# 11

# 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, usually referenced 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 and the effects of ambient air quality on the project.

## Introduction

The New York City Economic Development Corporation (NYCEDC), the Office of the Chief Medical Examiner (OCME), and the New York City Department of Citywide Administrative Services (DCAS) (collectively, the Applicants), in affiliation with the New York City Health and Hospitals Corporation (H+H), New York City Public Schools (NYCPS), the New York City School Construction Authority (SCA), and the City University of New York (CUNY), are seeking several Uniform Land Use Review Procedure (ULURP) and discretionary actions (collectively, the Proposed Actions) to facilitate the development of approximately 2.19 million gross square feet (gsf) of new construction of academic, healthcare, Life Sciences, and retail space and public realm improvements (the Proposed Project). The public realm improvements would take the form of a new publicly accessible open space, a replacement bridge over Franklin D. Roosevelt (FDR) Drive at East 25th Street to make it ADA accessible, a tie-in to the Kips Bay Coastal Resiliency (KBCR) project's planned flood protection to the northeast along FDR Drive and protection along East 25th Street,[1] including a connection to the existing floodwall at the U.S. Department of Veterans Affairs New York Harbor Healthcare System's Manhattan campus (U.S. Corbin VA Facility), and a widening of the demapped portion of the former East 26th Street (former East 26th Street) located between FDR Drive and First Avenue to accommodate two-way traffic flow.

[1] Absent the KBCR project, the Proposed Project would incorporate standalone flood protections with independent utility into the design.

Consistent with the *2021 CEQR Technical Manual*, this chapter includes a discussion of the assessment of the potential impacts of emissions from mobile sources (vehicle trips) generated by the Proposed Project, vehicle emissions at the proposed parking facilities, and proposed laboratories in case of a chemical spill. The chapter also discusses the analyses prepared to assess the effect of existing sources on the air quality at the proposed uses – specifically the effect of the traffic along FDR Drive (considered an atypical source), the review of potential sources of industrial source emissions, and the effect of two nearby hospitals that are considered large stationary sources.

## Principal Conclusions

The air quality analysis, as summarized below, found that the Proposed Actions would not result in significant adverse air quality impacts on the surrounding sensitive receptors, nor would nearby emission sources significantly impact the Proposed Project.

The mobile source analyses determined that project-generated traffic resulting in concentrations of CO and fine particulate matter ($PM_{10}$ and $PM_{2.5}$) at the analyzed intersections would not result in any violations of National Ambient Air Quality Standards (NAAQS). Further, the 8-hour CO incremental concentrations and the 24-hour and annual incremental $PM_{2.5}$ concentrations were predicted to be below the City's *de minimis* criteria.

The CO concentrations that would result from the Proposed Project parking facilities would not exceed the applicable impact thresholds. Therefore, the proposed parking facilities would not result in a significant adverse impact on air quality.

In the event of a chemical spill in a Proposed Project laboratory fume hood, no significant adverse impact on the air quality at the Proposed Project building or the surrounding area would be anticipated.

The existing emission sources at Bellevue Hospital and the U.S. Corbin VA Facility were considered. These sources consist of emergency equipment that operates infrequently with no potential for significant adverse impacts on the Proposed Project.

Due to the proximity of the Proposed Project to FDR Drive, an Atypical Source analysis was performed. The results indicate that the emissions along FDR Drive would not result in significant adverse air quality impacts at the Proposed Project locations analyzed.

## Pollutants and Applicable Standards/Guidelines

In summary, the key potential impacts evaluated are:

- The effect of project-generated traffic on air quality at local intersections (mobile source analysis)
- The effect of vehicle emissions at parking facilities on local air quality (mobile source analysis)
- The effect of the atypical source on the Proposed Project (vehicle emissions on FDR Drive)
- The effect of potential sources of industrial or manufacturing uses on the Proposed Project (industrial sources)
- The effect of large or major sources on the air quality at the Proposed Project (stationary source analysis)
- The effect of potential chemical spills at the proposed laboratories

It is expected that the Proposed Project would use electricity and/or Con Edison steam for all heating, ventilation, and air conditioning (HVAC) and hot water needs and that the only fossil fuel fired systems on-site during project operation would be used exclusively for emergencies and required testing and maintenance (e.g., emergency generators). Therefore, an analysis of HVAC and hot water systems at the Development Site is not warranted.

To ensure that there would be no significant adverse impacts from the HVAC and hot-water systems of the Proposed Project, certain restrictions related to the fuel type would be incorporated into an E-Designation for air quality (E-1006).

The E-Designation text would be as follows:

***Development Site (Block 962, p/o Lot 100)***

*Any new development on the above-referenced property must exclusively use electricity and/or Con Edison steam for all HVAC and hot water systems.*

## 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.
- **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.
- **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.
- **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.

- **Ozone ($O_3$)** and its precursors, including $NO_x$, can cause damage to tissues in the respiratory tract. Ozone forms when oxygen reacts with ozone precursors, including hydrocarbons and nitrogen oxides, in the presence of sunlight (ultraviolet radiation). Ozone is associated with increased risk of respiratory infections and susceptibility to pulmonary inflammation, as well as lung diseases, such as asthma and chronic obstructive pulmonary disease (COPD).
- **Lead** emissions are principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Lead emissions from automobiles have been declining in recent years because of the use of unleaded gasoline. Lead is not produced in large quantities by mobile sources.
- **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 United States Environmental Protection Agency (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 a guidance document DAR-1 (February 2021), 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 evaluate the potential effects to the public.

## Ambient Air Quality Standards

In accordance with the requirements of the Clean Air Act (CAA), as amended 1990, the 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 (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), particulate matter less than 10 microns in diameter ($PM_{10}$) and less than 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). These standards are reviewed from time to time and may be revised.

In addition to criteria pollutants, non-criteria pollutants are emitted by a wide range of 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 these pollutants. However, EPA and the NYSDEC have issued guidelines that establish acceptable ambient levels based on human exposure.

New York State has adopted similar standards as those set by the EPA, with the exception of lead, total suspended particulates (TSP), particulate matter ($PM_{10}$, $PM_{2.5}$), and hydrocarbons. The NAAQS are presented in **Table 11-1**.

## Table 11-1 National Ambient Air Quality Standards

| Pollutant | | Primary/ Secondary | Averaging Time | 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 | | Primary and secondary | 8 hours | 0.070 ppm (3) | Annual fourth-highest daily maximum concentration, averaged over 3 years |
| Particulate Matter | Particulate Matter ($PM_{2.5}$) | Primary | 1 year | 9.0 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 Oxides | | 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/m$^3$ as a calendar quarter average) also remain in effect.

[2] The level of the annual $NO_2$ standard is 0.053 ppm. It is shown here in terms of ppb for comparison with the 1-hour standard.

[3] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) $O_3$ standards additionally remain in effect in some areas. Revocation of the previous (2008) $O_3$ 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 $SO_2$ standards or is not meeting the requirements of a SIP call under the previous $SO_2$ 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 April 2024

## Regulatory Context

The 1990 CAA with Amendments resulted in states being designated by the EPA as being within attainment and non-attainment areas, with classifications based upon the severity of their exceedance of the air quality standards. Air quality control regions are classified and divided into one of three categories: attainment, unclassified, maintenance, 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 areas that achieved attainment. An unclassified area is a region where not enough information is available to the EPA to make a determination. Unclassified areas are generally considered as attainment areas for administrative purposes. A single area can be in attainment of the standards for some pollutants while being in non-attainment for others.

Manhattan (New York County) is designated as a serious non-attainment area for 2008 8-hour ozone standard and moderate non-attainment area for the 2015 8-hour ozone standard, both as part of a larger New York-Northern New Jersey-Long Island, NY-NJ-CT non-attainment area. The area has been designated a maintenance area for the CO standard as of May 20, 2002, for the 2006 $PM_{2.5}$ standard as of April 18, 2014. EPA strengthened the annual average primary standard to 9 $\mu g/m^3$ effective March 2013. EPA has not yet designated areas as being in attainment or non-attainment with this new standard. Manhattan is in attainment for all other criteria pollutants (Pb, $NO_2$, and $SO_2$).

## Impact Criteria

The predicted concentrations of pollutants of concern associated with a proposed project are compared with either the NAAQS for criteria air pollutants or ambient guideline concentrations for non-criteria pollutants. In general, if a project would cause the standards for any pollutant to be exceeded, it would likely result in a significant adverse air quality impact. In addition, the City's *de minimis* criteria are also used to evaluate the significance of impacts for CO and $PM_{2.5}$.

The NYSDEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter ($\mu g/m^3$) for the one-hour (SGC) and annual average time (AGC) periods for various air toxic compounds.[2]

### 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 project-generated mobile sources, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant adverse environmental impact. Significant increases of CO concentrations in New York City are defined as:

- An increase of 0.5 ppm or more in the maximum eight-hour average CO concentration at a location where the predicted No-Action eight-hour concentration is equal to or between 8.0 and 9.0 ppm; or
- An increase of more than half the difference between baseline (i.e., No-Action) concentrations and the eight-hour standard, when No-Action concentrations are below 8.0 ppm.

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

### $PM_{2.5}$ *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 24-hour maximum $PM_{2.5}$ concentration increase of more than half the difference between the 24-hour background concentration and the 24-hour standard; or
- Predicted annual average $PM_{2.5}$ concentration increments 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 for mobile sources, at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.3 µg/$m^3$ at any receptor location for stationary sources.

## 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. Ambient background concentrations presented in **Table 11-2** were based on the 2019, 2021, and 2022 data from the NYSDEC's *Ambient Air Quality Reports*[3] (the three most recent years of available data that exclude 2020, which may not be representative due to the pandemic). These concentrations were developed in accordance with the NYSDEC DAR-10 *Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis*, Table 3.[4]

[3] New York State Department of Environmental Conservation, *Ambient Air Quality Reports*, https://dec.ny.gov/environmental-protection/air-quality/monitoring, accessed April 2024.

[4] New York State Department of Environmental Conservation, DAR-10 *Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis*, https://extapps.dec.ny.gov/docs/air_pdf/dar10.pdf, accessed April 2024.

**Table 11-2 Background Concentrations**

| Pollutant | Averaging Time | Monitoring Location | Background Concentration |
|---|---|---|---|
| **Nitrogen Dioxide ($NO_2$)** | 1-Hour | IS 52 | 104 µg/m$^3$ |
| | Annual | | 32 µg/m$^3$ |
| **Carbon Monoxide (CO)** | 1-Hour | CCNY | 1.7 ppm |
| | 8-Hour | | 1.2 ppm |
| **Ozone ($O_3$)** | 8-Hour | CCNY | 0.069 ppm |
| **Sulfur Dioxide ($SO_2$)** | 1-Hour | IS 52 | 11 µg/m$^3$ |
| **Lead (Pb)** | 3-month rolling | IS 52 | 0.0036 µg/m$^3$ |
| **Particulate Matter ($PM_{10}$)** | 24-Hour | IS 52 | 34 µg/m$^3$ |
| **Particulate Matter ($PM_{2.5}$)** | 24-Hour | IS 45 | 18.2 µg/m$^3$ |
| | Annual | | 7.2 µg/m$^3$ |

Source: NYSDEC, *Ambient Air Quality Reports (2019, 2020-2022)*, https://dec.ny.gov/environmental-protection/air-quality/monitoring

Notes:

[1] 1-hour $NO_2$ background concentration is based on the three-year average of the 98th percentile of daily maximum 1-hour concentrations from available monitoring data. Annual $NO_2$ background concentration is based on the maximum annual average from three recent years of available monitoring data.

[2] 1-hour and 8-hour CO background concentrations are based on the highest of the second highest concentrations each year over three years of monitoring data.

[3] The ozone background concentration is based on the annual fourth-highest daily maximum 8-hour concentration averaged over three years of recent monitoring data.

[4] 1-hour $SO_2$ background concentration is based on the annual fourth-highest daily maximum 8-hour concentration, averaged over three years of recent monitoring data.

[5] The lead background is based on the maximum concentration over three years of recent monitoring data.

[6] The $PM_{10}$ background concentration is based on the average of the highest 24-hour concentrations over three years of recent monitoring data.

[3] The 24-hour $PM_{2.5}$ background concentration is based on the average of the 98th percentile concentrations over recent three years of monitoring data. The annual $PM_{2.5}$ background is based on the average of the annual concentrations over three years of recent monitoring data.

The 24-hour $PM_{2.5}$ CEQR *de minimis* threshold was calculated to be 8.4 µg/m$^3$, using the 24-hour $PM_{2.5}$ background concentration from the above table, in accordance with the *CEQR Technical Manual*.

# Methodology and Screening Analyses

## Mobile Source Analysis

### Intersection Screening Analysis

A screening analysis was performed based on the traffic analysis to assess whether the project-generated vehicle trips would have the potential to exceed the *CEQR Technical Manual* carbon monoxide threshold of 170 trips at an intersection included in the traffic analysis for the project. The screening analysis also assessed whether the *CEQR Technical Manual* PM screening threshold would be exceeded at the worst-case intersection (highest truck volume and highest overall volumes). The

PM screening analysis was based on the worksheet provided on page 17-12 of the *CEQR Technical Manual*, along with the number of project-generated peak hour trips, and vehicle and roadway classifications.

The screening analysis results showed that traffic generated by the Proposed Project would exceed the *CEQR Technical Manual* thresholds requiring a detailed particulate matter ($PM_{10}$ and $PM_{2.5}$) and carbon monoxide (CO) analysis. Therefore, the analysis was performed with and without the Proposed Project (i.e., No-Action and With-Action conditions) at the worst-case intersection (identified through the screening process as the intersection of former East 26th Street and First Avenue) for the 2031 build year.

## Detailed Intersection Analysis

### *Vehicle Emissions*

Vehicular CO and PM engine emission factors were computed using the USEPA mobile source emissions model, Motor Vehicle Emission Simulator (MOVES4). Emissions are supplied for average projected free flow speeds provided by the traffic analysis. Applicable and up to date environmental and vehicular traffic data for MOVES are supplied by NYSDEC to accurately model project conditions. Additional link-based data files requirements for MOVES are compiled by obtaining volume, speed, and traffic distribution data from the traffic analysis.

MOVES input files (i.e., fuel data, county-specific hourly temperature and relative humidity data, inspection/maintenance coverage, etc.) for New York County (Manhattan) were obtained from NYSDEC. Source type age distribution data were obtained from NYSDEC and processed using the EPA's Age Distribution Projection Tool for MOVES4.

### *Traffic Data*

The air quality analysis incorporated traffic data developed for the Proposed Project, including vehicle speeds, volumes, and vehicle classification data.

### *Fugitive Dust*

In addition to exhaust, tire and brake-wear emission factors estimated by MOVES4 for particulate matter, fugitive dust emissions were estimated using EPA's Compilation of Air Emissions Factors (AP-42)[5] guidance for paved roads. Significant atmospheric dust arises from the mechanical disturbance of granular material exposed to the air. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations. Fugitive dust emissions were used in the short-term, 24-hour modeling of $PM_{2.5}$ and $PM_{10}$. Consistent with New York City Department of Environmental Protection (NYCDEP) guidance that fugitive dust has insignificant contribution on the neighborhood scale, fugitive dust emissions were not used in the annual $PM_{2.5}$ modeling (i.e., neighborhood scale analysis).

[5] Environmental Protection Agency, AP-42, https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf, accessed April 2024.

### *Dispersion Model*

The EPA AERMOD model (version 22112) was used in the analyses of CO, $PM_{2.5}$ and $PM_{10}$ at the selected intersection. The intersection links were modeled using the area source option in the model and following EPA guidance. Links extended approximately 1,000 feet (300 meters) from the modeled intersection.

### *Receptor Placement*

Sensitive receptors near the intersection selected for the analysis were placed at sidewalks (at 3, 25, and 50 meters from the intersection and at 1.8 meters above grade following the EPA CO Guideline). The model used the same receptors for CO, $PM_{10}$ and $PM_{2.5}$ (24-hour and annual) analyses. For the $PM_{2.5}$ annual neighborhood analysis, receptors will be placed at a distance of 15 meters from the edge of the roadway and 25 meters apart along the intersection links.

### *Meteorological Data*

The dispersion analysis used the latest available five years (2017-2021) of hourly meteorological observations from LaGuardia Airport National Weather Service station and upper air data obtained from the Brookhaven Station, New York. This meteorological data for the AERMOD model was obtained from the NYSDEC.

## Atypical Source Analysis

Section 210 of the *CEQR Technical Manual* requires the analysis of vehicular emissions from atypical sources within 200 feet of sensitive uses introduced by a proposed project. Due to the proximity of the project to FDR Drive, an Atypical Source analysis was performed.

Emission factors for CO and PM ($PM_{2.5}$, and $PM_{10}$) were estimated using the MOVES4 model, based on estimated speeds, volumes, and vehicle classification data published by the New York State Department of Transportation (NYSDOT). Annual background growth rates consistent with guidance in the *CEQR Technical Manual* were used to project traffic volumes in the 2031 Build Year. All vehicles on FDR Drive were modeled as light duty vehicles as larger trucks and buses are prohibited from FDR Drive in this area. Appropriate credits were applied to reflect the inspection and maintenance program, with hourly temperature and relative humidity data specific for Manhattan obtained from NYSDEC.

Receptors were placed at various locations and elevations representing facades of the Proposed Project buildings and open space sensitive uses facing FDR Drive to predict concentrations from vehicles.

The particulate matter analysis was conducted using hourly inputs for 24 hours while the CO analysis used the peak traffic volume hour.

The dispersion modeling analysis was performed using AERMOD, with the area source option, following EPA guidance.[6] The predicted CO, $PM_{2.5}$, and $PM_{10}$ concentrations with the Proposed Project were compared to the NAAQS.

## Parking Analysis

The Proposed Project would include approximately 53 parking spaces for OCME and approximately 175 spaces for CUNY. An air quality analysis was completed to evaluate the potential for air quality

[6] EPA. *Project-Level Conformity and Hot-Spot Analyses*, https://www.epa.gov/state-and-local-transportation/project-level-conformity-and-hot-spot-analyses#pmguidance, accessed April 2024.

impacts from vehicle activity at the proposed parking facilities. A quantitative analysis was conducted using the hourly ins and outs obtained from the transportation analysis to estimate potential air quality impacts from the largest ("worst-case") parking facility's vehicle emissions. The "worst-case" parking facility is the parking facility that would have the maximum number of vehicles entering and exiting at peak periods, and the facility located closest to the nearest sensitive receptor (i.e., wherever there is public access or there are operable windows). The proposed CUNY parking garage was determined to be the "worst-case" parking facility and was therefore analyzed.

For all arriving and departing vehicles, an average speed of five miles per hour was conservatively assumed for travel within the parking garage. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. Although specific design plans for the project have not yet been defined, at the minimum, the garage would be designed for an airflow of one cubic foot per minute of fresh air per gross square foot of the garage area. One exhaust vent was conservatively assumed to be facing the garage entrance on East 25th Street.

To calculate pollutant concentrations that would result from the activity within the garage, the exhaust vent was analyzed as a "virtual point source" using the *CEQR Technical Manual* air quality appendix methodology for mechanically ventilated enclosed parking garages. This methodology is used to estimate pollutant concentrations at various distances from an exhaust vent. The methodology is based on the assumption that the concentration in the garage is equal to the concentration leaving the vent and includes calculations used to determine the appropriate initial horizontal and vertical dispersion coefficients at the exhaust vent.

The CO concentrations were predicted 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 (5 PM – 6 PM). Traffic data for the parking garage analysis were derived from the parking demand described in **Chapter 10, Transportation**. Background and on-street concentrations were added to the modeling results to obtain the total ambient levels at sensitive receptors for CO.

Receptors were modeled at the sidewalk immediately adjacent to the site (on East 25th Street) and on the sidewalk opposite the site (across East 25th Street) at pedestrian level heights. Emission factors were obtained from the EPA MOVES4 model for the Proposed Project's 2031 build year. The following temperature, speed, and idling parameters were included as input to the MOVES4 model:

- Exhaust and crankcase emissions
- 45˚ Fahrenheit with a relative humidity of 77
- On-road speeds of 15 miles per hour (mph)
- Speeds of 5 mph entering and travelling in the garage
- Speeds of 2.5 mph on the garage exit ramp
- Ramp slope of 8.14˚
- Idle and start speed of 0 mph.
- The peak traffic hour for the garage was determined to be 5 PM – 6 PM

The total projected CO concentrations were estimated and compared to the NAAQS and with the CO *de minimis* criteria. It is anticipated that the number of diesel vehicles entering and exiting the proposed parking facilities would not be significant, therefore a $PM_{2.5}$ analysis was not performed.

## Industrial Source Survey

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 air toxics emissions from ventilation exhaust systems of 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). If any sources are identified, a screening analysis is performed based on Table 17-3 in Chapter 17 of the *CEQR Technical Manual*. The screening table provides the 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 distances between 30 feet and 400 feet from the receptor of same height. Potential impacts predicted from the industrial source of concern are then compared with the short-term and annual guideline concentrations recommended in NYSDEC's DAR-1 AGC/SGC Tables. If a proposed project fails this screening analysis, or the screening analysis methodology is not applicable to the project, further analysis using AERMOD is warranted to determine any potential for significant adverse impacts.

While the Development Site is located within 400 feet of a small section of a manufacturing zone (M-1), there are no manufacturing or industrial uses within this area. The Skyport (Seaplane Terminal) is located nearby but outside of the 400-foot area and was therefore excluded from the analysis. A review of NYCDEP's permit database indicated one source of potential concern (permit PB464503). Permit information was requested from NYCDEP and based on the information received, no industrial source or process emissions are covered by this permit. The permit is for the emergency generator use at the U.S. Corbin VA Facility. Therefore, an industrial source screening analysis was not warranted.

## Laboratory Chemical Spill Analysis

For laboratory space, the *CEQR Technical Manual* identifies laboratory chemical emissions as a potential concern and provides guidance on how to conduct an analysis of facilities where there is the potential for emissions in the event of an accidental chemical spill or for recirculation of vapors from the fume hood exhaust into the building's windows or the HVAC systems. The manual also notes that U.S. Occupational Safety and Health Administration (OSHA) and National Institute for Occupational Safety and Health's (NIOSH) Short-Term Exposure Levels (STELs) are used as guidance thresholds for chemical spill analyses.

The Proposed Project would result in the development of research and instructional laboratories. It is anticipated that these chemical laboratories would include fume hoods. Fume hoods are enclosures that are kept under negative pressure to release chemical vapors and chemicals that are used and could be accidentally spilled in the lab to exhaust points above the building roof. They prevent potential chemical spill vapors from releasing into the laboratory by providing continuous exhaust from the labs.

Per *CEQR Technical Manual* guidelines, an air quality analysis was performed to assess the potential for the chemical vapors from these discharge points to potentially impact surrounding existing buildings and air intake vents of the proposed building. Maximum predicted concentrations of the chemicals were compared to the STELs, or ceiling levels recommended by OSHA.

**Table 11-3** shows the chemical exhaust system illustrative design parameters, based on the information obtained for the Public Health Lab Environmental Assessment Statement, as a similar project, as specific information for the Proposed Project is not available. The exhaust was modeled to be on Building B2, to evaluate its potential effects on Building B1 and existing taller uses.

**Table 11-3 Laboratory Hood Exhaust Parameters**

| Exhaust Component | Unit |
|---|---|
| Number of exhausts modeled | 1 |
| Exhaust diameter | 26 inches |
| Exhaust velocity | 2,000 ft/min |
| Exhaust height[1] | 420 feet |

Notes:
[1] Assumes that the exhaust would be at the height of the bulkhead of Building B2.

### *Chemicals for Analysis*

A list of chemicals that may be present in the proposed laboratories, obtained for the Public Health Lab project was reviewed. Chemicals were chosen for the analysis based on their toxicity and potential for air quality impacts. Common buffers, salts, enzymes, nucleotides, peptides, and other bio-chemicals were not considered in the analysis because they are not generally categorized as air pollutants. Additionally, nonvolatile chemicals, or chemicals with a vapor pressure of less than 10 mm Hg (millimeters of mercury, a unit of pressure) were also excluded. **Table 11-4** shows the hazardous chemicals selected for the analysis. One of the critical parameters in determining potential impacts from chemical spills is the vapor pressure of chemicals. Vapor pressure is a measure of a chemical's volatility (i.e., its tendency to evaporate, or to form fumes or vapors). Furthermore, the exposure standards (OSHA permissible exposure limit [PEL], National Institute for Occupational Safety and Health [NIOSH], immediately dangerous to life or health [IDLH], and OSHA and/or NIOSH STEL and ceiling values) are measures of a chemical's toxicity, where more toxic substances have lower exposure standards.

**Table 11-4 Chemicals Analyzed for Worst-Case Spill Analysis**

| Chemical | Vapor Pressure (mm Hg) | STEL (ppm) | Ceiling (ppm) |
|---|---|---|---|
| Formaldehyde | 329 | N/A | 0.1 |
| Chloroform | 160 | 2 | 50 |
| Nitric Acid | 48 | 2 | 4 |
| Acetonitrile | 73 | N/A | N/A |
| Acetone | 180 | N/A | N/A |
| Acetic Acid | 11 | 15 | N/A |

Notes:
STEL—short-term exposure limit is a 15-minute time weighted average (TWA) exposure that should not be exceeded at any time during a workday.
Ceiling—level set by OSHA not to be exceeded in any workplace based on up to 15 minutes exposure. Where (N/A) appears, there is no available STEL or Ceiling value.

### *Estimates of Worst-Case Emission Rates*

The dispersion of chemicals from an accidental spill in the Proposed Project laboratories was analyzed to assess the potential impact on ambient air quality for the public, and on the staff, patients, and students within the Proposed Project buildings. Evaporation rates for the volatile chemicals assumed to be used in the proposed laboratories were estimated using the model

developed by the Shell Development Company to assess air quality impacts from chemical spills.[7] The Shell model calculates evaporation rates based on physical properties of the chemical, temperature, and rate of air flow over the spill surface. Room temperature conditions (20° C or ~293° K) and an air-flow rate of 0.5 meters/second were assumed for calculating evaporation rates. The analysis assumes that a chemical spill in a fume hood would extend to an area of 12 sf (approximately 1.11 square meters) for larger spill volumes and 0.04 square feet (approximately 0.004 square meters) for a spill volume of 0.01 L. The emission rates in **Table 11-5** were calculated using the assumed spill area and the evaporation rates developed using the Shell model. The vapor from the spill would be drawn into the fume hood exhaust system and released into the atmosphere. The large volume of air drawn through this system provides a high degree of dilution for chemical fumes before they are released into the atmosphere.

**Table 11-5 Estimated Emissions from a Spill in a Fume Hood**

| Chemical | Quantity (Liters) | Evaporation Rate ($g/m^2/s$) | Emission Rate (g/s) |
|---|---|---|---|
| Formaldehyde | 0.01 | 4.31 | 0.004 |
| Chloroform | 48 | 1.33 | 1.480 |
| Nitric Acid | 2.5 | 0.26 | 0.292 |
| Acetonitrile | 1.75 | 0.25 | 0.282 |
| Acetone | 10.25 | 0.83 | 0.921 |
| Acetic Acid | 2.5 | 0.05 | 0.059 |

### *Recirculation Modelling*

The potential for recirculation of fume hood emissions or other sources of hazardous pollutants back into the nearest window or fresh air intake vent was assessed using the Wilson method described by D.J. Wilson in *A Design Procedure for Estimating Air Intake Contamination from Nearby Exhaust Vents*.[8] This empirical procedure, which has been verified by both wind tunnel and full-scale testing, is a refinement of the ASHRAE handbook procedure and takes into account such factors as plume momentum, stack tip downwash, and cavity recirculation effects to determine the worst-case dilution between the exhaust and nearest air intake vent. Three separate effects produce the worst-case dilution:

- Internal system dilution which happens by combining exhaust streams (i.e., mixing in plenum chamber of multiple exhaust streams and fresh air);
- wind dilution, dependent on the distance from the vent to intake and the exit velocity; and
- dilution from stack that is caused by stack height and plume rise from vertical exhaust velocity.

The critical wind speed of the worst-case dilution is dependent on exit velocity, distance from vent to intake, and the cross-sectional area of the exhaust stack.

[7] Fleischer, M.T. *An Evaporation/Air Dispersion Model for Chemical Spills on Land*, Shell Development Company, December 1980.

[8] D.J. Wilson. *A Design Procedure for Estimating Air Intake Contamination from Nearby Exhaust Vents*, ASHRAE TRAS 89, Part 2A, pp. 136-152, 1983.

### *Dispersion Modelling*

Maximum concentrations at elevated receptors downwind of the fume exhausts were estimated using EPA's AERMOD dispersion model (version 23132). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. Hourly meteorological data collected at the LaGuardia Airport station from 2017 to 2021 were used in this analysis. The analysis of potential impacts from a chemical spill was performed assuming stack tip downwash, urban dispersion and surface roughness length, and elimination of calms, using AERMOD with and without building downwash options to assess the worse-case impact from these sources.

Sensitive receptor buildings with heights similar or greater than the source were identified. Discrete receptors (i.e., locations at which concentrations are calculated) were placed on each floor of the receptor building along each building façade where operable windows and air intakes could be located.

## Large and 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. Large sources are identified as facilities with a State Facility Permit. Major sources are identified as Title V facilities that require Prevention of Significant Deterioration permits.

Large or major sources are those that have State Air Facility or Title V permits. In accordance with the *CEQR Technical Manual*, an air quality assessment of such a source is required if the source is located within 1,000 feet of the proposed project. Two sources that hold State Air Facility permits were identified within 1,000 feet of the site as part of the land survey and NYSDEC database search – Bellevue Hospital (located at 462 First Avenue) and the U.S. Corbin VA Facility.

Bellevue Hospital's permit covers 7 emergency generators that participate in the Coordinated Demand Reduction Program (CDPR). Based on data obtained through a FOIL request, the generators run less than emergency generators (500 hours per generator per year) based on records obtained for 2019 – 2022. As the operation of the generators at Bellevue Hospital are less than 500 hours per year, these generators could be considered intermittent sources. Based on the annual emissions reports for the emergency generators obtained from DEC, the generators are sparingly used and run well below the allowable 500 hours per year. Therefore, no further analysis was performed.

# Assessment

## Mobile Source Intersection Analysis

A microscale (detailed) analysis of the impacts of the project-generated trips was conducted for the future conditions With and Without the Proposed Project at the intersection of former East 26th Street and First Avenue. Emissions of CO, $PM_{10}$ (24-hour) and $PM_{2.5}$ (24-hour and annual) at all links

were estimated using MOVES4 model using traffic data developed for the Proposed Project and the NYSDEC inputs for Manhattan.

The intersection analysis was conducted using the AERMOD dispersion model and incorporated microscale receptors for the CO impacts and PM 24-hour impacts, as well as neighborhood scale receptors for the annual $PM_{2.5}$ impacts. The results of this analysis are presented in **Table 11-6**.

**Table 11-6 Mobile Source Analysis Results**

| Pollutant | Averaging Period | Background | No-Action | With-Action | Increment | Impact Threshold (*De Minimis*/ NAAQS) |
|---|---|---|---|---|---|---|
| **CO** | 1-hour | 1.7 ppm | 2.6 ppm | 3.5 ppm | N/A | 35 ppm (NAAQS) |
| **CO** | 8-hour | 1.2 ppm | 1.41 ppm | 1.47 ppm | 0.06 ppm | 3.9/9 ppm (*de minimis*/ NAAQS) |
| **$PM_{2.5}$** | 24-hour | 18.2 µg/$m^3$ | 22.56 µg/$m^3$ | 23.61 µg/$m^3$ | 1.05 µg/$m^3$ | 8.4/35 µg/$m^3$ (*de minimis*/ NAAQS) |
| **$PM_{2.5}$** | Annual | 7.2 µg/$m^3$ | 7.421 µg/$m^3$ | 7.495µg/$m^3$ | 0.074 µg/$m^3$ | 0.1/9 µg/$m^3$ (*de minimis*/ NAAQS) |
| **$PM_{10}$** | 24-hour | 34 µg/$m^3$ | 53.8 µg/$m^3$ | 67.5 µg/$m^3$ | N/A | 150 µg/$m^3$ (NAAQS) |

As **Table 11-6** shows, the CO, $PM_{10}$ 24-hour, $PM_{2.5}$ 24-hour and neighborhood-scale annual total and incremental concentrations are below the applicable NAAQS and CEQR *de minimis* criterion thresholds; therefore, the results demonstrate that mobile source air quality emissions from the Proposed Project would not result in a significant adverse air quality impact.

## Atypical Source Analysis

An analysis was performed to determine if pollutant concentrations related to emissions from vehicular traffic on the elevated FDR Drive would have the potential to result in significant adverse impacts on air quality at the Development Site. Trucks and commercial vehicles are generally not allowed on the section of FDR Drive that's within 200 feet of the Proposed Project. Although most vehicles on FDR Drive are gasoline vehicles, the impact of both CO and PM ($PM_{10}$ and $PM_{2.5}$) emissions was considered. 2031 vehicular CO and PM emission rates were estimated using the EPA MOVES4 model and the NYSDEC inputs for Manhattan. The AERMOD run followed the EPA's *Transportation Conformity Guidance for PM Nonattainment and Maintenance Areas* to estimate maximum impacts from FDR Drive traffic emissions on the Proposed Project. The results of this analysis are presented in **Table 11-7**.

**Table 11-7 Atypical Source Analysis Results**

| Pollutant | Averaging Period | Background | Modeled Concentration | With Action Total | NAAQS |
|---|---|---|---|---|---|
| CO | 1-hour | 1.7 ppm | 2.88 ppm | 4.6 ppm | 9 ppm |
| CO | 8-hour | 1.2 ppm | 1.70 ppm | 2.9 ppm | 35 ppm |
| $PM_{2.5}$ | 24-hour | 18.2 µg/m$^3$ | 3.3 µg/m$^3$ | 21.5 µg/m$^3$ | 35 µg/m$^3$ |
| $PM_{2.5}$ | Annual | 7.2 µg/m$^3$ | 0.54 µg/m$^3$ | 7.7 µg/m$^3$ | 9 µg/m$^3$ |
| $PM_{10}$ | 24-hour | 34 µg/m$^3$ | 15.2 µg/m$^3$ | 49.2 µg/m$^3$ | 150 µg/m$^3$ |

The results indicate that the highest CO and PM concentrations at the Proposed Project locations from the emissions along FDR Drive would be less than the applicable NAAQS.

## Parking Analysis

The maximum CO concentrations from the largest proposed parking garage, the CUNY parking garage, were modeled using the previously described methodology. Receptors were placed on the sidewalk on the same side of the street as the proposed parking garage (6 feet from the assumed vent location) and the sidewalk on the opposite side of the street from the garage (52 feet from the assumed vent location). The maximum predicted eight-hour average CO concentration is 1.35 ppm. This value includes a predicted concentration of 0.12 ppm from the proposed parking garage, an on-street contribution of 0.032 ppm, and a background level of 1.2 ppm. The maximum predicted concentration is substantially below the applicable NAAQS of 9 ppm, and the calculated concentration increment from the garage is below the *de minimis* criterion for CO of 3.9 ppm. Therefore, the proposed CUNY parking garage and the other smaller parking garage facilities would not result in any significant adverse air quality impacts.

## Laboratory Chemical Spill Analysis

### Recirculation Modelling Results

The results of the recirculation analysis are presented in **Table 11-8**. The results indicate that an accidental spill for each of the chemicals analyzed in a fume hood described above would produce a maximum concentration at the nearest intake vent location well below the corresponding STELs or ceiling values set by OSHA and/or NIOSH. Thus, there would be no significant impact due to recirculation of fume hood exhaust into the air intakes at the Proposed Project buildings.

**Table 11-8 Recirculation Analysis Results**

| Chemical | STEL/OSHA Ceiling (ppm) | Predicted Concentrations (ppm) |
|---|---|---|
| Formaldehyde | 0.1 | 0.008 |
| Chloroform | 2 | 0.178 |
| Nitric Acid | 2 | 0.067 |
| Acetonitrile | N/A | 0.099 |
| Acetone | N/A | 0.228 |
| Acetic Acid | 15 | 0.014 |

## Dispersion Modelling Results

A detailed air quality analysis was conducted using EPA's AERMOD model (version 23132) to determine the potential for emissions from a chemical spill in the proposed laboratory to significantly impact the existing sensitive receptors in the surrounding area.

The results of the detailed AERMOD analysis presented in **Table 11-9** are below the corresponding STELs or ceiling values set by OSHA and/or NIOSH. Therefore, no significant impact from chemical laboratory fume hoods on the air quality at the surrounding receptors is anticipated.

**Table 11-9 Dispersion Analysis Results**

| Chemical | STEL/OSHA Ceiling (ppm) | 1-hour Average (ppm) |
|---|---|---|
| **Formaldehyde** | 0.1 | 0.030 |
| **Chloroform** | 2 | 0.685 |
| **Nitric Acid** | 2 | 0.256 |
| **Acetonitrile** | N/A | 0.380 |
| **Acetone** | N/A | 0.876 |
| **Acetic Acid** | 15 | 0.054 |