Chapter 15: Air Quality

A. INTRODUCTION

This chapter examines the potential for air quality impacts from the proposed project. As described in Chapter 1, "Project Description," the proposed project would redevelop the northern portion of the Bronx Psychiatric Center (BPC) campus with a mix of commercial and medical office, bio-tech/research, hotel, accessory, college/trade school, community facility, and retail uses along with open space and parking facilities.

The proposed project would be completed in two phases, with 2023 as the analysis year for Phase I completion, and 2028 as the year for Phase II full build-out, or "With-Action" condition.

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 parking garages and surface parking lots. Therefore, an analysis was conducted to evaluate potential future CO and particulate matter (PM) concentrations in the vicinity of the ventilation outlets with the proposed parking facilities.

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.

In addition, since the project site is partially located within a manufacturing zoning district, a survey of uses surrounding the project was conducted to determine the potential for impacts from industrial emissions.

PRINCIPAL CONCLUSIONS

The mobile source analyses determined that in the 2023 With-Action condition, concentrations of CO and fine particulate matter less than 10 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 $PM_{2.5}$ increments are predicted to be below their respective *de minimis* criteria. However, in the 2028 With-Action, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion at the intersections of Marconi Street and Waters Place and Waters Place and

Fink Avenue/ Hutchinson River Parkway (HRP) Southbound Off Ramp. Therefore, a significant adverse air quality impact is predicted at these locations. Accordingly, traffic mitigation measures were examined to avoid a potential significant impact at the affected intersections. Mitigation measures are discussed in Chapter 22, "Mitigation."

The analysis of the proposed parking facilities determined that they would not result in any significant adverse air quality impacts.

Based on the stationary source refined analysis, which evaluated the effects of nitrogen dioxide (NO_2) and $PM_{2.5}$ emissions from the proposed project's natural gas-fired heating and hot water systems, with the implementation of stack location restrictions and low-NO_x burners, there would be no potential significant adverse air quality impacts.

No industrial sources or large or major emission sources were identified within the project study area. Therefore, there would be no potential for a significant adverse impact on stationary source air quality from these sources.

B. POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (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 analysis was also conducted to evaluate future CO concentrations with the operation of the proposed project's parking facilities.

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 farther 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 heating and hot water systems associated with the proposed project.

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

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[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.

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.

For the proposed project, an analysis was conducted to assess the worst-case PM impacts due to the increased traffic with the proposed project), 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; 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 project's 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.

NONCRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, noncriteria pollutants may be of concern. Noncriteria pollutants are emitted by a wide range of man-made and naturally occurring sources. These pollutants are sometimes referred to as hazardous air pollutants and when emitted from mobile sources, as Mobile Source Air Toxics (MSATs). Emissions of noncriteria pollutants from industries are regulated by EPA.

The potential impacts of noncriteria pollutants on the proposed project from nearby industrial sources were examined.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

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

of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 15-1**. The NAAQS for CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only.

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

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average (2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average (3)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average (1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (4)	NA	12	NA	15
24-Hour Average (5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(6)	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. 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
3. 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
4. 3-year average of annual mean.
5. Not to be exceeded by the annual 98th percentile when averaged over 3 years.
5. 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.

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.

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.

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.

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 were 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. The area has been in nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard effective April 18, 2014, and is now under a maintenance plan. USEPA designated the area as in attainment for the 12 $\mu g/m^3$ annual-average $PM_{2.5}$ 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 non-attainment area for the 1997 8-hour average ozone standard. In March 2008, USEPA strengthened the 8–hour ozone standards, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ('anti-backsliding'). 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. On July 19, 2017, the New York State Department of Environmental Conservation (NYSDEC) announced that the New York metropolitan area (NYMA) is not projected to meet the July 20, 2018 attainment deadline and is therefore requesting that USEPA reclassify the NYMA to "serious" nonattainment that would impose a new attainment deadline of July 20, 2021 (based on 2018-2020 monitored data). On April 30, 2018 USEPA designated the same area as a moderate NAA for the revised 2015 ozone standard. On November 18, 2018, USEPA proposed reclassifying the NYMA from "moderate" to "serious" NAA.

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. In December 2017, USEPA designated most of New York State counties currently meet the 1-hour standard, including all of New York City.

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 15-1**) would be deemed to have a potential significant adverse impact.

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

CO De Minimis Criteria

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

$PM_{2.5}$ De Minimis Criteria

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

[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

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 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

INTRODUCTION

This section presents the methodologies, data, and assumptions used to conduct the air quality analyses for the proposed project. The analyses presented below are as follows:

- Mobile Source Analysis
  - Impacts due to project-generated traffic on CO and PM concentrations at receptor locations for the following conditions:
    i. Phase I (2023) With-Action Condition without HRP Improvements
    ii. Phase II (2028) With-Action Condition with HRP Improvements
  - Impacts due to the proposed parking facilities.
- Stationary Source Analysis
  - Impacts from fossil fuel-fired heating and hot water systems from the proposed project (Phase II 2028 With-Action Condition); and
  - Survey of nearby uses in the adjacent manufacturing district (Phase II 2028 With-Action Condition).

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.

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 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 14, "Transportation"). Traffic data for the future without and with the proposed project were employed in the respective air quality modeling scenarios. The weekday morning (7:30 to 8:30 AM), midday (12:15 to 1:15 PM), and evening (4:15 to 5:15 PM), were analyzed for CO and $PM_{2.5}$. These periods were selected 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.

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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.

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 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.

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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.

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 La Guardia Airport and concurrent upper air data collected at Brookhaven, New York for the period 2012–2016. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEARS

The microscale analyses were performed for 2023 and 2028, the years by which Phase I and Phase II of the proposed project are expected to be completed, respectively. These analyses were 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, (see **Table 15-1)**. These represent a recent 3-year average for the 24-hour average $PM_{2.5}$ and the highest value from three 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 (2013–2017). The background concentrations are presented in **Table 15-2**.

Table 15-2
Background Pollutant Concentrations for Mobile Source Sites

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	Botanical Gardens, Bronx	2.2 ppm	35 ppm
	8-hour	Botanical Gardens, Bronx	1.6 ppm	9 ppm
PM_{10}	24-hour	IS 52, Bronx	39 µg/m^3	150 µg/m^3
$PM_{2.5}$	24-hour	Botanical Gardens, Bronx	21.2 µg/m^3	35 µg/m^3
Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2013–2017.				

ANALYSIS SITES

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. The incremental traffic volumes for the weekday AM, midday, 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, five intersections were selected for microscale analysis (see **Table 15-3** and **Figure 15-1**): Sites 1 to 4 were analyzed for both Phase I and Phase II. Site 5 would provide a connection to the service road from the southbound HRP and was therefore analyzed for the Phase II with HRP improvements conditions. The potential impact from vehicle emissions of CO, PM_{10}, and $PM_{2.5}$ was analyzed at each site.

Table 15-3
Mobile Source Analysis Sites

Analysis Site	Location
1	Marconi Street and Project Driveway
2	Marconi Street and Waters Place
3	Waters Pl and Fink Ave/ Hutch SB Off Ramp
4	OMH Entrance and Waters Place
5	Service Roadway and East-West 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 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. 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 approximately 2,509 accessory parking spaces by Phase I completion in 2023 and 4,029 accessory parking spaces by Phase II full build-out in 2028 within the project site. As described in Chapter 1, "Project Description", a new two-story parking garage (Parking Garage 4) would be constructed over the existing surface lot west of the Thompson Building. A new three-story parking garage (Parking Garage 3) would be located north of the Thompson Building and a new six-story parking garage (Parking Garage 5) would be located east of the Parker Building. The existing surface parking lot between the Thompson Building and Parker Building would be reconfigured and expanded. Buildings 3, 4, and 5 would have ground-floor retail and would be connected by a new, shared, three-story parking garage with a roof garden. Building 6 would be located northeast of Building 5 and would be connected to a new, three-story parking garage (Parking Garage 2). Surface parking lots would be located north of Buildings 3, 4, and 5 and south of Tower 6.

The sidewalks adjacent to the new East-West Road have the potential to be impacted from parking facilities located to the south (Parking Garage 4, Parking Garage 3, and the expanded existing parking lot between the Thompson Building and the Parker Building) and to the north (the shared parking garage connecting Buildings 3, 4, and 5). Additionally, the East-West Road would potentially contribute to increased concentrations at these locations; therefore, these sidewalk locations and parking facilities were selected for analysis.

Emissions from vehicles using the parking facilities could potentially affect ambient levels of CO and PM at adjacent receptors. An analysis of the emissions from the outlet vents and their

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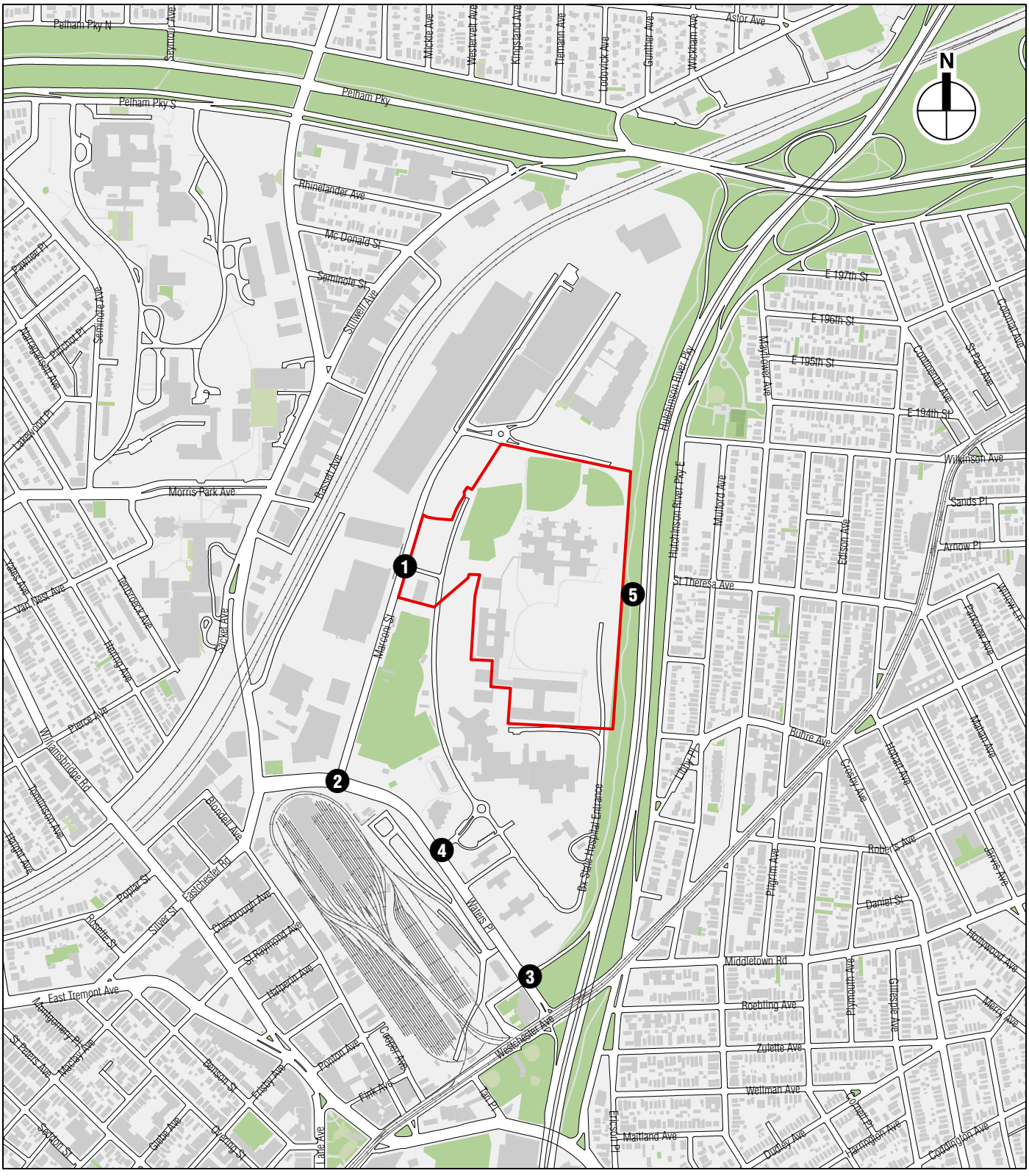

Air Quality Mobile Source Analysis Sites

BRONX PSYCHIATRIC CENTER LAND USE IMPROVEMENT PROJECT

Figure 15-1

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 five 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. Although the project is still in the preliminary stage of design and details on the ventilation system 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. This analysis was performed for Phase II only since it would have higher levels of parking activity compared to Phase I, which would result in higher levels of pollutant emissions from vehicles.

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 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 Chapter 14, "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* criterion threshold.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

The only fossil fuel that would be used for heating and hot water systems for the proposed project buildings would be natural gas. The pollutants of greatest concern with natural gas combustion are NO_2 and $PM_{2.5}$. Therefore, future concentrations of 1-hour average and annual average NO_2 and incremental 24-hour and annual average $PM_{2.5}$ resulting from the proposed heating and hot water system emissions were predicted using the USEPA/AMS AERMOD dispersion model.[8] This analysis was performed for Phase II only since this phase would involve the construction of additional buildings for commercial office, medical office, community facility, accessory, and retail uses, which would result in higher pollutant emissions from stationary sources, compared to Phase I. This analysis accounts for the range of potential heights

[8] USEPA. *AERMOD: Description of Model Formulation*. 454/R-03-004. September 2004; and

USEPA. *User's Guide for the AMS/EPA Regulatory Model—AERMOD*. 454/B-03-001, September 2004 and Addendum June 2015.

and the maximum potential floor area for each building as permitted in the General Project Plan (GPP) for the proposed project.[9]

AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). This steady-state plume model incorporates current concepts about flow and dispersion in complex terrain, including updated treatment of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of the interaction between the plume and terrain.

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analyses of potential impacts from the exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length, and elimination of calms.

The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the "cavity region" (i.e., the area around a structure, which under certain conditions may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to determine the projected dimensions of the proposed buildings 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 performed both with and without downwash in order to assess the worst-case impacts at elevated receptors close to the height of the sources, which would occur without downwash, as well as the worst-case impacts at lower elevations and ground level, which would occur with downwash.

For the analysis of the effect of the proposed development on 1-hour average NO_2 concentrations, the Plume Volume Molar Ratio Method (PVMRM) module was applied within AERMOD, following USEPA's modeling guidance.[10] PVMRM analyzes chemical transformation of NO emitted from the stack to NO_2. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were obtained from the NYSDEC New York Botanical Gardens monitoring station, which is the station with recent ozone data nearest to the project site. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust was assumed for the proposed

[9] As noted in Chapter 1, "Project Description," the GPP would allow approximately 25 feet in height (two stories) and associated floor area to be shifted among buildings within each phase. Any increases in height and floor area for one building would be accompanied by a commensurate decrease in height and floor area for another building in the same phase. Within Phase I, the shifts in height and floor area would be permitted between the Parker Building, Building 3, and Building 4. Within Phase II, the shifts in height and floor area would be permitted between Buildings 5, 6, and 7. This analysis accounts for the range of permitted height for each building and the maximum permitted floor area for each building.

[10] USEPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, March 1, 2011.

development's heat and hot water systems. This ratio is appropriate for boilers per USEPA guidance.[11]

The annual average NO_2 impacts from the proposed development were conservatively calculated assuming that all of the NO emitted by the heat and hot water systems of the proposed development was fully transformed to NO_2 (100 percent conversion). For the analysis of 1-hour impacts, the PVMRM module was applied and hourly background NO_2 data were added within the model. The highest combined daily 1-hour NO_2 concentration was determined at each receptor location for each day. The 8th highest (98th percentile) of the daily 1-hour maximum concentration for each modeled year was then calculated within the model. The 98th percentile concentrations were averaged over five years at each receptor, in accordance with USEPA guidance for addressing the NO_2 1-hour NAAQS.

Total hourly NO_2 concentrations throughout the modeling period were determined by adding the hourly modeled concentrations to the detailed hourly ambient NO_2 concentrations measured at the New York Botanical Gardens monitoring station for each corresponding hour. Then, the highest combined daily 1-hour NO_2 concentration was determined at each receptor location for each day. The 8th highest daily concentration (98th percentile) for each modeled year at any receptor was calculated by the model. The 5-year average of the 8th highest concentrations was then compared with the 1-hour NO_2 NAAQS standard.

$PM_{2.5}$ impacts were assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria. The $PM_{2.5}$ 24-hour average background concentration of 24 $\mu g/m^3$ was used to establish the *de minimis* value of 6.9 $\mu g/m^3$. The background concentration is based on a three-year average of the 98th percentile concentrations obtained from the New York Botanical Gardens ambient monitoring station during the 2015–2017 period.

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at LaGuardia Airport (2013–2017) and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the 5-year period. These data were processed using the USEPA AERMET program to develop data in a format that can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Background Concentrations

As with mobile sources, to estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts from stationary sources must be added to a background value that accounts for pollutant concentrations from other sources that are not directly accounted for in the model. The annual NO_2 background value used is 34.6 $\mu g/m^3$. It is based on the maximum annual average value measured at the Botanical Gardens monitoring station, over

[11] MACTEC for Alaska Department of Environmental Conservation, Evaluation of Bias in AERMOD-PVMRM, June 2005 http://www.epa.gov/scram001/7thconf/aermod/pvmrm_bias_eval.pdf; San Joaquin Valley, Recommended In-stack NO_2/NOx Ratios, http://www.valleyair.org/busind/pto/Tox_Resources/AirQualityMonitoring.htm.

a recent five-year period for which hourly NO_2 data at that station were collected (2013–2017). For comparison with the 1-hour NO_2 standard, total hourly NO_2 concentrations throughout the modeling period were determined by adding the hourly modeled concentrations to the detailed hourly ambient NO_2 concentrations measured at the monitoring station for each corresponding hour.

Receptor Placement

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the project building facades and on nearby buildings for the stationary source modeling analysis. The model receptor network consisted of locations representative of operable windows, intake vents, public open space, and otherwise accessible locations. Rows of receptors were placed in the model at spaced intervals at multiple elevations.

Emission Estimates and Stack Parameters

Fuel consumption was estimated based on procedures outlined in the *CEQR Technical Manual*. Emission rates for the heating and hot water systems for the proposed buildings were projected using the proposed development size (square feet) by use, fuel consumption rates provided in the *CEQR Technical Manual* and USEPA's *Compilation of Air Pollutant Emission Factors (AP-42)*[12] for combustion of natural gas. $PM_{2.5}$ emissions include both the filterable and condensable fractions. The short-term emission rates were calculated by scaling the annual emissions to account for a 100-day heating season. The exhaust velocity was calculated based on the exhaust flowrate for the boiler capacity, estimated using the energy use of the proposed project and USEPA's fuel factors.[13] Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data prepared and provided by DEP, and were used to calculate the exhaust velocity. Emission rates and stack parameters are provided in **Table 15-4**.

INDUSTRIAL SOURCES

The project site is partially located within a manufacturing zone. Therefore, he potential impacts of uses on project area air quality were assessed. The assessment considered the following:

- Desktop survey of land use and Sanborn maps within 400 feet of the project site;
- Field survey of uses within 400 feet of the project site to identify uses that have the potential for emitting air pollutants;
- USEPA Envirofacts database[14] search; and
- NYSDEC Title V program and State Facility permit program search within the 1,000-foot study area.

[12] USEPA, Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, http://www.epa.gov/ttn/chief/ap42.

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

[14] USEPA, Envirofacts Data Warehouse, https://www3.epa.gov/enviro/, accessed December 2017.

Table 15-4
Emission Rates and Stack Parameters for Proposed Buildings

Building Name	Annual NO_x (g/s)	Short Term NO_x (g/s)	Annual $PM_{2.5}$ (g/s)	Short Term $PM_{2.5}$ (g/s)	Stack diameter (ft)	Average Stack Velocity (m/s)	Peak Stack Velocity (m/s)	Stack Height (ft)
Thompson Building (Building 1)	0.017	0.062	0.0013	0.0047	2	0.59	2.16	183
Parker Building (Building 2)*	0.014	0.051	0.0029	0.0105	4.4	0.27	0.99	87
Building 3*	0.0039	0.014	0.00080	0.0029	2	0.36	1.33	207
Building 4*	0.0041	0.015	0.00084	0.0031	2	0.38	1.4	126
Building 5*	0.0085	0.031	0.00175	0.0064	3.2	0.31	1.14	207
Building 6*	0.0093	0.034	0.0019	0.0069	3.2	0.34	1.23	221
Building 7*	0.0054	0.020	0.0011	0.0040	2	0.51	1.85	234
Retail Building	0.0013	0.0047	0.00010	0.00036	2	0.045	0.16	23
Powerhouse Building	0.00053	0.0019	0.000040	0.00015	2	0.018	0.067	30
Little League Support Building	0.00033	0.0012	0.000025	0.000090	2	0.011	0.041	10

Notes:
The exhaust temperature modeled for all project buildings is 307.8 ºF.
* NO_2 emissions for the Parker Building and Buildings 3-7 were modeled assuming low-NO_x (<30 ppm) burners, which would be needed to preclude the potential for significant adverse impacts.

As discussed, the potential impacts of uses within the adjacent manufacturing zone on project area air quality were assessed. A field survey was conducted on December 2, 2016 to identify uses within 400 feet of the project site that have the potential for emitting air pollutants. No businesses with industrial source activities of concern were identified in the study area during the field survey. No sources of concern were identified from the desktop survey of land use and Sanborn maps or through the USEPA Envirofacts database. A desktop search for major or large emissions sources permitted under the NYSDEC Title V program and State Facility permit program was conducted within the 1,000-foot study area. While BPC previously obtained a State Facility Permit to construct a new, smaller boiler plant in place of the existing facility (powerhouse) that is being decommissioned, this new plant is no longer planned for construction. Instead, as discussed in Chapter 1, "Project Description," the existing powerhouse would be repurposed to provide accessory amenity space for the proposed project. No other 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, since no facilities requiring an analysis were identified, there would be no potential for a significant adverse impact on the proposed project from industrial sources.

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 15-5**. These values are 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 15-2**.

Table 15-5
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Botanical Gardens, Bronx	ppm	8-hour	0.3	9
			1-hour	0.35	35
SO_2	Botanical Gardens, Bronx	µg/m^3	3-hour	67.3	1,300
			1-hour	20.1	196
PM_{10}	IS 52, Bronx	µg/m^3	24-hour	27	150
$PM_{2.5}$	Botanical Gardens, Bronx	µg/m^3	Annual	8.6	12
			24-hour	21.2	35
NO_2	Botanical Gardens, Bronx	µg/m^3	Annual	28.1	100
			1-hour	108.2	188
Lead	IS 52, Bronx	µg/m^3	3-month	0.0041	0.15
Ozone	Botanical Gardens, Bronx	ppm	8-hour	0.070	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 2015, 2016, and 2017, and the 24-hour concentration is the average of the annual 98th percentiles in 2015, 2016 and 2017. 8-hour average ozone concentrations are the average of the 4th highest-daily values from 2015 to 2017. SO_2 1-hour and NO_2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively, of the highest daily 1-hour maximum from 2015 to 2017.

Source: 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 2017.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT—2023

MOBILE SOURCES

CO concentrations in the 2023 No-Action condition were determined using the methodology previously described. **Table 15-6** 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 periods analyzed.

As shown in **Table 15-6**, No-Action values are predicted to be well below the 8-hour CO standard of 9 ppm.

Table 15-6
Maximum Predicted 8-Hour Average CO
No-Action Concentrations—2023

Analysis Site	Location	Time Period	8-Hour Concentration (ppm)
1	Marconi Street and Project Driveway	AM	1.9
2	Marconi Street and Waters Place	AM	2.0
3	Waters Pl, Fink Ave and HRP SB Off Ramp	PM	2.0
4	OMH Entrance and Waters Place	AM	1.9

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.6 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 15-7**. The values shown are the highest predicted concentrations for the receptor locations.

Table 15-7
Maximum Predicted 24-Hour Average PM10
No-Action Concentrations—2023 (µg/m^3)

Analysis Site	**Location**	Concentration
1	Marconi Street and Project Driveway	52.4
2	Marconi Street and Waters Place	54.8
3	Waters Pl, Fink Ave and HRP SB Off Ramp	54.1
4	OMH Entrance and Waters Place	51.5

Notes:
NAAQS—24-hour average 150 µg/m^3.
Concentration includes a background concentration of 39.0 µg/m^3.

As shown in **Table 15-7**, Phase I No-Action concentrations are predicted to be well below the 24-hour PM_{10} standard of 150 µg/m^3.

STATIONARY SOURCES

It is assumed that in the Phase I No-Action condition, the Bronx Children's Psychiatric, Thompson, and Parker Buildings would remain vacant. It is also assumed that the powerhouse, two metal shelters, and small storage building on the project site would remain vacated and decommissioned. Therefore, emissions associated with heating and hot water systems are assumed to be similar to existing conditions, and would be lower than with the proposed project.

G. THE FUTURE WITH THE PROPOSED PROJECT—2023

MOBILE SOURCES

CO concentrations in the 2023 With-Action condition were predicted using the methodology previously described. **Table 15-8** shows the future maximum predicted 8-hour average CO concentrations at the intersection studied. (No 1-hour values are shown, since no 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 criterion. Therefore, mobile source CO emissions from the proposed project would not result in a significant adverse impact on air quality.

Table 15-8
Maximum Predicted 8-Hour CO With-Action Concentrations—2023
(ppm)

Analysis Site	Location	Time Period	No-Action	With-Action	*De Minimis*
1	Marconi Street and Project Driveway	AM	1.9	2.5	5.5
2	Marconi Street and Waters Place	AM	2.0	2.8	5.5
3	Waters Pl, Fink Ave and HRP SB Off Ramp	PM	2.0	2.9	5.5
4	OMH Entrance and Waters Place	AM	1.9	2.5	5.5

Notes:
8-hour standard is 9 ppm.
Concentration includes a background concentration of 1.6 ppm.

PM_{10} concentrations with the proposed project were determined using the methodology previously described and used in the No-Action condition. **Table 15-9** 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.

As shown in **Table 15-9**, maximum Phase I PM_{10} concentrations are predicted to be well below the 24-hour PM_{10} standard of 150 $\mu g/m^3$.

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 15-10** and **15-11**, respectively. Note that $PM_{2.5}$ concentrations in the No-Action condition are not presented, since impacts are assessed on an incremental basis.

Table 15-9
Maximum Predicted 24-Hour Average PM_{10} With-Action Concentrations—2023 ($\mu g/m^3$)

Analysis Site	Location	No-Action	With-Action
1	Marconi Street and Project Driveway	52.4	53.1
2	Marconi Street and Waters Place	54.8	57.7
3	Waters Pl, Fink Ave and HRP SB Off Ramp	54.1	63.5
4	OMH Entrance and Waters Place	51.5	56.5

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentrations presented include a background concentration of 39.0 $\mu g/m^3$.

Table 15-10
Maximum Predicted 24-Hour Average $PM_{2.5}$ Incremental Concentrations—2023 ($\mu g/m^3$)

Analysis Site	Location	Increment	*De Minimis Criterion*
1	Marconi Street and Project Driveway	0.38	6.9
2	Marconi Street and Waters Place	1.65	6.9
3	Waters Pl, Fink Ave and HRP SB Off Ramp	1.33	6.9
4	OMH Entrance and Waters Place	1.82	6.9

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

Table 15-11
Maximum Predicted Annual Average $PM_{2.5}$ Incremental Concentrations—2023 ($\mu g/m^3$)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Marconi Street and Project Driveway	0.019	0.1
2	Marconi Street and Waters Place	0.095	0.1
3	Waters Pl, Fink Ave and HRP SB Off Ramp	0.094	0.1
4	OMH Entrance and Waters Place	0.049	0.1

Note: $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 $\mu g/m^3$.

The results in **Table 15-10** show that the daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion. As shown in **Table 15-11**, the maximum annual incremental $PM_{2.5}$ concentrations would be below the *de minimis* criterion; therefore, there would be no potential for significant adverse air quality impacts for the 2023 Phase 1 Build Year.

STATIONARY SOURCES

As discussed above, the stationary source analysis was performed for Phase II only since it would involve the construction of additional buildings for commercial office, medical office,

community facility, accessory, and retail uses, which would result in higher pollutant emissions from stationary sources, compared to Phase I. The stationary source analysis is provided below in "The Future With the Proposed Project—2028."

H. THE FUTURE WITHOUT THE PROPOSED PROJECT—2028

MOBILE SOURCES

CO concentrations in the 2028 No-Action condition were determined using the methodology previously described. **Table 15-12** 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 periods analyzed.

Table 15-12
Maximum Predicted 8-Hour Average CO
No-Action Concentrations—2028

Analysis Site	Location	Time Period	8-Hour Concentration (ppm)
1	Marconi Street and Project Driveway	PM	1.8
2	Marconi Street and Waters Place	AM	1.8
3	Waters Pl, Fink Ave and HRP SB Off Ramp	PM	1.8
4	OMH Entrance and Waters Place	PM	1.7
5	Project Driveway (East-West Road) and Hutchison River Parkway Service Road	AM	1.9

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.6 ppm.

As shown in **Table 15-12**, 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 15-13**. The values shown are the highest predicted concentrations for the receptor locations.

As shown in **Table 15-13**, maximum PM_{10} Phase II No-Action concentrations are predicted to be well below the 24-hour PM_{10} standard of 150 $\mu g/m^3$.

STATIONARY SOURCES

It is assumed that in the Phase II No-Action Condition, the Bronx Children's Psychiatric, Thompson, and Parker Buildings would remain vacant. It is also assumed that the powerhouse, two metal shelters, and small storage building on the project site would remain vacated and decommissioned. Therefore, emissions associated with heating and hot water systems are assumed to be similar to existing conditions, and would be lower than with the proposed project.

Table 15-13
Maximum Predicted 24-Hour Average PM_{10} No-Action Concentrations—2028 ($\mu g/m^3$)

Analysis Site	Location	Concentration
1	Marconi Street and Project Driveway	55.4
2	Marconi Street and Waters Place	54.7
3	Waters Pl, Fink Ave and HRP SB Off Ramp	54.3
4	OMH Entrance and Waters Place	51.1
5	Project Driveway (East-West Road) and Hutchison River Parkway Service Road	65.0

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentration includes a background concentration of 39.0 $\mu g/m^3$.

I. THE FUTURE WITH THE PROPOSED PROJECT—2028

MOBILE SOURCES

With the HRP Improvements, the new service road would also create a new signalized intersection at the eastern end of the Project Driveway (East-West Road) bisecting the project site. Therefore, this intersection was analyzed to estimate future CO and PM concentrations.

CO concentrations for Phase II of the proposed project were predicted using the methodology previously described. **Table 15-14** shows the future maximum predicted 8-hour average CO concentrations at the intersections studied. (No 1-hour values are shown, since no 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 criterion. 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 15-15** 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.

As shown in **Table 15-15**, maximum Phase II PM_{10} concentrations are predicted to be well below the 24-hour PM_{10} standard of 150 $\mu g/m^3$.

Table 15-14
Maximum Predicted 8-Hour CO
With-Action Concentrations—2028 (ppm)

Analysis Site	Location	Time Period	No-Action	With-Action	*De Minimis*
1	Marconi Street and Project Driveway	PM	1.8	2.9	5.5
2	Marconi Street and Waters Place	AM	1.8	2.7	5.5
3	Waters Pl, Fink Ave and HRP SB Off Ramp	PM	1.8	2.8	5.5
4	OMH Entrance and Waters Place	PM	1.7	2.2	5.5
5	Project Driveway (East-West Road) and Hutchison River Parkway Service Road	AM	1.9	2.1	5.5

Notes:
8-hour standard is 9 ppm.
Concentration includes a background concentration of 1.6 ppm.

Table 15-15
Maximum Predicted 24-Hour Average PM_{10}
With-Action Concentrations—2028 ($\mu g/m^3$)

Analysis Site	Location	No-Action	With-Action
1	Marconi Street and Project Driveway	55.4	59.1
2	Marconi Street and Waters Place	54.7	62.7
3	Waters Pl, Fink Ave and HRP SB Off Ramp	54.3	65.5
4	OMH Entrance and Waters Place	51.1	54.3
5	Project Driveway (East-West Road) and Hutchison River Parkway Service Road	65.0	71.3

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentrations presented include a background concentration of 39.0 $\mu g/m^3$.

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 15-16** and **15-17**, respectively. Note that $PM_{2.5}$ concentrations in the No-Action condition are not presented, since impacts are assessed on an incremental basis.

The results in **Table 15-16** show that the daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion. As shown in **Table 15-17**, at two of the five intersections analyzed, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion. This would be considered a significant adverse air quality impact. Therefore, traffic mitigation measures were examined to avoid a potential significant impact at these intersections. Mitigation measures are discussed in Chapter 22, "Mitigation."

Table 15-16
Maximum Predicted 24-Hour Average $PM_{2.5}$ Incremental Concentrations—2028 (µg/m³)

Analysis Site	Location	Increment	*De Minimis Criterion*
1	Marconi Street and Project Driveway	0.96	6.9
2	Marconi Street and Waters Place	3.46	6.9
3	Waters Pl, Fink Ave and HRP SB Off Ramp	2.60	6.9
4	OMH Entrance and Waters Place	1.19	6.9
5	Project Driveway (East-West Road) and Hutchison River Parkway Service Road	2.19	6.9

Note:
$PM_{2.5}$ *de minimis* criterion — 24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 µg/m³.

Table 15-17
Maximum Predicted Annual Average $PM_{2.5}$ Incremental Concentrations—2028 (µg/m³)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	Marconi Street and Project Driveway	0.052	0.1
2	Marconi Street and Waters Place	0.254	0.1
3	Waters Pl, Fink Ave and HRP SB Off Ramp	0.165	0.1
4	OMH Entrance and Waters Place	0.046	0.1
5	Project Driveway (East-West Road) and Hutchison River Parkway Service Road	0.020	0.1

Note: $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 µg/m³.

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 (4 feet) as either the parking facilities to the north or south, and a far side sidewalk receptor across the East-West internal roadway (79 feet). 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 1.95 ppm. This value includes a predicted concentration of 0.13 ppm from emissions within the parking facilities, a background level of 1.60 ppm, and an on-street contribution of 0.13 ppm. The maximum predicted concentration is substantially below the applicable standard of nine ppm and the *de minimis* CO criterion of 6.9 ppm.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments including increments associated with on street traffic are 0.31 µg/m³ and 0.05 µg/m³, respectively. The maximum predicted $PM_{2.5}$ increments are below the respective $PM_{2.5}$ *de minimis* criterion of 6.9 µg/m³ for the 24-hour average concentration and 0.3 µg/m³ for the annual concentration.

The results of the analysis demonstrate that the proposed parking facilities would not result in any significant adverse air quality impacts.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS ANALYSIS

A detailed dispersion analysis using the AERMOD model was performed to assess the potential air quality impacts from emissions associated with the natural-gas fired heating and hot water systems serving the proposed buildings. The maximum predicted concentrations for NO_2 and $PM_{2.5}$ are presented in **Table 15-18,** along with the relevant background concentrations, the total potential concentrations, and the applicable ambient standards.

Table 15-18
Projected NO_2 Concentrations and $PM_{2.5}$ Increments From the Heat and Hot Water Systems ($\mu g/m^3$)

Pollutant	Averaging Period	Maximum Modeled Impact	Background Concentration	Total Concentration	Criterion
NO_2	Annual [1]	1.03	34.6	35.6	100[4]
	1-hour [2]	N/A	N/A	173	188[4]
$PM_{2.5}$	Annual	0.27	N/A	N/A[3]	0.3[5]
	24-hr	6.8	N/A	N/A[3]	6.9[5]

Notes:
N/A – Not Applicable.
(1) The annual modeled NO_2 concentration was conservatively reported to be equal to the NO_x concentration. The increment presented is the highest concentration at any receptor over the five years modeled (2013–2017).
N/A – Not Applicable.
(2) Total hourly NO_2 concentrations throughout the modeling period were determined by adding the hourly, modeled concentrations to the hourly ambient NO_2 concentrations for each corresponding hour. The total 1-hour concentration reported is the five-year average of the annual 98th percentile of the highest combined daily 1-hour NO_2 concentrations, in accordance with USEPA guidance.
(3) $PM_{2.5}$ impacts are evaluated by comparing incremental concentrations to *de minimis* criteria. Therefore, a total concentration is not applicable.
(4) NAAQS.
(5) $PM_{2.5}$ *de minimis*; annual 0.3 $\mu g/m^3$; 24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 $\mu g/m^3$.

The concentrations presented in **Table 15-18** are the maximum potential air quality impacts from emissions associated with the heating and hot water systems serving the proposed project. This analysis accounts for the range of potential heights and the maximum potential floor area for each building as permitted in the General Project Plan (GPP) for the proposed project. The maximum modeled impacts presented below reflect the provisions set forth below with respect to fuel type, low-NO_x burners and exhaust stack location.

As shown in the table, the maximum NO_2 concentrations from heating and hot water system emissions, when added to ambient background levels, would be below the NAAQS. The maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 6.9 $\mu g/m^3$. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable *de minimis* criterion of 0.3 $\mu g/m^3$ for local impacts.

To ensure that there are no significant adverse impacts of $PM_{2.5}$ from the proposed project's heat and hot water system emissions, certain restrictions would be required regarding fuel type, low-NO_x burners and exhaust stack location. As noted above, this analysis assesses the maximum potential air quality impacts accounting for the range of potential heights and the maximum

potential floor area at each site. Depending on how the proposed project is ultimately built out, it may yield lesser impacts than predicted and all of these restrictions may not be required.

The requirements would be as follows:

Parker Building

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are located at least 100 feet away from the western wall of the building, to avoid any potential significant air quality impacts.

Building 3

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

Building 4

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are located at least 53 feet away from the northern wall of the building, to avoid any potential significant air quality impacts.

Building 5

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners, to avoid any potential significant air quality impacts.

Building 6

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are located at least 20 feet from the western wall of the building, to avoid any potential significant air quality impacts.

Building 7

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and hot water exhaust stack(s) are located at least 40 feet away from the southern wall of the building, to avoid any potential significant air quality impacts.

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