Chapter 15: Air Quality

A. INTRODUCTION

This chapter examines the potential for the proposed actions to result in significant adverse air quality impacts. As described in Chapter 1, "Project Description," the applicants, the New York City Department of City Planning (DCP) and SJC 33 Owner 2015 LLC, are proposing a series of discretionary actions (the proposed actions) that would facilitate the redevelopment of St. John's Terminal Building at 550 Washington Street (Block 596, Lot 1) (the development site) with a mix of residential and commercial uses, and public open space (the proposed project) in Manhattan Community District 2.

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, or emissions from parking garage ventilation systems. Indirect impacts are caused by off-site emissions associated with a project, such as emissions from nearby existing stationary sources (impacts on the development site) or by emissions from on-road vehicle trips ("mobile sources") generated by the proposed project or other changes to future traffic conditions due to a project.

Heating, ventilation, and air conditioning (HVAC) systems would be included to provide space heating and hot water to the proposed buildings, and combined heat and power (CHP) plants would provide a portion of the electrical power and heating to certain buildings on the development site. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed project.

The maximum hourly incremental traffic volumes generated by the proposed project are expected to exceed the *City Environmental Quality Review* (*CEQR*) *Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at one intersection in the study area, but would not exceed the particulate matter emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the 2014 *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from project-generated traffic was performed for CO.

The development site would include on-site parking. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations from the proposed parking garage.

Since the development site is located in a manufacturing district, potential effects of stationary source emissions from existing nearby industrial facilities on the proposed project were assessed. The development site is also adjacent to a New York City Department of Sanitation (DSNY) garage that is under construction between Spring, Washington, Canal, and West Streets, and is near existing UPS and FedEx distribution facilities to the east and north of the development site, respectively. Therefore, potential impacts from diesel trucks may be of concern, and potential air quality effects from DSNY vehicles and delivery trucks traveling to and from the vicinity of the development site are evaluated, as well as emissions from the DSNY garage ventilation exhaust system.

PRINCIPAL CONCLUSIONS

The proposed actions would not result in significant adverse air quality impacts. Concentrations of CO due to the proposed project would not result in any violations of National Ambient Air Quality Standards (NAAQS) or the City's *de minimis* criteria for CO at intersections in the study area. In addition, concentrations of CO and particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) from the parking facilities associated with the proposed project would not in any significant adverse air quality impacts.

The analysis of DSNY, UPS, and FedEx truck fleets traveling near the development site demonstrated that there would be no significant adverse air quality impacts on the development site. In addition, emissions from the DSNY garage ventilation exhaust system were determined to not result in any significant adverse impact on the development site. An analysis of mobile source emissions on the proposed publicly accessible open space areas over West Houston Street determined that there would not be any significant adverse impact on air quality on these areas. The structure and public open space over West Houston Street is conservatively assumed to have no impact on the analysis because the structure is not modeled as a barrier to the airflow.

Analysis of the emissions and dispersion of nitrogen dioxide (NO_2) and particulate matter less than 10 microns in diameter (PM_{10}) from HVAC sources with the proposed actions indicate that such emissions would not result in a violation of NAAQS. Emissions of $PM_{2.5}$ were analyzed in accordance with the City's current $PM_{2.5}$ *de minimis* criteria, which determined that the maximum predicted $PM_{2.5}$ increments from the proposed actions would be less than the applicable annual average criterion of 0.3 $\mu g/m^3$ for local impacts and 0.1 $\mu g/m^3$ for neighborhood-scale impacts. The air quality modeling analysis also determined the highest predicted increase in 24-hour average $PM_{2.5}$ concentrations would not exceed the applicable *de minimis* criterion. To ensure that there are no significant adverse impacts resulting from the proposed actions due to HVAC and CHP emissions, certain restrictions would be required for the development site.

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 (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 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, NO2, SO_2, 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 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 predicted on a local, or microscale, basis.

The proposed actions would result in an increase in vehicle trips higher than the 2014 *CEQR Technical Manual* screening threshold of 170 trips at one intersection. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the proposed actions. In addition, an analysis of mobile source CO emissions on the proposed publicly accessible open space areas over West Houston Street was performed.

NITROGEN OXIDES, VOCS, AND OZONE

NOx 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. Therefore, the effects of NOx and VOC emissions from all sources are 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.

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

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA, and therefore, lead is not a pollutant of concern for the proposed actions; therefore, an analysis of this pollutant from stationary or mobile sources is 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

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

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 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, construction and agricultural activities, and 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, or $PM_{2.5}$, 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 directly emitted from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

Diesel-powered vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles. The proposed project would not result in any significant increases in truck traffic near the development site or in the region or other potentially significant increase in $PM_{2.5}$ vehicle emissions as defined in Chapter 17, Sections 210 and 311 of the 2014 *CEQR Technical Manual*. Therefore, an analysis of potential mobile source impacts of PM from the proposed actions was not warranted. However, an analysis of $PM_{2.5}$ from vehicles traveling to and from the DSNY/UPS garage, as well as a FedEx facility nearby, was performed to determine the potential for an air quality impact on the proposed project. In addition, an analysis of mobile source PM_{10} and $PM_{2.5}$ emissions on the proposed publicly accessible open space areas over West Houston Street was performed.

An analysis was conducted to assess the PM impacts due to natural gas-fired HVAC systems with the proposed actions.

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 vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant, and, therefore, an analysis of SO_2 from mobile sources is not warranted.

As part of the proposed project, natural gas would be burned in HVAC 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 actions.

AIR TOXICS

In addition to the criteria pollutants discussed above, non-criteria air pollutants, also called air toxics, may be of concern. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by EPA.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, the New York State Department of Environmental Conservation (DEC) has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed guideline concentrations for numerous noncriteria pollutants. The DEC guidance document DAR-1 (February 2014) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to noncriteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

As the development site is located in a manufacturing district, an analysis to examine the potential for impacts from industrial emissions was performed.

C. AIR QUALITY STANDARDS, REGULATIONS 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 and secondary standards are the same for NO_2 (annual), ozone, lead, and PM, and there is no secondary standard for CO and the 1-hour NO_2 standard. The NAAQS are presented in **Table 15-1**. The NAAQS for CO, annual NO_2, and 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 PM, settleable particles, non-methane hydrocarbons, and ozone that correspond to federal standards that have since been revoked or replaced, and for beryllium, fluoride, and hydrogen sulfide.

EPA recently lowered the primary annual average $PM_{2.5}$ standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$, effective March 2013.

The current 8-hour ozone standard of 0.075 parts per million (ppm) is effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December 2015, EPA further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070. EPA expects to issue final area designations by October 1, 2017; those designations likely would be based on 2014-2016 air quality data.

EPA lowered the primary and secondary standards for lead to 0.15 $\mu g/m^3$, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

EPA established a new 1-hour average NO_2 standard of 0.100 ppm, effective April 10, 2010, in addition to the current annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA also established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of the daily maximum 1-hour average concentration (the 4th highest daily maximum corresponds approximately to 99th percentile for a year.)

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as mentioned above, DEC has issued standards for three noncriteria compounds. As described above, DEC has also developed a guidance document DAR-1, which contains a compilation of annual and short term (1-hour) guideline concentrations for numerous other noncriteria compounds. The DEC guidance 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 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 EPA on May 30th, 2014.

Manhattan, which had been designated as a moderate NAA for PM_{10}, was reclassified by EPA as in attainment on July 29, 2015.

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

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 (2)	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average (3)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average (4,5)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average (1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (6)	NA	12	NA	15
24-Hour Average (7)	NA	35	NA	35
Sulfur Dioxide (SO_2) (8)				
1-Hour Average(9)	0.075	196	NA	NA
Maximum 3-Hour Average (1)	NA	NA	0.50	1,300

Notes: ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.

1. Not to be exceeded more than once a year.
2. EPA has lowered the NAAQS down from 1.5 µg/m³, effective January 12, 2009.
3. 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
4. 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
5. EPA has lowered the NAAQS down from 0.~~070~~ 075 ppm, effective December 2015.
6. 3-year average of annual mean. EPA has lowered the primary standard from 15 µg/m³, effective March 2013.
7. Not to be exceeded by the annual 98th percentile when averaged over 3 years.
8. EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
9. 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.

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

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 in moderate nonattainment for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8–hour ozone standards. EPA 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, EPA reclassified the area as a moderate NAA. New York State has begun submitting SIP documents in December 2014. The state is expected to be able to meet its SIP obligations for both the 1997 and 2008 standards by satisfying the requirements for a moderate attainment plan for the 2008 ozone NAAQS.

New York City is currently in attainment of the annual average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" for the new 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 (2016 or 2017).

EPA has established a new 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties currently meet the 1-hour standard. Additional monitoring will be required. Draft attainment designations were published by EPA in February 2013, indicating that EPA is deferring action to designate areas in New York State and expects to proceed with designations once additional data are gathered.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

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

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

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

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard; or
- 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 that are predicted to be greater than 0.3 µg/m^3 at a discrete or ground level receptor location.

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the CEQR *de minimis* criteria above 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 on $PM_{2.5}$ concentrations and determine the need to minimize particulate matter emissions resulting from the proposed actions.

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 actions. The analyses presented below are as follows:

- Mobile Source Analysis
  - *CEQR Technical Manual* $PM_{2.5}$ mobile source screening at study area intersections;
  - Impacts due to project-generated traffic on CO concentrations at receptor locations;
  - Impacts due to the proposed parking garage;
  - Impacts on the proposed project due to truck fleets in the vicinity of the project area (DSNY, UPS, and FedEx vehicles);
  - Impacts on the proposed project due to emissions from the DSNY garage ventilation exhaust system;
  - Impacts due to mobile source emissions on the proposed publicly accessible open space extending over West Houston Street; and
  - Impacts on the proposed project due to emissions from the Holland Tunnel ventilation exhaust.
- Stationary Source Analysis
  - Impacts from fossil fuel-fired HVAC systems from the proposed project;
  - Impacts from nearby industrial sources on the development site; and
  - Impacts of transitory odor from the DSNY facility at 500 Washington Street on the development site.

MOBILE SOURCES

As stated above, the proposed project's incremental traffic volumes are expected to exceed the CO screening threshold of 170 vehicles in a peak hour, but are not expected to exceed the $PM_{2.5}$ screening thresholds discussed in Chapter 17, Sections 210 and 311 of the 2014 *CEQR Technical Manual*. In terms of emissions of NO_2 from mobile sources, the incremental increases in NO_2 concentrations are primarily due to relatively small increases in the number of vehicles (as compared to existing or No Build traffic in the study area). This increase would not be expected to significantly affect levels of NO_2 experienced near roadways without the proposed actions.

Potential impacts of the proposed project's mobile sources, as well as parking garages and the truck fleets that would be operating near the proposed project, were evaluated, as follows.

As discussed in Chapter 14, "Transportation", developing the South Site with office instead of a hotel could have the potential towould generally result in similar or fewer peak hour tripsadditional significant adverse traffic impacts, which will be explored between the Draft Environmental Impact Statement (DEIS) and Final Environmental Impact Statement (FEIS) in coordination with the New York City Department of Transportation (NYCDOT). However, due to different trip-making characteristics, some intersections or specific movements at these intersections could incur more incremental trips. Analyses of these intersections found that overall traffic impact conclusions would be the same with the South Site developed into a hotel or office space. For the proposed project with big box retail, there is a potential, at two of these intersections where significant adverse traffic impacts have already been identified with the South Site developed into a hotel, that additional time periods or additional traffic movements could incur significant adverse impacts, if the South Site is developed with office instead. However, incremental traffic volumes at these intersections do not exceed the CO or $PM_{2.5}$ mobile source screening thresholds and only the intersection of West Street and Spring Street under the hotel scenario exceeds the *CEQR Technical Manual* threshold of 170 vehicles for CO (the $PM_{2.5}$ screening threshold is not exceeded under either scenario at any intersection). Therefore, the mobile source intersection analysis may need to be revised between the DEIS and FEIS to address changes to the traffic analysiswas only performed for the project with big box retail with hotel use at the South Site, since it is representative of a reasonable worst-case assessment of potential mobile source impacts.

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 employ a model approved by EPA that has 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 actions.

Vehicle Emissions

Vehicular CO engine emission factors were computed using the EPA 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 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 NYSDEC.

Vehicle classification data were based on field studies. Appropriate credits were used to accurately reflect the inspection and maintenance program. 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.

County-specific hourly temperature and relative humidity data obtained from NYSDEC were used.

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 actions (see Chapter 14, "Transportation"). Traffic data for the future No Build and Build conditions was employed in the respective air quality modeling scenarios. The Weekday PM (5 PM to 6 PM) and Saturday (3:15 PM to 4:15 PM) peak periods were analyzed.

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.[4] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, 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

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

[4] EPA, 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, EPA-454/R-92-006.

are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first level of CAL3QHC modeling.

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).

In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor. Following the EPA guidelines[5], 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 0.77 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

Analysis Year

The microscale analyses were performed for the 2024 analysis year for the proposed actions. The future analysis was performed with and without the proposed actions.

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 must be added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations for the nearest monitored location are presented in **Table 15-2**. CO concentrations are based on the latest available five years of monitored data (2010–2014). Consistent with the NAAQS, the second-highest value is used. These values were used as the background concentrations for the mobile source analysis.

Table 15-2
Maximum Background Pollutant Concentrations
For Mobile Source Sites

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY, Manhattan	2.7 ppm	35 ppm
	8-hour		1.8 ppm	9 ppm

Note: CO values are the highest of the latest 5 years.
Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2010–2014.

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

Analysis Site

One analysis site was selected for microscale analysis, at Spring Street and West Street. This site was selected because it is the only location in the study area where levels of project-generated traffic are predicted to exceed the CO *CEQR Technical Manual* screening threshold of 170 peak hour trips at an intersection.

Receptor Placement

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at the selected site; receptors were placed along the approach and departure links at 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.

PARKING ANALYSIS

As described in Chapter 1, "Project Description," the development site comprises the North, Center, and South Sites. The proposed project would include parking facilities at all three sites under the project without big box retail, and would include parking facilities at only the North and South Sites under the project with big box retail, where parking spaces would be replaced with retail use at the Center Site. The air exhausted from the garages' ventilation systems would contain elevated levels of pollutants due to emissions from vehicles using the garage. Ventilation air from the proposed parking garages would be directed to various exhausts located above street level.

An analysis of the emissions from the outlet vents and their dispersion in the environment was performed, calculating pollutant levels in the surrounding area, using the methodology set forth in the 2014 *CEQR Technical Manual*. Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOVES mobile source emission model as referenced in the 2014 *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. The concentration of CO and PM within the garages 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.

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 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.

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would enter and exit the facility (PM concentrations were determined on a 24-hour and annual average basis). Traffic data for the parking garage analysis were derived from the trip generation analysis for the project without big box retail, which would include a higher number of parking spaces, described in Chapter 14, "Transportation."

The proposed parking garages would be located below-grade, with entrance/egress from West Street for the North and South Sites, and the new access road, King Street Court, for the Center Site. Since design information regarding the garages' mechanical ventilation system is not available, the worst-case assumption was used that the air from the proposed parking garage would be vented through a single outlet. West Street was assumed for the vent location since background traffic volumes are higher than Washington Street, and therefore, has a higher potential for total pollutant concentrations. The vent face was modeled to directly discharge at a height of approximately 10 feet above grade along the west façades of the proposed North, South, and Center Sites, and "near" and "far" receptors were placed along the sidewalks at a pedestrian height of 6 feet at a distance of approximately five feet and 140 feet, respectively, from each of the vents. In addition, receptors were placed on the building façade at a height of six feet above the vent. A persistence factor of 0.79 was used to convert the calculated 1-hour average maximum concentrations to 8-hour averages, accounting for meteorological variability over the average 8-hour period, as referenced in the 2014 *CEQR Technical Manual*.

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels of CO and $PM_{2.5}$.

TRUCK FLEET ANALYSIS

The development site is adjacent to a DSNY garage that was recently completed and is located across the street from existing UPS and FedEx distribution facilities to the east of the development site. Therefore, potential air quality effects from DSNY vehicles and UPS and FedEx delivery trucks traveling to and from the vicinity of the development site were evaluated.

Information was obtained from the DSNY garage FEIS[6] (CEQR No. 07-DOS-003M) on the number of vehicles that operate from the DSNY garage since this facility is not yet operational. Based on the DSNY FEIS, during the AM midday, and PM peak periods DSNY trucks volumes were estimated on routes along Washington Street, Spring Street and West Street. DSNY truck volumes during other hours were estimated based on the profile of the off-peak hours relative to the peak hours obtained from the hourly trip generation.

For the analysis of UPS and FedEx truck fleet operations, hourly traffic volume data were collected at Washington Street and West Houston Street, Washington Street and Clarkson Street, and Washington Street and Spring. The hour with the highest truck volumes was conservatively used to estimate $PM_{2.5}$ emissions of these truck fleets, and the hourly truck volumes were used to estimate off-peak volumes using the peak hour as a baseline. UPS trucks traveling on the open roof of the UPS facility on Washington Street across from the development site were also included in the analysis based on the truck volume data collected for the UPS facility entrance ramp. It was assumed that the UPS trucks entering the facility via the ramp to the open roof would exit the facility in the same hour.

The EPA MOVES model, described earlier, was used to estimate vehicle emissions of $PM_{2.5}$. In accordance with the $PM_{2.5}$ *de minimis* criteria methodology, $PM_{2.5}$ 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 analysis, since the New York City Department of Environmental Protection (DEP) considers it

[6] FEIS for Sanitation Garage and Salt Shed for Manhattan Districts 1, 2 & 5, DSNY, September 26, 2008.

to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[7] and the *CEQR Technical Manual*.

To determine motor vehicle generated PM concentrations on the proposed project adjacent to streets within the study area, the EPA AERMOD model was applied. $PM_{2.5}$ emissions were modeled using the line source option, and includes the modeling of hourly concentrations based on estimated hourly data on the truck fleets 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 of 2010-2014.

$PM_{2.5}$ 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 of 23.1 $\mu g/m^3$ (based on the 2012 to 2014 average of 98th percentile concentrations) was used to establish the *de minimis* value.

Receptors were placed at sensitive locations, i.e., at potential operable windows and outdoor spaces at the lowest occupied floor of the proposed buildings.

DSNY GARAGE ANALYSIS

An analysis of the emissions from the DSNY garage ventilation system was performed, calculating pollutant levels on the proposed project, using the methodology set forth in the 2014 *CEQR Technical Manual* (see methodology for the development site parking analysis for a description of the general procedures used to estimate pollutant concentrations from the DSNY garage).

Estimates on DSNY vehicle types and volumes were obtained from the DSNY garage FEIS. For UPS trucks that will utilize the DSNY garage, it was conservatively assumed that all trucks enter and exit the garage in the same hour, since UPS vehicle activity is not available[8]. The default vehicle age mix from the EPA MOVES model was used to determine the emission rates for refuse trucks; therefore, no credit was taken for DSNY trucks that are equipped with advanced diesel particulate filters for model years earlier than those that were reflected based on national phase-in schedule, or possible use of alternate fuel vehicles for both light duty DSNY vehicles and DSNY trucks. Therefore, since DSNY previously converted its truck fleets to use PM controls as required under New York City Local Law 38, the DSNY vehicle emission estimates are considered to be very conservative.

Based on design information which indicates locations of general exhaust louvers for the DSNY garage, a single vent was conservatively assumed at the exhaust louver closest to the development site. A receptor was placed on the development site, assuming hotel use on the South Site, at a distance of approximately 12 feet.

[7] 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.

[8] The DSNY garage FEIS did not include UPS vehicle activity as part of the proposed actions since the site was previously used as a UPS surface parking facility, therefore UPS trucks were considered part of the background traffic condition. UPS truck estimates are based on the number of UPS parking spaces provided in the DSNY garage, as reported in the DSNY garage FEIS.

PROPOSED ELEVATED OPEN SPACE OVER WEST HOUSTON STREET

As described in Chapter 1, "Project Description," the proposed project would include the creation of an elevated 20,750-sf publicly accessible open space extending over West Houston Street, which would include plantings, seating, and overlook locations, approximately 26 feet above street level. Potential air quality impacts from future traffic conditions on the proposed open space were evaluated.

The mobile source analysis of the proposed open space was performed to evaluate potential impacts of CO, PM_{10} and $PM_{2.5}$. Concentrations were determined using the general procedures and assumptions described previously for the truck fleet analyses, using the EPA MOVES2014a to estimate vehicle emissions, and the EPA AERMOD dispersion model to estimate motor vehicle generated pollutant concentrations on the proposed open space areas over West Houston Street.

Traffic data for the future With Action conditions (proposed project with big box retail) were used for the air quality modeling analysis. For the PM microscale ~~analysis~~ analyses, each of the peak periods analyzed in the Chapter 14, "Transportation," were used (weekday AM, midday and PM, and Saturday). For the CO microscale analysis, the Weekday PM (5 PM to 6 PM) and Saturday (3:15 PM to 4:15 PM) peak periods were analyzed.

For PM_{10} and $PM_{2.5}$, the peak 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. Off-peak increments from the proposed development were determined by adjusting the peak period volumes by weekday and weekend 24-hour distributions as applicable.

The background CO concentrations for the open space analysis are presented in **Table 15-2**. $PM_{2.5}$ 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 of 23.1 µg/m^3 (based on the 2012 to 2014 average of 98th percentile concentrations) was used to establish the *de minimis* value, consistent with the background concentration provided for the Division Street monitoring station in Manhattan.

Multiple receptors were modeled at the publically accessible open space areas above West Houston Street, at a pedestrian height of 1.8 meters. The structure and public open space over West Houston Street is conservatively assumed to have no impact on the analysis because the structure is not modeled as a barrier to the airflow.

IMPACTS FROM HOLLAND TUNNEL PORTAL

The development site is located north of the ventilation building for the Holland Tunnel on Washington Street between Spring and Canal Streets. The ventilation building is one of four structures that provide mechanically forced air ventilation for vehicles traveling within the tunnel. Emissions from ventilation air are directed to the top of the ventilation building, which is approximately 122 feet tall.

The ventilation building is located approximately 550 feet from the development site. Since the ventilation building is more than 200 feet from the development site, it would not be analyzed as an "atypical" source of vehicular emissions as defined in the *CEQR Technical Manual*. In addition, the tunnel ventilation emissions are not considered a large or major source as defined in the *CEQR*

Technical Manual. In general, previous environmental studies that have been conducted on tunnel ventilation system exhausts at sites much closer than the development site is to the Holland Tunnel have concluded that tunnel emissions would not pose a significant adverse air quality impact. Overall, while tunnel emissions may result in slightly higher concentrations at the development site compared to ambient background concentrations, they would not result in any exceedances of NAAQS, and no significant adverse air quality impacts would be anticipated to occur.

STATIONARY SOURCES

HVAC AND CHP SYSTEMS

A stationary source analysis was conducted to evaluate potential impacts from the proposed project's HVAC and CHP systems. Boilers would generate hot water for building heating and domestic hot water. CHP systems would potentially be installed to provide electrical power and heating to certain buildings on the development site. The boiler and CHP systems were assumed to utilize natural gas exclusively.

For the air quality analysis, various building massing configurations were analyzed to identify the potential for a significant adverse impact on air quality. In general, when determining potential impacts on the development site from the proposed project's stationary sources of emissions sources (Project-on-Project), uses that minimize building heights were considered as sources, while maximum building heights were considered as receptors. Two basic massing configurations were used for evaluating Project-on-Project impacts, Configuration 1 and Configuration 2. For Configuration 1, the Center Site-West Building was modeled at its maximum allowable height (320 feet), while the South Site was modeled with the office scenario (i.e., at a height of 150 feet). This configuration was analyzed since it results in the greatest variation in heights between the Center Site-West Building and the South Site, which may result in higher impacts on the Center Site. For Configuration 2, the Center Site-West Building was modeled at its minimum illustrative height (250 feet), while the South Site was modeled with the hotel scenario (i.e., at a height of 240 feet). This configuration was analyzed since it results in the smallest difference in building heights between the Center Site-West Building and the South Site, which may result in higher cumulative impacts on the other buildings on the development site. For determination of project-on-existing air quality impacts, minimum building heights on the development site were assumed, since other existing or planned buildings in the area are lower in height than the proposed project's buildings. This massing configuration is referred to as Configuration 3. **Table 15-3** summarizes the building uses and heights that were analyzed. This is conservative since maximum impacts from nearby elevated sources tend to occur on the upper floors of a receptor site (e.g., at window locations).

Table 15-3
Building Configurations for HVAC Analysis

Building	Project-on-Project	Project-on-Existing
North Site- East Building	Residential (360 Feet)	Residential (360 Feet)
North Site- West Building	Residential (430 Feet)	Residential (430 Feet)
Center Site- East Building	Residential (240Feet)	Residential (240 Feet)
Center Site - West Building	Residential (250 Feet) Residential (320Feet)	Residential (250 Feet)
South Site	Office (150 Feet) Hotel (240 Feet)	Office (150 Feet)

It was assumed that each building would have a separate boiler installation with the exhaust stack located on the tallest portion of the roof of the building. However, for the senior housing building on the North Site, it was assumed that HVAC exhaust stacks would be vented to the roof of the adjacent east market rate building (east building) on the North Site.

For each building, a limitation on the type of fuel for HVAC systems would be required. In addition, for certain buildings, additional limitations would be placed including emission limits and restrictions on the placement of boiler and CHP exhaust stacks for buildings, to ensure that no significant adverse air quality impacts occur.

Stack exhaust parameters and emission estimates for the proposed boiler installations were conservatively estimated based on a conceptual level of design. Short-term boiler emissions were determined based on the estimated equipment sizing, with conservative assumptions on seasonal utilization. In addition, for buildings that were assumed to include a CHP system, winter boiler utilization was reduced based on design estimates to account for the recovered thermal energy from the CHP system, which would offset boiler operation.

Annual boiler fuel usage was obtained from conceptual design estimates, based on the size (in gross square feet [sf]) and type of development. CHP emissions were determined assuming the equipment operates at full load on a continuous basis. Emissions rates for the boilers were calculated based on emissions factors obtained from the EPA *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*. NO_2 emissions for the CHP plants were estimated based on the New Source Performance Standards for stationary spark ignition internal combustion engines as per 40 CFR Part 60, subpart JJJJ, and $PM_{2.5}$ emissions were based on emission factors obtained from AP-42. PM_{10} and $PM_{2.5}$ emissions include both the filterable and condensable fractions. **Table 15-4 and Table 15-5** present the stack parameters and emission rates used in the analysis for boiler and CHP systems, respectively.

Since the proposed project's boilers would operate primarily during colder periods, the short-term impact analysis used maximum seasonal energy estimates to adjust the boiler load for each season of the year to approximate the short-term boiler demand.

Table 15-4
Boiler Stack Parameters and Emission Rates

Parameter		Building				
		North Site		Center Site		
		East Tower	West Tower	Northeast Tower	Southwest Tower	South Site
Building Size (gsf)[3]		122,433	612,167	538,751	376,749	311,100
Building Height (ft)		360	430	240	250-320	150-240
Boiler Capacity (MMBtu/hr) [2]		7.5	12.5	15	12	8
Stack Exhaust Temp. (°F)[4]		307.8	307.8	307.8	307.8	307.8
Stack Exhaust Height (ft)		410	450	270	310 / 370	180 / 300
Height Above Roof (ft)		50	20	30	50	30
Stack Exhaust Diameter (ft) [5]		1.5	2	3	2	1.5
Stack Exhaust Flow (ACFM)[1][6]		1,849	3,082	3.698	2.958	1,972
Stack Exhaust Velocity (ft/s)[6]		17.45	16.33	8.73	15.67	18.62
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Short-term Emission Rates:						
Lb/hr[3]	NO_x	0.2725	1.2255	0.3634	0.4360	0.2907
	PM_{10}	0.0447	0.0745	0.0894	0.0715	0.0477
	PM_{25}	0.0447	0.0745	0.0894	0.0715	0.0477
Annual Emission Rates:						
Lb/hr[4]	NO_x	0.0306	0.4131	0.0898	0.0942	0.0778
	PM_{10}	0.0063	0.0314	0.0276	0.0193	0.0160
	PM_{25}	0. 0063	0.0314	0.0276	0.0193	0.0160

Notes:
(1) ACFM = actual cubic feet per minute.
(2) British Thermal Units, or BTUs, are a measure of energy used to compare consumption of energy from different sources, such as gasoline, electricity, etc., taking into consideration how efficiently those sources are converted to energy. One BTU is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree.

Reference:
(3) The square footage for each tower was estimated based on the breakdown provided in the ULURP application on the zoning square footage for each of the buildings, and the total gross square footage for each of the sites.
(4) Emission factors are based on AP-42, while stack parameters are based on conceptual design data.
(5) The stack diameter, and exhaust temperature are based on data obtained from a survey of New York City boilers from buildings of a similar size.
(6) The stack exhaust flow rate is estimated based on the type of fuel and heat input rates.

Dispersion Modeling

Potential impacts from the proposed project's HVAC emissions were evaluated using a refined dispersion model, the EPA/AMS AERMOD dispersion model. 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 and includes updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and handling of terrain interactions.

Table 15-5
CHP Stack Parameters and Emission Rates

Parameter		Building: North Site West Building	Building: Center Site Southwest Building
Building Height (ft)		430	250-320
CHP Capacity (kW) [(2)]		500	300
Stack Exhaust Temp. (°F)[(4)]		248	248
Stack Exhaust Height (ft)		450	310/370
Height Above Roof (ft)		20	50
Stack Exhaust Diameter (ft) [(4)]		1.2	1.2
Stack Exhaust Flow (ACFM)[(1)(5)]		2,923	1,754
Stack Exhaust Velocity (ft/s)[(5)]		43.08	25.82
Fuel Type		Natural Gas	Natural Gas
Lb/hr[(2)]	NO_x	1.4771	0.8863
	PM_{10}	0.0423	0.0254
	PM_{25}	0.0423	0.0254

Notes:
(1) ACFM = actual cubic feet per minute.
(2) kW = kilowatts.
References:
(3) NO_2 emissions were estimated based on the New Source Performance Standards for stationary spark ignition internal combustion engines as per 40 CFR Part 60, subpart JJJJ. $PM_{2.5}$ and PM_{10} Emission factors are based on AP-42, while stack parameters are based on conceptual design data.
(4) The stack diameter, exhaust velocity, and exhaust temperature are based on data obtained from a survey of New York City boilers from buildings equipment of a similar size.
(5) The stack exhaust flow rate is estimated based on the type of fuel and heat input rates.

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability of calculating pollutant concentrations at locations when 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 exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length (with and without building downwash), 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 building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources 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 at elevated receptors close to the height of the sources, which would occur without downwash, as well as the worst case at lower elevations and ground level, which would occur with downwash.

Methodology Utilized for Estimating NO_2 Concentrations

Annual NO_2 concentrations from HVAC sources were estimated using a NO_2 to NO_x ratio of 0.75, as described in EPA's *Guideline on Air Quality Models* at 40 CFR part 51 Appendix W, Section 5.2.4.[9]

For assessing 1-hour average NO_2 concentrations for compliance with NAAQS, EPA guidance was utilized.[10] Background concentrations are currently monitored at several sites within New York City, which are used for reporting concentrations on a "community" scale. Because this data is compiled on a 1-hour average format, it can be used for comparison with the new 1-hour standards. Therefore, background 1-hour NO_2 concentrations currently measured at the community-scale monitors can be considered representative of background concentrations for purposes of assessing the impact of the proposed project's HVAC systems.

1-Hour average NO_2 concentration increments from the proposed project's HVAC systems were estimated using 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 Queens College monitoring station that is the nearest ozone monitoring station and 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.

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).

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at La Guardia Airport (2010–2014), 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. These data were 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 to determine surface parameters used by the AERMET program.

Receptor Placement

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors were analyzed and included locations on the development site and other nearby buildings, and at operable windows, air intakes, and publicly accessible ground-level locations. The model also included elevated and ground-level receptor grids in order to address more distant locations and to identify the highest ground-level impact.

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[9] http://www.epa.gov/scram001/guidance/guide/appw_05.pdf.

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

Background Concentrations

To estimate the maximum expected total pollutant concentrations, the calculated impacts from the emission sources must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 15-6**). The background levels are based on concentrations monitored at the nearest DEC ambient air monitoring stations over the most recent five-year period for which data are available (2010-2014), with the exception of PM_{10}, which is based on three years of data, consistent with current DEP guidance (2012-2014). For the 24-hour PM_{10} concentration the highest second-highest measured values over the specified period were used.

Table 15-6
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	1-hour	Botanical Garden, Bronx	(1)	100
	Annual	Botanical Garden, Bronx	39.2	100
$PM_{2.5}$	24-hour	Division Street, Manhattan	23.1	196
PM_{10}	24-hour	Division Street, Manhattan	39	150

Notes:
(1) The 1-Hour NO_2 background concentration is not presented in the table since the AERMOD model determines the total 98th percentile 1-Hour NO_2 concentration at each receptor.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2007-2011.

Total 1-hour NO_2 concentrations were determined following methodologies that are accepted by the EPA, and which are considered appropriate and conservative for this review. The methodology used to determine the compliance of total 1-hour NO_2 concentrations from the proposed sources with the 1-hour NO_2 NAAQS[11] was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the seasonal hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each receptor 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.

INDUSTRIAL SOURCES

The potential impacts of existing industrial operations on pollutant concentrations at the development site were analyzed. All potential industrial air pollutant emission sources within 400 feet of the development site's boundaries were considered for inclusion in the air quality impact analyses, as recommended in the 2014 *CEQR Technical Manual*.

Land use and Sanborn maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A field survey was conducted on October 29, 2015 to identify buildings within 400 feet of the development site that have the potential for emitting air pollutants. Four businesses with potential industrial source activities in the study area were identified during the field survey. Next, a request was made to DEP's Bureau of Environmental

[11] http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf.

Compliance (BEC) and DEC to obtain the most current information regarding the release of air pollutants from all existing manufacturing or industrial sources within the study area. The DEP and DEC air permit information provided was compiled into a database of source locations, air emission rates, and other data pertinent to determining source impacts. A comprehensive search was also performed to identify DEC Title V permits and permits listed in the EPA Envirofacts database.[12] However, no permitted activities were identified at these locations. No other sources of emissions were identified; therefore, no significant impacts on the proposed project are anticipated from industrial source emissions.

No major or large emissions sources permitted under the DEC Title V program and State Facility permit program were identified within the 1,000 foot study area; therefore, no quantified analysis of the impact of large sources on the proposed project is warranted.[13]

IMPACTS FROM DSNY GARAGE

The development site is adjacent to the DSNY/UPS facility on 500 Washington Street, which is currently under construction and is nearing completion. According to the DSNY garage FEIS the facility will have fueling, washing, storage, and maintenance operations for DSNY vehicles and UPS-semi trailer storage. Potential air quality and odor impacts on the proposed project due to these operations at the DSNY garage were evaluated, as described in the “Probable Impacts of the Proposed Actions” in this chapter.

E. EXISTING CONDITIONS

Recent concentrations of all criteria pollutants at DEC air quality monitoring stations nearest the study area are presented in **Table 15-7**, below. 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 15-6**, above.

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 the NAAQS for the pollutants at these sites in 2014.

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

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

Table 15-7
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY, Manhattan	ppm	1-hour	1.9	35
	CCNY, Manhattan		8-hour	1.3	9
SO_2	IS 52, Bronx	µg/m^3	3-hour	46.6	1,300
			1-hour	45.5	196
PM_{10}	Division Street, Manhattan	µg/m^3	24-hour	37	150
$PM_{2.5}$	Division Street, Manhattan	µg/m^3	Annual	10.1	12
			24-hour	23.1	35
NO_2	Botanical Garden, Bronx	µg/m^3	Annual	32.4	100
	Botanical Garden, Bronx		1-hour	109	188
Lead	IS 52, Bronx	µg/m^3	3-month	0.004	0.15
Ozone	CCNY, Manhattan	ppm	8-hour	0.067	0.075

Notes: The CO, PM_{10}, and 3-hour SO_2 concentrations for short-term averages are the second-highest from the most recent year with available data. $PM_{2.5}$ annual concentrations are the average of 2012, 2013, and 2014, and the 24-hour concentration is the average of the annual 98th percentiles in 2012, 2013 and 2014. 8-hour average ozone concentrations are the average of the 4th highest-daily values from 2012 to 2014. 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 2012 to 2014.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2010–2014.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations in the No Build condition were determined for future 2024 conditions using the methodology previously described. **Table 15-8** shows the future maximum predicted 8-hour average CO concentration, including background concentration, at the analysis intersection in the No Build condition. The value shown is the highest predicted concentration for the receptor locations for any of the time periods analyzed.

Table 15-8
Maximum Predicted Future (2024) 8-Hour
Average Carbon Monoxide No Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	Spring Street and West Street	Weekday PM	2.3
		Saturday	2.3

Notes: 8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.8 ppm.

As shown in **Table 15-8**, 2024 No-Build values are predicted to be well below the 8-hour CO standard of 9 ppm.

G. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

The proposed actions would result in increased mobile source emissions in the immediate vicinity of the development site and also have the potential to affect the surrounding community with emissions from HVAC equipment. The following sections describe the results of the studies performed to analyze the potential impacts on the surrounding community from these sources for the 2024 analysis year.

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations for future conditions in the 2024 analysis year were predicted using the methodology previously described. **Table 15-9** shows the future maximum predicted 8-hour average CO concentration 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 value shown is the highest predicted concentration. The results indicate that the proposed actions would not result in any violations of the 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations are very small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria. Therefore, mobile source CO emissions with the proposed actions would not result in a significant adverse impact on air quality.

Table 15-9
Maximum Predicted Future (2024)
Carbon Monoxide Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)		*De Minimis*
			No Action	Build	
1	Spring Street and West Street	Weekday PM	2.3	2.3	5.6
		Saturday	2.3	2.3	5.6

Notes: 8-hour standard is 9 ppm.
Concentration includes a background concentration of 1.8 ppm.

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted 8-hour average CO and $PM_{2.5}$ concentrations from the proposed parking garages were analyzed using several receptor points, a “near” side receptor on West Street as adjacent to the proposed parking facilities, and a “far” side receptor on the opposite side of West Street, since the traffic volumes on West Street would be the highest. The total CO impacts included both background CO levels and contributions from traffic on adjacent roadways (for the far side receptor only). There was also a receptor placed on the façade of each proposed building above each parking garage.

The maximum predicted 8-hour average CO concentration of all the sensitive receptors described above for any of the proposed buildings would be 2.4 ppm for the far side receptor. This value includes a predicted concentration of 0.01 ppm from the parking garage vent, and includes a background level of 1.8 ppm. This concentration is substantially below the applicable standard of 9 ppm. In addition, the predicted concentration of 2.4 ppm is below the CEQR *de minimis* criteria, which is approximately 3.6 ppm. Therefore, the proposed parking garage would not result in any significant adverse impacts of CO.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments, including consideration of on street incremental traffic associated with the proposed actions, are 0.~~32~~29 $\mu g/m^3$ and 0.~~07~~ 06 $\mu g/m^3$, at the building façade, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 5.95 µg/m^3 for the 24-hour average concentration and 0.3 µg/m^3 for the annual concentration. Therefore, the proposed parking garages would not result in any significant adverse air quality impacts for $PM_{2.5}$.

TRUCK FLEET ANALYSIS

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments from DSNY, UPS, and FedEx trucks were calculated so that they could be compared to the *de minimis* criteria that would determine the potential significance of any impacts at the proposed development site. Based on this analysis, the maximum predicted 24-hour average $PM_{2.5}$ concentration is predicted to be 0.69 µg/m^3. This concentration is substantially below the *de minimis* criteria of 6 µg/m^3. The maximum predicted annual average incremental $PM_{2.5}$ concentration is predicted to be 0.14 µg/m^3, which is well below the *de minimis* criteria of 0.3 µg/m^3.

The results show that the annual and 24-hour $PM_{2.5}$ increments are predicted to be below the *de minimis* criteria. Therefore, there would be no potential for significant adverse impacts on air quality from the DSNY, UPS, and FedEx truck fleets operating in the vicinity of the project area on the buildings in the proposed development site.

DSNY GARAGE ANALYSIS

Based on the methodology previously described, the maximum predicted 8-hour average CO and $PM_{2.5}$ concentrations from the DSNY parking garage were analyzed at elevated receptors on the proposed hotel use on the South Site.

The maximum predicted 8-hour average CO concentration was 1.8 ppm on the development site. This value includes a background level of 1.8 ppm and a calculated CO concentration of 0.04 ppm from the garage. This concentration is substantially below the applicable standard of 9 ppm. In addition, the predicted concentration of 1.8 ppm is below the CEQR *de minimis* criteria, which is approximately 3.6 ppm. Therefore, the DSNY garage would not result in any significant adverse impacts of CO on the proposed project.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 1.86 µg/m^3 and 0.27 µg/m^3, on the development site, respectively. The maximum predicted $PM_{2.5}$ increments are below the respective $PM_{2.5}$ *de minimis* criteria of 5.95 µg/m^3 for the 24-hour average concentration and 0.3 µg/m^3 for the annual concentration. Therefore, the DSNY parking garage would not result in any significant adverse air quality impacts for $PM_{2.5}$ on the proposed project.

PROPOSED ELEVATED OPEN SPACE OVER WEST HOUSTON STREET

Based on the methodology previously described, the maximum predicted 8-hour average CO and $PM_{2.5}$ concentrations from the future build traffic conditions were analyzed at elevated receptors on the proposed open space over West Houston Street.

Table 15-10 shows the future maximum predicted CO and $PM_{2.5}$ concentrations at the proposed open space over West Houston Street. The values shown are the highest predicted concentrations. The results indicate that the maximum concentrations would not result in any violations of the CO NAAQS or $PM_{2.5}$ *de minimis* criteria. Therefore, mobile source emissions with the proposed actions would not result in a significant adverse impact on air quality on the proposed open space areas above West Houston Street.

Table 15-10
Maximum Predicted Future (2024) Build Concentrations at Proposed Open Space Areas Over West Houston Street

Pollutant	Averaging Period	Maximum Concentration	Standard
CO	1-Hr	3.0	35 ppm
	8-Hr	1.9	9 ppm
PM_{10}	24-Hour	43.3	150 µg /m^3
$PM_{2.5}$	24-Hour	1.23	5.95 µg /m^3
	Annual	0.20	0.3 µg /m^3

Notes:
1-hr CO concentration includes a background concentration of 2.7 ppm.
8-Hr CO concentration includes a background concentration of 1.8 ppm.
24-Hr PM_{10} concentration includes a background concentration of 39 µg /m^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.

STATIONARY SOURCES

HVAC SYSTEMS

Table 15-11 shows maximum overall predicted concentrations for NO_2 and PM_{10} from the proposed project's HVAC systems, which were predicted to occur on elevated locations on the proposed project's buildings. Maximum predicted concentrations on other existing and proposed buildings, as well as at ground level receptors, would be much lower, as shown in **Table 15-12**. As shown in the tables, the maximum concentrations from stack emissions, when added to ambient background levels, would be well below the NAAQS.

Table 15-11
Future Maximum Modeled Pollutant Concentrations from the Proposed Project (µg/m^3)

Pollutant	Averaging Period	Concentration Due to Stack Emission	Maximum Background Concentration	Total Concentration	Standard
NO_2	1-Hour(1)	-	-	109.1	188
	Annual(2)	2.3	39.2	41.5	100
PM_{10}	24-hour	5.9	39	44.9	150

Notes:
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. Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.

Table 15-12
Future Maximum Modeled Pollutant Concentrations from the Proposed Project at Existing and No Build Receptor Locations (μg/m³)

Pollutant	Averaging Period	Concentration Due to Stack Emission	Maximum Background Concentration	Total Concentration	Standard
NO_2	1-Hour(1)	-	-	145.8	188
	Annual(2)	1.7	39.2	40.9	100
PM_{10}	24-hour	3.8	39	42.8	150

Notes:
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. Annual NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.75 as per EPA guidance.

The air quality modeling analysis also determined the highest predicted increase in 24-hour average and annual average $PM_{2.5}$ concentrations from the proposed project's heating and hot water systems. As shown in **Table 15-13**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable *de minimis* criterion of 5.95 μg/m³. The maximum concentrations under Configuration 1 and Configuration 2 were projected to be on the south façade of the North Site's East Tower at a height of 275 feet. On an annual basis, the projected $PM_{2.5}$ impacts would be less than the applicable DEP *de minimis* criterion of 0.3 μg/m³ for local impacts, and the DEP *de minimis* criterion of 0.1 μg/m³ for neighborhood scale impacts. In addition, as shown in **Table 15-14**, maximum concentrations of $PM_{2.5}$ are predicted to be below the city's *de minimis* criteria at elevated receptors on existing and No Build developments, and at ground level locations. The maximum concentration on other existing and proposed buildings, analyzed under Configuration 3, was predicted to be on the northwestern façade of the proposed No Build development located at 551 Greenwich Street, at a height of 275 feet.

Table 15-13
Future Maximum Modeled $PM_{2.5}$ Concentrations from the Proposed Project(in μg/m³)

Pollutant	Averaging Period	Maximum Concentration	*De Minimis* Criteria
$PM_{2.5}$	24-Hour	5.92	5.95(1)
	Annual (Discrete)	0.14	0.3
	Annual (Neighborhood Scale)	0.0038	0.1

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

To ensure that there are no significant adverse impacts of $PM_{2.5}$ from the proposed project's HVAC and CHP emissions, certain restrictions would be required through the mapping of an (E) designation (E-384) for air quality on each parcel regarding fuel type and exhaust stack location. The requirements of the (E) designation would be as follows:

Table 15-14
Future Maximum Modeled $PM_{2.5}$ Concentrations from the Proposed Project at Existing Buildings, No Build Developments and Ground-Level Receptors (in µg/m^3)

Pollutant	Averaging Period	Maximum Concentration	*De Minimis* Criteria
$PM_{2.5}$	24-Hour	3.84	5.95[1]
	Annual (Discrete)	0.10	0.3
	Annual (Neighborhood Scale)	0.0045	0.1

Notes:
1. $PM_{2.5}$ *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

North Site

East Building (Including Senior Housing Development)

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired HVAC equipment, with a maximum boiler capacity of 7.5 MMBtu/hr (inclusive of any boilers serving the senior housing development on the North Site), be fitted with low NO_x (30 ppm) burners and ensure that fossil fuel-fired heating and HVAC exhaust stack(s) are located at least 410 feet above grade, to avoid any potential significant air quality impacts.

West Building

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired HVAC and CHP equipment and ensure that fossil fuel-fired HVAC and CHP equipment exhaust stack(s) are located at least 450 feet above grade, to avoid any potential significant air quality impacts.

Center Site

East Building

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired HVAC equipment, with a maximum boiler capacity of 15 MMBtu/hr, be fitted with low NO_x (20 ppm) burners and ensure that fossil fuel-fired heating and HVAC exhaust stack(s) are located at least 270 feet above grade. HVAC stacks must be located at least 85 feet away from the northern lot line facing West Houston Street, at least 895 feet away from the southern lot line facing Spring Street, at least 190 feet away from the western lot line facing West Street, and at least 40 feet away from the eastern lot line facing Washington Street to avoid any potential significant air quality impacts.

Southwest Building

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired HVAC and CHP equipment, with a maximum boiler capacity of 12 MMBtu/hr, and a maximum CHP capacity of 300 kW, be fitted with low NOx (30 ppm) burners and ensure that fossil fuel-fired heating and HVAC and CHP equipment exhaust stack(s) are located at least 310 feet above grade, to avoid any potential significant air quality impacts.

South Site

Office Use

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired HVAC equipment, with a maximum boiler capacity of 8 MMBtu/hr, be fitted with low NOx (30 ppm) burners and ensure that fossil fuel-fired heating and HVAC exhaust stack(s) are located at a maximum of 180 feet above grade, to avoid any potential significant air quality impacts.

Hotel/Mixed-Use

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired HVAC equipment, with a maximum boiler capacity of 8 MMBtu/hr, be fitted with low NOx (30 ppm) burners and ensure that fossil fuel-fired heating and HVAC exhaust stack(s) are located at least 300 feet above grade, to avoid any potential significant air quality impacts.

With these restrictions, emissions from the proposed project's HVAC and CHP exhaust stacks would not result in any significant adverse air quality impacts.

To the extent permitted under Section 11-15 of the Zoning Resolution, the requirements of the (E) designations may be modified, or determined to be unnecessary, based on new information or technology, additional facts or updated standards that are relevant at the time each building is ultimately developed.

IMPACTS FROM DSNY GARAGE

Potential air quality and transitory odor impacts on the proposed project due to operations at the DSNY garage were evaluated.

Refueling Operations

According to the DSNY Garage FEIS, the refueling station for DSNY trucks and city vehicles will be located in the northwest portion of the ground floor. All DSNY collection vehicles will be refueled upon returning to the garage, entering from the West Street/Route 9A access. Fuel and oil will be stored in nine underground tanks installed below the ground level of the garage. The refueling area will be naturally ventilated with an opening approximately up to 30 feet in height by 58 feet in width, fronting West Street/Route 9A. In addition, the gasoline and E85 Ethanol fuel pumps will be served by a vapor recovery system; hence, odors from the refueling area are expected to have a negligible impact on air quality.

Vehicle Refueling and Maintenance

According to the DSNY Garage FEIS, vehicle washing and maintenance areas will be located on the third floor. DSNY vehicle washing will occur Monday through Friday during the PM and overnight shifts (4 PM to 12 AM and 12 AM to 8 AM). DSNY collection trucks will be washed once every two weeks and all other DSNY vehicles at least once a month. No potential air quality impacts from vehicle washing activities were identified in the DSNY Garage FEIS

DSNY Truck Refuse Storage

According to the DSNY Garage FEIS, the new DSNY garage on 500 Washington Street would temporarily house a maximum of 25 full collection trucks for a limited duration of no longer than one shift i.e. eight hours or less. These vehicles would include trucks with paper and metal, glass, and plastic, which are essentially hooded, and trucks with refuse. DSNY trucks will also travel along certain road segments near the development site. These actions may potentially cause transitory odor impacts on the proposed project.

Odor impacts were evaluated in the 2006 Solid Waste Management Plan (SWMP) FEIS[14]by DSNY using an "odor panel" evaluation, where a group of trained and experienced assessors quantifies the odor concentrations (expressed as the dilutions to threshold [DT]), odor intensity, and odor persistence on odor sampling conducted for staged collection vehicles in accordance with established protocols and standards. The results indicated low odor levels, within the range of indoor and outdoor background levels and the detection limit of 4 DT. The indoor background and truck odors ranged from 5-7 DTs. In addition, sampling staff observed little or no perceivable odors when walking by the collection vehicles during the measurement time period.

Odor concentrations detected in outdoor air within the City had on the order of a 5 DT concentration even without local source impacts, based on measurements taken during the SWMP FEIS odor study. According to the DSNY Garage FEIS, the addition of 1-2 DTs in the garage due to the presence of full DSNY collection vehicles would not likely make a detectable difference to an average observer.

The new DSNY garage would store all collection vehicles within a much larger garage, avoiding on-street storage of trucks. In addition, to limit pollutant concentrations to levels below Occupational Safety and Health Administration (OSHA) standards, the garage is designed to achieve six air exchanges per hour. This provides additional dilution and dispersion of odorous compounds, further reducing the potential for off-site impacts.

Based on the odor analysis conducted in the DSNY garage FEIS and results of the FEIS SWMP odor study, the temporary storage of collection trucks with refuse inside the DSNY garage would not result in significant odor impacts outside the garage, therefore, it would result in negligible impacts on the proposed project. ✷

[14] FEIS for New York City Comprehensive Solid Waste Management Plan, February 13, 2006.