Chapter 13: Air Quality

A. INTRODUCTION

This chapter examines the potential for air quality impacts from the Proposed Project along the Arthur Kill waterfront. As described in greater detail in Chapter 1, "Projection Description," the Proposed Project is a commercial center with associated parking, open space, and street and infrastructure improvements. Direct impacts on air quality stem from emissions generated by stationary sources at a project site, such as emissions from on-site fuel combustion for heating and hot water systems. Indirect impacts include emissions from motor vehicle trips ("mobile sources") generated by a project or other changes to future traffic conditions due to a project.

With respect to mobile sources, the maximum projected hourly incremental traffic with the Proposed Project would exceed the 2014 *City Environmental Quality Review (CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 170 peak hour trips at certain intersections in the study area and the fine particulate matter ($PM_{2.5}$) emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, a mobile source analysis for these pollutants was performed.

The Proposed Project 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 Proposed Project includes fossil fuel-fired heating and hot water systems. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from these sources.

Since the Project Site is located in a manufacturing district, potential effects of stationary source emissions from existing nearby industrial facilities on the Proposed Project were assessed.

PRINCIPAL CONCLUSIONS

The mobile source analyses determined that concentrations of CO and fine particulate matter less than ten microns in diameter (PM_{10}) due to project-generated traffic at intersections would not result in any violations of National Ambient Air Quality Standards (NAAQS). The results also determined that the CO and 24-hour and annual $PM_{2.5}$ increments are predicted to be below their respective *de minimis* criteria.

The analysis of the parking garage would not result in any significant adverse air quality impacts, with certain design restrictions in place.

Based on the stationary source screening analysis that considered the effect of nitrogen dioxide (NO_2) and particulate matter (PM) emissions from the Proposed Project's natural gas-fired combustion sources, there would be no potential significant adverse air quality impacts. To ensure that there are no significant adverse impacts of $PM_{2.5}$ from the Proposed Project's heating and hot water system emissions, certain restrictions would be required through the mapping of an (E) designation for air quality (E-443) regarding fuel type and exhaust stack location.

B. POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of carbon monoxide (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 (USEPA) 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 USEPA.

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 Proposed Project would result in changes in traffic patterns and an increase in traffic volume in the study area. Therefore, a mobile source analysis was conducted at critical intersections in the study area to evaluate future CO concentrations with and without the Proposed Project. A parking garage analysis was also conducted to evaluate future CO concentrations with the operation of the proposed parking garages.

NITROGEN OXIDES, VOCS, AND OZONE

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

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

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary point sources, and is not a local concern from mobile sources. (NO_x emissions from fuel combustion are typically greater than 90 percent NO with the remaining fraction primarily NO_2 at the source.[1]) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources became of greater concern for this pollutant. Emissions of NO_2 were analyzed for natural gas-fired HVAC equipment associated with the Proposed Project.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA, and therefore, lead is not a pollutant of concern for the Proposed Project. Therefore, an analysis of this pollutant from stationary or mobile sources 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, and all types of construction and agricultural activities, including 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.

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

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.

An analysis was conducted to assess the worst case PM impacts due to the increased traffic, parking facility, and natural gas-fired heating and hot water systems associated with the Proposed Project.

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.

As part of the Proposed Project, natural gas would be burned in the proposed heating and hot water systems. The sulfur content of natural gas is negligible; therefore, no analysis was performed to estimate the future levels of SO_2 with the Proposed Project.

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 USEPA.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, the New York State Department of Environmental Conservation (NYSDEC) has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed guideline concentrations for numerous noncriteria pollutants. The NYSDEC guidance document DAR-1 (February 2014) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The NYSDEC 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 Site is located in a manufacturing district, an analysis to examine the potential for impacts from industrial emissions was performed.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary National Ambient Air Quality Standards (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 13-1**. 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.

USEPA 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. USEPA 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.

USEPA 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, USEPA further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070. USEPA expects to issue final area designations by October 1, 2017; those designations likely would be based on 2014-2016 air quality data.

USEPA lowered the primary and secondary standards for lead to 0.15 $\mu g/m^3$, effective January 12, 2009. USEPA 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.

USEPA 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.

USEPA 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 (the 4th highest daily maximum corresponds approximately to 99th percentile for a year.)

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

Table 13-1
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 (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/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. 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 0.070 ppm, effective December 2015.
6. 3-year average of annual mean. EPA 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.

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 was also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard on April 18, 2014, and is now under a maintenance plan. USEPA designated the area as in attainment for the new 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

Effective June 15, 2004, USEPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties as in moderate non-attainment for the 1997 8-hour average ozone standard. In March 2008 USEPA strengthened the 8–hour ozone standards. USEPA 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, USEPA reclassified the area as a moderate NAA. New York State began 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. USEPA 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 (likely 2017).

USEPA 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. Additional monitoring will be required. Draft attainment designations were published by USEPA in February 2013, indicating that USEPA is deferring action to designate areas in New York State and expects to proceed with designations once additional data are gathered.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the 2014 *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[2] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see Table 13-1) 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.

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

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 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 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.

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 Project employ models approved by USEPA 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 Project.

An analysis of mobile source air quality impacts due to the Proposed Project was performed for selected intersections in the traffic study area; an analysis of the Proposed Project's parking facilities was also performed.

VEHICLE EMISSIONS

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the USEPA mobile source emissions model, MOVES2014a.[3] 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 the New York State Department of Environmental Conservation (NYSDEC).

Vehicle classification data were based on field studies. Appropriate credits were used to accurately reflect the inspection and maintenance program.[4] County-specific hourly temperature and relative humidity data obtained from NYSDEC 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 USEPA[5] and the *CEQR Technical Manual*.

TRAFFIC DATA

Traffic data for the air quality 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 12, "Transportation"). Traffic data for the future without and with the Proposed Project were employed in the respective air quality modeling scenarios. The weekday morning (7:00 to 8:00 AM), midday (12:00 to 1:00 PM), evening (5:00 to 6:00 PM), and Saturday midday (1:00 to 2:00 PM) peak periods were analyzed for $PM_{2.5}$. Only the weekday evening and Saturday midday periods were analyzed for CO. These time periods were selected

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[3] USEPA. *Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a*. November 2015.

[4] 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.

[5] USEPA. *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.

for the mobile source analysis because they produce the maximum anticipated project-generated traffic, and therefore have the greatest potential for significant air quality impacts.

For $PM_{2.5}$, traffic volumes for the same peak periods were used as the baseline for determining off-peak volumes. Off-peak traffic volumes in the future without the Proposed Project, and off-peak increments from the Proposed Project, were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations. For annual impacts, average weekday and weekend 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

DISPERSION MODEL FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets within the surrounding area resulting from vehicle emissions were predicted using the CAL3QHC model Version 2.0[6]. 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 flowrate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to project the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QCHR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model, CAL3QHCR, is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first level of CAL3QHC modeling. To determine motor-vehicle-generated $PM_{2.5}$ concentrations adjacent to streets within the traffic study area, the CAL3QHCR model was applied. This refined version of the model can use hourly traffic and meteorology data, and is therefore more appropriate for calculating 24-hour and annual average concentrations.

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).

Tier I CO Analysis—CAL3QHC

Following the USEPA guidelines[7], CAL3QHC computations 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

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[6] USEPA, User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections, Office of Air Quality, Planning Standards, Research Triangle Park, North Carolina, USEPA-454/R-92-006.

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

by a factor of 0.7 to account for persistence of meteorological conditions and fluctuations in traffic volume. A surface roughness (which is used to estimate the effects of terrain obstacles that can influence wind speed patterns near ground-level) of 3.21 meters was used, as referenced in the *CEQR Technical Manual*. 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.

Tier II PM_{10} /$PM_{2.5}$ Analysis—CAL3QHCR

A Tier II analysis performed for PM_{10} and $PM_{2.5}$ with 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 Newark Airport and upper air data collected at Brookhaven, New York for the period 2011-2015. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The microscale analyses were performed for 2019, the year by which the Proposed Project is expected to be completed. The future analysis was performed both without the Proposed Project (the No Action condition) and with the Proposed Project (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 form of the NAAQS, as shown in Table 13-1 and provided in the *CEQR Technical Manual.* These represent the most recent 3-year average for the 24-hour average $PM_{2.5}$ and the highest value from the three most recent years of data available for PM_{10}. $PM_{2.5}$ annual average impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria, without considering the annual background. Therefore, the annual $PM_{2.5}$ background is not presented in the table. CO concentrations are based on the latest available five years of monitored data (2011–2015). The background concentrations are presented in **Table 13-2**.

Table 13-2
Maximum Background Pollutant Concentrations for Mobile Source Sites

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY, Manhattan	2.7 ppm	35 ppm
	8-hour	CCNY, Manhattan	1.7 ppm	9 ppm
PM_{10}	24-hour	Division Street, Manhattan	44 μg/m^3	150 μg/m^3
$PM_{2.5}$	24-hour	Port Richmond, Staten Island	20.3 μg/m^3	35 μg/m^3

Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2011–2015.
Note: PM_{10} and CO are not measured in Staten Island.

ANALYSIS SITES

Intersections in the traffic study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. The incremental traffic volumes for the weekday AM, midday, PM, and Saturday midday periods were reviewed and intersections with increments exceeding the CO and PM screening thresholds referenced earlier were identified. Of those intersections, three were selected for microscale analysis (see **Table 13-3**): Sites 1 and 2 were selected because they are projected to have the largest incremental traffic volume; Site 1 is the primary entrance to the Proposed Project and Site 2 will become a signalized intersection as part of the Proposed Project. Site 3 was selected based on project-generated trips and level of congestion. The potential impact from vehicle emissions of CO, PM_{10}, and $PM_{2.5}$ was analyzed at each site.

Table 13-3
Mobile Source Analysis Sites

Analysis Site	Location
1	Arthur Kill Road & Richmond Valley Road
2	Arthur Kill Road and Project Driveway North
3	Page Avenue and Richmond Valley Road

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 roadway segments approaching and departing intersections, at regularly spaced interval of 25 feet within 75 feet of the intersection, and additional receptor at a further 50-foot distance. Ground-level receptors were placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. For predicting annual average neighborhood-scale $PM_{2.5}$ concentrations, receptors were placed at a distance of 15 meters from the nearest moving lane at each analysis location, based on the DEP procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

PARKING FACILITIES

The Proposed Project would include a three-level, structured parking facility (the largest parking level would be below grade and enclosed, and the two above-grade levels would not be enclosed) with a capacity of 1,668 spaces to account for the new parking demand. Emissions from vehicles using the parking facility could potentially affect ambient levels of CO and PM at adjacent receptors. Accordingly, an analysis of the emissions from the outlet vents 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 garages were estimated using the USEPA MOVES mobile source emission model, as referenced in the *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. Since the project is still in the preliminary stage of design, it was assumed for analysis purposes that the all levels of the garage would be fully enclosed, which is considered conservative since it concentrates the emissions from automobile tailpipe exhausts at specific locations, since enclosed garages require mechanically ventilation. In addition, although details on the ventilation system have not yet been defined, included their location, at a minimum, the garage would be designed for a minimum airflow of 1 cubic foot per minute of fresh air per gross square foot of garage area, based on New York City Building Code requirements. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

To determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in USEPA's *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates CO and PM concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces. It was assumed for the purpose of this analysis that all levels of the parking garage would be mechanically ventilated.

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would enter and exit the facility (PM concentrations were determined on a 24-hour and annual average basis). Traffic data for the parking garage analysis was derived from the trip generation analysis described in Chapter 12, "Transportation." Background and on-street concentrations were added to the modeling results to obtain the total ambient levels for CO. The 24-hour average $PM_{2.5}$ background concentration was used to determine the *de minimis* criteria threshold.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

A stationary source analysis was conducted to evaluate potential impacts from the Proposed Project's heating and hot water systems. The combustion equipment would use natural gas exclusively.

Initial Screening

An initial screening analysis was performed using the methodology described in Section 322.1 of Chapter 17 of the *CEQR Technical Manual*. This methodology determines the threshold of development size below which the Proposed Project would not have a significant adverse impact. The screening procedure utilizes information regarding the fuel to be used, the maximum development size, type of development, and the exhaust stack height, to evaluate whether or not there is a potential for a significant adverse impact.

Based on the distance from the Proposed Project to the nearest building of similar or greater height (within an initial study area screening distance of 400 feet), if the maximum development size is greater than the threshold size in the *CEQR Technical Manual,* then there is the potential for significant adverse air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis.

AERSCREEN Analysis

Potential 1-hour average NO_2 and 24-hour and annual average $PM_{2.5}$ impacts from the Proposed Project's heating and hot water systems' emissions were evaluated using the USEPA's AERSCREEN model (version 15181 USEPA, 2015). The AERSCREEN model predicts worst-case 1-hour average concentrations 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.[8] The AERSCREEN model was used to calculate worst-case ambient concentrations of NO_2 and $PM_{2.5}$ 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 complex terrain algorithms and utilizes a 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 USEPA guidance.

NO_x is emitted mostly as NO and transformed to NO_2 as part of the chemical reactions in the atmosphere. Maximum 1-hour average NO_2 concentrations were estimated from modeled NO_x concentrations using an NO_2 to NO_x ratio of 0.8. The 0.8 ratio used for the maximum 1-hour concentration is the recommended default ratio per USEPA's guidance memo providing additional clarification regarding application of *Appendix W Modeling Guidance* for the 1-hour average NO_2 modeling.[9]

Emission Estimates and Stack Parameters

The stack exhaust parameters and emission rates used in the AERSCREEN analysis are presented in **Table 13-4**. 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 development (589,619 gross square feet [gsf]) as recommended in the *CEQR Technical Manual*, and applying the USEPA's *Compilations of Air Pollutant Emission Factors (AP-42)* emission factors for natural gas-fired boilers.[10] The short-term emission rates were calculated by scaling the annual emissions to account for a 100-day heating season. At this time, detailed design information on the sizing and placement of heating and hot water systems is not available. Therefore, for the purpose of this analysis, the exhaust from the heating and hot water systems were assumed to be vented through a single stack located three feet above the bulkhead roof of the cinema.

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[8] 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.

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

[10] USEPA. *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

Table 13-4
Heating and Hot Water System Stack Parameters and Emission Rates

Stack Parameter	Value
Stack Elevation (feet) (1)	99
Stack Diameter (feet)	1.0
Exhaust Velocity (meters per second)	27.6
Exhaust Temperature (degrees Fahrenheit)	300
Emission Rate (grams/second)	
NO_x (1-hour average)	0.18
$PM_{2.5}$ (24-hour average)	0.014
$PM_{2.5}$ (Annual average)	0.0038

Notes:
(1) Height above Staten Island datum.

Receptor Placement

Receptors (locations in the model at which concentrations are projected) are generally placed at windows in residential or other sensitive buildings, air intakes, and publically accessible open space locations, as applicable. The nearest building of similar or greater height is beyond 400 feet; therefore, this distance was conservatively used in the initial screening analysis, as per *CEQR Technical Manual* guidance. Receptors representing the tallest building within 400 feet, at a distance of 306 feet from the Proposed Project, at 4849 Arthur Kill Road were also modeled for the AERSCREEN analysis. Discrete receptors (*i.e.*, locations at which concentrations are calculated) were modeled at multiple heights along the façade of the receptor building to represent operable window locations and potential intake vents. The Proposed Project includes a rooftop restaurant on the second floor and publically accessible waterfront open space. Receptors representing these sensitive uses within the Project Site were also modeled to ensure that pollutant concentrations at these locations do not exceed the air quality impact criteria.

Background Concentrations

To estimate the maximum expected total NO_2 concentration at a given receptor, the maximum predicted modeled concentration was added to the corresponding background concentration (see **Table 13-5**). This background level represents the 98th percentile annually of the daily-highest 1-hour average NO_2 concentration (these are the statistical form of the respective standards) that was monitored at the nearest NYSDEC background monitoring station. It was conservatively assumed that the maximum background concentration occurs on all days. The background concentration for annual average $PM_{2.5}$ is not used since the criterion is based on incremental concentrations only. However, the *de minimis* criteria take into account background concentrations for the 24-hour $PM_{2.5}$ standard.

Table 13-5
Maximum Background Pollutant Concentrations
For Heating and Hot Water System Analysis

Pollutant	Average Period	Location	Background Concentration (μg/m³)	Standard (μg/m³)
NO_2	1-hour	Queens College, Queens	113	188 (1)
$PM_{2.5}$	24-hour	Port Richmond, Staten Island	20.3	7.8 (2)
$PM_{2.5}$	Annual	N/A	N/A	0.3 (3)

Notes:
N/A – Not Applicable
1 1-hour average NAAQS.
2 $PM_{2.5}$ *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.
3 $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 μg/m³

INDUSTRIAL SOURCES

The potential impacts of existing industrial operations on pollutant concentrations at the Project Site were analyzed. Potential industrial air pollutant emission sources within 400 feet of the Project Site's boundaries were considered for inclusion in the air quality impact analyses, as recommended in the 2014 *CEQR Technical Manual*. A permit land use survey and permit search was performed to identify potential sources of air toxics within 400 feet of the project site were reviewed. As discussed in Chapter 2, "Land Use, Zoning and Public Policy", commercial and light industrial in the vicinity of the Project Site uses include a veterinary hospital, a medical imaging facility, a beverage warehouse and distribution facility on the western side of Arthur Kill Road, and several shopping centers (Outerbridge Plaza, Richmond Valley Atrium, and Major League Plaza) with retail and commercial office facilities on the eastern side of Arthur Kill Road. A review of the DEP permit database was performed to determine whether any existing business have potential emission sources of concern. A comprehensive search was also performed to identify NYSDEC Title V permits and permits listed in the EPA Envirofacts database.[11] None of the businesses within 400 feet of the Project Site have uses that would be considered a source of concern for industrial source emissions, and based on the permit searches, no industrial source permits were identified. Therefore, no significant adverse air quality impacts on the Proposed Project from sources are anticipated from industrial source emissions.

In addition, no major or large emissions sources permitted under the NYSDEC Title V program and State Facility permit program were identified within the 1,000 foot study area; therefore, no quantified analysis of the impact of large or major emission sources on the Proposed Project is warranted.[12]

[11] EPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air, *accessed October, 2015.*

[12] The *CEQR Technical Manual* defines "large" emission source as sources located at facilities which require a State facility permit, and "major" sources as sources located at Title V permitted facilities that require Prevention of Significant Deterioration permits and emit either 10 tons per year of any of the listed pollutants or 25 tons per year of a mixture of listed air pollutants.

E. EXISTING CONDITIONS

Monitored background concentrations of SO_2, NO_2, CO, ozone, lead, PM_{10}, and $PM_{2.5}$ for the study area are shown in **Table 13-6**. These values are the most recent monitored data that have been made available by NYSDEC. All data statistical forms and averaging periods are consistent with the definitions of the NAAQS. It should be noted that these values are somewhat different than the background concentrations presented in Table 13-5.

Table 13-6
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY, Manhattan	ppm	8-hour	1.5	9
			1-hour	2.3	35
SO_2	IS 52, Bronx	$\mu g/m^3$	3-hour	28	1,300
			1-hour	36.9	196
PM_{10}	Division Street, Manhattan	$\mu g/m^3$	24-hour	44	150
$PM_{2.5}$	Port Richmond, Staten Island	$\mu g/m^3$	Annual	8.3	12
			24-hour	20.3	35
NO_2	Queens College, Queens	$\mu g/m^3$	Annual	32.3	100
			1-hour	113	188
Lead	IS 52, Bronx	$\mu g/m^3$	3-month	0.0061	0.15
Ozone	Queens College, Queens	ppm	8-hour	0.069	0.075

Notes: Based on the NAAQS definitions, the CO and 3-hour SO_2 concentrations for short-term averages are the second-highest from the year. $PM_{2.5}$ annual concentrations are the average of 2013, 2014, and 2015, and the 24-hour concentration is the average of the annual 98th percentiles in 2013, 2014 and 2015. 8-hour average ozone concentrations are the average of the 4th highest-daily values from 2013 to 2015. 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 2013 to 2015.
Source: NYSDEC, New York State Ambient Air Quality Data.

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

There were no monitored violations of NAAQS at these monitoring sites in 2015.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT

MOBILE SOURCES

CO concentrations in the No Action condition were determined using the methodology previously described. **Table 13-7** 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.

Table 13-7
Maximum Predicted 8-Hour Average CO No Action Concentrations

Analysis Site	Location	Time Period	8-Hour Concentration (ppm)
1	Arthur Kill Road & Richmond Valley Road	Saturday midday	2.5
2	Arthur Kill Road and Project Driveway North	Saturday midday	2.6
3	Page Avenue and Richmond Valley Road	Saturday midday	2.1

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.7 ppm.

As shown in Table 13-7, No Action values are predicted to be well below the 8-hour CO standard of 9 ppm.

PM_{10} concentrations for the No Action condition were determined using the methodology described above. Predicted future PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in the No Action condition are presented in **Table 13-8**. The values shown are the highest predicted concentrations for the receptor locations.

Table 13-8
Maximum Predicted 24-Hour Average PM_{10} No Action Concentrations ($\mu g/m^3$)

Analysis Site	**Location**	Concentration
1	Arthur Kill Road & Richmond Valley Road	57.54
2	Arthur Kill Road and Project Driveway North	57.95
3	Page Avenue and Richmond Valley Road	54.69

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

STATIONARY SOURCES

In the future, it is expected that there will not be any new development on the Project Site, and therefore, conditions on the Project Site are not expected to change from existing conditions. The existing residential building on Block 7632, Lot 6 will remain in the No Action condition.

G. THE FUTURE WITH THE PROPOSED PROJECT

MOBILE SOURCES

CO concentrations for future conditions with the Proposed Project were predicted using the methodology previously described. **Table 13-9** shows the future maximum predicted 8-hour average CO concentrations at the intersection studied. (No 1-hour values are shown, since no

Table 13-9
Maximum Predicted 8-Hour CO With Action Concentrations (ppm)

Analysis Site	Location	Time Period	No-Action	With Action	*De Minimis*
1	Arthur Kill Road & Richmond Valley Road	Saturday midday	2.5	2.6	5.8
2	Arthur Kill Road and Project Driveway North	Saturday midday	2.6	2.5	5.8
3	Page Avenue and Richmond Valley Road	Saturday midday	2.1	2.4	5.5

Notes:
8-hour standard is 9 ppm.
Concentration includes a background concentration of 1.7 ppm.

exceedances of the NAAQS would occur and the *de minimis* criteria are only applicable to 8-hour concentrations; therefore, the 8-hour values are the most critical for impact assessment.) 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 standard. In addition, the incremental increases in 8-hour average CO concentrations are very 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 impact on air quality. PM_{10} concentrations with the Proposed Project were determined using the methodology previously described and used in the No Action condition. **Table 13-10** 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.

Table 13-10
Maximum Predicted 24-Hour Average PM_{10} Concentrations ($\mu g/m^3$)

Analysis Site	Location	No Action	With Action
1	Arthur Kill Road & Richmond Valley Road	57.54	66.12
2	Arthur Kill Road and Project Driveway North	57.95	62.57
3	Page Avenue and Richmond Valley Road	54.69	57.41

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentrations presented include 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 so that they could be compared 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 13-11** and **13-12**, respectively. Note that $PM_{2.5}$ concentrations in the No Action condition are not presented, since impacts are assessed on an incremental basis.

Table 13-11
Maximum Predicted 24-Hour Average $PM_{2.5}$ Incremental Concentrations ($\mu g/m^3$)

Analysis Site	Location	Increment	*De Minimis Criterion*
1	Arthur Kill Road & Richmond Valley Road	3.1	7.4
2	Arthur Kill Road and Project Driveway North	0.65	7.4
3	Page Avenue and Richmond Valley Road	1.38	7.4
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 13-12
Maximum Predicted Annual Average $PM_{2.5}$ Incremental Concentrations ($\mu g/m^3$)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Arthur Kill Road & Richmond Valley Road	0.087	0.1
2	Arthur Kill Road and Project Driveway North	-0.044	0.1
3	Page Avenue and Richmond Valley Road	0.095	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 Project.

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the parking garage at the Proposed Project site were analyzed, assuming a near side sidewalk receptor on the same side of the street (16 feet) as the parking facility and a far side sidewalk receptor on the opposite side of the street (70 feet) from the parking facility. All values are the highest predicted concentrations for any time period analyzed.

The maximum predicted 8-hour average CO concentration of all the receptors modeled is 2.6 ppm. This value includes a predicted concentration of 0.72 ppm from emissions within the parking garage, on-street contribution of 0.13 ppm, and a background level of 1.7 ppm. The maximum predicted concentration is substantially below the applicable standard of nine ppm and the *de minimis* CO criterion of 7.4 ppm.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments including increments associated with on street traffic are 2.0 $\mu g/m^3$ and 0.27 $\mu g/m^3$, respectively. The maximum predicted $PM_{2.5}$ increments are below the respective $PM_{2.5}$ *de minimis* criterion of 7.4 $\mu g/m^3$ for the 24-hour average concentration and 0.3 $\mu g/m^3$ for the annual concentration.

To ensure that impacts from the proposed Project's parking facility, when added to future With Action traffic, are not significant with respect to the *CEQR de minimis* criteria, the parking facility would be required to utilize a minimum of two exhaust vents, each located at a minimum height of 37 feet above grade. With these restrictions in place, the proposed parking garage would not result in any significant adverse air quality impacts.

STATIONARY SOURCES

INITIAL SCREENING

The results of the screening analysis are presented in **Figure 13-1**. The distance below which impacts might occur on buildings of similar height was calculated at 174 feet. Since the distance to the nearest building of similar height would be greater than 400 feet, there would be no potential for a significant adverse impact on air quality, with respect to the annual average NO_2 concentrations.

AERSCREEN ANALYSIS

An analysis was performed using AERSCREEN model to evaluate potential impacts of $PM_{2.5}$, 1-hour NO_2, and 1-hour SO_2 from operation of heating and hot water systems at the Project Site. The results of the screening analysis of the Proposed Project's heating and hot water systems at the off-site building receptors, the Proposed Project's rooftop restaurant, and waterfront open space receptors are presented in **Tables 13-13**, **13-14**, and **13-15**, respectively. The maximum predicted 1-hour average NO_2 concentration was added to the maximum ambient background concentration and compared with the NAAQS, while 24-hour and annual average $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. As shown in Tables 13-13, 13-14, and 13-15, the maximum modeled concentrations for all pollutants are less than the applicable criterion and would therefore not have a significant impact on air quality.

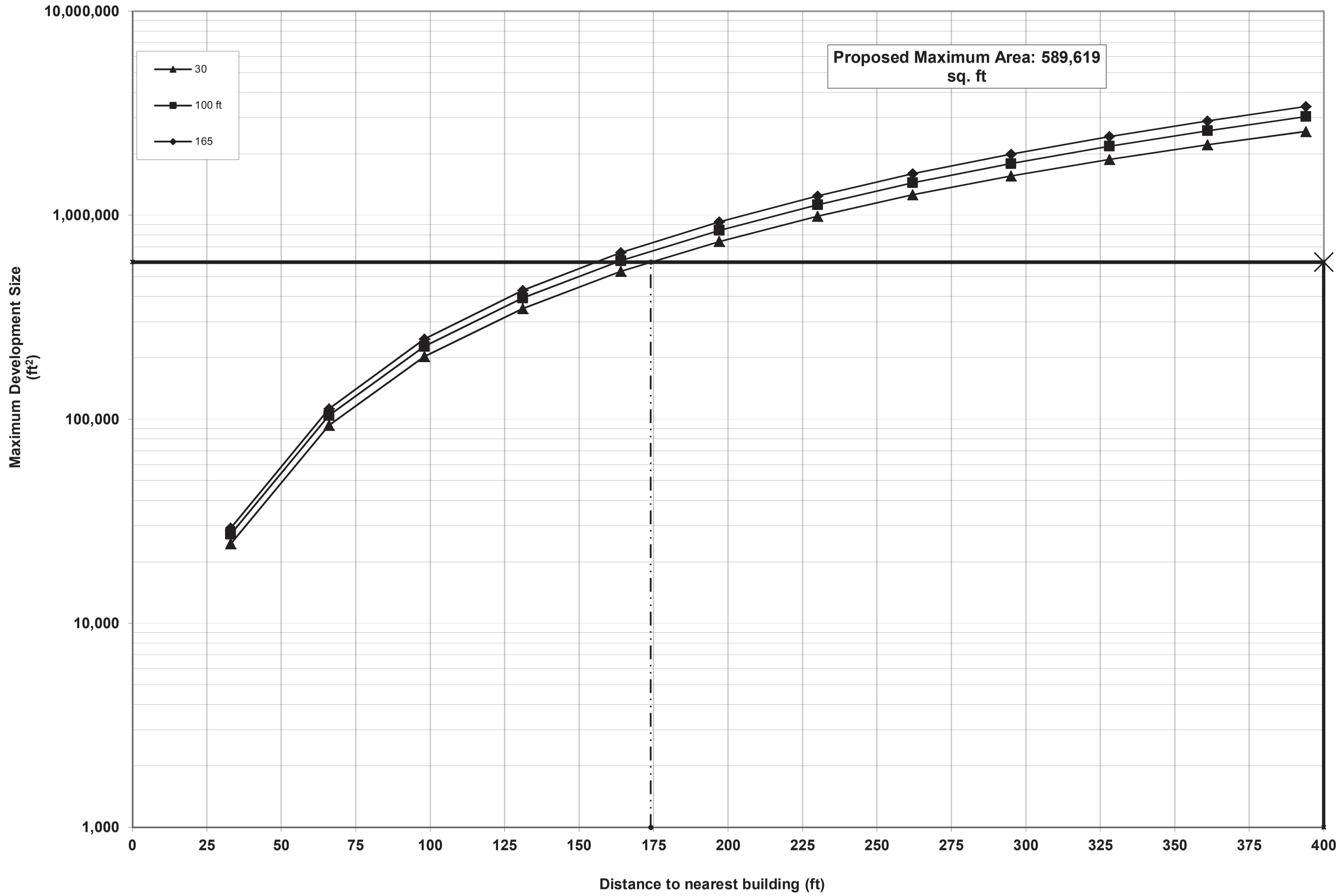
Table 13-13
Maximum Modeled Pollutant Concentrations(μg/m³)
For Off-Site Building Receptors

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	23.1 (1)	113	136	188 (2)
$PM_{2.5}$	24-hour	1.3	N/A	1.3	7.4 (3)
$PM_{2.5}$	Annual	0.06	N/A	0.06	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 USEPA 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/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 μg/m³.

HVAC Screening Analysis
Site: Waterfront Commons
Date: 4/7/2016
Pass

FIG App 17-8
NO_2 BOILER SCREEN
COMMERCIAL AND OTHER NON-RESIDENTIAL DEVELOPMENT - NATURAL GAS



Stack Height: 93 ft
Distance to Nearest Building of Similar or Greater Height: 400 ft
Proposed Maximum SQFA: 589,619 sq. ft
Minimum Allowable Distance to Nearest Building: 174 ft

Notes: Building Plan

Heating and Hot Water System Screening Analysis
Figure 13-1

Table 13-14
Maximum Modeled Pollutant Concentrations(µg/m^3)
For Proposed Rooftop Restaurant on Project Site

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	11.4 [(1)]	113	124	188 [(2)]
$PM_{2.5}$	24-hour	0.7	N/A	0.7	7.4 [(3)]
$PM_{2.5}$	Annual	0.03	N/A	0.03	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 USEPA 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.

Table 13-15
Maximum Modeled Pollutant Concentrations(µg/m^3)
For Public Waterfront Open Space on Project Site

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	23.3 [(1)]	113	136	188 [(2)]
$PM_{2.5}$	24-hour	1.3	N/A	1.3	7.4 [(3)]
$PM_{2.5}$	Annual	0.06	N/A	0.06	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 USEPA 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 *CEQR Technical Manual* screening analysis and the AERSCREEN analysis, there would be no potential significant adverse stationary source air quality impacts from the Proposed Project’s heating and hot water systems on adjacent properties or within the Project Site.

To ensure that there are no significant adverse impacts of $PM_{2.5}$ from the Proposed Project’s heating and hot water system emissions, certain restrictions would be required through the mapping of an (E) designation for air quality (E-443) regarding fuel type and exhaust stack location.

The requirements of the (E) designation would be as follows:

> **Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, and ensure that a single exhaust stack is utilized for fossil fuel-fired heating and hot water systems, with a minimum elevation of 99 feet above grade on the tallest element of the Proposed Project to avoid any potential significant air quality impacts within the Project Site or on neighboring properties.**

With these restrictions, emissions from the Proposed Project’s heating and hot water systems would not result in any significant adverse air quality impacts.

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 the proposed project is developed. ✷