A. INTRODUCTION

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

The maximum projected hourly incremental traffic volumes generated by the Proposed Actions would exceed the 2020 *City Environmental Quality Review* (CEQR) *Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at certain intersections in the study area, as well as the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311, of the *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for CO and PM.

The Proposed Project would include fossil fuel-burning heat and hot water systems. The existing Stevenson Commons steam plants, which are located near the Proposed Project, burn natural gas. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed heat and hot water systems.

The Proposed Project would include two accessory parking garages and four surface-level lots. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations in the vicinity of the ventilation outlets with the proposed accessory parking garages.

In addition, a portion of the 400 feet study area around the Development Site is located within a C4-1 zoning district. Therefore, potential effects of stationary source emissions from existing nearby industrial facilities on the Proposed Project were assessed.

B. PRINCIPAL CONCLUSIONS

As discussed below, the maximum pollutant concentrations and concentration increments from mobile sources with the Proposed Project are projected to be lower than the corresponding NAAQS and CEQR *de minimis* criteria. The parking facilities assumed to be developed as a result of the Proposed Actions were analyzed for potential air quality effects, which found that where would be no significant adverse air quality impacts.

In terms of industrial sources, no businesses were found to have a New York State Department of Environmental Conservation (DEC) air permit or New York City Department of Environmental Protection (DEP) certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no analysis was required.

Based on a detailed dispersion modeling analysis, there would be no potential significant adverse air quality impacts from emissions of nitrogen dioxide (NO_2), and particulate matter (PM), from the proposed heat and hot water systems for the Proposed Project and the existing steam plants. An (E) Designation (E-626) would be mapped in connection with the Proposed Actions to ensure that future developments would not result in any significant adverse air quality impacts from fossil fuel-fired heat and hot water systems emissions.

C. POLLUTANTS FOR ANALYSIS

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

Carbon Monoxide

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

The Proposed Project would result in an increase in vehicle trips greater than the *CEQR Technical Manual* screening threshold of 170 trips at certain intersections. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Actions. In addition, the Proposed Project would include parking facilities within some of the buildings on the Development Site. Therefore, an analysis was conducted to evaluate future CO concentrations resulting from the operation of the proposed 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 further downwind from large stationary sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) With the promulgation of the 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2 associated with the Proposed Project would be relatively small, 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.

Potential NO_2 concentrations from the fuel combustion for the Proposed Project's heat and hot water systems were evaluated. NO_2 concentrations were also evaluated as part of a cumulative analysis of emissions from the Proposed Project's heat and hot water systems and the steam plants at the existing Stevenson Commons development.

Lead

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

Respirable Particulate Matter—PM_{10} and $PM_{2.5}$

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

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

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

An assessment of PM emissions from the Proposed Project's heat and hot water systems was conducted. Cumulative impacts of PM emissions from the Proposed Project's heating and hot water systems and the Stevenson Commons existing steam plant were also evaluated.

Sulfur Dioxide

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

Based on the proposed design, natural gas would be burned in the proposed heat and hot water systems. The sulfur content of natural gas is negligible; therefore, no significant adverse impacts would occur in terms of future levels of SO_2 with the Proposed Project.

D. 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[1] for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in Table 12-1. 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

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

correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants beryllium, fluoride, and hydrogen sulfide.

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

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average (2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average (3)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average (4)	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	0.50	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. Not to be exceeded more than once a year on average over three years.
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, EPA lowered the 2008 ozone NAAQS from 0.075 parts per million (ppm) to 0.070. EPA issued final area designations for the revised standard on April 30, 2018.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as mentioned above, New York State has issued standards for three noncriteria compounds. DEC has also developed a guidance document DAR-1[2] (August 2016), which contains a compilation of annual and short term (1-hour) guideline concentrations for numerous other noncriteria compounds. The DEC thresholds represent ambient levels that are considered safe for public exposure.

NAAQS Attainment Status and State Implementation Plans

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

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

Manhattan had been designated as a moderate NAA for PM_{10}. EPA clarified on July 29, 2015 that the designation only applied to the revoked annual standard.

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

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as a moderate non-attainment area for the 1997 8-hour average ozone standard. In March 2008 EPA 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'). EPA designated the same NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, as requested by New York State, EPA reclassified the area as a "moderate" NAA. On July 19, 2017 DEC announced that the New York Metro Area (NYMA) is not projected to meet the July 20, 2018 attainment deadline and DEC therefore requested that EPA reclassify the NYMA to "serious" nonattainment. EPA reclassified the NYMA from "moderate" to "serious" NAA, effective September 23, 2019, which imposes a new attainment deadline of July 20, 2021 (based on 2018-2020 monitored data). On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. SIP revisions are due by August 3, 2021.

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

[2] DEC. DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212. August 2016.

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. In December 2017, EPA designated the entire State of New York as in attainment for this standard, with the exception of Monroe County, which was designated "unclassifiable".

Determining the Significance of Air Quality Impacts

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

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

CO De Minimis Criteria

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

$PM_{2.5}$ De Minimis Criteria

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

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

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

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

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

E. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

Mobile Source Analysis

Intersection Analysis

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

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

VEHICLE EMISSIONS

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, Motor Vehicle Emission Simulator (MOVES2014b).[4] This emissions model is capable of calculating engine, break wear, and tire wear emission factors for various vehicle types, based on the fuel type (e.g., gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from DEC.

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

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

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

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 DEP considers it to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[6] and the *CEQR Technical Manual*.

TRAFFIC DATA

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Project (see Chapter 11, "Transportation"). Traffic data for the future without the project (the No-Action condition) and the With-Action condition were employed in the respective air quality modeling condition. The weekday morning (7:45 to 8:45 AM), midday (12:30 to 1:30 PM), evening (4:30 to 5:30 PM) peak periods as well as the Saturday midday peak period (2:00-3:00 PM) were analyzed.

The peak weekday morning, midday, evening as well as Saturday midday 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 site were estimated based on the parking demand as a result of the Proposed Project. For annual impacts, average weekday and weekend 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

DISPERSION MODELS FOR MICROSCALE ANALYSES

The CO and PM concentrations due to vehicular emissions adjacent to the analysis sites were predicted using the American Meteorological Society/Environmental Protection Agency Regulated Model (AERMOD) Version 19191.[7] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. AERMOD has been a recommended model for transportation air quality analyses for several years and EPA mandated its use for transportation conformity purposes after a three-year transition period.[8] Following EPA guidelines, the analysis was performed using an area source representation of emission sources in order to simulate traffic-related air pollutant dispersion.[9] In addition, the weighted average release height and initial vertical source parameters were calculated for each modeled roadway. Hourly traffic volumes and associated emission factors were used to estimate hourly emission rates from each modeled roadway segment and predict traffic-related air pollutant concentrations at receptor locations.

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

[7] EPA. *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. EPA-454/B-19-027. Research Triangle Park, North Carolina. August 2019.

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

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

METEOROLOGY

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

The AERMOD model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 2015–2019. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data are processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps.

ANALYSIS YEAR

The microscale analyses were performed for 2028, the year by which the Proposed Project is likely to be completed. The future analysis was performed for both without the Proposed Actions (the No-Action condition) and with the Proposed Actions (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 determine total pollutant concentrations.

The background concentrations measured at the nearest monitoring stations are presented in Table 12-2. The data was obtained from DEC for ~~the most~~a recent three-year period (2017-2019). These values were used as the background concentrations for the mobile source analysis.

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

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	Botanical Garden, Bronx	2.0 ppm	35 ppm
	8-hour	Botanical Garden, Bronx	1.5 ppm	9 ppm
PM_{10}	24-hour	IS 52, Bronx	36 µg/m³	150 µg/m³
$PM_{2.5}$	24-hour	IS 52, Bronx	18 µg/m³	35 µg/m³
	Annual	IS 52, Bronx	7.3 µg/m³	12 µg/m³

Notes:
(1) CO concentrations represent the maximum second-highest monitored concentrations from ~~the most recent~~ three years of data.
(2) PM_{10} concentration represents the average highest monitored concentration from ~~the most recent~~ three years of data.
(3) $PM_{2.5}$ concentration represents the average of the 98th percentile day from ~~most recent~~ three years of data.

Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017-2019.

ANALYSIS SITE

Intersections analyzed in the traffic study were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. Several intersections were determined to exceed both the CO and PM screening thresholds referenced in the *CEQR Technical Manual*. One intersection was selected for microscale analysis—at White Plains Road and Lafayette Avenue. This intersection was selected because it is the signalized intersection with the greatest number of truck-equivalent vehicles per the screening thresholds in the *CEQR Technical Manual* that would result in the highest potential PM incremental concentrations.

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected site(s); receptors were placed along the approach and departure links at a 25 foot interval out to 125 feet in each direction. 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

The Proposed Actions would include up to 466 accessory parking spaces, comprised of 206 below grade spaces and 260 at-grade parking spaces. The below grade spaces would be located within two garages, located below Proposed Buildings B2 (parking garage P1) and B3 (parking garage P2), and surface parking would be provided at four surface parking lots (P3 – P6).

Emissions from vehicles using the mechanically-ventilated parking garages and parking lots could potentially affect pollutant concentrations in the immediate vicinity of the ventilation outlets and in close proximity to the parking lots. Since the parking garages and lots would be used by automobiles, the primary pollutant of concern is CO, but PM was evaluated as well.

Since the parking garage under Proposed Building B2 is the parking facility with the largest capacity as well as the largest predicted number of vehicle ins/outs, this facility was analyzed. Additionally, analyses were conducted for the two parking garages as well as parking lots P4 and P5 due to their proximity to each other, to assess the potential cumulative effects.

For the parking garages and surface lots, the emissions from the outlet vents and their dispersion were analyzed using the methodology defined in the *CEQR Technical Manual*. Maximum CO concentrations were determined for the time periods when overall on-site parking activity would be the greatest, considering the hours when the greatest number of vehicles would exit the facilities. PM increments were determined for peak daily (24-hour) use. The number of vehicles entering and exiting the garages and lots were derived from the trip generation analysis described in the traffic section of the EAS.

Emissions from vehicles entering, parking, and exiting the parking facilities were determined using the EPA MOVES mobile source emission model as described in detail above for the analysis of emissions at intersections. 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 60 seconds before proceeding to the exit. The concentrations within the system were calculated assuming a minimum ventilation rate, based on New York City Building Code requirements of one cubic foot per minute of fresh air per gross square foot of garage area.

For the parking garages, to determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in EPA's *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates concentrations at various distances from an outlet vent by assuming that the concentration at the vent represents the emission rate divided by the fresh air ventilation rate, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

The air from the proposed parking garages was conservatively assumed to be vented through a single outlet at a height of approximately 10 feet. It was assumed that the vent would discharge towards Lafayette Avenue. For the individual analysis of the parking garage below Proposed Building B2, the closest receptors to the proposed vent location would be the sidewalk receptors along Lafayette Avenue; therefore, "near" and "far" receptors were placed along the sidewalks at a pedestrian height of 6 feet and at distances of 7 feet and 94 feet, respectively, from the vent. For the cumulative analysis of parking garage P1 and parking garage P2, the proposed vent location for both garages was conservatively assumed to be facing Underhill Lane; therefore, "near" and "far" receptors were placed along sidewalks at a pedestrian height of 6 feet at distances of 7 feet and 53 feet, respectively, from the vent. For the parking garages, a receptor was also modeled at the vent height, 10 feet from the vent, to conservatively assess the air quality impacts on the Proposed Project building window or other air intake location. A persistence factor of 0.70 was used to convert the maximum 1-hour average CO concentrations to 8–hour averages, per *CEQR Technical Manual* guidance, and factors of 0.6 and 0.1 to convert maximum 1-hour $PM_{2.5}$ concentrations to 24-hour and annual averages, respectively, per EPA guidance,[10] accounting for meteorological variability over the longer averaging periods.

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels. The on-street pollutant concentrations were determined using the methodology in the Air Quality Appendix of the *CEQR Technical Manual*, utilizing traffic volumes from a traffic survey conducted in the study area.

Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOVES mobile source emission model based on county-specific hourly temperature and relative humidity data obtained from DEC. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking garage. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. The concentration of CO within the garage was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of 1 cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

Stationary Sources

Heating and Hot Water Systems

The Proposed Project would utilize natural gas-fired combustion equipment to provide heating and hot water services to the proposed buildings. Based on the current design, packaged terminal air conditioning (PTAC) units would be installed to provide heating for residential spaces in Proposed Buildings B1, B2, B3, B5, and B6. A boiler plant would provide space heating services for Proposed Building B4. Natural gas-fired hot water heaters would provide domestic hot water to Proposed Buildings B1, B2, B3, and B4. Note that although the proposed design for B5 and B6 would have an electric hot water heater in each

[10] EPA. *AERSCREEN User's Guide*. EPA-454/B-11-001. March 2011.

residential unit, the air quality analysis conservatively assumed that two natural gas-fired domestic hot water heaters would be used for each of these buildings.

The existing buildings within the Project Area are served by two central boiler plants, located at Tower 2 and Tower 3. To ensure that emissions from these sources would not result in any significant adverse air quality impacts, and furthermore, that concentrations of pollutants from the existing sources combined with the Proposed Project would not result in any concentrations exceeding standards at on-site or off-site locations, a cumulative air quality impact was performed for the future With-Action condition.

AERMOD ANALYSIS

The analysis was performed using the AERMOD dispersion model, described earlier. AERMOD is EPA'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 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). AERMOD also uses the Building Profile Input Program for PRIME (BPIPPRM) to provide a detailed analysis of downwash influences on a direction-specific basis. BPIPPRM determines 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 both with and without downwash in order to assess the worst-case impacts at elevated locations close to the height of the source, which would occur without downwash, as well as the worst-case impacts at lower elevations and ground level, which would occur with downwash, consistent with the *CEQR Technical Manual* guidance.

<u>Methodology Utilized for Estimating NO_2 Concentrations</u>

Annual NO_2 concentrations from stationary sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA guidance.[11]

The 1-hour average NO_2 concentration increments from the Proposed Project's stationary combustion sources were estimated using the AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were taken from the DEC IS 52 monitoring station, the nearest DEC ozone monitoring

[11] EPA. Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO2 National Ambient Air Quality Standard, available at: https://www3.epa.gov/scram001/guidance/clarification/NO2_Clarification_Memo-20140930.pdf

station which had complete five years of hourly data available. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed, which is considered representative for boilers.

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

The meteorological data set consisted of five consecutive years of meteorological data, with surface data collected at LaGuardia Airport (2015–2019), and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. DEC-supplied meteorological data processed with the AERMET Version 19191 processor was used for the modeling analysis.

EMISSION RATES AND STACK PARAMETERS

<u>Proposed Buildings</u>

For the proposed buildings annual emission rates for heating and hot water systems were calculated based on fuel consumption estimates provided by the project design team, and applying emission factors for natural gas-fired boilers.[12] NO_x emissions for the hot water heaters for the proposed buildings were calculated based on design information, with a maximum NO_x emission concentration of 30 ppm for Proposed Buildings B1, B2, B3, and B4. $PM_{2.5}$ emissions include both the filterable and condensable components. For the proposed buildings, the short-term emission rates (24-hour and shorter) were calculated using daily emissions estimates provided by the project design team. The short-term emission rates for the existing Stevenson Commons steam plant were calculated using the peak capacity for the boilers.

For Building B4, the exhaust velocity was calculated based on design information about the exhaust flow. For Buildings B1, B2, and B3, to calculate exhaust velocity, the fuel consumption of the Proposed Project was multiplied by EPA's fuel factor for natural gas,[13] providing the exhaust flow rate at standard temperature; the flow rate was then corrected for the exhaust temperature, and exhaust velocity was calculated based on the stack diameter.

The emission rates and exhaust stack parameters used in the modeling analysis for the proposed buildings are presented in Table 12-3.

[12]. EPA. Compilation of Air Pollutant Emission Factors AP-42. 5th Ed., V. I, Ch. 1.4. September, 1998.
[13]. EPA. *Standards of Performance for New Stationary Sources.* 40 CFR Chapter I Subchapter C Part 60. Appendix A-7, Table 19-2. 2013.

TABLE 12-3
Exhaust Stack Parameters and Emission Rates – Proposed Buildings

Parameter	B1		B2		B3		B4		B5		B6	
	Hot Water Heaters	**Space Heating**	**Hot Water Heaters**	**Space Heating**	**Hot Water Heaters**	**Space Heat**	**Hot Water Heaters**	**Boilers**	**Hot Water Heaters**	**Space Heating**	**Hot Water Heaters**	**Space Heating**
Capacity (MMBtu/hr) (per unit)	1.3	0.013	1.3	0.013	1.3	0.013	0.5	2	0.2	0.013	0.4	0.013
Number of Units	2	568 PTACs	2	455 PTACs	2	635 PTACs	2	3	2	54 PTACs	2	90 PTACs
Stack Height (ft)	128	--	141	--	118	--	72	72	48	--	48	--
Stack Diameter (ft)[1]	0.7	--	0.7	--	0.7	--	0.3	0.7	0.7	--	0.7	--
Number of Stacks	2	--	2	--	2	--	2	3	2	--	2	--
Exhaust Velocity (fpm)	847[2]	--	847[2]	--	847[2]	--	1,547[3]	1,552[3]	130	--	261	--
Exhaust Temperature (F)[4]	200	--	200	--	200	--	200	200	200	--	200	--
Emission Rate Per Unit (grams/second)												
NO_2 (1-hour average)	0.0060[5]	0.092	0.0060[5]	0.074	0.0060[5]	0.10	0.0023[5]	0.0092[5]	0.00092	0.0088	0.0018	0.015
NO_2 (Annual average)	0.00050[5]	0.012	0.00044[5]	0.011	0.00061[5]	0.014	0.00025[5]	0.00067[5]	0.000084	0.00079	0.00017	0.0016
$PM_{2.5}$ (24-hour average)	0.00010	0.0070	0.00009	0.0056	0.00013	0.0079	0.000051	0.0019	0.00041	0.00067	0.00084	0.0011
$PM_{2.5}$ (Annual average)	0.00010	0.00094	0.00009	0.00087	0.00013	0.0011	0.000051	0.00014	0.000017	0.000060	0.000035	0.00012

Notes:
[1] Stack diameter based on design information
[2] The stack exhaust velocity is estimated based on the type of fuel and the estimated boiler capacity.
[3] The stack exhaust velocity is estimated based on design information.
[4] Based on boiler specifications for similar equipment.
[5] NO_x emission rate based on 30 ppm low NO_x burners

Existing Stevenson Commons Buildings

For the existing Stevenson Commons steam plant, the exhaust velocity and the exhaust temperature was provided by the project design team. Assumptions for stack diameter and exhaust temperature for the proposed systems were based on boiler specifications for similar equipment, and were used to calculate the exhaust velocity. The emission rates and exhaust stack parameters used in the modeling analysis for the existing buildings are presented in Table 12-4.

TABLE 12-4
Exhaust Stack Parameters and Emission Rates – Existing Steam Plant

Parameter	Tower 2 – 755 White Plains Road	Tower 3 – 1850 Lafayette Avenue
Capacity (MMBtu/hr) (per unit)[1]	17.72	11.81
Number of Units	2	2
Stack Height (ft)[2]	243.2	243.6
Stack Diameter (ft)[2]	2.1	2.1
Number of Stacks	1	1
Exhaust Velocity (fpm)[3]	3,580	2,350
Exhaust Temperature (F)[2]	400	400
Emission Rate (grams/second)		
NO_2 (1-hour average)	0.44	0.29
NO_2 (Annual average)	0.080	0.060
$PM_{2.5}$ (24-hour average)	0.033	0.022
$PM_{2.5}$ (Annual average)	0.0061	0.0045

Notes:
[1] Capacities based on photographs of boiler nameplates
[2] Stack height, diameter, and exhaust temperature based on design information
[3] The stack exhaust velocity is estimated based on design information.

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 12-5). For the 1-hour average NO_2 concentration at a given receptor, the modeled concentration from the source was added to corresponding background concentration of 110.6 µg/m^3. This background level represents the three-year average (2017-2019) of the annual 98th percentile of the daily-highest one-hour average NO_2 concentrations (this is the statistical form of the standard) monitored at the nearest DEC background monitoring station—IS 52, Bronx. Note that the maximum modeled concentration would not necessarily coincide with the maximum background concentrations, and, therefore, this approach results in a conservatively high estimate. The annual NO_2 background is based on the maximum annual average value measured over the most recent five years for which data is available (2017-2019), 32.8 µg/m^3.

For the AERMOD analysis, total 1-hour NO_2 concentrations were refined following a more detailed approach (EPA "Tier 3"). The methodology used to determine the total 1-hour NO_2 concentrations from the facility was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from the boilers were first added to the seasonal hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each location and the 98th percentile daily 1-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally the 98th percentile concentrations were averaged over the latest five years.

$PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria. The $PM_{2.5}$ 24-hour average background concentration based on the 98th percentile concentration, averaged over the years 2017-2019 was used to establish the *de minimis* value of 8.5 ug/m^3. $PM_{2.5}$ annual average impacts are assessed on an incremental basis and compared to 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 12-5
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	1-hour	IS 52, Bronx	110.6	188
	Annual	IS 52, Bronx	32.8	100
$PM_{2.5}$	24-hour	IS 52, Bronx	18	35
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.				

RECEPTOR PLACEMENT

Discrete receptors were modeled along existing and proposed-building façades to represent potentially sensitive locations such as operable windows and intake vents. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations. A broad ground-level grid was also included to identify potential concentrations at publicly accessible locations in the surrounding area.

Large/Major Source Analysis

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 USEPA's Envirofacts database,[14] the NYSDEC Title V and State Facility Permit websites, the New York City Department of Buildings website, and DEP permit data.

No facilities with a State Facility, Title V, or PSD Permit within the 1,000 feet study area around the proposed detention facility were identified. Therefore, no analysis of the potential impacts of large or major sources of emissions was required.

Industrial Source Analysis

The surrounding area is primarily zoned residential, with a portion of the 400 feet study area around the Development Site located within a C4-1 zoning district. The remainder of the 400 feet study area is zoned R6 and does not include any commercial businesses. A review of DEP and NYSDEC air permits was performed to determine whether there are any permitted industrial sources of emissions within the 400 feet study area. Land use maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A search of federal- and state-permitted facilities within the study area was conducted. DEP's online permit search database was also used to identify any permitted industrial uses in the study area.[15]

[14] USEPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air.
[15] DEP. *NYC DEP CATS Information.* https://a826-web01.nyc.gov/dep.boilerinformationext, accessed May 21, 2020.

No businesses were found to have a NYSDEC air permit or DEP certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no potential significant adverse air quality impacts would occur on the Proposed Project from industrial sources.

F. EXISTING CONDITIONS

~~The r~~Representative criteria pollutant concentrations measured in recent years at DEC air quality monitoring stations nearest to the Project Area are presented in Table 12-6. The values presented are consistent with the form of the NAAQS. As shown in the table, the recently monitored levels did not exceed the NAAQS. It should be noted that in some cases these values are somewhat different from the background concentrations used in the stationary source and mobile source analyses, since ~~these are~~ the ~~most recent~~ reported monitored values are not in all cases based on three years of monitoring data~~, rather than more conservative values~~ used for dispersion modeling. The concentrations presented in Table 12-6 provide a comparison of the air quality in the Project Area with the NAAQS, while background concentrations are obtained from several years of monitoring data, and represent a conservative estimate of the highest concentrations for future ambient conditions.

TABLE 12-6
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Botanical Garden	ppm	1-hour	1.9	35
			8-hour	1.5	9
SO_2	IS 52	µg/m^3	1-hour	14.6	196
PM_{10}	IS 52	µg/m^3	24-hour	33	150
$PM_{2.5}$	IS 52	µg/m^3	Annual	7.3	12
			24-hour	18	35
NO_2	IS 52	µg/m^3	Annual	31.7	100
			1-hour	110.6	188
Lead	IS 52	µg/m^3	3-month	0.0027	0.15
Ozone	IS 52	ppm	8-hour	0.069	0.075

Notes:
(1) The CO concentration ~~for the short-term average~~ is the second-highest from ~~the most recent year with available data~~2019.
(2) The PM_{10} concentration ~~for the short-term average~~ is the highest from ~~the most recent year with available data~~2019.
(3) $PM_{2.5}$ annual concentrations are the average of 2017–2019 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentiles in the same period.
(4) The 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 2017 to 2019.
(5) The lead concentrations is based on the highest quarterly average concentration measured in 2019.
(6) The ozone concentration is based on the 3-year average (2017–2019) of the 4th highest daily maximum 8-hour average concentrations.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.

G. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO-ACTION CONDITION)

Mobile Sources

CO concentrations in the 2028 No Action condition were determined using the methodology previously described. Table 12-7 shows future maximum predicted 8-hour CO concentration, including the background concentration, at the analysis intersections in the No Action condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

TABLE 12-7
Maximum Predicted 8-Hour Average CO No-Action Concentrations

Analysis Site	Location	8-Hour Concentration (ppm)
1	White Plains Road and Lafayette Avenue	1.57~~1.59~~
Notes: 8-hour standard (NAAQS) is 9 ppm. Concentration includes a background concentration 1.5 ppm.		

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 12-8. 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 12-8
Maximum Predicted 24-Hour Average
PM_{10} No-Action Concentrations (μg/m^3)

Analysis Site	Location	Concentration
1	White Plains Road and Lafayette Avenue	51.8~~56.4~~
Notes: NAAQS—24-hour average 150 μg/m^3. Concentration includes a background concentration of 36 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

In the future without the Proposed Actions, it is expected that no new development would occur within the Project Area. 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.

H. THE FUTURE WITH THE PROPOSED ACTIONS (WITH-ACTION CONDITION)

Mobile Sources

Intersection Analysis

CO concentrations for the 2028 With Action condition were predicted using the methodology previously described. Table 12-9 shows the future maximum predicted 8-hour average CO concentrations at the study intersection. The values shown are the highest predicted concentrations. The results indicate that the Proposed Project in the 2028 With Action condition would not result in any violations of the 1-hour or 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations are small, and consequently would not result in a violation of the *CEQR Technical Manual de minimis* CO criteria. Therefore, mobile source CO emissions from the Proposed Project would not result in a significant adverse air quality impact.

TABLE 12-9
2028 Maximum Predicted
CO With-Action Concentrations (ppm)

Analysis Site	Location	Averaging Period	No Action	With Action	*De Minimis*
1	White Plains Road and Lafayette Avenue	1-Hour	~~2.27~~2.22	~~2.37~~2.31	--
		8-Hour	~~1.59~~1.57	~~1.62~~1.59	4.5

Notes:
1-hour standard is 35 ppm; 8-hour standard is 9 ppm.
Concentration includes a background concentration of 2.0 ppm for the 1-hour average and 1.5 ppm for the 8-hour average.

PM_{10} concentrations with the Proposed Project were determined using the methodology previously described and used in the No-Action condition. Table 12-10 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 12-10
Maximum Predicted 24-Hour Average PM_{10}
With-Action Concentrations (µg/m^3)

Analysis Site	Location	No-Action	With-Action
1	White Plains Road and Lafayette Avenue	~~56.4~~51.8	~~60.5~~54.5

Notes:
NAAQS—24-hour average 150 µg/m^3.
Concentrations presented include a background concentration of 36 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 12-11 and 12-12, respectively. ~~Note that $PM_{2.5}$ concentrations in the No-Action condition are not presented, since impacts are assessed on an incremental basis.~~

TABLE 12-11
Maximum Predicted 24-Hour Average PM2.5
Incremental Concentrations (µg/m3)

Analysis Site	Location	No Action	With Action	Increment	~~De Minimis~~ Criterion
1	White Plains Road and Lafayette Avenue	-	-	0.86	8.5
		~~22.81~~21.15	~~23.67~~21.63	-	35

Note:
$PM_{2.5}$ *de minimis* criterion—24-hour average, not to exceed more than half the difference between the background concentration (18 µg/m^3) and the 24-hour standard of 35 µg/m^3.

TABLE 12-12
Maximum Predicted Annual Average $PM_{2.5}$
Incremental Concentrations (µg/m^3)

Analysis Site	Location	No Action	With Action	Increment	~~De Minimis~~ Criterion
1	White Plains Road and Lafayette Avenue	-	-	~~0.069~~0.071	0.1
		~~7.49~~7.47	~~7.56~~7.54	-	12

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

Parking Analysis

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facilities at Proposed Building B2 (P1) and Proposed Building B3 (P2) as well as parking lots P4 and P5 were analyzed, assuming a near side sidewalk receptor on the same side of the street (seven feet) as the parking facility, and a far side sidewalk receptor on the opposite side of the street from the parking facility. Due to the proximity of the parking garages at Proposed Building B2 and Proposed Building B3, the cumulative effect of these garages was analyzed. For the parking garages, the near side receptor of each facility was added to the far side receptor of the other facility. Additionally, the cumulative effect of parking lots P4 and P5 was analyzed due to the close proximity of these parking facilities. For parking lots P4 and P5, maximum concentrations from the near side receptor of each facility was added to the far side receptor of the other facility on Underhill Lane.

The maximum predicted 1-hour average CO concentration is 2.25 ppm, based on the cumulative impacts of parking garage P1 and P2. This value includes a predicted concentration of 0.22 ppm from emissions within the parking garage, on-street contribution of 0.02 ppm, and a background level of 2.01 ppm. The maximum predicted 8-hour average CO concentration is 1.7 ppm, based on the cumulative impacts of parking garage P1 and P2. This value includes a predicted concentration of 0.18 ppm from emissions within the parking garage, on-street contribution of 0.012 ppm, and a background level of 1.5 ppm. The maximum predicted concentrations are substantially below the 1-hour and 8-hour standards of 35 ppm and 9 ppm, respectively, and the maximum predicted 8-hour concentration is below the *de minimis* CO criteria.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 2.8 µg/m^3 and 0.10 µg/m^3, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 8.5 µg/m^3 for the 24-hour average concentration and 0.3 µg/m^3 for the annual average concentration. Therefore, the proposed parking facilities would not result in any significant adverse air quality impacts.

Stationary Sources

Heat and Hot Water System Analysis

Tables 12-13 and 12-14 present the maximum predicted concentration from the heating and hot water systems of the Proposed Buildings and the existing Stevenson Commons steam plants on the Proposed Buildings and on existing buildings, respectively. As shown in the tables, all predicted pollutant concentrations are less than the applicable impact criteria. Therefore, there would be no potential for significant adverse air quality impacts from the Proposed Project's heating and hot water systems.

TABLE 12-13
Maximum Modeled Pollutant Concentrations
Project-on-Project (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	181 (1)	-	181	188(2)
	Annual	1.14	32.8	33.9	100
$PM_{2.5}$	24-hour	7.4	N/A	-N/A	8.5(3)
	Annual	0.12	N/A	N/A	0.3(4)

Notes:
N/A – Not Applicable
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(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)

TABLE 12-14
Maximum Modeled Pollutant Concentrations
Project-On-Existing Buildings (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	127 (1)	-	127	188(2)
	Annual	0.71	32.8	33.5	100
$PM_{2.5}$	24-hour	4.5	N/A	N/A	8.5(3)
	Annual	0.08	N/A	N/A	0.3(4)
	Annual - Neighborhood	0.019	N/A	N/A	0.1

Notes:
N/A – Not Applicable
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(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 Project's heating and hot water system emissions, certain restrictions would be required through an Air Quality (E) Designation (E-626) that would be placed on the Proposed Buildings. These restrictions were assumed in the analysis results presented in Tables 12-13 and 12-14, and would avoid the potential for significant air quality impacts from stationary sources based on the conservative assumptions used in the analysis.

The restrictions would be as follows:

BLOCK 3600, ~~TENTATIVE FUTURE~~ TAX LOT 10 – PROPOSED BUILDING B1

Any new residential and/or commercial development on Proposed Building B1 (Block 3600, ~~Tentative Future~~ Tax Lot 10) must utilize only PTACs fired by natural gas in any fossil fuel-fired heating equipment, must utilize natural gas only for any fossil fuel-fired hot water equipment, and ensure that such hot water equipment be fitted with low NO_x burners (30 ppm), that hot water system stacks are located no more than 179 feet from the lot line facing Thieriot Avenue, and at least 128 feet above grade, to avoid potential significant air quality impacts.

BLOCK 3600, ~~TENTATIVE FUTURE~~ TAX LOT 20 – PROPOSED BUILDING B2

Any new residential and/or commercial on Proposed Building B2 (Block 3600, ~~Tentative Future~~ Tax Lot 20) must utilize only PTACs fired by natural gas in any fossil fuel-fired heating equipment, must utilize natural gas only for any fossil fuel-fired hot water equipment, and ensure that such hot water equipment be fitted with low NO_x burners (30 ppm), and locate hot water exhaust stack(s) at least 141 feet above grade, to avoid potential significant air quality impacts.

BLOCK 3600, ~~TENTATIVE FUTURE~~ TAX LOT 15 – PROPOSED BUILDING B3

Any new residential and/or commercial on Proposed Building B3 (Block 3600, ~~Tentative Future~~ Tax Lot 15) must utilize only PTACs fired by natural gas in any fossil fuel-fired heating equipment, must utilize natural gas only for fossil fuel-fired hot water equipment, and ensure that such hot water equipment be fitted with low NO_x burners (30 ppm), and locate hot water exhaust stack(s) at least 118 feet above grade, to avoid potential significant air quality impacts.

BLOCK 3600, ~~TENTATIVE FUTURE~~ TAX LOT 50 – PROPOSED BUILDING B4 ~~AND PROPOSED BUILDING B5~~

PROPOSED BUILDING B4

Any new residential and/or commercial on Proposed Building B4 (Block 3600, ~~Tentative Future~~ Tax Lot 50) must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x burners (30 ppm), and locate heating and hot water exhaust stack(s) at least 72 feet above grade, to avoid potential significant air quality impacts.

BLOCK 3600, TAX LOT 40 – PROPOSED BUILDING B5

PROPOSED BUILDING B5

Any new residential and/or commercial development on Proposed Building B5 (Block 3600, ~~Tentative Future~~ Tax Lot 40~~50~~) must utilize only PTACs fired by natural gas in any fossil fuel-fired heating equipment, must utilize natural gas only for fossil fuel-fired hot water equipment, and ensure that such hot water equipment be fitted with low NO_x burners (30 ppm), and that hot water system stack(s) are located at least ~~260~~ 15 feet from the lot line facing Thieriot Avenue, and at least 48 feet above grade, to avoid potential significant air quality impacts.

BLOCK 3600, ~~TENTATIVE FUTURE~~ TAX LOT 30 – PROPOSED BUILDING B6

Any new residential and/or commercial development on Proposed Building B6 (Block 3600, ~~Tentative Future~~ Tax Lot 30) must utilize only PTACs fired by natural gas in any fossil fuel-fired heating equipment, must utilize natural gas only for fossil fuel-fired hot water equipment, and ensure that such hot water equipment be fitted with low NO_x burners (30 ppm), and locate hot water exhaust stacks at least 48 feet above grade, to avoid potential significant air quality impacts.