Chapter 15: Air Quality

A. INTRODUCTION

The potential for air quality impacts from the proposed actions is examined in this chapter. As described in Chapter 1, "Project Description," the applicants—Cherry Street Owner, LLC (an affiliate of JDS Development Group, and Two Bridges Senior Apartments LP); Two Bridges Associates, LP (a joint venture between CIM Group and L+M Development Partners); and LE1 Sub LLC—are proposing minor modifications to the existing Two Bridges Large Scale Residential Development (LSRD) to facilitate the development of three new mixed-use buildings within the Two Bridges LSRD.

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 a development site) or by emissions from on-road vehicle trips ("mobile sources") generated by a proposed project or other changes to future traffic conditions due to a project.

The proposed projects would include natural gas-fired heat and hot water systems for each of the proposed buildings, while the proposed building on Site 5 would potentially include a combined heat and power (CHP, or cogeneration) plant. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed projects' stationary sources of emissions. In addition, due to the proximity of the 80 Rutgers Slip building to the proposed Site 4 (4A/4B) building, an analysis of the heating and hot water systems from the 80 Rutgers Slip building on the proposed Site 4 (4A/4B) building was performed. In addition, potential effects of stationary source emissions from existing nearby industrial facilities on the proposed actions' sensitive uses were assessed.

The maximum hourly incremental traffic volumes generated by the proposed actions are not projected to exceed the 2014 *City Environmental Quality Review* (*CEQR*) *Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at one intersection in the study area, but would exceed 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 project-generated traffic was performed for PM.

The proposed actions would also introduce sensitive uses within 200 feet of the elevated section of the Franklin Delano Roosevelt (FDR) Drive; therefore, the effects of this existing roadway on the proposed uses were analyzed, as recommended in the *CEQR Technical Manual*.

The proposed Site 5 building would include a parking garage. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations in the vicinity of the ventilation outlets with the proposed parking garage. The predicted increments from the garage ventilation

were also added, where appropriate, to the predicted concentrations from the mobile source analysis, to assess the cumulative impact of both sources.

As discussed in Chapter 1, "Project Description," Lot 2 on the Site 5 project site is assigned an (E) Designation for air quality, listed in the DCP (E) Designation database as E-312, established in the 2013 *Two Bridges (Health Care Chaplaincy) Environmental Assessment Statement* (CEQR No. 12DCP157M, M120183ZSM). The (E) Designation for air quality requires that the proposed building on this site use natural gas as the only fossil fuel for any on-site heating and water systems, and must be located on the tallest portion of the proposed building. The proposed building's on-site heating and hot water systems would also be designed to ensure that maximum concentrations of nitrogen dioxide do not exceed the National Ambient Air Quality Standard (NAAQS) on a 1-hour average basis. To attain this standard, the proposed building's boilers used for space heating would have low-NO_x (<16 ppm) burners, the boilers used for hot water would utilize low-NO_x (<20 ppm) burners, and the boilers would have a stack placement of a minimum of 260 feet from the lot line facing Cherry Street or a minimum of 236 feet from the lot line facing Rutgers Slip. The maximum capacity of equipment used for space heating and hot water would be 6 MMBTU/hour.

The proposed (E) Designation requirements for air quality associated with the proposed actions are discussed in this chapter.

PRINCIPAL CONCLUSIONS

The proposed actions would not result in significant adverse air quality impacts. Concentrations of particulate matter less than 10 microns in diameter (PM_{10}) due to the proposed projects would not result in any violations of NAAQS at intersections in the study area, and incremental concentrations of particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) would not exceed the City's *de minimis* criteria for $PM_{2.5}$. In addition, concentrations of CO and $PM_{2.5}$ from the parking facility associated with the proposed projects would not result in any significant adverse air quality impacts.

An analysis was performed of the emissions and dispersion of nitrogen dioxide (NO_2) and PM_{10} from heating and hot water systems for the proposed projects, as well as potential CHP systems sources associated with the proposed Site 5 building, which determined that such emissions would not result in a violation of NAAQS. Emissions of $PM_{2.5}$ were 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 projects would be less than the applicable annual average criterion of 0.3 $\mu g/m^3$ for local impacts and 0.1 $\mu g/m^3$ for neighborhood-scale impacts. The air quality modeling analysis also determined the highest predicted increase in 24-hour average $PM_{2.5}$ concentrations would not exceed the applicable *de minimis* criterion. To ensure that there would be no significant adverse impacts resulting from the proposed actions due to heating and hot water and CHP emissions, certain restrictions would be required for the proposed projects.

The analysis of the emissions from heat and hot water systems from the existing building at 80 Rutgers Slip determined that there would be no significant adverse air quality impacts on the proposed residential uses on Site 4 (4A/4B).

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. Volatile organic compounds (VOCs), PM, 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 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.

The number of project-generated vehicles was determined to be below the *CEQR Technical Manual* threshold for requiring an analysis at an intersection. However, emissions of CO on the proposed projects from the elevated FDR Drive were analyzed. In addition, CO was analyzed in the parking facility analysis for the proposed Site 5 building.

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 projects 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 not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. While NO_2 concentrations due to mobile sources have not been analyzed quantitatively, any increase in NO_2 associated with the proposed projects would be relatively small, since as the maximum number of vehicles generated by the proposed actions is projected to be below the *CEQR Technical Manual* CO screening threshold and as further demonstrated

below for PM, due to the relatively small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways.

Potential impacts on local NO_2 concentrations from the fuel combustion for the proposed action's heat and hot water boiler systems were evaluated.

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

All 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. For the proposed actions, PM was analyzed in the mobile-source, parking facility, and heat and hot water system analyses.

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.

As part of the proposed projects, 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 projects.

AIR TOXICS

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

The New York State Department of Environmental Conservation (DEC) has issued a guidance document (DAR-1) that contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to noncriteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

As the project sites are located within 400 feet of a manufacturing zoned district, the potential for impacts from industrial emissions was evaluated.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

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

EPA has revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ and retaining the level of the annual standard at 15 $\mu g/m^3$. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked. EPA later lowered the primary annual $PM_{2.5}$ average standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$, effective March 2013.

EPA has also revised the 8-hour ozone standard, lowering it from 0.08 to 0.075 parts per million (ppm), effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December 2015, EPA further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070. EPA expects to issue final area designations by October 1, 2017; those designations likely would be based on 2014–2016 air quality data.

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

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

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
8-Hour Average	9(1)	10,000	None	
1-Hour Average	35(1)	40,000		
Lead				
Rolling 3-Month Average(2)	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(3)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(4,5)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(6)	NA	12	NA	15
24-Hour Average(7)	NA	35	NA	35
Sulfur Dioxide (SO_2)(8)				
1-Hour Average(9)	0.075	196	NA	NA
Maximum 3-Hour Average(1)	NA	NA	0.50	1,300

Notes:
ppm – parts per million (unit of measure for gases only)
µg/m^3 – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m^3 are presented.
[1] Not to be exceeded more than once a year.
[2] USEPA has lowered the NAAQS down from 1.5 µg/m3, effective January 12, 2009.
[3] 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
[4] 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
[5] USEPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
[6] 3-year average of annual mean. USEPA has lowered the primary standard from 15 µg/m3, effective March 2013.
[7] Not to be exceeded by the annual 98th percentile when averaged over 3 years.
[8] USEPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
[9] 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

EPA established a 1-hour average NO_2 standard of 0.100 ppm, effective April 12, 2010, in addition to the annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA also established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour concentrations.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, the DEC has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

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

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

Manhattan, 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 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. As stated above, EPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the new 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

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

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

EPA has established a 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. Draft attainment designations were published by EPA in February 2013, indicating that EPA is deferring action to designate areas in New York State and expects to proceed with designations once additional data are gathered. In January 2017, New York State recommended that EPA designate most of New York State (including New York City) as in attainment for this standard; the remaining counties 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.[1] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 15-1**) would be deemed to have a potential significant adverse impact.

In addition, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO DE MINIMIS CRITERIA

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

$PM_{2.5}$ DE MINIMIS CRITERIA

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

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments which 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).

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

[1] 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 above *de minimis* criteria have been used to evaluate the significance of predicted impacts of the proposed projects on $PM_{2.5}$ concentrations.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

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 projects employ models approved by EPA that have been widely 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 projects.

VEHICLE EMISSIONS

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOVES.[2] 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 types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from DEC.

Vehicle classification data were based on field studies for the analyzed intersections. For the analysis of the elevated portion of the FDR Drive on the proposed projects, all vehicles were assumed to be light duty vehicles. Appropriate credits were used to accurately reflect the inspection and maintenance program.[3] County-specific hourly temperature and relative humidity data obtained from DEC were used.

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

[3] 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.

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[4] and the *CEQR Technical Manual*.

TRAFFIC DATA

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed projects (see Chapter 14, "Transportation"). Traffic data for the future without and with the proposed actions were employed in the respective air quality modeling scenarios. 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 future without the proposed projects were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations, and off-peak increments from the proposed projects, were determined by adjusting the peak period volumes by the projected 24-hour distribution of vehicle usage at the proposed parking garage. For annual impacts, average weekday 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

Traffic volumes on the elevated portion of the FDR Drive were derived from adjusting the annual average daily traffic volumes published by the New York State Department of Transportation (NYSDOT) to estimate peak hour traffic volumes. Annual background growth rates consistent with guidance in the *CEQR Technical Manual* were used to project traffic volumes for the analysis year.

DISPERSION MODELS FOR MICROSCALE ANALYSES

Maximum contributions from vehicular emissions on the elevated FDR Drive to CO concentrations at the project sites were calculated using the CAL3QHC model Version 2.0.[5] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC calculates emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to project the number of idling vehicles.

Maximum contributions from vehicular emissions to PM concentrations adjacent to each analysis site were calculated using the CAL3QHCR model Version 2.0.[5] The CAL3QHCR is an extended module of the CAL3QHC model, and allows for the incorporation of hourly meteorological data

[4] 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.

[5] EPA. User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections. EPA454R92006.

into the modeling. This refined version of the model can utilize hourly traffic and meteorology data, and is therefore more appropriate for calculating the 24-hour and annual average concentrations required to address the timescales of the PM NAAQS.

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).

Following the EPA guidelines,[6] CAL3QHC computations of CO concentrations were performed using a wind speed of 1 meter per second, and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.79 to account for fluctuations in meteorological conditions and traffic volume. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest projected concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

For computation of PM concentrations, the CAL3QHCR 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 2012–2016. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The microscale analyses were performed for 2021, the year by which the proposed projects are likely to be completed. The future analysis was performed both without the proposed projects (the No Action condition) and with the proposed projects (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 the analysis site. Background concentrations are added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations used in the mobile source analysis were based on concentrations recorded at a monitoring station representative of the county or from the nearest available monitoring station and in the statistical format of the NAAQS (see **Table 15-1**), as provided in the *CEQR Technical Manual*. These represent the most recent 3-year average for 24-hour average PM_2 and 1-hour average NO_2, the highest value from the three most recent years of data available for PM_{10}, and the highest value from the five most recent years of data available for all other pollutant and averaging period combinations. The background concentrations are presented in **Table 15-2**.

[6] *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, EPA Office of Air Quality Planning and Standards, Publication EPA-454/R-92-005.

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

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY, Manhattan	2.3 ppm	35 ppm
	8-hour	CCNY, Manhattan	1.5 ppm	9 ppm
PM_{10}	24-hour	Division Street, Manhattan	44 µg/m^3	150 µg/m^3
$PM_{2.5}$	24-hour	Division Street, Manhattan	21.6 µg/m^3	35 µg/m^3

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

ANALYSIS SITES

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. The incremental traffic volumes for the weekday AM, midday, and PM periods were reviewed and intersections with increments exceeding the PM volume thresholds were identified. Of those intersections, two intersections were selected for microscale analysis (see **Table 15-3**): Sites 1 and 2 were selected because they are projected to have the largest incremental traffic volumes. Site 4 (4A/4B) was also selected for analysis since it exceeds the *CEQR Technical Manual* threshold for PM analysis. The potential impact from vehicle emissions of PM_{10}, and $PM_{2.5}$ was analyzed at each of these sites.

Table 15-3
Mobile Source Analysis Sites

Analysis Site	Location
1	South Street and Montgomery Street
2	South Street and Clinton Street
3	FDR Highway
4	Pike Street and Cherry Street

In addition, Site 3 was included representing the impact of the nearby elevated FDR Drive roadway on air quality at the project sites. Receptors were placed at various locations and elevations on each of the project sites adjacent to the FDR Drive to predict concentrations from vehicles.

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at each of the selected sites; receptors were placed along the approach and departure links and roadway segments at regularly spaced intervals. When elevated roadways are present, receptors were also placed at elevated residential locations. Receptors in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters, from the nearest moving lane at each analysis location, based on the *CEQR Technical Manual* procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

PARKING ANALYSIS

On Site 5, the proposed project would result in the development of a 103-space accessory parking garage. Emissions from vehicles using the mechanically ventilated parking garage could potentially affect ambient levels of CO and PM 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*.

Emissions from vehicles entering, parking, and exiting the garage 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 garage. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. The concentration of CO and PM within the garage 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 vent was analyzed as a "virtual point source" using the methodology in EPA's Workbook of Atmospheric Dispersion Estimates, AP-26. This methodology estimates pollutant 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 exit the facility (PM concentrations were determined on a 24-hour and annual average basis). Emissions from departing vehicles include engine start emissions. Traffic data for the parking garage analysis were derived from the trip generation analysis described in Chapter 14, "Transportation."

The exhaust air from the proposed parking garage was assumed to be vented through a single outlet at a height of approximately 10 feet. Since there is no specific garage design at this time, the vent face was assumed to discharge towards South Street, which is considered conservative since it has higher background levels of traffic. The closest receptors to the proposed vent location are the sidewalk receptors along South Street; therefore, "near" and "far" receptors were placed along the sidewalks at a pedestrian height of 6 feet and at distances of 7 feet and 56 feet, respectively, from the vent. A receptor was also modeled at the vent height, 10 feet from the vent, to conservatively assess the air quality impacts on proposed Site 5 building windows or air intake locations. A persistence factor of 0.79 for Lower Manhattan was used to convert the calculated 1-hour average maximum concentrations to 8-hour averages, accounting for meteorological variability over the average 8-hour period, as referenced in the *CEQR Technical Manual*.

Background and on-street CO concentrations were added to the modeling results to obtain the total ambient levels. The on-street CO concentration was determined using the methodology in the Air Quality Appendix of the *CEQR Technical Manual*, utilizing traffic volumes from the traffic studies conducted for the proposed projects.

STATIONARY SOURCES

HEAT AND HOT WATER AND CHP SYSTEM ANALYSIS

A stationary source analysis was conducted to evaluate potential impacts from the proposed projects' heat and hot water systems, as well as the potential CHP (cogeneration) system at Site 5. Boilers would generate hot water for building heating and domestic hot water. A CHP system would potentially be installed at Site 5 to provide a portion of the electrical power and heating for the site. The boiler and CHP systems for the proposed projects were assumed to utilize natural gas exclusively.

Site 4 (4A/4B)

Based on available design information, Site 4 (4A/4B) would have a central boiler installation with the exhaust stack located on the tallest portion of the roof.

Stack exhaust parameters and short-term emission rates for the proposed boiler installation were estimated based on the expected capacity and number of boilers. Annual boiler fuel usage for the site's boiler installation was obtained from the *CEQR Technical Manual* Air Quality Appendix, based on the size (in gross square feet [gsf]) and type of development (residential).

Site 5

For Site 5, two CHP and heat/hot water designs were modeled: 1) a central boiler installation that would be located on the taller building, and 2) an alternate design with a boiler installation in each building, vented to separate stacks. The existing buildings would be retained, and ground floor retail space along Cherry Street would be enlarged. For the proposed one-story retail expansions at the base of the existing 265 and 275 Cherry Street buildings on Site 5, it was assumed that these expansions would be served by separate heating and hot water systems, with a minimum stack setback of 10 feet from the existing buildings.

Stack exhaust parameters and emission rates were conservatively estimated based on a conceptual level of design. Short-term boiler emissions for the proposed Site 5 building were determined based on the estimated equipment sizing, with conservative assumptions on seasonal utilization. In addition, since the proposed Site 5 building would potentially include a CHP system, boiler utilization was reduced based on estimated offsets in fuel consumption to account for the recovered thermal energy from the CHP system.

Annual boiler fuel usage was based on fuel consumption estimated for the overall building. CHP emissions were determined assuming the equipment operates at full load on a continuous basis. Emissions 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*. NO_2 emissions for the CHP plants were estimated based on equipment manufacturer design information, and $PM_{2.5}$ emissions were based on emission factors obtained from AP-42. PM_{10} and $PM_{2.5}$ emissions include both the filterable and condensable fractions. **Tables 15-4 and 15-5** present the stack parameters and emission rates used in the analysis for the boiler and CHP systems, respectively.

Table 15-4
Boiler Stack Parameters and Emission Rates for the Proposed Projects

Parameter	Site 4 (4A/4B)	Site 5			Site 6A
		Separate Boilers Scenario (West/East)	Central Boiler Scenario	Retail Expansion	
Building Size (gsf)	617,464	1,227,932		5,319[5]	672,266
Building Height (ft)	1,008	725/795	795	12	730
Stack Height (ft)[1]	965.5	765/798	798	15	727
Stack Diameter (per stack) (ft)	3[2]	2[2]	3[2]	1[2]	1.2[3]
Stack Exit Velocity (ft/s)[3]	9.0	13.0	9.4	0.35	20.7
Stack Exit Temperature (°F)[2]	307.8	307.8		307.8	307.8
Short-term Emission Rates (per stack):					
NO_x (g/s)	0.3706	0.0616	0.1988	0.0008	0.0334[3]
PM_{10} (g/s)	0.0225	0.0094	0.0151	0.00006	0.0507[3]
PM_{25} (g/s)	0.0225	0.0094	0.0151	0.00006	0.0507[3]
Annual Emission Rates (per stack):					
NO_x (g/s)	0.0528	0.0240	0.0962	0.0002	0.0057
PM_{10} (g/s)	0.0040	0.0037	0.0073	0.00002	0.0009
PM_{25} (g/s)	0.0040	0.0037	0.0073	0.00002	0.0009

Notes:
[1] Assumes a 3-foot stack above the building roof as per *CEQR Technical Manual* Guidance.
[2] The stack diameter and exhaust temperature are based on data obtained from a survey of New York City boilers from buildings of a similar size.
[3] The stack diameter for Site 6A is based on information on the preliminary design (per stack) for the proposed building, which would include five stacks. The stack temperature is based on data obtained from a survey of New York City boilers from buildings of a similar size. Emission rates for Site 6A are listed per stack.
[4] The stack exhaust flow rate, as the basis for stack velocity, is estimated based on the type of fuel and heat input rates.
[5] The total size of the additional retail components of 5,319 gsf was divided into two equal components at the base of 265 and one at 275 Cherry Street buildings, respectively. The parameters are per stack.

Table 15-5
CHP Stack Parameters and Emission Rates for Site 5

Parameter		Analyzed Site 5 CHP Scenarios	
		Separate CHP Plants Scenario (per Building)	Central CHP Plant Scenario
Building Roof Height (ft)		725/795	795
CHP Capacity (kW)[2]		150	1,000
Stack Exhaust Temp. (°F)[4]		500	853
Stack Exhaust Height (ft)		728/798	798
Stack Exhaust Diameter (ft)[4]		1.2	1.6
Stack Exhaust Flow (ACFM)[1][5]		509	6,949
Stack Exhaust Velocity (ft/s)[5]		7.9	60
Fuel Type		Natural Gas	Natural Gas
g/s[2]	NO_x	0.0302	0.2016
	PM_{10}	0.0031	0.0229
	PM_{25}	0.0031	0.0229

Notes:
[1] ACFM = actual cubic feet per minute.
[2] kW = kilowatts.
References:
[3] Emissions were estimated based on equipment manufacturer design information. $PM_{2.5}$ and PM_{10} Emission factors are based on AP-42, while stack parameters are based on conceptual data.
[4] The stack diameter, exhaust velocity, and exhaust temperature are based on data obtained from a survey of equipment of a similar size.
[5] The stack exhaust flow rate is estimated based on the type of fuel and heat input rates.

Site 6A

Based on available design information, Site 6A would have a boiler installations with the five exhaust stacks located on the tallest portion of the roof. Stack exhaust parameters and short-term emission rates for the proposed boiler installation were estimated based on the expected capacity and number of boilers. Annual boiler fuel usage for the site's boiler installation was obtained from the *CEQR Technical Manual* Air Quality Appendix, based on the size (in gsf) and type of development (residential).

It was assumed for Sites 4 (4A/4B) and 6A, and for the Site 5 central boiler and CHP plant scenarios, that emissions from the boiler and CHP systems would exhaust to the top of the each building, at a minimum height of three feet above the building roof, as per the default assumption referenced in the *CEQR Technical Manual*. This is considered conservative since for most buildings, the three foot stack would be within the mechanical bulkhead area, and would likely be required to be taller in height. For the Site 5 scenario with individual boiler systems, taller stacks would be required for the boilers, as discussed further below.

Dispersion Modeling

Potential impacts were evaluated using the EPA/AMS AERMOD dispersion model.[7] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain 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 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

The annual average NO_2 concentrations from the proposed projects were conservatively calculated assuming that all of the NO emitted by these operations was fully transformed to NO_2.

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

[7] EPA. *AERMOD Implementation Guide*. 454/B-16-013. December 2016.

EPA. *AERMOD Model Formulation and Evaluation.* 454/R-17-001. May 2017.

EPA. *User's Guide for the AMS/EPA Regulatory Model (AERMOD).* 454/B-16-011. December 2016.

incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were taken from the DEC Queens College monitoring station that is the nearest ozone monitoring station and had complete five years of hourly data available. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed, which is considered representative.

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

Meteorological Data

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

Receptor Placement

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed buildings' façades to represent potentially sensitive locations such as operable windows and intake vents. For each of the proposed 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. Receptors were also placed at publically accessible ground-level locations.

Background Concentrations

As with the mobile source analysis, for most pollutants, the predicted impacts from stationary sources analyzed must be added to a background value that accounts for existing pollutant concentrations from sources that are not directly accounted for in the model to estimate the maximum expected pollutant concentration at a given location (receptor). All background concentrations used in the stationary source analysis are based on data collected at the DEC I.S. 52/Division Street monitoring station from 2012 to 2016. The annual NO_2 background is based on the maximum annual average value measured over the five years. The 24-hour average PM_{10} background concentration is based on the maximum second-highest 24-hour average concentration measured over the most recent 3-year period for which monitoring data are available (2014–2016).

Total 1-hour NO_2 concentrations were determined following methodologies that are accepted by the EPA, and which 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[8] was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the seasonal

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

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 five years. The background concentrations are presented in **Table 15-6**.

Table 15-6
Maximum Background Pollutant Concentrations for AERMOD Stationary Source Analyses

Pollutant	Average Period	Location	Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	1-hour	I.S. 52, Bronx	(1)	188
	Annual	I.S. 52, Bronx	36.5	100
$PM_{2.5}$	24-hour	Division Street, Manhattan	21.6	35
PM_{10}	24-hour	Division Street, Manhattan	44	150

Note:
(1) The 1-Hour NO_2 background concentration is not presented in the table since the AERMOD model determines the total 98th percentile 1-Hour NO_2 concentration at each receptor.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012–2016.

INDUSTRIAL SOURCES

The potential impacts of existing industrial operations on pollutant concentrations at the project sites were analyzed. Potential industrial air pollutant emission sources within 400 feet of the project sites' boundaries were considered for inclusion in the air quality impact analyses, as recommended in the *CEQR Technical Manual*.

Land use and Sanborn maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A permit search for DEP and DEC air permits was also conducted.

The only manufacturing-zoned district within the study area is the waterfront area south of the project sites, which includes the planned waterfront redevelopment of Piers 35 and 42 into a recreational pier. No permitted manufacturing/industrial activities were identified at these locations, and no other sources of manufacturing/industrial emissions were identified. Therefore, no significant impacts on the proposed projects are anticipated from industrial source emissions.

ADDITIONAL SOURCES

Large and Major Sources

The *CEQR Technical Manual* requires an assessment of any actions that could result in the location of sensitive uses within 1,000 feet of a large or major emission source. The *CEQR Technical Manual* defines "large" emission sources as sources located at facilities which require a State facility permit, and "major" sources as sources located at Title V permitted facilities or facilities that require Prevention of Significant Deterioration permits.

To evaluate the potential effects of these existing sources on the proposed projects, a review of existing DEC permitted facilities was conducted. No major or large emissions sources permitted under the DEC Title V program and State Facility permit program were identified within the 1,000 foot study area. In addition, the potential for the No Build development at One Manhattan Square as a large or major source as defined in the *CEQR Technical Manual* was assessed using the One Manhattan Square project's gross floor area (approximately 1,248,000 gsf), an AP-42 emission factor of 100 pounds per million cubic feet of natural gas, and the energy factor of 45.2 cubic feet

per square foot-year as recommended in the *CEQR Technical Manual*, NO_x were estimated to be 2.8 tons per year. Since annual emissions of NO_x emissions are estimated to be less than 12.5 tons per year, which is the NYSDEC threshold for capping NO_x emissions under a registration, it is very unlikely that the One Manhattan Square development would be classified as a large or major source since NO_x emissions would not need to be capped. Therefore, a quantified analysis of the potential impact of large or major emissions sources on the proposed projects is not warranted, and no significant impacts on the proposed projects are anticipated from such sources.

80 Rutgers Slip

The proposed Site 4 (4A/4B) building would cantilever over a portion of the existing residential building at 80 Rutgers Slip. Due to the proximity of the existing building to the proposed Site 4 (4A/4B) building, an analysis of the heating and hot water systems from the 80 Rutgers Slip building on the proposed Site 4 (4A/4B) building was performed.

Potential 1-hour average NO_2 and 24-hour and annual average $PM_{2.5}$ impacts from the 80 Rutgers Slip building's heat and hot water systems' emissions were evaluated using the EPA's AERSCREEN model (Version 16216 EPA, 2016). The AERSCREEN model predicts worst-case one-hour impacts downwind from a point, area, or volume source. AERSCREEN generates application-specific worst-case meteorology using representative minimum and maximum ambient air temperatures, and site-specific surface characteristics such as albedo, Bowen ratio, and surface roughness length.[9] The AERSCREEN model was used to calculate worst-case ambient concentrations of criteria pollutants from the proposed project downwind of the stack.

The model incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithm, 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). AERSCREEN utilizes the PRIME plume rise model enhancements to the Building Profile Input Program (BPIPPRM) to provide a detailed analysis of downwash influences on a direction-specific basis. AERSCREEN also incorporates AERMOD's complex terrain algorithms and utilizes the AERMAP terrain processor to account for the actual terrain in the vicinity of the source on a direction-specific basis.

The AERSCREEN model was run both with and without the influence of building downwash, using urban diffusion coefficients that were based on a review of land-use maps of the area. Other model options were selected based on EPA guidance.

NO_2 1-hour concentrations were estimated using an NO_2 to NO_x ratio of 0.8 for the maximum 1-hour concentration. The 0.8 ratio used for the maximum 1-hour concentration is the recommended default ambient ratio per EPA's guidance memo providing additional clarification regarding application of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS.[10]

[9] The albedo is the fraction of the total incident solar radiation reflected by the ground surface. The Bowen ratio is the ratio of the sensible heat flux to the latent (evaporative) heat flux. The surface roughness length is related to the height of obstacles to the wind flow and represents the height at which the mean horizontal wind speed is zero based on a logarithmic profile.

[10] EPA. Memorandum: Clarification on the use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard. September 30, 2014.

Modeling Parameters for AERSCREEN Analysis

Emission Rates and Stack Parameters. Annual emissions rates for heating and hot water systems were calculated based on fuel consumption estimates, using energy use estimates based on type of development and size of the existing 80 Rutgers Slip building (approximately 85,615 gsf) as recommended in the *CEQR Technical Manual*, and applying the EPA's *Compilations of Air Pollutant Emission Factors (AP-42*) emission factors for natural gas-fired boilers.[11] The short-term emission rate was calculated by scaling the annual emissions to account for a 100-day heating season. The exhaust from the heating and hot water systems was assumed to be vented through a single stack located on the bulkhead roof of the building at a height of approximately 107 feet above grade.

The emission rates and exhaust stack parameters used in the modeling analyses are presented in **Table 15-7**.

Table 15-7
Exhaust Stack Parameters and Emission Rates

Stack Parameters	
Stack Height (feet)	107
Stack Diameter (feet)(1)	2
Exhaust Velocity (meters/second)(1)	0.94
Exhaust Temperature (degrees Fahrenheit)(1)	307.8
Emission Rate (grams/second)	
NO_2 (1-hour average)	0.0263
$PM_{2.5}$ (24-hour average)	0.0020
$PM_{2.5}$ (Annual average)	0.0005
Note: (1) Stack parameters are based on boiler specifications from DEP Boiler Permit Database.	

Background Concentrations

To estimate the maximum expected total NO_2 concentration in the AERSCREEN analysis at a given receptor, the maximum predicted modeled concentrations were added to the corresponding background concentration of 120.8 µg/m^3. This background levels represents the 98th percentile annually of the daily-highest 1-hour average NO_2 concentrations, (this are the statistical form of the standard) monitored at the nearest NYSDEC background monitoring station, I.S. 52, in the Bronx. The measured background concentrations were added to the 98th percentile predicted contribution from the modeled source to determine the maximum predicted total pollutant concentrations (EPA "first tier" approach). Note that the highest concentration increment would not necessarily coincide with the highest background levels.

$PM_{2.5}$ impacts were 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_21.6 µg/m^3 (based on the 98th percentile concentration, averaged over 2012–2014) from the Division Street ambient monitoring station was used to establish the *de minimis* value of 6.7 µg/m^3 (see **Table 15-6**).

[11] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I, Chapter 1, Section 3. http://www.epa.gov/ttn/chief/ap42. September, 1998.

Receptor Locations

Receptors are generally placed at windows in residential or other sensitive buildings, air intakes, and publically accessible open space locations, as applicable. Receptors were placed on the proposed residential floors facing the heating and hot water system stack that would be used at 80 Rutgers Slip in the future with the proposed projects. Discrete receptors were modeled at multiple heights along the south façade of this building to represent operable window locations, and potential intake vents.

E. EXISTING CONDITIONS

The most recent concentrations of all criteria pollutants at DEC air quality monitoring stations nearest to the project sites are presented in **Table 15-7**. As shown, 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 analyses. The concentrations presented in **Table 15-8** are based on the form of the standards, using the most recent period for which data are available; the background concentrations used for the modeling analysis (see **Tables 15-2 and 15-6**) presented are obtained from several years of monitoring data and represent a conservative estimate of the highest background concentrations for future conditions.

Table 15-8
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY, Manhattan	ppm	8-hour	1.2	9
			1-hour	1.7	35
SO_2	I.S. 52, Bronx	µg/m^3	3-hour	21.7	1,300
			1-hour	28.1	196
PM_{10}	Division Street, Manhattan	µg/m^3	24-hour	34	150
$PM_{2.5}$	Division Street, Manhattan	µg/m^3	Annual	9.6	15
			24-hour	21.6	35
NO_2	I.S. 52, Bronx	µg/m^3	Annual	36.5	100
			1-hour	121	188
Lead	I.S. 52, Bronx	µg/m^3	3-month	0.0047	0.15
Ozone	I.S. 52, Bronx	ppm	8-hour	0.068	0.075

Notes:
The CO, PM_{10}, and 3-hour SO_2 concentrations for short-term averages are the second-highest from the most recent year with available data.
$PM_{2.5}$ annual concentrations are the average of 2014, 2015, and 2016, and the 24-hour concentration is the average of the annual 98th percentiles in 2014, 2015 and 2016. 8-hour average ozone concentrations are the average of the 4th highest-daily values from 2014 to 2016.
SO_2 1-hour and NO_2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively, of the highest daily 1-hour maximum from 2014 to 2016.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012–2016.

F. FUTURE WITHOUT THE PROPOSED PROJECTS

MOBILE SOURCES

PM_{10} concentrations in the No Action condition were determined for 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 15-9**. The values shown are the highest predicted concentrations for the receptor locations. As shown in the table, No Action condition concentrations are predicted to be well below the PM_{10} NAAQS.

Table 15-9
Maximum Predicted 24-Hour Average
PM_{10} No Action Concentrations ($\mu g/m^3$)

Analysis Site	Location	Concentration
1	South Street and Montgomery Street	52.3
2	South Street and Clinton Street	50.1
4	Pike Street and Cherry Street	49.2

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentration includes a background concentration of 44.0 $\mu g/m^3$.

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

G. PROBABLE IMPACTS OF THE PROPOSED PROJECTS

MOBILE SOURCES

INTERSECTION ANALYSIS

PM concentrations in the With Action condition were predicted using the methodology previously described. **Table 15-10** presents the predicted PM_{10} 24-hour concentrations at the analyzed intersections in the With Action condition. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations. The results indicate that the proposed projects would not result in any violations of the PM_{10} NAAQS at intersection in the study area.

Table 15-10
Maximum Predicted 24-Hour Average PM_{10} Concentrations ($\mu g/m^3$)

Analysis Site	Location	No Action	With Action
1	South Street and Montgomery Street	52.3	60.3
2	South Street and Clinton Street	50.1	56.7
4	Pike Street and Cherry Street	49.2	50.5

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentration includes a background concentration of 44.0 $\mu g/m^3$.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments were calculated for comparison with the *de minimis* criteria. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 15-11 and 15-12**, respectively.

Table 15-11
Maximum Predicted 24-Hour Average $PM_{2.5}$ Incremental Concentrations ($\mu g/m^3$)

Analysis Site	Location	Increment ($\mu g/m^3$)	*De Minimis* ($\mu g/m^3$)
1	South Street and Montgomery Street	2.4	6.7
2	South Street and Clinton Street	2.2	6.7
4	Pike Street and Cherry Street	0.5	6.7

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

Table 15-12
Maximum Predicted Annual Average $PM_{2.5}$ Incremental Concentrations ($\mu g/m^3$)

Analysis Location	Location	Increment ($\mu g/m^3$)	*De Minimis* ($\mu g/m^3$)
1	South Street and Montgomery Street	0.08	0.1
2	South Street and Clinton Street	0.09	0.1
4	Pike Street and Cherry Street	0.04	0.1
Note: $PM_{2.5}$ *de minimis* criteria—annual (neighborhood scale), 0.1 $\mu g/m^3$.			

The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criteria. Therefore, there would be no potential for significant adverse impacts on air quality from vehicle trips generated by the proposed projects.

ELEVATED FDR DRIVE ANALYSIS

Carbon Monoxide

As described in Section D, "Methodology for Predicting Pollutant Concentrations," an analysis was undertaken to determine maximum CO concentrations on the proposed projects from vehicle emissions along the nearby elevated portion of the FDR Drive. The maximum predicted 1-hour and 8-hour average CO concentrations are presented in **Table 15-13**. The results show that With Action CO concentrations at the project sites near the elevated roadway would be well below the 1-hour and 8-hour CO NAAQS.

Table 15-13
Maximum Predicted 8-Hour Average CO Concentrations from the Elevated FDR Drive on the Proposed Projects

Analysis Site	1-Hour Concentration (ppm)	8-Hour Concentration (ppm)
Project Sites—South Street between West of Rutgers Slip and Montgomery Street, adjacent to FDR Drive.	2.5	1.7
Note: 1-hour standard is 35 ppm, 8-hour standard is 9 ppm.		

Particulate Matter

PM concentrations at the proposed buildings due to vehicle emissions along the elevated FDR Drive were determined for the With Action condition using the methodology previously described. **Table 15-14** shows the future maximum predicted 24-hour average PM_{10} concentration along the south façades of the proposed buildings. The value shown is the highest predicted concentration for all locations analyzed and includes the ambient background concentration. The results indicate that there would be no violation of the PM_{10} standard at the project sites in the With Action condition.

Table 15-14
Maximum Predicted 24-Hour Average PM_{10} Concentrations from the Elevated FDR Drive on the Proposed Projects

Analysis Site	Background Concentration ($\mu g/m^3$)	Concentration ($\mu g/m^3$)
Project Sites—South Street between West of Rutgers Slip and Montgomery Street	44	48.3
Note: National Ambient Air Quality Standards—24-hour, 150 $\mu g/m^3$.		

Tables 15-15 and 15-16 show the With Action maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations along the south façades of the proposed buildings. Since the analysis is for an existing emissions source, the emissions do not represent an increase due to the proposed projects. However, the results of the analysis were compared with the City's $PM_{2.5}$ *de minimis* guidance criteria, and demonstrate that there would be no significant adverse impacts from vehicle emissions along the elevated FDR Drive on the air quality at the project sites.

Table 15-15
Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations from the Elevated FDR Drive on the Proposed Projects

Analysis Site	Concentration ($\mu g/m^3$)	*De Minimis* ($\mu g/m^3$)
Project Sites—South Street between West of Rutgers Slip and Montgomery Street, adjacent to FDR Drive.	1.4	6.7
Note: $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 $\mu g/m^3$.		

Table 15-16
Maximum Predicted Annual Average $PM_{2.5}$ Concentrations from the Elevated FDR Drive on the Proposed Projects

Analysis Site	Concentration ($\mu g/m^3$)
Project Sites—South Street between West of Rutgers Slip and Montgomery Street, adjacent to FDR Drive	0.1
Note: $PM_{2.5}$ *de minimis* criteria—annual (at discrete receptors), 0.3 $\mu g/m^3$.	

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facility at Site 5 were determined. Receptors were placed assuming a near side sidewalk receptor on the same side of the street as the proposed parking facility (7 feet from the assumed vent location) and a far side sidewalk receptor on the opposite side of the street from the parking facility (57 feet from the assumed vent location).

The maximum predicted eight-hour average CO concentration is 1.7 ppm. This value includes a predicted concentration of 0.03 ppm from the proposed parking garage, an on-street contribution of 0.13 ppm, and a background level of 1.5 ppm. The maximum predicted concentration is substantially below the applicable NAAQS of nine ppm and the *de minimis* CO criteria of 5.4 ppm.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 0.4 $\mu g/m^3$ and 0.06 $\mu g/m^3$, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 6.7 $\mu g/m^3$ for the 24-hour average concentration and 0.3 $\mu g/m^3$ for the annual concentration. Therefore, the proposed parking garage on Site 5 would not result in any significant adverse air quality impacts.

STATIONARY SOURCES

HEAT AND HOT WATER AND CHP SYSTEM ANALYSIS

Table 15-17 shows maximum overall predicted concentrations for NO_2 and PM_{10} from the proposed projects' heating and hot water systems, which were generally predicted to occur on

elevated locations on the proposed projects' buildings (with the exception of the NO_2 1-hour average concentrations). Maximum predicted concentrations on other existing and proposed buildings, as well as at ground level receptors, would be much lower, as shown in **Table 15-18**.

Table 15-17
Future Maximum Modeled Pollutant Concentrations from the Proposed Projects (μg/m³)

Pollutant	Averaging Period	Concentration Due to Stack Emission	Maximum Background Concentration	Total Concentration	Standard
NO_2	1-Hour[1]	179.3	hourly	179.3	188
	Annual	4.1	36.5	40.6	100
PM_{10}	24-hour	3.5	44	47.5	150

Note:
[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.

Table 15-18
Future Maximum Modeled Pollutant Concentrations from the Proposed Projects at Existing and No Build Receptor Locations (μg/m³)

Pollutant	Averaging Period	Concentration Due to Stack Emission	Maximum Background Concentration	Total Concentration	Standard
NO_2	1-Hour(1)	179.3	hourly	179.3	188
	Annual	1.2	36.5	37.7	100
PM_{10}	24-hour	2.5	44	46.5	150

Note:
[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.

These results reflect the highest concentrations predicted for the two analyzed Site 5 boiler/CHP design configurations. As shown in the tables, the maximum concentrations from stack emissions, when added to ambient background levels, would be well below the NAAQS at all receptor locations.

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 projects' heating and hot water systems. As shown in **Table 15-19**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 6.7 μg/m³. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable City *de minimis* criterion of 0.3 μg/m³ for local impacts, and the City's *de minimis* criterion of 0.1 μg/m³ for neighborhood scale impacts. In addition, as shown in **Table 15-20**, maximum concentrations of $PM_{2.5}$ are predicted to be below the city's *de minimis* criteria at elevated receptors on existing buildings and No Build developments, and at ground level locations.

To ensure that there are no significant adverse impacts of $PM_{2.5}$ from the proposed projects' boiler and CHP emissions, certain restrictions would be required through the mapping of an (E) Designation (E-489) for air quality. For each building, a limitation on the type of fuel for heating and hot water and CHP systems would be required. In addition, for certain sites, additional limitations would be placed including emission limits and restrictions on the placement of boiler

and CHP exhaust stacks for buildings, to ensure that no significant adverse air quality impacts occur. The requirements of the (E) Designation would be as follows:

Table 15-19
Future Maximum Modeled $PM_{2.5}$ Concentrations from the Proposed Projects (in µg/m³)

Pollutant	Averaging Period	Concentration	*De Minimis* Criteria
$PM_{2.5}$	24-Hour	3.5	6.7(1)
	Annual (Discrete)	0.2	0.3
	Annual (Neighborhood Scale)	0.007	0.1

Note:
(1) $PM_{2.5}$ *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.

Table 15-20
Future Maximum Modeled $PM_{2.5}$ Concentrations from the Proposed Projects at Existing Buildings, No Build Developments and Ground-Level Receptors (in µg/m³)

Pollutant	Averaging Period	Concentration	*De Minimis* Criteria
$PM_{2.5}$	24-Hour	2.5	6.7(1)
	Annual (Discrete)	0.1	0.3
	Annual (Neighborhood Scale)	0.007	0.1

Note:
(1) $PM_{2.5}$ *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.

Site 4 (4A/4B)

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, ensure that fossil fuel-fired heating and hot water equipment exhaust stack(s) are located at least 965 feet above grade, and ensure that no operable windows or air intakes on the above-referenced property be located on the southeastern façade between 123 feet and 181 feet above grade, to avoid any potential significant air quality impacts.

Site 5

Central Boiler Design

East Tower. For a central boiler installation, any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heat and hot water equipment, be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water equipment exhaust stack(s) are located at least 798 feet above grade, to avoid any potential significant air quality impacts.

West Tower. For a central boiler installation, no fossil fuel-fired heat and hot water equipment or CHP equipment will be utilized on the above-referenced property.

Separate Boiler Design

East Tower. Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heat and hot water and CHP equipment, be fitted with low NO_x (30 ppm) burners, and ensure that any fossil fuel-fired heating and hot water equipment or combined

heat and power equipment exhaust stack(s) are located at least 798 feet above grade to avoid any potential significant air quality impacts.

West Tower. Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water and combined heat and power (CHP) equipment, be fitted with low NO_x burners for boilers (30 ppm) and CHP equipment (1.6 lb NO_x per megawatt-hour [MWh]), and ensure that fossil fuel-fired heating and heating and hot water equipment exhaust stack(s) are located at least 765 feet above grade, with CHP equipment exhaust stacks at least 728 feet above grade, and with heating and hot water and CHP exhaust stacks located at least 282 feet away from the lot line facing demapped Jefferson Street, to avoid any potential significant air quality impacts.

Retail Expansions along Cherry Street

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, to avoid any potential significant air quality impacts.

Site 6A

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be 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 727 feet above grade and at least 282 feet away from the lot line facing demapped Jefferson Street, to avoid any potential significant air quality impacts.

With these restrictions, emissions from the proposed projects' boiler and CHP exhaust stacks would not result in any significant adverse air quality impacts. Note that the above air quality (E) Designation for Site 5 would supersede the existing (E) Designation on that property.

To the extent permitted under Section 11-15 of the Zoning Resolution, the requirements of the (E) Designations may be modified, or determined to be unnecessary, based on new information or technology, additional facts, or updated standards that are relevant at the time each building is ultimately developed.

ADDITIONAL SOURCE—80 RUTGERS SLIP

The results of the more detailed screening analysis for 1-hour average NO_2, and 24-hour and annual average $PM_{2.5}$ are presented in **Table 15-21**. The maximum predicted 1-hour average NO_2 and SO_2 concentration was added to the maximum ambient background concentration and compared with the NAAQS, while 24-hour average $PM_{2.5}$ concentration was compared with the $PM_{2.5}$ *de minimis* criteria. As shown in **Table 15-21**, the maximum modeled concentrations for all pollutants are less than the applicable criterion and would not therefore have a significant impact on air quality.

Table 15-21
Maximum Modeled Pollutant Concentrations(µg/m^3)
from 80 Rutgers Slip on the Proposed Projects

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	5.3[(1)]	120.8	126.1	188[(2)]
$PM_{2.5}$	24-hour	0.3	N/A	0.3	6.7[(3)]
$PM_{2.5}$	Annual	0.01	N/A	0.01	0.3[(4)]

Notes:
N/A—Not Applicable.
(1) The 1-hour NO_2 concentration is estimated using NO_2 to NO_x ratio of 0.8 as per EPA guidance.
(2) 1-hour average NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 µg/m^3.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 µg/m^3.

Based on the analysis presented above, no significant adverse air quality impacts would be predicted at Site 4 (4A/4B) from the existing building at 80 Rutgers Slip. ✷