Chapter 12: Air Quality

A. INTRODUCTION

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

The co-Applicants, the New York City Educational Construction Fund (ECF) and 240 Nassau Street Holdings, LLC, are seeking zoning approvals, including zoning map and text amendments, a special permit, and other City and State approvals and potential future U.S. Department of Housing and Urban Development (HUD) actions (the "Proposed Actions"), to facilitate the construction of a proposed mixed-use development on Block 110, Lot 25 and Block 111, Lot 1 (the "Project Site") in Downtown Brooklyn, Community District (CD) 2. The proposed development would include four new buildings totaling approximately 1.7 million gross square feet (gsf), including public school facilities; residential, retail, and community facility space; cultural center space; and open space (the "Proposed Project").

The Proposed Actions include the transfer, reallocation, and lease of property among 240 Nassau Street Holdings, LLC, ECF, and the City of New York to allow for the Proposed Project and ECF financing and discretionary zoning approvals from the New York City Planning Commission (CPC) and New York City Council. A detailed description of the Proposed Project and the approvals needed to facilitate the Proposed Project is presented in Chapter 1, "Project Description."

The maximum projected hourly incremental traffic volumes associated with the Proposed Actions would exceed the 2025 *City Environmental Quality Review (CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 160 peak-hour vehicle trips at a number of intersections in the study area, as well as the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from traffic generated by the Proposed Project was performed for CO and PM.

The Proposed Actions would introduce sensitive uses (residential uses) within 200 feet of the elevated section of the Brooklyn-Queens Expressway (BQE) and associated ramps. The effect of these existing roadways on the Proposed Project was therefore analyzed, as recommended in the *CEQR Technical Manual*.

Electric-powered equipment would be utilized for heating and hot water needs for all of the proposed buildings, and therefore, a stationary source analysis of the Proposed Project's heating and hot water systems was not required.

The Project Site is located within 400 feet of a manufacturing district; therefore, potential effects of stationary source emissions from existing nearby industrial facilities on the Project Site were assessed. In addition, a review was performed to identify any large or major sources in the study area and to assess their potential impact on the Project Site.

PRINCIPAL CONCLUSIONS

The analysis of projected mobile source emissions generated by the Proposed Project determined that maximum concentrations of CO due to project-generated traffic at intersections would not result in any violations of National Ambient Air Quality Standards (NAAQS), and further, CO concentrations were predicted to be below CEQR *de minimis* criteria. For $PM_{2.5}$, the results showed that for With Action conditions, the maximum daily (24-hour) and annual $PM_{2.5}$ incremental concentrations are predicted to be below the *de minimis* criteria. The analysis of the elevated section of the BQE on the Proposed Project determined that CO and $PM_{2.5}$ concentrations at the proposed buildings near the elevated roadway would be well below the NAAQS in the future with the Proposed Actions (the "With Action" condition). Therefore, no potential significant adverse air quality impacts from these emission sources would occur due to the Proposed Actions.

A review of manufacturing and processing emission sources within a 400-foot study area, and large and major sources of emissions within 1,000 feet of the Project Site, was performed. No existing or potential sources of industrial emissions were identified, and no large or major sources of emissions were identified. Therefore, no analysis of the potential impacts of these emissions was required, and no potential significant adverse air quality impacts from these emission sources would occur due to the Proposed Actions.

B. POLLUTANTS FOR ANALYSIS

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

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations

near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

For the Proposed Actions, CO was included explicitly in the mobile source analysis. The Proposed Actions would result in an increase in vehicle trips greater than the *CEQR Technical Manual* screening threshold of 160 trips at certain intersections. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Actions.

NITROGEN OXIDES, VOCS, AND OZONE

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

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

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

LEAD

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

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include: the

condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

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

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

SULFUR DIOXIDE

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

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

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

as the secondary standards or more restrictive. The NAAQS are presented in **Table 12-1**. In addition, New York State has adopted 3-hour and 24-hour SO_2 ambient air quality standards for New York State, defined on a running 12-month basis. New York State also has standards for total suspended particles, settleable particles, and 24-hour and annual SO_2, which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants fluoride and hydrogen sulfide.

Table 12-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	PPM	µg/m³	PPM	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9(1)	10,000	None	
1-Hour Average	35(1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(3)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(7)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(4)	NA	9	NA	15
24-Hour Average(5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(6)	0.075	196	NA	NA
Annual Average(44)	NA	NA	0.010	26

Notes: ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
(3) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(4) 3-year average of annual mean.
(5) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(6) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
(7) Not to be exceeded more than once a year on average over 3 years.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

Effective December 2015, EPA lowered the 2008 ozone NAAQS from 0.075 ppm to 0.070 ppm. EPA issued final area designations for the revised standard on April 30, 2018. EPA has revised the NAAQS for $PM_{2.5}$, effective March 6, 2024. The revision included lowering the

level of the annual $PM_{2.5}$ primary standard from the current level of 12 micrograms per cubic meter ($\mu g/m^3$) to 9 $\mu g/m^3$ and retaining the level of the 24-hr primary and secondary standard at 35 $\mu g/m^3$. In addition, the PM_{10} 24-hour average primary and secondary standard was retained.

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

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 the 1-hour and 8-hour CO NAAQS.

Manhattan had been designated as a moderate NAA for PM_{10}. EPA clarified on July 29, 2015 that the designation only applied to the revoked annual standard. The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA) since 2004 under the CAA due to exceedance of the 1997 annual average standard, and were also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard effective April 18, 2014, and is now under a limited maintenance plan for the 2024 to 2034 period. EPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

As described above, EPA has revised the $PM_{2.5}$ standard. On February 7, 2025, DEC made an initial recommendation that all of New York State be designated attainment for the 2024 $PM_{2.5}$ Annual and 24-hour NAAQS. $PM_{2.5}$ attainment designations under the new standard were expected to be effective by 2026. For areas designated as non-attainment, $PM_{2.5}$ SIPs would be due by November 2027 and would be designed to meet the $PM_{2.5}$ standard by 2032, although this may be extended in some cases. However, EPA moved to vacate the 2024 $PM_{2.5}$ standard, which is currently under judicial review. In the meantime, EPA has postponed attainment designations.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as moderate non-attainment areas for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8-hour ozone standards, but certain

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

requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ('anti-backsliding'). EPA designated the same NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012, with subsequent reclassifications to "moderate" and "serious" nonattainment since compliance with the NAAQS was not achieved by the required attainment dates. On November 29, 2021, DEC presented a demonstration that the New York Metro Area (NYMA) was not projected to meet the July 20, 2021 attainment deadline and therefore requested that EPA reclassify the NYMA to "severe" nonattainment. EPA reclassified the NYMA from "serious" to "severe" NAA, effective November 7, 2022, which imposed a new attainment deadline of July 20, 2027 (based on 2018–2020 monitored data). On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. On July 25, 2024, EPA reclassified the NYMA from "moderate" to "serious" nonattainment for the 2015 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.

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

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[3] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 12-1**) would be deemed to have a potential significant adverse impact.

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

CO DE MINIMIS CRITERIA

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

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

more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

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

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete receptor location (elevated or ground level).

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

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

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

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

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

Vehicle Emissions

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, Motor Vehicle Emission Simulator (MOVES5).[4] This emissions model is capable of calculating engine, brake wear, and tire wear emission factors for various vehicle types, based on the fuel type (e.g., gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, number of starts per day, engine soak time, and various other factors that influence emissions such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from DEC.

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

Road Dust

$PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analyses, since 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[6] and the *CEQR Technical Manual*.

Traffic Data

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Project (see Chapter 11, "Transportation"). Traffic data for future conditions without the project (the No Action condition) and the With Action condition were employed in the respective air quality modeling condition. Each of the traffic peak periods (weekday AM, MD and PM and Saturday) were used.

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

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[4] EPA. Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015. Overview of EPA's Motor Vehicle Emission Simulator (MOVES5). November 2024, EPA-420-R-24-011.

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

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

Dispersion Model for Microscale Analyses

The CO and PM concentrations due to vehicular emissions adjacent to the analysis sites were predicted using the American Meteorological Society/Environmental Protection Agency Regulated Model (AERMOD) Version 24142.[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. AERMOD is a recommended model for transportation air quality analyses, and EPA mandated its use for transportation conformity purposes after a three-year transition period.[8] Following EPA guidelines, the analysis was performed using a line source representation of emission sources in order to simulate traffic-related air pollutant dispersion.[9] In addition, the weighted average release height and initial vertical source parameters were calculated for each modeled roadway. Hourly traffic volumes and associated emission factors were used to estimate hourly emission rates from each modeled roadway segment and predict traffic-related air pollutant concentrations at receptor locations.

Meteorology

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

The AERMOD model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 2017–2021. This data is the most recent five-year set available from DEC. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data are processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps. The meteorological dataset processed with the AERMET Version 21112 processor, provided by DEC, was used for the analysis.[10]

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[7] EPA. *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. EPA-454/B-24-007, November 2024.

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

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

[10] DEC staff previously communicated in an email to AKRF that the met data provided by DEC and processed with earlier versions is acceptable for use with later AERMOD versions. DEC does not have immediate plans to update the met data using AERMET Version 24142.

Analysis Year

The microscale analyses were performed for the 2033 analysis year, the year by which the Proposed Project is anticipated to be completed. The analysis was performed for both the No Action and With Action conditions.

Background Concentrations

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

The background concentrations for the nearest monitored location are presented in **Table 12-2**. PM and CO concentrations are based on three recent years of monitored data (2022-2024) consistent with the statistical format of the NAAQS. These values were used as the background concentrations for the mobile source analysis.

Table 12-2
Maximum Background Pollutant Concentrations for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	Queens College	1.68	35 ppm (1)
	8-hour		1.3	9 ppm
$PM_{2.5}$	24-hour	JHS 126	18.5	35 µg/m^3 (2)
	Annual		7.8	9 µg/m^3 (3)

Notes:
(1) CO concentrations represent the maximum second-highest monitored concentrations from the three recent years of data.
(2) $PM_{2.5}$ 24-hour-average concentration represents the average of the 98th percentile day from three recent years of data.
(3) EPA has lowered the NAAQS from 12 µg/m^3, effective March 6, 2024.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2022-2024.

Analysis Site

Intersections in the study area were reviewed for microscale analysis. Of the intersections that were determined to exceed the CO and/or $PM_{2.5}$ screening thresholds based on the *CEQR Technical Manual* guidance, one was selected for microscale analysis: Navy Street and Sands Street. This intersection was selected since it has the highest number of peak-hour generated trips. CO and $PM_{2.5}$ concentrations were predicted at this intersection.

Receptor Placement

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected site. Receptors were placed along the approach and departure links and roadway segments at regularly spaced intervals. Ground-level receptors were placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. Receptors 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.

ANALYSIS OF ELEVATED ROADWAY

The Proposed Project is within 200 feet of the BQE and associated ramps. The effect of these existing elevated roadways on the Proposed Project was therefore analyzed, as recommended in the *CEQR Technical Manual*.

Emission factors for CO and $PM_{2.5}$ were determined using the EPA MOVES5 model, using volumes from data maintained by the New York State Department of Transportation (NYSDOT).[11] Peak hour speeds were estimated using available data.[12]

Existing traffic data for the highway analysis was obtained from the NYSDOT Traffic Data Viewer for the eastbound and westbound BQE travel lanes.[13] Weekday morning (7 to 8 AM) and afternoon (2 to 3 PM) peak periods were the periods with the highest AM and PM traffic volumes, respectively.

To account for the suspension of fugitive road dust in air from vehicular traffic in the atypical roadway analysis, $PM_{2.5}$ emission rates for the 24-hour averaging period included fugitive road dust. Road dust emission factors were calculated according to the latest procedure delineated by EPA[14] and the *CEQR Technical Manual*.

Traffic data for peak and non-peak periods were obtained using annual average daily traffic (AADT) from the NYSDOT Traffic Data Viewer. The AADT data was collected in 2018 and 2025, and annual background growth rates consistent with guidance in the *CEQR Technical Manual* were used to project traffic volumes for the analysis year. These peaks were used as a baseline for determining off-peak volumes, using NYSDOT Automated Traffic Recorder (ATR) data. Off-peak traffic volumes were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts. For annual impacts, since weekend traffic data was not available from NYSDOT, the average weekday 24-hour distribution was used to more accurately simulate traffic patterns over longer periods.

Discrete receptors were modeled along the proposed building façades to represent sensitive locations such as operable windows and intake vents. Rows of receptors at 16.4-foot (5-meter) intervals around the proposed buildings were analyzed, at 10-foot vertical intervals from 6 feet to 115 feet above grade. Receptors were also placed at pedestrian levels at locations where new open spaces would be located adjacent to the proposed buildings.

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[11] The ratio between passenger cars and passenger trucks calculated from the county-specific vehicle population data used in the DEC inventory projections for 2023 was applied as an additional breakdown of the fraction coded as autos in the data published by NYSDOT.

[12] Replica, https://www.replicahq.com/. Replica is a data platform that provides travel patterns, including travel speeds by aggregating mobile device location data with supplemental datasets.

[13] https://nysdottrafficdata.drakewell.com/publicmultinodemap.asp

[14] 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.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

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

EMERGENCY GENERATORS

Diesel-powered generators would be installed to provide power in the event of a loss of utility electric power. Based on the current project design, the generators would consist of the following: Building 1 – 1,500 kilowatts (kW), Building 2 – 600 kW, Building 3 – 750 kW, and Building 4 – 350 kW.

The generators would be used infrequently, and only for very limited periods of time for testing outside of an actual emergency. Therefore, no analysis of this equipment was performed, and no significant adverse air quality impact would be anticipated.

INDUSTRIAL SOURCES

Businesses with potential manufacturing or process emission sources within 400 feet of the Project Site were surveyed for inclusion in the air quality impact analyses, as recommended in the *CEQR Technical Manual*. Existing land uses were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A search of federal, state, and city permit data within the study area was conducted using the DEP Clean Air Tracking System (CATS) database[15] and the DEC Info Locator.[16] A field survey was conducted on February 12, 2026 to identify businesses within 400 feet of the Project Site that have the potential for emitting air pollutants. No current permitted activities were identified within the study area, and no other sources of emissions were identified in the land use survey. The permit search did not identify any existing or expired permits for manufacturing or processing activities. Therefore, no potential for significant adverse air quality impacts on the Proposed Project are anticipated from industrial sources of emissions.

ADDITIONAL SOURCES

The *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a “large” or “major” emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the Project Site, a review of DEC Title V and State Facility Air permits was performed to identify any federal or state-permitted facilities. Existing large and major

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[15] DEP. *Clean Air Tracking System database*. https://a826-web01.nyc.gov/DEP.BoilerInformationExt· Accessed February 2026.

[16] DEC. https://gisservices.dec.ny.gov/gis/dil/ Accessed February 2026.

sources of emissions (i.e., sources having a Title V or State Facility Air Permit) within 1,000 feet of the Project Site were surveyed.

No facilities with a State Facility, Title V, or PSD Permit within the 1,000-foot study area around the Project Site were identified. Therefore, no analysis of the potential impacts of large or major sources of emissions on the Proposed Project was required.

E. EXISTING CONDITIONS

The representative criteria pollutant concentrations measured in recent years at DEC air quality monitoring stations nearest to the Project Site are presented in **Table 12-3**. The values presented are consistent with the form of the NAAQS. As shown in the table, the recently monitored levels did not exceed the NAAQS, with the exception of the 8-hour ozone NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the stationary source and mobile source analyses, since these are the most recent reported monitored values, rather than more conservative values used for dispersion modeling. The concentrations presented in **Table 12-3** provide a comparison of the air quality in the project area with the NAAQS, while background concentrations are obtained from several years of monitoring data and represent a conservative estimate of the highest concentrations for future ambient conditions.

Table 12-3
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College	ppm	1-hour	1.23	35
			8-hour	1	9
SO_2	Queens College [1]	µg/m^3	1-hour	4.6	196
PM_{10}	Queens College	µg/m^3	24-hour	31	150
$PM_{2.5}$	JHS 126 [2,3]	µg/m^3	Annual	7.8	9
			24-hour	18.5	35
NO_2	Queens College [4,5]	µg/m^3	1-hour	100.8	188
			Annual	27.7	100
Lead	IS 52 [6]	µg/m^3	3-month	0.0045	0.15
Ozone	Queens College [7]	ppm	8-hour	0.071	0.070

Notes:
[1] The 1-hour value is based on a three-year average of the 99th percentile of daily maximum 1-hour average concentrations.
[2] Annual value is based on a three-year average of annual concentrations.
[3] The 24-hour value is based on the three-year average of the 98th percentile of 24-hour average concentrations.
[4] The 1-hour value is based on a three-year average of the 98th percentile of daily maximum 1-hour average concentrations.
[5] Annual value based on a three-year maximum of annual concentrations.
[6] Based on the highest quarterly average concentration measured during 2022 to 2024.
[7] Based on the three-year average of the 4th highest daily maximum 8-hour average concentrations.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2022-2024.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations in the 2033 No Action condition were determined using the methodology previously described. **Table 12-4** shows future maximum predicted 8-hour CO concentrations, including background concentrations, at the analysis intersections in the No Action condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

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

Table 12-4
Maximum Predicted 8-Hour Average CO No Action Concentration

Analysis Site	Location	8-Hour Concentration (ppm)
1	Navy Street and Sands Street	1.43

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.3 ppm.

STATIONARY SOURCES

Absent the Proposed Project, none of the Proposed Actions would be sought or approved. The existing schools on Block 111, Lot 1 would remain and Block 110, Lot 25 will be developed with an as-of-right seven-story, 75-foot building (110 feet including bulkhead) containing approximately 83,500 gsf of residential space (approximately 84 units) that complies with the current R6 zoning regulations. Although the No Action condition would result in less development compared to the With Action condition, electric-powered heating and hot water systems would be expected to be utilized, and therefore, no stationary sources of emissions associated with this equipment would occur under the No Action condition, consistent with the With Action condition.

G. THE FUTURE WITH THE PROPOSED ACTIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations for the Proposed Project were predicted using the methodology previously described. **Table 12-5** shows the future maximum predicted 8-hour average CO concentrations at the intersection studied. The values shown are the highest predicted concentrations. The results indicate that the Proposed Project would not result in any violations of the 8-hour CO NAAQS. In addition, the incremental increases in 8-hour average CO concentrations are small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria. Therefore, mobile source CO emissions from the Proposed Project would not result in a significant adverse air quality impact.

Table 12-5
Maximum Predicted 8-Hour CO
With Action Concentration (ppm)

Analysis Site	Location	No Action	With Action	Increment	*De Minimis*
1	Navy Street & Sands Street	1.43	1.48	0.05	4.2

Notes:
8-hour standard is 9 ppm.
Concentrations include a background concentration of 1.3 ppm.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations were calculated so that they could be compared with the NAAQS and the *de minimis* criteria, respectively. 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 12-6 and 12-7**, respectively. **Tables 12-6 and 12-7** also present the maximum predicted concentrations in the No Action and With Action condition. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

Table 12-6
Maximum Predicted 24-Hour Average $PM_{2.5}$
With Action and Incremental Concentration (µg/m^3)

Analysis Site	Location	No Action	With Action	Maximum Increment	Criterion
1	Navy Street and Sands Street	-	-	1.06	8.3[(1)]
		21.95[(2)]	22.62[(2)]	-	35[(3)]

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

Table 12-7
Maximum Predicted Annual Average $PM_{2.5}$
With Action and Incremental Concentration (µg/m^3)

Analysis Site	Location	No Action	With Action	Maximum Increment	Criterion
1	Navy Street and Sands Street	-	-	0.066	0.1[(1)]
		7.96[(2)]	8.02[(2)]	-	9[(3)]

Notes:
[(1)] $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 µg/m^3.
[(2)] Concentrations presented include a background concentration of 7.8 µg/m^3.
[(3)] NAAQS.

The results in **Tables 12-6 and 12-7** show that the 24-hour $PM_{2.5}$ increments are predicted to be below the 24-hour and annual *de minimis* criterion~~,~~ respectively, and total concentrations are below the NAAQS at the analysis site. The results demonstrate that mobile source $PM_{2.5}$ emissions from the Proposed Project would not result in a significant adverse air quality impact at the analyzed intersection.

ANALYSIS OF ATYPICAL ROADWAY

As described in Section D, "Methodology for Predicting Pollutant Concentrations," an analysis was undertaken to determine maximum CO and PM concentrations from the elevated portion of the BQE and associated ramps on the Proposed Project.

Carbon Monoxide

The maximum predicted 1-hour and 8-hour average CO concentrations on the Proposed Project are presented in **Table 12-8**. The results show that the maximum With Action CO concentrations at the Proposed Project from the elevated BQE would be well below the 1-hour and 8-hour CO NAAQS in the With Action condition.

Table 12-8
Maximum Predicted 8-Hour Average CO Concentrations from the Atypical Roadway on the Proposed Project

Averaging Period	Maximum Total Concentration (ppm)	NAAQS (ppm)
1-Hour	2.07	35
8-Hour	1.69	9
Note: Total concentration includes a background concentration of 1.68 ppm for the 1-hour averaging period and 1.3 ppm for the 8-hour averaging period.		

Particulate Matter

Table 12-9 presents the With Action maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations on the Proposed Project. The results show that With Action $PM_{2.5}$ concentrations at the Proposed Project near the elevated roadway would be well below the 24-hour and annual $PM_{2.5}$ NAAQS.

Table 12-9
Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations from the Atypical Roadway on the Proposed Project

Averaging Period	Concentration ($\mu g/m^3$)	NAAQS
24-hour	20.6[(1)]	35
Annual	8.78[(2)]	9
Note: [(1)] Concentration includes a background concentration of 18.5 $\mu g/m^3$. [(2)] Concentration includes a background concentration of 7.8 $\mu g/m^3$.		

Therefore, no significant adverse air quality impact is predicted from the BQE on the Proposed Project. ✷