APPENDIX C:
OPERATIONAL AIR QUALITY ANALYSIS METHODOLOGY MEMORANDUM

To: Glen Price, NYCDCP
From: WSP
Date: July 25, 2024
Project: Midtown South Mixed-Use Study (MSMX)
Reference: Air Quality Analysis Methodology and Assumptions

INTRODUCTION

The Proposed Actions, located in Midtown Manhattan, would alter traffic patterns and potentially increase volumes in the study area, create new stationary sources, as well as locate sensitive receptors near stationary sources. As a result of these potential changes, air quality conditions in terms of localized pollutant levels, could also be affected. To determine the extent of these changes, an air quality analysis will be conducted for the Midtown South Mixed-Use Study (MSMX) for mobile sources and stationary sources.

The purpose of this memorandum is to describe the air quality analysis approach for the projected and potential development sites for the MSMX EIS. A total of **68 development sites** (61 projected and 7 potential) have been identified within the rezoning area. The project's analysis year is 2034.

The following outline of methodology and assumptions is based on the guidance contained in the 2021 *CEQR Technical Manual*.

MOBILE SOURCE ANALYSIS

Pollutants of Concern.

The microscale analysis will evaluate the potential impacts that the proposed rezoning will have on localized CO, and $PM_{2.5}$ levels in the study area as a result of adding project-generated vehicles. Selected sites will be analyzed based on the RWCDS supplied by NYCDCP and the traffic study.

Dispersion and Emissions Modeling for Microscale Analyses

Analysis Locations

CEQR Technical Manual screening procedures will be applied to traffic study data to determine intersections potentially requiring detailed air quality study. Selection of these analysis locations will also consider other studies and historic observations (which identify high levels of congestion at these locations). The Proposed Actions may result in intersections which surpass the CO and $PM_{2.5}$ screening criteria. As a result, once the list of intersections that surpass the CEQR screening criteria have been identified, intersections will be further ranked by considering those with the largest overall traffic volumes, and worst existing congestion or level of service (LOS) and traffic volumes.

Pollutants, screening procedures and thresholds include:

Carbon Monoxide

The final selection of analysis sites will be completed when trip generation and assignment information and peak hour traffic volume is finalized and made available. If the traffic study results in intersections that would surpass the screening limit of 140 peak hour vehicle trips (north of 30th street) or 170 vehicle

peak hour vehicle trips (south of 30th street), they will be provided to NYCDCP for review and approval. It is assumed that no more than two "worst case" (2) intersections in total will be analyzed for CO. The site selection will be based on the CEQR intersection screening analysis and will take into account existing and projected level of service (LOS), and overall No-Action and With-Action vehicular volume comparisons. The CO analysis will predict one-hour and eight-hour concentrations and compare them to the NAAQS and CEQR CO *de minimis* criteria.

$PM_{2.5}$

The addition of project-generated heavy-duty diesel vehicles (HDDV) and to a lesser degree light-duty gasoline vehicles (LDGV) could impact localized PM emissions. As a result, it is anticipated that an analysis of $PM_{2.5}$ will be conducted at up to two (2) "worst case" intersections. The selection will be based on project-generated trip data using the CEQR screening procedure for $PM_{2.5}$. Should the screening procedure show that the number of project-generated HDDV equivalents will not surpass the screening thresholds, no further analysis of mobile source PM will be conducted. However, it is anticipated that at least two (2) locations will fail the screening procedure. If more than two intersections fail the screening, the worst-case locations that result in the highest number of project-generated HDDV equivalents will be selected for analysis. The AERMOD model will be used to predict $PM_{2.5}$ concentrations and an analysis will be conducted to assess whether microscale 24-hour and neighborhood scale annual concentration levels are below CEQR $PM_{2.5}$ *de minimis* criteria and the National Ambient Air Quality Standards (NAAQS).

Dispersion Modeling

The CO, and $PM_{2.5}$ mobile source analyses will be conducted using the AERMOD model at all intersections identified. AERMOD[1] is a versatile model capable of predicting pollutant concentrations from continuous point, area, and volume sources. It has replaced the EPA's CAL3QHCR, for modeling air quality near roadways, and other ground-level sources. The model classifies emission sources within a project as line, area, volume, or point sources. Like CAL3QHCR, the model incorporates meteorological data. Based on the location of the Proposed Actions, the most recently available five years of meteorological data from LaGuardia Airport and concurrent upper air data from Brookhaven, New York will be used in the modeling.

Multiple receptors will be modeled at each of the selected sites; for microscale analyses, receptors will be placed along approach and departure links at spaced intervals at a pedestrian height of 1.8 meters. Based on the City's guidance for $PM_{2.5}$ neighborhood-scale corridor modeling, receptors in that analysis will be placed 15 meters from the nearest moving lane at each analysis location.

Emission Factors

Vehicular cruise and idle CO and PM emission factors to be utilized in the dispersion modeling will be computed using EPA's mobile source emissions model, Motor Vehicle Emission Simulator, or MOVES. This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. For PM, emissions from brake and tire wear would also be included. Project specific traffic data obtained through field studies as well as county-specific

[1] EPA, User's Guide for the AMS/EPA Regulatory Model (AERMOD), EPA-454/B-22-007 June 2022

hourly temperature and relative humidity data obtained from the New York State Department of Environmental Conservation (NYSDEC) will be used.

In order to account for the suspension of fugitive road dust in the air from vehicular traffic in the local microscale analysis, $PM_{2.5}$ emission rates will include fugitive road dust. However, since the New York City Department of Environmental Protection (NYCDEP) considers fugitive road dust to have an insignificant contribution on a neighborhood scale, fugitive road dust will not be included in the neighborhood scale $PM_{2.5}$ microscale analyses. Road dust emission factors will be calculated according to the latest procedure delineated by EPA[2] and the *CEQR Technical Manual*.

The EPA protocol for determining maximum $PM_{2.5}$ concentrations requires producing quarterly emissions factors. Quarterly (seasonal) and off-peak emission factors can be prepared using additional runs of the MOVES model. This involves creating season-specific meteorological data files for each $PM_{2.5}$ MOVES run. Peak traffic volumes will be used as a worst-case scenario to conservatively predict emissions factors for the entire year. If further refinements are necessary, the potential for additional and/or more detailed traffic data to be used within the air quality analysis will be discussed with NYCDCP. Speed data used within the MOVES model will be obtained from information gathered during the traffic data collection program.

Parking Facilities Analysis

No parking facilities are anticipated with this project. As such, an analysis of parking facilities is not required.

Background Concentrations

Background concentrations for all pollutants used in the analyses will be determined using the most recent data available from NYSDEC. Data will be from monitoring stations representative of the project area or from the nearest available monitoring station. Applicable averaging times will be determined from referencing the *CEQR Technical Manual* for CO, and $PM_{2.5.}$

STATIONARY SOURCE ANALYSIS

Heating Ventilation and Air Conditioning (HVAC) Systems

A significant consideration in the analysis of Project stationary source impacts on nearby existing buildings is the mandate that use of fossil fuels in new construction begin phase out in 2024 (Local Law 154). New construction in NYC must use electric based HVAC systems beginning in 2024 for low-rise buildings (1-2 family homes and buildings less than 7 stores). Final phase-in for buildings taller than 7 stories with at least 50% affordable units begins January 1, 2028. The analysis year for the Proposed Actions (2034) is beyond the final phase-in date of Local Law 154, thus it is expected that HVAC systems in new construction would not use fossil fuels in most circumstances and screening of Project HVAC systems will not be needed.

However, due to uncertainties regarding the implementation of Local Law 154, HVAC screening will be conducted following the screening procedures outlined in the 2021 *CEQR Technical Manual* assuming the use of fossil fuels (natural gas). The potential for impacts on existing developments as well as "project-on-project impacts" for both projected and potential development

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

sites will be evaluated. The nearest existing building and/or projected development of a similar or greater height will be analyzed as the potential receptor.

For all projected and potential sites that fail the initial screening based on development area and distance to nearest building, the AERMOD model will be used to evaluate the potential for significant adverse impacts. Since HVAC system design information is not available for any locations that need evaluation, it will be assumed that exhaust stacks would be located 3 feet above roof height (as per the *CEQR Technical Manual*) for the screening analysis. Roof heights for projected and potential development sites will be obtained from the RWCDS. The most recently available five years of meteorological data from LaGuardia Airport and concurrent upper air data from Brookhaven, New York will be used in the modeling.

For the AERMOD analyses, concentrations of nitrogen dioxide (NO_2), and particulate matter ($PM_{2.5}$) will be determined at affected sites. Modeling for sulfur dioxide (SO_2) will not be included due to prohibition on use of fuel oil in new buildings and inherently low sulfur content of natural gas. Receptors would be placed at elevated locations on all facades and at multiple elevations on buildings that were predicted to be potentially impacted based on the screening analysis, to identify maximum pollutant concentrations. Predicted values will be compared with National Ambient Air Quality Standards (NAAQS) for NO_2, and the City's CEQR de minimis criteria for $PM_{2.5}$.

In the event that violations of standards are predicted, an air quality E-designation would be proposed for the site, describing the fuel and/or HVAC exhaust stack restrictions that would be required to avoid a significant adverse air quality impact.

HVAC Cluster Analysis
It is anticipated that a cumulative impact analysis will be performed for development sites with a similar height located in close proximity to one another (i.e., site clusters). The proposed action area will be studied to determine cluster selection. Development sites will be evaluated for grouping based on the following criteria:

- Density and scale of development;
- Similarity of height; and
- Proximity to other buildings of a similar or greater height.

Final selection of specific cluster locations for analysis will be submitted to DCP for review. If additional clusters warrant analysis, justification for their inclusion will be provided to DCP for review and approval; however, no more than three (3) clusters in total will be analyzed.

The HVAC cluster analysis will be performed using the most recent version of the EPA AERMOD Model (currently Version 23132). The AERMOD model is a dispersion model that uses emission source geometry and site-specific meteorology data to determine pollutant concentrations at a series of receptors. The AERMOD analysis will be performed to identify impacts of NO_2 and $PM_{2.5}$.

Emissions Estimation
Using information in the Air Quality Appendix of the *CEQR Technical Manual*, an estimate of the emissions from the development's HVAC systems will be made. The appendix includes tables which can

be used to estimate emissions based on the development size, type of fuel used and type of construction for residential buildings constructed up to 1993 and commercial buildings constructed up to 1995.

The latest natural gas consumption factors will be used for residential and commercial development, where applicable. Mixed-use developments will use the residential natural gas consumption factor since it is more conservative. Short-term factors will be determined by using peak hourly fuel consumption estimates for heating and cooling systems. Consumption factors will be combined with emission factors for emission rate determination. Emission factors for natural gas will be obtained from the EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. It is assumed fuel oil will not be used and will not be evaluated for residential, commercial and mixed-use developments.

The distance from the HVAC emission sources to the nearest buildings will be used in the modeling analysis. The analysis will focus on existing buildings or other projected or potential development sites which are of a similar or greater height than the source.

Industrial Source Analysis

An assessment of potential process and manufacturing sources located within a radius of 400 feet has been prepared using the NYCDEP Clean Air Tracking System (CATS) database. A total of **33 industrial source permits** have been identified as either being active (**7**) or expired since 2010 (**26**). Any industrial sources beyond 400 feet of projected or potential development sites that are not major emission sources (i.e., minor or major sources that have a NYSDEC Air State Facility or Title V permit) will be excluded from analysis. In addition, the analysis will exclude existing industrial sources located at projected development sites, since the proposed action assumes that all such sites would be redeveloped. However, for potential development sites, the industrial analysis will be performed two ways, as follows:

- Assuming the site is developed, in which case the industrial source is not assumed to be operating in the with-action Condition. In this case, potential air quality impacts from other industrial sources in the study area will be analyzed to evaluate their potential effects on the development site.
- Assuming the site is not developed, in which case the industrial source is assumed to be operating in the with-action Condition, and its potential effects on other projected development sites will be determined.

There could be a scenario where an industrial establishment on a projected development site would continue its operations after redevelopment. Such industrial sources will be analyzed for air quality impacts on the projected site.

Figure 1 presents the existing industrial sources (active and expired since 2010) based on entries in the NYCDEP CATS database. As shown in Table 1[3], a total of **33 permits** potentially requiring analysis were determined to be within the development boundary or located within the projected development site.

A field survey will be performed to confirm the operational status of the sites identified in the permit search, and to identify any additional sites having emission sources that would warrant an analysis. If

[3] All tables are in accompanying Excel file.

any such sources are identified, further consultation will be made with DCP to determine procedures for estimating emissions from these sources.

Table 2 summarizes the projected development sites proposed for the MSMX. Table 3 summarizes the potential development sites proposed for the MSMX EIS. Development sites will not be considered as receptors for the industrial source analysis if there are no existing industrial sources that are located within 400 feet of the site. This will be confirmed following field surveys of the active and expired industrial permits.

Predicted concentrations of these compounds will be compared to DEC DAR-1 guideline values for short-term (SGC) and annual (AGC) averaging periods. For any criteria pollutants, maximum modeled concentrations will be compared with NAAQS. In the event that violations of standards are predicted, measures to reduce pollutant levels to within standards will be examined.

Potential cumulative impacts of multiple air pollutants will be determined based on the EPA's Hazard Index Approach for non-carcinogenic compounds and using the EPA's Unit Risk Factors for carcinogenic compounds. Both methods are based on equations that use EPA health risk information established for individual compounds to determine the level of health risk posed by specific ambient concentrations of that compound. The derived values of health risk are additive and can be used to determine the total risk posed by multiple air pollutants.

State Facility and Title V (Major) Sources

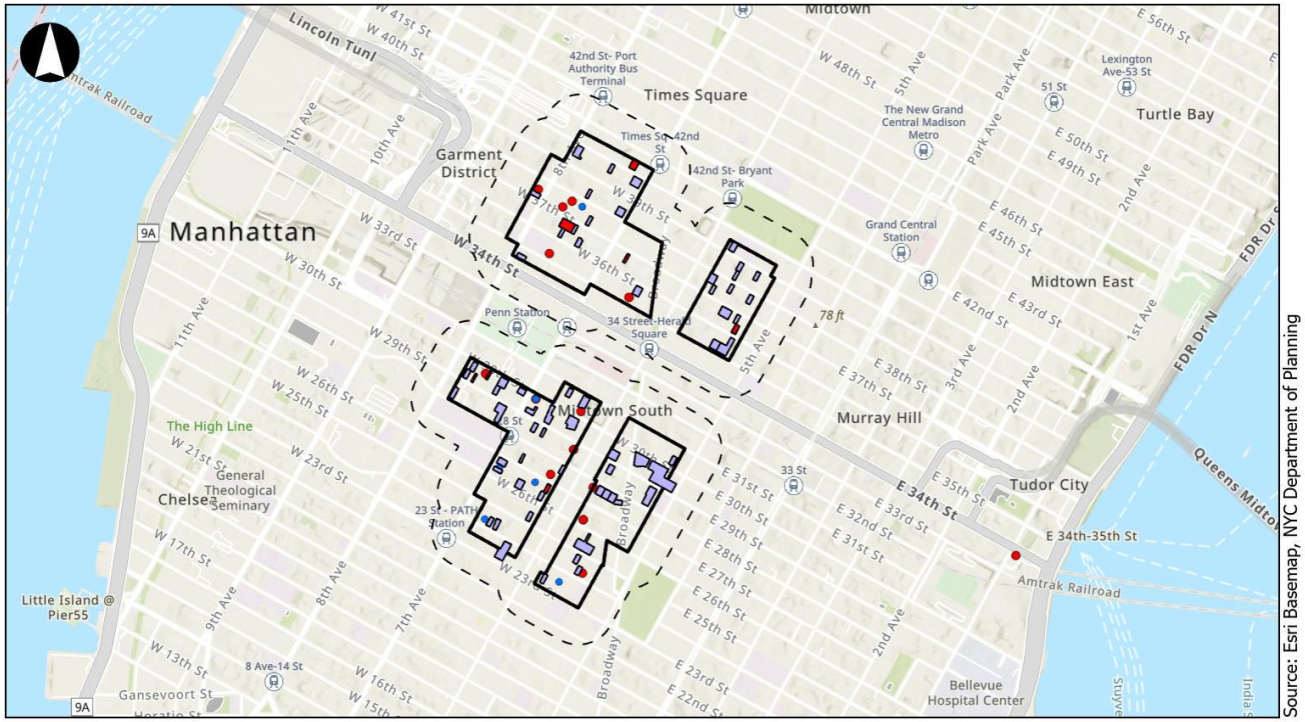
A review of New York State Department of Environmental Conservation (NYSDEC) Title V and State Facility draft and issued permits database and the Environmental Protection Agency (EPA) database was performed to identify any Title V (major) or state facility-permitted (minor) facilities.

Figure 2 shows the project development area and the 1,000-foot boundary. According to DEC data, there are four facilities with NYSDEC air state facility (ASF) permits and one facility with a Title V permit within 1,000 feet of the project site. The boilers at these facilities may exhaust at a height above the project's projected and potential development sites, however, per the CEQR technical manual a detailed analysis may still be required by the lead agency and/or reviewing agencies to address, for example, the potential for the project's projected and potential development sites to be affected by downwash of emissions from the ASF and Title V sources. The preliminary analysis for minor and major sources presented herein will be confirmed and finalized prior to performing the industrial source analysis.

If required, the large source analysis will proceed following steps and assumptions similar to those outlined for the HVAC analysis methodology in task 1, except that emission rates and stack parameters will be based on information from the permits/permit applications. Receptors will be placed at multiple elevations along the façade of proposed buildings at projected and potential development sites. Impacts will be assessed in relation to the NAAQS.

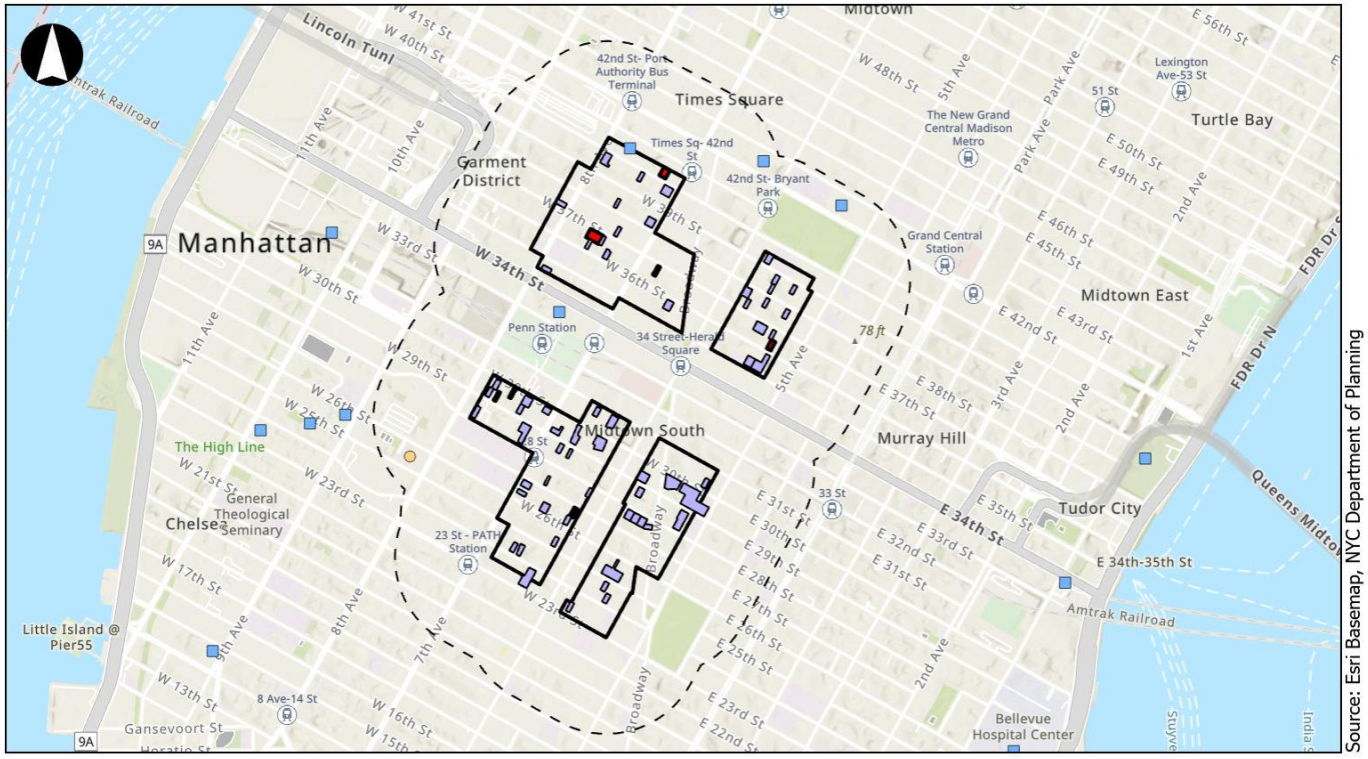
Pollutant concentrations will be predicted using the AERMOD model compared with NAAQS for NO_2, SO_2, PM_{10}, and $PM_{2.5}$. In the event that an exceedance of a standard is predicted, a refined modeling analysis using the EPA AERMOD model will be performed.

Figure 1. Existing Industrial Source Permits within 400 Feet



MIDTOWN SOUTH MIXED-USE STUDY **Figure 1**

Figure 2. Title V and State Facility Permits within 1000 Feet



Source: Esri Basemap, NYC Department of Planning

MIDTOWN SOUTH MIXED-USE STUDY **Figure 2**