Chapter 6.10: Construction—Air Quality

A. INTRODUCTION

The potential for air quality effects during construction from the proposed project is examined in this chapter. Construction of the proposed project requires the use of both nonroad construction equipment and on-road vehicles. Nonroad construction equipment includes equipment operating on-site such as pile drivers, excavators, and loaders. On-road vehicles include construction trucks arriving to and departing from the project area as well as operating on-site. Emissions from nonroad construction equipment and on-road vehicles, as well as dust-generating construction activities such as truck loading and unloading operations, have the potential to affect air quality.

In general, much of the heavy equipment used in construction is powered by diesel engines that have the potential to produce relatively high levels of nitrogen oxides (NO_x) and particulate matter (PM) (both PM_{10} and $PM_{2.5}$) emissions. Dust generated by construction activities is also a source of PM emissions. Gasoline engines produce relatively high levels of carbon monoxide (CO). Since the United States Environmental Protection Agency (EPA) mandates the use of ultra-low-sulfur diesel (ULSD) fuel[1] for all highway vehicles and nonroad equipment, and New York City Local Law 77 of 2003 mandates the use of ULSD fuel for nonroad equipment used on City construction projects, sulfur oxides (SO_x) emitted from the proposed project's construction activities would be negligible. Therefore, the pollutants analyzed for the construction period included NO_2, the component of NO_x that is a regulated component, PM_{10}, $PM_{2.5}$, and CO.

This chapter contains a review of these pollutants; applicable regulations, standards, and benchmarks; and general methodology for the construction air quality analyses, which included both local (microscale) and regional (mesoscale) analyses.

B. PRINCIPAL CONCLUSIONS

NO ACTION ALTERNATIVE (ALTERNATIVE 1)

The No Action Alternative assumes that no new comprehensive coastal protection system would be constructed in the proposed project area. Therefore, this alternative is not evaluated further as there will be no new construction associated with the proposed project.

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[1] EPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and nonroad engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD fuel, with sulfur levels in nonroad diesel fuel limited to a maximum of 15 parts per million.

PREFERRED ALTERNATIVE (ALTERNATIVE 4): FLOOD PROTECTION SYSTEM WITH A RAISED EAST RIVER PARK

Measures would be taken to reduce pollutant emissions during construction in accordance with all applicable laws, regulations, and building codes as well as New York City Local Law 77. These include dust suppression measures, idling restriction, and the use of ULSD fuel and best available tailpipe reduction technologies. With the implementation of these emission reduction measures, construction of the Preferred Alternative would not result in any predicted concentrations above the National Ambient Air Quality Standards (NAAQS) for NO_2, CO, and PM_{10} or the *de minimis* thresholds for $PM_{2.5}$ from nonroad and on-road sources. Therefore, no significant adverse air quality impacts are predicted from the construction of the Preferred Alternative.

Annual emissions from nonroad and on-road sources over the scheduled construction duration would not exceed any of the *de minimis* criteria defined in the general conformity regulations. Therefore, construction of the Preferred Alternative would conform to the relevant State Implementation Plan (SIP) and does not require a general conformity determination.

OTHER ALTERNATIVES

The Flood Protection System on the West Side of East River Park – Baseline Alternative (Alternative 2), The Flood Protection System on the West Side of East River Park – Enhanced Park and Access Alternative (Alternative 3), and The Flood Protection System East of Franklin Delano Roosevelt East River Drive (FDR Drive) (Alternative 5) would implement measures to reduce pollutant emissions during construction in accordance with all applicable laws, regulations, and building codes as well as New York City Local Law 77. With the implementation of these emission reduction measures, construction would not result in significant adverse effects with respect to air quality. As with the Preferred Alternative, construction under these alternatives would conform to the relevant SIP and does not require a general conformity determination.

The magnitude of construction activities during the peak construction period of Alternative 2 would be the same or lower than the Preferred Alternative and any air quality effects identified under Alternative 3 would be similar to those identified under the Preferred Alternative. Alternative 5 would require extensive work within and adjacent to the FDR Drive and could require full closure of the FDR Drive northbound lanes for a period of two months. Therefore, construction activities under Alternative 5 may have the potential for short-term effects on local air quality due to changes in traffic patterns and diversions.

C. REGULATORY CONTEXT

POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources including nonroad equipment. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities (e.g., power plants, industrial facilities, etc.), including emissions from construction equipment, such as excavators, and bulldozers, marine engines, etc., are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and NO_x are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, SO_x, ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources and sources utilizing nonroad diesel fuel, such as large international marine engines. However, diesel vehicles (both nonroad and on-road) currently contribute very little to SO_2 emissions since the sulfur content of diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, ozone, and lead are regulated by EPA under the Clean Air Act (CAA), and are referred to as 'criteria pollutants'; emissions of precursors to criteria pollutants, including VOCs, NO_x, and SO_2, are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. At high concentrations of CO, public health could be impacted as oxygen is derived from critical organs such as the brain and heart. These effects can exacerbate existing heart conditions and may result in reduced oxygen to the heart accompanied by chest pain also known as angina. Consequently, CO concentrations must be analyzed on a local, or microscale, basis.

Construction of the proposed project would result in a temporary increase in traffic volumes in the areas surrounding the project areas. However, the temporary increase in traffic volumes would not exceed the screening threshold of 170 vehicles at intersections in the project area. Therefore, a quantified assessment of mobile source emissions of CO is not warranted. CO concentrations were determined for construction activities within the two project areas, and where applicable, cumulative effects from on-site and on-road sources were assessed. In addition, regional (mesoscale) CO emissions were evaluated.

NITROGEN OXIDES, VOCS, AND OZONE

NOx contaminants are of principal concern because of their adverse effects on the respiratory system, and increased respiratory symptoms in people with asthma (from short-term NO_2 exposure), along with their role, together with VOCs, as precursors in the formation of ground-level ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The cumulative effects of NOx and VOC emission sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a criteria pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source), prior to the promulgation of the EPA's 2010 1-hour average standard, it was primarily of concern further downwind from large stationary point sources, and not a local concern from mobile sources. With the promulgation of the 2010 1-hour average standard for NO_2, local ground-level sources, such as vehicular and nonroad construction sources, may also be of greater concern for this pollutant in the future. However, for vehicular sources, any increase in NO_2 associated with the proposed project would be relatively small, as demonstrated below for CO and PM, due to the small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways. For nonroad construction sources, the monthly/annual variation in the types of equipment needed on the construction site and the utilization of the equipment would fluctuate on an hourly basis. In addition, the statistical basis of the 1-hour NO_2 standard (a three-year statistical average of modeled concentrations), unlike the other pollutants and the corresponding averaging periods modeled in the construction analysis, such as $PM_{2.5}$ 24-hour and NO_2 annual averaging periods, make it difficult to accurately model construction sources which would move throughout the project area over the entire construction period as opposed to sources that operate on a regular basis in a defined location such as an exhaust stack on a building.

EPA guidance on modeling 1-hour NO_2 discusses intermittent emissions.[2] EPA states that "the intermittent nature of the actual emissions…in many cases, when coupled with the probabilistic form of the standard, could result in modeled impacts being significantly higher than actual impacts would realistically be expected to be for these emission scenarios." Furthermore, EPA "recommends that compliance demonstrations for the 1-hour NO_2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations."

When construction of the proposed project commences, there would be a greater percentage of nonroad diesel engines on-site that conform to the newer EPA emissions standards, resulting in reduced NO_x emissions during construction activities. Given the level of existing data and models, there are no clear methods to predict the rate of transformation of NO to NO_2 at ground-level for construction sources that would not be anticipated to operate within the immediate vicinity of a single receptor location for an extended period of time. Further, substantial uncertainty still exists as to 1-hour NO_2 background concentrations at ground level, especially near roadways, since these concentrations have not been adequately measured and no attainment determinations have been made by the EPA. For these reasons, a 1-hour NO_2 analysis was not conducted for construction sources.

Potential effects on annual local NO_2 concentrations from fuel combustion for on-site construction activities were determined. In addition, the change in regional NO_x and VOC emissions was analyzed.

LEAD

Current airborne lead emissions are principally associated with industrial sources. Lead in gasoline was banned under the CAA in 1996 and would not be emitted from any other component of the proposed project. Therefore, an analysis of this pollutant is not warranted. In addition, as discussed in Chapter 6.6, "Construction—Hazardous Materials," any demolition activities with the potential to disturb positively identified or suspected lead-based paint or lead-containing paint would be performed in accordance with the applicable Occupational Safety and Health Administration regulation (OSHA 29 CFR 1926.62—Lead Exposure).

[2] EPA Memorandum, "Additional Clarification Regarding Application of Appendix W, Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard," March 1, 2011.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles in a wide range of sizes and chemical compositions, either as liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions, and forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction and agricultural activities, and wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: $PM_{2.5}$ and PM_{10}, which includes $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

All gasoline-powered and diesel-powered nonroad construction sources and vehicles, especially heavy-duty trucks, are significant sources of respirable PM, most of which is $PM_{2.5}$. PM concentrations may consequently be locally elevated near roadways. An analysis was conducted to assess the reasonable worst-case PM effects due to the increased construction-related traffic and on-site construction sources associated with the construction under the proposed project. In addition, regional PM emissions were evaluated.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under EPA's New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and nonroad vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant; therefore, an analysis of SO_2 from mobile sources and/or nonroad sources was not warranted.

AIR QUALITY STANDARDS, REGULATIONS, AND BENCHMARKS

The regulatory context for the proposed project includes the following standards, requirements, and policies for which each of the alternatives have been analyzed to result in a determination of environmental effects during project construction.

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established[3] for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive.

As discussed above, higher pollutant concentrations above the primary standards may result in public health impacts that could include exacerbation of existing heart conditions, chest pains, respiratory conditions such as asthma, and other impacts to the respiratory system. Longer exposures to elevated concentrations may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. People with asthma, as well as children and the elderly are generally at greater risk for the health effects. However, concentrations below the NAAQS would provide adequate protection, including the at-risk populations of older adults, children and people with asthma.

The NAAQS are presented in **Table 6.10-1**. The NAAQS for CO, annual NO_2, and three-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particles, settleable particles, non-methane hydrocarbons, 24-hour and annual SO_2, and ozone which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants beryllium, fluoride, and hydrogen sulfide.

Effective December 2015, EPA reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070. EPA issued final area designations for the revised standard on April 30, 2018.

[3] EPA. National Ambient Air Quality Standards. 40 CFR part 50.

Table 6.10-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9[(1)]	10,000	None	
1-Hour Average	35[(1)]	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average[(2)]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average[(3,4)]	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average[(1)]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean[(5)]	NA	12	NA	15
24-Hour Average[(76)]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average[(7)]	0.075	196	NA	NA
Maximum 3-Hour Average[(1)]	NA	NA	0.50	1,300

Notes:
ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
[1] Not to be exceeded more than once a year.
[2] 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
[3] 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
[4] EPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
[5] 3-year average of annual mean.
[6] Not to be exceeded by the annual 98th percentile when averaged over 3 years.
[7] 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a SIP, which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

In 2002, EPA re-designated New York City as in attainment for CO. Under the resulting maintenance plans, New York City is committed to implementing site-specific control measures throughout the City to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

Manhattan, which had been designated as a moderate NAA for $PM_{10,}$ was reclassified by EPA as in attainment on July 29, 2015.

The five New York City counties, Nassau, Suffolk, Rockland, Westchester, and Orange Counties has been designated as a $PM_{2.5}$ NAA (New York Portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT NAA) non-attainment area since 2004 under the CAA due to exceedance of the 1997 annual average standard, and were also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard on April 18, 2014, and is now under a maintenance plan. EPA lowered the annual average primary $PM_{2.5}$ standard to 12 $\mu g/m^3$, effective March 2013. EPA designated the area as in attainment for the new 12 $\mu g/m^3$ NAAQS, effective April 15, 2015.

On April 18, 2014, EPA redesignated the New York City Metropolitan Area as in attainment. Previously, it had been nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area, now under a maintenance plan for this standard, includes the same ten-county area as the maintenance area for the 1997 annual $PM_{2.5}$ NAAQS.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as a "moderate" non-attainment area for the 1997 8-hour average ozone standard. EPA designated the New York–Northern New Jersey–Long Island, NY-NJ-CT NAA as a "marginal" NAA for the 2008 ozone NAAQS, effective July 20, 2012. On August 23, 2019, as requested by New York State, EPA reclassified the area as a "severe" NAA. New York State has begun submitting SIP documents in December 2014. The state is expected to be able to meet its SIP obligations for both the 1997 and 2008 standards by satisfying the requirements for a moderate area attainment plan for the 2008 ozone NAAQS.

New York City is currently in attainment of the annual average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" of the 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available.

EPA has established a new 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties currently meet the 1-hour standard. In December 2017, EPA designated most of the State of New York, including New York City, as in attainment for this standard.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY EFFECTS

The New York State Environmental Quality Review Act (SEQRA) regulations and the 2014 *City Environmental Quality Review (CEQR) Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[4] In terms of the magnitude of air quality effects, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 6.10-1**) would be deemed to have a potential significant adverse effect.

In addition, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, *de minimis*

[4] New York City. *CEQR Technical Manual*. Chapter 1, section 222. March 2014; and New York State Environmental Quality Review Regulations, 6 NYCRR § 617.7

threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse effect, even in cases where violations of the NAAQS are not predicted.

Carbon Monoxide (CO) De Minimis Criteria

New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from the effect of proposed projects or actions on mobile sources, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental effect. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8.0 ppm.

$PM_{2.5}$ de Minimis Criteria

The New York State Department of Environmental Conservation (NYSDEC) has published a policy to provide interim direction for evaluating $PM_{2.5}$ effects.[5] This policy applies only to facilities applying for permits or major permit modifications under SEQRA that emit 15 tons of PM_{10} or more annually. The policy states that such a project will be deemed to have a potentially significant adverse effect if the project's maximum effects are predicted to increase $PM_{2.5}$ concentrations by more than 0.3 $\mu g/m^3$ averaged annually or more than 5 $\mu g/m^3$ on a 24-hour basis. Projects that exceed either the annual or 24-hour threshold will be required to prepare an Environmental Impact Statement (EIS) to assess the severity of the effects, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the $PM_{2.5}$ effects of the source to the maximum extent practicable.

In addition, New York City uses *de minimis* criteria to determine the potential for significant adverse $PM_{2.5}$ effects under CEQR are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level effect is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete receptor location (elevated or ground level).

Actions requiring review under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the above-mentioned *de minimis* criteria will be considered to have a potential significant adverse effect.

[5] NYSDEC. CP33: Assessing and Mitigating Impacts of Fine Particulate Emissions. December 29, 2003.

The above-mentioned *de minimis* criteria were used to evaluate the significance of predicted effects on $PM_{2.5}$ concentrations for the construction activities associated with the proposed project.

CONFORMITY WITH STATE IMPLEMENTATION PLANS

The conformity requirements of the CAA and regulations promulgated thereunder limit the ability of federal agencies to assist, fund, permit, and approve projects that do not conform to the applicable SIP. To implement the proposed project, the City is proposing to enter into a grant agreement with the U.S. Department of Housing and Urban Development (HUD). Therefore, general conformity regulations would apply to the proposed project.

The pollutants of concern on a regional basis are CO, PM_{10}, $PM_{2.5}$, NO_x, and VOC. Emissions from on-road trucks and worker vehicles and from nonroad construction equipment were calculated on an annual basis based on the emissions modeling procedures described above for the microscale analysis.

Under the general conformity regulations, a general conformity determination for federal actions is required for each criteria pollutant or precursor in non-attainment or maintenance areas where the action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at rates equal to or exceeding the prescribed *de minimis* rates for that pollutant. In the case of this project, the prescribed annual rates are 50 tons of VOCs and NO_x, 100 tons of CO, $PM_{2.5}$, or SO_2.

D. METHODOLOGY

ANALYSIS PERIOD

As discussed in detail in Chapter 6.0, "Construction Overview," construction of the proposed project is anticipated to begin in 2020. Note that although the superstructure of the shared-use flyover bridge for the proposed project would be completed in 2025, the flood protection and enhanced park and access features under the Preferred Alternative would be completed in 2023. Construction activities in Project Area One and Project Area Two are each anticipated to be divided into three primary segments (see Figure 6.0-1 for the locations of the construction segments). Due to the complexity of the proposed project and the variable construction options considered, a preliminary construction schedule has been developed to provide for a reasonable and conservative analysis of the range of environmental effects associated with construction activities for the proposed project.

Because the level of construction activities would vary over the construction period, a reasonable worst-case analysis period was selected based on the estimated monthly construction work schedule, equipment to be employed and their usage factors, and equipment emission rates. The periods of highest emissions nearest to sensitive receptor locations are expected to be the periods of greatest effects. Construction-related emissions were calculated throughout the duration of construction on a rolling annual and peak day basis for $PM_{2.5}$. $PM_{2.5}$ was selected for determining the worst-case periods for all pollutants analyzed because the ratio of predicted $PM_{2.5}$ incremental concentrations is anticipated to be higher than for other pollutants, based on previous analyses of construction air emissions. Therefore, estimates of $PM_{2.5}$ emissions throughout construction were used to determine the reasonable worst-case scenario for all pollutants. Generally, emission patterns of PM_{10} and NO_2 would follow $PM_{2.5}$ emissions, since they are correlated with horsepower (hp) for diesel engines. CO emissions may have a somewhat different pattern but would also be anticipated to be highest during periods when the most activity would occur.

The dispersion modeling analysis was performed for the reasonable worst-case annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods for Alternative 3 and 4. The potential for significant adverse effects was determined by comparing modeled NO_2, CO, and PM_{10} concentrations to the NAAQS, and modeled $PM_{2.5}$ and CO increments to applicable *de minimis* thresholds in the context of magnitude, duration, and locations and the size of the area affected by the air emissions sources.

Other less intensive construction periods are discussed qualitatively, based on the reasonable worst-case analysis period results.

CONSTRUCTION EMISSION SOURCES

Construction emissions sources include nonroad construction equipment, on-road vehicles and dust-generating construction activities. A list of the nonroad construction equipment and on-road vehicles that would likely be operated during the modeled reasonable worse-case analysis period was developed to be used to calculate the emissions generated from the likely construction activities during the reasonable worse-case analysis period.

NONROAD CONSTRUCTION EQUIPMENT

Nonroad construction equipment includes equipment operating on-site, such as pile drivers, excavators, and loaders. See **Appendix K1** for a preliminary list of construction equipment for the proposed project. Emission factors for NO_x, CO, PM_{10}, and $PM_{2.5}$ from nonroad construction engines were developed using the latest EPA NONROAD Emission Model (NONROAD).[6]

On-Road Vehicles

On-road vehicles include construction worker vehicles and construction trucks arriving to and from the construction sites, as well as operating on-site. Traffic data for the construction air quality analysis was provided from projected future growth in traffic and other information developed as part of the construction traffic analysis presented in Chapter 6.9, “Construction—Transportation.” Since emissions from nonroad construction equipment and on-road vehicles may contribute to concentration increments concurrently, both nonroad construction equipment and on-road vehicles were modeled together, where applicable, to address local project-related construction emissions.

Vehicular engine emission factors were computed using the EPA Motor Vehicle Emission Simulator (MOVES2014a) emission model.[7] For analysis purposes, it was assumed that the concrete trucks would operate for 60 minutes per hour and heavy trucks, such as dump trucks and tractors, would have a maximum three-minute idle time.

Both barges and trucks are expected to be used for material transport during construction of the Preferred Alternative. Therefore, the analysis for the Preferred Alternative included the use of

[6] NONROAD Model (Nonroad Engines, Equipment, and Vehicles) User Guide, EPA420-R-05-013, December 2005.

[7] EPA, Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014a, EPA-420-B-15-095, November 2015

both barges and trucks for material deliveries. For Alternative 3, material deliveries may occur partially by barges or by trucks only. Therefore, an analysis was performed to estimate the increase in annual pollutant emissions for these two delivery options. For the consideration of construction barges to supplement truck deliveries, tugboat emissions were estimated according to the latest emission factors and methodologies delineated by EPA.[8]

Dust Generating Activities

In addition to engine emissions, fugitive dust emissions are generated from operations (e.g., transferring excavated materials into dump trucks), and vehicle travel on-site. Fugitive dust emissions from operations were calculated using EPA procedures provided in AP-42 Table 13.2.3-1.[9] Road dust emissions from vehicle travel on-site were calculated using equations from EPA's AP-42, Section 13.2.1 for paved roads.

As discussed below under "Emissions Reduction Measures," the construction of the proposed project is required to follow the New York City Department of Environmental Protection (DEP) *Construction Dust Rules* regarding construction-related dust emissions.[10] Therefore, a 50 percent reduction in particulate emissions from fugitive dust was conservatively assumed in the calculations to account for required dust control measures that would be employed, such as wet suppression.

EMISSION REDUCTION MEASURES

Construction activity has the potential to adversely affect air quality as a result of diesel emissions and fugitive dust. Measures would be taken to reduce pollutant emissions during construction in accordance with all applicable laws, regulations, and building codes. These include use of clean fuel, the idling restriction for on-road vehicles, and dust suppression measures:

- *Clean Fuel.* ULSD[11] fuel will be used exclusively for all diesel engines throughout the construction site.
- *Dust Control Measures.* To minimize dust emissions from construction activities, a dust control plan including a robust watering program would be required as part of contract specifications. For example, all trucks hauling loose material would be equipped with tight-fitting tailgates and their loads securely covered prior to leaving the project area; water sprays would be used for all excavation and transfer of soils to ensure that materials would be dampened as necessary to avoid the suspension of dust into the air. Loose materials (e.g., on-site material storage piles) would be watered or covered. All construction-related

[8] EPA, Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, April 2009.

[9] EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources*, Chapter 13: Miscellaneous Sources.

[10] https://www1.nyc.gov/assets/dep/downloads/pdf/air/construction-dust-rules.pdf.

[11] EPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and nonroad engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD fuel sulfur levels in nonroad diesel fuel are limited to a maximum of 15 parts per million.

dust reduction measures required by DEP's *Construction Dust Rules*[12] would be implemented.

- *Idling Restriction.* In accordance with Title 24, Chapter 1, Subchapter 7, Section 24-163 of the NYC Administrative Code, the local law restricting unnecessary idling on roadways, truck idle time would be restricted to three minutes except for those vehicles that are not using their engines to operate a loading, unloading, or processing device (e.g., concrete mixing trucks) or otherwise required for the proper operation of the engine.

Additional emissions controls are required for New York City agency projects by New York City Local Law 77 of 2003, including the use of ULSD and best available technology (BAT) as outlined below:

- *Best Available Tailpipe Reduction Technologies.* Nonroad diesel engines with a power rating of 50 hp or greater, and controlled truck fleets (i.e., truck fleets under long-term contract with the proposed project), including, but not limited to concrete mixing and pumping trucks, would utilize BAT for reducing diesel particulate matter emissions. Diesel particulate filters (DPFs) have been identified as being the tailpipe technology currently proven to have the highest emissions reduction capability. Construction contracts would specify that all nonroad diesel engines rated at 50 hp or greater would utilize DPFs, either installed by the original equipment manufacturer or retrofitted. Retrofitted DPFs must be verified by the EPA or the California Air Resources Board. Other technologies proven to achieve an equivalent emissions reduction may also be used.

The analysis took into account the emissions reduction measures listed above that would be implemented during construction of the proposed project. In addition, the proposed project may also consider implementing the following emissions reduction measures to further reduce the effects of construction activities on air quality:

- *Utilization of Newer Equipment.* EPA's Tier 1 through 4 standards for nonroad diesel engines regulate the emission of criteria pollutants from new engines, including PM, CO, NO_x, and hydrocarbons (HC). All nonroad construction equipment with a power rating of 50 hp or greater would meet at least the Tier 3[13] emissions standard.
- *Diesel Equipment Reduction.* Construction would minimize the use of diesel engines and utilize electric engines to the extent practicable. Equipment that could use electric engines in lieu of diesel engines includes, but may not be limited to, welders and rebar benders.

DISPERSION MODELING

Potential effects from the proposed project's nonroad construction equipment, on-road vehicles, and dust generating activities were evaluated using the EPA/AMS AERMOD model (version

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[12] https://www1.nyc.gov/assets/dep/downloads/pdf/air/construction-dust-rules.pdf

[13] The first federal regulations for new nonroad diesel engines were adopted in 1994, and signed by EPA into regulation in a 1998 Final Rulemaking. The 1998 regulation introduces Tier 1 emissions standards for all equipment 50 hp and greater and phases in the increasingly stringent Tier 2 and Tier 3 standards for equipment manufactured in 2000 through 2008. In 2004, EPA introduced Tier 4 emissions standards with a phased-in period of 2008 to 2015. The Tier 1 through 4 standards regulate the EPA criteria pollutants, including PM, HC, NO_x and CO. Prior to 1998, emissions from nonroad diesel engines were unregulated. These engines are typically referred to as Tier 0.

18081), a refined dispersion model. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources), and the preferred model of both EPA and NYSDEC. AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of the interactions.

SOURCE SIMULATION

During construction, various types of construction equipment would be used at different locations throughout the project area. Some of the equipment would be mobile and operate throughout specified areas, while some would remain fixed at distinct locations for short-term periods. For short-term model scenarios (predicting concentration averages for periods of 24 hours or less), nonroad construction sources such as pile drivers, compressors, or generators, which would likely remain at a single location at a given day, were simulated as point sources in the model. Other nonroad construction sources, engines such as excavators or loaders, which would move around the site on any given day, as well as on-road vehicles, were simulated as area sources in the model. All sources are anticipated to move around the site throughout the year and were therefore simulated as area sources in the annual analyses.

RECEPTOR LOCATIONS

Receptors (locations in the model where concentrations are predicted) were placed at residential (i.e., Gouverneur Gardens, East River Housing Corporation, New York City Housing Authority [NYCHA] developments, Stuyvesant Town, etc.), and other sensitive uses (i.e., schools, community facilities) at both ground-level and elevated locations (e.g., residential windows), and at publicly accessible open spaces that would have continuous public access during the modeled periods of construction including portions of the Corlears Hook Park that would remain publicly accessible during construction as well as the ferry landings at East River Park and Stuyvesant Cove Park. In addition, a ground-level receptor grid was placed to enable extrapolation of concentrations at locations more distant from the project area.

METEOROLOGICAL DATA

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at LaGuardia Airport in Queens, New York (2013–2017) and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the EPA AERMET (version 18081) program to develop data in a format, which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

E. AFFECTED ENVIRONMENT

To estimate the maximum expected total pollutant concentrations, the calculated effects from the emission sources must be added to a background value that accounts for existing pollutant concentrations from other sources. The background levels are based on concentrations monitored at the nearest NYSDEC ambient air monitoring stations. These represent the most recent 3-year average for 24-hour average $PM_{2.5}$, the highest value from the three most recent years of available data for PM_{10}, and the highest value from the five most recent years of data available for all other pollutants and averaging period combinations. The background concentrations are presented in **Table 6.10-2**.

Table 6.10-2
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration	NAAQS
NO_2	Annual	IS 52, Bronx	38.9 μg/m^3	100 μg/m^3
CO	1-hour	City College of New York, Manhattan	2.3 ppm	35 ppm
CO	8-hour	City College of New York, Manhattan	1.5 ppm	9 ppm
PM_{10}	24-hour	Division Street, Manhattan	44 μg/m^3	150 μg/m^3
$PM_{2.5}$	24-hour	Division Street, Manhattan	20.7 μg/m^3	35 μg/m^3
Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2013–2017.				

F. ENVIRONMENTAL EFFECTS

A detailed description of the alternatives analyzed in this chapter is presented in Chapter 2.0, "Project Alternatives."

NO ACTION ALTERNATIVE (ALTERNATIVE 1)

The No Action Alternative is the future condition without the proposed project and assumes that no new comprehensive coastal protection system is installed in the proposed project area. Therefore, this alternative is not evaluated further as there will be no new construction associated with the proposed project.

PREFERRED ALTERNATIVE (ALTERNATIVE 4): FLOOD PROTECTION SYSTEM WITH A RAISED EAST RIVER PARK

Based on the anticipated construction schedule for the Preferred Alternative, equipment to be employed and their usage factors, and equipment emission rates, the periods of highest emissions nearest to sensitive receptor locations were identified for the following periods and were selected for analysis (see **Appendix K1**):

- Project Area One, Short-Term Analysis Period: February 2022;
- Project Area One, Annual Analysis Period: March 2021 to February 2022;
- Project Area Two, Short-Term Analysis Period: September 2021; and
- Project Area Two, Annual Analysis Period: June 2021 to May 2022.

As discussed above, the dispersion modeling analysis was performed for the reasonable worst-case annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods. The potential for significant adverse effects was determined by comparing modeled NO_2, CO, and PM_{10} concentrations to the NAAQS, and modeled $PM_{2.5}$ and CO increments to applicable *de minimis* thresholds in the context of magnitude, duration, and locations and the size of the area affected by the concentration increment. Other less intensive construction periods are discussed qualitatively, based on the reasonable worst-case analysis period results. The analysis of the Preferred Alternative assumed the use of both barges and trucks for material deliveries.

PROBABLE EFFECTS OF CONSTRUCTION

Maximum predicted concentration increments and overall concentrations including background concentrations from construction activity under the Preferred Alternative are presented in **Table 6-10-3**. Concentrations are presented for receptors near both Project Areas One and Two.

As shown in **Table 6.10-3**, the maximum predicted total concentrations of PM_{10}, CO, and annual-average NO_2 are below the applicable NAAQS under the Preferred Alternative during construction activities at Project Areas One and Two. As discussed above, concentrations below the NAAQS would provide adequate protection from adverse public health impacts, including the at-risk populations of older adults, children and people with asthma. In addition, the maximum predicted $PM_{2.5}$ incremental concentrations would not exceed the applicable CEQR *de minimis* criteria of 7.2 μg/m^3 in the 24-hour average period or 0.3 μg/m^3 in the annual average period.

Table 6.10-3
Pollutant Concentrations from Construction Site Sources (μg/m^3)
Preferred Alternative

Pollutant	Averaging Period	Maximum Predicted Increment	Background Concentration	Maximum Predicted Total Concentration	*De Minimis* Criteria[(1)]	NAAQS
Project Area One						
$PM_{2.5}$	24-hour	1.47	20.7	-	7.2	35
	Annual	0.17	-	-	0.3	15
PM_{10}	24-hour	4.18	44	48.2	-	150
NO_2	Annual	6.2	38.9	45.1	-	100
CO	1-hour	0.4	2.3	2.7	-	35 ppm
	8-hour	0.1	1.5	1.6	-	9 ppm
Project Area Two						
$PM_{2.5}$	24-hour	2.9	20.7	-	7.2	35
	Annual	0.29	-	-	0.3	15
PM_{10}	24-hour	8.0	44	52.0	-	150
NO_2	Annual	15.0	38.9	53.9	-	100
CO	1-hour	1.4	2.3	3.7	-	35 ppm
	8-hour	0.2	1.5	1.7	-	9 ppm

Notes:
$PM_{2.5}$ concentration increments are compared to the *de minimis* criteria. Increments of all other pollutants are compared with the NAAQS to evaluate the magnitude of the increments. Comparison to the NAAQS is based on total concentrations.
(1) $PM_{2.5}$ *de minimis* criteria is defined as 24-hour average not to exceed more than half the difference between the background concentration and the 24-hour NAAQS; annual average not to exceed more than 0.3 μg/m^3 at discrete receptor locations.

Extended Hour Construction

As described in Chapter 6.0, "Construction Overview," in order to factor in potential weather delays and/or other possible construction delays and to meet the project construction schedule as determined by the City, additional evening and overnight construction and Saturday construction may also be necessary. The air quality modeling analysis presented above reflects the maximum reasonable worst-case air quality concentrations predicted over any workday during the period of the most intensive construction activities and that construction during this period would concentrate in one 8-hour day shift and one six-hour night shift during the workday. If evening and overnight and Saturday work is needed to meet the construction schedule or make up for possible delays, the annual air quality concentrations due to construction would be similar since the amount of construction activities that needed to be completed over an annual period would be similar in order to maintain the 3.5-year construction schedule. Similarly, for the short-term analysis periods, the results presented above represent reasonable worst-case air quality concentrations predicted over any workday during the period.

Conformity with State Implementation Plans

Annual on-site and off-site construction-related emissions over the scheduled construction duration (2020 through 2023) are presented in **Table 6.10-4**. The pollutant emissions associated with construction of the proposed project would be well below any of the *de minimis* criteria. Therefore, the proposed project would conform to the SIP and does not require a full conformity determination.

Table 6.10-4
Emissions from Construction Activities (ton/yr)
Preferred Alternative

	$PM_{2.5}$	PM_{10}	NO_x	VOC	SO_2	CO
De Minimis Criteria	100	100	50	50	100	100
2020	0.99	1.07	18.0	1.05	0.10	e
2021	**1.72**	**1.85**	**31.1**	**1.82**	**0.18**	**10.9**
2022	1.69	1.83	30.0	1.72	0.16	10.7
2023	0.79	0.86	13.9	0.78	0.07	5.0

Note: Emissions presented in **bold** represent the highest annual emissions.
* This table has been revised for the FEIS.

OTHER ALTERNATIVE (ALTERNATIVE 2): FLOOD PROTECTION SYSTEM ON THE WEST SIDE OF EAST RIVER PARK – BASELINE

The magnitude of construction activities during the peak construction period of Alternative 2 would be the same or lower than the Preferred Alternative. As a result, the construction effects under Alternative 2 would be equal or lesser magnitude than the effects identified under the Preferred Alternative as described above.

OTHER ALTERNATIVE (ALTERNATIVE 3): FLOOD PROTECTION SYSTEM ON THE WEST SIDE OF EAST RIVER PARK – ENHANCED PARK AND ACCESS

The dispersion modeling analysis was performed for the reasonable worst-case annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods. The potential for significant adverse effects was determined by comparing modeled NO_2, CO, and PM_{10} concentrations to the NAAQS, and modeled $PM_{2.5}$ and CO increments to applicable *de minimis* thresholds in the context of magnitude, duration, and locations and the size of the area affected by the concentration increment. Other less intensive construction periods are discussed qualitatively, based on the reasonable worst-case analysis period results.

Under Alternative 3, the periods of highest emissions nearest to sensitive receptor locations would occur during the following periods:

- Project Area One, Short-Term Analysis Period: May 2022 (Activities at Segments 2 and 3);

- Project Area One, Annual Analysis Period: June 2021 to May 2022 (Activities at Segments 2 and 3);
- Project Area Two, Short-Term Analysis Period: May 2023 (Activities at Segments 4, 5, and 6); and
- Project Area Two, Annual Analysis Period: October 2021 to September 2022 (Activities at Segments 4 and 5).

PROBABLE EFFECTS OF CONSTRUCTION

Maximum predicted concentration increments and overall concentrations including background concentrations from construction activity under Alternative 3 are presented in **Table 6.10-5**. Concentrations are presented for receptors near both Project Areas One and Two.

Table 6.10-5
Pollutant Concentrations from Construction Site Sources (μg/m³)
Alternative 3

Pollutant	Averaging Period	Maximum Predicted Increment	Background Concentration	Maximum Predicted Total Concentration	*De Minimis* Criteria(1)	NAAQS
Project Area One						
$PM_{2.5}$	24-hour	1.5	20.7	-	7.2	35
	Annual	0.22	-	-	0.3	15
PM_{10}	24-hour	3.9	44	47.9	-	150
NO_2	Annual	10.8	38.9	49.7	-	100
CO	1-hour	0.8	2.3	1.6	-	35 ppm
	8-hour	0.1	1.5	1.6	-	9 ppm
Project Area Two						
$PM_{2.5}$	24-hour	3.0	20.7	-	7.2	35
	Annual	0.28	-	-	0.3	15
PM_{10}	24-hour	7.2	44	51.2	-	150
NO_2	Annual	17.9	38.9	56.8	-	100
CO	1-hour	1.5	2.3	3.8	-	35 ppm
	8-hour	0.1	1.5	1.6	-	9 ppm

Notes:
$PM_{2.5}$ concentration increments are compared to the *de minimis* criteria. Increments of all other pollutants are compared with the NAAQS to evaluate the magnitude of the increments. Comparison to the NAAQS is based on total concentrations.
(1) $PM_{2.5}$ *de minimis* criteria is defined as 24-hour average not to exceed more than half the difference between the background concentration and the 24-hour NAAQS; annual average not to exceed more than 0.3 μg/m³ at discrete receptor locations.

As discussed above, based on the $PM_{2.5}$ construction emissions profiles for Project Area One, the highest project-wide emissions were predicted when construction activities at Segments 2 and 3 would occur simultaneously under the assumed schedule and sequence. In Project Area Two, the highest project-wide emissions were when construction activities at Segments 4, 5, and 6 are anticipated to overlap. These periods were selected for detail analyses.

As shown in **Table 6.10-5**, the maximum predicted total concentrations of PM_{10}, CO, and annual-average NO_2 are below the applicable NAAQS under Alternative 3 during construction activities at Project Areas One and Two. As discussed above, concentrations below the NAAQS would provide adequate protection from adverse public health impacts, including the at-risk populations of older adults, children and people with asthma. In addition, the maximum predicted $PM_{2.5}$ incremental concentrations would not exceed the applicable CEQR *de minimis* criteria of 6.7 µg/m^3 in the 24-hour average period or 0.3 µg/m^3 in the annual average period.

Conformity with State Implementation Plans

As discussed above, both barges and trucks are expected to be used for material transport during construction of the Preferred Alternative and therefore, the analysis for the Preferred Alternative presented above included the use of both barges and trucks for material deliveries. However, for Alternative 3, material deliveries may occur partially by barges or by trucks only. Therefore, an analysis was performed to estimate the increase in annual pollutant emissions for these two delivery options.

Annual on-site and off-site construction-related emissions over the scheduled 5-year construction duration for trucking only option are presented in **Table 6.10-6**. As presented in **Table 6.10-6**, the pollutant emissions would be well below any of the *de minimis* criteria. Therefore, the Alternative 3 would conform to the SIP and does not require a full conformity determination under this delivery option.

Table 6.10-6
Emissions from Construction Activities (ton/yr)
Material Deliveries by Trucks Only

	$PM_{2.5}$	PM_{10}	NO_x	VOC	SO_2	CO
De Minimis Criteria	100	100	50	50	100	100
2020	0.47	0.50	8.58	0.52	0.05	3.49
2021	**0.84**	**0.91**	**15.50**	**0.95**	**0.09**	**6.24**
2022	0.83	0.90	15.20	0.94	0.09	6.23
2023	0.74	0.80	13.31	0.82	0.08	5.45
2024	0.51	0.55	9.09	0.55	0.05	3.72
2025	0.19	0.21	3.33	0.20	0.02	1.36

Note: Emissions presented in **bold** represent the highest annual emissions.
The analysis of Alternative 3 was performed assuming a preliminary construction schedule with construction starting approximately a year earlier than the final construction schedule. Emissions under the final construction schedule would be similar to or marginally less than those included in the dispersion modeling.
* This table has been revised for the FEIS.

The use of tug boats for the movement of the barges would increase annual pollutant emissions when compared with the pollutant emissions under the trucks only option. While this would represent an increase in the pollutant emissions, the tug boats would transverse in the navigation channel within the East River, some distance away from East River Park and the inland neighborhoods. In addition, with the use of barges, construction truck activity on nearby roadways would be reduced. Further, the use of tug boats and barges would be temporary and only limited to the construction period.

Emissions associated with the total annual construction activity under Alternative 3 utilizing a combination of barges and trucks are presented in **Table 6.10-7**. As presented in **Table 6.10-7**, the pollutant emissions would not exceed any of the *de minimis* criteria. Therefore, the proposed project would also conform to the SIP and does not require a full conformity determination under this delivery option.

Table 6.10-7
Emissions from Construction Activities (ton/yr)
Material Deliveries by Trucks and Barges

	$PM_{2.5}$	PM_{10}	NO_x	VOC	SO_2	CO
De Minimis Criteria	100	100	100	50	100	100
2020	0.82	0.89	22.21	1.00	0.05	4.39
2021	**1.44**	**1.57**	**38.81**	**1.77**	**0.09**	**7.77**
2022	1.26	1.36	31.63	1.52	0.09	7.31
2023	0.83	0.90	17.13	0.96	0.08	5.70
2024	0.51	0.55	9.09	0.55	0.05	3.72
2025	0.19	0.21	3.33	0.20	0.02	1.36

Note: Emissions presented in **bold** represent the highest annual emissions.
* This table has been revised for the FEIS.

OTHER ALTERNATIVE (ALTERNATIVE 5): FLOOD PROTECTION SYSTEM EAST OF FDR DRIVE

Alternative 5 proposes a flood protection alignment similar to Alternative 4, except for the approach in Project Area Two between East 13th Street and Avenue C. This alternative would raise the northbound lanes of the FDR Drive in this area by approximately six feet to meet the design flood elevation then connect to closure structures at the south end of Stuyvesant Cove Park. Maintaining the flood protection alignment along the east side of the FDR Drive would eliminate the need to cross the FDR Drive near East 13th Street as well as the need to install floodwalls adjacent to NYCHA Jacob Riis Houses, Con Edison property, and Murphy Brothers Playground.

Similarly, the activities included under Alternative 5 could result in a minor increase of pollutant emissions regionally when compared with the emissions under the Preferred Alternative. Therefore, as the annual regional emissions under the Preferred Alternative are well below the applicable *de minimis* thresholds, the increased emissions under Alternative 5 would not result in an exceedance of the thresholds.

However, Alternative 5 would require extensive work within the FDR Drive and could require full closure of the FDR Drive northbound lanes for a period of two months. Therefore, the raising of the FDR Drive platform under Alternative 5 may have the potential for short-term effects on local air quality due to changes in traffic patterns and diversions. ✷