Chapter 15: Air Quality

A. INTRODUCTION

This chapter examines the potential for the proposed actions to result in significant adverse air quality impacts. As described in Chapter 1, "Project Description," and Chapter 2, "Analytical Framework," in the future with the proposed actions (the With Action condition), the Project Area would be redeveloped with two new mixed-use buildings on two project sites (project site A—601 West 29th Street and project site B—606 West 30th Street). The Project Area includes these two project sites as well as an intervening lot (Lot 38), which ~~is not~~may be part of ~~either~~ project site B and~~but~~ is assumed to be redeveloped for the purposes of environmental review. The Project Area would be rezoned and included in the Special Hudson River Park District. Overall, it is assumed that the Project Area would contain residential apartments, retail, accessory parking, and a public facility (potentially a Fire Department of the City of New York-Emergency Medical Service [FDNY-EMS] Station). In addition, the analyses presented in this chapter reflect a slight shift eastward (7.5 feet) of the tower portion of the building proposed on project site B, as per the alignment proposed in the A-Application for project site B (see Chapter 1, "Project Description" and Chapter 2, "Analytical Framework").

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 heat and hot water systems, or emissions from parking garage ventilation systems. Indirect impacts are caused by off-site emissions associated with a project, such as emissions from nearby existing stationary sources (impacts on the development site) or by emissions from on-road vehicle trips ("mobile sources") generated by the proposed actions or other changes to future traffic conditions due to a project.

The maximum hourly incremental traffic volumes generated by the proposed actions would not exceed the 2014 *City Environmental Quality Review* (*CEQR*) *Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at a single intersection in the study area. In addition, project generated volumes would not exceed the particulate matter (PM) emission screening thresholds discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. However, the proposed actions would include parking facilities for project site A and project site B. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations from the proposed parking facilities.

Since portions of the Project Area are within areas zoned for manufacturing uses, the potential for impacts from existing industrial sources was assessed.

Boilers would provide space heating and domestic hot water to the proposed projects. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed actions on both the surrounding neighborhood (project-on-existing) and the proposed projects (project-on-project).

In addition, potential effects from large and major sources of emissions in the study area on the proposed projects were evaluated.

PRINCIPAL CONCLUSIONS

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 potential significant adverse air quality impacts from industrial sources would occur with the proposed actions.

The analysis of the parking facilities to be developed as part of the proposed actions determined that there would not be any significant adverse air quality impacts with respect to CO and PM emissions.

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from fossil fuel-fired heat and hot water systems as well as the potential cogeneration system. However, restrictions through the mapping of an (E) Designation (E-455) for air quality on the Project Area (Block 675 Lots 12[1] [formerly Lots 12, 29, and 36], 38, and 39) regarding fuel type, exhaust stack location, and equipment technology for both project site A and B would be necessary to ensure that emissions from fossil fuel-fired systems would not result in any significant air quality impacts.

An analysis of the full build out of the Eastern Rail Yards project—permitted as the 20 Hudson Yards Facility—determined that there would be no potential for significant adverse air quality impacts on the proposed projects from this emissions source. Furthermore, as discussed in the Hudson Tunnel DEIS, maximum $PM_{2.5}$ concentrations are predicted to exceed the 24-hour and annual average $PM_{2.5}$ *de minimis* criteria during the most intense stages of construction at sidewalk locations along Twelfth Avenue, the western portions of West 30th Street and West 29th Streets, and along portions of building façades below 25 feet above grade on the project sites. An assessment of the Hudson Tunnel Project showed that no significant adverse air quality impacts on air quality receptor locations on either project sites A or B from the construction of the Hudson Tunnel Project are predicted.

B. POLLUTANTS FOR ANALYSIS

Ambient 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 (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 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

[1] Since the publication of the DEIS, Lots 12, 29, and 36 have been formally merged into a single lot, Lot 12. However, in the interest of continuity and clarity, the FEIS continues to refer to Lots 12, 29, and 36.

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, 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 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 predicted on a local, or microscale, basis.

The proposed actions would not result in an increase in vehicle trips higher than the *CEQR Technical Manual* screening threshold of 170 trips at any intersection. Therefore, a mobile source analysis to evaluate future CO concentrations was not warranted. However, an assessment of CO impacts from the parking garages included in the proposed actions was conducted.

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. Therefore, the effects of NOx and VOC emissions from all sources are 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 proposed actions-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 point sources, and is not a local concern from mobile sources. (NO_x emissions from fuel combustion are typically greater than 90 percent NO with the remaining fraction primarily NO_2 at the source.)[2] However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as mobile sources have become of greater concern for this pollutant. The proposed actions would include natural gas-fired heating and hot water systems at project site A and project site

[2] EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources,* Section 1.3, Table 1.3-1.

B;[3] therefore, emissions of NO_2 from the stationary sources as part of the proposed actions were analyzed.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA, and therefore, lead is not a pollutant of concern for the proposed actions; therefore, an analysis of this pollutant from stationary or mobile sources is 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 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, construction and agricultural activities, and wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers, or $PM_{2.5}$, 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 directly emitted from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles. The proposed actions would not result in any significant increases in truck traffic near the Project Area or in the region or other potentially significant increase in $PM_{2.5}$ vehicle emissions as defined in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual.* Therefore, an analysis of potential mobile source impacts of PM from the proposed actions was

[3] Lot 38 would be rezoned and included in the Special Hudson River Park District. ~~There is no development proposed at this site however,~~ For the purposes of environmental review, ~~its~~ the potential for Lot 38 to be redeveloped under the proposed rezoning is conservatively assumed as part of the project site B heating and hot water system.

not warranted. However, an analysis of $PM_{2.5}$ from the potential parking as part of the proposed actions was conducted.

The proposed actions would include natural gas-fired heating and hot water systems; therefore, emissions of PM from the stationary sources as part of the proposed actions were analyzed.

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 vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant, and, therefore, an analysis of SO_2 from mobile sources is not warranted.

Natural gas would be used as part of the proposed actions' heating and hot water systems. The sulfur content of natural gas is negligible; therefore, no SO_2 analysis was required.

AIR TOXICS

In addition to the criteria pollutants discussed above, non-criteria air pollutants, also called air toxics, may be of concern. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by EPA.

Federal ambient air quality standards do not exist for non-criteria pollutants; however, the New York State Department of Environmental Conservation (DEC) has issued standards for certain non-criteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed guideline concentrations for numerous non-criteria pollutants. The DEC guidance document DAR-1 (July 2016) contains a compilation of annual and short-term (1-hour) guideline concentrations for these compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to non-criteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

As the Project Area is located within 400 feet of a manufacturing zoned district, potential impacts from industrial emissions on the proposed projects were evaluated.

C. AIR QUALITY STANDARDS, REGULATIONS AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established 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 and secondary standards are the same for NO_2 (annual), ozone, lead, and PM, and there is no secondary standard for CO and the 1-hour NO_2 standard. The NAAQS are presented in **Table 15-1**. The NAAQS for CO, annual NO_2, and SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running

12-month basis rather than for calendar years only. New York State also has standards for total suspended PM, settleable particles, non-methane hydrocarbons, and ozone that correspond to federal standards that have since been revoked or replaced, and for beryllium, fluoride, and hydrogen sulfide.

EPA lowered the primary annual average $PM_{2.5}$ standard from 15 µg/m^3 to 12 µg/m^3, effective March 2013.

The 8-hour ozone standard of 0.075 parts per million (ppm) is effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December 2015, EPA further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070. EPA expects to issue final area designations by October 1, 2017; those designations likely would be based on 2014–2016 air quality data.

EPA lowered the primary and secondary standards for lead to 0.15 µg/m^3, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

Table 15-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
8-Hour Average	9[(1)]	10,000	None	
1-Hour Average	35[(1)]	40,000		
Lead				
Rolling 3-Month Average[(2)]	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average[(3)]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average[(4,5)]	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average[(1)]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean[(6)]	NA	12	NA	15
24-Hour Average[(7)]	NA	35	NA	35
Sulfur Dioxide (SO_2)[(8)]				
1-Hour Average[(9)]	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/m^3 – 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/m^3 are presented.
(1) Not to be exceeded more than once a year.
(2) EPA has lowered the NAAQS down from 1.5 µg/m3, effective January 12, 2009.
(3) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
(4) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(5) EPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
(6) 3-year average of annual mean. USEPA has lowered the primary standard from 15 µg/m3, effective March 2013.
(7) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(8) EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
(9) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

EPA established a new 1-hour average NO_2 standard of 0.100 ppm, effective April 10, 2010, in addition to the current annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA also established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of the daily maximum 1-hour average concentration (the 4th highest daily maximum corresponds approximately to 99th percentile for a year).

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

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 City is committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

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

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties which 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) was redesignated as in attainment for the standard on April 18, 2014, and is now under a maintenance plan. As stated above, 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 new 12 $\mu g/m^3$ NAAQS, effective April 15, 2015.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties as in moderate nonattainment for the 1997 8-hour average ozone standard. In March 2008, EPA strengthened the 8-hour ozone standards. EPA designated these same areas as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, as requested by New York State, EPA reclassified the area as a moderate NAA. New York State has begun submitting SIP documents in December 2014. The state is expected to be able to meet its SIP obligations for both the 1997 and 2008 standards by satisfying the requirements for a moderate attainment plan for the 2008 ozone NAAQS.

New York City is currently in attainment of the annual average NO_2 standard. EPA has designated the entire state of New York as “unclassifiable/attainment” for the new 1-hour NO_2

standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available.

EPA has established a new 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties currently meet the 1-hour standard. In January 2017, New York State recommended that EPA designate most of State of New York, including New York City, as in attainment for this standard; the remaining areas will be designated upon the completion of required monitoring by December 31, 2020.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[4] In terms of the magnitude of air quality 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, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, 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 8.0 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

For projects subject to CEQR, the *de minimis* criteria currently employed for determination of potential significant adverse $PM_{2.5}$ impacts are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard; or

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

- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.1 µg/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 that are predicted to be greater than 0.3 µg/m^3 at a discrete or ground level receptor location.

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the CEQR *de minimis* criteria above 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 on $PM_{2.5}$ concentrations and determine the need to minimize particulate matter emissions resulting from the proposed actions.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

PARKING FACILITIES

The proposed actions would include a parking facility at both project site A and project site B. Emissions from vehicles using the parking facilities could potentially affect ambient levels of pollutants at adjacent receptors. Since the parking facilities would be used by automobiles, the primary pollutants of concern are CO and PM (both $PM_{2.5}$ and PM_{10}). An analysis was performed of the emissions from the outlet vents and their dispersion in the environment to calculate pollutant levels in the surrounding area, using the methodology set forth in the *CEQR Technical Manual*. Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOVES mobile source emission model as referenced in the *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. The concentration of CO and PM within the garages was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of 1 cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

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 CO and PM concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

The 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 enter and exit the facilities (PM concentrations were determined on a 24-hour and annual average basis).

Traffic data for the parking garage analysis were derived from the trip generation analysis, described in Chapter 14, "Transportation."

The proposed parking garages would be located on the western portion of project site A and on the lower levels of project site B. Since design information regarding the garages' mechanical ventilation system is not yet available, the worst-case assumption was used that the air from each of the proposed parking garages would be vented through a single exhaust. The ventilation exhausts for project site A and B were assumed to be located on the building façades facing West 29th Street and West 30th Street, respectively. The vent faces were modeled to directly discharge at a height of approximately 10 feet above grade. "Near" and "far" receptors were placed along the sidewalks at a pedestrian height of 6 feet at a distance of approximately five feet from the vent and "far" receptors were places at a distance of approximately 40 feet and 50 feet from the vent, for project site A and project site B respectively. In addition, receptors were placed on the building façade at a height of six feet above the vent. A persistence factor of 0.77 was used to convert the calculated 1-hour average maximum CO concentrations to an 8-hour average, accounting for meteorological variability over the longer averaging periods, as referenced in the *CEQR Technical Manual*, while persistence factors of 0.6, and 0.1 were used for the $PM_{2.5}$ 24-hour and annual average concentrations, respectively.[5]

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels of CO and PM_{10}.

Vehicle Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOVES2014a.[6] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (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.

Vehicle classification data were based on field studies. Appropriate credits were used to accurately reflect the inspection and maintenance program. 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.

County-specific hourly temperature and relative humidity data obtained from DEC were used.

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

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[5] EPA, AERSCREEN User Guide, July 2015.

[6] EPA, Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014a, November 2015.

The background concentrations for the nearest monitored location for each pollutant are presented in **Table 15-2**. CO concentrations are based on the latest available five years of monitored data (2012–2016). Consistent with the NAAQS, the second-highest value was used. These values were used as the background concentrations for the mobile source analysis.

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

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY, Manhattan	2.3 ppm	35 ppm
	8-hour		1.5 ppm	9 ppm
PM_{10}	24-hour	Division Street, Manhattan	44 µg/m^3	150 µg/m^3
$PM_{2.5}$	24-hour	PS 19, Manhattan	24.2 µg/m^3	35 µg/m^3

Note: Values are the highest of the latest 5 years.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012–2016.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from heating and hot water systems associated with the two proposed projects. In addition to these sources, project site A may include a gas-fired cogeneration system that would be used at all times to power common areas and, during power outages, to provide standby power to common areas.

An assessment was also conducted to determine the potential for impacts due to industrial activities in the surrounding area, and from any nearby large emission sources.

HEATING AND HOT WATER/COGENERATION SYSTEMS

Stack exhaust parameters and emission estimates for the project site A heating and hot water systems and potential cogeneration system were conservatively estimated based on a conceptual level of design. Based on design information, project site A would have eight 5 MMBtu/hr boilers. The potential cogeneration system at project site A would include two (2) 100 kilowatt (kW) units.

Short-term emissions were determined based on conservatively assuming all eight boilers would operate continuously at 85 percent load, which is approximately equivalent to seven boilers operating at 100 percent, with one unit as a spare, and assuming the cogeneration system runs with the two units at 100 percent load. Annual boiler equipment fuel usage for the project site A was obtained using a conceptual design estimate for the proposed building, and assuming the cogeneration system runs continuously at 100 percent load throughout the year.

The exhaust stack for the project site B heating and hot water systems would be exhaust at a height that would exceed the envelop height of the proposed zoning envelop of the 36-story portion of project site A to the south. Since design information was not yet available for project site B, annual fuel usage for the project site B heating and hot water systems were based on the size (in gross square feet [sf]) and type of development, based on the factor referenced in the *CEQR Technical Manual*. As discussed previously, it was conservatively assumed that the development program for project site B would include Lot 38. Short-term emissions were conservatively estimated assuming a 100-day heating season.

Emissions rates for the heating and hot water systems were calculated based on emissions factors obtained from the EPA *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition,* *Volume I: Stationary Point and Area Sources*. PM_{10} and $PM_{2.5}$ emissions include both the filterable and condensable fractions. **Tables 15-3 and 15-4** present the stack parameters and emission rates used for analysis of the proposed projects' heating and hot water systems and the potential cogeneration system for project site A, respectively.

Table 15-3
Heating and Hot Water Systems
Stack Parameters and Emission Rates

Parameter		Proposed Project Sites: Project Site A	Proposed Project Sites: Project Site B[3]
Building Size (gsf)[4]		960,000	295,840
Building Height (ft)		700	529/579[6]
Boiler Capacity (MMBtu/hr)[2]		40.0	6.28
Stack Exhaust Temp. (°F)		307	307
Stack Exhaust Height (ft)		677	532/582[6]
Height Above Roof (ft)		6	3
Stack Exhaust Diameter (ft)		3.3	1.5[7]
Stack Exhaust Flow (ACFM)[1][8]		8,219	1,289
Stack Exhaust Velocity (ft/s)[8]		16.0	12.2
Fuel Type		**Natural Gas**	**Natural Gas**
Short-term Emission Rates:			
g/s[5]	NO_x	1.56×10^{-1}	3.22×10^{-2}
	PM_{10}	2.08×10^{-2}	6.62×10^{-3}
	PM_{25}	2.08×10^{-2}	6.62×10^{-3}
Annual Emission Rates:			
g/s	NO_x	2.78×10^{-2}	8.83×10^{-3}
	PM_{25}	5.70×10^{-3}	1.81×10^{-3}

Notes:
(1) ACFM = actual cubic feet per minute.
(2) British Thermal Units, or BTUs, are a measure of energy used to compare consumption of energy from different sources, such as gasoline, electricity, etc., taking into consideration how efficiently those sources are converted to energy. One BTU is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree.
(3) Lot 38 would be rezoned and included in the Special Hudson River Park District. ~~There is no development proposed at this site however,~~ For the purposes of environmental review, ~~its~~ the potential for Lot 38 to be redeveloped under the proposed rezoning is conservatively considered as part of the project site B system.

Reference:
(4) The square footage for each building was estimated based on the breakdown provided in the ULURP application on the zoning square footage for each of the buildings, and the total gross square footage for each of the project components.
(5) Emission factors were based on EPA AP-42 data.
(6) Both the illustrative building height and maximum potential building height for project site B were modeled to assess the worst-case scenario of stack height. In terms of project-on-project and project-on-existing/no build developments, respectively.
(7) The stack diameter was based on data obtained from a survey of New York City boilers from buildings of a similar size.
(8) The stack exhaust flow rate was estimated based on the type of fuel and heat input rates.

Table 15-4
Project Site A Cogeneration System
Stack Parameters and Emission Rates

Parameter		Project Site A Cogeneration System
Total Capacity (kW)		200
Stack Exhaust Temp. (°F)		307
Stack Exhaust Height (ft)		677
Height Above Roof (ft)		6
Stack Exhaust Diameter (ft)		1.6
Stack Exhaust Flow (ACFM)[(1)(3)]		7.293
Stack Exhaust Velocity (ft/s)[(3)]		56.9
Fuel Type		**Natural Gas**
Short-term Emission Rates:		
g/s[(2)]	NO_x	1.76×10^{-3}
	PM_{10}	8.06×10^{-3}
	PM_{25}	8.06×10^{-3}
Annual Emission Rates:		
g/s	NO_x	1.76×10^{-4}
	PM_{25}	2.21×10^{-3}

Note:
(1) ACFM = actual cubic feet per minute.
References:
(2) $PM_{2.5}$ emission factors are based on EPA AP-42 data and NO_x emission factors are based on equipment specifications.
(3) The stack exhaust flow rate was estimated based on the type of fuel and heat input rates.

AERMOD Analysis

Potential impacts from stationary source emissions were evaluated using a refined dispersion model, the EPA/AMS AERMOD dispersion model (Version 16216 EPA, 2016). 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 and includes updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and handling of terrain interactions.

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability of calculating pollutant concentrations at locations when the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analyses of potential impacts from exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length (with and without building downwash), and elimination of calms.

The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts 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). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to determine the projected building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources accounts for all obstructions within a radius equal to five obstruction heights of the stack.

The analysis was performed both with and without downwash in order to assess the worst case at elevated receptors close to the height of the sources, which would occur without downwash, as well as the worst case at lower elevations and ground level, which would occur with downwash.

Methodology Utilized for Estimating NO_2 Concentrations

Annual NO_2 concentrations from stationary sources were estimated using a NO_2 to NO_x ratio of 0.75, as described in EPA's *Guideline on Air Quality Models* at 40 CFR part 51 Appendix W, Section 5.2.4.[7]

For assessing 1-hour average NO_2 concentrations for compliance with NAAQS, EPA guidance was utilized.[8] Background concentrations are currently monitored at several sites within New York City, which are used for reporting concentrations on a "community" scale. Because this data is compiled on a 1-hour average format, it can be used for comparison with the new 1-hour standards. Therefore, background 1-hour NO_2 concentrations currently measured at the community-scale monitors can be considered representative of background concentrations for purposes of assessing the impact of the proposed projects' stationary sources of emissions.

One-hour average NO_2 concentration increments from the stationary sources were estimated using AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were taken from the DEC Queens College monitoring station that is the nearest ozone monitoring station and had complete five years of hourly data available. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed, which is considered representative.

The results represent the five-year average of the annual 98th percentile of the maximum daily 1-hour average, added to background concentrations (see below).

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at La Guardia Airport (2012–2016), and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Receptor Placement

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors were analyzed and included locations on the proposed project sites as well as other nearby buildings, and at operable windows, air intakes,

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[7] http://www.epa.gov/scram001/guidance/guide/appw_05.pdf.

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

and publicly accessible ground-level locations. The model also included ground-level receptor grids in order to address more distant locations and to identify the highest ground-level impact.

Background Concentrations

To estimate the maximum expected total pollutant concentrations, the calculated impacts from the emission sources must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 15-5**). The background levels are based on concentrations monitored at the nearest DEC ambient air monitoring stations over the most recent three-year period for which data are available (2014–2016), with the exception of NO_2, which is based on five years of data, consistent with current DEP guidance (2012–2016). For the 24-hour PM_{10} concentration the highest second-highest measured values over the specified period were used. $PM_{2.5}$ 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 of 24.2 µg/m^3 (based on the 98th percentile concentrations, averaged over 2014 to 2016) was used to establish the *de minimis* value.

Table 15-5
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-hour	IS 52, Bronx	121.2	188
	Annual	IS 52, Bronx	37.6	100
$PM_{2.5}$	24-hour	PS 19, Manhattan	24.2	35
	Annual	PS 19, Manhattan	10.5	12
PM_{10}	24-hour	Division Street, Manhattan	44	150
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012–2016.				

INDUSTRIAL SOURCES

An investigation was conducted to assess air quality impacts on the proposed projects associated with emissions from nearby industrial sources. Initially, land use and Sanborn maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations.

A search of the New York City Department of Environmental Protection's (DEP) Bureau of Environmental Compliance (BEC) air permits was performed to determine whether manufacturing or industrial emissions occur. In addition, a search of federal and state-permitted facilities within the study area was conducted using the EPA's Envirofacts database.[9] A field survey was conducted to identify buildings within 400 feet of the Project Area that have the potential for emitting air pollutants. The survey was conducted on May 11, 2017. No businesses were found to have a NYSDEC permit or DEP certificate of operation within the surveyed area, and no other potential sources of concern were identified. Therefore, no potential significant adverse air quality impacts from industrial sources would occur with the proposed actions, and no further analysis was warranted.

[9] http://oaspub.epa.gov/enviro/ef_home2.air

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 projected and potential development sites, a review of existing permitted facilities was conducted. Sources of information reviewed included the EPA’s Envirofacts database,[10] the DEC Title V and State Facility Permit websites,[11] the New York City Department of Buildings website, and DEP permit data.

One facility with a State Facility Permit, the full build out of the Eastern Rail Yards project—permitted as the 20 Hudson Yards State Facility[12]—was determined to be within 1,000 feet of the Project Area. The 20 Hudson Yards State Facility is a mixed-use real estate development, currently under construction, consisting of five towers, Tower A, Tower C, a Retail Podium Building, a residential building Tower D, and one mix-use Hotel/Residential building Tower E. The Retail Podium Building would also include a combined heat and power (CHP) plant. Therefore, the potential for air quality impacts on project sites A and B were evaluated using the AERMOD dispersion model discussed above.

Emission rates, stack parameters, and operating assumptions for the 20 Hudson Yards State 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, boiler plants, and engine generators, respectively.

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[10] EPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air

[11] DEC Title V and State Facility permit websites:
http://www.dec.ny.gov/dardata/boss/afs/issued_atv.html;
http://www.dec.ny.gov/dardata/boss/afs/issued_asf.html

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

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

Parameter		Building: Retail Podium CHP	Building: Tower C Microturbines
Building Height (ft)[(2)]		237.8	821.2
Stack Exhaust Temp. (°F)		293	260
Stack Exhaust Height (ft)[(3)]		247.8	821.2
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		Gas	Gas
g/s[(4)]	NO_x (1-hour)	0.097	0.011
	NO_x (Annual)	0.088	0.011
	CO (1-hr and 8-hr)	0.194	0.031
	PM_{10} (24-hour)	0.011	0.001
	$PM_{2.5}$ (24-hour)	0.011	0.001
	$PM_{2.5}$ (Annual)	0.010	0.001
	SO_2 (1-hour and 3-hour)	0.003	0.001

Notes:
(1) ACFM = actual cubic feet per minute.
(2) Building and stack exhaust height is the elevation referenced above datum.
(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 Tower C, 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 State Facility Boiler Stack Parameters and Emission Rates

Parameter		Building: Retail Podium Boilers	Tower A Boilers	Tower C Boilers	Tower D Boilers	Tower E Boilers
Building Height (ft)[(2)]		237.8	1,248.1	821.2	926.6	1070.5
Stack Exhaust Temp. (°F)		300	450	325	230	364
Stack Exhaust Elevation (ft)[(3)]		247.8	1,248.1	821.2	926.6	1070.5
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[(4)]	37.1	44.6
Fuel Type		Gas	Gas	Gas	Gas	Gas
g/s[(4)]	NO_x (1-hour)	0.042[(6)]	0.054	0.045[(5)]	0.037	0.047
	NO_x (Annual)	0.003[(6)]	0.054	0.045[(5)]	0.037	0.047
	CO (1-hour and 8-hour)	0.067	0.091	0.076[(5)]	0.062	0.079
	PM_{10} (24-hour)	0.006	0.009	0.006[(5)]	0.005	0.008
	PM_{25} (24-hour)	0.006	0.009	0.006[(5)]	0.005	0.008
	$PM_{2.5}$ (Annual)	0.0004	0.009	0.006[(5)]	0.005	0.008
	SO_2 (1-hour and 8-hour)	0.001	0.001	0.001[(5)]	0.001	0.001

Notes:
(1) ACFM = actual cubic feet per minute.
(2) Elevation referenced above Manhattan datum.
(3) Tower C has two boiler plants. Values shown are for each of the two stacks.
(4) Emissions presented are per unit.
(5) Reflects emissions from individual units at each of the two plants at the Tower.
(6) Assumes boilers on the Retail Podium Building would be fitted with low NO_x burners (19 ppm or less).

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

Parameter		Building						
		Retail Podium	Tower A 38th Floor	Tower A 9th Floor	Tower C 5th Floor	Tower C Roof	Tower D	Tower E
Building Height (ft)(4)		237.8	1,248.1	1248.1	821.2	821.2	926.6	1070.5
Stack Exhaust Temp. (°F)		882.2	920.6	912.5	882.2	882.2	882.2	912.5
Stack Exhaust Height (ft)		247.8	714(5)	198(5)	141.5(5)	821.2	926.6	205.5(5)
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)(2)	NO_x (1-hour)(3)	0.004	0.003	0.003	0.004	0.004	0.004	0.003
	NO_x (Annual)	0.008	0.006	0.007	0.008	0.008	0.008	0.007
	CO (1-hour)	2.917	1.944	2.430	2.917	2.917	2.917	2.430
	CO (8-hour)	2.187	1.458	1.823	2.187	2.187	2.187	1.823
	PM_{10} (24-hour)	0.025	0.016	0.021	0.025	0.025	0.025	0.021
	$PM_{2.5}$ (24-hour)	0.025	0.016	0.021	0.025	0.025	0.025	0.021
	$PM_{2.5}$ (Annual)	0.0004	0.0003	0.0003	0.0004	0.0004	0.0004	0.0003
	SO_2 (1-hour)(2)	0.0001	0.00004	0.0001	0.0001	0.0001	0.0001	0.0001
	SO_2 (3-hour)(2)	0.0001	0.00004	0.0001	0.0001	0.0001	0.0001	0.0001

Notes:
(1) ACFM = actual cubic feet per minute.
(2) 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 NYSDEC Part 225 regulations.
(3) Average hourly emission rates for NO_2 and SO_2 were prorated based on 500 hours operation per year per engine following EPA's guidance for intermittent sources.[13]
(4) Maximum building height referenced above Manhattan datum.
(5) The stack exhausting horizontally through the side of the building.

E. EXISTING CONDITIONS

Recent concentrations of all criteria pollutants at DEC air quality monitoring stations nearest the study area are presented in **Table 15-9**. All data statistical forms and averaging periods are consistent with the definitions of the NAAQS. It should be noted that these values are somewhat different than the background concentrations presented in **Table 15-5**.

These existing concentrations are based on recent published measurements, averaged according to the NAAQS (e.g., $PM_{2.5}$ concentrations are averaged over the three years); the background concentrations are the highest values in past years, and are used as a conservative estimate of the highest background concentrations for future conditions.

There were no monitored violations of the NAAQS for the pollutants at these sites in 2016.

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

Table 15-9
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY, Manhattan	ppm	1-hour	2.3	35
	CCNY, Manhattan		8-hour	1.5	9
SO_2	IS 52, Bronx	µg/m³	3-hour	67.3	1,300
			1-hour	41.4	196
PM_{10}	Division Street, Manhattan	µg/m³	24-hour	44	150
$PM_{2.5}$	PS 19, Manhattan	µg/m³	Annual	10.5	12
			24-hour	24.2	35
NO_2	IS 52, Bronx	µg/m³	Annual	37.6	100
			1-hour	121.2	188
Lead	IS 52, Bronx	µg/m³	3-month	0.0161	0.15
Ozone	CCNY, Manhattan	ppm	8-hour	0.069	0.070

Notes: The CO, PM_{10}, and 3-hour SO_2 concentrations for short-term averages are the second highest from the most recent year with available data. $PM_{2.5}$ annual concentrations are the average of 2014–2016 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentiles in the same period. 8-hour average ozone concentrations are the average of the 4th highest-daily values from 2014 to 2016. SO_2 1-hour and NO_2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively, of the highest daily 1-hour maximum from 2014 to 2016.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012–2016.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

In the future without the proposed actions, mobile source and stationary source emissions in the vicinity of the Project Area would be similar to existing conditions.

G. THE FUTURE WITH THE PROPOSED ACTIONS

The proposed actions would have the potential to affect the surrounding community with emissions from heating and hot water system equipment, the potential project site A cogeneration system, as well as the proposed parking facilities. In addition, the proposed action would include locating residential locations within 1,000 feet of the permitted 20 Hudson Yards State Facility. The following sections describe the results of the studies performed to analyze the potential impacts from these sources.

MOBILE SOURCES

PARKING FACILITIES

The proposed actions would include accessory parking facilities at both project site A and project site B. Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facilities at project sites A and B were analyzed, assuming a near side sidewalk receptor on the same side of the street (six feet) as the parking facility, and a far side sidewalk receptor on the opposite side of West 29th Street and West 30th Street from the parking facilities proposed for project site A and B.

The maximum predicted eight-hour average CO concentration of all the receptors modeled at either project site is 1.7 ppm. This value includes a predicted concentration of 0.10 ppm from emissions within the parking garage, on-street contribution of 0.06 ppm, and a background level of 1.5 ppm. The maximum predicted concentration is substantially below the applicable standard of 9 ppm and the *de minimis* CO criteria.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 0.2 µg/m^3 and 0.04 µg/m^3, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 5.4 µg/m^3 for the 24-hour average concentration and 0.3 µg/m^3 for the annual concentration. Therefore, the proposed parking garages would not result in any significant adverse air quality impacts

STATIONARY SOURCES

Table 15-10 shows maximum overall predicted concentrations for NO_2, $PM_{2.5}$, and PM_{10} from the heating and hot water systems proposed for project sites A and B as well as the potential cogeneration system at project site A, at receptors at existing and planned buildings. Maximum predicted NO_2 and PM_{10} concentrations, when added to ambient background levels, would be below the NAAQS. The air quality modeling analysis also determined the highest predicted increase in 24-hour average and annual average $PM_{2.5}$ concentrations from the proposed project's heating and hot water systems. As shown in **Table 15-10**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 5.4 µg/m^3. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable *de minimis* criterion of 0.3 µg/m^3 for local impacts, and the *de minimis* criterion of 0.1 µg/m^3 for neighborhood scale impacts

Table 15-10
Future Maximum Modeled Pollutant Concentrations
Project on Neighborhood (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact[(3)]	Maximum Background Concentration	Total Concentration	Threshold
NO_2	1-Hour[(1)]	-	-	181.8	188
	Annual[(2)]	0.3	39.2	39.5	100
$PM_{2.5}$	24-hour	5.33	24.2	N/A	5.4
	Annual (discrete)	0.093	N/A	N/A	0.3
	Annual (neighborhood)	<0.01	N/A	N/A	0.1
PM_{10}	24-hour	5.3	44	49.3	150

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) Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.
(3) Both the illustrative building height and maximum potential building height for project site B were modeled to assess the worst-case stack height, and the maximum modeled impact is presented in the table.

Table 15-11 shows maximum overall predicted concentrations for NO_2, $PM_{2.5}$, and PM_{10} from the heating and hot water system, which were predicted to occur on elevated locations on project site A. Maximum predicted NO_2 and PM_{10} concentrations, when added to ambient background levels, would be below the NAAQS. The air quality modeling analysis also determined the highest predicted increase in 24-hour average and annual average $PM_{2.5}$ concentrations from the proposed project's heating and hot water systems. As shown in **Table 15-11**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 5.4 µg/m^3. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable DEP *de minimis* criterion of 0.3 µg/m^3 for local impacts, and the DEP *de minimis* criterion of 0.1 µg/m^3 for neighborhood-scale impacts

Table 15-11
Future Maximum Modeled Pollutant Concentrations
Project Receptors (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact$^{(3)}$	Maximum Background Concentration	Total Concentration	Threshold
NO_2	1-Hour$^{(1)}$	-	-	151.0	188
	Annual$^{(2)}$	0.6	39.2	39.8	100
$PM_{2.5}$	24-hour	5.36	24.2	N/A	5.4
	Annual (discrete)	0.169	N/A	N/A	0.3
PM_{10}	24-hour	5.4	44	49.4	150

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.
$^{(2)}$ Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.
$^{(3)}$ Both the illustrative building height and maximum potential building height for project site B were modeled to assess the worst-case stack height, and the maximum modeled impact is presented in the table.

PROPOSED (E) DESIGNATION REQUIREMENTS

To avoid significant adverse impacts, restrictions would be required for the proposed projects' combustion equipment.

To ensure that there are no significant adverse impacts of NO_2 or $PM_{2.5}$ from the proposed actions, certain restrictions would be required through the mapping of an (E) Designation (E-455) for air quality on the Project Area (Block 675 Lots 12 [formerly Lots 12, 29, and 36], 38, and 39) regarding fuel type, exhaust stack location, and equipment technology. The requirements of the (E) Designation would be as follows:

Project Site A—601 West 29th Street (Block 675 Lot~~s~~ 12~~, 29, and 36~~)

Any new development on Block 675 Lot~~s~~ 12~~, 29, and 36~~ must utilize only natural gas in any fossil fuel-fired heating and hot water system equipment and be fitted with low NO_x (30 ppm) burners. Any potential cogeneration system must utilize only natural gas, be fitted with ultra-low NO_x burners with a maximum emission factor of 0.07 lb/Megawatt hour, and be limited to a maximum total rated capacity of 200 kW. Any heating and hot water equipment or cogeneration system exhaust stack(s) must be at least 677 feet above grade, and located at least 110 feet from the lot line of Lot ~~36~~ 12 facing West 30th Street and at most 41 feet from the lot line facing Eleventh Avenue, to avoid any potential significant air quality impacts.

Project Site B—606 West 30th Street (Block 675 Lots 38 and 39)

Any new development on Block 675 Lots 38 and 39 must utilize only natural gas in any fossil fuel-fired heating and hot water system equipment, be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are at least 532 feet above grade, and located at least 130 feet from the lot line facing Eleventh Avenue and at least 30 feet from the lot line facing West 30th Street, to avoid any potential significant air quality impacts.

ADDITIONAL SOURCES

20 HUDSON YARDS

The potential stationary source impacts on the Project Area from the permitted 20 Hudson Yards State Facility were determined using the AERMOD model. The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling were added to the background concentrations to estimate total air quality concentrations on the proposed actions, while $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. The results of the AERMOD analysis are presented in **Table 15-13**.

Table 15-12
Maximum Modeled Pollutant Concentrations on Project Area From 20 Hudson Yards State Facility (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Impact	Maximum Background Concentration	Total Concentration	Threshold
NO_2	1-Hour$^{(1)}$	-	-	105.3	188
	Annual$^{(2)}$	0.1	39.2	39.3	100
$PM_{2.5}$	24-hour	1.1	24.2	N/A	5.4$^{(3)}$
	Annual	0.02	N/A	N/A	0.3$^{(4)}$
PM_{10}	24-hour	1.1	44	45.5	150

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) Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.
(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), 0.3 µg/m³

As shown in **Table 15-13**, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective standards. Therefore, no significant adverse air quality impacts on either project sites A or B from the existing sources are predicted.

CONSIDERATION OF HUDSON TUNNEL PROJECT

As discussed in Chapter 1, "Project Description," the Hudson Tunnel Project is expected to start in 2019 with completion of the project expected in 2026. The air quality analysis for the construction of the Hudson Tunnel Project considered the unlikely event that both project sites A and B would be completed and operational during the most intensive stage of construction activity at the Hudson Tunnel, and modeled the façades as potential receptor locations. The most intense period of construction activity for the Hudson Tunnel Project would occur in June 2021 when the proposed projects would still be under construction and the Hudson Tunnel would be in the excavation and construction stage of the Twelfth Avenue shaft, cut, and cover of 30th Street as well as Tenth Avenue, and underpinning for the Lerner Building on Tenth Avenue between West 31st and 33rd Streets. The most intense stage located within the western portion of the project block—excavation and construction of the Twelfth Avenue shaft—would begin in early 2020 and continue until mid/late 2022. During this time period, construction for both project sites A and B ~~are~~ is anticipated to be in the superstructure and interior phases of construction, and are anticipated to be completed in late 2022. Before 2020, most construction activities would occur at locations in New Jersey. In addition, a portion of Lot 12 may be needed for Hudson Tunnel Project construction staging purposes between 2019 and 2026.

As discussed in the Hudson Tunnel DEIS, maximum $PM_{2.5}$ concentrations are predicted to exceed the 24-hour and annual average $PM_{2.5}$ *de minimis* criteria during the most intense stages of construction at sidewalk locations along Twelfth Avenue, the western portions of West 30th Street and West 29th Streets, and along portions of building façades below 25 feet above grade on the project sites. Concentrations were predicted to be highest in locations to the southwest (near the intersection of Twelfth Avenue and West 29th Street) and northeast (the northern West 30th Street sidewalk locations in the middle of the block) of the Hudson Tunnel construction site. In general, construction activity is temporary in nature, and maximum pollutant concentrations would be predicted to occur only within the most intense period of construction activity at the Hudson Tunnel. Furthermore, pollutant concentrations would not persist beyond completion of construction. While the Hudson Tunnel DEIS predicts that incremental $PM_{2.5}$ concentrations would exceed the $PM_{2.5}$ *de minimis* criteria during the most intense stages of construction, total concentrations of all analyzed pollutants ($PM_{2.5}$, PM_{10}, CO, and NO_2) would be below the corresponding NAAQS.[14,15] These impacts would only occur in the event the proposed projects are completed and occupied during the most intensive stages of construction for the Hudson Tunnel Project.

The exceedances of the $PM_{2.5}$ *de minimis* criteria that are predicted to occur on project site A or B in the Hudson Tunnel DEIS would not impact any sensitive receptor locations below 25 feet above grade. These areas are where the parking facilities, retail, mechanical, and residential lobby space would be located in the project sites and would not include any operable windows. Furthermore, retail and residential lobby spaces in these areas would be provided with conditioned outside air from air intakes located above the height of the predicted exceedances. Therefore, no air quality receptor locations on either project sites A or B would be predicted to exceed the $PM_{2.5}$ *de minimis* criteria.

Concentrations at locations on the façades of the proposed projects and at heights of 25 feet and above were not predicted to exceed either the applicable NAAQS or the $PM_{2.5}$ *de minimis* criteria. Therefore, no significant adverse air quality impacts on either project sites A or B from the construction of the Hudson Tunnel Project are predicted. ✷

[14] U.S. Department of Transportation Federal Railroad Administration and NJ TRANSIT. Hudson Tunnel Project Draft Environmental Impact Statement and Draft Section 4(f) Evaluation. Chapter 13: Air Quality. Section 16.6.4.3 Combined Impact Assessment. June 2017.

[15] The information and results of the Hudson Tunnel Project presented in this chapter are based on the Hudson Tunnel DEIS, The assessment for the proposed actions will be updated with any additional information presented in the Hudson Tunnel FEIS, as appropriate.