A. INTRODUCTION

The potential for air quality impacts from the proposed project at the Brooklyn Site is examined in this section. The proposed project would include natural gas-burning heat and hot water systems. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations with the proposed heat and hot water systems.

The maximum projected hourly incremental traffic volumes generated by the proposed project at the Brooklyn Site would not exceed the carbon monoxide (CO) screening threshold defined in the 2014 *City Environmental Quality Review (CEQR) Technical Manual* (170 peak-hour vehicle trips at an intersection in the study area). However, the incremental traffic volumes would exceed the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from traffic generated by the proposed project was performed for PM. The proposed project would include an accessory parking garage. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations near the ventilation outlets with the proposed parking garage.

The mobile source intersection analysis in this section are based on the transportation analysis that was prepared using a slightly larger program for the proposed detention facility than is described in Chapter 1, "Project Description." As a result, traffic volumes used in this analysis are slightly higher than would be projected for the proposed project as currently contemplated and the analysis is conservative in that it presents a larger potential for project-generated impacts. Between the Draft and Final EIS, the transportation and transportation-related analyses will be updated as appropriate to reflect the development program for the proposed detention facility.

In addition, potential effects from existing nearby large or major sources of emissions on the proposed detention facility were assessed.

PRINCIPAL CONCLUSIONS

Analysis of the emissions and dispersion of nitrogen dioxide (NO_2) and PM less than 10 microns in diameter (PM_{10}) from the heating and hot water systems of the development under the proposed project indicate that these emissions would not result in a violation of National Ambient Air Quality Standards (NAAQS). In addition, the maximum predicted incremental concentrations of particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) from the proposed project would be less than the applicable 24-hour and annual average criteria. To ensure that there is no potential for significant adverse impacts resulting from the proposed project due to heating and hot water system emissions, certain restrictions would be required.

The mobile source analyses determined concentrations of particulate matter less than 10 microns in diameter (PM_{10}) due to the proposed project at the Brooklyn site would not result in any violations of NAAQS at the intersection analyzed, and incremental concentrations of $PM_{2.5}$ would not exceed the City's *de minimis* criteria for $PM_{2.5}$. In addition, concentrations of CO and $PM_{2.5}$

from the parking facilities associated with the proposed detention facility would not have the potential to result in any significant adverse air quality impacts.

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 carbon monoxide (CO) are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide (NO) and nitrogen dioxide (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),[1] and are referred to as 'criteria pollutants'; emissions of precursors to criteria pollutants, including VOCs, NO_x, and SO_2, 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 is not expected to result in an increase in vehicle trips higher than the *CEQR Technical Manual* screening threshold of 170 trips at any intersection. Therefore, a mobile source analysis to evaluate future CO concentrations was not warranted. However, a parking analysis was conducted to evaluate future CO concentrations with the operation of the proposed parking facility.

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

[1] The Clean Air Act of 1970, as amended 1990 (42 U.S.C. §7401 et seq.)

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 criteria pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern farther downwind from large stationary point sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion are mostly in the form of NO at the source.) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. The increases in NO_2 concentrations associated with mobile sources have not been analyzed explicitly due to limitations in guidance and modeling tools. However, any increase in NO_2 associated with the proposed project would be relatively small, as demonstrated below for CO and PM, due to the very small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways.

The potential for impacts on local NO_2 concentrations from the fuel combustion for the heat and hot water systems associated with the proposed project were evaluated.

LEAD

Current airborne lead emissions are principally associated with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of 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.

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.

Since the traffic generated by the proposed project at the Brooklyn Site would potentially exceed the PM emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, a quantified assessment of emissions was performed for PM. A parking analysis was conducted to evaluate future PM concentrations with the operation of the proposed accessory parking facility. The proposed project would include natural gas-fired heating and hot water systems; therefore, emissions of PM from the existing and proposed stationary sources were analyzed.

SULFUR DIOXIDE

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

It is assumed that natural gas would be burned in the proposed heat and hot water systems. The sulfur content of natural gas is negligible; therefore, no analysis was undertaken to estimate the future levels of SO_2 with the proposed project.

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[2] 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 3.10-1**. 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.

[2] USEPA. National Ambient Air Quality Standards. 40 CFR Part 50.

Table 3.10-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average (2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average (3,4)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average (1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (5)	NA	12	NA	15
24-Hour Average (6)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average (7)	0.075	196	NA	NA
Maximum 3-Hour Average (1)	NA	NA	0.5	1,300

Notes: ppm – parts per million (unit of measure for gases only)
µg/m^3 – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable

All annual periods refer to calendar year.

Standards are defined in ppm. Approximately equivalent concentrations in µg/m^3 are presented.

1. Not to be exceeded more than once a year.
2. 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. USEPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
5. 3-year average of annual mean.
6. Not to be exceeded by the annual 98th percentile when averaged over 3 years.
7. 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.

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

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

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.

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 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.

Manhattan had been designated as a moderate NAA for PM_{10}; on July 29, 2015, USEPA clarified 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) were redesignated as in attainment for that standard effective April 18, 2014 and are now under a maintenance plan. USEPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. 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 a “moderate” NAA for the 1997 8-hour average ozone standard. In March 2008 USEPA strengthened the 8-hour ozone standards. USEPA designated these same areas as a “marginal” NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, as requested by New York State, USEPA reclassified the area as a “moderate” NAA. New York State began submitting SIP documents in December 2014. On July 19, 2017 NYSDEC announced that the New York Metropolitan Area is not projected to meet the July 20, 2018 attainment deadline and NYSDEC is therefore requesting that USEPA reclassify the New York Metropolitan Area to “serious” nonattainment, which would impose a new attainment deadline of July 20, 2021 (based on 2018-2020 monitored data). On November 18, 2018, EPA proposed reclassifying the NYMA from moderate to serious nonattainment. On April 30, 2018, USEPA designated the same area as a moderate NAA for the revised 2015 ozone standard.

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.

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. In December 2017, USEPA designated most of the State of New York, including New York City, as in attainment for this standard.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g.,

urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[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 3.10-1**) would be deemed to have the potential for a 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 NAAs, *de minimis* 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

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

$PM_{2.5}$ DE MINIMIS CRITERIA

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

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments 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 that 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 the potential for a significant adverse impact.

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

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 at the Brooklyn Site 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.

INTERSECTION ANALYSIS

Vehicle Emissions

Engine Emissions

Vehicular PM engine emission factors were computed using the USEPA mobile source emissions model, MOVES2014a.[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 the NYSDEC.

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

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the neighborhood-scale $PM_{2.5}$ microscale analyses, since the New York City Department of Environmental Protection (DEP) considers it to have an insignificant contribution on that scale. Road dust emission factors

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

[5] The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle's 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.

were calculated according to the latest procedure delineated by USEPA[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 Section 3.9, "Transportation-Brooklyn"). Traffic data for the future without the project (the No Action condition) and the With Action condition were employed in the respective air quality modeling condition. The peak morning, midday, and Saturday period traffic volumes were used as a baseline for determining off-peak volumes. Off-peak traffic volumes in the No Action condition were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations, and off-peak increments from the proposed project were estimated based on the parking demand as a result of the proposed project at the Brooklyn Site. For annual impacts, average weekday and Saturday 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

Dispersion Models for Microscale Analyses

The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of pollutants from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict 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.

Maximum contributions from vehicular emissions to PM concentrations adjacent to each analysis site were calculated using the CAL3QHCR model Version 2.0.[7] This refined version of the model can utilize hourly traffic and meteorology data, and is therefore more appropriate for calculating the 24-hour and annual average concentrations required to address the timescales of the PM NAAQS.

Meteorology

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

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

For computation of PM concentrations, the CAL3QHCR model includes the modeling of hourly concentrations based on hourly traffic data and 5 years of monitored hourly meteorological data. The data consists of surface data collected at JFK Airport and upper air data collected at

[6] 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.

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

Brookhaven, New York for the period 2013–2017. All hours were modeled, and the highest predicted concentration for each averaging period is presented.

Analysis Year

The microscale analyses were performed for 2027, the year by which the proposed project is anticipated to be completed. The future analysis was performed for both the No Action condition and the With Action condition.

Background Concentrations

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

The background concentrations for the nearest monitored location are presented in **Table 3.10-2**. PM concentrations are based on the latest available three years of monitored data (2015–2017) consistent with the statistical format of the NAAQS. These values were used as the background concentrations for the mobile source analysis.

Table 3.10-2
Maximum Background Pollutant Concentration for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
PM_{10}(1)	24-hour	Division Street, Manhattan	44 µg/m^3	150 µg/m^3
$PM_{2.5}$(2)	24-hour	JHS 126, Brooklyn	19.6 µg/m^3	35 µg/m^3

Notes:
(1) PM_{10} concentration represents the maximum second-highest monitored concentration from the most recent three years of data.
(2) $PM_{2.5}$ concentration represents the average of the 98th percentile day from the most recent three years.
Source:
New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2015–2017.

Analysis Site

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. One intersections were selected for microscale analysis—at Atlantic Avenue and Clinton Street. This site was selected because it is the location in the study area projected to have the highest levels of equivalent truck traffic and road dust, and, therefore, where the greatest potential for air quality impacts and maximum changes in concentrations would be expected. The potential impact from vehicle emissions of PM_{10} and $PM_{2.5}$ was analyzed 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 in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters, from the nearest moving lane at each

analysis location, based on the *CEQR Technical Manual* procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

PARKING ANALYSIS

Emissions from vehicles using the parking facility at the proposed detention facility at the Brooklyn Site could potentially affect ambient levels of CO and PM at adjacent receptors. 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 garage 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 garage. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. Although specific development plans for the project have not yet been defined, at the minimum, the garage would be designed for a minimum airflow of one 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 were derived from the trip generation analysis described in Section 3.9, "Transportation-Brooklyn." 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

A stationary source analysis was conducted to evaluate the potential for impacts from the site's heat and hot water systems. In addition, an assessment was conducted to determine the potential for impacts from any nearby large or major emissions sources.

HEAT AND HOT WATER SYSTEMS

An initial screening analysis was performed to assess the potential for air quality impacts associated with emissions from heat and hot water systems for the project site. The methodology described in the *CEQR Technical Manual* was used for the analysis, and considered impacts on sensitive uses (i.e., existing residences and proposed developments). To evaluate potential 1-hour average NO_2 and 24-hour and annual average PM impacts from the proposed project's heat and hot water systems, an additional screening analysis was performed using the USEPA AERSCREEN model.

Initial Screening Analysis

The methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the heat and hot water systems' exhaust stack height, to evaluate whether a significant adverse impact may occur. Based on the distance from the development site to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size shown in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required.

Since information on the heat and hot water systems' design was not available, the project site was evaluated with the nearest existing residential development of a similar or greater height analyzed as a potential receptor. The maximum gross floor area of the proposed detention facility was used as an input for the screening analysis.

It was assumed that natural gas would be used in the proposed detention facility's heat and hot water systems, and that the exhaust stack(s) would be located three feet above roof height (the default assumption in the *CEQR Technical Manual*).

AERSCREEN Analysis

Potential 1-hour average NO_2 and 24-hour and annual average $PM_{2.5}$ impacts from the proposed project's heat and hot water system's emissions were evaluated using the latest version of USEPA's AERSCREEN model (Version 16216). The AERSCREEN model predicts worst-case 1-hour average concentrations downwind from a point, area, or volume source. Concentrations over longer-period averages are estimated by multiplying the 1-hour results by persistence factors established by USEPA. 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 model incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithm, which is designed to predict concentrations 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 uses the Building Profile Input Program for PRIME (BPIPPRM) to provide a detailed analysis of downwash influences on a direction-specific basis. AERSCREEN also incorporates AERMOD's complex terrain algorithms and utilizes the AERMAP terrain processor to account for the actual terrain in the vicinity of the source on a direction-specific basis.

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

---

8. 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.

Maximum 1-hour average NO_2 concentrations were estimated using an NO_2 to NO_x ratio of 0.8—the recommended default ambient ratio per USEPA guidance.[9]

Emission Rates and Stack Parameters

Annual emission rates for the proposed project's heating and hot water systems were calculated based on fuel consumption estimates, using energy intensity estimates based on type of development and size of the proposed detention facility (1,366,700 gross square feet [gsf], including below grade space) as recommended in the *CEQR Technical Manual*, and applying emission factors for natural gas-fired boilers.[10] $PM_{2.5}$ emissions include both the filterable and condensable components. The short-term emission rates (24-hour and less) were calculated by scaling the annual emissions to account for a 100-day heating season. The exhaust from the heat and hot water systems was assumed to be vented through a single stack located three feet above the roof of the building at a height of approximately 398 feet above grade.

To calculate the exhaust flow rate, the estimated fuel consumption of the proposed project's heating and hot water systems was multiplied by USEPA's fuel factor for natural gas,[11] providing the exhaust flow rate at standard temperature; the flow rate was then corrected for the exhaust temperature. The exhaust velocity was then calculated based on the estimated stack diameter and calculated exhaust flow rate. Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data prepared and provided by New York City Department of Environmental Protection (DEP),[12] and were used to calculate the exhaust velocity.

The emission rates and exhaust stack parameters used in the modeling analyses are presented in **Table 3.10-3**.

---

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. *Compilation of Air Pollutant Emission Factors AP-42*. 5th Ed., V. I, Ch. 1.4. September 1998.

11 USEPA. *Standards of Performance for New Stationary Sources.* 40 CFR Chapter I Subchapter C Part 60. Appendix A-7, Table 19-2. 2013.

12 DEP. *Boiler Database*. E-mail communication from Mitchell Wimbish on August 11, 2017.

Table 3.10-3
Exhaust Stack Parameters and Emission Rates

Stack Parameter	Value
Stack Height (feet)	398
Stack Diameter (feet)(1)	5.0 (1)
Exhaust Velocity (meters/second)(1)	2.34
Exhaust Temperature (degrees Fahrenheit)(1)	307.8
Emission Rate (grams/second)	
NO_2 (1-hour average)	0.42
NO_2 (Annual average)	0.12
$PM_{2.5}$ (24-hour average)	0.032
$PM_{2.5}$ (Annual average)	0.0088

Note:
1. Stack parameter assumptions are based on boiler specifications for similar sized systems from boiler permit data provided by DEP.

Background Concentrations

To estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts must be added to a background value that accounts for existing pollutant concentrations from other sources that are not directly accounted for in the model (see **Table 3.10-4**). To develop background levels, concentrations measured at the most representative NYSDEC ambient monitoring station over the latest available five-year period (2013–2017) was used for the 1-hour and annual average NO_2 background. The $PM_{2.5}$ 24-hour average background concentration of 19.6 µg/m^3 (based on the 2015 to 2017 average of 98th percentile concentrations measured at the JHS 126 monitoring station) was used to establish the *de minimis* value for the 24-hour increment, consistent with the guidance provided in the *CEQR Technical Manual*. $PM_{2.5}$ 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.

Table 3.10-4
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-hour	Queens College, Queens	112.3	188
	Annual	Queens College, Queens	32.9	100
$PM_{2.5}$	24-hour	JHS 126, Brooklyn	19.6	35

Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2013–2017.

Receptor Placement

Receptors (locations at which concentrations are projected by the air dispersion model) generally include operable windows in residential or other buildings, potential building air intakes, and publicly accessible open space locations. The nearest building of a similar or greater height is located more than 400 feet away from the project site. A receptor was modeled for the tallest building (242 feet tall) located within 400 feet of the project site, as well as for two buildings located 624 and 876 feet away that are 300 and 388 feet tall, respectively. Other receptors at lower

heights were included at the same distance, and the worst-case ground level concentration was also determined.

ADDITIONAL SOURCES

The *CEQR Technical Manual* requires an analysis of projects that may have the potential to 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 existing permitted facilities was conducted. Sources of information reviewed included the NYSDEC Title V and State Facility Permit websites.

One facility with a Title V permit was identified: Cogen Corp-111 Livingston Street, which is within 1,000 feet of the project site. Therefore, an analysis was performed using the American meteorological Society (AMS)/USEPA Regulatory Model (AERMOD) dispersion model.[13]

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 and source types. AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatment of the boundary layer theory and understanding of turbulence and dispersion, and includes handling of the plume interaction with terrain. AERMOD is USEPA's preferred regulatory stationary source model.

AERMOD calculates pollutant concentrations from simulated sources (e.g., exhaust stacks) based on hourly meteorological data and surface characteristics, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analysis of potential impacts from exhaust stacks assumed stack tip downwash, urban dispersion and surface roughness length, and elimination of calms. AERMOD also incorporates the algorithms from the PRIME model (described above for AERSCREEN), and BPIPPRM was used to determine the projected building dimensions for modeling with the building downwash algorithm enabled. The modeling of plume downwash accounts for all obstructions within a radius equal to five obstruction heights of the stack.

The analysis was prepared with downwash in order to assess the worst-case impacts at lower elevations and ground level, which would occur with downwash, consistent with the *CEQR Technical Manual* guidance.

For the analysis of the 1-hour average NO_2 concentration from the building's heating and hot water systems, AERMOD's Plume Volume Molar Ratio Method (PVMRM) module was used to analyze chemical transformation within the model. PVMRM incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. The model applied ozone concentrations measured in 2013–2017 at the nearest available NYSDEC ozone monitoring station—the Queens College monitoring station in Queens. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed for boilers, which is considered representative.

Five years of surface meteorological data collected at LaGuardia Airport (2013–2017) and concurrent upper air data collected at Brookhaven, New York were used in the analysis.

The Cogen Corp stack is approximately 319 feet above grade. There are no intervening buildings between the Cogen Corp stack and the proposed detention facility that would restrict or otherwise affect the plume exhaust in such a way as to limit the dispersion of the plume downwind from the stack. Therefore, the AERMOD model was run with downwash only, rather than with and without downwash as per the *CEQR Technical Manual*. The facility emissions were estimated using the information developed for the air permits. **Table 3.10-5** presents the emission rates and stack parameters used in the AERMOD analysis for the analyzed facility.

Table 3.10-5
Stack Parameters and Emission Rates from Cogen Corp Engines

Parameter	Value	
Stack Height (ft)(1)	319	
Stack Diameter (ft)(1)	2.0	2.8
Exhaust Flow Rate (acfm) (2,3)	3030	
Exit Velocity (m/s)	5.2	
Exhaust Temperature (°F)(4)	345	
Fuel Type	Boiler	Engines
NO_x Short Term Emission Rate (g/s) (5)	0.079	0.72
NO_x Annual Emission Rate (g/s)(5)	0.079	0.72
SO_2 Short Term Emission Rate (g/s) (5)	0.00094	0.0013
PM_{10} Short Term Emission Rate (g/s) (5)	0.012	0.016
$PM_{2.5}$ Short Term Emission Rate (g/s) (5)	0.012	0.016
$PM_{2.5}$ Annual Emission Rate (g/s) (5)	0.012	0.016

Notes:
1 The stack height and diameter are based on the NYSDEC Title V permit.
2 acfm = actual cubic feet per minute.
3 The stack exhaust flow rate is based on the NYSDEC Title V permit application.
4 The stack exhaust temperature is based on the NYSDEC Title V permit application.
5 The short-term and annual emissions are based on the NYSDEC Title V permit application.

E. EXISTING CONDITIONS

The most recent concentrations of all criteria pollutants at NYSDEC air quality monitoring stations nearest to the project site are presented in **Table 3.10-6**. As shown, the recently monitored levels did not exceed the NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the analyses. For most pollutants the concentrations presented in **Table 3.10-6** are based on recent measurements obtained in 2017, the most recent year for which data are available; the background concentrations are obtained from several years of monitoring data and represent a conservative estimate of the highest background concentrations for future conditions. There were no monitored violations of NAAQS at these monitoring sites in 2017.

Table 3.10-6
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College, Queens	ppm	8-hour	0.9	9
			1-hour	1.4	35
SO_2	Queens College, Queens[1]	µg/m^3	3-hour	42.1	1,300
			1-hour	18.1	196
PM_{10}	Division Street, Manhattan	µg/m^3	24-hour	28	150
$PM_{2.5}$	JHS 126, Brooklyn[2]	µg/m^3	Annual	8.2	15
			24-hour	19.6	35
NO_2	Queens College, Queens[3]	µg/m^3	Annual	28.7	100
			1-hour	112.3	188
Lead	IS 52, Bronx[4]	µg/m^3	3-month	0.0041	0.15
Ozone	Queens College, Queens[5]	ppm	8-hour	0.074	0.075

Notes:
(1) The 1-hour value is based on a three-year average (2015–2017) of the 99th percentile of daily maximum 1-hour average concentrations.
(2) Annual value is based on a three-year average (2015–2017) of annual concentrations. The 24-hour value is based on the three-year average of the 98th percentile of 24-hour average concentrations.
(3) The 1-hour value is based on a three-year average (2015–2017) of the 98th percentile of daily maximum 1-hour average concentrations.
(4) Based on the highest quarterly average concentration measured during 2015 to 2017.
(5) Based on the three-year average (2015–2017) of the 4th highest daily maximum 8-hour average concentrations.
Source: NYSDEC, New York State Ambient Air Quality Data.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT

MOBILE SOURCES

PM_{10} concentrations in the No Action condition were determined by using the methodology previously described. Predicted future PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in the No Action condition are presented in **Table 3.10-7**. The values shown are the highest predicted concentrations for the receptor locations. As shown in the table, No Action condition concentrations are predicted to be well below the PM_{10} NAAQS.

Table 3.10-7
Maximum Predicted 24-Hour Average
PM_{10} No Action Concentrations (µg/m^3)

Analysis Site	Location	Concentration
1	Atlantic Avenue and Clinton Street	59.7

Notes:
NAAQS—24-hour average 150 µg/m^3.
Concentration includes a background concentration of 44 µg/m^3.

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

STATIONARY SOURCES

Absent the approvals, there would be no change on the project site, and the existing detention facility on the site would remain as is in existing conditions. Accordingly, in the No Action condition, emissions in the area from heating and hot water systems would be similar to existing conditions, which would be less than the proposed project.

G. THE FUTURE WITH THE PROPOSED PROJECT

MOBILE SOURCES

INTERSECTION ANALYSIS

PM_{10} concentrations with the proposed project were determined using the methodology previously described and used in the No Action condition. **Table 3.10-8** presents the predicted PM_{10} 24-hour concentrations at the analyzed intersections in the With Action condition. The value shown is the highest predicted concentration for the modeled receptor locations and includes background concentration.

Table 3.10-8
Maximum Predicted 24-Hour Average PM_{10}
With Action Concentration (µg/m^3)

Analysis Site	Location	No Action	With Action
1	Atlantic Avenue and Clinton Street	59.7	61.2

Notes:
NAAQS—24-hour average 150 µg/m^3.
Concentrations presented include a background concentration of 44.0 µg/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 3.10-9 and 3.10-10**, respectively. Note that $PM_{2.5}$ concentrations in the No Action condition are not presented, since impacts are assessed on an incremental basis.

Table 3.10-9
Maximum Predicted 24-Hour Average $PM_{2.5}$
Incremental Concentration (µg/m^3)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Atlantic Avenue and Clinton Street	0.6	7.7

Note:
$PM_{2.5}$ *de minimis* criterion—24-hour average, not to exceed more than half the difference between the background concentration (19.6 µg/m^3) and the 24-hour standard of 35 µg/m^3.

Table 3.10-10
Maximum Predicted Annual Average $PM_{2.5}$
Incremental Concentration ($\mu g/m^3$)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Atlantic Avenue and Clinton Street	0.05	0.1
Note: $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 $\mu g/m^3$.			

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the parking garage at the proposed project at the Brooklyn Site were analyzed, assuming a near side sidewalk receptor on the same side of the street (7 feet), and a far side sidewalk receptor across Smith Street (73 feet). All values are the highest predicted concentrations for any time period analyzed.

The maximum predicted 8-hour average CO concentration modeled is 1.51 ppm. This value includes a predicted concentration of 0.11 ppm from emissions within the parking facility and a background level of 1.4 ppm. The maximum predicted concentration is substantially below the applicable standard of 9 ppm, and the incremental concentration of 0.11 ppm is below the *de minimis* CO criterion of 3.8 ppm.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments from the vehicles using the garage are 0.38 $\mu g/m^3$ and 0.06 $\mu g/m^3$, respectively. These values are well below the respective $PM_{2.5}$ *de minimis* criteria of 7.7 $\mu g/m^3$ for the 24-hour average concentration and 0.3 $\mu g/m^3$ for the annual average concentration.

Therefore, the proposed parking garage would not have the potential to result in any significant adverse air quality impacts.

STATIONARY SOURCES

HEAT AND HOT WATER SYSTEMS

Initial Screening Analysis

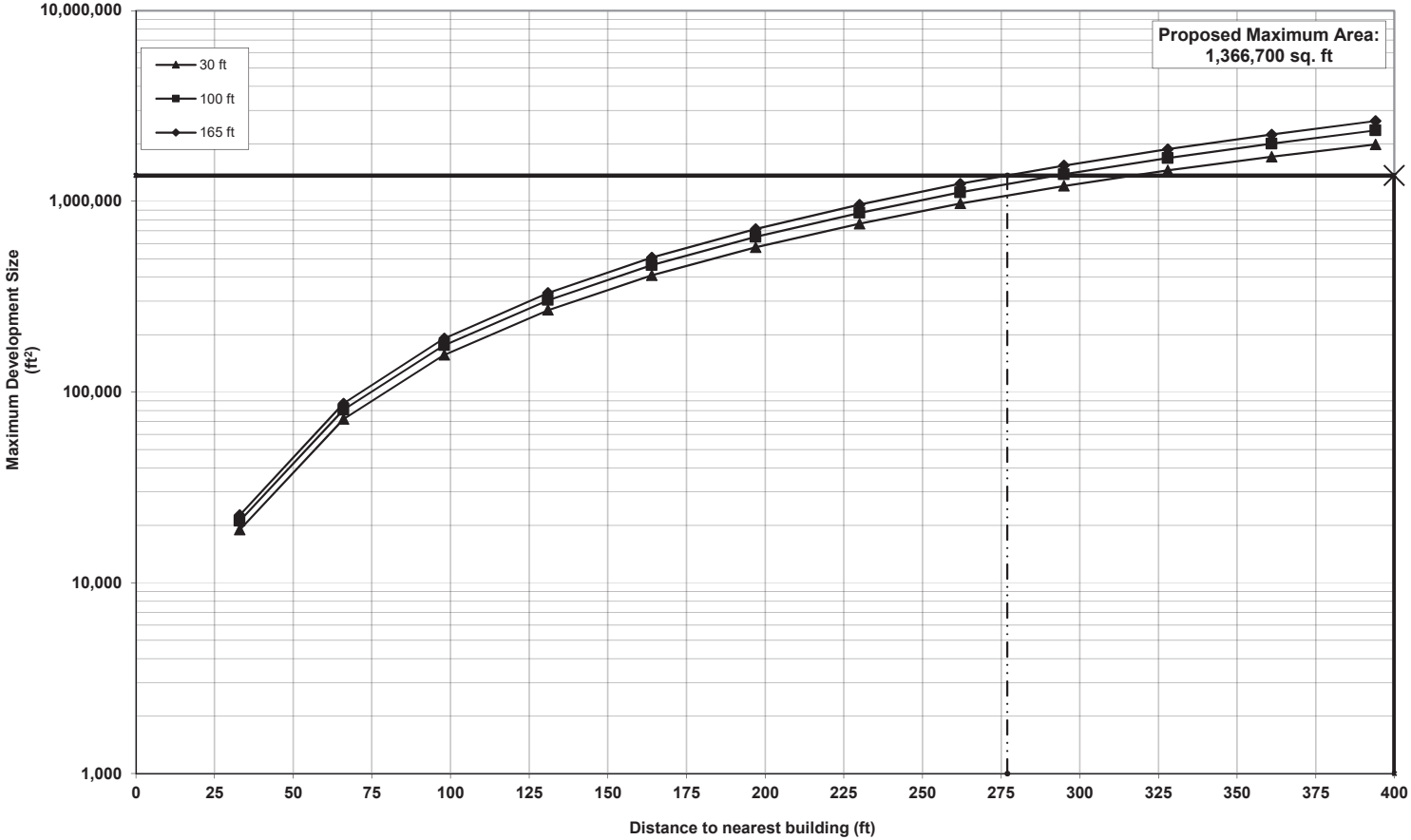
The results of the initial screening analysis are presented in **Figure 3.10-1**. The distance to the nearest building of similar height was determined to be greater than 400 feet; therefore, this distance was used for the analysis, as recommended in the *CEQR Technical Manual*. As indicated by the figure, potential impacts would not occur at distances greater than 277 feet. Annual average NO_2 is the critical pollutant for this analysis. Potential for significant impacts would also not be expected for SO_2, PM_{10}, and CO.

AERSCREEN Analysis

The results of the AERSCREEN analysis for 1-hour NO_2 and 24-hour and annual average $PM_{2.5}$ are presented in **Table 3.10-11**. As shown in the table, no exceedance of thresholds was identified in the AERSCREEN analysis.

HVAC Screening Analysis
Site: Brooklyn Site
Date: 2/22/2019
Pass

FIG App 17-7
NO_2 BOILER SCREEN
RESIDENTIAL DEVELOPMENT - NATURAL GAS



Stack Height: 398 ft
Distance to Nearest Building of Similar or Greater Height: 400 ft
Proposed Maximum SQFA: 1,366,700 sq. ft
Minimum Allowable Distance to Nearest Building: 277 ft

Basic Screening Results
Figure 3.10-1

Table 3.10-11
Maximum Modeled Pollutant Concentrations (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	32.7 (1)	112.3	145	188 (2)
	Annual	1.12	32.9	34	100 (2)
$PM_{2.5}$	24-hour	1.86	N/A	1.86	7.7 (3)
	Annual	0.09	N/A	0.09	0.3 (4)

Notes:
N/A – Not Applicable
1. The 1-hour average NO_2 concentration is estimated using NO_2 to NO_x ratio of 0.8 as per USEPA guidance.
2. 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).

To ensure that there is no potential for significant adverse impacts of $PM_{2.5}$ or NO_2 from the proposed detention center's heating and hot water system emissions, certain restrictions would be required that would be placed on the Brooklyn Site. These restrictions were assumed in the analysis results presented in **Table 3.10-11**, and would avoid the potential for significant air quality impacts from stationary sources based on the very conservative assumptions used in the analysis.

The restrictions would be as follows:

Brooklyn Site

Any new development on at the Brooklyn Site (Block 175, Lot 1) must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, and locate heating and hot water exhaust stacks at least 398 feet above grade.

Overall, based on the screening analyses presented, the proposed project's heating and hot water system would not result in any significant adverse air quality impacts.

ADDITIONAL SOURCES

Potential stationary source impacts on the Brooklyn Site from the existing large source were determined using the AERMOD model. The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling were added to the background concentrations to estimate total air quality concentrations on the proposed project, while $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. The results of the AERMOD analysis are presented in **Table 3.10-12**.

As shown in **Table 3.10-12**, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective standards. Therefore, no potential for significant adverse air quality impacts on the proposed Brooklyn Site from the existing large source is predicted.

Table 3.10-12
Maximum Modeled Pollutant Concentrations on the Proposed Brooklyn Site ($\mu g/m^3$)—Cogen Corp

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	NAAQS / *De Minimis*
NO_2	Annual[2]	0.70	32.9	33.6	100
	1-hour[1]	N/A	N/A	149	188
SO_2	1-Hour	0.28	18.1	18.4	196
PM_{10}	24-hour	0.51	44	44.5	150
$PM_{2.5}$	24-hour	0.51	N/A	0.51	7.7[3]
	Annual	0.03	N/A	0.03	0.3[4]

Notes:
[1] Reported concentration is the maximum total 98th percentile concentration at any receptor using seasonal-hourly background concentrations.
[2] Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75.
[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 $\mu g/m^3$.
[4] $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 $\mu g/m^3$.

✷

\