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Air Quality

Ambient air quality, or the quality of the surrounding air, may be affected by air pollutants produced by motor vehicles, referred to as "mobile sources"; by fixed facilities, referred to as "stationary sources"; or by a combination of both. Under CEQR, an air quality assessment determines both a proposed project's effects on ambient air quality as well as the effects of ambient air quality on the project.

Introduction

The Proposed Action would facilitate redevelopment of the Project Site with a commercial office building up to approximately 1,050 feet tall (including the bulkhead), with ground floor retail uses. The Proposed Project would include on-site transit-related improvements that would provide connections to the under-construction Long Island Rail Road (LIRR) East Side Access (ESA) concourse (the existing connection from 45th Street to the Grand Central Terminal Roosevelt passageway would remain adjacent to the site at 52 Vanderbilt). Potential air quality impacts of the Proposed Action include potential impacts from the project-generated traffic and from the Proposed Project's heating, ventilation and air conditioning (HVAC) systems. Consistent with the *CEQR Technical Manual*, the air quality analysis also includes potential impacts on the Proposed Project from nearby light industrial sources and "large" and "major" sources (i.e., facilities with State and Title V air permits).

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 heating and hot water systems. Indirect impacts are caused by off-site

emissions associated with a project, such as emissions from nearby existing stationary sources (i.e., impacts on the development site) or by emissions from on-road vehicle trips generated by a proposed project or other changes to future traffic conditions due to a project.

The key issues addressed in these analyses are the potential for:

- Emissions from the project-generated vehicular travel to significantly impact air quality near affected intersections;
- Emissions from the HVAC systems of the Proposed Project to significantly impact existing and proposed land uses;
- Emissions from the large/major sources to impact the Proposed Project;
- Emissions from light industrial and manufacturing facilities to impact the Proposed Project.

The Proposed Project would not introduce any parking, and therefore, an assessment of emissions from such a facility is not warranted.

Principal Conclusions

An air quality analysis was conducted based on the methodology set forth in the *CEQR Technical Manual,* and it concluded that the Proposed Action would not result in significant adverse air quality impacts. The air quality analysis, as summarized below, found that the Proposed Action would not cause significant air quality adverse impacts on the surrounding sensitive receptors nor would nearby emission sources significantly impact the Proposed Project. An (E) designation (E-584) for air quality would be placed on the Project Site (Block 1279, Lots 23, 24, 25, and 48) to ensure that the Proposed Project would not result in significant adverse air quality impacts.

The number of incremental trips generated by the Proposed Project would be lower than the screening thresholds for carbon monoxide (CO) and particulate matter (PM) (both $PM_{2.5}$ and PM_{10}) identified in the *CEQR Technical Manual*. Therefore, traffic emissions from the Proposed Project would not result in a significant adverse impact on air quality.

The detailed analysis demonstrated that the Proposed Project must utilize only natural gas in any fossil fuel-fired heating and hot water system, with a maximum boiler capacity of 32 MMBtu/hr, be fitted with low NOx burners (50 ppm) and ensure that the exhaust stack(s) are located at the highest tier and at least 1053 feet above grade to avoid any potential significant adverse air quality impact. These commitments would be memorialized in an (E) designation for the Proposed Project (E-584). With these commitments, the Proposed Project would not result in significant adverse air quality impacts.

The identified light industrial sources would not emit any carcinogenic air toxic pollutants. The analysis of non-carcinogenic non-criteria pollutants resulted in concentrations below guideline levels and demonstrated the hazard index below the threshold. Hence, no adverse air quality impacts on the Proposed Project are expected from the nearby industrial sources.

Analysis of the potential impacts from an existing large source on the Proposed Project showed that emissions from this facility would result in concentrations below the

appropriate ambient air quality thresholds. Therefore, there would be no significant adverse air quality impacts on the Proposed Project from the large source.

Air Quality Standards

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. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide (NO) and nitrogen dioxide (NO_2), collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs.

In accordance with the requirements of the Clean Air Act (CAA), as amended 1990, the U.S. Environmental Protection Agency (EPA) has promulgated National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of sensitive populations such as sick, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, which are called "criteria" pollutants. These six pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide (SO_2), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) and less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), and lead (Pb). These standards are reviewed from time to time and may be revised.

The State of New York has adopted similar standards as those set by the EPA, with the exception of sulfur dioxide, particulates, fluorides, and hydrogen sulfide. The NAAQS are presented in **Table 10-1**.

Table 10-1 National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Level	Level	Form
Carbon Monoxide (CO)	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	Primary and secondary	Rolling 3-month average	0.15 µg/m^3 [(1)]	Not to be exceeded
Nitrogen Dioxide (NO_2)	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and secondary	1 year	53 ppb [(2)]	Annual mean
Ozone (O_3)	Primary and secondary	8 hours	0.070 ppm [(3)]	Annual fourth-highest daily maximum concentration, averaged over 3 years
Particulate Matter ($PM_{2.5}$)	Primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
	Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
	Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
Particulate Matter (PM_{10})	Primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	Primary	1 hour	75 ppb[(4)]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Notes:

[(1)] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

[(2)] The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[(3)] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

[(4)] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is a USEPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Source: EPA NAAQS Table, https://www.epa.gov/criteria-air-pollutants/naaqs-table, accessed May 2020

In addition to criteria pollutants, there are other toxic air pollutants not included by the EPA in the list of principal pollutants. Non-criteria pollutants are emitted by a wide range of man-made and naturally occurring sources. These pollutants are sometimes referred to as hazardous air pollutants (HAP) and, when emitted from mobile sources, as Mobile Source Air Toxics (MSATs). No federal ambient air quality standards have been promulgated for toxic air

pollutants. However, EPA and New York State Department of Environmental Conservation (NYSDEC) have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure.

Regulatory Context

The 1990 CAA with Amendments resulted in states being divided into attainment and non-attainment areas, with classifications based upon the severity of their air quality problems. Air quality control regions are classified and divided into one of three categories: attainment, unclassified, or non-attainment depending upon air quality data and ambient concentrations of pollutants. Attainment areas are regions where ambient concentrations of a pollutant are below the respective NAAQS; non-attainment areas are those where concentrations exceed the NAAQS. Maintenance areas are former non-attainment that achieved attainment. An unclassified area is a region where data are insufficient to make a determination and is generally considered as an attainment area for administrative purposes. A single area can be in attainment of the standards for some pollutants while being in non-attainment for others. When an area is designated as non-attainment by EPA, the state is required to submit a State Implementation Plan (SIP) which outlines the plan to achieve conformity with the NAAQS and the following plan for maintaining the attainment status.

New York County is designated as a serious non-attainment area for the 2008 8-hour ozone standard and a moderate non-attainment area for the 2015 8-hour ozone standard. Both designations are part of a larger New York-Northern New Jersey-Long Island, NY-NJ-CT non-attainment areas. New York County has been a moderate PM_{10} non-attainment area since 1994. The county has been designated as a CO maintenance area on May 20, 2002 and as a $PM_{2.5}$ maintenance area for the 2006 24-hour $PM_{2.5}$ standard on April 18, 2014. New York County is in attainment for all other criteria pollutants (Pb, NO_2, and SO_2).

Pollutants of Concern

Air pollution is of concern because of its demonstrated effects on human health. Of special concern are the respiratory effects of the pollutants and their potential toxic effects, as described below.

Carbon monoxide (CO) is a colorless and odorless gas that is a product of incomplete combustion. Carbon monoxide is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches, nausea, and at sustained high concentration levels, can lead to coma and death. The Proposed Project would increase traffic volumes on streets surrounding the Development Site. Therefore, a CEQR mobile source screening analysis was conducted.

Particulate matter is made up of small solid particles and liquid droplets. PM_{10} refers to particulate matter with a nominal aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 micrometers or less. Particulates can enter the body through the respiratory system. Particulates over 10 micrometers in size are generally captured in the nose and throat and are readily expelled from the body. Particulates smaller than 10 micrometers, and especially particles smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli) in the lungs.

Particulates are associated with increased incidence of respiratory diseases, cardiopulmonary disease, and cancer.

All gasoline-powered and diesel-powered mobile source vehicles, especially heavy trucks and buses operating on diesel fuel, emit respirable particulates, most of which is $PM_{2.5}$. Consequently, levels of respirable particulates may be locally elevated near roadways with high volumes of gasoline and diesel-powered vehicles. Vehicular traffic may also contribute to PM emissions through brake and tire wear and by disturbing dust on roadways. The traffic generated by the Proposed Project was assessed as part of a CEQR $PM_{2.5}$ screening analysis.

Nitrogen oxides (NO_X), the most significant of which are nitric oxide (NO) and nitrogen dioxide (NO_2), can occur when combustion temperatures are extremely high (such as in engines) and atmosphere nitrogen gas combines with oxygen gas. NO is relatively harmless to humans but quickly converts to NO_2. Nitrogen dioxide has been found to be a lung irritant and can lead to respiratory illnesses. Nitrogen oxides, along with VOCs, are also precursors to ozone formation. Potential impacts on local NO_2 concentrations from the fuel combustion for the Proposed Project heating and hot water systems were analyzed (assuming the use of natural gas).

Sulfur Dioxide (SO_2) emissions are the main components of the "oxides of sulfur," a group of highly reactive gases from fossil fuel combustion at power plants, other industrial facilities, industrial processes, and burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. High concentrations of SO_2 will lead to formation of other sulfur oxides. By reducing the SO_2 emissions, other forms of sulfur oxides are also expected to decrease. When oxides of sulfur react with other compounds in the atmosphere, small particles that can affect the lungs can be formed. This can lead to respiratory disease and aggravate existing heart disease. Impacts from large sources include impacts from the fuel oil combustion. Therefore, potential future levels of SO_2 from these sources were examined. Fuel oil containing 15 parts per million (ppm) of sulfur or less is required for all new boilers in New York City.[1]

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

Federal ambient air quality standards do not exist for non-criteria pollutants; however, the New York State Department of Environmental Conservation (NYSDEC) has issued standards for certain non-criteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed guidance document DAR-1 (August 2016), which contains a compilation of annual and short term (1-hour) guideline concentration thresholds for these compounds. The NYSDEC's DAR-1 guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to non-criteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

[1] http://www.nyc.gov/html/dep/pdf/air/heating_oil_rule.pdf

Organic solvents are carbon-based substances capable of dissolving or dispersing one or more other substances. Solvents are used in a wide range of industries (construction, maritime, retail, and general industry). They are used in the extraction of fats and oils, in degreasing, in dry cleaning, and in the manufacture of many items including paints, varnishes, lacquers, paint removers, plastics, adhesives, textiles, impregnation agents, printing inks, rubber products, floor polishes, and waxes. Health hazards associated with solvent exposure include toxicity to the nervous system, reproductive damage, liver and kidney damage, respiratory impairment and dermatitis. Some solvents are believed to be carcinogenic.

Impact Criteria

The State Environmental Quality Review Act (SEQRA) regulations and *CEQR Technical Manual* indicate 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] The predicted concentrations of pollutants of concern associated with a proposed project are compared with the NAAQS for criteria air pollutants or ambient guideline concentrations for non-criteria pollutants. Generally, if project-related concentrations are higher the NAAQS, there is a potential for significant adverse air quality impacts from the project. In addition, the City's *de minimis* criteria are also used to determine significance of impacts for CO and $PM_{2.5}$.

The NYSDEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter (µg/m3) for the one-hour (SGC) and annual average time (AGC) periods for various air toxic compounds[3]. In order to evaluate residual risk of non-carcinogenic toxic air emissions, hazard index is calculated based on annual exposure limits. If the combined ratio of pollutant concentration divided by its annual exposure threshold for each of the toxic pollutants is found to be less than 2.0, according to DAR-1, the residual risk is deemed acceptable. In addition, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all the carcinogenic toxic pollutants combined is less than ten-in-one million, the residual risk is deemed acceptable.

$PM_{2.5}$ De Minimis Criteria

New York City uses de minimis criteria to determine a project's potential to result in a significant adverse $PM_{2.5}$ impact under CEQR. The *de minimis* criteria are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments which 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

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

[3] NYSDEC DAR-1 - http://www.dec.ny.gov/docs/air_pdf/dar1.pdf.

predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or

› Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.3 µg/m^3 at a discrete receptor location (elevated or ground level).

Background Concentrations

Background concentrations are ambient pollution levels associated with existing stationary, mobile, and other emission sources from the area and not associated with the Proposed Project. The latest full three years of monitoring data (2017 to 2019) from the representative monitoring stations were used to develop background concentrations for all pollutants (see **Table 10-2**).

Table 10-2 Background Concentrations

Pollutant	Averaging Time	Monitoring Location	Background Concentration
Carbon Monoxide	1-Hour	160 Convent Ave	2.5 ppm
	8-Hour		1.2 ppm
Nitrogen Dioxide	1-Hour	Queens College	104.0 µg/m^3
	Annual		27.1 µg/m^3
Particulate Matter (PM_{10})	24-Hour	Division St	39 µg/m^3
Particulate Matter ($PM_{2.5}$)	24-Hour	PS 19	23.3 µg/m^3
	Annual		9.4 µg/m^3
Sulfur Dioxide	1-Hour	Queens College	14.6 µg/m^3

Source: VHB, Inc. November 2020

CO and PM background concentrations were obtained from monitoring stations in Manhattan: CO was collected at the City College of New York, 160 Convent Avenue; PM_{10} was collected at the Yung Wing Elementary School, 40 Division Street; and $PM_{2.5}$ was collected from the station at PS19, 185 First Avenue. 1-hour and annual NO_2 and 1-hour SO_2 background concentrations were developed from monitoring data collected from the Queens College monitoring station at 65-30 Kissena Boulevard. These concentrations were estimated using the form of the NAAQS (see **Table 10-1**, column Form for information). Ozone concentrations for the NO_2 modeling were obtained from the City College monitoring station.

The CEQR *de minimis* 24-hour threshold based on the PS 19 $PM_{2.5}$ observations was estimated to be 5.8 µg/m^3.

Methodology and Screening Analyses

Mobile Sources

Mobile Source Screening Analysis

A screening analysis of mobile source emissions of CO and PM on ambient pollutant levels in the study area was conducted per *CEQR Technical Manual* guidance. For the project's study area, as described in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, the

threshold for conducting an analysis of CO emissions corresponds to 140 project-generated vehicles at a given intersection in the peak hour. The need for conducting an analysis of PM emissions is based on road type and the number of project-generated peak hour heavy-duty diesel vehicles (or its equivalency in vehicular $PM_{2.5}$ emissions) as determined using the worksheet provided on page 17-12 of the *CEQR Technical Manual* (Autos are assumed to be LDGT1 and trucks, such as pick-up trucks or vans, are assumed to be HDGV2B in the worksheet).

The mobile source CEQR screening analysis for the Proposed Action was conducted for the affected intersections within the network considered in the traffic analysis.

Stationary Sources

HVAC Analysis

The Proposed Project plans to use natural gas boilers for its HVAC systems. An air quality analysis was conducted to determine the potential impact of emissions from the proposed HVAC systems on existing and known future development. There are several high-rise buildings surrounding the Project Site, but One Vanderbilt Avenue is the only building within the 400-foot radius of the Project Site that is taller than the Proposed Project. A dispersion analysis using the latest version of the EPA's AERMOD (version 19191) model was conducted to estimate air quality impacts from the Proposed Project. NO_2 and particulate matter ($PM_{2.5}$ and PM_{10}) are pollutants of concern from the combustion of natural gas and therefore were considered to be pollutants of concern for this analysis.

Refined Dispersion Modeling

AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatment of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by the source building itself or by nearby structures. When plume gets entrapped in a wake, it could potentially result in excessive concentrations, especially close to the source. AERMOD can be run with and without building downwash (the downwash option accounts for the effects on plume dispersion created by the wake).

Emission Rates and Stack Parameters

Emission rates for the HVAC systems were estimated based on the EPA's AP-42, Compilation of Air Pollutant Emissions Factors, and the proposed boiler input capacity[4].

[4] https://www.eia.gov/consumption/commercial/data/2012/index.php?view=consumption#c23-c32

Methodology for Estimating NO_2 Concentrations

The 1-hour NO_2 concentration associated with the Proposed Project was estimated using the AERMOD Plume Volume Molar Ratio Method (PVMRM) module. The PVMRM module limits the NO_x to NO_2 conversion by considering NO_2 formation based on the amount of ozone within the plume volume. Hourly background ozone concentrations for this analysis were obtained from the City College ambient monitoring station at 160 Convent Avenue, the nearest monitoring station that has the latest five years of hourly data available. An in-stack NO_2 to NO_x ratio was assumed based on EPA's "alpha" version of the in-stack ratio database, which indicates that the in-stack ratio for boilers and combustion turbines is approximately 0.1[5], resulting in the NO_2/NO_x equilibrium ratio set to 0.9 (the recommended default value). The five years of hourly background NO_2 concentrations from the Queens College monitoring station were used to come up with the seasonal 24 hourly background concentrations that were added to the hourly estimated NO_2 concentrations within the AERMOD run. The design NO_2 value was estimated within the AERMOD model using five years of O_3 and seasonal hourly NO_2 background[6].

Annual NO_2 concentrations were estimated using a NO_2/NO_x conversion ratio of 0.75, as described in EPA's Guideline on Air Quality Models at 40 CFR part 51 Appendix W, Section 5.2.4.10.[7]

Meteorological Data

The latest five years (2015-2019) of hourly meteorological observations from La Guardia Airport National Weather Service station and upper air data was obtained from Brookhaven station, New York. These meteorological data provide hour-by-hour wind speeds and directions, and temperature among other data over the five-year period.

Receptor Locations

Receptors were placed on the two tallest buildings within 400 feet of the Proposed Project, One Vanderbilt and MetLife. Both buildings are office towers; they do not have operable windows but have air intakes located at several elevations. The MetLife building is about 300 feet shorter than the Proposed Project. Receptors were placed on the top three floors of the MetLife building. Air intake locations on the One Vanderbilt building were not known at the time of analysis and receptors were placed at all floors to account for the potential air intake locations. In both cases receptors were spread around the perimeter of the building at 25 feet distance from each other.

Industrial Source Analysis

As described in Section 220 and Section 321 in Chapter 17 of the *CEQR Technical* Manual, an air quality assessment is required to evaluate potential impacts of air toxics emissions from manufacturing or processing facilities within a 400-foot radius of a project site when a project would result in new sensitive uses (particularly residences, schools, hospitals, or parks). A screening analysis was performed based on Table 17-3 in Chapter 17 of the *CEQR Technical*

[5] http://www.epa.gov/ttn/scram/no2_isr_database.htm.

[6] https://www.epa.gov/sites/production/files/2015-07/documents/appwno2_2.pdf

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

Manual. The screening table provides the conservative estimate of a maximum 1-hour, 8-hour, 24-hour and annual average modeled values based on a generic emission rate of 1 gram per second of a pollutant from a 20-foot tall point source for the distances between 30 feet and 400 feet from the receptor of same height. Potential impacts predicted from the light industrial source of concern based on the screening table and actual emission rates estimated for the existing nearby facilities were compared with the short-term guideline concentrations and annual guideline concentration recommended in NYSDEC's DAR-1 AGC/SGC tables and with the carcinogenic and non-carcinogenic health risk thresholds from the same NYCDEC guidance. Carcinogenic health risks and the hazard index for non-carcinogenic pollutants were assessed based on the toxicity of the compounds analyzed and their AGC concentrations. The DAR-1 guidance instructs to evaluate health effects on the basis of cancer risk in case carcinogens were identified. The compliance criteria is lower than 10-in-a million cancer risk and hazard index less than 2 for non-carcinogen non-criteria pollutants.

Large or Major Source Analysis

As described in Section 220 and Section 321 in Chapter 17 of the *CEQR Technical Manual*, an air quality assessment is required to evaluate the potential impacts of emissions from a "large" or "major" emission source within a 1,000-foot radius of a project site. "Major" sources are identified as sources with Title V/PSD (Prevention of Significant Deterioration) permits. "Large" sources are identified as sources with Air State Facility (ASF) permits. A detailed analysis is usually performed for such sources to determine any potential for significant adverse impact on the proposed development.

Review of available information identified two large sources, a Generator Plant at 330 Madison Avenue and a Power Plant at 11 West 42nd Street, with ASF permits located within a 1,000-foot radius of the project site. The Generator Plant ASF permit states that this plant participates in the Coordinated Demand Reduction Program and will be used in demand response mode. According to the annual monitoring report to NYSDEC, this generator was used for less than a 100 hours per year in the past five years (2014-2018) and for less than 30 hours annually in the past four years. The EPA guidance[8] on treatment of intermittent sources allows for sources with infrequent and unpredictable hours of operation to be excluded from compliance demonstration. Based on this guidance and the Generator Plant's purpose and historical usage, it was excluded from the large source analysis.

The impact of emissions from the West 42nd Street Power Plant facility on the Proposed Project was estimated using the latest version of the EPA's AERMOD model.

Emissions and Dispersion Modeling

Emissions from the West 42nd Street large source facility were estimated based on their potential to emit obtained from the ASF permits and the EPA's AP-42, Compilation of Air Pollutant Emissions Factors. The Power Plant is a cogeneration facility that has eight natural gas-fueled electric generators and one natural gas-fueled boiler. Several pollutants are of concern from this large source: PM, both PM_{10} and $PM_{2.5}$ and NO_2. Stack parameters listed in the permit were used in the air quality analysis of this facility. The potential impacts of the large source were estimated both as a direct plume impact and using the downwash

[8] EPA, OAQPS, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 NAAQS, March 2011, https://www.epa.gov/sites/production/files/2015-07/documents/appwno2_2.pdf

algorithm. The downwash algorithm calculates concentrations affected by the turbulence created by buildings located near the respective stacks. The NO_2 modeling was conducted using PVMRM module in the AERMOD using hourly background ozone and NO_2 observations and the same assumptions that are described above under the HVAC analysis.

Receptors for the large source analysis were placed at the Proposed Project building. The resultant concentrations from the large source were compared with the NAAQS to determine potential for adverse air quality impacts.

Existing Conditions

Existing conditions in the area are characterized by the monitored concentrations representative of the project area. The same monitoring stations used to develop background concentrations were used to represent the existing conditions in the project area for the same pollutants. Concentrations for other pollutants were collected at the available monitoring locations in the City. Carbon monoxide and ozone concentrations were obtained from the City College of New York at 160 Convent Avenue. Lead concentrations are monitored only at one location in New York City, in the Bronx at IS 52 at 681 Kelly Street. Existing concentrations are presented in **Table 10-3** the form comparable to the NAAQS and in the same units as the standards. Concentrations of NO_2 and SO_2 are the same as **Table 10-2** only in different units.

Concentrations of all pollutants except ozone were below their respective NAAQS. Ozone concentrations slightly exceeded the 2015 8-hour standard which corresponds with the non-attainment status of the New York County where the project is proposed.

Table 10-3 Existing Monitored Concentrations (2017-2019)

Pollutant	Averaging Time	Concentration	NAAQS
Carbon Monoxide	1-Hour	2.5 ppm	35 ppm
	8-Hour	1.2 ppm	9 ppm
Lead	3-month	0.004 µg/m^3	0.15 µg/m^3
Nitrogen Dioxide	1-Hour	55 ppb	100 ppb
	Annual	14.6 ppb	53 ppb
Ozone	8-Hour	0.071 ppm	0.07 ppm
Particulate Matter (PM_{10})	24-Hour	39 µg/m^3	150 µg/m^3
Particulate Matter ($PM_{2.5}$)	24-Hour	23.3 µg/m^3	35 µg/m^3
	Annual	9.4 µg/m^3	12 µg/m^3
Sulfur Dioxide	1-Hour	5.3 ppb	75 ppb

Source: VHB, Inc. November 2020
ppm: parts per million; ppb: parts per billion

Assessment

The mobile source screening analysis using *CEQR Technical Manual* procedures was conducted for the intersections affected by the Proposed Project.

Mobile Sources

No-Action Condition

Absent the Proposed Action, the Project Site would be developed with a 15-FAR development. The development would consist of an approximately 474,532 gsf building, containing 411,540 gsf of office space, 6,144 gsf of retail, and 56,848 gsf of below-grade and mechanical space. In the No-Action condition, there would be no more than 15 trips generated at any intersection and no more than 4 truck trips within an hour (see **Chapter 9, Transportation**).

With-Action Condition

Traffic analysis estimated that no more than 25 trips would be generated by the Proposed Project (see **Chapter 9, Transportation**) at any intersection in any of the analyzed time periods, AM and PM peak hours or at midday. The projected trips (maximum of 25 in a peak hour) are lower than the CEQR CO threshold of 140 trips for Midtown Manhattan between 30th and 61st Streets. The traffic analysis projected no more than 7 diesel truck trips within an hour under the With-Action condition. These trips were conservatively assumed to be part of the 25 maximum trips even they were not projected for the same time period or location.

Assuming that the passenger cars are LDT1 and the trucks are HDDV2B, the total number of equivalent trucks were lower than the CEQR threshold at the collector roads (Manhattan streets) or minor arterials (Manhattan avenues). In addition, there would not be more than 10 deliveries within an hour using Vanderbilt Avenue (local street). The CEQR threshold for local streets is not exceeded even assuming that all 10 trips are made by diesel trucks.

As such, the Proposed Action would not have a potential for significant adverse air quality impacts from mobile sources.

HVAC Analysis

Refined HVAC Analysis

Potential impacts from the Proposed Project's HVAC systems were estimated on the nearby tall office buildings, MetLife and One Vanderbilt. The MetLife building is 780 feet tall and is located to the east of the project site. The One Vanderbilt building is 1,414 feet tall, the only building taller than the Proposed Project in a 400-feet radius and is to the south of the project site. Both buildings do not have operable windows. The only sensitive air quality locations on these two buildings would be the locations of air intakes. The AERMOD was run with and without downwash algorithm to assess the potential direct impact of the HVAC exhaust and impact with the added turbulence from the surrounding structures.

The Proposed Project is planned to be heated by natural gas-fired boilers with plume exhausted through the roof of the building. The HVAC system would consist of eight condensing low NO_x boilers, each with a 4 million Btu per hour heating input. It was assumed that the exhaust stack is elevated 3 feet above the roof of the proposed building. Stack parameters and emission rates are presented in **Table 10-4**. Exhaust temperature, exit velocity, and stack diameter were obtained from a NYCDEP database for similar boilers.

Table 10-4 HVAC Stack Parameters

Parameter	HVAC Exhaust	Unit
Stack height	1053	feet
Stack diameter	3	feet
Exit velocity	21	ft/sec
Exhaust temperature	307.9	^{o}F

Source: VHB, Inc. August 2020

Emissions were estimated using the EPA's AP-42 emission factors for low NO_x boiler, building size, and the annual natural gas consumption rates from the latest Energy Information Administration (EIA) Commercial Building Energy Consumption Survey. Since the Proposed Project is planned as an office use with ground floor retail space, natural gas fuel consumption for a commercial building in the North-East region was selected from the survey. Emission rates used in the HVAC analysis are presented in **Table 10-5**. Annual emission rates were estimated assuming that the boilers would operate only during the 100-day heating season.

Table 10-5 HVAC Systems Emission Rates

		Emission Rate (g/sec)	
Pollutant	**Time period**	**Per boiler**	**Per HVAC system**
Nitrogen Oxides	1-hour	0.025	0.198
	Annual	0.007	0.054
Particulate Matter ($PM_{2.5}$)	24-Hour	0.004	0.030
	Annual	0.001	0.008
Particulate Matter (PM_{10})	24-Hour	0.004	0.030

Source: VHB, Inc. August 2020

A dispersion analysis was then performed to estimate impacts of the Proposed Project HVAC systems emissions on the MetLife and One Vanderbilt buildings. The results of the HVAC analysis are presented in **Table 10-6** for all pollutants of concern.

Table 10-6 Highest Concentrations from HVAC Systems

Pollutant	Time period	Unit	Predicted Impact	Background Concentration	Total Concentration	NAAQS/*De minimis*
Nitrogen Dioxide	1-hour	ppb		78[1]	78	100
	Annual	ppb	0.4	14.6	14.9	53
Particulate Matter ($PM_{2.5}$)	24-Hour	$\mu g/m^3$	5.8	--	--	5.8
	Annual	$\mu g/m^3$	0.12	--	--	0.3
Particulate Matter (PM_{10})	24-Hour	$\mu g/m^3$	3.6	39	43	150

Note: This is total concentration that Includes predicted impact and the background level as they were added by AERMOD during the modeling run.
Source: VHB, Inc. October 2020

As shown in **Table 10-6**, the highest predicted concentrations for all pollutants do not exceed NAAQS or CEQR *de minimis* criteria. As such, there is no potential for a significant adverse air quality impact from the Proposed Project's HVAC systems emissions.

To ensure that there are no significant adverse impacts from HVAC system of the proposed action, certain restrictions would be required through the mapping of an (E) Designation for air quality regarding the HVAC systems and stack.

The (E) Designation (E-584) text would be as follows:

Block 1279, Lots 23, 24, 25, and 48 – Proposed Development Site

Any new commercial development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water system, with a maximum boiler capacity of 32 MMBtu/hr, be fitted with low NO_x burners (50 ppm) and ensure that the exhaust stack(s) are located at the highest tier and at least 1053 feet above grade to avoid any potential significant adverse air quality impact.

Industrial Source Analysis

To assess potential air quality impacts on the Proposed Project from existing industrial sources that emit toxic air contaminants, an investigation of existing land uses within a 400-foot radius of the project block was conducted to identify potential sources and determine if there are active permits associated with those sources.

As a first step, land use maps were reviewed to identify surrounding land uses that could have NYCDEP-issued industrial permits (i.e., sites classified as Industrial/Manufacturing, Transportation/Utility, or Public Facilities/Institutions). Once the potential facilities were identified, an additional review of NYCDEP's Clean Air Tracking System (NYCDEP CATS) was undertaken to assess whether the potential facilities have associated permits. **Table 10-7** lists these potential land uses.

Table 10-7 Industrial Sources within 400 Feet of the Project Block

Address	Block	Lot	Lot Owner Name[1]	DEP CATS
342 Madison Avenue	1278	14	Speed Graphics Inc.	PA054293
555 5th Avenue	1281	69	Rafael Fouzailoff	PB008715

[1] Source: NYCDEP's Clean Air Tracking System (NYCDEP CATS). https://a826-web01.nyc.gov/DEP.BoilerInformationExt/

Permit PA054293 is for the Speed Graphics Inc. entity that does silk screening, while permit PB008715 is for the Jewels by Star Ltd. entity that plates jewelry using rhodium plating bath. *CEQR Technical Manual* industrial screening analysis was conducted to assess potential air quality impacts from emissions of these two facilities on the Proposed Project. The results of this analysis are presented in **Table 10-8**. Results indicate that all individual contaminant concentrations would be below their respective short-term and annual guideline levels.

Table 10-8 Results of industrial Source Analysis

Chemical Name	CAS	Total Short-term Concentration (µg/m3)	SGC (µg/m3)	Total Annual Concentration (µg/m3)	AGC (µg/m3)
2-Butoxyethanol	00111-76-2	53.35	**14,000**	1.14	**1,600**
2-Ethoxyethyl Acetate	00111-15-9	81.82	**140**	1.75	**64**
Naptha Light Aromatic	64742-95-6	13.42	-	0.29	**100**
Dipropylene Glycol Methyl Ether	34590-94-8	1.96	**91,000**	0.04	**1,400**
Rhodium Sulfate	10489-46-0	0.000026	**1,000**	--	--
Sulfuric Acid	07644-93-9	0.00264	**120**	0.000028	**1**

Source: VHB, Inc. October 2020

Health risk is characterized using excess cancer risks per one million people for carcinogenic compounds and as hazard index for non-carcinogens. The solvents used by Speed Graphics, Inc. and the compound used in the jewelry plating are not considered carcinogens and therefore, cancer risk was not accessed. The non-cancer health risk was estimated using procedures from the NYSDEC DAR-1 based on the annual concentrations and AGC levels. The results of the hazard index assessment are presented in **Table 10-9**.

Table 10-9 Hazard Index Assessment

Chemical Name	CAS	DAR-1 classification	Hazard Quotient
2-Butoxyethanol	00111-76-2	Medium toxicity	0.001
2-Ethoxyethyl Acetate	00111-15-9	Medium toxicity, federal HAP	0.027
Naptha Light Aromatic	64742-95-6	Medium toxicity	0.003
Dipropylene Glycol Methyl Ether	34590-94-8	--	0.00003
Rhodium Sulfate	10489-46-0	--	--
Sulfuric Acid	07644-93-9	Medium toxicity	0.00003
Hazard Index			**0.031**

Source: VHB, Inc. October 2020

As the results of the analysis indicate the hazard index is much smaller than the threshold of 2 for non-carcinogenic pollutants. As a result, no adverse air quality impacts are anticipated, and no elevated health risks are expected from the industrial sources.

Large Source Analysis

The AERMOD dispersion modeling analysis was conducted to assess potential impacts on the Proposed Project from emissions from the West 42nd Street Power Plant. Stack

parameters obtained from the air permit and used in the modeling—including stack height, diameter, temperature, and exit velocity of the plume—are presented in **Table 10-10.**

Table 10-10 Large Source Stack Parameters

Parameter	NG boiler	NG engines	Unit
Stack Height	377	307	feet
Stack Diameter	20	30	inches
Exit Velocity	23.6	1.2	ft/sec
Exhaust Temperature	307.8	307.8	°F

Source: VHB, Inc. October 2020

Emission rates used in the analysis were estimated based on the permit information and EPA's AP-42 and are presented in **Table 10-11**. It was assumed that the Power Plant cogeneration engines work all year round, while the boiler operates only during the heating season.

Table 10-11 Large Source Emission Rates (g/sec)

		Emission Rate	
Pollutant	Time period	Power Plant NG Boiler	Power Plant NG Engines
Nitrogen Oxides	1-hour	0.08	0.59
	Annual	0.02	0.59
Particulate Matter ($PM_{2.5}$)	24-Hour	0.006	0.05
	Annual	0.002	0.05
Particulate Matter (PM_{10})	24-Hour	0.006	0.05
Sulfur Dioxide (SO_2)	1-hour	n/a	n/a

Source: VHB, Inc. October 2020

AERMOD analysis calculated pollutant concentrations resulting from both sources cumulatively for the two scenarios, with and without downwash effects, at receptor locations on the Proposed Project. **Table 10-12** presents the highest impacts resulting from the analysis along with the background concentrations and a comparison to the NAAQS.

Table 10-12 Highest Concentrations from the Large Source

Pollutant	Time period	Unit	Predicted Impact	Background Concentration	Total Concentration	NAAQS
Nitrogen Dioxide	1-hour	ppb	94.7		94.7	100
	Annual	ppb	1.2	14.6	15.5	53
Particulate Matter ($PM_{2.5}$)	24-Hour	$\mu g/m^3$	1.5	23.3	24.8	35
	Annual	$\mu g/m^3$	0.2	9.4	9.6	12
Particulate Matter (PM_{10})	24-Hour	$\mu g/m^3$	2.4	39	41	150

Note: This is total concentration that Includes predicted impact and the background level as they were added by AERMOD during the modeling run.
Source: VHB, Inc. November 2020

Results of the large source analysis show that potential impacts on the Proposed Project are below the respective ambient standards for all pollutants of concern. Therefore, no significant adverse air quality impacts on the Proposed Project are anticipated from the large source.