Chapter 15: Air Quality

A. INTRODUCTION

The potential for air quality impacts from the Proposed Project 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 heat 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 the Proposed Project or other changes to future traffic conditions due to a project.

The maximum projected hourly incremental traffic volumes generated by the Proposed Project would exceed the 2020 *City Environmental Quality Review (CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 140 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 Project (i.e., a mobile source analysis) was performed for CO and PM.

The Proposed Project would include accessory parking garages in certain development sites. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations in the vicinity of the ventilation outlets with the proposed parking garages. The predicted pollutant increments from the garages were also added, where appropriate, to the predicted concentrations from the mobile source analysis to assess the cumulative impact of both sources.

The Proposed Project would potentially include fossil fuel-burning heat and hot water systems. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed heat and hot water systems.

Two large emission sources (as defined in the *CEQR Technical Manual*) were identified within 1,000 feet of the proposed developments. Therefore, an analysis of the potential air quality impacts of these emissions sources on the Proposed Project was conducted, as described in the *CEQR Technical Manual*.

In addition, portions of the Project Area are located in a manufacturing district; therefore, potential effects of stationary source emissions from existing nearby industrial facilities on the Proposed Project were assessed.

PRINCIPAL CONCLUSIONS

The Proposed Project would not result in any significant adverse air quality impacts. The mobile source analyses determined that concentrations of CO and particulate matter less than 10 microns in diameter (PM_{10}) due to the Proposed Project would not result in any violations of National Ambient Air Quality Standards (NAAQS) at the intersections analyzed for the 2028 and 2038 analysis years and that incremental concentrations of CO would not exceed the *de minimis* criteria referenced in the *CEQR Technical Manual*. Maximum 24-hour average concentrations of particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) are predicted to exceed the *de minimis* criterion at one of the intersections sites analyzed for the 2038 analysis year, and annual incremental $PM_{2.5}$ concentrations are predicted to exceed the *de minimis* criterion at one intersection in the 2028 analysis year, and at all three intersection sites analyzed in the 2038 analysis year. The potential exceedances would be limited to the immediate areas around these intersections, primarily sidewalk locations, and no residential, hotel, or other buildings with sensitive uses would be affected. The affected areas are used only by transient users (pedestrians) and the overall exposure to the predicted $PM_{2.5}$ concentrations at the affected locations near these intersections would be infrequent and brief. Furthermore, while the maximum incremental increase in $PM_{2.5}$ concentrations was predicted to exceed the *CEQR Technical Manual de minimis* criteria, the maximum total 24-hour average concentration is 34.2 $\mu g/m^3$, which is below the NAAQS of 35 $\mu g/m^3$, and the maximum total annual concentration is 11.98 $\mu g/m^3$, which is below the NAAQS of 12 $\mu g/m^3$. Therefore, the $PM_{2.5}$ concentrations exceeding the *CEQR Technical Manual* $PM_{2.5}$ *de minimis* criteria would not constitute a significant adverse air quality impact.

Emissions of CO and PM from the proposed parking garages at Sites 4, 6, 7, and 8 were analyzed. The analysis found that pollutant concentrations from the proposed parking facilities would not result in any significant adverse air quality impacts. The mobile source intersection analysis determined that the intersection adjacent to Site 6 would exceed the *CEQR Technical Manual de minimis* criteria for the 2038 analysis year; therefore, the cumulative incremental $PM_{2.5}$ annual average concentration (including the contribution from the intersection) also results in a concentration that exceeds the *CEQR Technical Manual de minimis* criteria on an annual average basis. However, no violation of the NAAQS would result from cumulative impacts of the Proposed Project's mobile sources of emission and emissions from the proposed parking garages, and thus no significant adverse air quality impacts are predicted.

An analysis was performed of the emissions and dispersion of nitrogen dioxide (NO_2) and PM_{10} from potential fossil fuel-fired heating and hot water systems, which determined that such emissions would not result in a violation of the NAAQS for the 2028 and 2038 With Action condition. With respect to stationary source emissions, $PM_{2.5}$ was analyzed in accordance with the City's current $PM_{2.5}$ *de minimis* criteria, which determined that the maximum predicted $PM_{2.5}$ increments from the Proposed Project would be less than the applicable *CEQR Technical Manual de minimis* criteria and would not exceed the NAAQS. To ensure that there are no significant adverse impacts resulting from the Proposed Project due to heating and hot water emissions, additional air quality measures would be included in the project documents for specific development sites with respect to fuel type, emission limits, and stack height and setbacks.

Based on the analysis of the emissions from large and major sources of emissions in the study area on the Proposed Project, design requirements (e.g., stack location, maximum heat input capacity of natural gas-fired heat and hot water systems) would be imposed in the project documents to avoid the potential for significant air quality impacts at Sites 5 and 7 regarding the placement of operable windows and air intakes on portions of these sites.

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 project, CO was included explicitly in the mobile source and parking facility analyses, and is addressed indirectly in the heat and hot water screening analysis. The Proposed Project would result in an increase in vehicle trips greater than the *CEQR Technical Manual* screening threshold of 140 trips at certain intersections. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Project. In addition, the Proposed Project would include parking facilities at certain development sites. Therefore, an analysis was conducted to evaluate future CO concentrations with the operation of the proposed parking facilities.

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 Project 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 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, given the limitations on information available regarding NO_2 near-road background values, and the current lack of guidance and uncertainties regarding analysis methodologies, a qualitative discussion of mobile source-related NO_2 is presented.

Impacts on local NO_2 concentrations from the fuel combustion for the Proposed Project's heat and hot water systems were evaluated, as well as impacts from existing large and major sources of emissions.

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. 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 Project 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 Project was performed for PM and an analysis was conducted to evaluate future PM concentrations with the operation of the parking facilities assumed to be developed with the Proposed Project.

An assessment of PM emissions from heat and hot water systems at the proposed development sites was conducted, following the *CEQR Technical Manual* and EPA guidance. Impacts of PM from existing large and major sources of emissions were also evaluated.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under 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 and/or non-road sources was not warranted.

It is assumed that natural gas would be burned in the proposed heat and hot water systems. The sulfur content of natural gas is negligible; therefore, no analysis was undertaken to estimate the future levels of SO_2 with the Proposed Project. However, impacts of SO_2 from existing large and major sources of emissions were evaluated.

NONCRITERIA POLLUTANTS

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 human-made and naturally occurring sources. Emissions of many air toxics from industries are regulated by EPA. In addition, air pollutants associated with motor vehicles, including compounds designated by EPA as mobile source air toxics (MSATs), are associated with a range of health effects. Based on current National Environmental Policy Act (NEPA) guidance for projects subject to Federal Highway Administration evaluation, most actions would have low or no meaningful MSAT effects. The Proposed Project would increase traffic in the study area, but would not result in a traffic increase that would materially affect MSAT emissions.

As portions of the Project Area are located within 400 feet of a manufacturing district, an analysis to examine the potential for impacts from industrial emissions was performed.

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[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 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 CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particles, settleable particles, non-methane hydrocarbons, 24-hour and annual SO_2, and ozone which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants beryllium, fluoride, and hydrogen sulfide.

---

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

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 (1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (4)	NA	12	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.

Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as mentioned above, the New York State Department of Environmental Conservation (DEC) has issued standards for three noncriteria compounds. DEC has also developed a guidance document DAR-1[2] (August 2016), which contains a compilation of annual and short term (1-hour) guideline

[2] DEC. DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212. August 2016.

concentrations for numerous other noncriteria compounds. The DEC 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 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.

EPA clarified on July 29, 2015 that the PM_{10} non-attainment designation for Manhattan 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.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as a moderate non-attainment area for the 1997 8-hour average ozone standard. 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.

On April 11, 2016, as requested by New York State, EPA reclassified the area as a "moderate" NAA. On July 19, 2017 DEC announced that the New York Metro Area (NYMA) is not projected to meet the July 20, 2018 attainment deadline and DEC therefore requested that EPA reclassify the NYMA to "serious" nonattainment. EPA reclassified the NYMA from "moderate" to "serious" NAA, effective September 23, 2019, which imposes a new attainment deadline of July 20, 2021 (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. SIP revisions are due by August 3, 2021.

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. In December 2017, EPA designated the entire State of New York as in attainment for this standard, with the exception of Monroe County, which was designated "unclassifiable."

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. Similarly, for non-criteria pollutants, predicted exceedance of the DEC DAR-1 guideline concentrations would be considered 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 8.0 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:

- 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. March 2014; and SEQR Regulations. 6 NYCRR § 617.7

Actions predicted to increase $PM_{2.5}$ concentrations by more than the above *de minimis* criteria are considered to have the potential for a significant adverse impact. The above *de minimis* criteria have been used to evaluate the significance of predicted impacts of the Proposed Project on $PM_{2.5}$ concentrations. In determining whether the exceedances constitute a significant adverse air quality impact, ESD's evaluation of localized projected exceedances of the *de minimis* criteria considers whether they contribute to or exacerbate a violation of the $PM_{2.5}$ NAAQS or have the potential to result in sustained exposure giving rise to public health concerns.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

REASONABLE WORST-CASE DEVELOPMENT SCENARIO

In order to assess the possible effects of the Proposed Project, a reasonable worst-case development scenario (RWCDS) was prepared for the With Action condition (see Chapter 2, "Analytical Framework," Table 2-3). In general, when analyzing potential impacts due to the Proposed Project, development that results in higher levels of emissions was assumed. For the mobile source analysis, air quality impacts were determined based on the future development that maximizes vehicle trip generation.

As described in Chapter 1, "Project Description," the new buildings would be developed in accordance with Design Guidelines for the Proposed Project, which would specify the parameters for permitted development in lieu of zoning. Consistent with zoning in other high-density commercial areas of New York City, the Design Guidelines would not impose height limits, except for on the midblock portion of Site 1, where a 400-foot height limit would be imposed. Therefore, to provide for a conservative analysis, the stationary source air quality analysis considered the maximum illustrative building height for each development site (referred to as the illustrative massing scenario), as well as an additional 150 feet of height for future design flexibility (referred to as the additional height scenario). This is conservative when determining impacts on the Proposed Project, since maximum impacts from nearby elevated sources tend to occur on the upper floors of a receptor site (e.g., at window locations). In addition, maximizing building heights results in the greatest potential for building downwash conditions, which may result in higher concentrations at ground-level receptors and low-rise buildings.

As discussed in Chapter 1, "Project Description," it is anticipated that the larger building in terms of height and floor area on Site 2 would be located on the western portion of the site along Eighth Avenue. However, under the Design Guidelines, the taller tower could be located on either side of the site. The stationary source analyses presented in this chapter are based on the larger Site 2 building being located on the western portion of the site along Eighth Avenue. As necessary and appropriate, additional modeling may be conducted between the Draft and Final EIS to determine the design requirements to ensure that there are no significant adverse impacts due to heating and hot water emissions for a scenario in which the larger building on Site 2 is located on the eastern portion of the site along Seventh Avenue.

As discussed in Chapter 14, "Transportation," the transportation analyses are based on the larger Site 2 building being located on the eastern portion of the site along Seventh Avenue and, accordingly, the mobile source analysis in this chapter is based on the traffic data developed for the transportation analysis. A change in the location of the larger building on the site would not affect the traffic data on which the mobile source analysis in this chapter is based, and would not change the conclusions of the mobile source analysis presented in this chapter.

MOBILE SOURCES

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, most dispersion analyses predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analyses for the Proposed Project 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 Project.

NITROGEN DIOXIDE

In order to evaluate the microscale effect of mobile source emissions due to the Proposed Project on NO_2 concentrations, predicted mobile source pollutant concentrations at affected roadways and intersections would need to be added to background concentrations. Community-scale monitors currently in operation could be used to represent background NO_2 conditions away from roadways, but there is substantial uncertainty regarding background concentrations at or near ground-level locations in close proximity to roadways.

EPA regulations require that two new near-road NO_2 monitors operate in the New York metropolitan region.[4] New York and New Jersey have selected two near-road sites—Queens College (at a location near the Horace Harding Expressway/I-495) and a site near the George Washington Bridge in Fort Lee. The three-year (2017–2019) 98th percentile 1-hour average concentration of 126 $\mu g/m^3$ was measured at the Fort Lee near-road monitor site. Although a complete three-year data set is not available from the Queens College station, the current 98th percentile concentration available measured at this station is 96 $\mu g/m^3$. The concentrations at both monitoring sites are well below the 1-hour NO_2 NAAQS of 188 $\mu g/m^3$. Given the limitations on information available regarding NO_2 on-road background values, and the current lack of guidance and uncertainties regarding analysis methodologies, the effect of the Proposed Project on 1-hour NO_2 from mobile sources was evaluated qualitatively.

INTERSECTION ANALYSIS

Vehicle Emissions

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, Motor Vehicle Emission Simulator (MOVES 2014b).[5] This emissions model is

---

4 EPA. Network Design Criteria for Ambient Air Quality Monitoring, 40 CFR Part 58 Appendix D.

5 EPA. Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015.

capable of calculating engine, brake 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.

Vehicle classification data were based on data obtained from other traffic studies, because data collection was not possible under atypical conditions due to COVID-19. Appropriate credits were used to accurately reflect the inspection and maintenance program.[6] County-specific hourly temperature and relative humidity data obtained from DEC were used.

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and 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 the New York City Department of Environmental Protection (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[7] and the *CEQR Technical Manual*.

Traffic Data

Traffic data for the intersection analysis were derived from existing traffic counts (which included data collected from other studies due to data collection restrictions), projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Project (see Chapter 14, “Transportation”). Traffic data for the future without the Proposed Project (the No Action condition) and the With Action condition were employed in the respective air quality modeling condition. The weekday morning (8:00 AM to 9:00 AM), midday (12:00 Noon to 1:00 PM), and evening (5:00 PM to 6:00 PM) peak periods were analyzed.

Since detailed traffic information is not available for other periods, traffic conditions were conservatively estimated as follows:

Traffic Volumes

The peak morning, midday, and evening period traffic volumes were used as a baseline for determining off-peak volumes. Off-peak traffic volumes in the No Action condition were determined by using the 24-hour distributions of actual vehicle counts collected at the nearest automatic traffic recorder (ATR) locations to adjust the peak hour volumes to reflect lower volumes during the non-peak periods. For the project-generated vehicle trips, off-peak increments from the Proposed Project were estimated by using the 24-hour parking demand for the Proposed Project to adjust the peak hour volumes to reflect lower volumes during the non-peak periods. The traffic conditions for the analyzed peak periods were used to characterize conditions during the weekend period, in order to determine annual average concentrations. This results in a conservative analysis.

---

6 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.

7 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.

Vehicle Speeds

Due to COVID-related restrictions on collection of field data, vehicle speeds for the existing condition were estimated based on data collected in the area for the 2010 *15 Penn Plaza FEIS*, as well as available data from the Traffic Information Management System (TIMS) maintained by the New York City Department of Transportation (DOT) to supplement any gaps in traffic information. Vehicle Speeds for the No Action and With Action conditions were then determined based on projecting existing speeds using delay information obtained from the transportation analysis.

For non-peak periods between the hours of 5:00 AM and 9:00 PM, the peak period delays corresponding to the closest peak period (AM, MD, or PM) were assumed. For the overnight period, No Action and With Action vehicle speeds were assumed to be 15 miles per hour as a conservative estimate for free flow speeds in the area.

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 19191.[8] 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 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.[9] Following EPA guidelines, the analysis was performed using an area source representation of emission sources in order to simulate traffic-related air pollutant dispersion.[10] 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. All hours were modeled, and the highest predicted concentration for each averaging period is presented.

---

[8] EPA. *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. EPA-454/B-19-027. Research Triangle Park, North Carolina. August 2019.

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

[10] 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

Analysis Years

The microscale analyses was performed for an interim analysis year (Phase 1) of 2028 and a final analysis year (Phase 2) of 2038, the year by which the Proposed Project is assumed 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 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 concentrations are based on the latest available three years of monitored data (2017–2019 consistent with the statistical form of the NAAQS. CO concentrations are also based on the latest available three years of monitored data (2017–2019). 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	2.52 ppm	35 ppm
	8-hour	CCNY	1.2 ppm	9 ppm
PM_{10}	24-hour	Division Street	39.3 μg/m³	150 μg/m³
$PM_{2.5}$	24-hour	Division Street	19.7 μg/m³	35 μg/m³
	Annual	Division Street	9.0 μg/m³	12 μg/m³

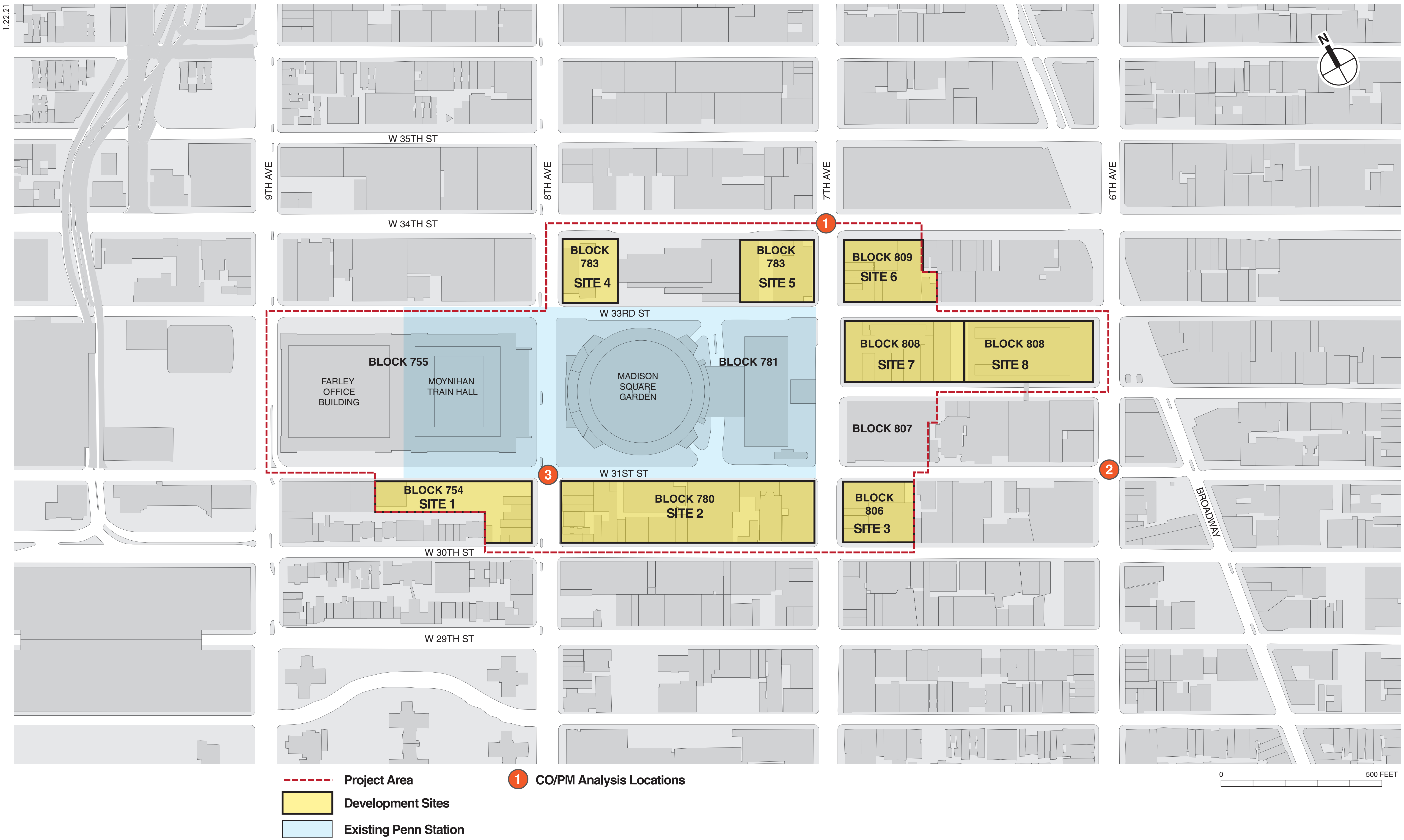
Notes:
(1) CO concentrations represent the maximum second-highest monitored concentrations from the most recent three years of data.
(2) PM_{10} concentration represents the average highest monitored concentration from the most-recent three years of data.
(3) $PM_{2.5}$ concentration represents the average of the 98th percentile day from most recent three years of data.
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**). These sites were selected because they are the locations in the study area projected to have the highest levels of incremental traffic, and, therefore, where the greatest air quality impacts and maximum changes in concentrations would be expected. The potential impact from vehicle emissions of CO, PM_{10}, and $PM_{2.5}$ was analyzed at each site.

Table 15-3
Mobile Source Analysis Sites

Analysis Site	Location
1	7th Avenue and 34th Street
2	6th Avenue and 31st Street
3	8th Avenue and 31st Street



Mobile Source Analysis Sites
Figure 15-1

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected site(s); receptors were placed along the approach and departure 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. For prediction of annual average neighborhood-scale $PM_{2.5}$ concentrations, receptors were placed at a distance of 15 meters from the nearest moving lane at each analysis location, based on current DEP guidance for mobile source $PM_{2.5}$ modeling.[11]

PARKING ANALYSIS

The Proposed Project would result in the development of four 100-space accessory parking garages: Site 4 (1 Penn West), Site 6 (Block 809), Site 7 (15 Penn I), and Site 8 (15 Penn II). Emissions from vehicles using the mechanically ventilated parking garages could potentially affect pollutant concentrations in the immediate vicinity of the ventilation outlets. Therefore, an analysis of the emissions from the outlet vent and their dispersion in the environment was performed, calculating pollutant levels in the surrounding area, using the methodology set forth 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 the facility. PM increments were determined on a 24-hour and annual average basis. The number of vehicles entering and exiting the garage were derived from the trip generation analysis described in Chapter 14, "Transportation," of this DEIS.

Emissions from vehicles entering, parking, and exiting the garage were determined using the EPA MOVES 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. The concentrations within the system were 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.

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.

For each parking garage analyzed, exhaust air was assumed to be vented through a single outlet at a height of approximately 10 feet above the sidewalk. Since specific garage designs are not yet available at the time of the analysis, the vent face was conservatively assumed to discharge towards the street that has the highest background levels of traffic for each garage. A "near" receptor was placed at sidewalk locations at a distance of seven feet from the vent (as referenced in the *CEQR Technical Manual*) and "far" receptor was placed on the opposite side of the street. The receptors were placed at a pedestrian height of six feet. A receptor was also modeled at a height of 10 feet above the vent to conservatively assess the air quality impacts on each building window or air intake location. A persistence factor of 0.77 was used to convert the maximum 1-hour average CO

[11] DEP. Interim Guidance for $PM_{2.5}$ Analyses. March 3, 2008.

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.

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels for CO. To determine compliance with the NAAQS, CO concentrations were determined for the maximum one and eight-hour average periods. The 24-hour average $PM_{2.5}$ background concentration was used to determine the *de minimis* criterion-derived threshold. The on-street pollutant concentrations were determined using the methodology in the Air Quality Appendix of the *CEQR Technical Manual*, utilizing traffic volumes from the traffic analysis for the Proposed Project.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

The air quality analysis of the heating and hot water systems determined the potential for impacts on existing and future background developments, as well as “project-on-project” impacts. It was conservatively assumed that all the developments would utilize natural gas for heating and hot water systems.[13] The exhaust stacks for the heat and hot water systems were initially located at the edge of the development massing, closest to the nearest building of a similar or greater height, to be conservative.

If the resulting maximum predicted concentrations were determined not to meet the NAAQS or $PM_{2.5}$ *de minimis* criteria, the analysis was refined to set back the stack initially in 20-foot increments, and then in 10-foot increments, until the source was found to meet the applicable air quality standards. If necessary, additional air quality measures were considered, including use of low NO_x burners, increasing stack heights, or a combination of these measures. Project documents would include design requirements that conform to the assumptions used in the analysis.

The new buildings that would be constructed with the Proposed Project would be developed in accordance with Design Guidelines for the Proposed Project, which would specify the parameters for permitted development in lieu of zoning. The analysis utilized the development density and illustrative massing for each of the eight development sites to estimate potential project-on-project and project-on-existing impacts. In addition, reasonably conservative potential building envelopes (i.e., assuming minimum required setbacks) and exhaust stack heights were assumed, since this resulted in potentially higher concentrations by minimizing source-receptor distances between development sites. The stack exhaust was placed at locations nearest to the adjacent development(s). In addition, receptor buildings were analyzed at their illustrative height (the illustrative massing scenario) and at a taller height (150 feet taller than the illustrative massing; the additional height scenario), to determine the potential for air quality impacts from adjacent development sites that would potentially be shorter in height. Potential cumulative effects from the overall development

---

[12] EPA. *AERSCREEN User's Guide*. EPA-454/B-11-001. March 2011.

[13] As discussed in Chapter 16, “Greenhouse Gas Emissions,” the proposed developments may implement fully electric systems or use a district steam system for heating and hot water services, instead of systems that burn natural gas or other fossil fuels. An electric or steam system would not result in direct pollutant emissions and therefore the use of a natural gas-fired system represents a conservative assumption for the purposes of this stationary source analysis.

were also determined to evaluate potential air quality impacts from the combined heating and hot water systems from all of the development sites.

The analysis was performed assuming a separate heating and hot water system for each building within each of the development sites. The stack exhaust was modeled on the tallest roof of each building, and the exhaust stack was modeled at locations nearest to the other buildings of a similar or greater height.

Receptors were placed at elevated locations on all façades and at multiple elevations on buildings within the same parcel to predict maximum pollutant concentrations. Generally, receptors were spaced at a 10-foot interval vertically on the critical upper portions of buildings (to represent individual floors of a building), while at lower portions of buildings vertical receptor spacing was increased to 30 feet. Horizontally, receptor spacing was a minimum of about 30 feet.

Emission Rates and Stack Parameters

It was assumed that each of the eight development sites would have one or more boiler installation that would generate hot water for building heating and domestic hot water. Since design information on the proposed heating and hot water equipment and operations was not available, the following assumptions were utilized:

<u>Emission Factors:</u> Emission factors were 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 included both the filterable and condensable fractions.

<u>Fuel Usage:</u> Annual fuel consumption rates for the heating and hot water systems of the proposed buildings were calculated using energy use estimates based on type of development and size of the buildings as recommended in the *CEQR Technical Manual.* For Site 1, the development program that would result in the greatest amount of hotel use was assumed, since hotel is a sensitive use, and is therefore potentially impacted by other development sites.

The reasonable worst-case analysis assumed natural gas would be utilized for each development site. Short-term emissions were conservatively estimated assuming a 100-day heating season.

<u>Stack Parameters:</u> Exhaust stacks were assumed to be three feet above roof height (as per the *CEQR Technical Manual*). The exhaust velocity was calculated based on the exhaust flowrate for the estimated boiler capacity, using the energy use of the proposed building and the EPA fuel factor for natural gas. Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data provided by DEP.

The exhaust velocity was calculated based on the exhaust flow rate for the heating and hot water system capacity and estimated using the energy use of the proposed building and EPA fuel factor for natural gas. Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data provided by DEP.

Emission rates for the boilers 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.

Emission rates and stack parameters for the development sites are presented in **Table 15-4**.

Table 15-4
Stack Parameters and Emission Rates

Parameter		Development Site									
		Site 1		Site 2							
		Hotel Building	Commercial Building	East Building	West Building	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Building Height–Illustrative Massing (ft)		235	747	1,052	1,300	936	663	1,018	1,130	1,270	975
Stack Exhaust Temp. (°F)[2]		307.8	307.8	307.8	307.8	307.8	307.8	307.8	307.8	307.8	307.8
Stack Exhaust Height (ft)		238	750	1,055	1,303	939	666	1,021	1,133	1,273	978
Stack Exhaust Diameter (ft)[2]		3.2	5	5	5	5	5	5	5	5	5
Stack Exhaust Flow (ACFM)[1][3]		2,311	3,810	8,070	11,832	8,994	5,688	3,863	4,260	5,291	10,583
Stack Exhaust Velocity (ft/s)		4.8	3.23	6.82	9.98	7.59	4.8	3.26	3.6	4.47	8.93
Short-Term Emission Rates											
g/s[4]	NO_x	0.108	0.066[5]	0.139[5]	0.205[5]	0.157	0.098	0.067	0.074[5]	0.061[5]	0.183[5]
	$PM_{2.5}$	0.0082	0.014	0.029	0.042	0.0319	0.02	0.014	0.015	0.019	0.038
Annual Average Emission Rates											
g/s[4]	NO_x	0.0296	0.018[5]	0.038[5]	0.056[5]	0.0426	0.0269	0.0183	0.0202[5]	0.017[5]	0.05[5]
	$PM_{2.5}$	0.0023	0.0037	0.0079	0.0115	0.0087	0.0056	0.0038	0.0042	0.0052	0.0104

Notes:
(1) ACFM = actual cubic feet per minute.
(2) The stack diameter and exhaust temperature are based on boiler specifications from DEP Boiler Permit Database.
(3) The stack exhaust flow rate was estimated based on the type of fuel and heat input rates.
(4) Emission rates are based on EPA AP-42 data.
(5) NO_x emission rates based on 30 ppm low NO_x burners.

Dispersion Modeling

Potential impacts were evaluated using the AERMOD dispersion model. The AERMOD model calculates pollutant concentrations from one or more sources (e.g., exhaust stacks) based on hourly meteorological data, 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 was performed 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.

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, based on EPA guidance.[14]

The 1-hour average NO_2 concentration increments from the Proposed Project's stationary combustion sources were estimated using the AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module

14 EPA. Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard, available at: https://www3.epa.gov/scram001/guidance/clarification/NO2_Clarification_Memo-20140930.pdf

incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were taken from the DEC IS 52 monitoring station, the nearest DEC ozone monitoring station which 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 for boilers.

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, with surface data collected at LaGuardia Airport (2015–2019), 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. DEC-supplied meteorological data processed with the AERMET Version 19191 processor was used for the modeling analysis.

Receptor Placement

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed buildings' façades (including No Action developments) to represent potentially sensitive locations, such as operable windows and intake vents. For each of the buildings, receptors were conservatively placed on the façades of the maximum development envelope. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations. Generally, receptors were spaced at a 10-foot interval vertically, while horizontally, receptor spacing was a minimum of 10 feet and a maximum of 30 feet. Receptors were also placed at publicly accessible ground-level locations.

Background Concentrations

To estimate the maximum expected total pollutant concentrations at a given location (receptor), the predicted impacts from the emission sources were added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 15-5**). The background levels were based on concentrations monitored at the nearest DEC ambient air monitoring stations over the most recent three-year period for which data are available (2017–2019).

For stationary sources, $PM_{2.5}$ annual average impacts were assessed on an incremental basis and compared with 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. The $PM_{2.5}$ 24-hour average background concentration of 19.6 $\mu g/m^3$ (based on the 2017 to 2019 average of 98th percentile concentrations measured at the Division Street monitoring station) was used to establish the *de minimis* value for the 24-hour increment, consistent with the guidance provided in the *CEQR Technical Manual.*

For stationary sources, total 1-hour NO_2 concentrations were calculated following methodologies that are accepted by EPA (EPA "Tier 3") and are considered appropriate and conservative. The methodology used to determine the compliance of total 1-hour NO_2 concentrations from the proposed sources with the 1-hour NO_2 NAAQS[15] was based on adding the monitored background

[15] http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf.

to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the seasonal hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each receptor 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 three years.

Table 15-5
Background Pollutant Concentrations for Stationary Souce Analysis

Pollutant	Average Period	Location	Concentration (μg/m³)	NAAQS (μg/m³)
NO_2	Annual[1]	IS 52	32.8	100
	1-hour[2]		111	188
SO_2	1-hour[3]	IS 52	14.6	196
$PM_{2.5}$	24-hour	Division Street	19.7	35
PM_{10}	24-Hour[4]	Division Street	39.3	150

Notes:
1 Annual average NO_2 background concentration is based on the highest value over three years of data, from 2017-2019.
2 The 1-hour NO_2 background concentration is based on the maximum 98th percentile One-Hour NO_2 concentration averaged over three years of data, from 2017-2019.
3 The 1-hour SO_2 background concentration is based on the maximum 99th percentile concentration averaged over three years of data, from 2017-2019.
4 PM_{10} is based on the average of the three-year highest value from 2017-2019.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.

Analysis Years

The analysis was performed for an interim analysis year (Phase 1) of 2028 and a final analysis year (Phase 2) of 2038, the year by which the Proposed Project is assumed to be completed.

Determining the Significance of Air Quality Impacts

For the stationary source analysis, the exhaust stacks for the heat and hot water systems were assumed to be located at the edge of the development massing closest to the receptor. If a source could not meet the NAAQS or $PM_{2.5}$ *de minimis* criteria, the stack would then be set back in 20 foot (or similar) increments, until the source met the respective criteria. If necessary, further restrictive measures were considered, including use of low NO_x burners, increasing stack heights, or a combination of these measures.

Predicted values were compared with NAAQS for NO_2, SO_2, and PM_{10}, and the *CEQR Technical Manual de minimis* criteria for $PM_{2.5}$. In the event that exceedances of NAAQS or *de minimis* criteria were predicted, air quality restrictions were proposed for the site, describing the fuel and/or heat and hot water system exhaust stack design measures that would be required to avoid a significant adverse air quality impact.

ENGINE GENERATORS

The Penn Station Service Building on Block 780 currently contains engines that are designed to provide emergency power to certain Penn Station track operations in the event of a loss of utility power. The facility includes two 2.5-megawatt (MW) diesel engine generators. The Proposed Project would result in the demolition of the existing Penn Station Service Building and construction of a new service building on Site 2. The Metropolitan Transportation Authority (MTA) has stated that in the future with the Proposed Project, any diesel engine generators in the new service building would be used for emergency purposes only. Therefore, no air quality analysis of these engines was performed.

INDUSTRIAL SOURCES

The potential impacts of existing industrial operations on pollutant concentrations at the development site were evaluated. Potential industrial air pollutant emission sources within 400 feet of the proposed development sites were surveyed for inclusion in the air quality impact analyses, as recommended in the *CEQR Technical Manual*.

Land use maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A field survey was conducted on August 14, 2020 to identify buildings within 400 feet of the development sites that have the potential for emitting air pollutants. A search of federal- and state-permitted facilities within the study area was conducted using EPA's Envirofacts database.[16] DEP's online permit database was also searched to identify any permitted industrial uses in the study area.[17]

No current permitted activities were identified within the study area, and no other sources of emissions were identified in the land use and field surveys. Therefore, no potential for significant impacts on the Proposed Project are anticipated from industrial source emissions in the 2028 With Action Condition.

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 within 1,000 feet of 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.

A review of DEC Title V permits and the EPA Envirofacts database was performed to identify any federal or state-permitted facilities. Two sources have been identified: 1) an existing combined heat and power (CHP) plant at the Vornado 1 Penn Plaza development, and 2) an existing boiler plant at 1385 Broadway. Therefore, an analysis of these sources was performed to assess their potential effects on the development sites.

The AERMOD dispersion model was used in the analysis, with the same meteorological data and background concentrations used for the heating and hot water system analysis. Also, as described in the methodology for the analysis of the Proposed Project's stationary sources, total 1-hour NO_2 concentrations were determined using the EPA Tier 3 approach.

Available data from DEC and Vornado (for 1 Penn Plaza), including the existing permit and periodic emissions summaries and reports were used. The Vornado 1 Penn Plaza boiler stack is approximately 225 feet above grade. The facility emissions were calculated based on the actual fuel usage data for Vornado 1 Penn Plaza from 2016 to 2019, and applying EPA's Compilations

---

[16] EPA. Envirofacts. https://www3.epa.gov/enviro/. Accessed September 23, 2020.

[17] DEP. *NYC DEP CATS Information.* https://a826-web01.nyc.gov/dep.boilerinformationext. New York City Open Data https://data.cityofnewyork.us/Environment/CATS-Permits/f4rp-2kvy. Accessed August 4, 2020 and September 24, 2020.

of Air Pollutant Emission Factors (AP-42)[18] emission factors for boilers. The 12-month period with the highest fuel usage was used for the air quality analysis. **Table 15-6** presents the emission rates and stack parameters used in the AERMOD analysis for the analyzed facility.

Table 15-6
Stack Parameters and Emission Rates from 1 Penn Plaza CHP Plant

Parameter	Value
Stack Height (ft)[(1)]	225
Stack Diameter (ft)[(1)]	1.7
Exhaust Flow Rate (acfm) [(1,2)]	17,736
Exhaust Temperature (°F)[(1)]	900
Fuel Type	Natural Gas
NO_x Short Term Emission Rate (g/s)	0.2748
NO_x Annual Emission Rate (g/s)	0.2748
$PM_{2.5}$ Short Term Emission Rate (g/s)	0.0190
$PM_{2.5}$ Annual Emission Rate (g/s)	0.0190

Notes:
1 The stack height, stack diameter, stack exhaust flow rate, and stack exhaust temperature are based on the DEC State Facility Permit.
2 acfm = actual cubic feet per minute.

The 1385 Broadway building boiler stack is approximately 316 feet above grade. The facility emissions were estimated using the information developed for the air permit, and applying EPA's Compilations of Air Pollutant Emission Factors (AP-42)[19] emission factors for boilers firing No. 2 fuel oil. **Table 15-7** presents the emission rates and stack parameters used in the AERMOD analysis for the analyzed facility.

Table 15-7
Stack Parameters and Emission Rates from 1385 Broadway Boilers

Parameter	Value
Stack Height (ft)[(1)]	316
Stack Diameter (ft)[(1)]	3.4
Exhaust Flow Rate (acfm) [(1,2)]	6,356
Exhaust Temperature (°F)[(1)]	400
Fuel Type	No. 2 Fuel Oil
NO_x Short Term Emission Rate (g/s)	0.53
NO_x Annual Emission Rate (g/s)	0.53
PM_{10} Short Term Emission Rate (g/s)	0.063
$PM_{2.5}$ Short Term Emission Rate (g/s)	0.057
$PM_{2.5}$ Annual Emission Rate (g/s)	0.057
SO_2 Short Term Emission Rate (g/s)	0.011

Notes:
1 The stack height, stack diameter, stack exhaust flow rate, and stack exhaust temperature are based on the DEC State Facility Permit.
2 acfm = actual cubic feet per minute.

The exhaust stack for the 1 Penn Plaza CHP Plant is 225 feet above grade, which is approximately 500 feet below the 1 Penn Plaza building. The stack plume exhaust is therefore influenced by the 1 Penn Plaza building massing under all wind directions, and would be further influenced by the proposed nearby developments. Furthermore, there are no intervening buildings between the 1

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

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

Penn Plaza exhaust stack and the proposed new buildings that would restrict or otherwise affect the CHP Plant plume exhaust in such a way as to restrict the dispersion of the plume downwind from the stack. Therefore, the AERMOD model for the 1 Penn Plaza CHP plant analysis was run with downwash only, rather than with and without downwash as per the *CEQR Technical Manual*.

Note that the proposed developments that could be impacted by these facilities are much taller in height than the emission sources. Therefore, maximum pollutant concentrations would occur below the top of the illustrative building massings, and the additional height scenario did not need to be modeled.

E. EXISTING CONDITIONS

The representative criteria pollutant concentrations measured in recent years at DEC air quality monitoring stations nearest to the Project Area are presented in **Table 15-8**. 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. 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 15-8** provide a comparison of the air quality in the Proposed Project area with the NAAQS. The background concentrations set forth in the table were obtained from several years of monitoring data, and represent a conservative estimate of the highest concentrations for future ambient conditions.

Table 15-8
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY	ppm	1-hour	1.68	35
			8-hour	1.1	9
SO_2	IS 52	μg/m^3	1-hour	14.6	196
PM_{10}	Division Street	μg/m^3	24-hour	43	150
$PM_{2.5}$	Division Street	μg/m^3	Annual	9	12
			24-hour	19.7	35
NO_2	IS 52	μg/m^3	Annual	31.7	100
	IS 52		1-hour	110.6	188
Lead	IS 52	μg/m^3	3-month	0.0027	0.15
Ozone	IS 52	ppm	8-hour	0.070	0.075

Notes:
(1) The CO concentration for the short-term average is the second-highest from the most recent year with available data.
(2) The PM_{10} concentration for the short-term average is the highest from the most recent year with available data.
(3) $PM_{2.5}$ annual concentrations are the average of 2017–2019 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentiles in the same period.
(4) The 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 2017 to 2019.
(5) The lead concentrations is based on the highest quarterly average concentration measured in 2019.
(6) The ozone concentration is based on the 3-year average (2017–2019) of the 4th highest daily maximum 8-hour average concentrations.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.

F. FUTURE WITHOUT THE PROPOSED PROJECT – 2028

MOBILE SOURCES

CO

CO concentrations in the 2028 No Action condition were determined using the methodology previously described. **Table 15-9** shows future maximum predicted 1-hour and 8-hour CO concentrations, including background concentrations, at the analysis intersections in the No Action condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 15-9
2028 Maximum Predicted CO No Action Concentrations

Analysis Site	Location	1-Hour Concentration (ppm)	8-Hour Concentration (ppm)
1	Seventh Avenue and West 34th Street	3.1	1.5
2	Sixth Avenue and West 31st Street	3.5	1.7
3	Eighth Avenue and West 31st Street	3.5	1.6

Notes:
1-hour standard (NAAQS) is 35 ppm; 8-hour standard is 9 ppm.
Concentration includes a 1-hour average background concentration of 2.5 ppm and an 8-hour average background concentration of 1.2 ppm.

PM_{10}

PM_{10} concentrations in the 2028 No Action condition were determined by using the methodology previously described. Predicted future PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in the No Action condition are presented in **Table 15-10**. The values shown represent the maximum of the sixth-highest predicted concentrations for the receptor locations combined with the background concentration, consistent with EPA guidance on determining potential violations of the NAAQS.[20] As shown in the table, No Action condition concentrations are predicted to be well below the PM_{10} NAAQS.

Table 15-10
2028 Total Predicted 24-Hour Average
PM_{10} No Action Concentrations (µg/m^3)

Analysis Site	Location	Concentration
1	Seventh Avenue and West 34th Street	84.2
2	Sixth Avenue and West 31st Street	81.3
3	Eighth Avenue and West 31st Street	83.9

Notes:
NAAQS—24-hour average 150 µg/m^3.
Concentration includes a background concentration of 39.3 µg/m^3.

[20] 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

$PM_{2.5}$

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations in the No Action condition for the 2028 analysis year were calculated so that they could be compared with the NAAQS. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average $PM_{2.5}$ concentrations in the No Action condition are presented in **Tables 15-11**. The values shown for the 24-hour average $PM_{2.5}$ concentrations represent the maximum of the 98th percentile concentrations for the modeled receptor locations combined with the background concentrations, consistent with EPA guidance on determining potential exceedances of the NAAQS.

Table 15-11
2028 Maximum Predicted
$PM_{2.5}$ No Action Concentrations (μg/m^3)

Analysis Site	Location	24–Hour Average	Annual Average
1	Seventh Avenue and West 34th Street	28.8	10.0
2	Sixth Avenue and West 31st Street	28.1	10.0
3	Eighth Avenue and West 31st Street	26.2	10.1

Notes:
NAAQS—24-hour average 35 μg/m^3; annual average 12 μg/m^3.
Concentration includes a background concentration of 19.7 μg/m^3 for 24-hour average and 9.0 μg/m^3 for the annual average.

STATIONARY SOURCES

In the 2028 No Action condition, development will occur on Site 7. Development on Sites 1 through 6 and 8 is not anticipated by 2028, and it is assumed that the emissions from these buildings on these sites will remain unchanged from existing conditions. Overall, stationary source emissions in the 2028 No Action Condition would be similar to the 2028 With Action Condition.

G. FUTURE WITH THE PROPOSED PROJECT – 2028

In the 2028 With Action condition, Site 7 would be redeveloped; the proposed below-grade expansion of Penn Station on Sites 1, 2, and 3 would be completed; and the reconstruction of the existing Penn Station would be completed.

MOBILE SOURCES

INTERSECTION ANALYSIS

CO

CO concentrations for the 2028 With Action condition were predicted using the methodology previously described. **Tables 15-12 and 15-13** show the future maximum predicted 1-hour and 8-hour average CO concentrations at the intersections studied, respectively. The values shown are the highest predicted concentrations. The results indicate that the Proposed Project in the 2028 With Action condition would not result in any violations of the 1-hour or 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations are small, and consequently would not result in a violation of the *CEQR Technical Manual de minimis* CO criteria. Therefore, mobile source CO emissions from the Proposed Project would not result in a significant adverse air quality impact.

Table 15-12
2028 Maximum Predicted 1-Hour Average
CO With Action Concentrations (ppm)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	3.1	3.2
2	Sixth Avenue and West 31st Street	3.5	3.8
3	Eighth Avenue and West 31st Street	3.5	3.5
Notes: 1-hour standard is 35 ppm. Concentration includes a background concentration of 2.5 ppm.			

Table 15-13
2028 Maximum Predicted 8-Hour Average
CO With Action Concentrations (ppm)

Analysis Site	Location	No Action	With Action	*De Minimis*
1	Seventh Avenue and West 34th Street	1.5	1.6	4.7
2	Sixth Avenue and West 31st Street	1.7	1.8	4.8
3	Eighth Avenue and West 31st Street	1.6	1.6	4.7
Notes: 8-hour standard is 9 ppm. Concentration includes a background concentration of 1.2 ppm.				

PM_{10}

PM_{10} concentrations for the 2028 With Action condition were determined using the methodology previously described and used in the No Action condition. **Table 15-14** presents the predicted PM_{10} 24-hour concentrations at the analyzed intersections in the With Action condition. As described for the No Action condition, the values shown represent the maximum of the sixth- highest predicted concentrations for the receptor locations combined with the background concentration. As shown in **Table 15-14**, no violations of the PM_{10} NAAQS are predicted at the analyzed intersection for the 2028 With Action condition. Therefore, no significant adverse impacts are predicted due to PM_{10} concentrations from mobile sources in the 2028 With Action condition.

Table 15-14
2028 Maximum Predicted 24-Hour Average
PM_{10} With Action Concentration (μg/m^3)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	84.2	87.3
2	Sixth Avenue and West 31st Street	81.3	87.0
3	Eighth Avenue and West 31st Street	83.9	87.5
Notes: NAAQS—24-hour average 150 μg/m^3. Concentrations presented include a background concentration of 39.3 μg/m^3.			

$PM_{2.5}$

Using the methodology previously described, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations for the 2028 analysis year were calculated to be compared with the *CEQR Technical Manual de minimis* criteria, as presented in **Tables 15-15 and 15-16**, respectively.

Table 15-15
2028 Maximum Predicted 24-Hour Average $PM_{2.5}$ Incremental Concentrations (μg/m^3)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Seventh Avenue and West 34th Street	0.2	7.7
2	Sixth Avenue and West 31st Street	0.7	7.7
3	Eighth Avenue and West 31st Street	0.2	7.7

Notes: $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration (19.7 μg/m^3) and the 24-hour standard of 35 μg/m^3.

Table 15-16
2028 Maximum Predicted Annual Average $PM_{2.5}$ Incremental Concentrations (μg/m^3)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Seventh Avenue and West 34th Street	0.06	0.1
2	Sixth Avenue and West 31st Street	0.12	0.1
3	Eighth Avenue and West 31st Street	0.03	0.1

Note: $PM_{2.5}$ *de minimis* criteria—annual (neighborhood scale), 0.1 μg/m^3.

Total predicted concentrations in the No Action and With Action condition for the 2028 analysis year were also calculated so that they could be compared with the NAAQS, as presented in **Tables 15-17 and 15-18** for the 24-hour and annual average periods, respectively. As previously described, the values shown for the total 24-hour average $PM_{2.5}$ concentrations represent the maximum of the 98th percentile concentrations for the modeled receptor locations combined with the background concentrations.

Table 15-17
2028 Predicted 24-Hour Average $PM_{2.5}$ With Action Concentration (μg/m^3)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	28.8	29.0
2	Sixth Avenue and West 31st Street	28.1	28.4
3	Eighth Avenue and West 31st Street	26.2	28.7

Notes:
NAAQS—24-hour average 35 μg/m^3.
Concentrations presented include a background concentration of 19.7 μg/m^3.

Table 15-18
2028 Predicted Annual Average $PM_{2.5}$ With Action Concentration (μg/m^3)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	10.0	10.1
2	Sixth Avenue and West 31st Street	10.0	10.1
3	Eighth Avenue and West 31st Street	10.1	10.1

Notes:
NAAQS—annual average 12 μg/m^3.
Concentrations presented include a background concentration of 9.0 μg/m^3.

The results in **Tables 15-15, 15-17,** and **15-18** 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.

As shown in **Table 15-16**, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion at the intersection of Sixth Avenue and West 31st Street. This increase in $PM_{2.5}$ is determined at a distance of 15 meters (approximately 50 feet) from a roadway corridor, which is similar to the minimum distance defined for locating neighborhood scale monitoring stations. The potential exceedances would be limited to the immediate areas around this intersection. The areas with modeled exceedances of the *de minimis* criterion include the sidewalk locations at the affected intersection and the immediate surroundings and are primarily comprised of retail and commercial office buildings. The affected areas are primarily used by transient users (pedestrians), therefore, the overall exposure to the predicted $PM_{2.5}$ exceedances at the affected locations near these intersections would be brief, and this exposure would be below the short-term (24-hour) $PM_{2.5}$ *de minimis* criterion. Because the areas affected represent a portion of the area within the neighborhood, the effect on $PM_{2.5}$ concentrations would not represent a neighborhood-scale effect but rather a localized one.

Furthermore, while the maximum incremental increase in $PM_{2.5}$ concentration was predicted to exceed the *CEQR Technical Manual de minimis* criterion on an annual basis, it should be noted that the *de minimis* criteria by itself is not a direct indicator of unhealthy air quality. When added to the current measured background concentration at the nearest representative DEC monitoring station (9.0 $\mu g/m^3$, measured at Division Street in Manhattan), the maximum total concentration is 10.1 $\mu g/m^3$, which is below the NAAQS of 12 $\mu g/m^3$ (see **Table 15-18**). Future background concentrations are expected to be lower, continuing a long-term trend in improvements in ambient air quality, due to ongoing efforts at the state and local levels to improve air quality. These include DEC's implementation plans for regional haze, the New York City Climate Mobilization Act and the New York State Climate Leadership and Community Protection Act, which seek to reduce emissions from fossil fuels through use of renewable energy sources and increased energy efficiency.

The prediction of future $PM_{2.5}$ concentrations from the Proposed Project are based on very conservative assumptions of future traffic conditions and vehicle emissions (in particular, the analysis does not assume any significant change in current utilization of gasoline and diesel powered vehicles versus electric vehicles). When accounting for the above mentioned factors, both the incremental $PM_{2.5}$ concentrations from the Proposed Project's mobile sources and the ambient background $PM_{2.5}$ concentrations are anticipated to be reduced in the 2028 analysis year as compared to current levels.

The Proposed Project would not contribute to or exacerbate a violation of the $PM_{2.5}$ NAAQS even with the very conservative assumptions used in this analysis. Therefore, the exceedances of the $PM_{2.5}$ *de minimis* criterion on an annual basis would not constitute a significant adverse air quality impact.

NO_2

While initial monitored background concentrations near roadways are below the NAAQS, there is currently insufficient data and no established analysis techniques to determine reliably whether modeled concentrations due to emissions from mobile sources in the study area would be above or below the 1-hour NO_2 standard in the 2028 No Action condition or With Action condition. However, the traffic associated with the Proposed Project is not expected to change NO_2 concentrations appreciably, since the vehicular traffic increments associated with the 2028 With Action condition would be a small percentage of the total number of vehicles in the area.

PARKING ANALYSIS

In the 2028 With Action condition, Site 7 would be the only development site expected to be complete. Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facility at this site was analyzed, assuming a near side sidewalk receptor on the same side of the street (seven feet) as the parking facility, and a far side sidewalk receptor on the opposite side of Seventh Avenue.

The maximum predicted eight-hour average CO concentration of all the receptors modeled for the four analyzed parking facilities is 1.3 ppm. This value includes a predicted concentration of 0.01 ppm from emissions within the parking garage, on-street contribution of 0.1 ppm, and a background level of 1.2 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 0.04 µg/m^3 and 0.01 µg/m^3, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria 7.7 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

HEAT AND HOT WATER SYSTEMS

The results of the AERMOD analysis for the Proposed Project's heating and hot water systems in the 2028 analysis year are presented in **Tables 15-19 and 15-20** for the illustrative massing scenario and the additional height scenario, respectively. As shown in the tables, no exceedances of the NO_2 NAAQS were predicted, and incremental concentrations of $PM_{2.5}$ were predicted to be less than the *CEQR Technical Manual de minimis* criteria. Therefore, no significant adverse air quality impacts from the Proposed Project's heating and hot water systems are predicted.

Table 15-19
2028 Maximum Modeled Pollutant Concentrations
From the Proposed Project's Heating and Hot Water Systems
Illustrative Massing Scenario (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	99.9	N/A (1)	99.9	188 (2)
	Annual	0.0048 (3)	32.8	32.8	100 (2)
$PM_{2.5}$	24-hour	0.02	N/A	0.02	7.7 (3)
	Annual	0.0015	N/A	0.0015	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour concentration predicted at any receptor, which consists of the sum of the source-modeled concentrations and seasonal-hourly background concentrations.
2. NAAQS.
3. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling 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/m^3.
4. $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

Table 15-20
2028 Maximum Modeled Pollutant Concentrations
From the Proposed Project's Heating and Hot Water Systems
– Additional Height Scenario (µg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	100.0	N/A (1)	100.0	188 (2)
	Annual	0.0168 (3)	32.8	32.8	100 (2)
$PM_{2.5}$	24-hour	0.03	N/A	0.03	7.7 (3)
	Annual	0.0052	N/A	0.0052	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration 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. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling 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).

To ensure that there are no potential significant adverse air quality impacts, certain design constraints would be incorporated into the Proposed Project and included in the project documents for Site 7. These restrictions were assumed in the analysis results presented in **Tables 15-19 and 15-20**, and would avoid the potential for significant air quality impacts from stationary sources based on the conservative assumptions used in the analysis. The restrictions are presented in Section I, "Future With the Proposed Project – 2038."

ADDITIONAL SOURCES

Potential stationary source impacts from existing large emission sources on the Proposed Project for the 2028 analysis year were determined using the methodology previously described. Site 7 was determined to be within 1,000 of a large or major source (1 Penn Plaza CHP Plant).

The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling analysis were added to the background concentrations to estimate total air quality concentrations on Site 7, while $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. Total 1-hour NO_2 concentrations were determined following the refined EPA Tier 3 approach described earlier for the heating and hot water system analysis. The results of the AERMOD analysis are presented in **Table 15-21**.

Table 15-21
Maximum Modeled Pollutant Concentrations (µg/m³)
from 1 Penn Plaza CHP Plant on the Proposed Project

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	Annual (1)	2.3	32.8	35.1	100
	1-hour	186	N/A (2)	186	188
$PM_{2.5}$	24-hour	2.2	N/A	2.2	7.7(3)
	Annual	0.21	N/A	0.21	0.3 (4)

Notes:
1. Annual NO_2 concentrations were estimated using a NO_2/NO_x ratio of 0.75, based on EPA modeling guidance.
2. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
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.

H. FUTURE WITHOUT THE PROPOSED PROJECT – 2038

MOBILE SOURCES

CO

CO concentrations in the 2038 No Action condition were determined using the methodology previously described. **Table 15-22** shows future maximum predicted 1-hour and 8-hour CO concentrations, including background concentrations, at the analysis intersections in the No Action condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 15-22
2038 Maximum Predicted
CO No Action Concentration

Analysis Site	Location	1-Hour Concentration (ppm)	8-Hour Concentration (ppm)
1	Seventh Avenue and West 34th Street	3.1	1.5
2	Sixth Avenue and West 31st Street	3.4	1.6
3	Eighth Avenue and West 31st Street	3.4	1.5

Notes:
1-hour standard (NAAQS) is 35 ppm; 8-hour standard is 9 ppm.
Concentration includes a 1-hour average background concentration of 2.5 ppm and an 8-hour average background concentration of 1.2 ppm.

PM_{10}

PM_{10} concentrations in the 2038 No Action condition were determined by using the methodology previously described. Predicted future PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in the No Action condition are presented in **Table 15-23**. The values shown represent the maximum of the sixth-highest predicted concentrations for the receptor locations combined with the background concentration, consistent with EPA guidance on determining potential violations of the NAAQS. As shown in the table, No Action condition concentrations are predicted to be well below the PM_{10} NAAQS.

Table 15-23
2038 Total Predicted 24-Hour Average
PM_{10} No Action Concentrations (µg/m^3)

Analysis Site	Location	Concentration
1	Seventh Avenue and West 34th Street	87.7
2	Sixth Avenue and West 31st Street	84.8
3	Eighth Avenue and West 31st Street	90.5

Notes:
NAAQS—24-hour average 150 µg/m^3.
Concentration includes a background concentration of 39.3 µg/m^3.

$PM_{2.5}$

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations in the No Action condition for the 2038 analysis year were calculated so that they could be compared with the NAAQS. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average $PM_{2.5}$ concentrations in the No Action condition are presented in **Tables 15-24**. The values shown for the 24-hour average $PM_{2.5}$ concentrations represent the maximum of the 98th percentile concentrations for the modeled receptor locations combined with the background concentrations, based on EPA guidance on determining potential violations of the NAAQS.

Table 15-24
2038 Maximum Predicted
$PM_{2.5}$ No Action Concentrations (μg/m^3)

Analysis Site	Location	24 –Hour	Annual Average
1	Seventh Avenue and West 34th Street	29.2	10.1
2	Sixth Avenue and West 31st Street	28.7	10.1
3	Eighth Avenue and West 31st Street	29.7	10.2

Notes:
NAAQS—24-hour average 35 μg/m^3; annual average 12 μg/m^3.
Concentration includes a background concentration of 19.7 μg/m^3 for 24-hour average and 9.0 μg/m^3 for the annual average

STATIONARY SOURCES

In the 2038 No Action condition, Sites 4 and 5 will be redeveloped in addition to Site 7, which will be completed by the 2028 analysis year. Site 4 will be redeveloped with a 1.1-million-gross-square-foot (gsf) mixed-use building with hotel, office, and retail uses, and Site 5 will be redeveloped with an approximately 250,000-gsf office building with ground-floor retail space. As described above, Site 7 will be redeveloped with a 1.6-million-gsf office building with ground-floor retail space. No development is assumed on Sites 1, 2, 3, 6, and 8, and these sites would remain as in existing conditions. Overall, stationary source emissions in the 2038 No Action Condition would be lower than the 2038 With Action Condition.

I. FUTURE WITH THE PROPOSED PROJECT – 2038

MOBILE SOURCES

INTERSECTION ANALYSIS

CO

CO concentrations for the 2038 With Action condition were predicted using the methodology previously described. **Tables 15-25 and 15-26** shows the future maximum predicted 1-hour and 8-hour average CO concentrations at the intersections studied, respectively. The values shown are the highest predicted concentrations. The results indicate that the Proposed Project in the 2038 With Action condition would not result in any violations of the 1-hour or 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations are small, and consequently would not result in a violation of the *CEQR Technical Manual de minimis* CO criteria. Therefore, mobile source CO emissions from the Proposed Project would not result in a significant adverse air quality impact.

Table 15-25
2038 Maximum Predicted 1-Hour Average CO With Action Concentrations (ppm)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	3.1	4.0
2	Sixth Avenue and West 31st Street	3.4	4.9
3	Eighth Avenue and West 31st Street	3.4	3.9
Notes: 1-hour standard is 35 ppm. Concentration includes a background concentration of 2.52 ppm.			

Table 15-26
2038 Maximum Predicted 8-Hour Average CO With Action Concentrations (ppm)

Analysis Site	Location	No Action	With Action	*De Minimis*
1	Seventh Avenue and West 34th Street	1.5	1.7	4.6
2	Sixth Avenue and West 31st Street	1.6	2.0	4.7
3	Eighth Avenue and West 31st Street	1.5	1.7	4.7
Notes: 8-hour standard is 9 ppm. Concentration includes a background concentration of 1.2 ppm.				

PM_{10}

PM_{10} concentrations for the 2038 With Action condition were determined using the methodology previously described and used in the No Action condition. **Table 15-27** presents the predicted PM_{10} 24-hour concentrations at the analyzed intersections in the With Action condition. As described for the No Action condition, the values shown represent the maximum of the sixth highest predicted concentrations for the receptor locations combined with the background concentration.

Table 15-27
2038 Maximum Predicted 24-Hour Average PM_{10} With Action Concentration (μg/m^3)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	87.7	105.0
2	Sixth Avenue and West 31st Street	84.8	117.1
3	Eighth Avenue and West 31st Street	90.5	107.0
Notes: NAAQS—24-hour average 150 μg/m^3. Concentrations presented include a background concentration of 39.3 μg/m^3.			

$PM_{2.5}$

Using the methodology previously described, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations for the 2038 analysis year were calculated to be compared with the *CEQR Technical Manual de minimis* criteria, as presented in **Tables 15-28 and 15-29**, respectively.

Table 15-28
2038 Maximum Predicted 24-Hour Average $PM_{2.5}$ Incremental Concentrations (µg/m^3)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Seventh Avenue and West 34th Street	4.7	7.7
2	Sixth Avenue and West 31st Street	8.5	7.7
3	Eighth Avenue and West 31st Street	4.1	7.7

Notes:
$PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration (19.7 µg/m^3) and the 24-hour standard of 35 µg/m^3.

Table 15-29
2038 Maximum Predicted Annual Average $PM_{2.5}$ Incremental Concentrations (µg/m^3)

Analysis Site	Location	No Action	With Action	Increment	*De Minimis* Criterion
1	Seventh Avenue and West 34th Street	10.1	11.2	1.10	0.1
2	Sixth Avenue and West 31st Street	10.1	11.98	1.88	0.1
3	Eighth Avenue and West 31st Street	10.2	11.0	0.81	0.1

Notes: $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 µg/m^3.

Total predicted concentrations in the No Action and With Action condition for the 2038 analysis year were also calculated so that they could be compared with the NAAQS, as presented in **Tables 15-30 and 15-31** for the 24-hour and annual average periods, respectively. As previously described, the values shown for the total 24-hour average $PM_{2.5}$ concentrations represent the maximum of the 98th percentile concentrations for the modeled receptor locations combined with the background concentrations.

Table 15-30
2038 Total Predicted 24-Hour Average $PM_{2.5}$ With Action Concentration (µg/m^3)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	29.6	32.6
2	Sixth Avenue and West 31st Street	28.7	34.2
3	Eighth Avenue and West 31st Street	29.7	32.4

Notes:
NAAQS—24-hour average 35 µg/m^3.
Concentrations presented include a background concentration of 19.7 µg/m^3.

Table 15-31
2038 Total Predicted Annual Average $PM_{2.5}$ With Action Concentration (µg/m^3)

Analysis Site	Location	No Action	With Action
1	Seventh Avenue and West 34th Street	10.1	11.2
2	Sixth Avenue and West 31st Street	10.1	11.98
3	Eighth Avenue and West 31st Street	10.2	11.0

Notes:
NAAQS—annual average 12 µg/m^3.
Concentrations presented include a background concentration of 9.0 µg/m^3.

The results in **Tables 15-28 and 15-30** show that the 24-hour $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion at analysis sites 1 and 3, and total concentrations are below the NAAQS at each of the analysis sites.

As shown in **Table 15-28 and 15-29**, the 24-hour $PM_{2.5}$ increment is predicted to exceed the short term (24-hour) *de minimis* criterion at the intersection of Sixth Avenue and West 31st Street, and the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion at all three intersection sites analyzed. For mobile sources, the increase in annual-average $PM_{2.5}$ is determined at a distance of 15 meters (approximately 50 feet) from a roadway corridor, which is similar to the minimum distance defined for locating neighborhood scale monitoring stations. The potential exceedances of the annual *de minimis* criterion were predicted at the intersections Seventh Avenue and 34th Street, Sixth Avenue and West 31st Street, and Eighth Avenue and West 31st Street. The potential exceedances would be limited to the immediate areas around these intersections. The areas with modeled exceedances of the *de minimis* criterion include the sidewalk locations at the affected intersections and the immediate surroundings, which include portions of Sites 1, 2, 5, and 6, and are primarily comprised of retail and commercial office buildings. The affected areas are primarily used by transient users (pedestrians), therefore, the overall exposure to the predicted $PM_{2.5}$ exceedances at the affected locations near these intersections would be brief. Because the areas affected represent a portion of the area within the neighborhood, the effect on $PM_{2.5}$ concentrations would not represent a neighborhood-scale effect but rather a localized one.

Furthermore, while the maximum incremental increase in $PM_{2.5}$ concentration was predicted to exceed the *CEQR Technical Manual de minimis* criteria, it should be noted that the *de minimis* criteria by itself is not a direct indicator of unhealthy air quality. When added to the current measured background concentrations at the nearest representative DEC monitoring station (Division Street in Manhattan), the maximum total short-term concentration is 34.2 $\mu g/m^3$, which is below the NAAQS of 35 $\mu g/m^3$ (see **Table 15-30**), and the maximum total annual-average concentration is 11.98 $\mu g/m^3$, which is below the NAAQS of 12 $\mu g/m^3$ (see **Table 15-31**). Future background concentrations are expected to be lower, continuing a long-term trend in improvements in ambient air quality, due to ongoing efforts at the state and local levels to improve air quality. These include DEC's implementation plans for regional haze, the New York City Climate Mobilization Act and the New York State Climate Leadership and Community Protection Act, which seek to reduce emissions from fossil fuels through use of renewable energy sources and increased energy efficiency.

The prediction of future $PM_{2.5}$ concentrations from the Proposed Project are based on very conservative assumptions of future traffic conditions and vehicle emissions (in particular, the analysis does not assume any significant change in current utilization of gasoline and diesel powered vehicles versus electric vehicles). When accounting for the above mentioned factors, both the incremental $PM_{2.5}$ concentrations from the Proposed Project's mobile sources and the ambient background $PM_{2.5}$ concentrations are anticipated to be significantly reduced in the 2038 analysis year as compared to current levels.

The Proposed Project would not contribute to or exacerbate a violation of the $PM_{2.5}$ NAAQS even with the very conservative assumptions used in this analysis. Therefore, the exceedances of the $PM_{2.5}$ *de minimis* criteria on a short-term or annual basis would not constitute a significant adverse air quality impact.

NO_2

Similar to the assessment for the 2028 With Action condition, while initial monitored concentrations are below the NAAQS, there is currently insufficient data and no established analysis techniques to determine reliably whether modeled concentrations due to emissions from mobile sources in the study area would be above or below the 1-hour NO_2 standard in the 2038 No Action condition or the With Action condition. However, the traffic associated with the Proposed Project is not expected to change NO_2 concentrations appreciably, since the vehicular traffic increments associated with the 2038 With Action condition would be a small percentage of the total number of vehicles in the area. There would also be an increasing percentage of newer vehicles that meet EPA's lower emission limits (Tier 3 emission standards for light duty vehicles) entering the fleet, which are expected to reduce emissions of NO_2 from vehicles.

PARKING ANALYSIS

Under the 2038 With Action condition, all development sites are assumed to be complete and operational, and therefore the maximum predicted CO and PM concentrations from the four 100-space accessory parking garages were analyzed. Based on the methodology previously described, a near side sidewalk receptor on the same side of the street as each parking facility was assumed, as well as a far side sidewalk receptor on the opposite side of the street from the parking facility.

The maximum predicted eight-hour average CO concentration of all the receptors modeled for the four analyzed parking facilities are presented in **Table 15-32**. As shown in the table, the maximum predicted concentration is substantially below the applicable standard of 9 ppm and the *de minimis* CO criteria.

Table 15-32
2038 Maximum Predicted 8-Hour Average Parking Garage CO Concentrations (ppm)

Site	Receptor with Maximum Concentration	Garage Contribution	On-street Contribution	Background Concentration	*Total Concentration*
Site 4	Far side	0.002	0.07	1.2	1.3
Site 6	Near side	0.020	0.73(1)	1.2	2.0
Site 7	Far side	0.006	0.11	1.2	1.3
Site 8	Far side	0.004	0.07	1.2	1.3

Notes:
8-hour standard is 9 ppm.
1. Since Site 6 is adjacent to an analyzed intersection, on-street contribution is the modeled result from the intersection analysis. Note that the modeled result from the intersection analysis was extracted from only the receptors on either side of Seventh Avenue and may not be the same as the reported maximum concentration in the intersection analysis results.

The maximum predicted 24-hour and annual average $PM_{2.5}$ incremental concentrations are shown in **Table 15-33** and **Table 15-34**, respectively.

As shown in **Table 15-33**, 24-hour average $PM_{2.5}$ total incremental concentrations for each garage would be below the $PM_{2.5}$ *de minimis* criterion of 7.7 $\mu g/m^3$. The maximum predicted $PM_{2.5}$ increment from the contribution of each garage alone is also well below the respective $PM_{2.5}$ *de minimis* criteria of 7.7 $\mu g/m^3$ for the 24-hour average concentration and 0.3 $\mu g/m^3$ for the annual average concentration. However, since Site 6 is adjacent to Seventh Avenue and 34th Street, which was predicted to exceed the *CEQR Technical Manual* annual average *de minimis* criterion of 0.1 $\mu g/m^3$ as a result of traffic due to the Proposed Project, the cumulative incremental $PM_{2.5}$ annual average concentration that included the contribution from the intersection would result in a concentration that exceeds the *CEQR Technical Manual de minimis* criteriion on an annual average basis. However, as discussed above, potential impacts from the Proposed Project at intersections would not result in a violation of the $PM_{2.5}$ NAAQS. On a neighborhood scale, $PM_{2.5}$ concentrations from the proposed parking garage would be much lower than as reported in **Table 15-34** and are considered negligible. Therefore, no violation of the NAAQS would result from cumulative impacts of the Proposed Project's mobile sources of emission and emissions from the proposed parking garages, and thus no significant adverse air quality impacts are predicted.

Table 15-33
2038 Maximum Predicted 24-Hour Average Parking Garage $PM_{2.5}$ Increments (μg/m^3)

Site	Receptor with Maximum Concentration	Garage Contribution	On-street Contribution	*Total Increment*
Site 4	Near side	0.02	N/A (1)	0.02
Site 6	Near side	0.04	5.6(2)	5.6
Site 7	Far side	0.006	0.02	0.02
Site 8	Near side	0.03	N/A (1)	0.03

Notes:
The 24-hour average $PM_{2.5}$ *de minimis* criterion is 7.7 μg/m^3.
1. Contribution from adjacent street not included since receptor is not downwind of on-street sources.
2. Since Site 6 is adjacent to an analyzed intersection, on-street contribution is the modeled result from the intersection analysis. Note that the modeled result from the intersection analysis was extracted from only the receptors on either side of Seventh Avenue and may not be the same as the reported maximum concentration in the intersection analysis results.

Table 15-34
2038 Maximum Predicted Annual Average Parking Garage $PM_{2.5}$ Increments (μg/m^3)

Site	Receptor with Maximum Concentration	Garage Contribution	On-street Contribution	*Total Increment*
Site 4	Near side	0.003	N/A (1)	0.003
Site 6	Near side	0.01	1.1(2)	1.1
Site 7	Far side	0.001	0.003	0.004
Site 8	Near side	0.005	N/A (1)	0.005

Notes:
The annual average $PM_{2.5}$ *de minimis* criterion is 0.1 μg/m^3.
1. Contribution from adjacent street not included since receptor is not downwind of on-street sources.
2. Since Site 6 is adjacent to an analyzed intersection, on-street contribution is the modeled result from the intersection analysis. Note that the modeled result from the intersection analysis was extracted from only the receptors on either side of Seventh Avenue and may not be the same as the reported maximum concentration in the intersection analysis results.

STATIONARY SOURCES

HEAT AND HOT WATER SYSTEMS

The results of the AERMOD analysis for the Proposed Project's heating and hot water systems in the 2038 analysis year are presented in **Table 15-35 and Table 15-36** for the illustrative massing scenario, at off-site and project receptors, respectively.

Table 15-35
2038 Maximum Modeled Pollutant Concentrations
From the Proposed Project's Heating and Hot Water Systems
Off-Site Receptors – Illustrative Massing Scenario(µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	133.19	N/A (1)	133.19	188 (2)
	Annual	0.37 (3)	32.8	33.17	100 (2)
$PM_{2.5}$	24-hour	2.09	N/A	2.09	7.7 (3)
	Annual	0.08	N/A	0.08	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour concentration predicted at any receptor using seasonal-hourly background concentrations.
2. NAAQS.
3. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling 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/m^3.
4. $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

Table 15-36
2038 Maximum Modeled Pollutant Concentrations
From the Proposed Project's Heating and Hot Water Systems
On the Proposed Project – Illustrative Massing Scenario (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	179.16	N/A (1)	179.16	188 (2)
	Annual	1.38 (3)	32.8	34.18	100 (2)
$PM_{2.5}$	24-hour	7.69	N/A	7.69	7.7 (3)
	Annual	0.2	N/A	0.2	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour concentration predicted at any receptor using seasonal-hourly background concentrations.
2. NAAQS.
3. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling 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/m^3.
4. $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

The results of the AERMOD analysis for the Proposed Project's heating and hot water systems in the 2038 analysis year are presented in **Table 15-37 and Table 15-38** for the additional height scenario, at off-site and project receptors, respectively.

Table 15-37
2038 Maximum Modeled Pollutant Concentrations
From the Proposed Project's Heating and Hot Water Systems
Off-Site Receptors– Additional Height Scenario (µg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	117.8	N/A (1)	117.8	188 (2)
	Annual	0.26 (3)	32.8	33.06	100 (2)
$PM_{2.5}$	24-hour	0.89	N/A	0.89	7.7 (3)
	Annual	0.03	N/A	0.03	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour concentration predicted at any receptor using seasonal-hourly background concentrations.
2. NAAQS.
3. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling 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).

Table 15-38
2038 Maximum Modeled Pollutant Concentrations
From the Proposed Project's Heating and Hot Water Systems
On the Proposed Project– Additional Height Scenario (µg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	178.3	N/A (1)	178.3	188 (2)
	Annual	1.26 (3)	32.8	34.06	100 (2)
$PM_{2.5}$	24-hour	7.36	N/A	7.36	7.7 (3)
	Annual	0.19	N/A	0.19	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour concentration predicted at any receptor using seasonal-hourly background concentrations.
2. NAAQS.
3. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling 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).

As shown in the tables, no exceedances of the NO_2 NAAQS were predicted and incremental concentrations of $PM_{2.5}$ were predicted to be less than the CEQR *de minimis* criteria. Therefore, no significant adverse air quality impacts from the Proposed Project's heating and hot water systems are predicted.

To ensure that there are no potential significant adverse air quality impacts from stationary sources, certain design constraints would be incorporated into the Proposed Project and required in the project documents. These constraints were assumed in the analysis results presented in **Table 15-35 and Table 15-36** for the illustrative massing scenario and **Tables 15-37 and 15-38** for the additional height scenario, and are outlined below.

INDUSTRIAL SOURCES

The potential impacts of existing industrial operations on pollutant concentrations at the development site were evaluated. Potential industrial air pollutant emission sources within 400 feet of the proposed development sites were surveyed for inclusion in the air quality impact analyses, as recommended in the *CEQR Technical Manual*.

Land use maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A field survey was conducted on August 14, 2020 to identify buildings within 400 feet of the project site that have the potential for emitting air pollutants. A search of federal- and state-permitted facilities within the study area was conducted using EPA's Envirofacts database.[21] DEP's online permit search database was also used to identify any permitted industrial uses in the study area.[22]

No permitted activities were identified within the study area. No other sources of emissions were identified in the land use and field surveys; therefore, no potential for significant impacts on the Proposed Project are anticipated from industrial source emissions in the 2038 With Action Condition.

ADDITIONAL SOURCES

Potential stationary source impacts from the existing large emission sources on the Proposed Project for the 2038 analysis year were determined using the methodology previously described. For the 2038 analysis year, the large emission sources at 1 Penn Plaza and 1385 Broadway were analyzed.

The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling analysis were added to the background concentrations to estimate total air quality concentrations on the Proposed Project, while $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. Total 1-hour NO_2 concentrations were determined following the refined EPA Tier 3 approach described earlier for the heating and hot water system analysis. The results of the AERMOD analysis for 1 Penn Plaza and 1385 Broadway are presented in **Tables 15-39 and 15-40**, respectively.

Table 15-39
Maximum Modeled Pollutant Concentrations (μg/m^3) from 1 Penn Plaza CHP Plant on the Proposed Project

Pollutant	Averaging Period	Maximum Modeled Impact	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	Annual (1)	2.4	32.8	35.2	100
	1-hour	179	N/A (1)	179	188
$PM_{2.5}$	24-hour	5.2	N/A	5.2	7.7 (3)
	Annual	0.20	N/A	0.20	0.3 (4)

Notes:
1. Annual NO_2 concentrations were estimated using a NO_2 /NO_x ratio of 0.75, based on EPA modeling guidance.
2. The 1-hour average NO_2 concentration represents the maximum total 98th percentile 1-hour concentration predicted at any receptor using seasonal-hourly background concentrations.
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.

[21] EPA. Envirofacts. https://www3.epa.gov/enviro/. Accessed September 23, 2020.

[22] DEP. *NYC DEP CATS Information.* https://a826-web01.nyc.gov/dep.boilerinformationext. New York City Open Data https://data.cityofnewyork.us/Environment/CATS-Permits/f4rp-2kvy. Accessed August 4, 2020 and September 24, 2020.

Table 15-40
Maximum Modeled Pollutant Concentrations (µg/m³)
from 1385 Broadway on the Proposed Project

Pollutant	Averaging Period	Maximum Modeled Impact	Background Concentration	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	Annual (1)	1.4	32.8	34.2	100
	1-hour	135	N/A (2)	135	188
SO_2	1-hour	1.04	14.6	15.6	196
PM_{10}	24-hour	2.4	39.3	41.7	150
$PM_{2.5}$	24-hour	2.2	N/A	2.2	7.7(3)
	Annual	0.20	N/A	0.20	0.3 (4)

Notes:
1. Annual NO_2 concentrations were estimated using a NO_2 /NO_x ratio of 0.75, based on EPA modeling guidance.
2. The 1-hour average NO_2 concentration represents the maximum of the total 98th percentile 1-hour concentration predicted at any receptor using seasonal-hourly background concentrations.
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.

To ensure that there are no potential significant adverse air quality impacts from the CHP Plant at 1 Penn Plaza, certain restrictions would be imposed by the project documents. These restrictions were assumed in the analysis results presented in **Table 15-39**, and are outlined below. It should be noted that pollutant concentrations at receptors located on the façade of the building facing away from the modeled source (i.e., the eastern facades of the development sites 5, 6, and 7) would be lower than predicted by the AERMOD model since the building's bulk would obstruct the source plume from directly impacting receptors on the far side of the building, resulting in additional dilution of the plume. Therefore, concentrations predicted by the model to exceed NAAQS or *CEQR Technical Manual* $PM_{2.5}$ *de minimis* criteria at these receptors were excluded from the analysis results.

As shown in **Table 15-40**, the predicted pollutant concentrations for all of the pollutant averaging periods are below their respective standards. Therefore, no significant adverse air quality impacts on the Proposed Project from the large emission sources at 1385 Broadway are predicted.

PROPOSED RESTRICTIONS

As discussed above, the conclusion that no significant air quality impacts due to emissions from the Proposed Project's fossil fuel-fired heating and hot water systems, or from the CHP Plant at 1 Penn Plaza on the Proposed Project, is based on the assumption that certain design requirements would be incorporated into the project documents. The design requirements apply to fossil fuel-fired heating and hot water systems in the proposed developments, and the location of air intakes and operable windows; if a particular development site utilizes grid electric power or Con Edison steam service to power its heat and hot water system, the restrictions regarding fuel type, exhaust stack location, and maximum heat input capacity of natural gas-fired heat and hot water systems would not be required. The design requirements for each development site are discussed below.

These restrictions may be modified, or determined to be unnecessary by ESD at the time each building is developed, based on new information or technology, additional facts (such as the decommissioning of an existing source), or updated standards. Any such determination would be based upon further environmental analysis. In particular, if the CHP Plant at 1 Penn Plaza is decommissioned prior to the development of Sites 5 and 7, the restrictions on operable windows and air intakes on those sites would no longer be required.

Site 1 West

Fossil fuel-fired heating and hot water equipment located at Site 1 West must burn only natural gas, the exhaust stack must be located a minimum of 421 feet from the tax lot line along Eighth Avenue, and no more than 489 feet from the tax lot line along Eighth Avenue.

Site 1 East

Fossil fuel-fired heating and hot water equipment located at Site 1 East must burn only natural gas, be fitted with low NO_x (30 ppm) burners, and the exhaust stack must be located a minimum of 110 feet from the tax lot line along Eighth Avenue. The maximum capacity of equipment used for heating and hot water systems shall not exceed a total of 14.4 MMBtu/hr.

Site 2 West

Fossil fuel-fired heating and hot water equipment located at Site 2 West must burn only natural gas, be fitted with low NO_x (30 ppm) burners, and the exhaust stack must be located no more than 90 feet from the tax lot line along Eighth Avenue.

Site 2 East

Fossil fuel-fired heating and hot water equipment located at Site 2 East must burn only natural gas, be fitted with low NO_x (30 ppm) burners, the exhaust stack must be located a minimum of 76 feet from the tax lot line along West 31st Street, and a minimum of 120 feet from the tax lot line along Seventh Avenue.

Site 3

Fossil fuel-fired heating and hot water equipment located at Site 3 must burn only natural gas, be fitted with low NO_x (30 ppm) burners, the exhaust stack must be located a minimum of 204 feet from the tax lot line along Seventh Avenue, and a minimum of 82 feet from the tax lot line along West 31st Street.

Site 4

Fossil fuel-fired heating and hot water equipment located at Site 4 must burn only natural gas, be fitted with low NO_x (20 ppm) burners, the exhaust stack must be located no more than 32 feet from the tax lot line along Eighth Avenue. The maximum capacity of equipment used for heating and hot water systems shall not exceed a total of 21.5 MMBtu/hr.

Site 5

Fossil fuel-fired heating and hot water equipment located at Site 5 must burn only natural gas, be fitted with a low NO_x (30 ppm) burner, the exhaust stack must be located a minimum of 132 feet from the tax lot line along West 33rd Street, and a minimum of 111 feet from the tax lot line along Seventh Avenue. The maximum capacity of equipment used for heating and hot water systems shall not exceed a total of 14.6 MMBtu/hr.

Due to current configuration of the 1 Penn Plaza CHP Plant, if the emissions from this source continue, no operable windows or air intakes would be permitted on the western façade of Site 5 between a height of 220 feet and 330 feet above grade, on the southern façade between a height of 240 feet and 320 feet above grade, and on the northern façade between 230 feet and 310 feet above grade.

Site 6

Fossil fuel-fired heating and hot water equipment located at Site 6 must burn only natural gas, be fitted with low NO_x (30 ppm) burners, and the exhaust stack must be located a minimum of 138 feet from the tax lot line along Seventh Avenue, and a minimum of 147 feet from the tax lot line along West 33rd Street. The maximum capacity of equipment used for heating and hot water systems shall not exceed a total of 20.2 MMBtu/hr.

Site 7

Fossil fuel-fired heating and hot water equipment located at Site 7 must burn only natural gas, be fitted with low NO_x (20 ppm) burners, and the exhaust stack must be located a minimum of 137 feet from the edge of the lot facing West 33rd Street, a minimum of 154 feet from the tax lot line along Seventh Avenue, and no more than 312 feet from the tax lot line along Seventh Avenue. The maximum capacity of equipment used for heating and hot water systems shall not exceed a total of 20.0 MMBtu/hr.

Due to the current configuration of the 1 Penn Plaza CHP Plant, if the emissions from this source continue, no operable windows or air intakes would be permitted on the northern and western façades of Site 7 between a height of 260 feet and 280 feet above grade.

Site 8

Fossil fuel-fired heating and hot water equipment located at Site 8 must burn only natural gas, be fitted with low NO_x (30 ppm) burners, and the exhaust stack must be located no more than 149 feet from the tax lot line along the Avenue of the Americas. ✷