A. INTRODUCTION

The potential for air quality impacts from the Proposed Actions is examined in this chapter. Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heating and hot water systems. Indirect impacts are caused by off-site emissions associated with a project such as emissions from nearby existing stationary sources or by emissions from on-road vehicle trips generated by a proposed project or other changes to future traffic conditions due to a project.

As described in detail in Chapter 1, “Project Description,” the Applicant is seeking discretionary approvals (the “Proposed Actions”) to facilitate the development of the Western Rail Yard site (Block 676, Lots 1 and 5) in the Hudson Yards neighborhood of Manhattan (the “WRY Site” or the “Development Site”) with approximately 6.2 million gross square feet (gsf) of new mixed use development including residential, commercial, and community facility space, a hotel resort with gaming, and new public open space (the “Proposed Project”). The Proposed Actions include a City Map Amendment to adjust the grade of West 33rd Street between Eleventh and Twelfth Avenues, which falls outside the boundaries of the Development Site, as well as a revocable consent for a staircase and elevator in the West 33rd Street sidewalk at Twelfth Avenue to provide access for the public and visitors to the Development Site. There is a state process underway to designate locations for downstate gaming licenses; therefore, the Applicant is also presenting for environmental analysis purposes an Alternative Scenario that reflects a similar density and the same open space configuration as the Proposed Project but includes residential, commercial, and hotel buildings without gaming. The scenario that would result in the more conservative analysis is analyzed for each technical area. The analysis provided below considers both “With Action” scenarios.

The maximum projected hourly incremental traffic volumes generated associated with the Proposed Actions would exceed the 2021 *City Environmental Quality Review (CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at a number of intersections in the study area, as well as the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311, of the *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for CO and PM.

The Proposed Project and the Alternative Scenario would include parking for Sites A and C. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations in the vicinity of the ventilation outlets with the proposed parking garages. In addition, potential air quality effects on the Proposed Project and the Alternative Scenario from the existing surface parking lot north of the Development Site were assessed.

Electric-powered equipment would be utilized for heating and hot water needs for all of the proposed buildings under both With Actions scenarios, and therefore, a stationary source analysis of the Proposed Actions' heating and hot water systems is not required. Fossil fuel-powered engine generators that would serve the Development Site would potentially be utilized for demand response to supplement utility electric power under peak demand conditions; therefore, an analysis of these stationary sources was conducted.

The Development Site is located in a manufacturing district; therefore, potential effects of stationary source emissions from existing nearby industrial facilities on the Development Site were assessed. In addition, a review was performed to identify any large or major sources in the study are to assess their potential impacts on the Development Site.

The cumulative effects of emissions from the proposed diesel-powered engine generators that would potentially be used for demand response generators along with existing sources of emissions were analyzed. This included pollutant emissions from the systems to be installed to ventilate locomotive emissions from the below grade areas of the Long Island Rail Road (LIRR) railyard.

PRINCIPAL CONCLUSIONS

Based on a detailed dispersion modeling analysis, there would be no potential significant adverse air quality impacts from emissions of pollutants from the potential demand response generators. Certain restrictions on fuel type, enrolled capacity, placement of exhaust stacks, and use of low-nitrogen oxide (low-NO_x) equipment are proposed, as well as requirements on the use of electric-powered systems for the proposed buildings as described in Section H, "Proposed Air Quality Requirement in Amended Restrictive Declaration." Restrictive Declaration (R-230) would be amended to specify these restrictions, to ensure that the future development would not result in any significant adverse air quality impacts. The restrictions reflect the changes to the development proposed for the WRY Site since the 2009 FEIS and would supersede those identified in those documents.

In terms of industrial sources, no businesses were found to have a New York State Department of Environmental Conservation (DEC) air permit or New York City Department of Environmental Protection (DEP) certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no analysis was required.

An analysis of the 20 Hudson Yards Facility determined that there would be no potential for significant adverse air quality impacts on the Development Site from this existing emissions source.

The potential cumulative effects of the proposed emission sources on the Development Site (with the exception of Site C) and the existing nearby large source determined that the Proposed Actions would not cause a violation of applicable air quality standards. However, maximum concentrations from the LIRR ventilation exhaust system would potentially constitute a significant adverse impact on air quality; therefore, between the Draft and Final EIS, further review and evaluation will be performed to confirm this finding, and as necessary, mitigation measures would be developed and implemented by the

Applicant to eliminate or address any significant adverse impact associated with emissions from the LIRR ventilation exhaust system.

The mobile source analyses determined that concentrations of CO due to project-generated traffic at intersections would not result in any violations of National Ambient Air Quality Standards (NAAQS), and furthermore, CO concentrations were predicted to be below CEQR *de minimis* criteria. For $PM_{2.5}$, the results showed that for With Action conditions, the daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criteria. However, the maximum annual incremental $PM_{2.5}$ concentration is predicted to potentially exceed the annual *de minimis* criterion at the analyzed intersection locations in the With Action condition for the Proposed Project, and one analyzed intersection location for the Alternative Scenario.

Between the Draft and Final EIS, additional review and evaluation will be performed which is expected to determine that the identified impacts related to mobile source annual average $PM_{2.5}$ increments will be avoided. Additional modeling of $PM_{2.5}$ concentrations (Grid Analysis) will be performed using more refined or comprehensive analysis procedures to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources. It is anticipated that this will reduce $PM_{2.5}$ concentrations below the annual *de minimis* criterion threshold.

The parking facilities assumed to be developed as a result of the Proposed Actions were analyzed for potential air quality effects. The analysis found that these parking facilities would not be expected to result in any significant adverse air quality impacts. In addition, the analysis of the existing parking facility north of the Development Site was determined to not result in any significant adverse air quality impacts on the Development Site.

B. POLLUTANTS FOR ANALYSIS

Air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide [NO] and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (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 some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road 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 the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA) and are referred to as criteria pollutants; emissions of VOCs, NO_x, and other precursors to criteria pollutants from certain source categories 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. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

For the Proposed Actions, CO was included explicitly in the mobile source analysis, and is addressed indirectly in the stationary source analysis. The Proposed Actions would result in an increase in vehicle trips greater than the *CEQR Technical Manual* screening threshold of 170 trips at certain intersections. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Actions. In addition, potential effects of CO from the Proposed Project's and Alternative Scenario's parking facilities were analyzed.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of 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 effects of NO_x and VOC emissions from all 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.

The Proposed Actions would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of project-related emissions of these pollutants from mobile sources was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) With the promulgation of the 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2 associated with the Proposed Actions would be relatively small, due to the relatively small increases in the overall number of vehicles at intersections in the study area. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways. Furthermore, the monitored NO_2 concentrations at both near-road and rooftop monitoring sites (including monitored NO_2 concentrations at near road locations are well below the 1-hour NO_2 NAAQS of 188 $\mu g/m^3$. Therefore, it is unlikely that the incremental congestion from the Proposed Actions at local intersection locations would result in an exceedance of the NO_2 NAAQS.

Potential impacts on local NO_2 concentrations from potential fuel combustion for the diesel engines associated with the proposed buildings on the Development Site were evaluated. In addition, NO_2 emissions from the LIRR platform ventilation systems to be constructed were analyzed, along with emissions from the nearby existing 20 Hudson Yards Facility.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of the Proposed Project or the Alternative Scenario. Therefore, an analysis of this pollutant was not warranted.

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either 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 from 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, agricultural activities, as well as 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: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (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) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways. Since the traffic generated by the Proposed Actions would exceed the PM emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for PM.

An assessment of PM emissions from the diesel engines associated with the proposed buildings on the Development Site was conducted, following the *CEQR Technical Manual* and EPA guidance. In addition, PM emissions from the LIRR platform ventilation systems to be constructed were analyzed, along with emissions from the nearby existing 20 Hudson Yards Facility.

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 the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and therefore analysis of SO_2 from mobile sources was not warranted.

An assessment of SO_2 emissions from the diesel engines associated with the proposed buildings on the Development Site was conducted, following the *CEQR Technical Manual* and EPA guidance. In addition, SO_2 emissions from the LIRR platform ventilation systems to be constructed were analyzed, along with emissions from the nearby existing 20 Hudson Yards Facility.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established[1] 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. The NAAQS are presented in **Table 15-1**. The NAAQS for 3-hour SO_2 has also been adopted as the ambient air quality standard for New York State but is 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 and 24-hour and annual SO_2, which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants fluoride and hydrogen sulfide.

Effective December 2015, EPA lowered the 2008 ozone NAAQS from 0.075 ppm to 0.070 ppm. EPA issued final area designations for the revised standard on April 30, 2018. EPA has revised the NAAQS for $PM_{2.5}$, effective March 6, 2024. The revision included lowering the level of the annual $PM_{2.5}$ primary standard from the current level of 12 micrograms per cubic meter ($\mu g/m^3$) to 9 $\mu g/m^3$ and retaining the level of the 24-hr primary and secondary standard at 35 $\mu g/m^3$. In addition, the PM_{10} 24-hour average primary and secondary standard was retained.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as previously mentioned, DEC has issued standards for two noncriteria compounds. DEC has also developed a guidance document DAR-1[2] (February 2021), which contains a compilation of annual and short-term (1-hour) guideline concentrations for numerous other noncriteria compounds. The DEC thresholds represent ambient levels that are considered safe for public exposure.

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[1] EPA. National Ambient Air Quality Standards. 40 CFR Part 50.

[2] DEC. DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212. February 2021.

Table 15-1
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)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(7)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(4) (8)	NA	9	NA	15
24-Hour Average(5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(6)	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) 3-year average of annual mean.
(5) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(6) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
(7) Not to be exceeded more than once a year on average over 3 years.
(8) EPA has lowered the NAAQS from 12 µg/m³, effective March 6, 2024.
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 State Implementation Plan (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 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 had been designated as a moderate NAA for PM_{10}. EPA clarified on July 29, 2015 that the designation only applied to the revoked annual standard. The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA) 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 effective April 18, 2014 and is now under a maintenance plan. EPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

As described above, EPA has revised the $PM_{2.5}$ standard. $PM_{2.5}$ attainment designations under the new standard are expected to be effective by May 2026. For areas designated as non-attainment, $PM_{2.5}$ SIPs would be due by November 2027 and would be designed to meet the $PM_{2.5}$ standard by 2032, although this may be extended in some cases.

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 moderate non-attainment areas for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8-hour ozone standards, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard (‘anti-backsliding’). EPA designated the same NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012, with subsequent reclassifications to “moderate” and “serious” nonattainment since compliance with the NAAQS was not achieved by the required attainment dates. On November 29, 2021, DEC presented a demonstration that the New York Metro Area (NYMA) was not projected to meet the July 20, 2021 attainment deadline and therefore requested that EPA reclassify the NYMA to “severe” nonattainment. EPA reclassified the NYMA from “serious” to “severe” NAA, effective November 7, 2022, which imposed a new attainment deadline of July 20, 2027 (based on 2018–2020 monitored data). On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. EPA is currently reviewing revisions to New York’s SIP plan.

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 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. EPA has designated the entire State of New York as in attainment for this standard, with the exception of a portion of St. Lawrence County which was designated as “nonattainment.”

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and *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.[3] In terms of the magnitude of air quality impacts, 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 15-1**) would be deemed to have a potential significant adverse impact.

In addition, to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations would not be significantly increased in non-attainment areas, 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 impact, even in cases where violations of the NAAQS are not predicted.

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 impact 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 impact. 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 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

In addition, New York City uses *de minimis* criteria to determine the potential for significant adverse $PM_{2.5}$ impacts 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 impact 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 which are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete receptor location (elevated or ground level).

[3] New York City. *CEQR Technical Manual*. Chapter 1, Section 222. November 2020; and SEQR Regulations. 6 NYCRR § 617.7

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

The above *de minimis* criteria have been used to evaluate the significance of predicted impacts of the Proposed Actions on $PM_{2.5}$ concentrations.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

The prediction of vehicle-generated emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configuration. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and physical configuration combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and since it is necessary to predict the reasonable worst-case condition, it is important to note that most dispersion analyses predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analyses for the Proposed Actions employ models approved by EPA that have been used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could ensue from the Proposed Actions.

Vehicle Emissions

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, Motor Vehicle Emission Simulator (MOVES4).[4] This emissions model is capable of calculating engine, break wear, and tire wear emission factors for various vehicle types, based on the fuel type (e.g., gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from DEC.

[4] EPA. Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015. Overview of EPA's Motor Vehicle Emission Simulator (MOVES4). EPA-420-R-23-019. August 2023.

Vehicle classification data were based on field data. Appropriate credits were used to accurately reflect the inspection and maintenance program.[5] County-specific hourly temperature and relative humidity data obtained from DEC were used.

Road Dust

$PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analyses, since DEP considers it to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[6] and the *CEQR Technical Manual*.

Traffic Data

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Project and Alternative Scenario (see Chapter 14, “Transportation”). Traffic data for the future without the project (the No Action condition) and the With Action condition were employed in the respective air quality modeling condition. Based on a review of project and background traffic volumes, the periods corresponding with the higher traffic volumes (weekday or weekend) were utilized. For the With Action condition, the weekday AM, midday, PM and evening periods, and the Saturday midday/afternoon and evening peak periods were analyzed for the Proposed Project, and the weekday AM, midday and PM peak periods were analyzed for the Alternative Scenario.

The peak periods were used as a baseline for determining off-peak volumes for weekday and weekends. Off-peak traffic volumes in the No Action condition were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations, and off-peak increments from the With Action condition were estimated based on the parking demand as a result of the Proposed Project and Alternative Scenario.

Dispersion Model for Microscale Analyses

The CO and PM concentrations due to vehicular emissions adjacent to the analysis sites were predicted using the American Meteorological Society/Environmental Protection Agency Regulated Model (AERMOD) Version 23132.[7] 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). 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 terrain

[5] The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

[6] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1. NC. http://www.epa.gov/ttn/chief/ap42. January 2011.

[7] EPA. *User’s Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. EPA-454/B-23-008. Research Triangle Park, North Carolina. October 2023.

interactions. AERMOD has been a recommended model for transportation air quality analyses for several years and EPA mandated its use for transportation conformity purposes after a three-year transition period.[8] Following EPA guidelines, the analysis was performed using an area source representation of emission sources in order to simulate traffic-related air pollutant dispersion.[9] In addition, the weighted average release height and initial vertical source parameters were calculated for each modeled roadway. Hourly traffic volumes and associated emission factors were used to estimate hourly emission rates from each modeled roadway segment and predict traffic-related air pollutant concentrations at receptor locations.

Meteorology

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

The AERMOD model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 2015–2019. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data are processed using the EPA AERMET 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. The meteorological dataset processed with the AERMET Version 21112 processor, provided by DEC, was used for the analysis.[10]

Analysis Year

The microscale analyses were performed for the 2031 analysis year, the year by which the Proposed Project and Alternative Scenario are anticipated to be completed. The analysis was performed for both the No Action condition and the With Action condition.

Background Concentrations

Background concentrations are those pollutant concentrations originating from distant sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of an

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[8] EPA. Revisions to the Guideline on Air Quality Models: Final rule. Federal Register, Vol. 82, No. 10, January 2017.

[9] EPA. *Project-Level Conformity and Hot-Spot Analyses*, available at: https://www.epa.gov/state-and-local-transportation/project-level-conformity-and-hot-spot-analyses#pmguidance

[10] DEC staff previously communicated in an email to AKRF that the met data provided by DEC and processed with earlier versions is acceptable for use with AERMOD Version 22112. DEC does not have immediate plans to update the met data using AERMET Version 22112.

analysis site. Background concentrations must be added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations for the nearest monitored location are presented in **Table 15-2**. PM and CO concentrations are based on three recent years of monitored data (2017–2019)[11] consistent with the statistical format of the NAAQS. These values were used as the background concentrations for the mobile source analysis.

Table 15-2
Maximum Background Pollutant Concentrations for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY, Manhattan	2.52	35 ppm [(1)]
	8-hour		1.20	9 ppm
$PM_{2.5}$	24-hour	JHS 126, Brooklyn	17.8	35 μg/m^3 [(2)]
	Annual		7.6	9 μg/m^3 [(3)]

Notes:
[(1)] CO concentrations represent the maximum second-highest monitored concentrations from the three recent years ears of data.
[(2)] $PM_{2.5}$ 24-hour-average concentration represents the average of the 98th percentile day from three recent years of data.
[(3)] EPA has lowered the NAAQS from 12 μg/m^3, effective March 6, 2024.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.

Analysis Sites

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. Of those intersections, three were selected for microscale analysis (see **Table 15-3** and **Figure 15-1**). Site 1 was selected because it is projected to have the highest peak hour project-generated incremental traffic volumes for the weekday and Saturday peak periods; Site 2 was selected because it is projected to have the highest total (24-hr) project-generated incremental traffic volumes for the Proposed Project and the Alternative Scenario; and Site 3 was chosen because of high overall traffic volumes, and the highest peak hour traffic volumes on the Tenth Avenue corridor for the Proposed Project and the Alternative Scenario. The potential impact from CO and $PM_{2.5}$ emissions were analyzed at each of the sites.

Table 15-3
Mobile Source Analysis Sites

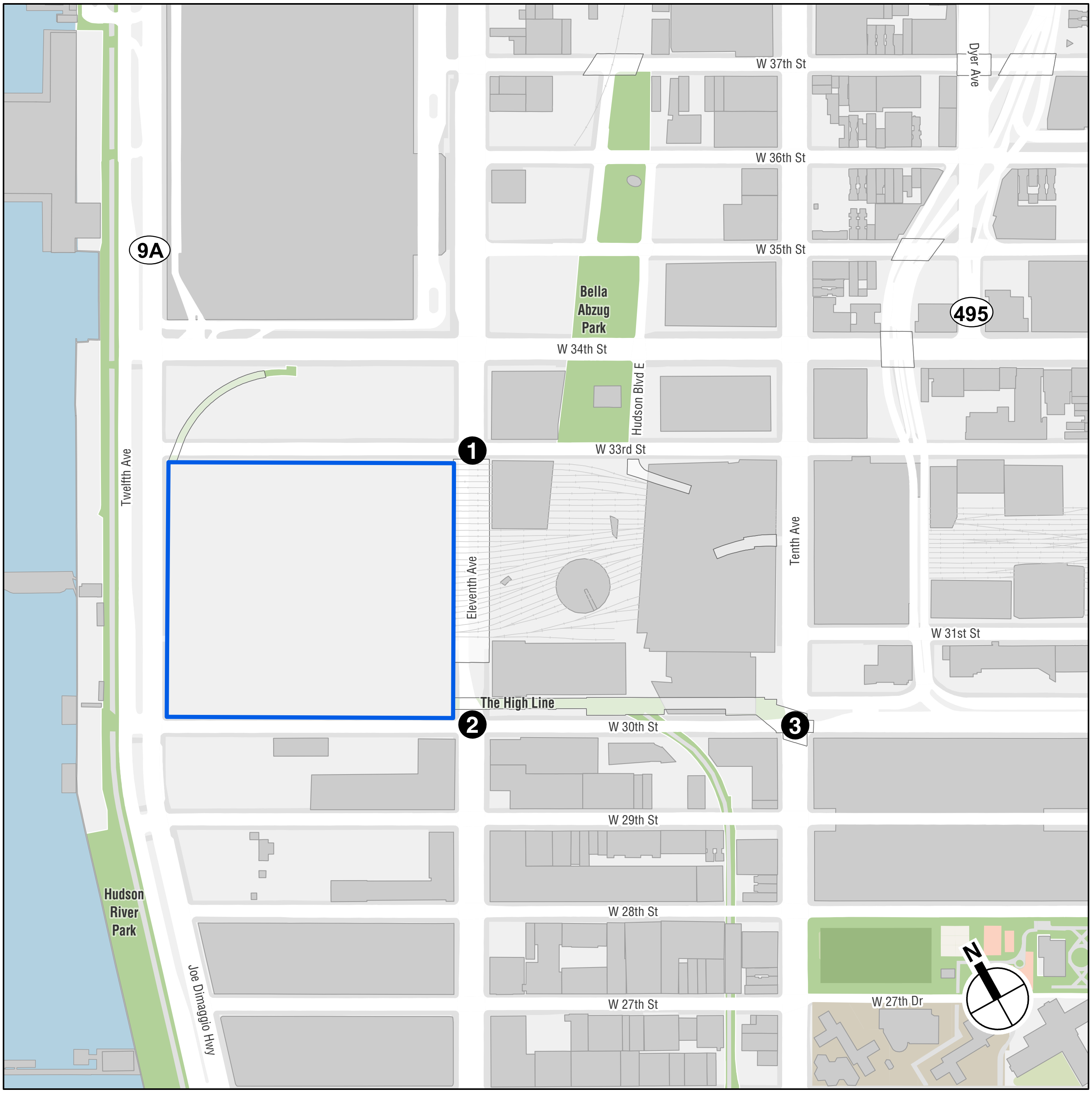
Analysis Site	Location	Pollutant
1	Eleventh Ave and West 33rd St	CO, $PM_{2.5}$
2	Eleventh Ave and West 30th St	CO, $PM_{2.5}$
3	Tenth Ave and West 30th St	CO, $PM_{2.5}$

Receptor Placement

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected sites. Receptors were placed along the approach and departure

[11] The 2020 and 2021 background data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19.

9.5.24



Development Site

Air Quality Microscale Analysis Location

0 400 FEET

Intersections for the Air Quality Microscale Analysis

WESTERN RAIL YARD MODIFICATIONS

Figure 15-1

links and roadway segments at regularly spaced intervals. Ground-level receptors were placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. Receptors in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters, from the nearest moving lane at each analysis location, based on the *CEQR Technical Manual* procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

VEHICLE IDLING

For the Proposed Project and Alternative Scenario, the West 33rd Street segment would be converted to a two-way street and would be accessed from Eleventh Avenue, continue west into the Development Site, and terminate at a cul-de-sac to facilitate vehicular and pedestrian access and to provide a more direct connection to the High Line. A small percentage of vehicles traveling to and from the Development Site would utilize the proposed cul-de-sac. Emissions from vehicle idling would be minimized through continuous management of traffic on the Development Site, including the cul-de-sac, as well as ensuring that NYC's anti-idling law are satisfied. Also, as EV usage increases, potential air quality effects from vehicle emissions on the Development Site would continue to decrease. Therefore, no significant adverse air quality effects would be anticipated.

PARKING FACILITIES

Proposed Parking Facilities

The Proposed Project would include approximately 225 parking spaces to be provided on Site A, including up to 200 accessory spaces for residential uses and 25 spaces accessory to retail and other commercial uses. There would also be a separate LIRR parking area with 32 spaces, which would be located adjacent to the train tracks at track level (26 spaces for LIRR employee vehicles and 6 spaces for LIRR maintenance trucks). The 32 LIRR spaces currently exist on the Development Site. Approximately 500 accessory parking spaces for commercial uses would be provided on Site C.

In the Alternative Scenario, a 450-space garage providing accessory parking to commercial and hotel uses along West 33rd Street would be developed on Site C. The Alternative Scenario would provide the same amounts of accessory parking on Site A and LIRR parking.

Emissions from vehicles using the proposed parking facilities could potentially affect levels of CO and PM concentrations in the immediate vicinity of the ventilation outlets. Therefore, an analysis of CO and PM emissions was performed for the Site A and Site C parking facilities. The emissions from the garages outlet vents and their dispersion were analyzed using the methodology defined in the *CEQR Technical Manual*. Maximum CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit each facility. PM increments were determined for peak daily (24-hour) use. The number of vehicles entering and exiting the garages were derived from the trip generation analysis described in Chapter 14, “Transportation.”

Emissions from vehicles entering, parking, and exiting the garages were determined using the EPA MOVES4 mobile source emission model as described in detail above for the analysis of emissions at intersections. For all arriving and departing vehicles, an average speed of five miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for 60 seconds before proceeding to the exit. For the Site A parking garage, although the project is still in the preliminary stage of design and details on the ventilation system have not yet been defined, the concentrations within the system were conservatively calculated assuming a minimum ventilation rate, based on New York City Building Code requirements of one cubic foot per minute of fresh air per gross square foot of garage area. For the Site C parking garage, the preliminary design includes a ventilation system with a maximum flowrate of 65,000 actual cubic feet per minute (acfm). The ventilation system would operate over a range of flowrates, with a 10:1 turndown ratio. To be conservative, the minimum flowrate of 6,500 acfm (10 percent of the maximum flowrate) was chosen for the parking garage analysis.

For the parking garages, to determine pollutant concentrations, the outlet vents were analyzed as a “virtual point source” using the methodology in EPA’s *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates concentrations at various distances from an outlet vent by assuming that the concentration at the vent represents the emission rate divided by the fresh air ventilation rate and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

The vent location for the Site A garage was assumed to be from a louver located along the west side of the garage at a height of 10 feet above grade and along Twelfth Avenue; therefore, “near” and “far” receptors were placed along sidewalks at a pedestrian height of 6 feet at distances of 7 feet and 117 feet, respectively, from the vent. Since the Site C parking garage would be elevated, a receptor was modeled at the anticipated vent height of 72 feet and at a distance of 10 feet from the vent, to conservatively assess the air quality impacts on the Proposed Project building window or other air intake location. A persistence factor of 0.77 was used to convert the maximum 1-hour average CO concentrations to 8–hour averages, per *CEQR Technical Manual* guidance, and factors of 0.6 and 0.1 to convert maximum 1-hour $PM_{2.5}$ concentrations to 24-hour and annual averages, respectively, per EPA guidance,[12] accounting for meteorological variability over the longer averaging periods. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels. The on-street pollutant concentrations were determined using the methodology in the Air Quality Appendix of the *CEQR Technical Manual*, utilizing No Action and With Action traffic volumes from the traffic survey conducted in the study area.

Existing Parking Facility

The block to the north of the Development Site is a surface parking lot, which was formerly used as a truck marshalling yard for the Jacob K. Javits Convention Center, but is now used primarily for parking associated with the convention center. Based on the capacity and proximity of this parking facility to the Development Site, an assessment of the potential CO and PM impacts on the Development Site was performed. Cumulative impacts from on-street sources and emissions from the parking facility were calculated at receptors located at Site C.

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[12] EPA. *AERSCREEN User’s Guide*. EPA-454/B-21-005. April 2021.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

On, December 15, 2021, the New York City Council passed a bill that would effectively ban the installation of most new natural gas and other fossil fuel-fired systems in buildings in New York City (Local Law 154 of 2021). The ban would be enforced by the New York City Department of Buildings, and for buildings greater than six stories, is based on the submission of construction documents after July 1, 2027. Electric-powered equipment would be utilized for heating and hot water needs for all of the proposed buildings under both With Action scenarios. Therefore, a stationary source of the Proposed Actions' heating and hot water systems is not required.

DIESEL GENERATORS

LIRR Ventilation System Generators

Diesel-powered generators would be utilized to provide the LIRR below-grade ventilation system in the event of a utility power outage. Based on the current design, a total of five generators would be installed, with a total capacity of 13 megawatts (MW), consisting of three units rated at 2.5 MW and two units rated at 2.75 MW. A maximum of two-2.5 MW and one 2.75 MW engines would operate at any given time. In either With Action scenario, the engines would be located within the podium at Site C and would exhaust to the north façade to minimize potential air quality impacts to both on-site and off-site receptors. Each engine would be tested on a monthly basis for approximately 30 minutes. Since the LIRR generators would only be used for very limited periods of time for testing outside of an actual emergency, no analysis of this equipment was performed.

Development Site Generators

Under both the Proposed Project and the Alternative Scenario, generators would be installed to provide emergency back-up power for each of the proposed buildings. The generators at Sites B and C would potentially be enrolled in a utility-sponsored demand response program, while the generators serving Site A would be used for emergency back-up power only. Since certain equipment would be used for non-emergency purposes, an evaluation of the potential air quality impacts from pollutants emissions associated with this equipment was conducted.

Dispersion Model

A stationary source analysis was conducted using the methodology described in the *CEQR Technical Manual* to assess air quality impacts associated with emissions from the proposed diesel engines that could be used for demand response. 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 and source types. AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatment of the boundary layer theory and understanding of turbulence and dispersion, and includes handling of the plume interaction with terrain. AERMOD is EPA's preferred regulatory stationary source model.

AERMOD calculates pollutant concentrations from simulated sources (e.g., exhaust stacks) based on hourly meteorological data and surface characteristics and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analysis of potential impacts from exhaust stacks assumed stack tip downwash, urban dispersion and surface roughness length, and elimination of calms.

AERMOD incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithm, which is designed to predict concentrations in the "cavity region" (i.e., the area around a structure which under certain conditions may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). AERMOD also uses the Building Profile Input Program for PRIME (BPIPPRM) to provide a detailed analysis of downwash influences on a direction-specific basis. BPIPPRM determines the projected building dimensions for modeling with the building downwash algorithm enabled. The modeling of plume downwash accounts for all obstructions within a radius equal to five obstruction heights of the stack.

As per *CEQR Technical Manual* guidance, it is recommended that analysis of effects from stationary sources of emissions be performed both under with and without downwash in order to assess the worst-case impacts at elevated locations close to the height of the source, which would occur without downwash, as well as the worst-case impacts at lower elevations and ground level, which would occur with downwash. However, the analysis was performed under with downwash conditions only. The following summarizes the basis for this approach:

- Assuming no downwash conditions generally results in very conservative estimates of maximum pollutant concentrations from point sources. The analysis presented for the demand response engines is also conservative since these engines would normally only run for a few times in demand response mode during the year. Modeling assuming the generators are operating in demand response mode throughout the year under no downwash conditions would grossly overestimate pollutant concentrations.
- The proposed demand response generators would be vented horizontally from locations on the Development Site, well below the maximum building heights. Under these conditions, pollutants would be expected to be affected by building wakes under all meteorological conditions.
- For consistency with the methodology presented for the analysis of the existing 20 Hudson Yards emission sources (see "Additional Sources," below).

Potential 1-hour average NO_2 concentrations, added to representative background concentrations in the area, were compared with the NAAQS. Potential 24-hour and annual average incremental concentrations of $PM_{2.5}$ were compared with the $PM_{2.5}$ *de minimis* criteria defined in the *CEQR Technical Manual*. For the analysis of the 1-hour average NO_2 concentration from the proposed demand response engines, AERMOD's Plume Volume Molar Ratio Method (PVMRM) module was used to analyze chemical transformation within the model. PVMRM incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. The model applied ozone concentrations measured in 2015–2019 at the nearest available DEC ozone monitoring station— the IS 52 monitoring station in the Bronx.[13] An initial NO_2 to NO_x ratio of 20 percent at the source exhaust stack was assumed for diesel engines, which is considered representative.

Five years of surface meteorological data collected at LaGuardia Airport as well as concurrent upper air data collected at Brookhaven, New York were used in the analysis. Data from 2015–2019 was used.

Emission Rates and Stack Parameters

Since the final design and selection of the engine generators for the Development Site is not yet available, it was conservatively assumed for the purpose of the air quality analysis that they would utilize diesel fuel. All diesel-powered demand response engines would be designed to meet EPA Tier IV emission standards pursuant to New Source Performance Standards (NSPS) under 40 CFR Part 60 Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Design information on the proposed demand response engines equipment and operations were used in the AERMOD analysis.

The emission factors for NO_x were obtained from representative manufacturer's information. Emission factors for PM_{10} and $PM_{2.5}$ were obtained from EPA *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*. $PM_{2.5}$ emissions included both the filterable and condensable components.

The proposed demand response engines would be exhausted horizontally from a mechanical floor on the podium for Site C, and at mechanical floors located at the proposed Site B building and the proposed Site C Tower. While the final locations for demand response equipment have not been determined at this time, it was conservatively assumed that exhaust stacks would be located at a lower mechanical floor, in order to ensure that pollutant concentrations do not result in potential significant adverse air quality impacts at open space and sidewalk locations. The stack discharge dimensions and exhaust temperature were obtained from design information and the exhaust velocity was calculated based on the exhaust flowrate for the maximum proposed engine capacity under demand response conditions.

The demand response engines would generally be called to operate to provide capacity during the summer peak period during the hours of 10 AM to 8 PM, While the engines could be called at other hours, based on Related's operating experience at the 20 Hudson Yards Facility, this has not been the case. For modeling purposes, the engines were conservatively assumed to be running continuously for up to 12 hours per day assuming operation between 8:00 AM and 8:00 PM throughout the year.

[13] 2020 and 2021 background data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with DEP guidance. 2022 background data was not used since it needs to be paired with 2022 meteorological data, which DEC has stated is missing a significant number of days of upper air measurements, consequently, this data was not available for use in modeling analyses.

The emission rates and exhaust stack parameters used in the modeling analysis is presented in **Table 15-4**. As shown in the table, slightly different operating assumptions were used for the demand response engines for the Proposed Project and Alternative Scenario.

Table 15-4
Exhaust Stack Parameters and Emission Rates
Diesel Engines Potentially Used for Demand Response

Stack Parameter[3]	Site B	Site C Podium	Site C Tower/ Building C-2
Number of Engines	3	3/2[4]	3/2[4]
Fuel Type	Diesel	Diesel	Diesel
Installed Capacity per unit (KW)	3,000	3,000	3,000
Capacity under Demand Response Conditions (kilowatts)	3,000	2,300	2,300
Number of Stacks	3	3/2[4]	3/2[4]
Building Height (ft)	1,376	200	1,189/835
Stack Height (ft)[5]	45	72	72
Stack Diameter (ft)	1.0	1.0	1.0
Stack Exhaust Flow (ACFM)[2]	20,000	20,000	20,000
Stack Exhaust Velocity (ft/s)	424.3	424.3	424.3
Exhaust Temperature (degrees Fahrenheit)	1,000	1,000	1,000
Emission Rate (grams/second)			
NO_2 (1-hour average)	0.5932	0.4541	0.4541
NO_2 (Annual average)[6]	0.0135	0.0104	0.0104
PM_{10} (24-hour average)	0.0678	0.0520	0.0520
$PM_{2.5}$ (24-hour average)	0.0658	0.0504	0.0504
$PM_{2.5}$ (Annual average)[6]	0.0045	0.0035	0.0035
SO_2 (1-hour average)	0.0062	0.0047	0.0047

Notes:
[1] The stack parameters and emissions for the demand response engines are anticipated to be the same under the Proposed Project and Alternative Scenario.
[2] ACFM = actual cubic feet per minute.
[3] The engines would exhaust through individual stacks. The stack parameters and emissions presented are per stack.
[4] The first value presents the Proposed Project, and the second value presents the Alternative Scenario.
[5] The engine exhaust horizontally through the side of the building. The height presented is above project datum.
[6] Annual emissions are based on 200 hours per year of operation which includes demand response and monthly testing.

Background Concentrations

To estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts must be added to a background value that accounts for existing pollutant concentrations from other sources that are not directly accounted for in the model (see **Table 15-5**).

To develop background levels for each pollutant, concentrations measured at the most representative ambient monitoring station operated by DEC over a three-year period (2017–2019) were used, consistent with DEC guidance. More recent data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, based on guidance from DEP.

Table 15-5
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m3)	NAAQS (µg/m3)
NO_2	1-hour[1]	IS 52, Bronx	110.6	188
	Annual[2]		32.8	100
SO_2	1-hour[3]	IS 52, Bronx	14.6	196
PM_{10}	24-hour	IS 52, Bronx	36.0	150
$PM_{2.5}$	24-hour[4]	JHS 126, Brooklyn	17.8	35

Notes:
[1] The one-hour NO_2 background concentration is based on the maximum 98th percentile one-hour NO_2 concentration averaged over three years of data.
[2] Annual average NO_2 background concentration is based on the three-year highest value.
[3] The one-hour SO_2 background concentration is based on the maximum 99th percentile concentration averaged over three years of data.
[4] $PM_{2.5}$ 24-hour-average concentration represents the average of the 98th percentile day from three recent years of data.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.

Total 1-hour NO_2 concentrations were refined following a more detailed approach (EPA "Tier 3"). The methodology used to determine the total 1-hour NO_2 concentrations from the proposed demand response engines was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from the demand response engines were first added to the seasonal hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each location and the 98th percentile daily 1-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally the 98th percentile concentrations were averaged over the latest five years. Annual NO_2 concentrations from the demand response engines were estimated using the Tier 1 method, which conservatively assumes a full conversion of NO_2 to NO_x. Potential 1-hour and annual average NO_2 concentrations, added to representative background concentrations in the area, were compared with the NAAQS.

$PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria. The $PM_{2.5}$ 24-hour average background concentration based on the 98th percentile concentration, averaged over the three-year period was used to establish the *de minimis* value of 8.6 ug/m^3. $PM_{2.5}$ annual average impacts are assessed on an incremental basis and compared to the $PM_{2.5}$ *de minimis* criteria, without considering the annual background. Therefore, the annual $PM_{2.5}$ background is not presented in the table.

Receptor Placement

Discrete receptors were modeled along proposed building façades to represent potentially sensitive locations such as operable windows and intake vents. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations. Receptors at ground-level were also included to estimate maximum potential concentrations at publicly accessible locations in the surrounding area.

LIRR PLATFORM VENTILATION SYSTEM

The platform to be created on the Development Site would include localized exhaust hoods placed over locations where LIRR dual-mode locomotives and other equipment park in the railyard. Potential air quality impacts associated with the platform ventilation system were evaluated as part of the 2021 *Western Rail Yard Infrastructure FEIS* (2021 Infrastructure FEIS). That analysis used conservative assumptions to evaluate potential air quality impacts, including assuming all locomotive emissions would vent through a single fan plant location. The analysis determined that the maximum predicted total concentrations are below the applicable NAAQS and the CEQR *de minimis* criteria for CO and $PM_{2.5}$.

Although the air quality impacts of the LIRR platform ventilation systems were previously analyzed, the potential cumulative effects on air quality of the LIRR platform ventilation systems and the demand response generators, as well as emissions associated with existing nearby sources in the study area, were determined (see “Cumulative Emissions Analysis,” below).

INDUSTRIAL SOURCES

Nearby industrial facilities were examined to identify any potential for adverse impacts on the Development Site from sources of air toxics. All commercial and industrial uses within 400 feet of the Development Site were considered for inclusion in the air quality impact analysis. Existing land uses were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A search of federal, state, and city permit data within the study area was conducted using the DEP Clean Air Tracking System (CATS) database[14] and the DEC Info Locator.[15] No current permitted activities were identified within the study area, and no other sources of emissions were identified in the land use survey. The permit search did not identify any existing or expired permits for manufacturing or processing activities. Therefore, no potential for significant adverse air quality impacts on the Proposed Project or the Alternative Scenario are anticipated from industrial sources of emissions.

ADDITIONAL SOURCES

The *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a “large” or “major” emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the Development Site, a review of DEC Title V and State Facility Air permits was performed to identify any federal or state-permitted facilities. Existing large and major sources of emissions (i.e., sources having a Title V or State Facility Air Permit) within 1,000 feet of the Development Site were surveyed. One facility with a State Facility Permit, the 20 Hudson Yards Facility,[16] was determined to be within 1,000 feet of the Development Site. The 20 Hudson Yards Facility is a mixed-use real estate development, consisting of five towers: commercial office towers Tower A (30 Hudson Yards) and Tower C (10 Hudson Yards), a Retail Podium Building (20 Hudson Yards), a residential building Tower D (15 Hudson Yards), and one mixed-use Hotel/Residential building Tower E (35 Hudson Yards). The Retail Podium

[14] DEP. *Clean Air Tracking System database*. https://a826-web01.nyc.gov/DEP.BoilerInformationExt. Accessed March 2024.

[15] DEC. https://gisservices.dec.ny.gov/gis/dil/ Accessed March 2024.

[16] http://www.dec.ny.gov/dardata/boss/afs/permits/262050178400001.pdf

Building includes a combined heat and power (CHP) plant with a total generating capacity of 13.2 megawatts (MW). Therefore, the potential for air quality impacts on Development Site were evaluated using the AERMOD dispersion model discussed above. All currently operating regulated emission sources were modeled, regardless of whether they are within 1,000 feet of the Development Site.

Emission rates, stack parameters, and operating assumptions for the 20 Hudson Yards Facility were based on data that was developed for the State Facility Permit application. **Tables 15-6, 15-7, and 15-8** present the stack parameters and emission rates used in the State Facility Permit dispersion analysis for the CHP and microturbines, boiler plants, and engine generators, respectively.

The EPA's AERMOD refined dispersion model was used to estimate the short-term and annual concentrations of critical pollutants at sensitive receptor locations. The analysis was performed using the same model options described above for the analysis of the proposed demand response engines. As described above, the analysis was performed under building downwash conditions only.

Table 15-6
Large/Major Source Analysis – 20 Hudson Yards Facility
Cogeneration Unit Stack Parameters and Emission Rates

Parameter		Building	
		20 Hudson Yards Retail Podium CHP	10 Hudson Yards Microturbines
Capacity per unit (KW)		3,332	200
Number of Units		4	6
Building Height (ft)(2)		210.8	805.2
Stack Exhaust Temp. (°F)		293	260
Stack Exhaust Height (ft)(3)		220.8	805.2
Height Above Roof (ft)		10	0
Stack Exhaust Diameter (ft)(3)		2.2	3.0
Stack Exhaust Flow (ACFM)(1)		13,263	19,477
Stack Exhaust Velocity (ft/s)		60.0	45.9
Fuel Type		Natural Gas	Natural Gas
g/s(4)	NO_x (1-hour)	0.0968	0.0116
	NO_x (Annual)	0.0877	0.0116
	PM_{10} (24-hour)	0.0118	0.0018
	$PM_{2.5}$ (24-hour)	0.0118	0.0018
	$PM_{2.5}$ (Annual)	0.0107	0.0018
	SO_2 (1-hour)	0.0019	0.0009

Notes:
(1) ACFM = actual cubic feet per minute.
(2) Building and stack exhaust height are above grade.
(3) Each CHP engine on the Podium Building has its own dedicated stack; however, the CHP engines were modeled as two co-located equivalent exhaust stacks (each with a 0.934-meter equivalent diameter) for the State Facility Permit. For 10 Hudson Yards, there are six microturbines exhausting through a single stack.
(4) Emission rates presented are per unit.

Table 15-7
Large/Major Source Analysis – 20 Hudson Yards Facility Boiler Stack Parameters and Emission Rates

Parameter		Building				
		20 Hudson Yards Podium Boilers	30 Hudson Yards Boilers	10 Hudson Yards Boilers	15 Hudson Yards Boilers	35 Hudson Yards Boilers
Capacity per unit (MMBtu/hr)		14.47	6.0	7.25	6.0	6.0
Number of Units		6	8	4/3[3]	5	5
Building Height (ft)[2]		210.8	1,219.6	805.2	898.1	1,039
Stack Exhaust Temp. (°F)		300	450	325	230	364
Stack Exhaust Height (ft)[2]		220.8	1,219.6	805.2	898.1	1,039
Height Above Roof (ft)		10	0	0	0	0
Stack Exhaust Diameter (ft)		2.8	4.0	2.5/ 2.0[3]	2.0	2.7
Stack Exhaust Flow (ACFM)[1]		7,085	12,964	9,436/7,077[3]	7,000	14,952
Stack Exhaust Velocity (ft/s)		18.7	17.2	32/37.5[3]	37.1	44.6
Fuel Type		Gas	Gas	Gas	Gas	Gas
g/s[4]	NO_x (1-hour)	0.0420[6]	0.0371	0.0448[5]	0.0371	0.0371
	NO_x (Annual)	0.0027[6]	0.0371	0.0448[5]	0.0371	0.0371
	PM_{10} (24-hour)	0.0057	0.0056	0.0068[5]	0.0056	0.0056
	PM_{25} (24-hour)	0.0057	0.0056	0.0068[5]	0.0056	0.0056
	$PM_{2.5}$ (Annual)	0.0004	0.0056	0.0068[5]	0.0056	0.0056
	SO_2 (1-hour)	0.0011	0.0004	0.0005[5]	0.0004	0.0004

Table 15-8
Large/Major Source Analysis – 20 Hudson Yards Facility Engine Generator Stack Parameters and Emission Rates

Parameter		Building						
		20 Hudson Retail Podium	30 Hudson Yards 38th Floor	30 Hudson Yards 9th Floor	10 Hudson Yards 5th Floor	10 Hudson Yards Roof	15 Hudson Yards	35 Hudson Yards
Capacity per Unit (KW)		3,000	2,000	2,500	3,000	3,000	3,000	2,500
Number of Units		1	2	4	1	1	1	2
Building Height (ft)[2]		210.8	1,219.6	1219.6	805.2	805.2	898.1	1,039
Stack Exhaust Temp. (°F)		882.2	920.6	912.5	882.2	882.2	882.2	912.5
Stack Exhaust Height (ft)[2]		210.8	685.5 [3]	169.5[3]	125.5[3]	805.2	898.1	174[3]
Height Above Roof (ft)		10	0	0	0	0	0	0
Stack Exhaust Diameter (ft)		2.5	2.0	1.7	2.0	2.0	2.5	1.7
Stack Exhaust Flow (ACFM)[1]		23,557.7	16,301.3	15,409.4	23,557.7	23,557.7	23,557.7	15,409.4
Stack Exhaust Velocity (ft/s)		80.0	86.5	117.7	125.0	125.0	80.0	117.7
Fuel Type		Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
(g/s)[4]	NO_x (1-hour)	0.5583	0.3722	0.4653	0.5583	05583	0.5583	0.4653
	NO_x (Annual)	0.0083	0.0055	0.0069	0.0083	0.0083	0.0083	0.0069
	PM_{10} (24-hour)	0.0125	0.0083	0.0104	0.0125	0.0125	0.0125	0.0104
	$PM_{2.5}$ (24-hour)	0.0125	0.0083	0.0104	0.0125	0.0125	0.0125	0.0104
	$PM_{2.5}$ (Annual)	0.0004	0.0002	0.0003	0.0004	0.0004	0.0004	0.0003
	SO_2 (1-hour)[5]	0.0062	0.0041	0.0051	0.0062	0.0062	0.0062	0.0051

Notes:
(1) ACFM = actual cubic feet per minute.
(2) Building and stack exhaust height above grade.
(3) The stack exhausting horizontally through the side of the building.
(4) Emissions presented are per unit.
(5) SO_2 emissions were estimated based on the use of ultra-low sulfur fuel for fuel oil firing (0.0015 percent or less), as per DEC Part 225 regulations.

CUMULATIVE EMISSIONS ANALYSIS

Potential effects from the Proposed Actions' stationary sources of emissions (the proposed demand response engines), the proposed LIRR platform ventilation system, and the existing 20 Hudson Yards Facility were analyzed on a cumulative basis.

The EPA's AERMOD refined dispersion model was used to estimate the short-term and annual concentrations of critical pollutants at sensitive receptor locations. The analysis was performed using the same model options described above for the analysis of the proposed demand response engines.

Receptor Placement

Discrete receptors were modeled along proposed and existing building façades to represent potentially sensitive locations such as operable windows and intake vents. The receptor network included both With Action development scenarios. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations.

Emission Estimates and Stack Parameters

Emission rates and stack parameters for the proposed demand response engines and existing cogeneration plant sources at 20 Hudson Yards were consistent with the values determined for the separate analysis of these systems (see **Tables 15-4 and15-6**). For the demand response engine and boiler emissions sources at the existing 20 Hudson Yards Facility, several adjustments were made to refine the assumptions for the purpose of the cumulative emissions analysis, as follows:

- It was determined that two of the engines identified in the DEC State Facility Permit were not installed (one engine at the 10 Hudson Yards roof and one engine at 15 Hudson Yards). Therefore, these demand response engines were excluded from the cumulative emissions analysis.
- According to information provided by Related, it was determined that based on the configuration of the engine generators operated by Related and the building designs at 30 Hudson Yards and 35 Hudson Yards, no more than one diesel engine per building can be used for demand response. Furthermore, only two of the four tenant-operated generators on the 9th floor of 30 Hudson Yards are enrolled in a demand response program. Therefore, this information was used for the cumulative emissions analysis.
- The boilers at 20 Hudson Yards were assumed to operate at 100 percent load during the winter months and 75 percent load during the rest of the year. This is a very conservative assumption since boiler loads during the non-winter season are much lower.

For the LIRR platform ventilation system, the emission rates developed for the 2021 Infrastructure FEIS were used, and the stack parameters were based on available design information. The LIRR platform ventilation system is designed to maintain safe conditions for LIRR employees. In the event of a fire or smoke emergency, the ventilation system would provide safe egress and aid firefighting response. The design would incorporate a series of exhaust and make-up fan plants connected to intake and discharge louvers. The ventilation system design includes fan plants connected to a series of plenums and ducts, integrated into the platform structure.

Additionally, the fan plant design would include localized exhaust hoods to directly vent locomotive engine exhaust when firing diesel fuel. Currently, LIRR operates train service to/from eastern Long Island where no electrified rail service is available. Trains on these lines use two dual mode locomotives to provide direct service between eastern Long Island and Penn Station using both the eastern non-electrified rails and the western electrified rails. The locomotives are fitted with USEPA Tier I locomotive engines.

The analysis for the 2021 Infrastructure FEIS used conservative assumptions to evaluate potential air quality impacts, including assuming all locomotive emissions would vent through a single fan plant, to determine the potential worst-case air quality impact from each location. Based on the locations where locomotives idle in the LIRR railyard, the fan plant located on the western side of Site C would only exhaust these emissions. Therefore, for the purpose of this analysis, it was assumed that all locomotive emissions would be vented from this fan plant.

Locomotive emissions are assumed to be identical to those estimated for the 2021 Infrastructure FEIS, since LIRR railyard activities have not changed. However, aspects of the ventilation system design have changed since the 2021 Infrastructure FEIS. Based on the current designs for the Proposed Project and the Alternative Scenario, ventilation air from the LIRR railyard would be exhausted to one location: on the north façade of the Site C podium, at the northwest corner, at an elevation of 106 feet (72 feet above curb). Updated flowrate information on the fan plant exhausts was utilized.

A summary of the LIRR platform system's stack parameters and emission estimates used for the cumulative emissions analysis is presented in Table **15-9**.

Table 15-9
LIRR Platform Ventilation Systems Stack Parameters and Emission Rates

Stack Parameter	Value		
Exhaust Release Height (ft)	72		
Stack Exhaust Temp. (°F)	70		
Stack Exhaust Diameter (ft)[2]	52.9		
Stack Exhaust Flow (ACFM)[3]	300,000		
Stack Exhaust Velocity (ft/s)	2.27		
Emissions Rates[4]			
Time Period	**NO_x**	**PM**	**SO_2**
12 AM–8 AM[1]	0.0000	0.0000	**0.0000**
8 AM–3 PM	0.0925	0.0028	**0.0001**
3 PM–4 PM	0.3400	0.0101	0.0003
4 PM–5 PM	0.3030	0.0090	0.0002
5 PM–6 PM	0.1422	0.0042	0.0001
6 PM–12 AM[1]	0.0000	0.0000	0.0000

Notes:
Emissions represent total emissions from all diesel locomotives operating within the WRY Site.
[1] LIRR do not store dual-mode locomotives at the WRY Site overnight (from 6 PM to 8 AM the following day). Therefore, no diesel exhaust emissions modeled during the overnight period.
[2] The stack diameter is representative of a circular stack of equivalent area as the exhaust louver and exhausting horizontally.
[3] ACFM = actual cubic feet per minute. To be conservative, the analysis was performed assuming the minimum exhaust flowrate (30% of the design flow rate) which would occur under winter conditions.
[4] Emission rates are based on USEPA Tier I Line-Haul Locomotive Emission Standards.

E. EXISTING CONDITIONS

The representative criteria pollutant concentrations measured in recent years at DEC air quality monitoring stations nearest to the Development Site are presented in **Table 15-10**. The values presented are consistent with the form of the NAAQS. As shown in the table, the recently monitored levels did not exceed the NAAQS (including the recently revised NAAQS for annual $PM_{2.5}$), with the exception of the 8-hour ozone NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the stationary source and mobile source analyses, since these are the most recent reported monitored values, rather than more conservative values used for dispersion modeling. The concentrations presented in **Table 15-10** provide a comparison of the air quality in the rezoning area with the NAAQS, while background concentrations are obtained from several years of monitoring data and represent a conservative estimate of the highest concentrations for future ambient conditions.

Table 15-10
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY, Manhattan	ppm	1-hour	1.55	35
			8-hour	1.2	9
SO_2	IS 52[1]	µg/m^3	1-hour	9.5	196
PM_{10}	IS 52	µg/m^3	24-hour	33	150
$PM_{2.5}$	JHS 126, Brooklyn [2,3]	µg/m^3	Annual	8.1	9 [8]
			24-hour	20.1	35
NO_2	IS 52[4,5]	µg/m^3	1-hour	101.8	188
			Annual	29.8	100
Lead	IS 52[6]	µg/m^3	3-month	0.0049	0.15
Ozone	IS 52[7]	ppm	8-hour	0.068	0.070

Notes:
(1) The 1-hour value is based on a three-year average of the 99th percentile of daily maximum 1-hour average concentrations.
(2) Annual value is based on a three-year average of annual concentrations.
(3) The 24-hour value is based on the three-year average of the 98th percentile of 24-hour average concentrations.
(4) The 1-hour value is based on a three-year average of the 98th percentile of daily maximum 1-hour average concentrations.
(5) Annual value based on a three-year maximum of annual concentrations.
(6) Based on the highest quarterly average concentration measured during 2021 to 2023.
(7) Based on the three-year average of the 4th highest daily maximum 8-hour average concentrations.
(8) EPA has lowered the NAAQS from 12 µg/m^3, effective March 6, 2024.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2021–2023.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations in the No Action condition were determined using the methodology previously described. **Table 15-11** shows the future maximum predicted 8-hour CO concentration, including background concentration, at the analysis intersections in the No Action condition. The value shown is the highest predicted concentration for the receptor locations for any of the time periods analyzed.

Table 15-11
Maximum Predicted 8-Hour Average
CO No Action Concentrations (ppm)

Analysis Site	Location	Concentration
1	Eleventh Ave and West 33rd St	1.39
2	Eleventh Ave and West 30th St	1.49
3	Tenth Ave and West 30th St	1.80

Notes:
8-hour NAAQS is 9 ppm.
Concentration includes a background concentration of 1.2 ppm.

$PM_{2.5}$ concentrations for the No Action condition are not presented, since impacts are assessed on an incremental basis.

STATIONARY SOURCES

In the No Action condition, it is assumed that the Development Site will be developed with 5,009,725 gsf of residential, commercial, and community facility space at the time of the build year, based on the Maximum Commercial Scenario. Although the No Action condition would result in less development compared to the Proposed Project or the Alternative Scenario in the With Action condition, the restrictions prohibiting the use of fossil fuel-fired heating and hot water systems would not be in place. Therefore, stationary sources of emissions could potentially be greater under the No Action condition compared to the With Action condition.

G. THE FUTURE WITH THE PROPOSED ACTIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations for the Proposed Actions were predicted using the methodology previously described. **Tables 15-12 and 15-13** show the future maximum predicted 8-hour average CO concentration at the intersections studied for the Proposed Project and Alternative Scenario, respectively. The value shown is the highest predicted concentration at each intersection. The results indicate that the Proposed Project and Alternative Scenario would not result in any violations of the 8-hour CO NAAQS. In addition, the incremental increase in 8-hour average CO concentrations are small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria. Therefore, mobile source CO emissions from the Proposed Actions would not result in a significant adverse air quality impact.

Table 15-12
Maximum Predicted 8-Hour CO
With Action Concentrations (ppm)—Proposed Project

Analysis Site	Location	No Action	With Action	De Minimis
1	Eleventh Ave and West 33rd St	1.39	1.71	5.2
2	Eleventh Ave and West 30th St	1.49	1.89	5.2
3	Tenth Ave and West 30th St	1.80	2.10	5.2

Notes:
8-hour NAAQS is 9 ppm.
Concentrations includes a background concentration of 1.2 ppm.

Table 15-13
Maximum Predicted 8-Hour CO
With Action Concentration (ppm)—Alternative Scenario

Analysis Site	Location	No Action	With Action	De Minimis
1	Eleventh Ave and West 33rd St	1.39	1.63	5.2
2	Eleventh Ave and West 30th St	1.49	1.77	5.2
3	Tenth Ave and West 30th St	1.80	1.99	5.2

Notes: 8-hour NAAQS is 9 ppm.
Concentration includes a background concentration of 1.2 ppm.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments were calculated so that they could be compared with the NAAQS and the *de minimis* criteria. Based on this analysis, the maximum predicted localized 24-hour average incremental $PM_{2.5}$ concentrations are presented in **Tables 15-14 and 15-15** for the Proposed Project and Alternative Scenario, respectively. The tables also present the maximum predicted concentrations in the No Action and With Action condition. The No Action and With Action concentrations shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

Table 15-14
Maximum Predicted 24-Hour Average $PM_{2.5}$
With Action and Incremental Concentration (µg/m^3) – Proposed Project

Analysis Site	Location	No Action	With Action	Maximum Increment	Criterion
1	Eleventh Ave and West 33rd St	-	-	3.87	8.6[(1)]
		21.5[(2)]	23.77[(2)]	-	35[(3)]
2	Eleventh Ave and West 30th St	-	-	2.88	8.6[(1)]
		21.74[(2)]	23.31[(2)]	-	35[(3)]
3	Tenth Ave and West 30th St	-	-	2.51	8.6[(1)]
		23.59[(2)]	24.85[(2)]	-	35[(3)]

Notes:
[(1)] $PM_{2.5}$ *de minimis* criterion—24-hour average, not to exceed more than half the difference between the background concentration (17.8 µg/m^3) and the 24-hour standard of 35 µg/m^3.
[(2)] The 24-hour $PM_{2.5}$ concentration presented represents the maximum of the total 98th percentile. Concentrations presented include a background concentration of 17.8 µg/m^3.
[(3)] NAAQS.

Table 15-15
Maximum Predicted 24-Hour Average $PM_{2.5}$ With Action and Incremental Concentration ($\mu g/m^3$)—Alternative Scenario

Analysis Site	Location	No Action	With Action	Maximum Increment	Criterion
1	Eleventh Ave and West 33rd St	-	-	3.19	8.6[1]
		21.5[2]	23.54	-	-
2	Eleventh Ave and West 30th St	-	-	2.32	8.6[1]
		21.74 [2]	23.03 [2]	-	35[3]
3	Tenth Ave and West 30th St	-	-	2.09	8.6[1]
		23.59[2]	24.63	-	-

Notes:
[1] $PM_{2.5}$ *de minimis* criterion—24-hour average, not to exceed more than half the difference between the background concentration (18.5 $\mu g/m^3$) and the 24-hour standard of 35 $\mu g/m^3$.
[2] The 24-hour $PM_{2.5}$ concentration presented represents the maximum of the total 98th percentile. Concentrations presented include a background concentration of 17.8 $\mu g/m^3$.
[3] NAAQS.

The results show that the 24-hour $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion and total concentrations are below the NAAQS at each of the analysis sites.

Neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 15-16 and 15-17** for the Proposed Project and Alternative Scenario, respectively.

Table 15-16
Maximum Predicted Annual Average $PM_{2.5}$ With Action and Incremental Concentration ($\mu g/m^3$)—Proposed Project

Analysis Site	Location	No Action	With Action	Maximum Increment	Criterion
1	Eleventh Ave and West 33rd St	-	-	0.19	0.1[1]
		7.81 [2]	8.00 [2]	-	9[3]
2	Eleventh Ave and West 30th St	-	-	0.24	0.1[1]
		7.93 [2]	8.17 [2]	-	9[3]
3	Tenth Ave and West 30th St	-	-	0.25	0.1[1]
		8.26 [2]	8.47 [2]	-	9[3]

Notes:
[1] $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 $\mu g/m^3$.
[2] Concentrations presented include a background concentration of 7.6 $\mu g/m^3$.
[3] NAAQS.

Table 15-17
Maximum Predicted Annual Average $PM_{2.5}$ With Action and Incremental Concentration ($\mu g/m^3$)—Alternative Scenario

Analysis Site	Location	No Action	With Action	Maximum Increment	Criterion
1	Eleventh Ave and West 33rd St	-	-	0.08	0.1[1]
		7.85	7.93	-	9[3]
2	Eleventh Ave and West 30th St	-	-	0.11	0.1[1]
		7.99[2]	8.07[2]	-	9[3]
3	Tenth Ave and West 30th St	-	-	0.02	0.1[1]
		8,40	8.40	-	9[3]

Notes:
[1] $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 $\mu g/m^3$.
[2] Concentrations presented include a background concentration of 7.6 $\mu g/m^3$.
[3] NAAQS.

As shown in **Table 15-16**, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criteria at each of the analysis sites for the Proposed Project and as shown In **Table 15-17**, one of the analysis sites for the Alternative Scenario. This would be considered a significant adverse air quality impact in the absence of traffic mitigation measures. Therefore, traffic mitigation measures were examined to avoid any potential significant impacts at these intersection locations. Mitigation measures are discussed in Chapter 22, “Mitigation.”

Between the Draft and Final EIS, additional review and evaluation will be performed which is expected to determine that the identified impacts related to mobile source annual $PM_{2.5}$ increments will be avoided. This will include performing additional modeling of $PM_{2.5}$ concentrations (Grid Analysis) using more refined or comprehensive analysis procedures to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources. It is anticipated that this additional measure will show that $PM_{2.5}$ concentrations are below the annual *de minimis* criterion threshold.

PARKING ANALYSIS

Proposed Parking Facilities

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facilities at Sites A and C were analyzed. The analysis for Site A was performed assuming a near side sidewalk receptor (at a distance of 7 feet) as the parking facility, and a far side sidewalk receptor on the opposite side of the street from the parking facility. For Site C, an elevated receptor at the same height as the exhaust was assumed, at a minimum distance of 10 feet.

The maximum predicted eight-hour average CO and $PM_{2.5}$ concentrations of all the receptors modeled for the analyzed parking garage are presented in **Tables 15-18 and 15-19** for the Proposed Project and Alternative Scenario, respectively.

Table 15-18
Maximum Predicted Concentrations from the Parking Garages—Proposed Project

Pollutant	Averaging Period	Receptor with Maximum Concentration	Garage Contribution	On Street Contribution	Background	Total Concentration	Criterion
Site A							
CO	1-Hour	Building Receptor	0.17	N/A	2.5	2.67	35 ppm
	8-Hour	Building Receptor	0.09	N/A	1.20	1.29	9 ppm
$PM_{2.5}$	24-Hour	Building Receptor	0.065	N/A	N/A	0.065	8.6 $\mu g/m^3$
	Annual	Building Receptor	0.010	N/A	N/A	0.010	0.3 $\mu g/m^3$
Site C							
CO	1-Hour	Elevated Exhaust Receptor	1.02	N/A	2.5	3.50	35 ppm
	8-Hour	Elevated Exhaust Receptor	0.64	N/A	1.20	1.84	9 ppm
$PM_{2.5}$	24-Hour	Elevated Exhaust Receptor	0.39	N/A	N/A	0.39	8.6 $\mu g/m^3$
	Annual	Elevated Exhaust Receptor	0.064	N/A	N/A	0.064	0.3 $\mu g/m^3$
Note: The annual average $PM_{2.5}$ de minimis criterion is 0.3 $\mu g/m^3$.							

Table 15-19
Maximum Predicted Concentrations
from the Parking Garages—Alternative Scenario

Pollutant	Averaging Period	Receptor with Maximum Concentration	Garage Contribution	On Street Contribution	Background	Total Concentration	Criterion
Site A							
CO	1-Hour	Building Receptor	0.17	N/A	2.5	2.67	35 ppm
	8-Hour	Building Receptor	0.09	N/A	1.2	1.29	9 ppm
$PM_{2.5}$	24-Hour	Building Receptor	0.065	N/A	N/A	0.065	8.6 µg/m^3
	Annual	Building Receptor	0.010	N/A	N/A	0.010	0.3 µg/m^3
Site C							
CO	1-Hour	Elevated Exhaust Receptor	0.89	N/A	2.5	3.41	35 ppm
	8-Hour	Elevated Exhaust Receptor	0.34	N/A	1.2	1.54	9 ppm
$PM_{2.5}$	24-Hour	Elevated Exhaust Receptor	0.15	N/A	N/A	0.15	8.6 µg/m^3
	Annual	Elevated Exhaust Receptor	0.028	N/A	N/A	0.028	0.3 µg/m^3
Note: The annual average $PM_{2.5}$ de minimis criterion is 0.3 µg/m^3.							

As shown in the tables, the maximum predicted CO concentrations are substantially below the 1-hour and 8-hour standards of 35 ppm and 9 ppm, respectively, and the maximum predicted 8-hour concentration is below the *de minimis* CO criteria.

In addition, the maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 8.6 µg/m^3 for the 24-hour average concentration and 0.3 µg/m^3 for the annual average concentration. Therefore, the proposed parking facilities on the Development Site would not result in any significant adverse air quality impacts.

Existing Parking Facility

The maximum predicted CO and PM concentrations from the existing parking facility were analyzed, as shown in **Table 15-20**.

Table 15-20
Maximum Predicted Concentrations
from the Existing Jacob Javits Convention Center Parking Lot

Pollutant	Averaging Period	Parking Lot Contribution	On Street Contribution	Background	Total Concentration	NAAQS
Proposed Project						
CO	1-Hour	0.010	0.15	2.5	2.66	35 ppm
	8-Hour	0.0025	0.14	1.2	1.34	9 ppm
$PM_{2.5}$	24-Hour	0.14	7.42	17.8	25.4	35 µg/m^3
	Annual	0.036	0.98	7.6	8.6	9 µg/m^3
Alternative Scenario						
CO	1-Hour	0.010	0.13	2.5	2.64	35 ppm
	8-Hour	0.0042	0.10	1.2	1.3	9 ppm
$PM_{2.5}$	24-Hour	0.14	3.28	17.8	21.2	35 µg/m^3
	Annual	0.036	0.54	7.6	8.17	9 µg/m^3

As shown in the table, the maximum predicted CO and $PM_{2.5}$ concentrations are below the NAAQS. Therefore, the existing parking facility would result in any significant adverse air quality impacts on the Development Site.

STATIONARY SOURCES

DEVELOPMENT SITE GENERATORS

As described previously, a refined dispersion modeling analysis of potential fossil fuel-fired demand response engines was prepared. **Tables 15-21 and 15-22** present the maximum predicted concentrations from the Proposed Project's demand response engines on the Development Site and off-site locations, respectively. **Tables 15-23 and 15-24** present the maximum predicted concentrations from the demand response engines under the Alternative Scenario on the Development Site and off-site locations, respectively.

Table 15-21
Maximum Modeled Pollutant Concentrations on the Development Site from Demand Response Engines—Proposed Project ($\mu g/m^3$)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background	Total Concentration	Criterion
NO_2	1-hour	(1)	N/A	120.4	188(2)
	Annual	0.42	32.8	33.2	100
PM_{10}	24-Hour	2.5	36.0	38.5	150
$PM_{2.5}$	24-hour	2.45	N/A	2.45	8.6 (3)
	Annual	0.05	N/A	0.05	0.3(4)
SO_2	1-Hour	0.6	14.6	15.2	196

Notes: N/A – Not Applicable
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) NAAQS
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 $\mu g/m^3$
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor)

Table 15-22
Maximum Modeled Pollutant Concentrations on Off-Site Locations from Demand Response Engines—Proposed Project ($\mu g/m^3$)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background	Total Concentration	Criterion
NO_2	1-hour	(1)	N/A	156.7	188(2)
	Annual	0.31	32.8	33.1	100
PM_{10}	24-Hour	4.1	36.0	40.1	150
$PM_{2.5}$	24-hour	3.96	N/A	3.96	8.6 (3)
	Annual	0.05	N/A	0.05	0.3(4)
SO_2	1-Hour	1.3	14.6	15.9	196

Notes: N/A – Not Applicable
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 $\mu g/m^3$.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

Table 15-23
Maximum Modeled Pollutant Concentrations on the Development Site from Demand Response Engines—Alternative Scenario (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background	Total Concentration	Criterion
NO_2	1-hour	(1)	N/A	115.3	188(2)
	Annual	0.11	32.8	32.9	100
PM_{10}	24-Hour	1.8	36.0	37.8	150
$PM_{2.5}$	24-hour	1.78	N/A	1.78	8.7 (3)
	Annual	0.04	N/A	0.04	0.3(4)
SO_2	1-Hour	0.5	14.6	15.1	196

Notes: N/A – Not Applicable
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 μg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

Table 15-24
Maximum Modeled Pollutant Concentrations on Off-Site Locations from Demand Response Engines—Alternative Scenario (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background	Total Concentration	Criterion
NO_2	1-hour	(1)	N/A	175.4	188(2)
	Annual	0.14	32.8	32.9	100
PM_{10}	24-Hour	3.9	36.0	39.9	150
$PM_{2.5}$	24-hour	3.82	N/A	3.82	8.7 (3)
	Annual	0.05	N/A	0.05	0.3(4)
SO_2	1-Hour	1.4	14.6	16.0	196

Notes: N/A – Not Applicable
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO^2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 μg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

As shown in the tables, all predicted pollutant concentrations are less than the applicable impact criteria. Therefore, there would be no potential for significant adverse air quality impacts from the proposed demand response engines under the Proposed Project or the Alternative Scenario.

Based on the results of the conservative refined modeling analysis of the proposed demand response engines, a number of measures would be needed to avoid the potential for significant adverse impact on air quality as described in Section H, "Proposed Air Quality Requirements in Amended Restrictive Declaration" below. These restrictions were assumed in the analysis results presented in **Tables 15-21 through 15-24** and would avoid the potential for significant air quality impacts from stationary sources based on the conservative assumptions used in the analysis. All requirements would be implemented through an amendment to Restrictive Declaration (R-230). These requirements would supersede the requirements previously set forth for air quality in the Restrictive Declaration.

ADDITIONAL SOURCES

The potential stationary source impacts on the Development Site from the permitted 20 Hudson Yards Facility were determined using the AERMOD model. The maximum estimated concentrations from the modeling were added to the background concentrations to estimate total air quality concentrations. The results of the AERMOD analysis are presented in **Table 15-25 and 15-26** for the Proposed Project and Alternative Scenario, respectively.

Table 15-25
Maximum Modeled Pollutant Concentrations
From 20 Hudson Yards Facility—Proposed Project ($\mu g/m^3$)

Pollutant	Averaging Period	Maximum Modeled Impact[2]	Maximum Background Concentration	Total Concentration	NAAQS
NO_2	1-Hour[1]	N/A	N/A	169.4	188
	Annual	1.55	32.8	34.3	100
PM_{10}	24-hour	1.0	36.0	37.0	150
$PM_{2.5}$	24-hour	0.80	17.8	18.6	35
	Annual	0.11	7.6	7.7	9
SO_2	1-Hour	2.0	14.6	16.6	196

Notes:
[1] The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
[2] The concentrations presented are the results with restrictions outlined in Section H, “Proposed Air Quality Requirements in Amended Restricted Declaration.”

Table 15-26
Maximum Modeled Pollutant Concentrations
From 20 Hudson Yards Facility—Alternative Scenario ($\mu g/m^3$)

Pollutant	Averaging Period	Maximum Modeled Impact[2]	Maximum Background Concentration	Total Concentration	NAAQS
NO_2	1-Hour[1]	N/A	N/A	184.7	188
	Annual	1.4	32.8	34.2	100
PM_{10}	24-hour	1.2	36.0	37.2	150
$PM_{2.5}$	24-hour	1.02	17.8	18.8	35
	Annual	0.20	7.6	7.8	9
SO_2	1-Hour	3.3	14.6	17.9	196

Notes:
[1] The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
[2] The concentrations presented are the results with restrictions outlined in Section H, “Proposed Air Quality Requirements in Amended Restricted Declaration.”

As shown in the tables, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective NAAQS. Therefore, no significant adverse air quality impacts on the Development Site under the Proposed Project or the

Alternative Scenario from the existing sources at the 20 Hudson Yards Facility are predicted.

To ensure that there are no potential significant adverse air quality impacts, certain restrictions would be required as part of the Proposed Actions. These restrictions were assumed in the analysis results presented in **Tables 15-25 and 15-26** and would avoid the potential for significant air quality impacts on the Development Site from existing stationary sources based on the conservative assumptions used in the analysis. The restrictions are outlined in Section H and would be specified in Restrictive Declaration (R-230), which would be amended for the Proposed Actions.

CUMULATIVE EMISSIONS ASSESSMENT

The potential cumulative effects of the proposed emission sources on the Development Site (including the LIRR platform ventilation system) and the existing 20 Hudson Yards Facility were determined using the AERMOD model. The maximum estimated concentrations from the modeling were added to the background concentrations to estimate total air quality concentrations.

The results of the AERMOD analysis determined that at receptors on the Development Site (with the exception of Site C), no significant adverse air quality impacts are predicted from existing and proposed stationary sources in the area. The results of the AERMOD analysis furthermore demonstrated that at off-site locations, no violations of the 1-hour NO_2 NAAQS are attributable to the Proposed Actions. Therefore, it can be concluded that the Proposed Actions would not result in any significant adverse air quality effects when considering cumulative effects of existing and proposed emission sources in the area.

Restrictions would be required to avoid the potential for significant air quality impacts from existing and proposed stationary sources based on the conservative assumptions used in the analysis. These restrictions are outlined in Section H, “Proposed Air Quality Requirements in Amended Restrictive Declaration,” and would be specified in Restrictive Declaration (R-230), which would be amended for the Proposed Actions.

Maximum concentrations from the LIRR ventilation exhaust system are predicted to occur on Site C podium locations closest to the exhaust. These concentrations, which require further evaluation and refinement, would potentially constitute a significant adverse impact on air quality. However, design modifications, including restrictions on the location of air intakes and operable windows on the Building C podium, could preclude the potential for any significant adverse impact associated with the LIRR ventilation exhaust system. Between the Draft and Final EIS, further evaluation and refinement will be performed to confirm this finding. As necessary, based on this review, measures, such as building design modifications, would be developed and implemented by the Applicant to eliminate or address any significant adverse impact associated with emissions from the LIRR ventilation exhaust system. See Chapter 22, "Mitigation."

H. PROPOSED AIR QUALITY REQUIREMENTS IN AMENDED RESTRICTIVE DECLARATION

Based on the results of the conservative modeling analysis performed for the demand response engines, a number of measures would be needed to avoid the potential for significant adverse impact on air quality. All requirements would be implemented through an amendment to Restrictive Declaration R-230. These requirements would supersede the requirements previously set forth in this Restrictive Declaration based on the 2009 FEIS. The requirements specified in the amended Restrictive Declaration would be as follows:

DEVELOPMENT SITE (BLOCK 676, LOTS 1 AND 5)

PROPOSED PROJECT

Site A

Any new residential or commercial development shall utilize only electrically powered heating, and hot water systems, to avoid any potential significant adverse air quality impacts. Fossil fuel-fired engines installed for the building shall not be enrolled in a demand response program.

Site B

Any new residential or commercial development shall utilize only electrically powered heating, and hot water systems, to avoid any potential significant adverse air quality impacts. The maximum enrolled capacity for diesel-powered demand response engines shall be limited to 3.0 megawatts (MW), and the exhaust stacks would be located on the west façade at a minimum height of 45 feet above grade, and at least 65 feet from the lot line facing West 30th Street.

Site C

Any new residential or commercial development shall utilize only electrically powered heating, and hot water systems, to avoid any potential significant adverse air quality impacts.

To preclude the potential for significant adverse air quality impacts from the boilers and engines at the 20 Hudson Yards Facility, no operable windows or air intakes on the eastern façade of the Site C podium would be permitted between a height of 180 feet and 200 feet above grade and a portion of the south façade within 68 feet of the lot line facing 11th Avenue at a height of 200 feet above grade.

Site C Podium Generators: The maximum enrolled capacity for the diesel-powered demand response engines shall be limited to 2.3 megawatt (MW), and the exhaust stacks would be located on the southern façade at a minimum height of 72 feet above grade, and at least 10 feet from the lot line facing Eleventh Avenue.

Site C Tower Generators: The maximum enrolled capacity for the diesel-powered demand response engines shall be limited to 2.3 megawatt (MW), and the exhaust stacks would be located on the northern façade at a minimum height of 72 feet above grade, at least 571 feet from the lot line facing Eleventh Avenue.

ALTERNATIVE SCENARIO

Site A: Any new residential or commercial development shall utilize only electrically powered heating, and hot water systems, to avoid any potential significant adverse air quality impacts.

Site B: Any new residential or commercial development shall utilize only electrically powered heating, and hot water systems, to avoid any potential significant adverse air quality impacts. The maximum enrolled capacity for diesel-powered demand response engines shall be limited to 9.0 3.0 megawatt (MW), and the exhaust stacks would be located on the west façade at a minimum height of 45 feet above grade, and at least 60 feet from the lot line facing West 30th Street.

Site C: Any new residential or commercial development shall utilize only electrically powered heating, and hot water systems, to avoid any potential significant adverse air quality impacts.

To preclude the potential for significant adverse air quality impacts from the boilers and engines at the 20 Hudson Yards Facility, no operable windows or air intakes would be permitted on the eastern façade of the Site C podium between a height of 175 feet and 200 feet above grade, and for the Site C Office Tower on the southern façade between 205 feet and 245 feet, and eastern façade between 205 feet and 235 feet, and upper floors between 1,045 feet and 1,065 feet.

Site C Podium Generators: The maximum enrolled capacity for the diesel-powered demand response engines shall be limited to 2.3 megawatt (MW), and the exhaust stacks would be located on the southern façade at a minimum height of 72 feet above grade, and at least 10 feet from the lot line facing Eleventh Avenue.

Site C, Tower C-2: The maximum enrolled capacity for the diesel-powered demand response engines shall be limited to 2.3 megawatt (MW), and the exhaust stacks would be located on the northern façade at a height of 72 feet above grade, and at least 457 feet from the lot line facing Eleventh Avenue. ✷