Chapter 14: Air Quality

A. INTRODUCTION

This chapter examines the potential for the proposed actions to result in significant adverse air quality impacts. As described in Chapter 1, "Project Description," the proposed actions would facilitate construction of five new mixed-use buildings at the perimeter of the Lenox Terrace complex in the Central Harlem neighborhood of Manhattan. The new buildings would include approximately 1,430,258 gsf of new residential use; approximately 135,500 gsf of commercial space (an increase of approximately 39,845 gsf over conditions without the proposed project); and approximately 15,055 gsf of community facility space. In addition, two sites not owned by the applicant but located within the rezoning area are being analyzed as a projected future development site and a potential development site.

Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heat and hot water systems, or emissions from parking garage ventilation systems. Indirect impacts are caused by off-site emissions associated with a project, such as emissions from nearby existing stationary sources (impacts on the development site) or by emissions from on-road vehicle trips ("mobile sources") generated by the proposed actions or other changes to future traffic conditions due to a project.

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

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

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

PRINCIPAL CONCLUSIONS

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

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from fossil fuel-fired heat and hot water systems. However, restrictions through the mapping of an (E) Designation (**E-547**) for air quality on the proposed development site (Block 1730, Lots 1, 33, 40, 45, 50, 52, and 68), regarding fuel type and exhaust height for Buildings NE and N and exhaust height for Buildings NW, SW, and SE, and on the projected future development site (Block 1730, Lot 65) and the potential development site (Block 1730, Lots 16 and 19), regarding fuel type, exhaust stack location, and equipment technology**,** would be necessary to ensure that emissions from fossil fuel-fired systems would not result in any significant air quality impacts.

Based on the analysis of the emission sources from large and major sources of emissions in the study area on the proposed project, no significant adverse air quality impacts are predicted to occur; however, restrictions through the mapping of an (E) Designation (**E-547**) for air quality on the proposed development site (Block 1730, Lots 1, 33, 40, 45, 50, 52, and 68) regarding the placement of operable windows and air intakes on the Proposed Buildings NW and N would be required. ~~This analysis may also be refined as more information becomes available between the Draft and the Final EIS.~~

In terms of industrial sources, no businesses were found to have a New York State Department of Environmental Conservation (DEC) air permit or New York City Department of Environmental Protection (DEP) certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no potential significant adverse air quality impacts from industrial sources would occur with the proposed actions.

B. POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (NO and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of SO_2 are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA), and are referred to as ‘criteria pollutants’; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and parking garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

The proposed actions are not expected to result in an increase in vehicle trips higher than the *CEQR Technical Manual* screening threshold of 170 trips at any intersection. Therefore, a mobile source analysis to evaluate future CO concentrations was not warranted. Since the proposed project would develop new parking facilities on the Lenox Terrace campus, however, an assessment of CO impacts from the proposed parking garages was conducted.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. Therefore, the effects of NOx and VOC emissions from all sources are generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

The proposed actions would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of 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 point sources, and is not a local concern from mobile sources. (NO_x emissions from fuel combustion are typically greater than 90 percent NO with the remaining fraction primarily NO_2 at the source.[1]) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as mobile sources have become of greater concern for this pollutant. The proposed project is likely to use natural gas-fired heating and hot water systems for the new buildings; therefore, emissions of NO_2 from the stationary sources as part of the proposed project were analyzed.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA, and therefore, lead is not a pollutant of concern for the proposed project; therefore, an analysis of this pollutant from stationary or mobile sources is not warranted.

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from

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

volcanic and geothermal eruptions, and forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, construction and agricultural activities, and wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

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

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

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

SULFUR DIOXIDE

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

The proposed project is likely to use natural gas for the heating and hot water systems of the new buildings; however, it is possible that No. 2 fuel oil could be used. Therefore, potential project-generated emissions of SO_2 from stationary sources were analyzed.

C. AIR QUALITY STANDARDS, REGULATIONS AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the public's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary and secondary standards are the same for NO_2 (annual), ozone, lead, and PM; there is no secondary standard for CO and the 1-hour NO_2 standard. The NAAQS are presented in **Table 14-1**. 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 PM, SO_2, settleable particles, non-methane hydrocarbons, and ozone that correspond to federal standards that have since been revoked or replaced, and for beryllium, fluoride, and hydrogen sulfide.

Table 14-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9(1)	10,000	None	
1-Hour Average	35(1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(3, 4)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(1)	N/A	150	N/A	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(5)	N/A	12	N/A	15
24-Hour Average(6)	N/A	35	N/A	35
Sulfur Dioxide (SO_2)				
1-Hour Average(7)	0.075	196	N/A	N/A
Maximum 3-Hour Average(1)	N/A	N/A	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)
N/A – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
(3) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(4) EPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
(5) 3-year average of annual mean. (6) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(7) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
Source:
40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

EPA lowered the primary annual average $PM_{2.5}$ standard from 15 µg/m³ to 12 µg/m³, effective March 2013.

The 8-hour ozone standard of 0.075 parts per million (ppm) is effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December

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

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

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

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

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

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

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties which collectively 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) were redesignated as in attainment for the standard on April 18, 2014, and are 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 ~~new~~ 12 $\mu g/m^3$ NAAQS, effective April 15, 2015.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties as in moderate nonattainment for the 1997 8-hour average ozone standard. In March 2008, EPA strengthened the 8-hour ozone standards. EPA designated these same areas as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, as requested by New York State, EPA reclassified the area as a moderate NAA. New York State began submitting SIP documents in December 2014. On July 19, 2017 DEC announced that the New York Metropolitan Area is not projected to meet the July 20, 2018 attainment deadline and DEC ~~is~~ therefore ~~requesting~~ requested that EPA reclassify the area to “serious” nonattainment~~, which would impose a new attainment deadline of July 20, 2021 (based on 2018-2020 monitored data)~~. 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 November 18, 2018, EPA proposed reclassifying the NYMA from moderate to serious nonattainment. 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, 2020.

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

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

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[2] 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 14-1**) would be deemed to have a potential significant adverse impact. In addition, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO DE MINIMIS CRITERIA

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

$PM_{2.5}$ DE MINIMIS CRITERIA

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

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

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

the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or

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

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

The above *de minimis* criteria have been used to evaluate the significance of predicted impacts on $PM_{2.5}$ concentrations and determine the need to minimize particulate matter emissions resulting from the proposed project.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

PARKING FACILITIES

The proposed project would include parking facilities below Proposed Buildings NW and SW and their connecting base (along Lenox Avenue between West 132nd and 135th Streets), below Proposed Building NE (at the corner of Fifth Avenue and West 135th Street), and below Proposed Building SE (at the corner of Fifth Avenue and West 132nd Street). Emissions from vehicles using the parking facilities could potentially affect ambient levels of pollutants at adjacent receptors. Since the parking facilities would be used by automobiles, the primary pollutants of concern are CO and PM (both $PM_{2.5}$ and PM_{10}). An analysis was performed of the emissions from the outlet vents and their dispersion in the environment to calculate pollutant levels in the surrounding area, using the methodology set forth in the *CEQR Technical Manual*. Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOVES mobile source emission model as referenced in the *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. The concentration of CO and PM within the garages was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of 1 cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

To determine pollutant concentrations, the outlet vents were analyzed as a “virtual point source” using the methodology in EPA’s *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates CO and PM concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would enter and exit the facilities (PM concentrations were determined on a 24-hour and annual average basis). Traffic data for the parking garage analysis were derived from the trip generation analysis, described in Chapter 13, “Transportation.”

As described above, the proposed parking garages would be located below Proposed Buildings NW and SW and their connecting base, below Proposed Building NE, and below Proposed Building SE. Since design information regarding the garages' mechanical ventilation system is not yet available, the worst-case assumption was used that the air from each of the proposed parking garages would be vented through a single exhaust. The garage with the maximum number of spaces and along the street with the highest traffic volumes would be the parking garage below Proposed Buildings NW and SW and their connecting base; therefore; it was assessed as the parking garage with the potential for worst-case air quality impacts. The ventilation exhaust for this garage was assumed to be located on the building façade facing Lenox Avenue. The vent face was modeled to directly discharge at a height of approximately 10 feet above grade. "Near" and "far" receptors were placed along the sidewalks at a pedestrian height of 6 feet at a distance of approximately five feet from the vent and "far" receptors were places at a distance of approximately 7 feet and 164 feet from the vent. In addition, a receptor was placed on the Lenox Avenue building façade at a height of six feet above the vent. A persistence factor of 0.70 was used to convert the calculated 1-hour average maximum CO concentrations to an 8-hour average, accounting for meteorological variability over the longer averaging periods, as referenced in the *CEQR Technical Manual*, while persistence factors of 0.6, and 0.1 were used for the $PM_{2.5}$ 24-hour and annual average concentrations, respectively.[3]

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

Vehicle Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOVES2014a.[4] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from DEC.

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

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

Background Concentrations

Background concentrations are those pollutant concentrations originating from distant sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of the analysis site. Background concentrations must be added to modeling results to obtain total pollutant concentrations at an analysis site.

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

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

The background concentrations for the nearest monitored location for each pollutant are presented in **Table 14-2**. CO concentrations are based on the latest available five years of monitored data (2013–2017). Consistent with the NAAQS, the second-highest value was used. These values were used as the background concentrations for the mobile source analysis.

Table 14-2
Maximum Background Pollutant Concentrations for Mobile Source Parking Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY, Manhattan	2.3	35 ppm
	8-hour		1.5	9 ppm
$PM_{2.5}$	24-hour	JHS 45, Manhattan	19.4	35 µg/m^3

Note:
Values are the highest of the latest 5 years.
Source:
New York State Air Quality Report Ambient Air Monitoring System, DEC, 2013–2017.

STATIONARY SOURCES

As described above, a stationary source analysis was conducted to evaluate potential impacts from heating and hot water systems associated with the proposed project. An assessment was also conducted to determine the potential for impacts due to nearby emission sources.

HEATING AND HOT WATER SYSTEMS

Stack exhaust parameters and emission estimates for the proposed project's heating and hot water systems, as well as for the potential new buildings on the projected future development site and potential development site, were conservatively estimated.

The exhaust stacks for the project project's heating and hot water systems were assumed to exhaust at a minimum height of three feet above the roof of each new building. Annual fuel usage for the project project's heating and hot water systems were based on the size (in gross square feet [sf]) and type of development, based on the factor referenced in the *CEQR Technical Manual*. Short-term emissions were conservatively estimated assuming a 100-day heating season.

Emissions rates for the heating and hot water systems were calculated based on emissions factors obtained from the EPA *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*. PM_{10} and $PM_{2.5}$ emissions include both the filterable and condensable fractions.

~~In order to conservatively account for the area in the connecting podium between Buildings NW and SW, two scenarios were assessed. In the first scenario, the gross floor area of the podium was included in the size of Building NW. In the second scenario, the gross floor area of the podium was included in the size of Building SW.~~

Table 14-3A and 14-3B present the stack parameters and emission rates used for analysis of the proposed project's heating and hot water systems.

Table 14-3A
Heating and Hot Water Systems
Stack Parameters and Emission Rates –Buildings NW and SW

Parameter		Proposed Development Site Scenario 1		Proposed Development Site Scenario 2	
		Building NW ~~and Central Podium~~	Building SW	Building NW	Building SW ~~and Central Podium~~
Building Size (gsf)[1]		392,683	374,574	301,832	465,425
Building Height (ft)		284	284	284	284
Boiler Capacity (MMBtu/hr)[2]		9.87	9.41	7.58	11.69
Stack Exhaust Temp. (°F)		307.8	307.8	307.8	307.8
Stack Exhaust Height (ft)		287	287	287	287
Height Above Roof (ft)		3	3	3	3
Stack Exhaust Diameter (ft) [3]		3.2	3.2	3.2	4.4
Fuel Type		No. 2 Oil	No. 2 Oil	No. 2 Oil	No. 2 Oil
Stack Exhaust Flow (ACFM)[4][5]		2,566	2,448	1,973	3,042
Stack Exhaust Velocity (m/s)[5]		1.62	1.549	1.248	1.017
Short-term Emission Rates					
g/s[6]	NO_x	1.78E-01	1.69E-01	1.37E-01	2.10E-01
	PM_{10}	2.93E-02	2.80E-02	2.25E-02	3.47E-02
	PM_{25}	2.93E-02	2.80E-02	2.25E-02	3.47E-02
	SO_2	1.89E-03	1.80E-03	1.45E-03	2.24E-03
Annual Emission Rates					
g/s[6]	NO_x	4.87E-02	4.64E-02	3.74E-02	5.77E-02
	PM_{25}	8.03E-03	7.66E-03	6.17E-03	9.52E-03

Notes:

(1) Building square footage used to estimate energy consumption excludes amenity space. The floor areas for Building NW and Building SW are somewhat different than the current floor areas since, ~~F~~for purposes of a conservative analysis, the total gross floor area that was proposed for the central podium as part of the DEIS was included in the size of Building NW as well as in Building SW.

(2) British Thermal Units, or BTUs, are a measure of energy used to compare consumption of energy from different sources, such as gasoline, electricity, etc., taking into consideration how efficiently those sources are converted to energy. One BTU is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree.

(3) The stack diameter was based on data obtained from a survey of New York City boilers from buildings of a similar size.

(4) ACFM = actual cubic feet per minute.

(5) The stack exhaust flow rate was estimated based on the type of fuel and heat input rates.

(6) Emission factors are based on EPA AP-42 data.

Table 14-3B
Heating and Hot Water Systems
Stack Parameters and Emission Rates – Buildings N, NE, and SE, Projected Future Development Site and Potential Development Site

Parameter		Proposed Development Site			Projected Future Development Site	Potential Development Site
		Building NE	Building N	Building SE		
Building Size (gsf)[(1)]		262,976	228,966	287,055	65,468	265,457
Building Height (ft)		284	284	284	145	215
Boiler Capacity (MMBtu/hr)[(2)]		6.61	5.75	7.21	1.64	6.67
Stack Exhaust Temp. (°F)		307.8	307.8	307.8	307.8	307.8
Stack Exhaust Height (ft)		287	287	287	155	218
Height Above Roof (ft)		3	3	3	10	3
Stack Exhaust Diameter (ft)[(3)]		3.2	3.2	3.2	2	3.2
Fuel Type		No. 2 Oil	No. 2 Oil	No. 2 Oil	Gas	Gas
Stack Exhaust Flow (ACFM)[(4)(5)]		1,719	1,496	1,876	406	1,644
Stack Exhaust Velocity (m/s)[(5)]		1.087	0.947	1.187	0.655	1.040
Short-term Emission Rates						
g/s[(6)]	NO_x	8.16E-02	7.11E-02	1.30E-01	7.53E-03	3.05E-02
	PM_{10}	6.20E-03	5.40E-03	2.14E-02	1.54E-03	6.26E-03
	PM_{25}	6.20E-03	5.40E-03	2.14E-02	1.54E-03	6.26E-03
	SO_2	4.90E-04	4.26E-04	1.38E-03	1.22E-04	4.94E-04
Annual Emission Rates						
g/s[(6)]	NO_x	2.24E-02	1.95E-02	3.56E-02	2.06E-03	8.37E-03
	PM_{25}	1.70E-03	1.48E-03	5.87E-03	4.23E-04	1.72E-03

Notes:
(1) Building square footage used to estimate energy consumption excludes amenity space.
(2) British Thermal Units, or BTUs, are a measure of energy used to compare consumption of energy from different sources, such as gasoline, electricity, etc., taking into consideration how efficiently those sources are converted to energy. One BTU is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree.
(3) The stack diameter was based on data obtained from a survey of New York City boilers from buildings of a similar size.
(4) ACFM = actual cubic feet per minute.
(5) The stack exhaust flow rate was estimated based on the type of fuel and heat input rates.
(6) Emission factors are based on EPA AP-42 data.

AERMOD Analysis

Potential impacts from stationary source emissions were evaluated using a refined dispersion model, the EPA/AMS AERMOD dispersion model (Version 18081 EPA, 2018). AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain and includes updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and handling of terrain interactions.

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

The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the “cavity region” (i.e., the area around a structure which, under certain conditions, may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to determine the projected building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources accounts for all obstructions within a radius equal to five obstruction heights of the stack.

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

Methodology Utilized for Estimating NO_2 Concentrations

Annual NO_2 concentrations from stationary sources were estimated using a NO_2 to NO_x ratio of 0.75, as described in EPA’s *Guideline on Air Quality Models* at 40 CFR part 51 Appendix W, Section 5.2.4.[5]

For assessing 1-hour average NO_2 concentrations for compliance with NAAQS, EPA guidance was utilized.[6] Background concentrations are currently monitored at several sites within New York City, which are used for reporting concentrations on a “community” scale. Because this data is compiled on a 1-hour average format, it can be used for comparison with the new 1-hour standards. Therefore, background 1-hour NO_2 concentrations currently measured at the community-scale monitors can be considered representative of background concentrations for purposes of assessing the impact of the proposed project’s stationary sources of emissions.

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

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

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at La Guardia Airport (2013–2017), and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological

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

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

surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Receptor Placement

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors were analyzed and included locations on the proposed buildings as well as other nearby buildings (including existing Lenox Terrace residential buildings), and at operable windows, air intakes, and publicly accessible ground-level locations. The model also included ground-level receptor grids in order to address more distant locations and to identify the highest ground-level impact.

Background Concentrations

To estimate the maximum expected total pollutant concentrations, the calculated impacts from the emission sources must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 14-4**). The background levels are based on concentrations monitored at the nearest DEC ambient air monitoring stations over the most recent three-year period for which data are available (2015–2017), with the exception of NO_2, which is based on five years of data, consistent with current DEP guidance (2013–2017). For the 24-hour PM_{10} concentration the highest second-highest measured values over the specified period were used. $PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria. The $PM_{2.5}$ 24-hour average background concentration of 19.4 µg/m^3 (based on the 98th percentile concentrations, averaged over 2015 to 2017) was used to establish the *de minimis* value.

Table 14-4
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-hour	IS 52, Bronx	117.3(1)	188
	Annual	IS 52, Bronx	38.9	100
SO_2	1-hour	IS 52, Bronx	20.8	196
$PM_{2.5}$	24-hour	JHS 45, Manhattan	19.4	35
	Annual	JHS 45, Manhattan	7.9	12
PM_{10}	24-hour	IS 52, Bronx	39	150

Notes:
(1) The 1-Hour NO_2 background concentration presented in the table is not used since the AERMOD model determines the total 98th percentile 1-Hour NO2 concentration at each receptor.
Source:
New York State Air Quality Report Ambient Air Monitoring System, DEC, 2013–2017.

ADDITIONAL SOURCES

As described above, the *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a "large" or "major" emissions source. Major sources are defined as those located at facilities that have a DEC Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a DEC State Facility Permit. To assess the potential effects of these existing sources on the proposed buildings and the potential new building on the projected future development site, a review of existing permitted facilities was conducted. Sources of information reviewed included the EPA's Envirofacts database,[7] the DEC Title V and State Facility Permit websites,[8] the New York City Department of Buildings website, and DEP permit data.

One facility with a DEC State Facility Permit was identified, the New York Health & Hospitals Corporation (HHC) Harlem Hospital Center located at 506 Lenox Avenue, directly north of the rezoning area. The facility operates under a DEC State Facility Permit dated November 27, 2017. Pollutant concentrations were estimated from this facility to evaluate its potential impact on the proposed project. The AERMOD dispersion model was used in the analysis (see *Heating and Hot Water Systems*).

Based on the permit information obtained, the hospital has three boilers each rated at a heat input capacity of 83.2 MMBtu/hr. A maximum of two boilers operate at any given time, with one boiler as a stand-by unit, according to HHC. The boilers vent through a single exhaust stack. Annual emissions of NO_x are capped at 22.5 tons per year. The facility only utilizes No. 2 fuel oil in the boilers in the event natural gas service is interrupted. Therefore, the analysis was performed assuming the use of natural gas exclusively for the annual period due to the limited use of No. 2 oil and the fact that annual emissions are capped regardless of the fuel used. For short-term periods, the modeling analysis conservatively assumed the use of No. 2 fuel oil for the winter months (December, January, and February), and the use of natural gas for the rest of the year. The facility also has five diesel generators (four rated at 1,000 kW, and one rated at 400 kW).

The short-term emission rates and stack parameters for the hospital were modeled based on two boilers operating at 100 percent, 75 percent, and 50 percent capacity. The annual emissions were based on the NO_x annual emissions cap specified in the State Facility Permit.

Stack parameters for the boilers were based on the most recent stack test, which was conducted pursuant to the Title V permit. Available emissions testing information for the boilers was used in developing NO_x emission rates for the non-winter (natural gas) scenario. The NO_x emission rate for the boilers on winter scenario (No. 2 oil), as well as $PM_{2.5}$ emission rates for both scenarios, were based on ~~The facility emission rates were estimated using the information obtained, and applying the~~ EPA's AP-42 emission factors ~~for natural gas-fired and No. 2 fuel oil boilers~~. **Table 14-5** presents the emission rates and stack parameters used in the AERMOD analysis.

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

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

Table 14-5
Harlem Hospital Center Boiler Stack Parameters and Emission Rates

Parameter		Value
Boiler Peak Capacity (MMBtu/hr)[1]		165.2-166.2~~6.4~~
Boiler Annual Usage (MMBtu/hr)[2]		57.1
Fuel Type[3]		Natural Gas / No. 2 Oil
Stack Exhaust Temp. (°F)[5]		~~307.8~~389.5
Stack Exhaust Height (ft)		288
Stack Exhaust Diameter (ft)[5]		9.2~~6~~
Stack Exhaust Flow (ACFM)[5] for Natural Gas / No. 2 Oil	100%	~~40,605~~185,257 / ~~42,842~~111,625
	75%	~~30,454~~145,400 / ~~32,182~~101,077
	50%	~~20,302~~105,543 / ~~21,421~~72,242
	Annual	~~13,922~~51,806.4
Stack Exhaust Velocity (ft/s)[5] for Natural Gas / No. 2 Oil	100%	~~23.93~~46.3 / ~~25.25~~27.9
	75%	~~17.95~~36.4 / ~~18.94~~25.3
	50%	~~11.97~~26.4 / ~~12.63~~18.1
	Annual	~~8.21~~13.0
Short-term Emission Rates (Natural Gas / No. 2 Oil)		
100% Load		
g/s[4]	NO_x	~~2.055~~2.290 / 2.995
	PM_{10}	0.155~~6~~ / 0.319
	$PM_{2.5}$	0.155~~6~~ / 0.319
75% Load		
g/s[4]	NO_x	~~1.542~~1.708 / 2.245~~6~~
	PM_{10}	0.120~~117~~/ 0.239
	$PM_{2.5}$	0.120~~117~~/ 0.239
50% Load		
g/s[4]	NO_x	~~1.028~~1.164 / 1.498
	PM_{10}	0.085~~78~~ / 0.159
	$PM_{2.5}$	0.085~~78~~ / 0.159
Annual Average Emission Rates		
g/s[4]	NO_x	0.705
	$PM_{2.5}$	0.054

Notes:
[1] The Harlem Hospital Center boiler plant consists of three dual fuel-fired (natural gas and No. 2 oil) boilers each rated at a heat input capacity of 83.2 MMBtu/hr. The peak operating capacity represents two boilers operating at full load and one as a stand-by unit.
[2] Annual energy based on annual NO_x emissions cap.
[3] The facility only utilizes No. 2 fuel oil in the case of a natural gas service interruption. Therefore, the analysis for the annual period considers the use of natural gas exclusively. [4] Emission factors are based on EPA AP-42 data.
[5] ~~The stack parameter~~Stack diameter, temperature, and exhaust flow rates ~~is estimated~~ were based on ~~the~~ a stack test data report, for each type of fuel (natural gas/ No. 2 fuel oil) and for the 100% load and 50% load (values for the modeled 75% load were estimated through interpolation).

E. EXISTING CONDITIONS

Recent concentrations of all criteria pollutants at DEC air quality monitoring stations nearest the study area are presented in **Table 14-6**. All data statistical forms and averaging periods are consistent with the definitions of the NAAQS. It should be noted that these values are somewhat different than the background concentrations presented in **Table 14-5**, above.

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

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

Table 14-6
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY, Manhattan	ppm	1-hour	0.25	35
	CCNY, Manhattan		8-hour	0.2	9
SO_2	IS 52, Bronx	μg/m^3	3-hour	46.6	1,300
			1-hour	20.8	196
PM_{10}	IS 52, Bronx	μg/m^3	24-hour	27	150
$PM_{2.5}$	JHS 45, Manhattan	μg/m^3	Annual	7.9	12
			24-hour	19.4	35
NO_2	IS 52, Bronx	μg/m^3	Annual	32.5	100
			1-hour	117.3	188
Lead	IS 52, Bronx	μg/m^3	3-month	0.0041	0.15
Ozone	CCNY, Manhattan	ppm	8-hour	0.071	0.070

Notes:
The CO, PM_{10}, and 3-hour SO_2 concentrations for short-term averages are the second highest from the most recent year with available data. $PM_{2.5}$ annual concentrations are the average of 2015–2017 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentiles in the same period. 8-hour average ozone concentrations are the average of the 4th highest-daily values from 2015 to 2017. 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 2015 to 2017.
Source:
New York State Air Quality Report Ambient Air Monitoring System, DEC, 2013–2017.

F. FUTURE WITHOUT THE PROPOSED PROJECT

In the No Action scenario in 2023 and 2026, mobile source and stationary source emissions in the vicinity of the rezoning area are assumed to be similar to existing conditions.

G. FUTURE WITH THE PROPOSED PROJECT

The proposed project would generate emissions from heating and hot water system equipment for the proposed buildings, as well as from the proposed parking facilities and from the potential new building on the projected future development site. In addition, the proposed project would result in new mixed-use buildings within 1,000 feet of the Harlem Hospital Center, which is a DEC State Permit Facility, and thus emissions from the hospital on the proposed and potential buildings are analyzed. The following sections describe the results of the studies performed to analyze the potential impacts from these sources.

MOBILE SOURCES

PARKING FACILITIES

The proposed actions would facilitate the construction of accessory parking facilities below Proposed Buildings NW and SW and their connective base, below Proposed Building NE, and below Proposed Building SE. The maximum predicted CO and PM concentrations from the proposed parking facilities were analyzed, based on the methodology and assumptions described above

The maximum predicted eight-hour average CO concentration of all the receptors modeled at the garage with the maximum capacity is 1.65 ppm. This value includes a predicted concentration of 0.01 ppm from emissions within the parking garage, on-street contribution of 0.14 ppm, and a background level of 1.5 ppm. The maximum predicted concentration is substantially below the applicable standard of 9 ppm and the *de minimis* CO criteria.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 0.32 µg/m^3 and 0.05 µg/m^3, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 7.8 µg/m^3 for the 24-hour average concentration and 0.3 µg/m^3 for the annual concentration. Therefore, the proposed parking garages would not result in any significant adverse air quality impacts.

STATIONARY SOURCES

Table 14-7 shows maximum overall predicted concentrations for NO_2, SO_2, $PM_{2.5}$, and PM_{10} from the proposed project's heating and hot water systems at receptors at existing and planned buildings. Maximum predicted NO_2, SO_2 and PM_{10} concentrations, when added to ambient background levels, would be below the NAAQS. The air quality modeling analysis also determined the highest predicted increase in 24-hour average and annual average $PM_{2.5}$ concentrations from the proposed project's heating and hot water systems. As shown in **Table 14-7**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 7.8 µg/m^3. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable *de minimis* criterion of 0.3 µg/m^3 for local impacts, and less than the *de minimis* criterion of 0.1 µg/m^3 for neighborhood scale impacts.

Table 14-7
Future Maximum Modeled Pollutant Concentrations
Project-on-Existing (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact(3)	Maximum Background Concentration	Total Concentration	Threshold
NO_2	1-Hour(1)	-	-	115	188
	Annual(2)	0.4	38.9	39.3	100
SO_2	1-Hour	0.5	20.8	21.3	196
$PM_{2.5}$	24-hour	2.2	-	2.2	7.8
	Annual (discrete)	0.1	-	0.1	0.3
	Annual (neighborhood)	<0.1	-	<0.1	0.1
PM_{10}	24-hour	2.2	39	41.2	150

Notes:
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.

Table 14-8 shows maximum overall predicted pollutant concentrations from the project's heating and hot water system, which were predicted to occur on elevated locations on the proposed development site. Maximum predicted NO_2, SO_2 and PM_{10} concentrations, when added to ambient background levels, would be below the NAAQS. The air quality modeling analysis also determined the highest predicted increase in 24-hour average and annual average $PM_{2.5}$ concentrations from the proposed project's heating and hot water systems. As shown in **Table 14-8**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 7.8 $\mu g/m^3$. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable DEP *de minimis* criterion of 0.3 $\mu g/m^3$ for local impacts.

Table 14-8
Future Maximum Modeled Pollutant Concentrations
Project-on-Project ($\mu g/m^3$)

Pollutant	Averaging Period	Maximum Modeled Impact(3)	Maximum Background Concentration	Total Concentration	Threshold
NO_2	1-Hour(1)	-	-	180.1	188
	Annual(2)	1.5	38.9	40.4	100
SO_2	1-Hour	2.1	20.8	22.9	196
$PM_{2.5}$	24-hour	7.79	-	7.79	7.8
	Annual (discrete)	0.28	-	0.28	0.3
PM_{10}	24-hour	7.8	39	46.8	150

Notes:
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.

PROPOSED (E) DESIGNATION REQUIREMENTS

To ensure that there are no significant adverse impacts of NO_2 or $PM_{2.5}$ from the proposed actions, certain restrictions would be required through the mapping of an (E) Designation (**E-547**) for air quality on the proposed development site (Block 1730, Lots 1, 33, 40, 45, 50, 52, and 68), the projected future development site (Block 1730, Lot 65), and the potential development site (Block 1730, Lots 16 and 19) regarding fuel type, exhaust stack location, and equipment technology. The requirements of the (E) Designation would be as follows:

Building NW/Building SW/Building SE (Block 1730, Lots 1, 33, and 68)

Any new development on the above-referenced property must ensure that any fossil fuel-fired heating and hot water equipment exhaust stack(s) are located at least 287 feet above grade to avoid any potential significant air quality impacts.

Building NE (Block 1730, Lots 40 and 45)

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment and ensure that heating and hot water exhaust stack(s) are located at least 287 feet above grade to avoid any potential significant air quality impacts.

OR

Any new development on the above-referenced property must ensure that heating and hot water exhaust stack(s) are located at least 287 feet above grade and no more than 75 feet away from the eastern street line facing Fifth Avenue to avoid any potential significant air quality impacts.

Building N (Block 1730, Lots 50 and 52)

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment and ensure that heating and hot water exhaust stack(s) are located at least 287 feet above grade to avoid any potential significant air quality impacts.

OR

Any new development on the above-referenced property must ensure that heating and hot water exhaust stack(s) are located at least 287 feet above grade and at least 434 feet away from the eastern street line facing Fifth Avenue to avoid any potential significant air quality impacts.

Projected Future Development Site (Block 1730, Lot 65)

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are located at least 155 feet above grade. Heating and hot water stacks must be located at least 146 feet away from the western street line facing Lenox Avenue to avoid any potential significant air quality impacts.

Potential Development Site (Block 1730, Lots 16 and 19)

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are located at least 218 feet above grade to avoid any potential significant air quality impacts.

ADDITIONAL SOURCES

The potential for stationary source impacts on the proposed and potential buildings from the Harlem Hospital Center was determined using the AERMOD model. The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling were added to the background concentrations to estimate total air quality concentrations on the proposed actions, while $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. The results of the AERMOD analysis are presented in **Table 14-9**.

As shown in **Table 14-9**, the predicted NO_2 and PM_{10} concentrations are below the NAAQS. In addition, maximum predicted concentrations of $PM_{2.5}$ are below the $PM_{2.5}$ *de minimis* criteria. Overall, all of the pollutant time averaging periods shown are below their respective standards.

To ensure that there are no significant adverse impacts of NO_2 or $PM_{2.5}$ on the proposed project from the Harlem Hospital Center, restrictions through the mapping of an (E) Designation (**E-547**) for air quality on the proposed development site (Block 1730, Lots 1, 33, 40, 45, 50, 52, and 68) regarding the placement of operable windows and air intakes on the Proposed Buildings NW and N would be required as follows:

Building NW (Block 1730, Lot 68)

No operable windows or air intakes would be permitted ~~on the eastern façade above a height of 260 feet, and no operable windows or air intakes would be permitted~~ on the eastern, southern and western façades above a height of 270 feet above grade.

Table 14-9
Maximum Modeled Pollutant Concentrations on the Proposed Project From Harlem Hospital Center (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Maximum Background Concentration	Total Concentration	Threshold
NO_2	1-Hour[(1)]	-	-	~~173.8~~137.1	188
	Annual[(2)]	2.0~~7~~	38.9	~~41.6~~40.9	100
$PM_{2.5}$	24-hour	7.7~~6~~	-	7.7~~6~~	7.8[(3)]
	Annual	0.20~~8~~	-	0.20~~8~~	0.3[(4)]
PM_{10}	24-hour	7.7~~6~~	39	46.7~~6~~	150

Notes:
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.
(3) $PM_{2.5}$ *de minimis* criteria – 24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 μg/m³.
(4) $PM_{2.5}$ *de minimis* criteria – annual (discrete receptor), 0.3 μg/m³.

Building N (Block 1730, Lots 50 and 52)

No operable windows or air intakes would be permitted on the northern, western, and southern façades above a height of 270 feet above grade.

With these restrictions in place, no significant adverse air quality impacts on the proposed project from the hospital are predicted. ~~This analysis may also be refined as more information becomes available between the Draft and the Final EIS.~~ ✷