
PORT OF GULFPORT EXPANSION PROJECT
GULFPORT, HARRISON COUNTY MISSISSIPPI

Diesel Engines - Main Propulsion and Auxiliary Power Engines

Mode	No. of Tugs	Engine /Tug	HP/ Engine [1]	Load Factor[2]	Hr/Call (average)	NOx		CO		PM_{10}		$PM_{2.5}$		VOC		SO_2		CO_2		CH_4		N_2O		CO_2e		HAPs	
						g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call	g/hp-hr	g/call
Main Engines																											
Cruise	-	2	2,065			5.1		3.7		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	2,065	0.79	2.9	5.1	97,059	3.7	71,367	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Maneuvering	2	2	2,065	0.79	0.5	5.1	16,547	3.7	12,167	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Maneuvering	2	2	2,065	0.79	0.5	5.1	16,547	3.7	12,167	0.19	628	0.19	609	0.20	657	0.005	16	515	1,679,045	0.07	219	0.01	49	521	1,699,038	0.07	222
Reduced Speed Zone	2	2	2,065	0.79	2.9	5.1	97,059	3.7	71,367	0.19	3,683	0.19	3,572	0.20	3,854	0.005	93	515	9,848,590	0.07	1,286	0.01	286	521	9,965,862	0.07	1,303
Loading/Hotelling		2	2,065			5.1		3.7		0.19		0.19		0.20		0.005		515		0.07		0.01		521		0.07	
Total					6.9		227,211		167,067		8,621		8,362		9,022		217		23,055,270		3,009		669		23,329,799		3,051
Auxiliary Engines																											
Cruise	-	2	134			5.1		3.7		0.19		0.19		0.20		0.00		515		0.07		0.01		521		0.07	
Reduced Speed Zone	2	2	134	0.56	2.9	5.1	4,467	3.7	3,285	0.19	169	0.19	164	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Maneuvering	2	2	134	0.56	0.5	5.1	762	3.7	560	0.19	29	0.19	28	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Maneuvering	2	2	134	0.56	0.5	5.1	762	3.7	560	0.19	29	0.19	28	0.20	30	0.00	1	515	77,281	0.07	10	0.01	2	521	78,201	0.07	10
Reduced Speed Zone	2	2	134	0.56	2.9	5.1	4,467	3.7	3,285	0.19	169	0.19	164	0.20	177	0.00	4	515	453,300	0.07	59	0.01	13	521	458,698	0.07	60
Loading/Hotelling		2	134			5.1		3.7		0.19		0.19		0.20		0.00		515		0.07		0.01		521		0.07	
Total					6.9		10,458		7,690		397		385		415		10		1,061,163		139		31		1,073,799		140

Assist Activity	Miles	Speed (knots)	Time (Hours)
Cruise (FNC Entrance to RSZ)	13		
Reduced Speed Zone	27	8	2.9
Maneuver (Inbound)	0	0	0.5
Offload/Hotel/Load	0	0	23.0
Maneuver (Outbound)	0	0	0.5
Reduced Speed Zone	27	8	2.9
Cruise (RSZ to FNC Entrance)	13		
Total			**29.9**

Pollutant	Main Engines[3]		Auxiliary Engines[3]	
	g/kw-hr	g/hp-hr	g/kw-hr	g/hp-hr
NOx	6.8	5.1	6.8	5.07
CO	5.0	3.7	5.0	3.73
PM_{10}[4]	0.26	0.19	0.26	0.19
$PM_{2.5}$[5]	0.25	0.19	0.25	0.19
VOC	0.27	0.20	0.27	0.20
SO_2[4]	0.01	0.00	0.01	0.00
CO_2	690	515	690	515
CH_4	0.09	0.07	0.09	0.07
N_2O	0.02	0.01	0.02	0.01

Calls/Year	Mode	Emissions (Tons Per Year)										
		NOx	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO_2	CH_4	N_2O	CO_2e (MT)	HAPs
1,133	Main Engines	283.85	208.72	10.77	10.45	11.27	2.7E-01	28,803	3.8E+00	8.4E-01	26,441	3.8E+00
	Auxiliary Engines	13.06	9.61	0.50	0.48	0.52	1.2E-02	1,326	1.7E-01	3.8E-02	1,217	1.8E-01
	Total	**296.92**	**218.32**	**11.27**	**10.93**	**11.79**	**0.28**	**30,128**	**3.93**	**0.87**	**27,658**	**3.99**

HAP Emission Factors [6]

HAP*	lb/MMBtu	g/HP-hr
Benzene	7.76E-04	8.96E-04
Toluene	2.81E-04	3.24E-04
Xylenes	1.93E-04	2.23E-04
Formaldehyde	7.89E-05	9.11E-05
Acetaldehyde	2.52E-05	2.91E-05
Acrolein	7.88E-06	9.09E-06
Naphthalene	1.30E-04	1.50E-04
Total PAH	2.12E-04	2.45E-04
Diesel-PM_{10}	5.73E-02	6.61E-02

*HAP = Hazardous Air Pollutant
PAH = Polycylic Aromatic Hydrocarbons

1. Horsepower ratings are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventori* es, ICF International, April 2009, Table 3-10.
2. Load factors are based on U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-3.
3. U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-8 (assumes the use of Category 1, Tier 2 engines).
4. Corrected per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Table 3-9 (assumes the use of only ULSD fuel).
5. $PM_{2.5}$ = 0.97 x PM_{10} per U. S. Environmental Protection Agency *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* , ICF International, April 2009 Page 3-9
6. *Hazardous Air Pollutant (HAP) emission factors were totals from Tables 3.4-3 and 3.4-4; AP-42, Compilation of Emission Factors, U.S. Environmental Protection Agency, October 1996.*

MAINTENANCE DREDGING EMISSIONS
PORT OF GULFPORT EXPANSION PROJECT

NO-ACTION ALTERNATIVE
EVERY TEN YEARS

0.2 MMcy/yr Maintenance Dredging

DREDGING EQUIPMENT	Quantity	Engine Horsepower	Type of fuel	Load Factor	Dredge Volume (cy/year)	Dredge Capacity (cy/hour)	Hours/ Year	Emission Factors (grams/hp-hour)										
								CO	NO_X	PM	$PM_{2.5}$	PM_{10}	SO_X	VOC (HC)	CO_2	CH_4	N_2O	HAPs
BUCKET DREDGE	2	1742	diesel	0.8	200000	675	296	3.73	5.07	0.46	0.45	0.46	0.005	0.37	515	0.07	0.01	0.07
AUXILLARY ENGINES	2	600	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.07
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	0.8				3.73	5.07	0.46	0.45	0.46	0.005	0.37	515	0.07	0.01	0.07
AUXILLARY ENGINES	3	300	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.07
AUXILLARY ENGINES	1	150	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
SINGLE SCREW TUGBOAT	1	1000	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.07
AUXILLARY ENGINES	1	150	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
				Totals	**200000**	**675**	**296**											

	Emissions (tons/year)											
	CO	NO_X	PM	$PM_{2.5}$	PM_{10}	SO_X	VOC (HC)	CO_2	CH_4	N_2O	CO_2e	HAPs
	3.4	4.6	0.4	0.4	0.4	0.0	0.3	468.4	0.1	0.0	474	0.062
	1.2	1.6	0.1	0.1	0.1	0.0	0.1	161.3	0.0	0.0	163	0.021
	0.3	0.4	0.0	0.0	0.0	0.0	0.0	40.3	0.0	0.0	41	0.001
	5.8	7.9	0.7	0.7	0.7	0.0	0.6	806.7	0.1	0.0	816	0.107
	0.9	1.2	0.0	0.0	0.0	0.0	0.0	121.0	0.0	0.0	122	0.002
	1.0	1.3	0.1	0.0	0.1	0.0	0.1	134.4	0.0	0.0	136	0.018
	0.1	0.2	0.0	0.0	0.0	0.0	0.0	20.2	0.0	0.0	20	0.000
	1.0	1.3	0.1	0.0	0.1	0.0	0.1	134.4	0.0	0.0	136	0.018
	0.1	0.2	0.0	0.0	0.0	0.0	0.0	20.2	0.0	0.0	20	0.000
											CO_2e (MT)	
Totals	**13.8**	**18.8**	**1.4**	**1.3**	**1.4**	**0.02**	**1.2**	**1,907**	**0.2**	**0.1**	**1,751**	**0.23**

MAINTENANCE DREDGING EMISSIONS
PORT OF GULFPORT EXPANSION PROJECT

PROPOSED PROJECT ALTERNATIVE
ANNUAL

1.2 MMcy/yr Maintenance Dredging

DREDGING EQUIPMENT	Quantity	Engine Horsepower	Type of fuel	Load Factor	Dredge Volume (cy/year)	Dredge Capacity (cy/hour)	Hours/ Year	Emission Factors (grams/hp-hour)										
								CO	NO_X	PM	$PM_{2.5}$	PM_{10}	SO_X	VOC (HC)	CO_2	CH_4	N_2O	HAPs
BUCKET DREDGE	2	1742	diesel	0.8	1300000	675	1926	3.73	5.07	0.46	0.45	0.46	0.005	0.37	515	0.07	0.01	0.07
AUXILLARY ENGINES	2	600	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.07
MULTIPURPOSE VESSEL (Crew & Survey)	1	300	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
TWIN SCREW TUGBOAT (PRIMARY HAULER)	3	2000	diesel	0.8				3.73	5.07	0.46	0.45	0.46	0.005	0.37	515	0.07	0.01	0.07
AUXILLARY ENGINES	3	300	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
SINGLE SCREW TUGBOAT (TENDER)	1	1000	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.07
AUXILLARY ENGINES	1	150	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
SINGLE SCREW TUGBOAT	1	1000	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.07
AUXILLARY ENGINES	1	150	diesel	0.8				3.73	5.07	0.19	0.19	0.19	0.005	0.20	515	0.07	0.01	0.01
				Totals	**1300000**	**675**	**1926**											

	Emissions (tons/year)											
	CO	NO_X	PM	$PM_{2.5}$	PM_{10}	SO_X	VOC (HC)	CO_2	CH_4	N_2O	CO_2e	HAPs
	22.1	30.0	2.7	2.7	2.7	0.0	2.2	3044.6	0.4	0.1	3,081	0.403
	7.6	10.3	0.4	0.4	0.4	0.0	0.4	1048.6	0.1	0.0	1,061	0.139
	1.9	2.6	0.1	0.1	0.1	0.0	0.1	262.2	0.0	0.0	265	0.004
	38.0	51.7	4.7	4.6	4.7	0.0	3.8	5243.2	0.7	0.2	5,306	0.695
	5.7	7.8	0.3	0.3	0.3	0.0	0.3	786.5	0.1	0.0	796	0.011
	6.3	8.6	0.3	0.3	0.3	0.0	0.3	873.9	0.1	0.0	884	0.116
	0.9	1.3	0.0	0.0	0.0	0.0	0.1	131.1	0.0	0.0	133	0.002
	6.3	8.6	0.3	0.3	0.3	0.0	0.3	873.9	0.1	0.0	884	0.116
	0.9	1.3	0.0	0.0	0.0	0.0	0.1	131.1	0.0	0.0	133	0.002
											CO_2e (MT)	
Totals	**89.8**	**122.2**	**9.0**	**8.7**	**9.0**	**0.12**	**7.6**	**12,395**	**1.6**	**0.4**	**11,378**	**1.5**

APPENDIX P-3
AIR DISPERSION MODEL FILES AND FIGURES

Port of Gulfport Mobile Source Impacts Analysis From US 90 to Creosote Rd.

2020 Proposed Project Alternative Scenario: Port of Gulfport Mobile Sources Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)	Exceeds NAAQS
NO_2 [a]	1-hour [b]	162.2	188	NO
	annual [c]	25.6	100	NO
CO	1-hour [d]	167.4	40,000	NO
	8-hour [d]	77.8	10,000	NO
PM_{10}	24-hour [e]	3.2	150	NO
$PM_{2.5}$	24-hour [f]	2.3	35	NO
	annual [g]	0.8	12	NO

[a] The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 and 0.9 and annual NO_2 includes the ARM ratio of 0.75.

[b] Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.

[c] Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.

[d] Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.

[e] Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.

[f] Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.

[g] Total predicted concentration for the Annual $PM_{2.5}$ standard is the 5-year average of the annual concentrations.

2020 No-Action Alternative Scenario: Port of Gulfport Mobile Sources Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration (µg/m^3)	Federal Standard (µg/m^3)	Exceeds NAAQS
NO_2 [a]	1-hour [b]	161.5	188	NO
	annual [c]	14.7	100	NO
CO	1-hour [d]	165.6	40,000	NO
	8-hour [d]	44.3	10,000	NO
PM_{10}	24-hour [e]	1.8	150	NO
$PM_{2.5}$	24-hour [f]	1.3	35	NO
	annual [g]	0.5	12	NO

[a] The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 and 0.9 and annual NO_2 includes the ARM ratio of 0.75.

[b] Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.

[c] Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.

[d] Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.

[e] Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.

[f] Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.

[g] Total predicted concentration for the Annual $PM_{2.5}$ standard is the 5-year average of the annual concentrations.

2060 Proposed Project Alternative Scenario: Port of Gulfport Mobile Sources Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration (µg/m^3)	Federal Standard (µg/m^3)	Exceeds NAAQS
NO_2 [a]	1-hour [b]	142.5	188	NO
	annual [c]	11.5	100	NO
CO	1-hour [d]	493.7	40,000	NO
	8-hour [d]	176.2	10,000	NO
PM_{10}	24-hour [e]	1.6	150	NO
$PM_{2.5}$	24-hour [f]	0.9	35	NO
	annual [g]	0.3	12	NO

[a] The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 and 0.9 and annual NO_2 includes the ARM ratio of 0.75.

[b] Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.

[c] Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.

[d] Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.

[e] Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.

[f] Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.

[g] Total predicted concentration for the Annual $PM_{2.5}$ standard is the 5-year average of the annual concentrations.

2060 No-Action Scenario: Port of Gulfport Mobile Sources Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)	Exceeds NAAQS
NO_2 [a]	1-hour [b]	135.6	188	NO
	annual [c]	7.0	100	NO
CO	1-hour [d]	323.8	40,000	NO
	8-hour [d]	110.2	10,000	NO
PM_{10}	24-hour [e]	1.0	150	NO
$PM_{2.5}$	24-hour [f]	0.5	35	NO
	annual [g]	0.2	12	NO

[a] The maximum 1-hour NO_2 concentration includes ARM2 ratios of 0.2 and 0.9 and annual NO_2 includes the ARM ratio of 0.75.

[b] Total predicted concentration for the 1-hour NO_2 standard is the average of the H8H (98 percentile) modeled over 5 years.

[c] Total predicted concentration for the Annual NO_2 standard is maximum of five years modeled concentrations.

[d] Total predicted concentrations for the 1-hour and 8-hour CO standards are the maximum modeled over 5 years.

[e] Total predicted concentration for the 24-hour PM_{10} standard is the max of the H2H modeled over 5 years.

[f] Total predicted concentration for the 24-hour $PM_{2.5}$ standard is the average of the H8H (98 percentile) modeled over 5 years.

[g] Total predicted concentration for the Annual $PM_{2.5}$ standard is the 5-year average of the annual concentrations.

Appendix P-3 Emission Calculations

1. Proposed Project Alternative Scenario From US 90 to Gulfport Rail Yard - Train Trips

Port of Gulfport Weekday Freight Trains per Weekday Forecasts by Scenario

	2020	2060
max. train trips/hour	1	3
max. train trips/8 hour	7	16
train trips/day	7	47
train trips/year	1650	11675

Note: Trip data was obtained from the project's Draft EIS

Maximum operating hours are:

	2020	2060
Operating days/year	250	250
Operating hours/day	9	24

Note: Train traffic in year 2020 is restricted to the hours from 10 pm to 7 am.

Emission Factors (g/hp-hr) Used in Estimating Line Haul Locomotive Emissions

Forecast Year	Assumed Locomotive Engine Emissions Levels	CO	NOx	PM10	PM2.5
2020	Surrogate	1.28	6.06	0.14	0.14
2060	Tier 4	1.28	1.00	0.015	0.0146

Note:

1. Emission factors of CO, NO_x, and PM_{10} are from EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009," Table 5-8 and Table 5-10.

2. Emission factor of $PM_{2.5}$ was estimated based on EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009," Page 5-12, "$PM_{2.5}$ emission factors can be calculated by assuming that they represent 97% of PM_{10} emissions."

Emissions per train trip

E = EFhphr x N1 x HP x Hr x LF		2020				2060			
		CO	NO_x	PM_{10}	$PM_{2.5}$	CO	NO_x	PM_{10}	$PM_{2.5}$
EFhphr	Emission Factor (grams/hp-hr)	1.28	6.06	0.14	0.136	1.28	1.00	0.015	0.0146
HP	Locomotive Horsepower (hp/locomotive)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Hr (US90 to Rail Yard)	Locomotive Hours per trip (hours/train trip)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
LF	Load Factor	28%	28%	28%	28%	28%	28%	28%	28%
N1	Number of locomotive per train trip	4	4	4	4	4	4	4	4
Emissions	From US 90 to the Gulfport Rail Yard (lb/train trip)	2.15	10.17	0.24	0.23	2.15	1.68	0.03	0.02

Train Trip Emission Rates for Modeling (total)

Year	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2020	2.15E+00	1.88E+00	1.02E+01	7.91E+00	1.83E-01	1.77E-01	1.77E-01
2060	6.45E+00	4.30E+00	5.04E+00	2.24E+00	4.93E-02	4.78E-02	3.26E-02

Note: 24-hour average and annual average for year 2020 represent the hourly emission rate during the 9-hour operating hours, in order to be used as the emission input along with the HourOfDay options in the BEEST modeling. These emission rates were not averaged over 24 hours or 8,760 hours.

2020 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR1	114.53	1.03E-02	9.05E-03	4.90E-02	3.81E-02	8.80E-04	8.53E-04	8.53E-04
RR2	22.02	1.99E-03	1.74E-03	9.41E-03	7.32E-03	1.69E-04	1.64E-04	1.64E-04
RR3	17.91	1.62E-03	1.41E-03	7.65E-03	5.95E-03	1.38E-04	1.33E-04	1.33E-04
RR4	23.11	2.09E-03	1.83E-03	9.88E-03	7.68E-03	1.77E-04	1.72E-04	1.72E-04
RR5	17.54	1.58E-03	1.39E-03	7.50E-03	5.83E-03	1.35E-04	1.31E-04	1.31E-04
RR6	46.93	4.24E-03	3.71E-03	2.01E-02	1.56E-02	3.60E-04	3.50E-04	3.50E-04
RR7	43.48	3.93E-03	3.44E-03	1.86E-02	1.45E-02	3.34E-04	3.24E-04	3.24E-04
RR8	41.61	3.76E-03	3.29E-03	1.78E-02	1.38E-02	3.20E-04	3.10E-04	3.10E-04
RR9	35.16	3.17E-03	2.78E-03	1.50E-02	1.17E-02	2.70E-04	2.62E-04	2.62E-04
RR10-RR12, RR15-18	300.00	2.71E-02	2.37E-02	1.28E-01	9.97E-02	2.30E-03	2.23E-03	2.23E-03
RR13	236.20	2.13E-02	1.87E-02	1.01E-01	7.85E-02	1.81E-03	1.76E-03	1.76E-03
RR14	114.85	1.04E-02	9.07E-03	4.91E-02	3.82E-02	8.82E-04	8.56E-04	8.56E-04
RR19	186.23	1.68E-02	1.47E-02	7.96E-02	6.19E-02	1.43E-03	1.39E-03	1.39E-03

Note: Length taken from distance between two midpoints in modeling.

2060 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR1	114.53	3.10E-02	2.07E-02	2.42E-02	1.08E-02	2.37E-04	2.30E-04	1.57E-04
RR2	22.02	5.96E-03	3.98E-03	4.66E-03	2.07E-03	4.56E-05	4.43E-05	3.01E-05
RR3	17.91	4.85E-03	3.23E-03	3.79E-03	1.68E-03	3.71E-05	3.60E-05	2.45E-05
RR4	23.11	6.26E-03	4.17E-03	4.89E-03	2.17E-03	4.79E-05	4.64E-05	3.16E-05
RR5	17.54	4.75E-03	3.17E-03	3.71E-03	1.65E-03	3.63E-05	3.52E-05	2.40E-05
RR6	46.93	1.27E-02	8.47E-03	9.93E-03	4.41E-03	9.72E-05	9.43E-05	6.42E-05
RR7	43.48	1.18E-02	7.85E-03	9.20E-03	4.09E-03	9.01E-05	8.74E-05	5.95E-05
RR8	41.61	1.13E-02	7.51E-03	8.81E-03	3.91E-03	8.62E-05	8.36E-05	5.69E-05
RR9	35.16	9.52E-03	6.35E-03	7.44E-03	3.30E-03	7.28E-05	7.07E-05	4.81E-05
RR10-RR12, RR15-18	300.00	8.13E-02	5.42E-02	6.35E-02	2.82E-02	6.22E-04	6.03E-04	4.10E-04
RR13	236.20	6.40E-02	4.26E-02	5.00E-02	2.22E-02	4.89E-04	4.75E-04	3.23E-04
RR14	114.85	3.11E-02	2.07E-02	2.43E-02	1.08E-02	2.38E-04	2.31E-04	1.57E-04
RR19	186.23	5.04E-02	3.36E-02	3.94E-02	1.75E-02	3.86E-04	3.74E-04	2.55E-04

Note: Length taken from distance between two midpoints in modeling.

Total Source Length: 2999.4

Modeled Area Source Parameters	
Source type	Area
Release Height (m) [1]	4.148
Area Source Width (m)	3
Area Source Length (m)	Various
Initial Vertical Coefficient, Szinit (σzo)	3.86

Note:

Source Parameter Based on US EPA :"Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas."

Locomotive height: 4.88 meters, based on information of GE Dash 9-44CW

Vertical dimension: 4.88 X 1.7 = 8.296 meters

Release height: 8.296 /2 = 4.148 meters

Initial Vertical Coefficient, Szinit (σzo): 8.296/2.15 = 3.86 meters

Appendix P-3 Emission Calculations

2. No-Action Alternative Scenario From US 90 to Gulfport Rail Yard - Train Trips

Port of Gulfport Weekday Freight Trains per Weekday Forecasts by Scenario

	2020	2060
max. train trips/hour	1	2
max. train trips/8 hour	4	10
train trips/day	4	29
train trips/year	950	7100

Note: Trip data was obtained from the project's Draft EIS. Train trips per year are based upon Draft EIS train trips per day multiplied by the number of operating days per year.

Maximum operating hours are:

	2020	2060
Operating days/year	250	250
Operating hours/day	9	24

Note: Train traffic in year 2020 is restricted to the hours from 10 pm to 7 am.

Emission Factors (g/hp-hr) Used in Estimating Line Haul Locomotive Emissions

Forecast Year	Assumed Locomotive Engine Emissions Levels	CO	NO_x	PM_{10}	$PM_{2.5}$
2020	Surrogate	1.28	6.06	0.14	0.14
2060	Tier 4	1.28	1.00	0.015	0.0146

Note:

1. Emission factors of CO, NO_x, and PM_{10} are from EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009," Table 5-8 and Table 5-10.
2. Emission factor of $PM_{2.5}$ was estimated based on EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009," Page 5-12, "$PM_{2.5}$ emission factors can be calculated by assuming that they represent 97% of PM_{10} emissions."

Emissions per train trip

E = EFhphr x N1 x HP x Hr x LF		2020				2060			
		CO	NO_x	PM_{10}	$PM_{2.5}$	CO	NO_x	PM_{10}	$PM_{2.5}$
EFhphr	Emission Factor (grams/hp-hr)	1.28	6.06	0.14	0.136	1.28	1.00	0.015	0.0146
HP	Locomotive Horsepower (hp/locomotive)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Hr (US90 to Rail Yard)	Locomotive Hours per trip (hours/train trip)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
LF	Load Factor	28%	28%	28%	28%	28%	28%	28%	28%
N1	Number of locomotive per train trip	4	4	4	4	4	4	4	4
Emissions	From US 90 to the Gulfport Rail Yard (lb/train trip)	2.15	10.17	0.24	0.23	2.15	1.68	0.03	0.02

Train Trip Emission Rates for Modeling (total)

Year	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2020	2.15E+00	1.07E+00	1.02E+01	4.52E+00	1.04E-01	1.01E-01	1.01E-01
2060	4.30E+00	2.69E+00	3.36E+00	1.36E+00	3.04E-02	2.95E-02	1.98E-02

Note: 24-hour average and annual average for year 2020 represent the hourly emission rate during the 9-hour operating hours, in order to be used as the emission input along with the HourOfDay options in the BEEST modeling. These emission rates were not averaged over 24 hours or 8,760 hours.

2020 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR1	114.53	1.03E-02	5.17E-03	4.90E-02	2.18E-02	5.03E-04	4.88E-04	4.88E-04
RR2	22.02	1.99E-03	9.94E-04	9.41E-03	4.18E-03	9.66E-05	9.37E-05	9.37E-05
RR3	17.91	1.62E-03	8.08E-04	7.65E-03	3.40E-03	7.86E-05	7.62E-05	7.62E-05
RR4	23.11	2.09E-03	1.04E-03	9.88E-03	4.39E-03	1.01E-04	9.84E-05	9.84E-05
RR5	17.54	1.58E-03	7.92E-04	7.50E-03	3.33E-03	7.70E-05	7.46E-05	7.46E-05
RR6	46.93	4.24E-03	2.12E-03	2.01E-02	8.92E-03	2.06E-04	2.00E-04	2.00E-04
RR7	43.48	3.93E-03	1.96E-03	1.86E-02	8.26E-03	1.91E-04	1.85E-04	1.85E-04
RR8	41.61	3.76E-03	1.88E-03	1.78E-02	7.91E-03	1.83E-04	1.77E-04	1.77E-04
RR9	35.16	3.17E-03	1.59E-03	1.50E-02	6.68E-03	1.54E-04	1.50E-04	1.50E-04
RR10-RR12, RR15-18	300.00	2.71E-02	1.35E-02	1.28E-01	5.70E-02	1.32E-03	1.28E-03	1.28E-03
RR13	236.20	2.13E-02	1.07E-02	1.01E-01	4.49E-02	1.04E-03	1.01E-03	1.01E-03
RR14	114.85	1.04E-02	5.18E-03	4.91E-02	2.18E-02	5.04E-04	4.89E-04	4.89E-04
RR19	186.23	1.68E-02	8.41E-03	7.96E-02	3.54E-02	8.17E-04	7.93E-04	7.93E-04

Note: Length taken from distance between two midpoints in modeling.

2060 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR1	114.53	2.07E-02	1.29E-02	1.62E-02	6.55E-03	1.46E-04	1.42E-04	9.53E-05
RR2	22.02	3.98E-03	2.49E-03	3.11E-03	1.26E-03	2.82E-05	2.73E-05	1.83E-05
RR3	17.91	3.23E-03	2.02E-03	2.53E-03	1.02E-03	2.29E-05	2.22E-05	1.49E-05
RR4	23.11	4.17E-03	2.61E-03	3.26E-03	1.32E-03	2.95E-05	2.87E-05	1.92E-05
RR5	17.54	3.17E-03	1.98E-03	2.47E-03	1.00E-03	2.24E-05	2.17E-05	1.46E-05
RR6	46.93	8.47E-03	5.30E-03	6.62E-03	2.68E-03	6.00E-05	5.82E-05	3.90E-05
RR7	43.48	7.85E-03	4.91E-03	6.13E-03	2.49E-03	5.56E-05	5.39E-05	3.62E-05
RR8	41.61	7.51E-03	4.70E-03	5.87E-03	2.38E-03	5.32E-05	5.16E-05	3.46E-05
RR9	35.16	6.35E-03	3.97E-03	4.96E-03	2.01E-03	4.49E-05	4.36E-05	2.92E-05
RR10-RR12, RR15-18	300.00	5.42E-02	3.39E-02	4.23E-02	1.71E-02	3.84E-04	3.72E-04	2.50E-04
RR13	236.20	4.26E-02	2.67E-02	3.33E-02	1.35E-02	3.02E-04	2.93E-04	1.96E-04
RR14	114.85	2.07E-02	1.30E-02	1.62E-02	6.57E-03	1.47E-04	1.42E-04	9.55E-05
RR19	186.23	3.36E-02	2.10E-02	2.63E-02	1.06E-02	2.38E-04	2.31E-04	1.55E-04

Note: Length taken from distance between two midpoints in modeling.

Total Source Length: 2999.4

Modeled Area Source Parameters	
Source type	Area
Release Height (m) [1]	4.148
Area Source Width (m)	3
Area Source Length (m)	Various
Initial Vertical Coefficient, Szinit (σzo)	3.86

Note:

Source Parameter Based on US EPA :"Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas."

Locomotive height: 4.88 meters, based on information of GE Dash 9-44CW

Vertical dimension: 4.88 X 1.7 = 8.296 meters

Release height: 8.296 /2 = 4.148 meters

Initial Vertical Coefficient, Szinit (σzo): 8.296/2.15 = 3.86 meters

Appendix P-3 Emission Calculations

3. Proposed Project Alternative Scenario From Gulfport Rail Yard to Creosote Rd. - Train Trips

Port of Gulfport Weekday Freight Trains per Weekday Forecasts by Scenario

	2020	2060
max. train trips/hour	1	3
max. train trips/8 hour	5	10
train trips/day	5	29
train trips/year	1025	7200

Note: Trip data was obtained from the project's Draft EIS

Maximum operating hours are:

	2020	2060
Operating days/year	250	250
Operating hours/day	9	24

Note: Train traffic in year 2020 is restricted to the hours from 10 pm to 7 am.

Emission Factors (g/hp-hr) Used in Estimating Line Haul Locomotive Emissions

Forecast Year	Assumed Locomotive Engine Emissions Levels	CO	NO_x	PM_{10}	$PM_{2.5}$
2020	Surrogate	1.28	6.06	0.14	0.14
2060	Tier 4	1.28	1.00	0.015	0.0146

Note:

1. Emission factors of CO, NO_x, and PM_{10} are from EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009," Table 5-8 and Table 5-10.

2. Emission factor of $PM_{2.5}$ was estimated based on EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009," Page 5-12, "$PM_{2.5}$ emission factors can be calculated by assuming that they represent 97% of PM_{10} emissions."

Emissions per train trip

E = EFhphr x N1 x HP x Hr x LF		2020				2060			
		CO	NO_x	PM_{10}	$PM_{2.5}$	CO	NO_x	PM_{10}	$PM_{2.5}$
EFhphr	Emission Factor (grams/hp-hr)	1.28	6.06	0.14	0.136	1.28	1.00	0.015	0.0146
HP	Locomotive Horsepower (hp/locomotive)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Hr (US90 to Rail Yard)	Locomotive Hours per trip (hours/train trip)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
LF	Load Factor	28%	28%	28%	28%	28%	28%	28%	28%
N1	Number of locomotive per train trip	4	4	4	4	4	4	4	4
Emissions	From the Gulfport Rail Yard to Creosote Rd. (lb/train trip)	2.15	10.17	0.24	0.23	2.15	1.68	0.03	0.02

Train Trip Emission Rates for Modeling (total)

Year	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2020	2.15E+00	1.34E+00	1.02E+01	5.65E+00	1.31E-01	1.27E-01	1.27E-01
2060	6.45E+00	2.69E+00	5.04E+00	1.38E+00	3.04E-02	2.95E-02	2.01E-02

Note: 24-hour average and annual average for year 2020 represent the hourly emission rate during the 9-hour operating hours, in order to be used as the emission input along with the HourOfDay options in the BEEST modeling. These emission rates were not averaged over 24 hours or 8,760 hours.

2020 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR20	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR21	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR22	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR23	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR24	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR25	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR26	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR27	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR28	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR29	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR30	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR31	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR32	300.0	2.03E-02	1.27E-02	9.62E-02	5.34E-02	1.23E-03	1.20E-03	1.20E-03
RR33	98.2	6.65E-03	4.16E-03	3.15E-02	1.75E-02	4.04E-04	3.92E-04	3.92E-04

Note: Length taken from distance between two midpoints in modeling.

2060 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR20	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR21	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR22	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR23	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR24	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR25	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR26	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR27	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR28	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR29	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR30	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR31	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR32	300.0	6.10E-02	2.54E-02	4.76E-02	1.30E-02	2.88E-04	2.79E-04	1.90E-04
RR33	98.2	1.99E-02	8.31E-03	1.56E-02	4.27E-03	9.42E-05	9.13E-05	6.21E-05

Note: Length taken from distance between two midpoints in modeling.

Total Source Length: 3998.3

Modeled Area Source Parameters	
Source type	Area
Release Height (m) [1]	4.148
Area Source Width (m)	3
Area Source Length (m)	Various
Initial Vertical Coefficient, Szinit (σzo)	3.86

Note:

Source Parameter Based on US EPA :"Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas."

Locomotive height: 4.88 meters, based on information of GE Dash 9-44CW

Vertical dimension: 4.88 X 1.7 = 8.296 meters

Release height: 8.296 /2 = 4.148 meters

Initial Vertical Coefficient, Szinit (σzo): 8.296/2.15 = 3.86 meters

Appendix P-3 Emission Calculations

4. No-Action Alternative Scenario From Gulfport Railyard to Creosote Rd. - Train Trips

Port of Gulfport Weekday Freight Trains per Weekday Forecasts by Scenario

	2020	2060
max. train trips/hour	1	1
max. train trips/8 hour	3	6
train trips/day	3	18
train trips/year	600	4375

Note: Trip data was obtained from the project's Draft EIS. Train trips per year are based upon Draft EIS train trips per day multiplied by the number of operating days per year.

Maximum operating hours are:

	2020	2060
Operating days/year	250	250
Operating hours/day	9	24

Note: Train traffic in year 2020 is restricted to the hours from 10 pm to 7 am.

Emission Factors (g/hp-hr) Used in Estimating Line Haul Locomotive Emissions

Forecast Year	Assumed Locomotive Engine Emissions Levels	CO	NOx	PM10	PM2.5
2020	Surrogate	1.28	6.06	0.14	0.14
2060	Tier 4	1.28	1.00	0.015	0.0146

Note:

1. Emission factors of CO, NO_x, and PM_{10} are from EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009", Table 5-8 and Table 5-10.

2. Emission factor of $PM_{2.5}$ was estimated based on EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009", Page 5-12, "$PM_{2.5}$ emission factors can be calculated by assuming that they represent 97% of PM_{10} emissions."

Emissions per train trip

E = EFhphr x N1 x HP x Hr x LF		2020				2060			
		CO	NO_x	PM_{10}	$PM_{2.5}$	CO	NO_x	PM_{10}	$PM_{2.5}$
EFhphr	Emission Factor (grams/hp-hr)	1.28	6.06	0.14	0.136	1.28	1.00	0.015	0.0146
HP	Locomotive Horsepower (hp/locomotive)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Hr (US90 to Rail Yard)	Locomotive Hours per trip (hours/train trip)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
LF	Load Factor	28%	28%	28%	28%	28%	28%	28%	28%
N1	Number of locomotive per train trip	4	4	4	4	4	4	4	4
Emissions	From the Gulfport Rail Yard to Creosote Rd. (lb/train trip)	2.15	10.17	0.24	0.23	2.15	1.68	0.03	0.02

Train Trip Emission Rates for Modeling (total)

Year	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2020	2.15E+00	8.06E-01	1.02E+01	3.39E+00	7.84E-02	7.60E-02	7.60E-02
2060	2.15E+00	1.61E+00	1.68E+00	8.39E-01	1.89E-02	1.83E-02	1.22E-02

Note: 24-hour average and annual average for year 2020 represent the hourly emission rate during the 9-hour operating hours, in order to be used as the emission input along with the HourOfDay options in the AERMOD modeling. These emission rates were not averaged over 24 hours or 8760 hours.

2020 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR20	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR21	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR22	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR23	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR24	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR25	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR26	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR27	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR28	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR29	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR30	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR31	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR32	300.0	2.03E-02	7.62E-03	9.62E-02	3.21E-02	7.41E-04	7.19E-04	7.19E-04
RR33	98.2	6.65E-03	2.49E-03	3.15E-02	1.05E-02	2.42E-04	2.35E-04	2.35E-04

Note: Length taken from distance between two midpoints in modeling.

2060 Train Trip Emission Rates per Source

Source ID	Length	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	meters	g/s	g/s	g/s	g/s	g/s	g/s	g/s
RR20	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR21	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR22	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR23	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR24	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR25	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR26	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR27	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR28	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR29	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR30	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR31	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR32	300.0	2.03E-02	1.52E-02	1.59E-02	7.93E-03	1.79E-04	1.73E-04	1.15E-04
RR33	98.2	6.65E-03	4.99E-03	5.20E-03	2.59E-03	5.84E-05	5.67E-05	3.78E-05

Note: Length taken from distance between two midpoints in modeling.

Total Source Length: 3998.3

Modeled Area Source Parameters	
Source type	Area
Release Height (m) [1]	4.148
Area Source Width (m)	3
Area Source Length (m)	Various
Initial Vertical Coefficient, Szinit (σzo)	3.86

Note:

Source Parameter Based on US EPA :"Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas".

Locomotive height: 4.88 meters, based on information of GE Dash 9-44CW.

Vertical dimension: 4.88 X 1.7 = 8.296 meters

Release height: 8.296 /2 = 4.148 meters

Initial Vertical Coefficient, Szinit (σzo): 8.296/2.15 = 3.86 meters

Appendix P-3 Emission Calculations
5. Proposed Project Scenario From US 90 to Creosote Rd. - Truck Trips

Truck Trips Emission Factors

Year	Carbon Monoxide (CO)	Oxides of Nitrogen (NO_x)	Total PM_{10}	Total $PM_{2.5}$
	g/mile	g/mile	g/mile	g/mile
2020	2.2295	7.5475	0.6707	0.4327
2060	0.3833	1.3619	0.2708	0.0648

Note:
Emission factors are from MOVES2014a. Assumed 35 mph average speed, combined long haul trucks (average of peak winter and peak summer emissions).

Truck Trip Emissions

Year	Projected Daily Volume	Distance/trip	Daily VMT	CO	NO_x	PM_{10}	$PM_{2.5}$	CO	NO_x	PM_{10}	$PM_{2.5}$
	Trips/day	miles/trip	mile/day	lb/day	lb/day	lb/day	lb/day	lb/year	lb/year	lb/year	lb/year
2020	861	4.60	3963.22	19.480	65.944	5.860	3.781	4869.975	16486.046	1465.041	945.133
2060	2030	4.60	9344.18	7.895	28.054	5.578	1.335	1973.814	7013.570	1394.378	333.692

Note:
1. Trip distance: 7408 meters

Operation hours and days

Year	Minimum Operating hours	Maximum Operating hours	Operating Days
	hours/day	hours/day	days/year
2020	16	24	250
2060	16	24	250

Total Truck Trip Emissions along the Corridor for Modeling

Year	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2020	1.217	1.217	4.122	1.882	0.244	0.158	0.108
2060	0.493	0.493	1.753	0.801	0.232	0.056	0.038

Truck Trip Emission Rate Input to AERMOD (per area source)

Source ID	Year	Area Source Length	CO maximum 1-hr	CO 8-hr	NO_x maximum 1-hr	NO_x Annual	PM_{10} 24-hr	$PM_{2.5}$ 24-hr	$PM_{2.5}$ Annual
		meters	g/s/source	g/s/source	g/s/source	g/s/source	g/s/source	g/s/source	g/s/source
CT 1	2020	300	6.206E-03	6.206E-03	2.101E-02	9.593E-03	1.245E-03	8.029E-04	5.500E-04
CT 2	2020	250	5.177E-03	5.177E-03	1.752E-02	8.002E-03	1.038E-03	6.698E-04	4.587E-04
CT 3-12	2020	300	6.213E-03	6.213E-03	2.103E-02	9.603E-03	1.246E-03	8.038E-04	5.506E-04
CT13	2020	300	6.247E-03	6.247E-03	2.115E-02	9.657E-03	1.253E-03	8.083E-04	5.536E-04
CT14	2020	51	1.053E-03	1.053E-03	3.565E-03	1.628E-03	2.112E-04	1.362E-04	9.332E-05
CT15	2020	266	5.534E-03	5.534E-03	1.873E-02	8.554E-03	1.110E-03	7.160E-04	4.904E-04
CT16	2020	111	2.311E-03	2.311E-03	7.823E-03	3.572E-03	4.635E-04	2.990E-04	2.048E-04
CT17	2020	122	2.549E-03	2.549E-03	8.628E-03	3.940E-03	5.112E-04	3.298E-04	2.259E-04
CT18	2020	178	3.702E-03	3.702E-03	1.253E-02	5.723E-03	7.425E-04	4.790E-04	3.281E-04
CT19	2020	300	6.249E-03	6.249E-03	2.115E-02	9.659E-03	1.253E-03	8.085E-04	5.538E-04
CT20	2020	300	6.248E-03	6.248E-03	2.115E-02	9.658E-03	1.253E-03	8.084E-04	5.537E-04
CT21	2020	300	6.249E-03	6.249E-03	2.115E-02	9.659E-03	1.253E-03	8.085E-04	5.538E-04
CT22	2020	300	6.249E-03	6.249E-03	2.115E-02	9.659E-03	1.253E-03	8.085E-04	5.538E-04
CT23	2020	300	6.249E-03	6.249E-03	2.115E-02	9.660E-03	1.253E-03	8.085E-04	5.538E-04
CT24	2020	158	3.296E-03	3.296E-03	1.116E-02	5.095E-03	6.610E-04	4.264E-04	2.921E-04
CT25	2020	104	2.172E-03	2.172E-03	7.351E-03	3.357E-03	4.355E-04	2.810E-04	1.924E-04
CT26	2020	232	4.822E-03	4.822E-03	1.632E-02	7.454E-03	9.671E-04	6.239E-04	4.273E-04
CT27	2020	300	6.248E-03	6.248E-03	2.115E-02	9.658E-03	1.253E-03	8.084E-04	5.537E-04
CT28	2020	300	6.245E-03	6.245E-03	2.114E-02	9.654E-03	1.253E-03	8.080E-04	5.535E-04
CT29	2020	237	4.934E-03	4.934E-03	1.670E-02	7.627E-03	9.896E-04	6.384E-04	4.373E-04
CT 1	2060	300	2.515E-03	2.515E-03	8.938E-03	4.081E-03	1.185E-03	2.835E-04	1.942E-04
CT 2	2060	250	2.098E-03	2.098E-03	7.455E-03	3.404E-03	9.881E-04	2.365E-04	1.620E-04
CT 3-12	2060	300	2.518E-03	2.518E-03	8.947E-03	4.085E-03	1.186E-03	2.838E-04	1.944E-04
CT13	2060	300	2.532E-03	2.532E-03	8.997E-03	4.108E-03	1.192E-03	2.854E-04	1.955E-04
CT14	2060	51	4.268E-04	4.268E-04	1.517E-03	6.925E-04	2.010E-04	4.810E-05	3.295E-05
CT15	2060	266	2.243E-03	2.243E-03	7.969E-03	3.639E-03	1.056E-03	2.528E-04	1.731E-04
CT16	2060	111	9.366E-04	9.366E-04	3.328E-03	1.520E-03	4.411E-04	1.056E-04	7.231E-05
CT17	2060	122	1.033E-03	1.033E-03	3.671E-03	1.676E-03	4.865E-04	1.164E-04	7.975E-05
CT18	2060	178	1.501E-03	1.501E-03	5.332E-03	2.435E-03	7.067E-04	1.691E-04	1.158E-04
CT19	2060	300	2.533E-03	2.533E-03	8.999E-03	4.109E-03	1.193E-03	2.854E-04	1.955E-04
CT20	2060	300	2.532E-03	2.532E-03	8.998E-03	4.109E-03	1.193E-03	2.854E-04	1.955E-04
CT21	2060	300	2.533E-03	2.533E-03	8.999E-03	4.109E-03	1.193E-03	2.855E-04	1.955E-04
CT22	2060	300	2.533E-03	2.533E-03	8.999E-03	4.109E-03	1.193E-03	2.854E-04	1.955E-04
CT23	2060	300	2.533E-03	2.533E-03	9.000E-03	4.109E-03	1.193E-03	2.855E-04	1.955E-04
CT24	2060	158	1.336E-03	1.336E-03	4.747E-03	2.167E-03	6.291E-04	1.506E-04	1.031E-04
CT25	2060	104	8.802E-04	8.802E-04	3.127E-03	1.428E-03	4.145E-04	9.920E-05	6.794E-05
CT26	2060	232	1.954E-03	1.954E-03	6.945E-03	3.171E-03	9.204E-04	2.203E-04	1.509E-04
CT27	2060	300	2.532E-03	2.532E-03	8.998E-03	4.109E-03	1.193E-03	2.854E-04	1.955E-04
CT28	2060	300	2.531E-03	2.531E-03	8.994E-03	4.107E-03	1.192E-03	2.853E-04	1.954E-04
CT29	2060	237	2.000E-03	2.000E-03	7.106E-03	3.245E-03	9.419E-04	2.254E-04	1.544E-04

Note:
Total length is 7408 m.

Modeled Area Source Parameters	
Source type	Area
Release Height (m) [1]	3.4
Area Source Width (m)	25
Area Source Length (m)	Various
Initial Vertical Coefficient, Szinit (σzo)	3.16

Note:

Source Parameter Based on US EPA :"Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas".

Heavy duty vehicle height: 4.0 meters, PM guidance

Vertical dimension: 4.0 X 1.7 =6.8 meters

Release height: 6.8 /2 = 3.4 meters.

Initial Vertical Coefficient, Szinit (σzo): 6.8/2.15 = 3.16 meters

Appendix P-3 Emission Calculations
6. No-Action Alternative Scenario From US 90 to Creosote Rd. - Truck Trips

Truck Trips Emission Factors

Year	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Total PM10	Total PM2.5
	g/mile	g/mile	g/mile	g/mile
2020	2.2295	7.5475	0.6707	0.4327
2060	0.3833	1.3619	0.2708	0.0648

Note:
Emission factors are from MOVES2014a. Assumed 35 mph average speed, combined long haul trucks (average of peak winter and peak summer emissions).

Truck Trip Emissions

Year	Projected Daily Volume	Distance/trip	Daily VMT	CO	NO_x	PM_{10}	$PM_{2.5}$	CO	NO_x	PM_{10}	$PM_{2.5}$
	Trips/day	miles/trip	mile/day	lb/day	lb/day	lb/day	lb/day	lb/year	lb/year	lb/year	lb/year
2020	508	4.60	2338.35	11.493	38.908	3.458	2.231	2873.342	9726.958	864.391	557.639
2060	1235	4.60	5684.76	4.803	17.068	3.393	0.812	1200.818	4266.876	848.304	203.010

Note:
1. Trip distance: 7408 meters

Operation hours and days

Year	Minimum Operating hours	Maximum Operating hours	Operating Days
	hours/day	hours/day	days/year
2020	16	24	250
2060	16	24	250

Total Truck Trip Emissions along the Corridor for Modeling

Year	CO maximum 1-hr	CO 8-hr average	NO_x maximum 1-hr	NO_x Annual average	PM_{10} 24-hr average	$PM_{2.5}$ 24-hr average	$PM_{2.5}$ Annual average
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2020	0.718	0.718	2.432	1.110	0.144	0.093	0.064
2060	0.300	0.300	1.067	0.487	0.141	0.034	0.023

Truck Trip Emission Rate Input to AERMOD (per area source)

Source ID	Year	Area Source Length	CO maximum 1-hr	CO 8-hr	NO_x maximum 1-hr	NO_x Annual	PM_{10} 24-hr	$PM_{2.5}$ 24-hr	$PM_{2.5}$ Annual
		meters	g/s/source	g/s/source	g/s/source	g/s/source	g/s/source	g/s/source	g/s/source
CT 1	2020	300	3.662E-03	3.662E-03	1.240E-02	5.660E-03	7.343E-04	4.737E-04	3.245E-04
CT 2	2020	250	3.054E-03	3.054E-03	1.034E-02	4.721E-03	6.126E-04	3.952E-04	2.707E-04
CT 3-12	2020	300	3.666E-03	3.666E-03	1.241E-02	5.666E-03	7.351E-04	4.743E-04	3.248E-04
CT13	2020	300	3.665E-03	3.665E-03	1.241E-02	5.665E-03	7.350E-04	4.741E-04	3.248E-04
CT14	2020	51	6.177E-04	6.177E-04	2.091E-03	9.549E-04	1.239E-04	7.992E-05	5.474E-05
CT15	2020	266	3.246E-03	3.246E-03	1.099E-02	5.018E-03	6.510E-04	4.200E-04	2.877E-04
CT16	2020	111	1.356E-03	1.356E-03	4.589E-03	2.095E-03	2.719E-04	1.754E-04	1.201E-04
CT17	2020	122	1.495E-03	1.495E-03	5.061E-03	2.311E-03	2.999E-04	1.934E-04	1.325E-04
CT18	2020	178	2.172E-03	2.172E-03	7.352E-03	3.357E-03	4.356E-04	2.810E-04	1.925E-04
CT19	2020	300	3.666E-03	3.666E-03	1.241E-02	5.666E-03	7.351E-04	4.743E-04	3.248E-04
CT20	2020	300	3.665E-03	3.665E-03	1.241E-02	5.666E-03	7.351E-04	4.742E-04	3.248E-04
CT21	2020	300	3.666E-03	3.666E-03	1.241E-02	5.666E-03	7.352E-04	4.743E-04	3.248E-04
CT22	2020	300	3.666E-03	3.666E-03	1.241E-02	5.666E-03	7.351E-04	4.743E-04	3.248E-04
CT23	2020	300	3.666E-03	3.666E-03	1.241E-02	5.666E-03	7.352E-04	4.743E-04	3.248E-04

CT24	2020	158	1.933E-03	1.933E-03	6.545E-03	2.988E-03	3.877E-04	2.501E-04	1.713E-04
CT25	2020	104	1.274E-03	1.274E-03	4.312E-03	1.969E-03	2.555E-04	1.648E-04	1.129E-04
CT26	2020	232	2.829E-03	2.829E-03	9.576E-03	4.372E-03	5.673E-04	3.660E-04	2.507E-04
CT27	2020	300	3.665E-03	3.665E-03	1.241E-02	5.665E-03	7.350E-04	4.742E-04	3.248E-04
CT28	2020	300	3.664E-03	3.664E-03	1.240E-02	5.663E-03	7.347E-04	4.740E-04	3.247E-04
CT29	2020	237	2.895E-03	2.895E-03	9.799E-03	4.474E-03	5.805E-04	3.745E-04	2.565E-04
CT 1	2060	300	1.530E-03	1.530E-03	5.437E-03	2.483E-03	7.207E-04	1.725E-04	1.181E-04
CT 2	2060	250	1.276E-03	1.276E-03	4.536E-03	2.071E-03	6.012E-04	1.439E-04	9.854E-05
CT 3-12	2060	300	1.532E-03	1.532E-03	5.443E-03	2.486E-03	7.215E-04	1.727E-04	1.183E-04
CT13	2060	300	1.532E-03	1.532E-03	5.442E-03	2.485E-03	7.213E-04	1.726E-04	1.182E-04
CT14	2060	51	2.582E-04	2.582E-04	9.173E-04	4.189E-04	1.216E-04	2.910E-05	1.993E-05
CT15	2060	266	1.357E-03	1.357E-03	4.820E-03	2.201E-03	6.389E-04	1.529E-04	1.047E-04
CT16	2060	111	5.665E-04	5.665E-04	2.013E-03	9.192E-04	2.668E-04	6.385E-05	4.373E-05
CT17	2060	122	6.249E-04	6.249E-04	2.220E-03	1.014E-03	2.943E-04	7.042E-05	4.824E-05
CT18	2060	178	9.076E-04	9.076E-04	3.225E-03	1.473E-03	4.275E-04	1.023E-04	7.007E-05
CT19	2060	300	1.532E-03	1.532E-03	5.443E-03	2.486E-03	7.215E-04	1.727E-04	1.183E-04
CT20	2060	300	1.532E-03	1.532E-03	5.443E-03	2.485E-03	7.214E-04	1.726E-04	1.182E-04
CT21	2060	300	1.532E-03	1.532E-03	5.443E-03	2.486E-03	7.215E-04	1.727E-04	1.183E-04
CT22	2060	300	1.532E-03	1.532E-03	5.443E-03	2.486E-03	7.215E-04	1.727E-04	1.183E-04
CT23	2060	300	1.532E-03	1.532E-03	5.444E-03	2.486E-03	7.215E-04	1.727E-04	1.183E-04
CT24	2060	158	8.080E-04	8.080E-04	2.871E-03	1.311E-03	3.805E-04	9.106E-05	6.237E-05
CT25	2060	104	5.324E-04	5.324E-04	1.892E-03	8.638E-04	2.507E-04	6.000E-05	4.110E-05
CT26	2060	232	1.182E-03	1.182E-03	4.200E-03	1.918E-03	5.567E-04	1.332E-04	9.126E-05
CT27	2060	300	1.532E-03	1.532E-03	5.443E-03	2.485E-03	7.214E-04	1.726E-04	1.182E-04
CT28	2060	300	1.531E-03	1.531E-03	5.440E-03	2.484E-03	7.211E-04	1.726E-04	1.182E-04
CT29	2060	237	1.210E-03	1.210E-03	4.298E-03	1.963E-03	5.697E-04	1.363E-04	9.338E-05

Note:
Total length is 7408 m.

Modeled Area Source Parameters	
Source type	Area
Release Height (m) [1]	3.4
Area Source Width (m)	25
Area Source Length (m)	Various
Initial Vertical Coefficient, Szinit (σzo)	3.16

Note:

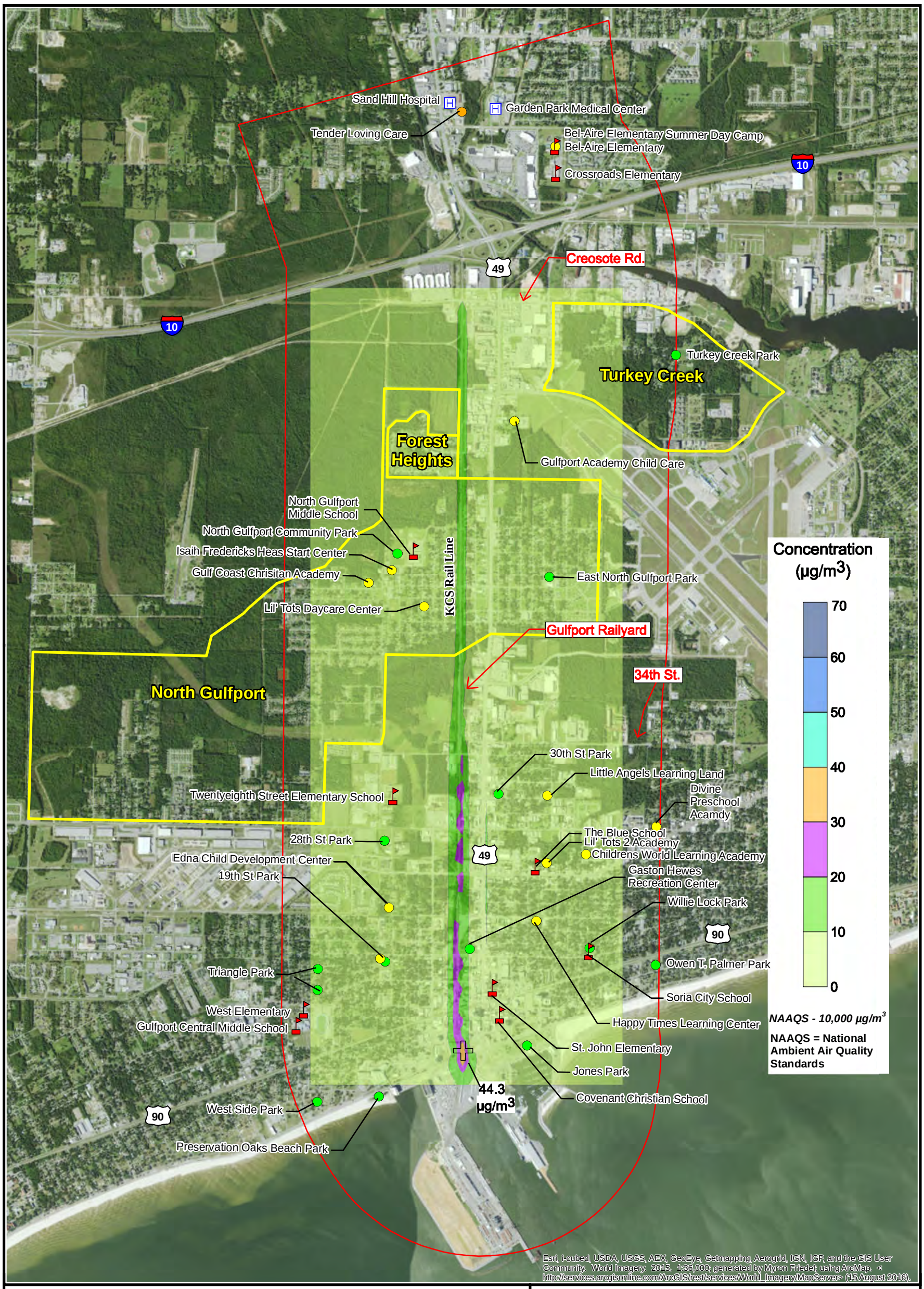
Source Parameter Based on US EPA :"Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas".

Heavy duty vehicle height: 4.0 meters, PM guidance

Vertical dimension: 4.0 X 1.7 =6.8 meters

Release height: 6.8 /2 = 3.4 meters.

Initial Vertical Coefficient, Szinit (σzo): 6.8/2.15 = 3.16 meters



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-1

Port of Gulfport Expansion Project

Dispersion Modeling Results
CO 8-hour
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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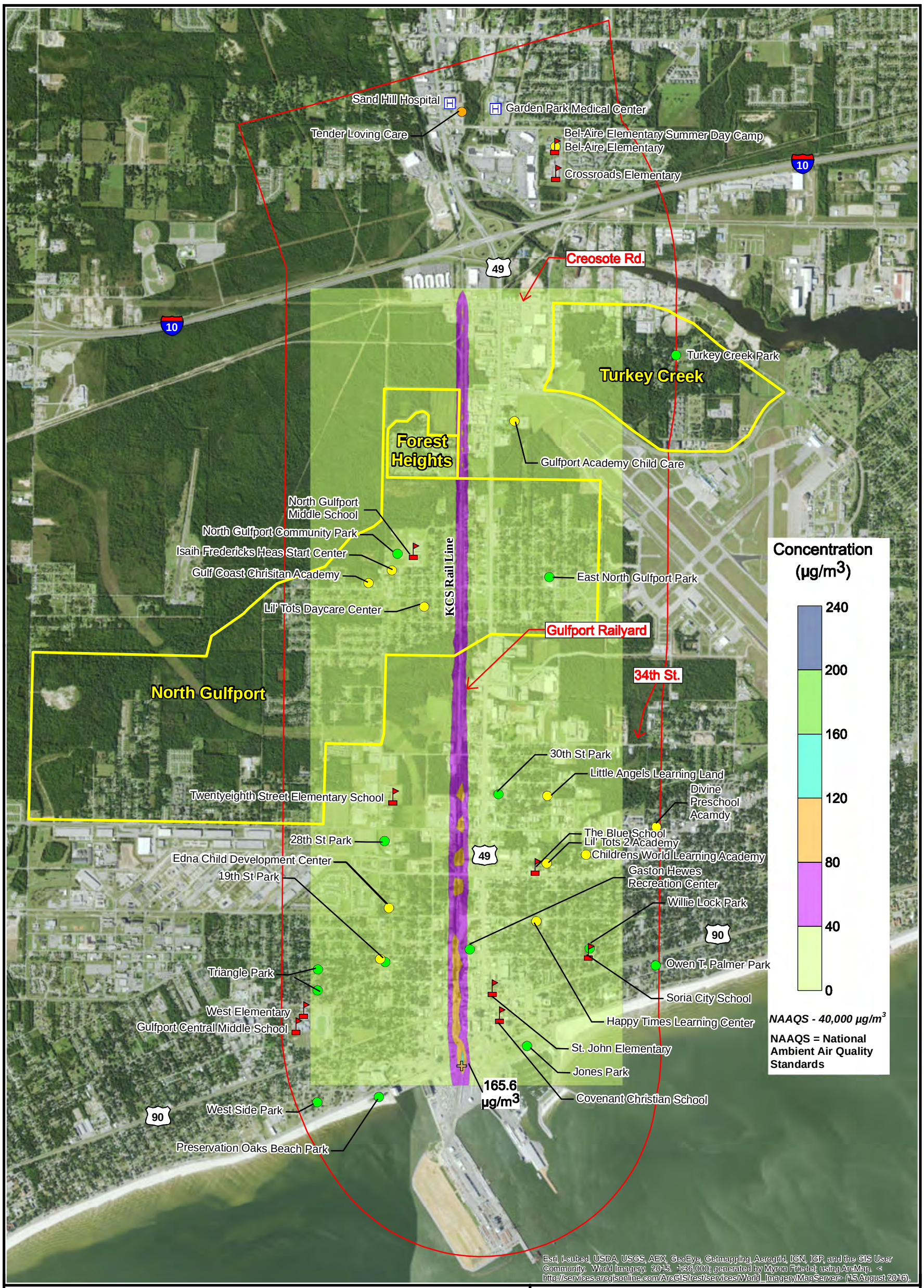

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-2

Port of Gulfport Expansion Project

Dispersion Modeling Results
CO 1-hour
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

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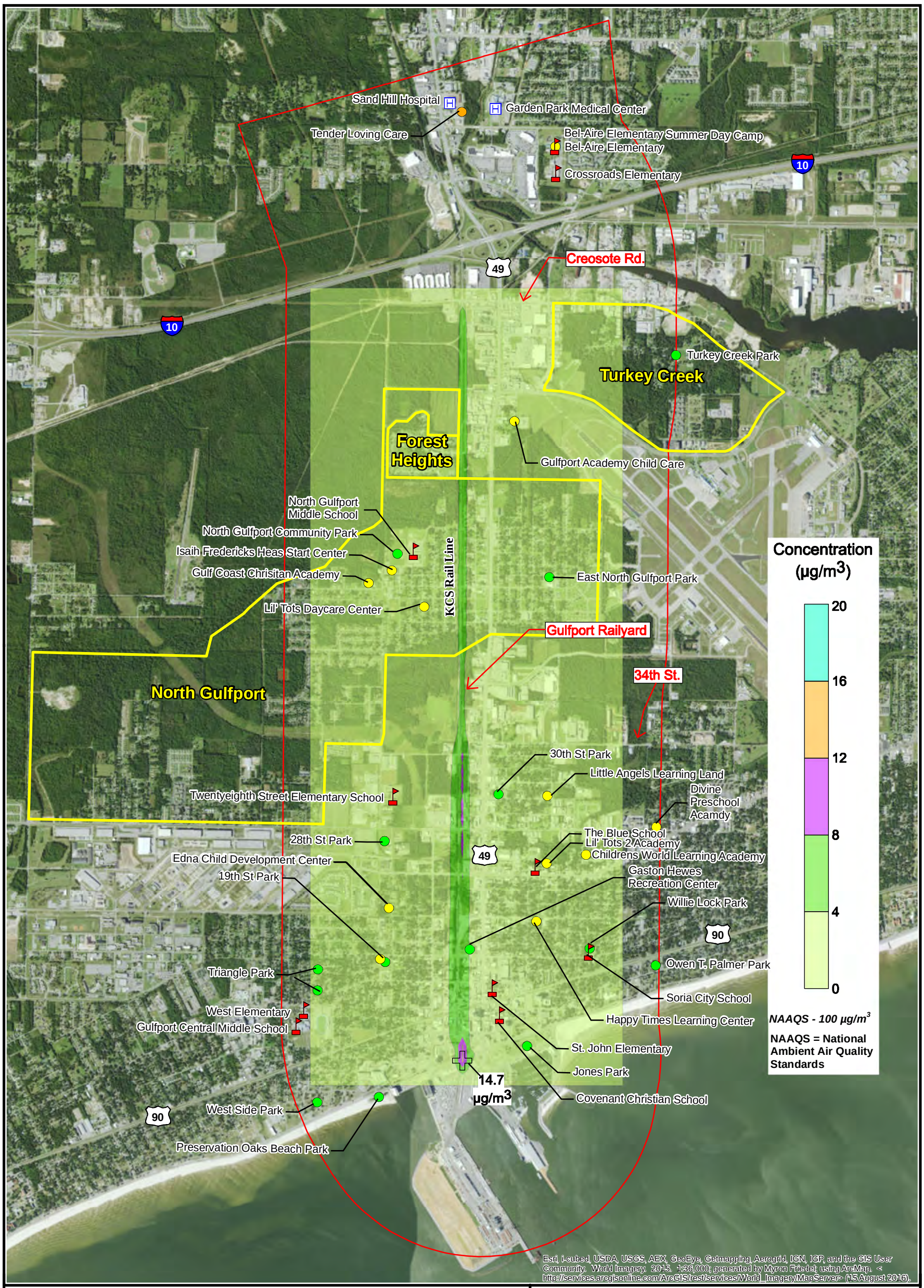

- School
- Convalescence Facility
- Daycare
- Hospital
- Park
- Environmental Justice Community
- Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-3

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 Annual
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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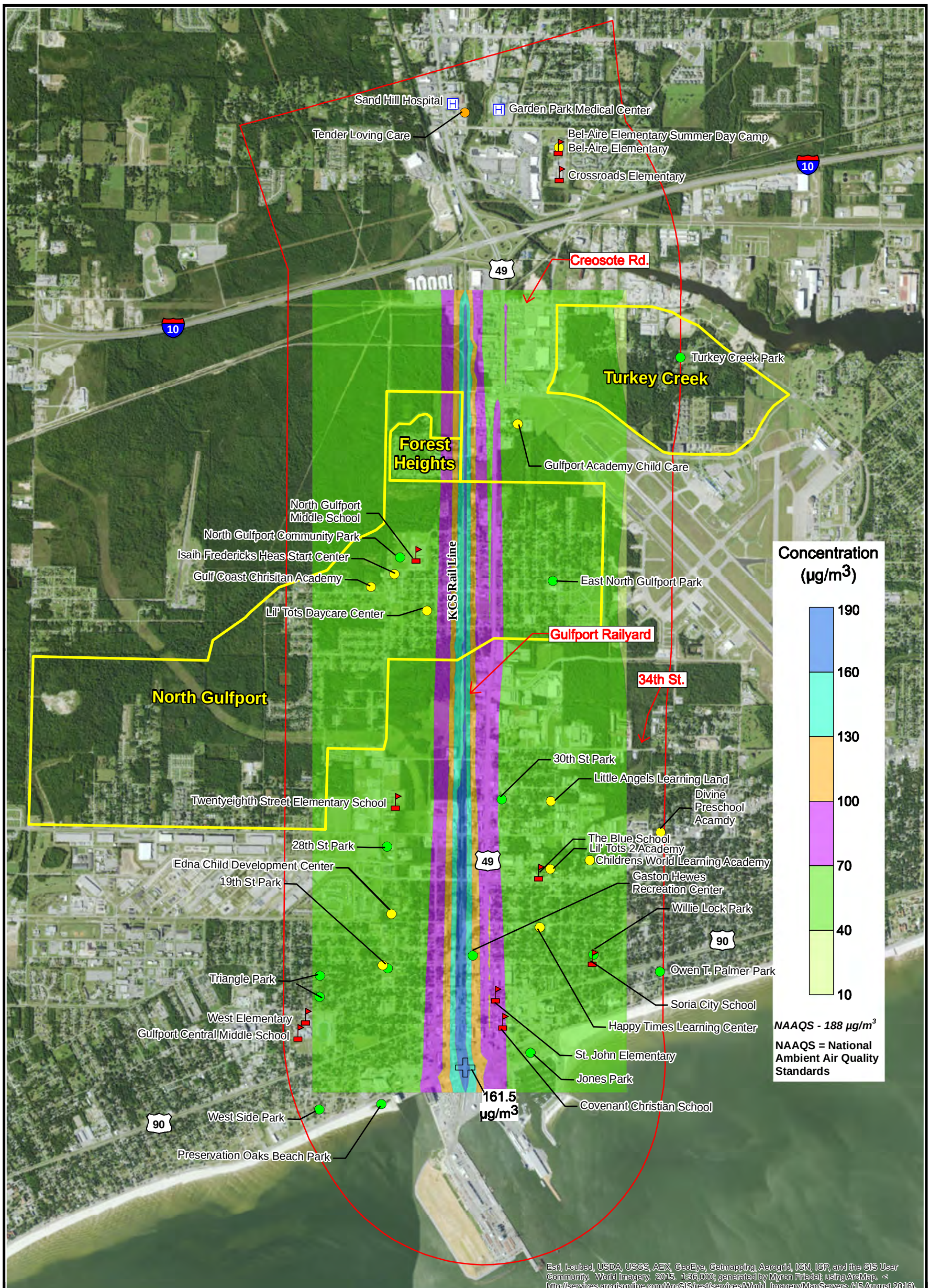

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-4

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 1-hour
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

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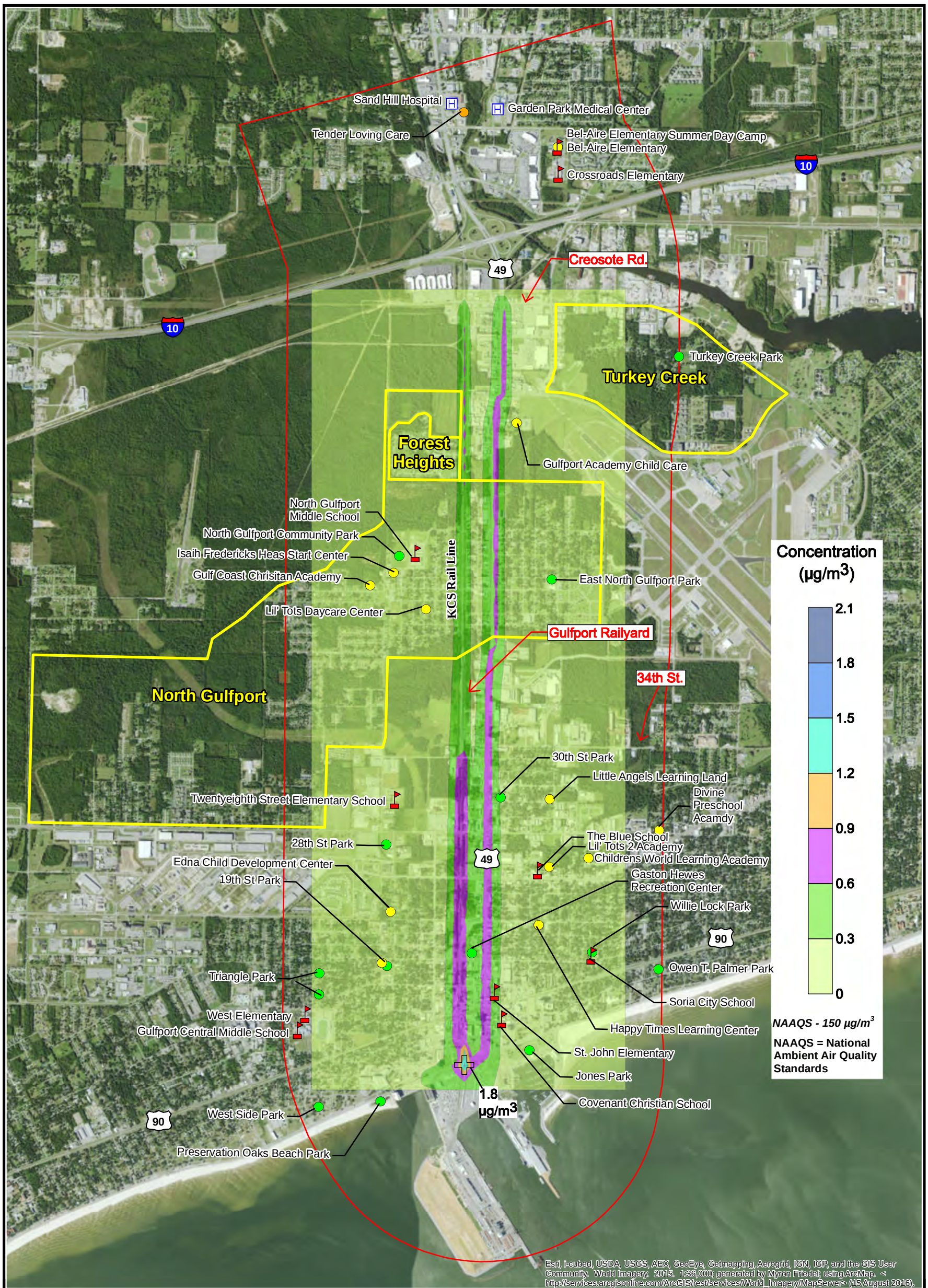

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-5

Port of Gulfport Expansion Project

Dispersion Modeling Results
PM_{10} 24-hour
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 18, 2017

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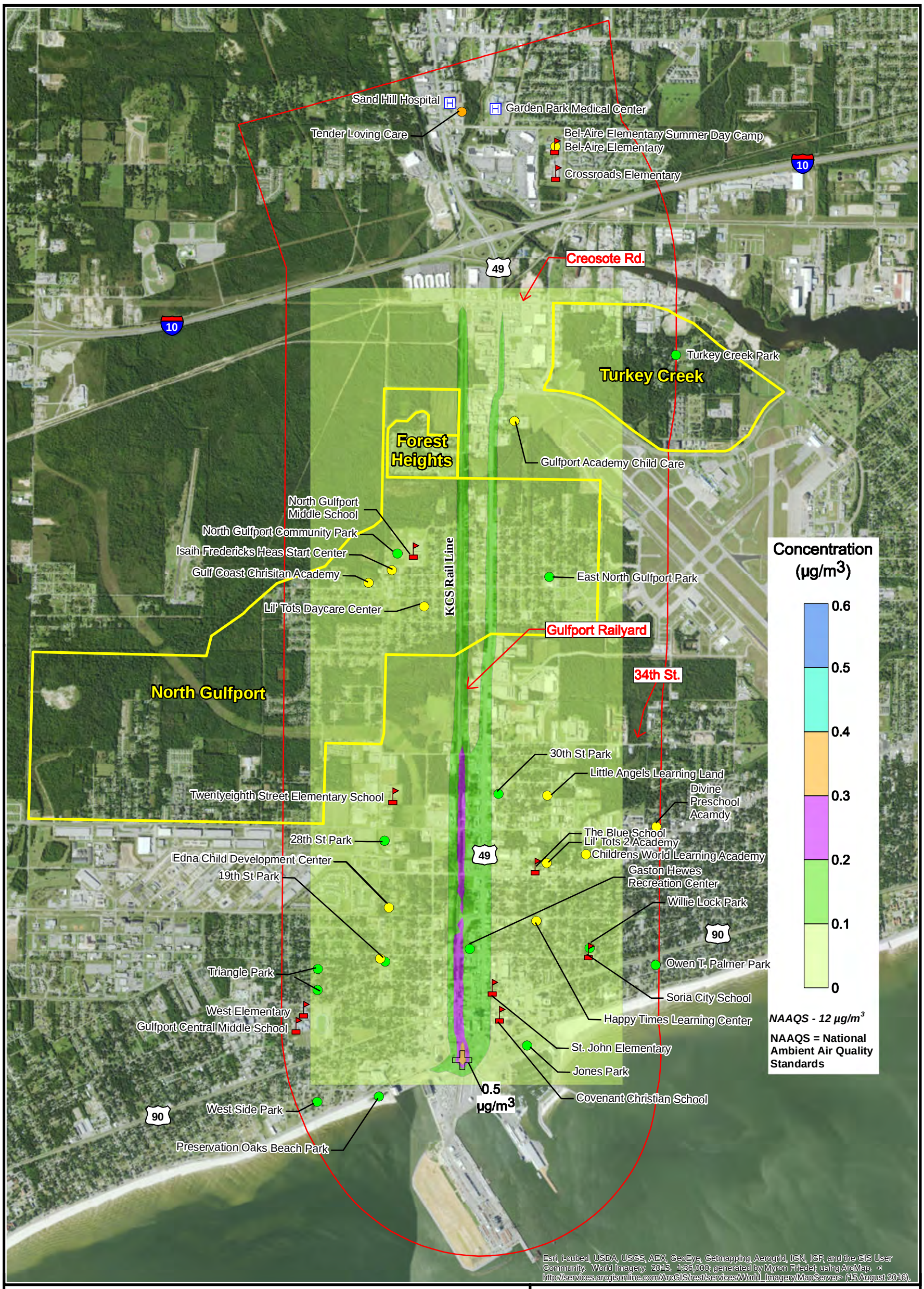

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-6

Port of Gulfport Expansion Project

Dispersion Modeling Results
$PM_{2.5}$ Annual
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

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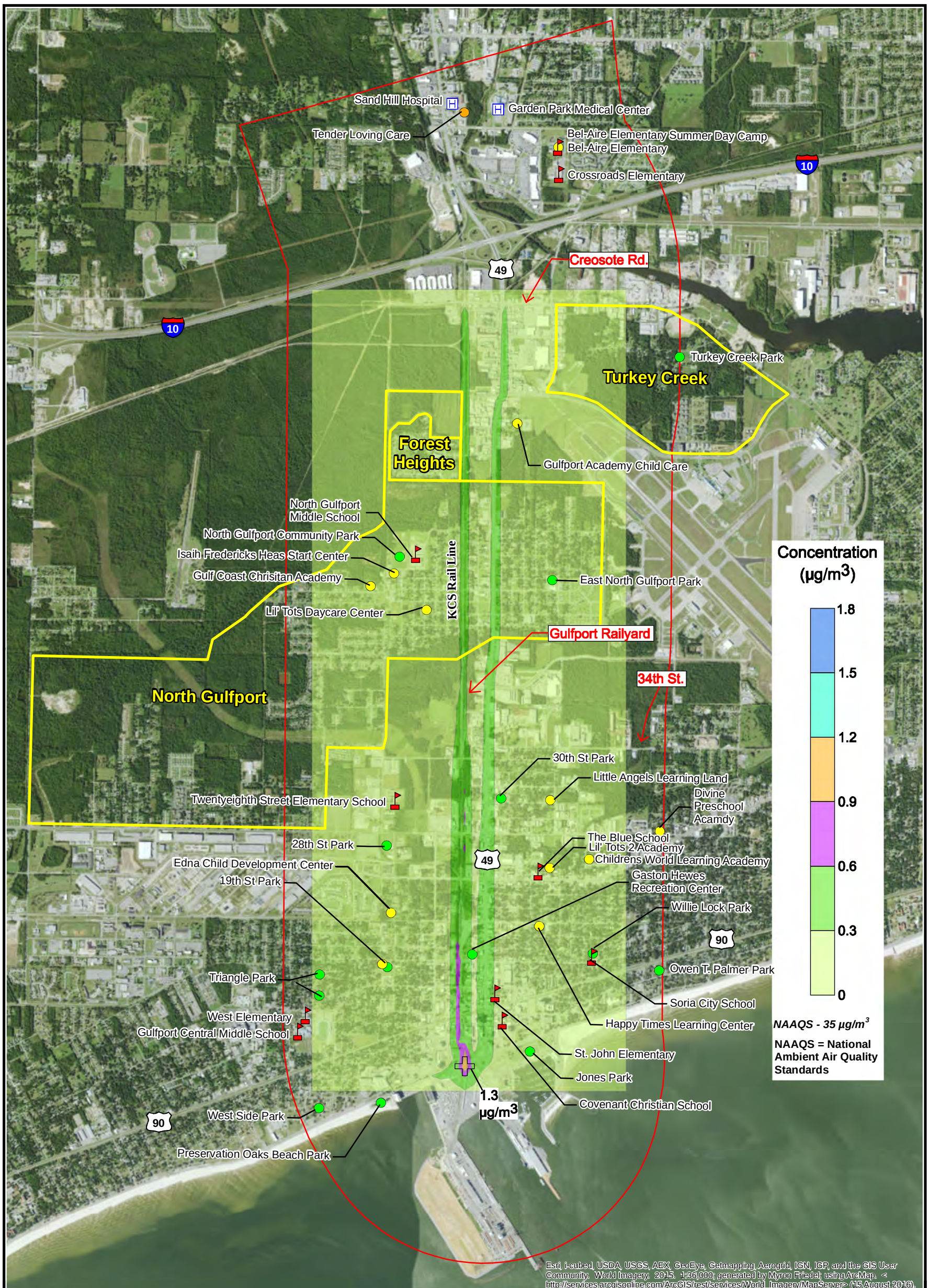

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-7

Port of Gulfport Expansion Project

Dispersion Modeling Results
$PM_{2.5}$ 24-hour
No-Action Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

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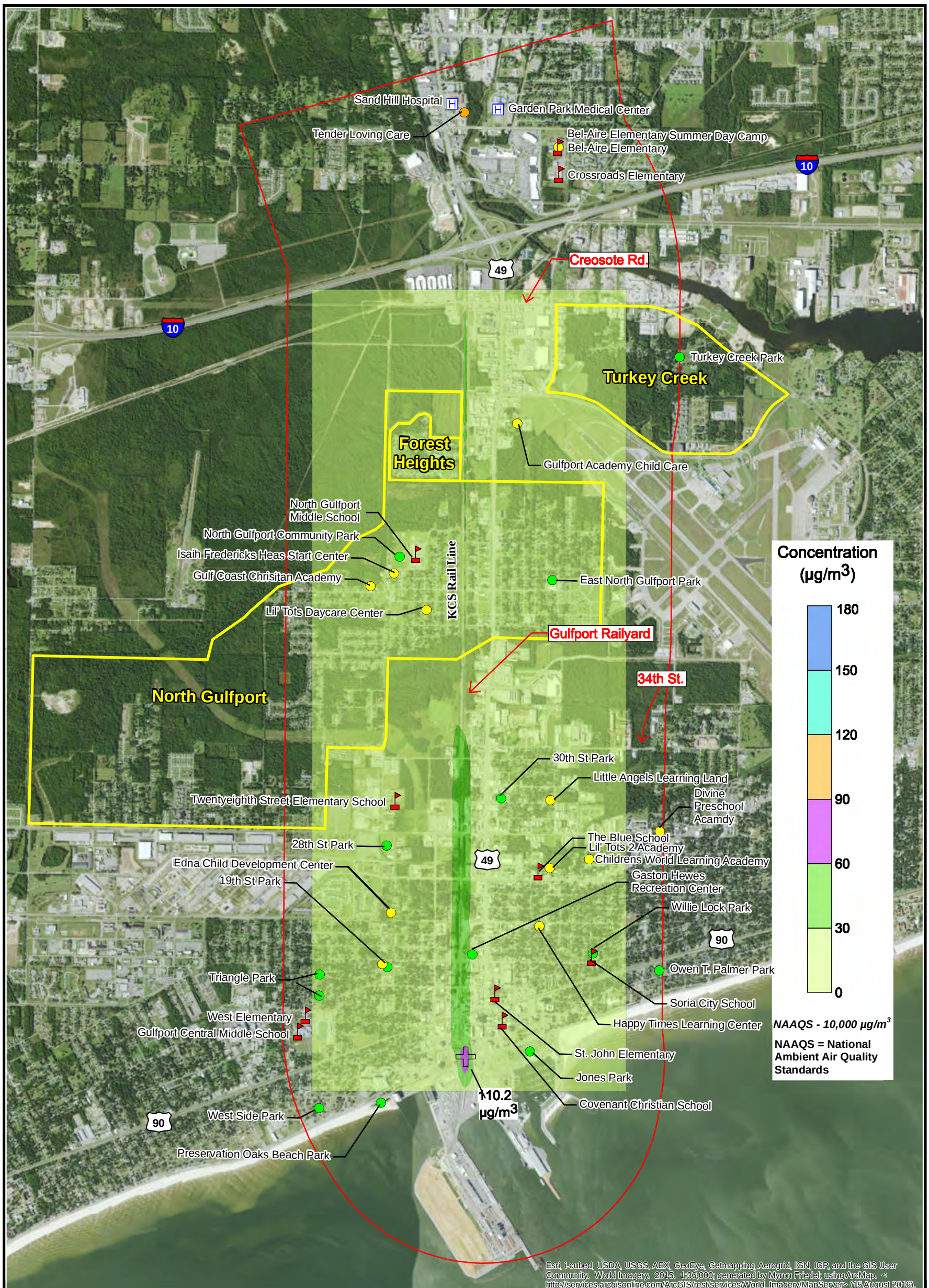

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-8

Port of Gulfport Expansion Project

Dispersion Modeling Results
CO 8-hour
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

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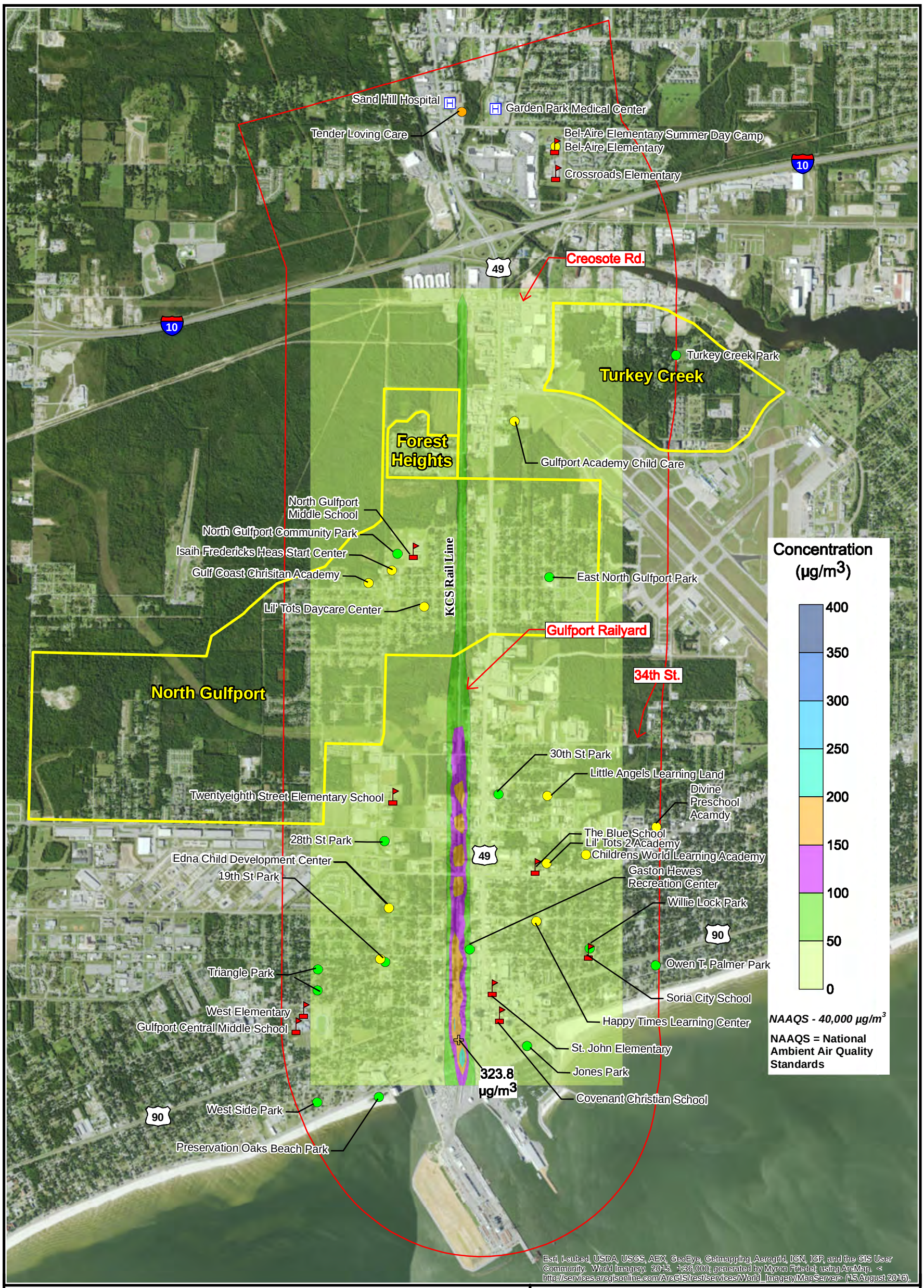

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-9

Port of Gulfport Expansion Project

Dispersion Modeling Results
CO 1-hour
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

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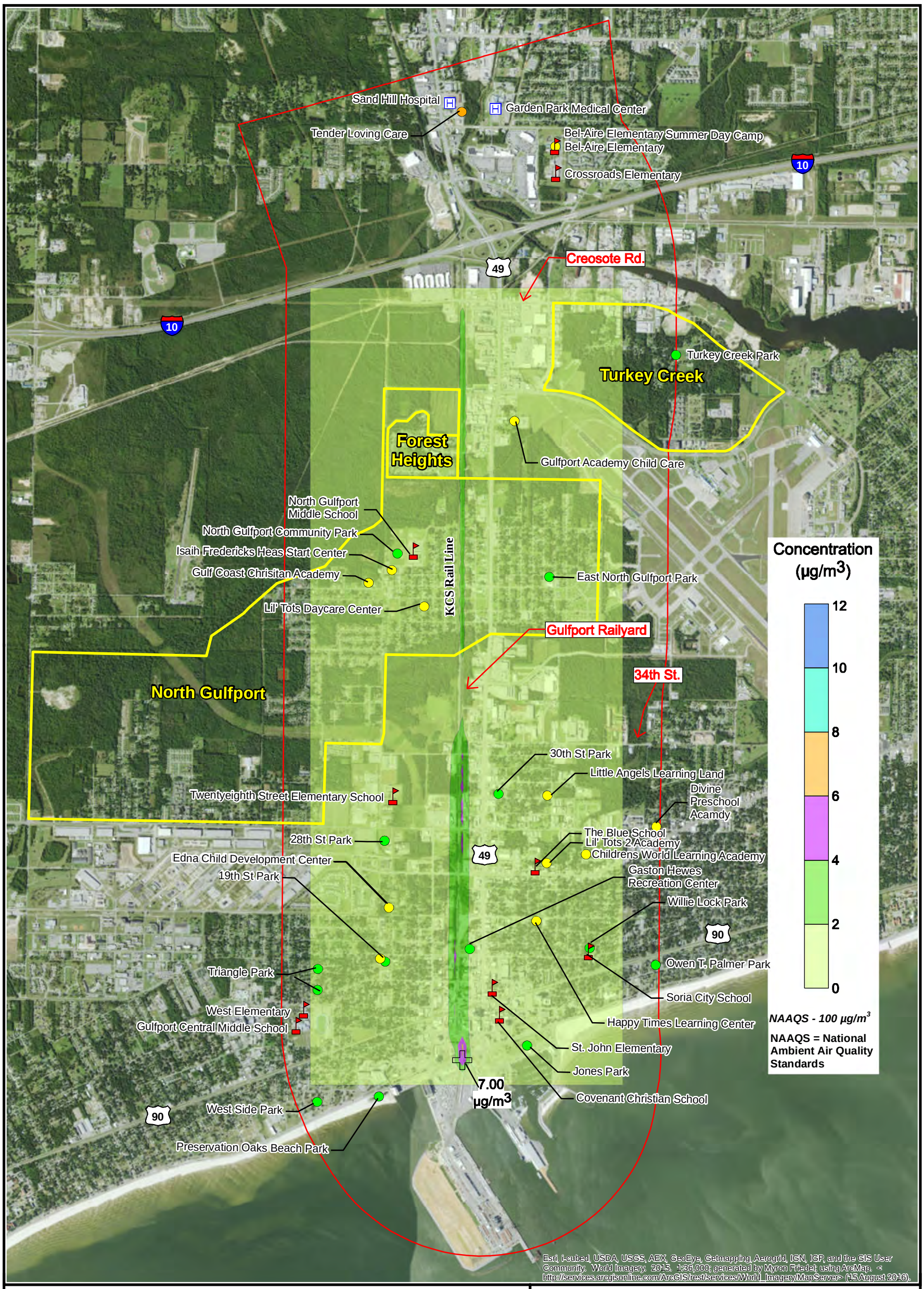


School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

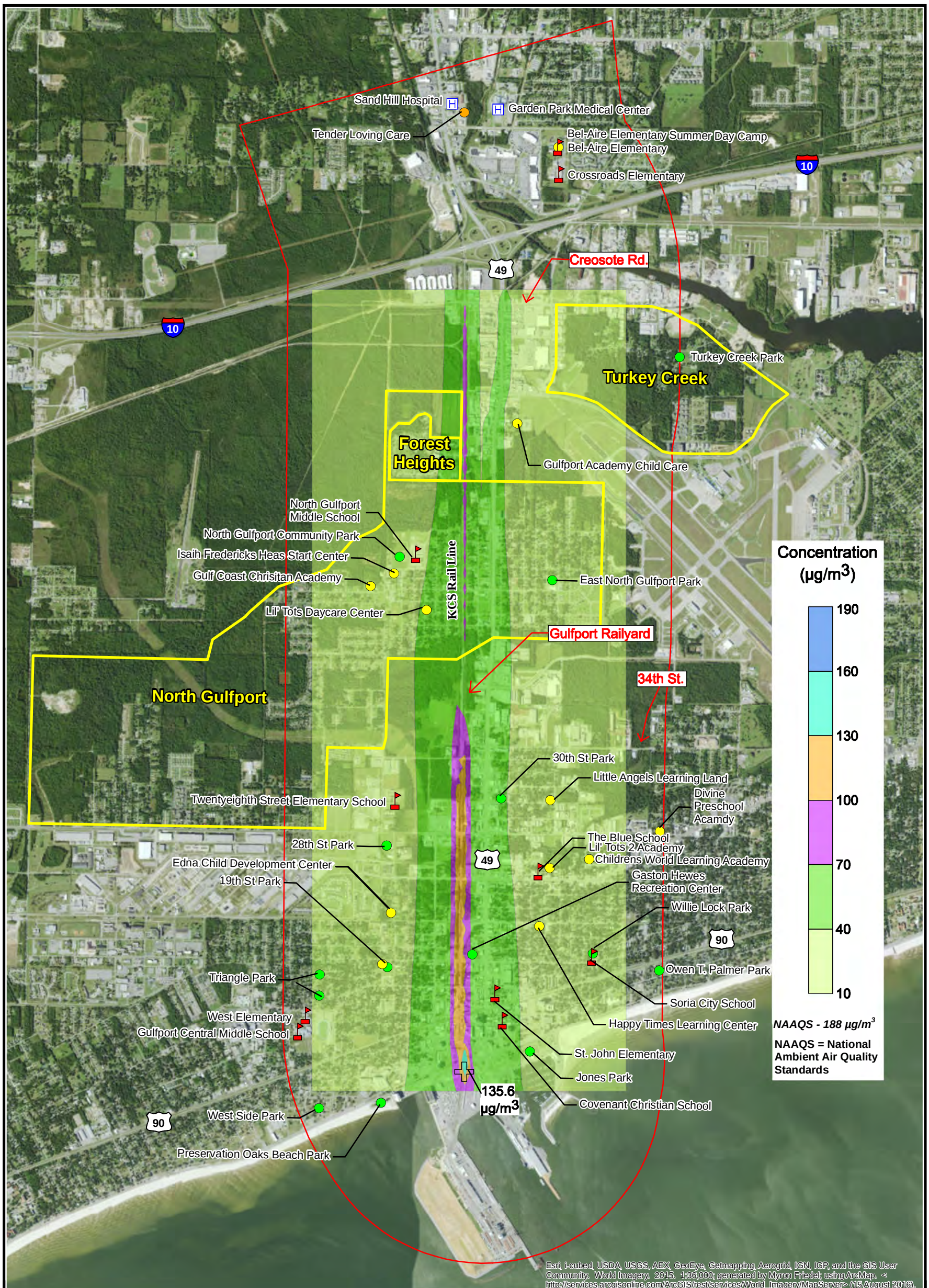
Figure P3-10

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 Annual
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_10_NO2_Annual_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

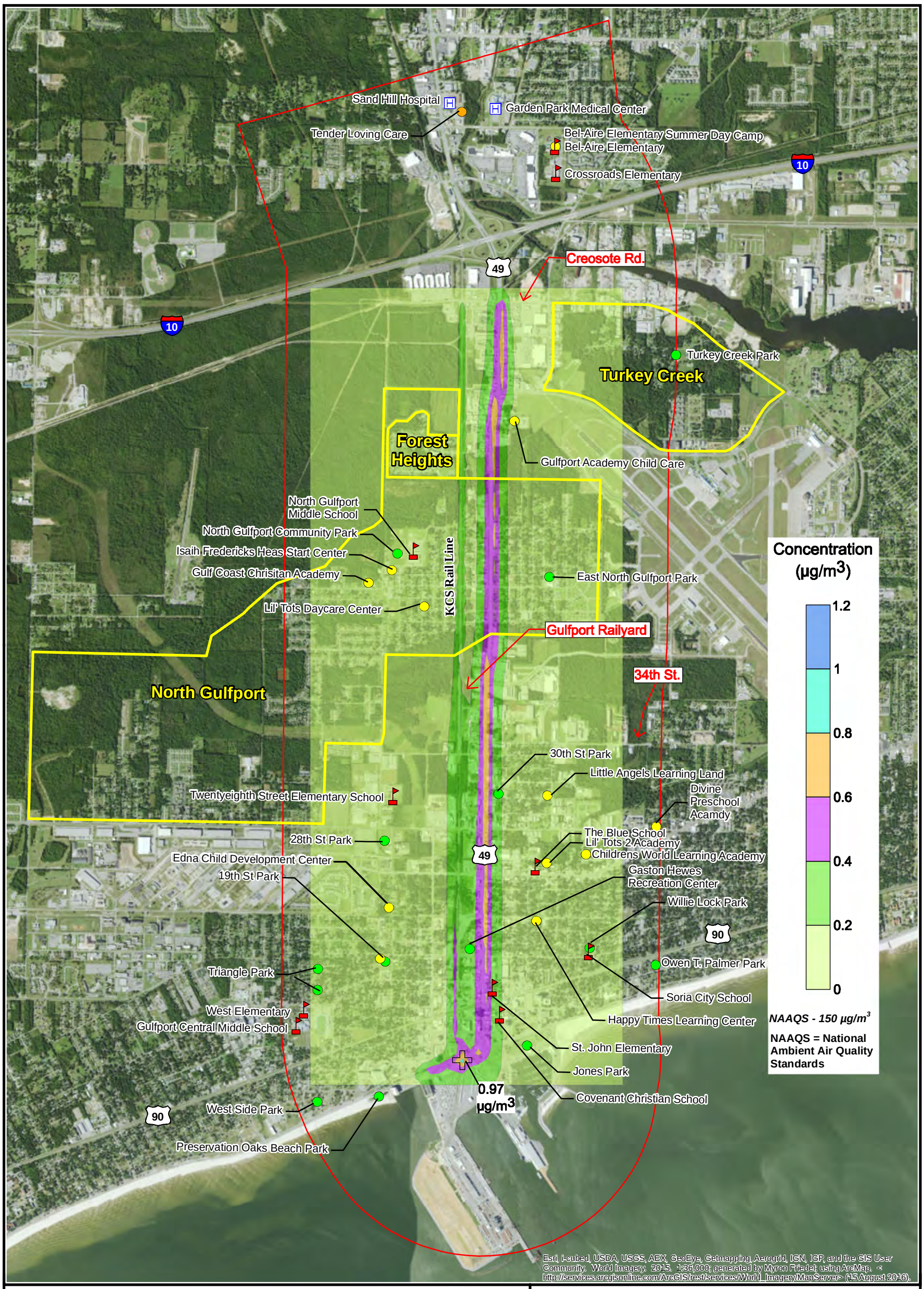
Figure P3-11

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 1-hour
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_11_NO2_1hr_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

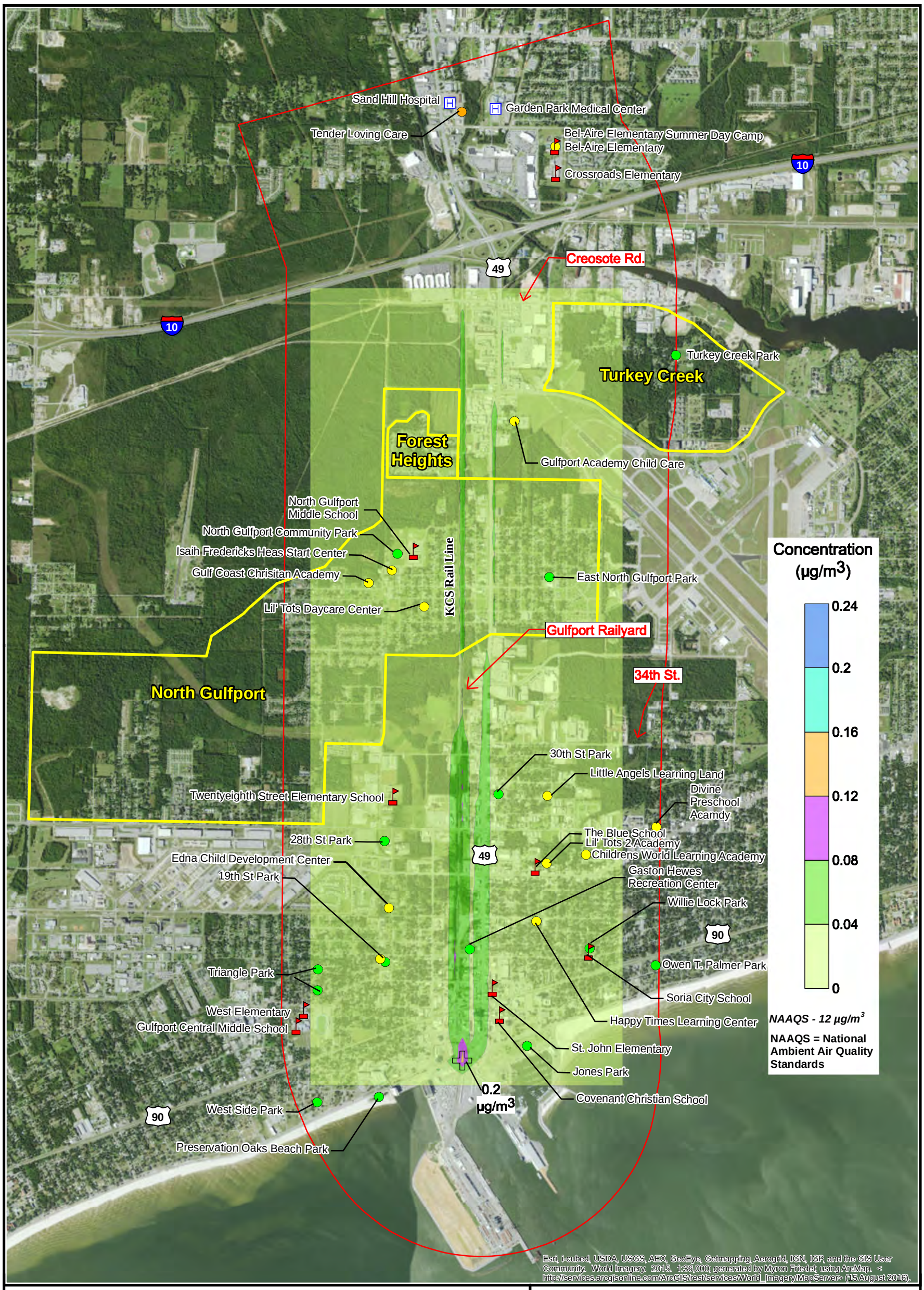
Figure P3-12

Port of Gulfport Expansion Project

Dispersion Modeling Results
PM_{10} 24-hour
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_12_PM10_24hr_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

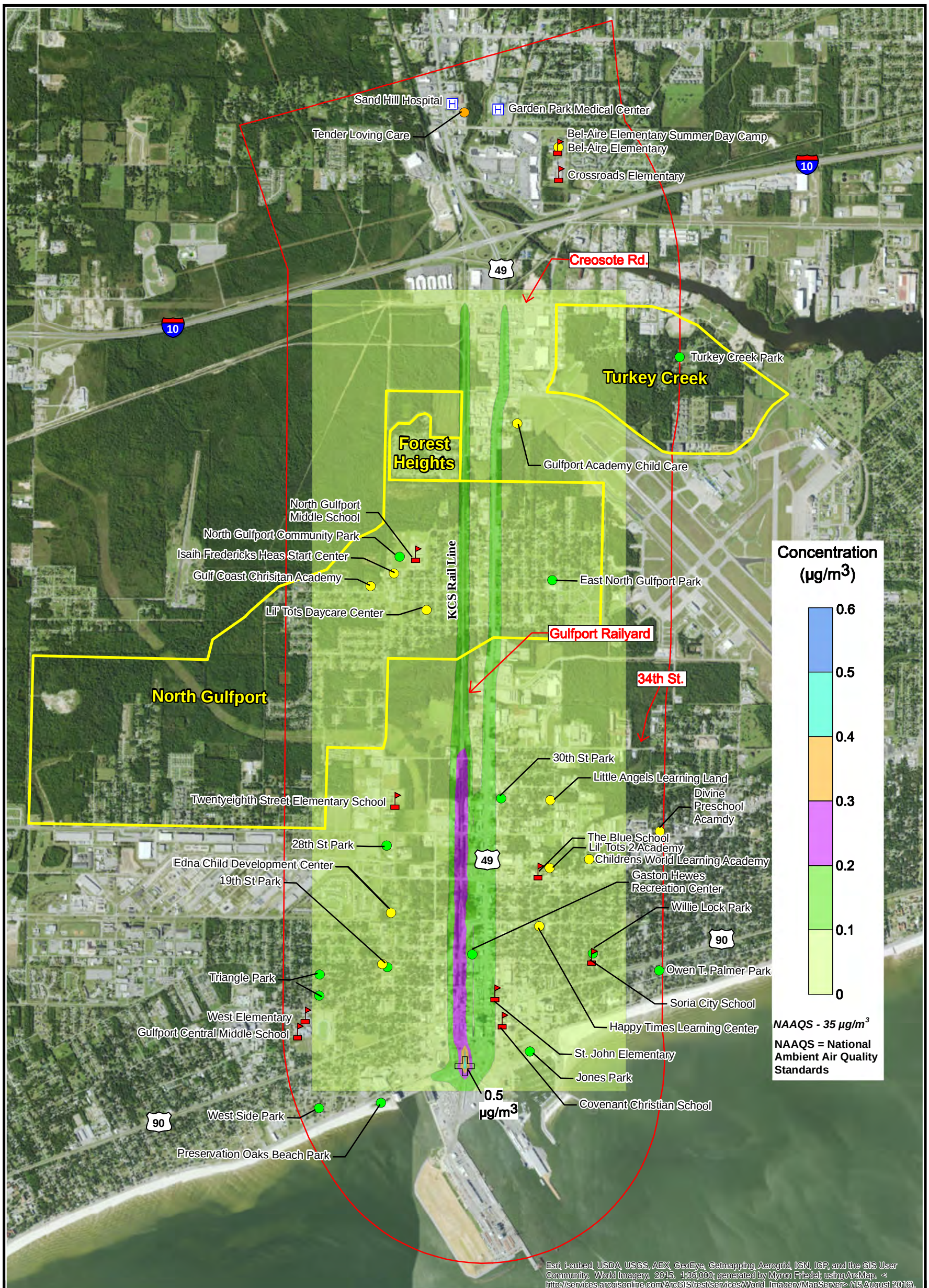
Figure P3-13

Port of Gulfport Expansion Project

Dispersion Modeling Results
$PM_{2.5}$ Annual
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_13_PM25_Annual_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

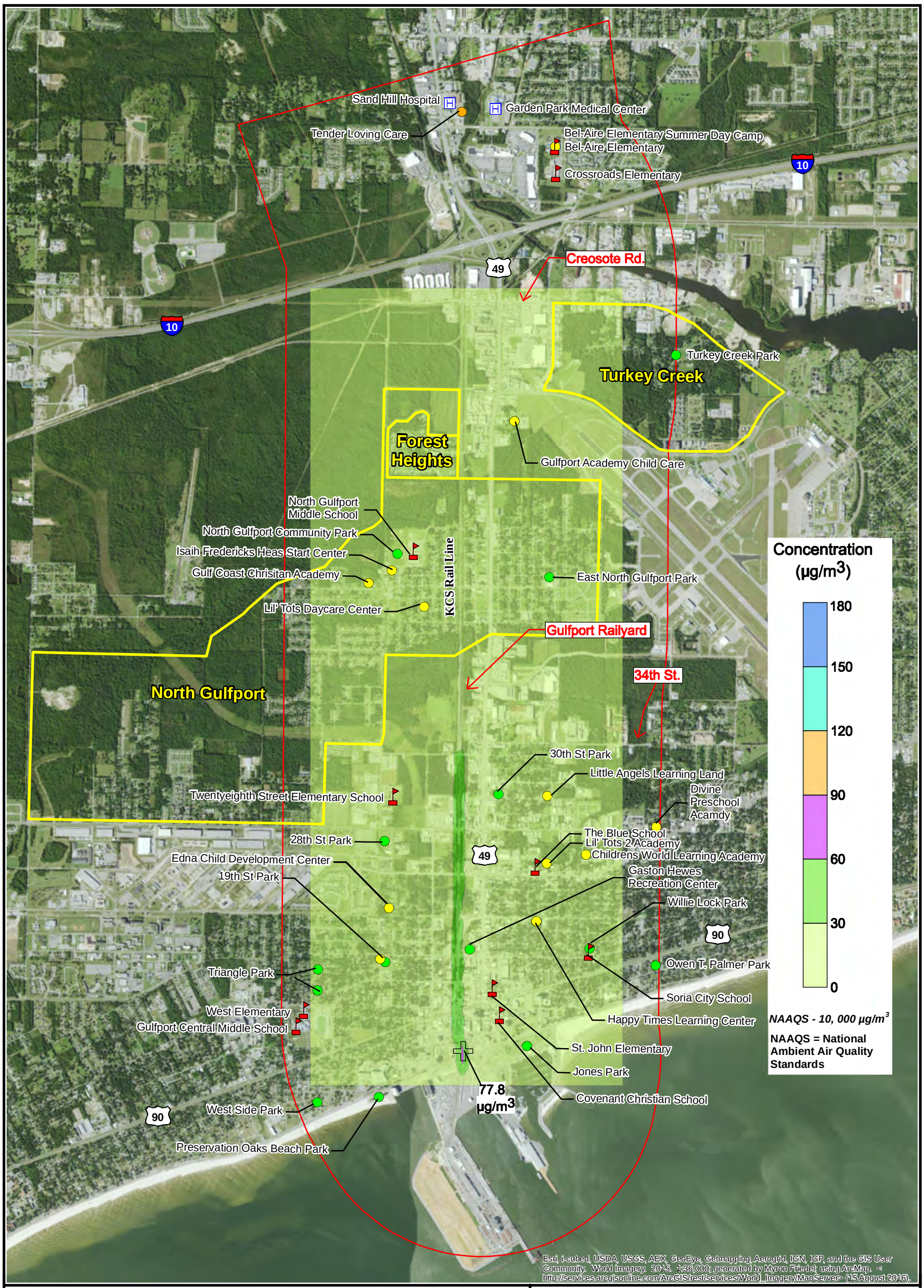
Figure P3-14

Port of Gulfport Expansion Project

Dispersion Modeling Results
$PM_{2.5}$ 24-hour
No-Action Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_14_PM25_24hr_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

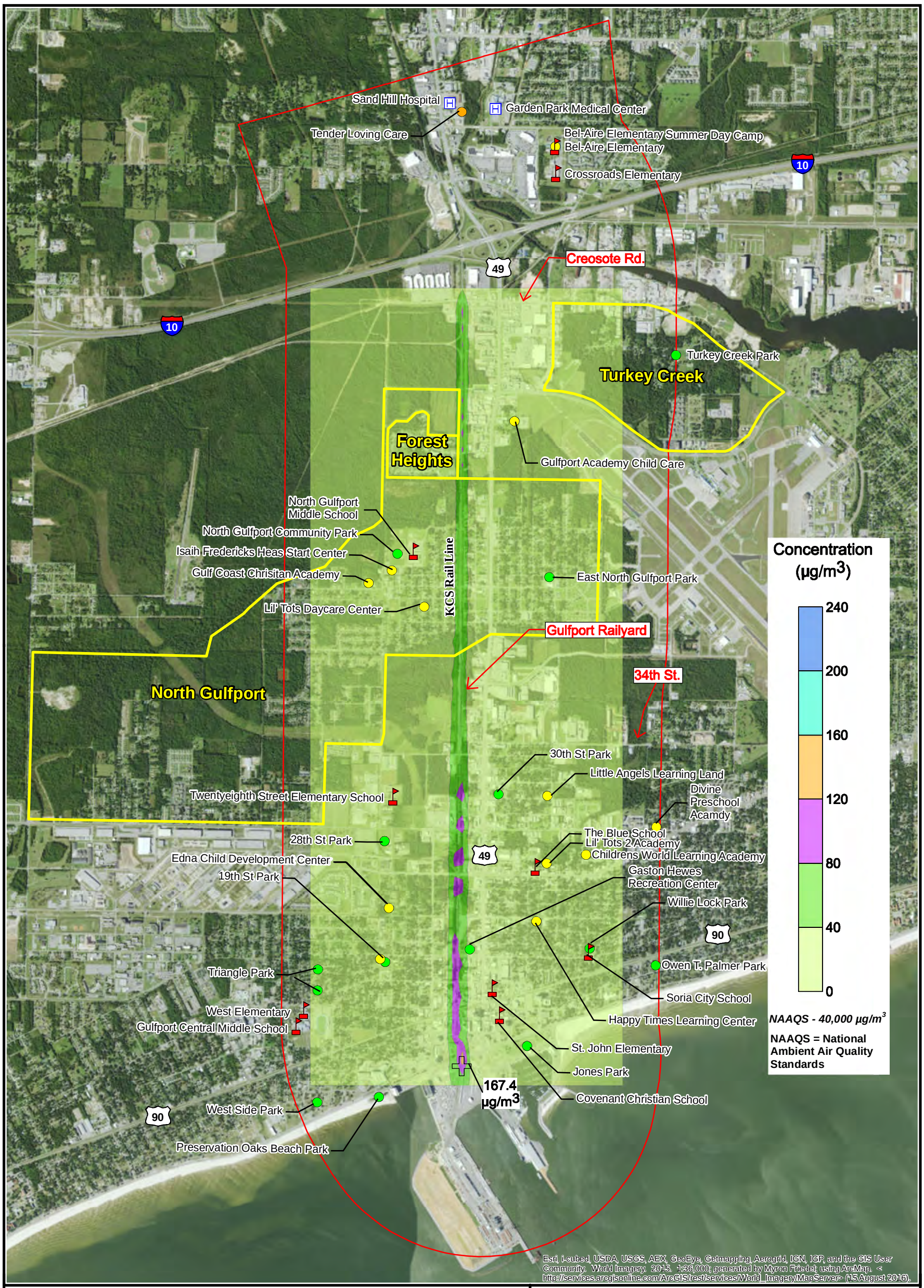
Figure P3-15

Port of Gulfport Expansion Project

Dispersion Modeling Results
CO 8-hour
Proposed Project Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_15_CO_8hr_2020.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

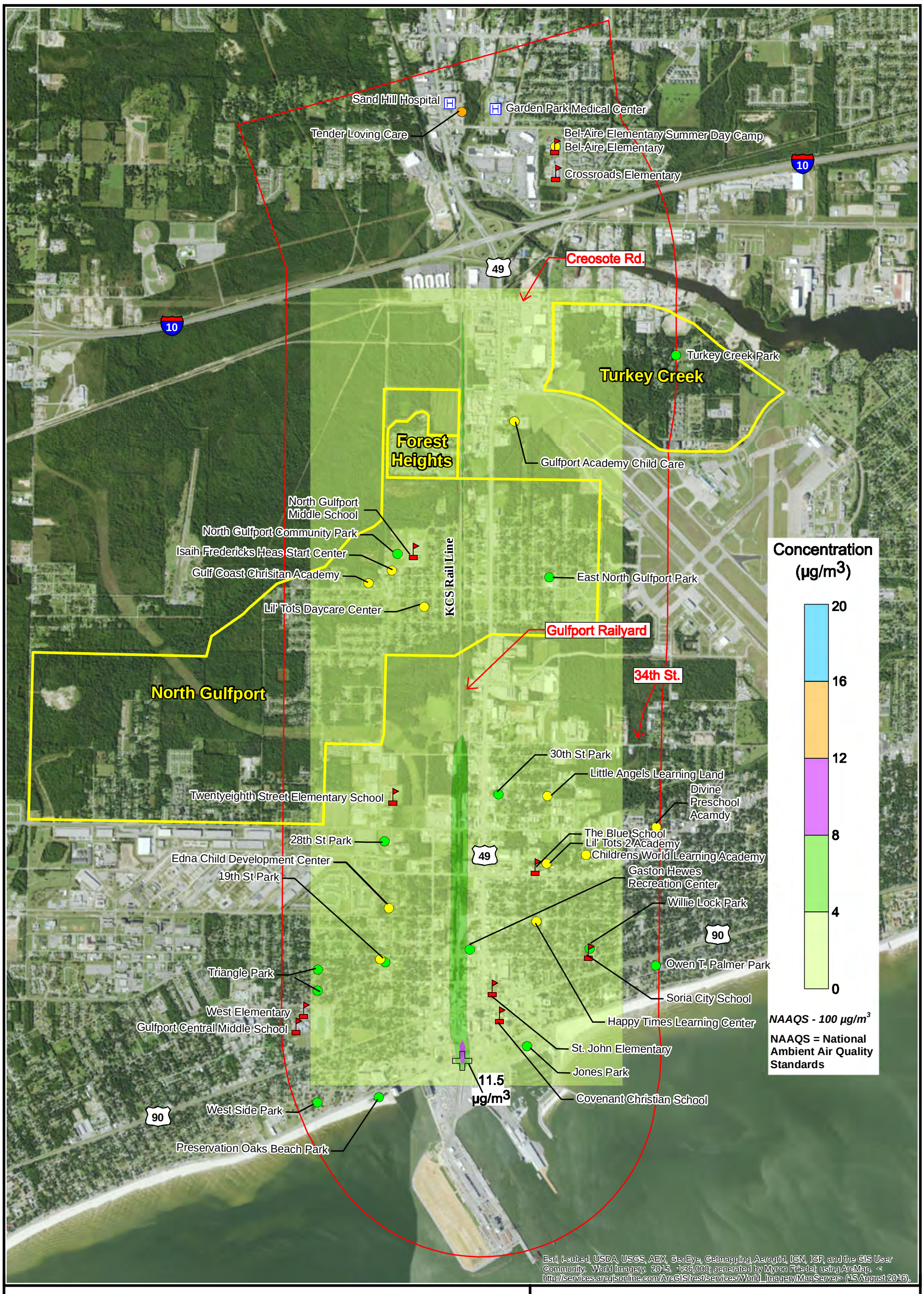
Figure P3-16

Port of Gulfport Expansion Project

Dispersion Modeling Results
CO 1-hour
Proposed Project Alternative 2020

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_16_CO_1hr_2020.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

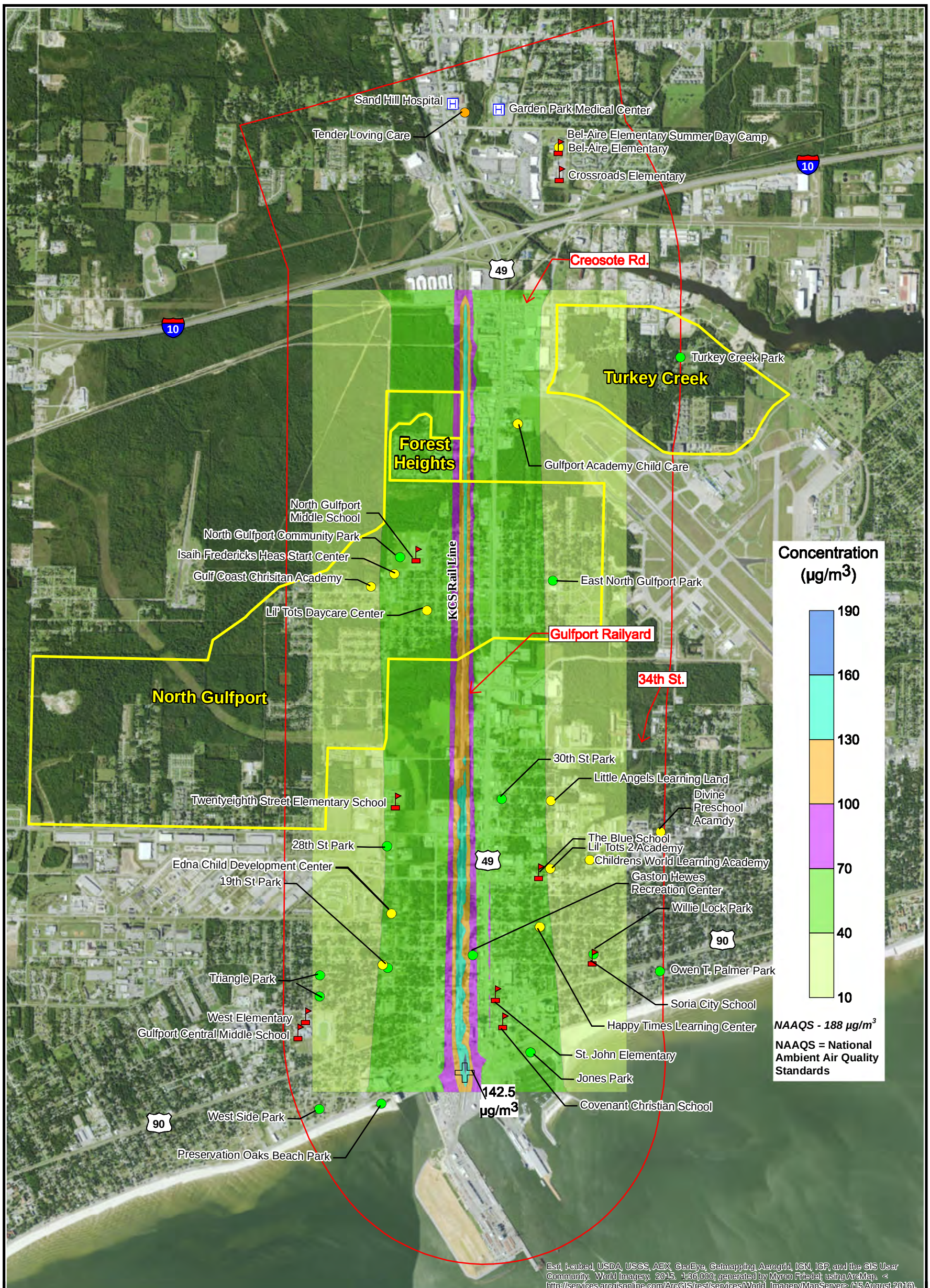
Figure P3-17

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 Annual
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_17_NO2_Annual_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

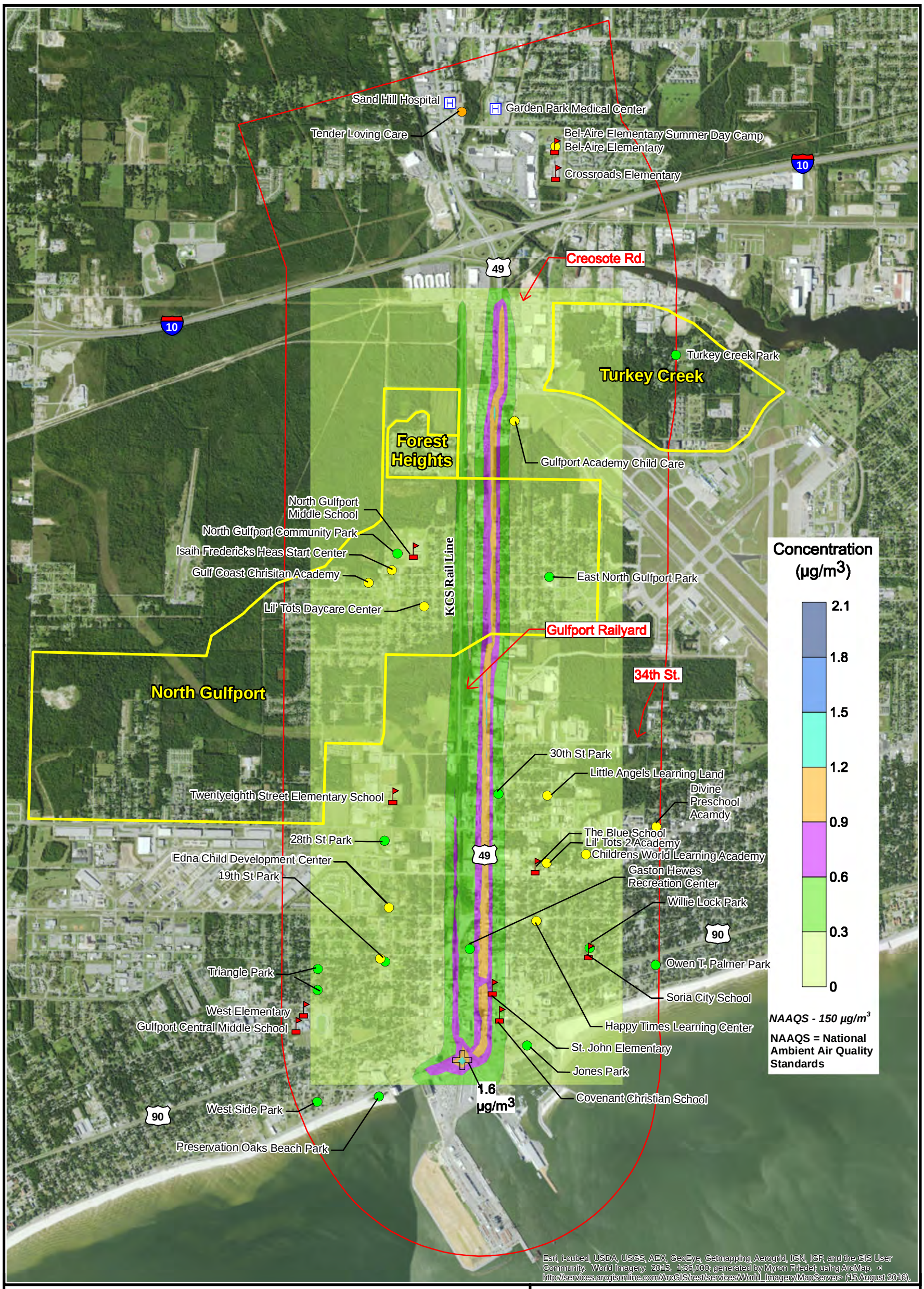
Figure P3-18

Port of Gulfport Expansion Project

Dispersion Modeling Results
NO_2 1-hour
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_18_NO2_1hr_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

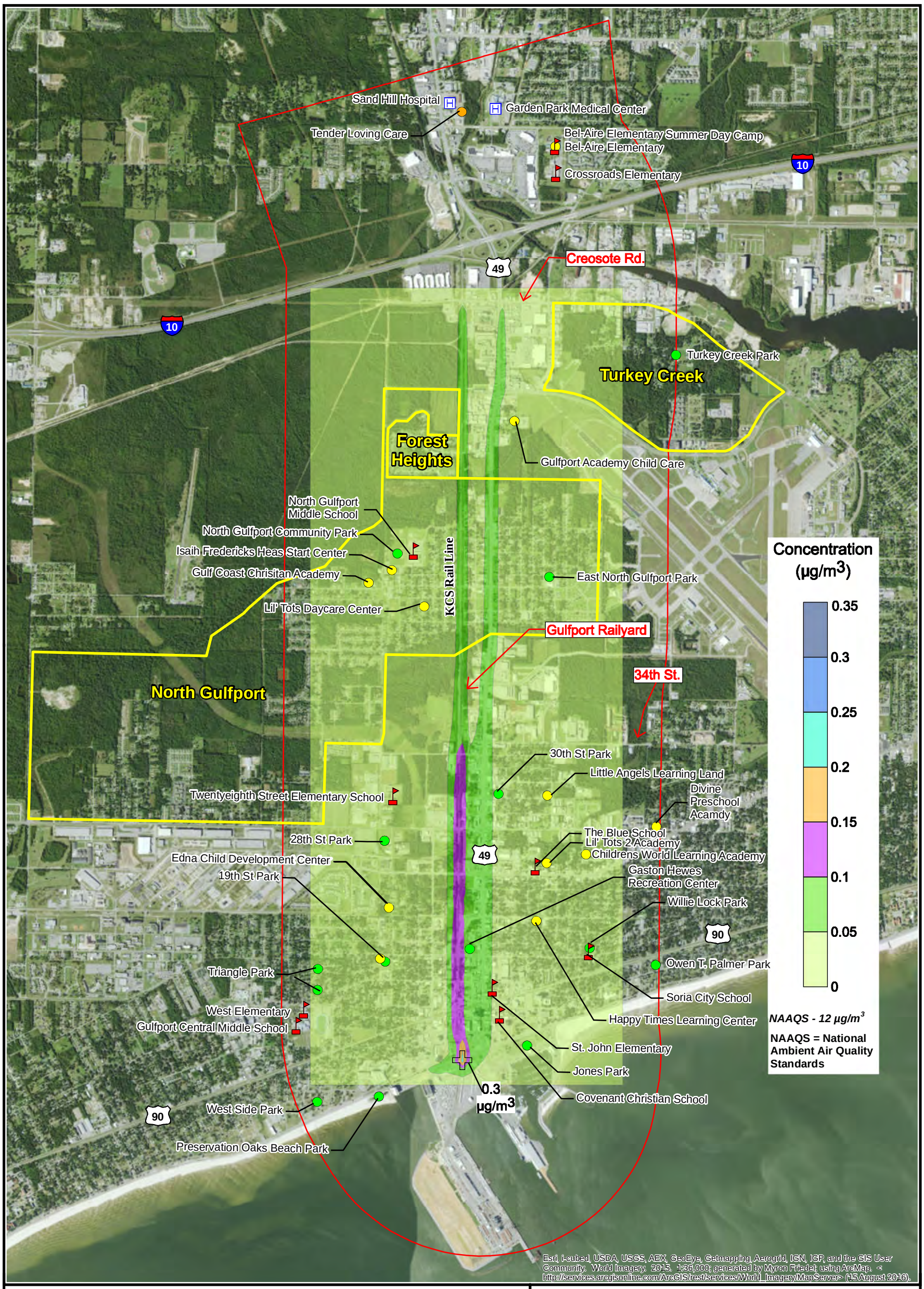
Figure P3-19

Port of Gulfport Expansion Project

Dispersion Modeling Results
PM_{10} 24-hour
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_19_PM10_24hr_2060.mxd



School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-20

Port of Gulfport Expansion Project

Dispersion Modeling Results
$PM_{2.5}$ Annual
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: January 19, 2017

File: N:\Clients\M_N\Mississippi_State_Port_Authority\100018536\geospatial\Figs_EIS\Air_Quality_Figs\P3_20_PM25_Annual_2060.mxd

Sand Hill Hospital
Garden Park Medical Center
Tender Loving Care
Bel-Aire Elementary Summer Day Camp
Bel-Aire Elementary
Crossroads Elementary
10
Creosote Rd.
49
10
Turkey Creek Park
Turkey Creek
Forest Heights
Gulfport Academy Child Care
North Gulfport Middle School
North Gulfport Community Park
Isaih Fredericks Heas Start Center
Gulf Coast Chrisitan Academy
Lil' Tots Daycare Center
KCS Rail Line
East North Gulfport Park
Gulfport Railyard
34th St.
North Gulfport
30th St Park
Little Angels Learning Land
Divine Preschool Acamdy
Twentyeighth Street Elementary School
The Blue School
Lil' Tots 2 Academy
Childrens World Learning Academy
28th St Park
Edna Child Development Center
19th St Park
49
Gaston Hewes Recreation Center
Willie Lock Park
90
Owen T. Palmer Park
Triangle Park
Soria City School
West Elementary
Gulfport Central Middle School
Happy Times Learning Center
St. John Elementary
Jones Park
0.9 µg/m3
Covenant Christian School
West Side Park
90
Preservation Oaks Beach Park

Concentration (µg/m3)
1.05
0.9
0.75
0.6
0.45
0.3
0.15
0

NAAQS - 35 µg/m3
NAAQS = National Ambient Air Quality Standards

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. 2015. 1:36,000; generated by Myron Friedel; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (15 August 2016).

School
Convalescence Facility
Daycare
Hospital
Park
Environmental Justice Community
Sensitive Receptors Area Boundary

0 0.5 1 Miles

Figure P3-21

Port of Gulfport Expansion Project

Dispersion Modeling Results
$PM_{2.5}$ 24-hour
Proposed Project Alternative 2060

Prepared By: 18827	Scale: 1" = 3000'
Job No.: 100018536	Date: March 8, 2017

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