Appendix 2

Operational Air Quality Analysis Methodology Memorandum

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Memorandum

To:	New York City Department of City Planning
From:	Henry Kearney, AKRF, Inc.
Date:	May 30, 2025
Re:	Herkimer-Williams EIS – Air Quality Analysis Methodology
cc:	Project Team

The purpose of this memorandum is to describe the air quality analysis approach for the Herkimer-Williams Environmental Impact Statement (EIS). The Proposed Actions would facilitate the development of five new buildings and potentially, a small retail kiosk containing a combined total of approximately 1,589,202 gross square feet (gsf), including approximately 435,766 gsf of commercial office space, 113,760 gsf of commercial retail space, 834,763 gsf of residential space (1,112 dwelling units or "DUs"), 22,985 gsf of community facility (house of worship) space, and 98,483 gsf of light industrial space, as well as approximately 174 accessory parking spaces and 20,080 sf of publicly accessible area (PAA) space.

The analysis year is 2036. In addition, there are existing emission sources in the area that are assumed to be active and may need to be analyzed for their potential impacts to future residents of the Project Area.

This memorandum presents a summary of the methodology and assumptions to be used for both the mobile and stationary source air quality analyses of the Proposed Actions.

MOBILE SOURCE ANALYSIS

INTERSECTION SELECTION

The mobile source analysis will evaluate the Proposed Actions for potential impacts from carbon monoxide (CO) and fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) due to vehicular traffic anticipated to be generated by the Proposed Actions. Based on a preliminary review of the study area roadway configuration, and the Level 2 assessment presented in the Transportation Planning Factors & Travel Demand Forecast Technical Memorandum, it is anticipated that projected vehicle trips generated by the Proposed Actions will exceed the CO threshold of 170 vehicles in a peak hour at a number of intersections in the study area. For $PM_{2.5}$, the screening procedure outlined in the 2021 *CEQR Technical Manual* is based on determining whether the projected number of vehicles trips at an intersection exceeds thresholds based on heavy-duty diesel vehicle (HDDV) equivalents. The thresholds are as follows:

- 12 or more HDDV for paved roads with average daily traffic fewer than 5,000 vehicles;
- 19 or more HDDV for collector roads;

- 23 or more HDDV for principal and minor arterials; or
- 23 or more HDDV for expressways and limited access roads.

The worksheet referenced in Section 201 of the 2021 *CEQR Technical Manual* will be utilized to calculate the equivalent number of HDDV equivalents at intersections in the traffic study area. The worksheet uses vehicle classification information based on the traffic data collected for the project and assigns these classifications to vehicle categories using a table referenced in the 2021 *CEQR Technical Manual*.[1] Roadway classifications will be determined by corridor at each intersection, based on NYCDOT functional class criteria and With-Action traffic volumes.

Intersections exceeding the CO and/or PM mobile source screening thresholds will be considered for analysis. Selection of specific intersections for analysis will depend on the baseline and No-Action traffic conditions along with the vehicular trip generation and distribution under the Proposed Actions. It is anticipated that two intersections will be analyzed for CO and/or $PM_{2.5}$, at the locations where the greatest number of project-generated trips are predicted (for $PM_{2.5}$, this will be based on the number of equivalent heavy-duty trucks as determined using the worksheet referenced in the 2021 *CEQR Technical Manual*).

DISPERSION MODELING

Potential impacts from the Proposed Actions' mobile sources will be predicted using the American Meteorological Society/EPA Regulated Model (AERMOD) Version 24142.[2] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. AERMOD is a recommended model for transportation air quality analyses, and EPA mandated its use for transportation conformity purposes after a three-year transition period.[3]

The analysis will be performed using a line source representation of emission sources in order to simulate traffic-related air pollutant dispersion, as per EPA guidance.[4] In addition, the weighted average release height and initial vertical source parameters will be calculated for each modeled roadway.

For the $PM_{2.5}$ analysis, 24-hour traffic volumes will be estimated using peak hour volumes as a baseline to determine volumes throughout the day. Off-peak traffic volumes will be determined by adjusting the peak period volumes by the 24-hour distributions from available traffic data at appropriate locations.

METEOROLOGY

The AERMOD model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data will consist of surface data collected at the JFK Airport National Weather Service Station (NWS) and upper air data collected at Brookhaven, New York for the period 2015–2019.[5] The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data are processed using the EPA AERMET program to develop data in a format which can be readily processed by the

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[1] MOBILE6 Input Data Format Reference Tables, August 14, 2003.

[2] EPA. *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. EPA-454/B-24-007, November 2024.

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

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

[5] NYSDEC has stated that upper air measurements for 2022 are missing a significant number of days, consequently 2022 meteorological data is not being considered.

AERMOD model. The land uses around the site where meteorological surface data are available will be classified using categories defined in digital United States Geological Survey (USGS) maps. The meteorological dataset processed with the AERMET Version 19191 processor, provided by the New York State Department of Environmental Conservation (DEC), will be used for the analysis.[6]

All hours will be modeled, and the highest resulting concentration for each averaging period will be presented, based on the form of the standard or criterion.

ANALYSIS YEAR

The microscale analyses will be performed for 2036, the year by which development facilitated by the Proposed Actions is likely to be completed. The future analysis will be performed both without the Proposed Actions (the No-Action condition) and with the Proposed Actions (the With-Action condition).

BACKGROUND CONCENTRATIONS

The background concentrations to be used in the mobile source analysis are based on concentrations recorded at a monitoring station representative of the county or from the nearest available monitoring station and in the statistical form of the National Ambient Air Quality Standards (NAAQS), as provided in the 2021 *CEQR Technical Manual*. The background concentrations are presented in **Table 1**.

Table 1
Maximum Background Pollutant Concentrations for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	Queens College 2	1.72 ppm	35 ppm
	8-hour	Queens College 2	1.2 ppm	9 ppm
$PM_{2.5}$	24-hour	JHS 126	17.8 µg/m^3	35 µg/m^3 (2)
	Annual	JHS 126	7.6 µg/m^3	9 µg/m^3 (3)

Notes:
(1) CO concentrations represent the maximum second-highest monitored concentrations from the three years of data.
(2) $PM_{2.5}$ 24-hour-average concentration represents the average of the 98th percentile day from three recent years of data.
(3) EPA has lowered the NAAQS from 12 µg/m^3.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017-2019.

PM and CO concentrations are based on three recent years of monitored data (2017–2019) consistent with the statistical format of the NAAQS. To develop background levels for each pollutant, concentrations measured at the most representative ambient monitoring station operated by DEC over a three-year period will be used consistent with DEC guidance. 2020 and 2021 data will not be used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with New York City Department of Environmental Protection (DEP) guidance.

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are predicted) will be modeled at each of the selected sites. Receptors will be placed along the approach and departure links at regularly spaced intervals along the coded links. Ground-level receptors will be placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. Based on DEP guidance

[6] NYSDEC staff previously communicated in an email to AKRF that the met data provided by NYSDEC and processed with earlier versions is acceptable for use with later AERMOD versions. NYSDEC does not have immediate plans to update the met data using AERMET Version 24142.

for neighborhood-scale corridor $PM_{2.5}$ modeling, receptors in that analysis will be placed at a distance of 15 meters from the nearest moving lane at each analysis location.

VEHICLE EMISSIONS

Engine Emissions

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 (MOVES).[7] 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. The inputs and use of MOVES incorporate the most current guidance available from DEC.

Project specific vehicle classification data obtained through field studies will be mapped to the 13 vehicle categories defined in the MOVES model based on New York State vehicle registration data in accordance with the current guidance in the 2021 *CEQR Technical Manual*. County-specific hourly temperature and relative humidity data obtained from DEC will be used.

Road Dust

To account for the suspension of fugitive road dust in air from vehicular traffic in the local microscale analysis, $PM_{2.5}$ emission rates will include fugitive road dust. However, since DEP 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[8] and the 2021 *CEQR Technical Manual*.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

Predicted values will be compared with NAAQS for CO and the City's CEQR *de minimis* criteria for CO and $PM_{2.5}$. If maximum predicted short-term or annual $PM_{2.5}$ concentrations result in a potential impact, refinements to the analysis would be implemented. For example, seasonal and off-peak emission factors can be prepared using additional runs of the MOVES model to capture the effect of temperature differences and changing vehicular classification mixes in off peak hours, respectively.

If the results of the mobile source analysis outlined above determine that maximum annual incremental $PM_{2.5}$ concentrations are greater than the *de minimis* criterion of 0.1 $\mu g/m^3$ on a neighborhood scale, additional modeling of $PM_{2.5}$ concentrations would be performed using a comprehensive analysis procedure to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources (Grid Analysis). The analysis would be performed using the AERMOD model, with receptors placed at a pedestrian height of 6 feet on a 1 kilometer (km) by 1 km grid, with receptors placed at a 25-meter spacing. The grid would be centered at the intersection location where the maximum concentrations are predicted to exceed the CEQR *de minimis* criterion. For roadways with traffic information, the same traffic volume and emission rates would be used in the analysis. All intersections analyzed for the traffic study within the 1 km by 1 km area would be included for the grid analysis (signalized and unsignalized). For roadways without traffic information, traffic volume and emission rates would be selected based on the nearest representative roadway with traffic volume information. Available data (e.g., speeds, vehicle classification data, volumes) from the Traffic Information Management System (TIMS) developed by the New York City Department of Transportation (DOT), as well as data maintained by the New York State Department of Transportation (NYSDOT), would be used to supplement any gaps in traffic information. The analysis

[7] EPA, Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015. Overview of EPA's Motor Vehicle Emission Simulator (MOVES4). EPA-420-R-23-019. August 2023.

[8] 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.

would be performed for the No-Action and With-Action Condition. The average annual $PM_{2.5}$ concentration would be determined at each receptor for each condition, and the neighborhood-scale concentration determined based on the arithmetic mean value for the receptor grid. The incremental annual concentration would be determined based on the difference between the neighborhood scale No-Action and With-Action concentrations. It is anticipated that these additional measures would reduce $PM_{2.5}$ annual incremental concentrations below the annual *de minimis* criterion threshold. If the analysis predicts that the maximum neighborhood scale concentration exceeds the *de minimis* criterion of 0.1 $\mu g/m^3$, the traffic mitigation measures would be incorporated into the grid analysis.

PARKING FACILITIES

The Proposed Actions would include accessory parking spaces. The parking facilities would consist of the following:

- Projected Development Site 1D —68 spaces; and
- Projected Development Site 1E—106 spaces.

Therefore, an analysis of CO and PM emissions will be performed. The analysis will be performed for the parking facilities that would have the greatest potential for impact on air quality. The analysis will follow the procedures outlined in the 2021 *CEQR Technical Manual* for assessing potential impacts from parking facilities. Potential impacts to sensitive receptors at sidewalk and proposed public open space locations as well as potential receptors on the projected development sites will be considered. Cumulative impacts from on-street sources and emissions from the parking facilities will be calculated.

ANALYSIS OF ATYPICAL ROADWAYS

The 2021 *CEQR Technical Manual* recommends analysis of projects that would result in placement of operable windows or air intakes generally within 200 feet of an "atypical" source of vehicle emissions, including not at-grade sources such as multi-lane highways, or bridges. A portion of the Project Area lies within 200 feet of an elevated section of the Atlantic Avenue that is above the East New York Avenue Long Island Rail Road (LIRR) station. In addition, at the Atlantic Avenue approaches, East New York Avenue is at a lower elevation relative to the Proposed Development. Therefore, the effect of these existing roadways on the Proposed Development will be analyzed.

Emission factors for CO and PM will be determined using the EPA MOVES4 model, using estimated speeds and volumes from information developed for the traffic analysis for the Proposed Actions. Receptors will be placed at various locations and elevations to predict concentrations from vehicles on each of the project buildings that is within 200 feet of the roadways that would include residential, commercial, or community facility uses. Receptors will also be placed at pedestrian levels at any new public open spaces that would be located within the 200-foot study area of these roadways.

The analysis will be performed for the With-Action condition. Predicted values will be compared with NAAQS.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

In 2021, the New York City Council passed a bill, Local Law 154, that effectively bans the installation of most new natural gas and other fossil fuel-fired systems in buildings in New York City. In addition, the design of the proposed buildings must meet the applicable provisions of the New York City Energy Conservation Code and demonstrate consistency with the City's carbon intensity limits established pursuant to Local Law 97 of 2019. While it is anticipated that most of the proposed buildings would utilize electric heating and/or hot water systems, at this time, design information is not available. Therefore, for the purpose of evaluating potential air quality impacts associated with the Reasonable Worst Case Development Scenario (RWCDS), it will be conservatively assumed that each of proposed buildings would utilize natural gas for heating and/or hot water systems, as discussed further below.

The analysis of fossil fuel-fired heating and hot water systems of the Proposed Development will consider impacts following the procedures outlined in the 2021 *CEQR Technical Manual* to determine the potential for impacts on existing and No-Action developments as well as "project-on-project" impacts.

A refined analysis will be performed using the AERMOD model. For this analysis, five years of meteorological data (2015-2019) from the JFK Airport NWS and concurrent upper air data, will be utilized for the simulation program. Concentrations of nitrogen dioxide (NO_2) and $PM_{2.5}$ will be determined at affected sites.

The AERMOD analyses will be performed assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash and elimination of calms. The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the "cavity region" (i.e., the area around a structure which under certain conditions may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) will be used to determine the projected building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources accounts for all obstructions within a radius equal to five obstruction heights of the stack.

Receptors

Receptors will be located on existing and proposed buildings (both the Proposed Development, as well as nearby No-Action developments). Receptors will be placed at elevated locations on all facades and at multiple elevations on buildings to identify maximum pollutant concentrations. Generally, receptors will be spaced at a three-meter vertical interval to represent each individual floor of a building, while horizontally, receptor spacing will be a minimum of three meters and a maximum of 10 meters. A broad ground-level grid will also be included to estimate maximum potential concentrations at publicly accessible locations in the surrounding area.

Emission Estimates and Stack Parameters

Natural gas fuel consumption will be estimated based on procedures outlined in the 2021 *CEQR Technical Manual*. An estimate of the emissions from the Proposed Development's heating and hot water systems will be made using the most recent available data from the U.S. Energy Information Administration (EIA). The EIA data includes tables which can be used to estimate emissions based on the development size, type of fuel used and type of construction. Use of current EIA data is consistent with guidance provided by DEP.[9] Accordingly, fuel consumption factors of 47.8 ft^3/ft^2-year and 36.1 ft^3/ft^2-year for natural gas will be used for residential and commercial use types, respectively (community facility uses will use the residential fuel consumption factor, to be conservative).[10, 11]

Emission factors from the natural gas combustion section of EPA's AP-42 will be used to calculate emission rates for the Proposed Development's heating and hot water systems. $PM_{2.5}$ emissions will include both the filterable and condensable components. Annual NO_2 concentrations from heating and hot water sources will be estimated using the Tier 1 method, which conservatively assumes a full conversion of NO_2 to NO_x.[12]

One-hour average NO_2 concentration increments associated with the Proposed Development's heating and hot water systems will be estimated using AERMOD model's Plume Volume Molar Ratio Method

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[9] Ikos Senior Housing Rezoning & UDAAP Environmental Assessment, CEQR No. 22HPD043Q, DEP letter to HPD, September 12, 2022.

[10] https://www.eia.gov/consumption/residential/data/2020/index.php?view=consumption#summary. Table CE1.2 Summary annual household site consumption and expenditures in the Northeast—totals and intensities, 2020

[11] https://www.eia.gov/consumption/commercial/data/2018/index.php?view=consumption. Table C25. Natural gas consumption and conditional energy intensity by census region, 2018.

[12] Appendix W to Part 51, *Guideline on Air Quality Models*, Section 4.2.3.4.

(PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. The model will apply ozone concentrations for the period of 2015–2019 at the nearest available DEC ozone monitoring station—the DEC Queens College monitoring station.[13] An initial NO_2 to NO_x ratio of ten percent at the source exhaust stack will be assumed, which is considered representative for boilers.

The methodology used to determine the compliance of total one-hour NO_2 concentrations from the proposed sources with the one-hour NO_2 NAAQS will be based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources will be first added to the seasonal hourly background monitored concentrations; then the highest combined daily one-hour NO_2 concentration will be determined at each receptor location and the 98th percentile daily one-hour maximum concentration for each modeled year calculated within the AERMOD model; finally the 98th percentile concentrations will be averaged over the latest five years.

Background Concentrations

To estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts must be added to a background value that accounts for existing pollutant concentrations from other sources that are not directly accounted for in the model (see **Table 2**).

Table 2
Background Pollutant Concentrations for Stationary Souce Analysis

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	Annual[1]	Queens College 2	28.7	100
	1-hour[2]		103.8	188
$PM_{2.5}$	24-hour	JHS 126	17.8	35

Notes:
[1] Annual average NO_2 background concentration is based on the three-year highest value.
[2] The one-hour NO_2 background concentration is based on the maximum 98th percentile one-hour NO_2 concentration averaged over three years of data.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017-2019.

To develop background levels, concentrations measured at the most representative DEC ambient monitoring station over a three-year period (2017-2019) will be used, consistent with DEC guidance. The 2020 and 2021 background data will not be used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, based on available guidance from DEP.

$PM_{2.5}$ annual average impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria, without considering the annual background. Therefore, the annual $PM_{2.5}$ background is not presented in the table. The $PM_{2.5}$ 24-hour average background concentration of 17.8 µg/m^3 (based on the 2017 to 2019 average of 98th percentile concentrations measured at the JHS 126 monitoring station) will be used to establish the *de minimis* value for the 24-hour increment, consistent with the guidance provided in the 2021 *CEQR Technical Manual.*

Determining the Significance of Air Quality Impacts

For the stationary source analysis, the exhaust stacks for the heating and hot water systems will be assumed to be located at the edge of the development massing facing the receptor, unless the source and receptor are

[13] 2020 and 2021 background data will not be used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with DEP guidance. 2022 background data will not be used since it needs to be paired with 2022 meteorological data, which NYSDEC has stated is missing a significant number of days of upper air measurements, consequently, this data is not available for use in modeling analyses.

immediately adjacent to each other. In these cases, the stack will be assumed to be located at an initial distance of 10 feet from the nearest receptor. If a source does not meet the NAAQS or $PM_{2.5}$ *de minimis* criteria, the stack would then be set back in 10-foot (or similar) increments, until the source meets the respective criteria. If necessary, further restrictive measures will be considered, including use of low NO_x burners, increasing stack heights, or a combination of these measures.

Predicted values will be compared with 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 (or other equivalent restriction, as appropriate) would be proposed for the projected development site, describing the fuel or exhaust stack restrictions that would be required to avoid a significant adverse air quality impact.

INDUSTRIAL SOURCE ANALYSIS

Analysis of Potential Impacts from Existing Uses

An initial review of air permit information was performed to identify potential process and manufacturing sources located within and around the Project Area. A search of air permits within the study area was conducted using the DEP Clean Air Tracking System (CATS) database to identify any DEP-permitted industrial uses in the study area.[14] Federal and state-permitted and registered facilities were searched using the New York State Department of Environmental Conservation DECinfo Locator.[15] AKRF reviewed the data to determine which industrial sources are within 400 feet of the Project Area. The facilities were geo-referenced to identify those permits within a radius of 400 feet of the Project Area. Any industrial sources beyond 400 feet of the Project Area were excluded from analysis, as well as any DEP permitted facility with a cancelled permit (facilities with an expired permit were assumed to be still in operation).

As shown in **Tables 3** and **4**, one DEP permit and two DEC registrations were determined to be within 400 feet of the Project Area. Therefore, they will be included in the industrial source analysis. All of the proposed buildings within 400 feet of at least one source will be included as receptors for the industrial source analysis.

Once the industrial source permits and registrations are received, they will be reviewed to determine if any should be excluded from the analysis based on the type of operation. For example, emergency generators are not considered industrial sources of emissions; therefore, these sources would not be analyzed. A subsequent field survey will be performed to confirm the operational status of the sites identified in the permit searches, and to identify any sites that have sources of emissions that would warrant an analysis. If any such sources are identified, further consultation will be made with DCP to determine procedures for estimating emissions from these sources.

Analysis of the Proposed Development

A refined analysis of the verified industrial sources will be performed using the AERMOD model. For this analysis, five years of meteorological data (2015-2019) from the JFK Airport NWS and concurrent upper air data will be utilized for the simulation program. The analysis will be performed using the same model options described above for the refined heating and hot water system analyses. Concentrations of pollutants will be determined at portions of the Project Area that are located within 400 feet of one or more industrial sources.

Receptors

Receptors will be placed at elevated locations on all facades and at multiple elevations on each applicable proposed building. Generally, receptors will be spaced at a three-meter interval vertically to represent each

[14] DEP. *NYC DEP CATS Information.* https://a826-web01.nyc.gov/dep.boilerinformationext. New York City Open Data https://data.cityofnewyork.us/Environment/CATS-Permits/f4rp-2kvy.

[15] DEC. DECinfo Locator. https://gisservices.dec.ny.gov/gis/dil/

individual floor of a building, while horizontally, receptor spacing will be a minimum of three meters and a maximum of 10 meters.

Table 3
Industrial Sources – DEP Air Permits

No.	Permit ID	Block	Lot	Address
1	PA043298	3666	31	38 Alabama Avenue

Notes:
Air permit identified from DEP Clean Air Tracking System.
Source: DEP CATS Open data https://data.cityofnewyork.us/Environment/Clean-Air-Tracking-System-CATS-Permits/f4rp-2kvy/about_data, Accessed March 1, 2024.

Table 4
Industrial Sources - DEC Registrations

No.	Registration ID	Address	Facility Name
1	2-6105-00815/00001	20 Williams Avenue	Best Service Auto Body
2	2-6105-00781/00001	2533 Atlantic Ave.	Carlos Gates & Iron Works

Emission Estimates and Stack Parameters

Emission rates and stack parameters will be obtained from the DEP permit and DEC registrations. Auto-related services are anticipated in the manufacturing zoned districts within and around the Project Area. These services include auto-body repair shops. Typically, DEP permits for auto-body repair shops that perform spray coating only include emissions information for solids and volatile organic compounds rather than specific air toxic compounds. Therefore, to supplement the information on air toxic compounds and/or their emission rates for any permitted auto-body spray coating operations, or in the event that any unpermitted sources are identified, a representative set of emissions will be utilized.[16] The representative data provides maximum percentage by weight and usage for individual air toxics that are commonly found in coatings used in paint spraying operations. **Table 5** summarizes weight percentages of VOCs for representative automotive coatings. The highest weight percentage associated with each VOC will be used, to be conservative.

Similar to VOCs, percentages by weight of solids (PM_{10} and $PM_{2.5}$) found in representative auto spray primers and paints will be utilized. Based on particle size information provided in EPA AP-42, PM_{10} accounts for the largest percentage of the solids' emissions (up to 46.7 percent), while $PM_{2.5}$ accounts for 28.6 percent of the paints and primers.[17] The proportion of a solid in a paint by weight is representative of its proportion in the emissions.

[16] DEP Permit ID PW000319.

[17] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Appendix B-1, Table 4.2.2.8: Particle Size Distribution Data and Sized Emission Factors for Selected Sources. http://www.epa.gov/ttn/chief/ap42. October 1986.

Table 4
Typical Composition of VOC Emissions from Auto Spray Paint Booths

Chemical Name	CAS #	Paint % by Weight				
		Acrylic Lacquer Thinner	Reactive Reducer	Hi-Perfor-mance Clear	Blue Shade Violet	Velocity Premium Clearcoat
Toluene	108-88-3	12%	20%	50%	5%	--
Xylenes	1330-20-7	7.4%	--	--	--	31%
Ethylbenzene	100-41-4	1.3%	--	--	--	5.6%
Acetone	67-64-1	45%	50%	--	--	10%
2-Methoxy-1-methylethyl Acetate	108-65-6	10%	5%	--	--	10%
Methylcyclohexane	108-87-2	4.8%	10%	--	--	--
Heptane	142-82-5	20%	10%	--	--	--
Isobutyl Acetate	110-19-0	10%	--	--	--	--
Isopropyl Alcohol	67-63-0	5%	--	--	--	--
n-Butyl acetate	123-86-4	--	5%	--	50%	--
Butanone	78-93-3	--	50%	20%	--	--
Ethyl 3-ethoxyproprionate	763-69-9	--	5%	10%	--	--
Solvent Naphtha	64742-89-9	--	10%	--	--	--
Benyzl butyl phthalate	85-68-7	--	--	10%	--	--
2-(2H-benzotriazzol-2-yl)-4,6-bitertpentylphenol	25973-55-1	--	--	5%	--	--
Ligroine	8032-32-4	--	--	--	5%	--
4-Methylpentan-2-one	108-10-1	--	--	--	--	7.8%
Heptan-2-one	110-43-0	--	--	--	--	3%

Source: *DEP Permit PW000319 and associated Safety Data Sheets.*

Solvent usage will be obtained from the permit data. Solvent usage will be multiplied by the weight percentage for each air toxic to estimate the maximum emission rate for each air toxic. If solvent usage is not available, a solvent usage based on the typical usage found at the permitted facilities will be used. This representative solvent usage as well as the weight percentages of the air toxics will also be used to estimate emissions at facilities that do not possess either a DEP permit or DEC registration and are determined to perform auto-body related spray coating.

For industrial sources where stack parameters are not available, conservation assumptions for stack exhaust diameter, exhaust velocity and temperature will be used, based on guidance in the 2021 *CEQR Technical Manual*.

Determining the Significance of Air Quality Impacts

A cumulative impact analysis will be performed for sources that emit the same air contaminant. Predicted concentrations of these compounds will be compared to DEC DAR-1 guideline values for short-term (SGC)

and annual (AGC) averaging periods.[18] 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.

Health Risk Assessment

Potential cumulative impacts from existing industrial sources will be evaluated based on the Hazard Index Approach for non-carcinogenic compounds and risk factors for carcinogenic compounds as described in the DEC DAR-1 guidance document. Both methods are based on equations that use health risk information at referenced concentrations for individual compounds to determine the level of health risk posed by an expected ambient concentration of these compounds at a sensitive receptor. For non-carcinogenic compounds, hazard quotients are calculated by dividing the maximum modeled concentration of each pollutant by its respective AGC. The quotients are then summed together to calculate a multi-contaminant hazard index for each sensitive receptor. The maximum hazard index indicates the worst-case scenario for potential impacts from non-carcinogenic pollutants. For non-carcinogenic compounds, DEC's DAR-1 considers a cumulative hazard index of less than 2.0 to be acceptable.

For carcinogenic compounds, DEC uses risk factors for evaluation of release of pollutants. DEC generally considers an overall incremental cancer risk from cumulative impacts of a proposed action of less than ten-in-one million to be acceptable. Using these factors, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of the carcinogenic toxic pollutants combined is less than ten-in-one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

Analysis of Potential Impacts from Future Uses

The Proposed Actions would result in some developments containing a mix of residential, non-residential, and light industrial development. Specifically, the development expected to occur under the RWCDS for the Proposed Actions includes 98,483 gross square feet (gsf) of industrial uses at Projected Development Site 1E. In addition, under the approved RWCDS for the Alternative Community Facility Scenario, Projected Development Site 1B could potentially include up to 13,450 gsf of light industrial space. Therefore, potential impacts from pollutant emissions from light industrial uses within the same building with sensitive receptors, and of manufacturing uses on nearby sensitive receptors in other projected development sites, will be evaluated.

Air emissions will be analyzed from potential manufacturing uses that would be permitted and reasonably could locate in the Proposed Development and/or Alternative Community Facility Scenario to assess their potential impacts on the potential sensitive uses at the Project Area as well as in the surrounding areas.

Uses

It is assumed that the RWCDS would include up to 10 industrial sources with emissions of air contaminants. Potential light industrial uses that would be allowed under the Proposed Actions were reviewed to identify use categories that might foreseeably locate within the Project Area. A comprehensive summary of emission sources with DEP permits was reviewed, based on a survey that was previously performed.[19] Of the identified use groups, those that had the greatest number of occurrences in air permits were selected. A summary of the 10 selected light industrial use categories is presented in **Table 5**.

[18] NYSDEC. DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212. February 2021.

[19] Gowanus Neighborhood Rezoning Final Environmental Impact Statement, September 2021.

Table 5
Industrial Uses Categories to be Analyzed

Projected Development Site	Use
1E, 1B	Book binding/tooling (by hand)
	Custom manufacturing/altering for retail
	Musical instruments, not including pianos or organs
	Precision instrument/jewelry manufacturing
	Printing, with no limitation on floor area
1E	Household/office equipment or machinery repair shops
	Apparel or other textile products from textiles or other materials, including hat bodies or similar products
	Fur good manufacturing (excl. tanning/dyeing)
	Soap or detergent packaging
	Textiles, dyeing or printing

Emissions Profile

To estimate emissions from light industrial uses that are considered foreseeable under the Proposed Actions' RWCDS, a detailed review of permitted emissions was performed. DEP air permit records were reviewed and permitted facilities representing uses considered as foreseeable under the Proposed Actions' RWCDS were identified. From these permits, processes that were considered consistent with the use group (i.e., not atypical of the use group itself) were included in the emissions profile. Pollutants listed in air permits associated with these facilities were included in the analysis. After compiling and sorting the emission data for each use group, the 93rd percentile value was determined. This value was determined following the approach that EPA used to evaluate data on the ratio of NO_2/NO_x emissions measured in exhaust stacks of fossil fuel fired equipment (the in-stack ratio).[20] In reviewing the data, EPA determined that 93 percent of the data entries were below a default value, which had been previously used in lieu of project-specific data. Based on this finding, the use of the default value was determined by EPA to be conservative "for most sources" and "a reasonable default" for assessing impacts in the immediate vicinity of the source. This value has been accepted by DEP to be reasonably conservative for estimating air toxic emissions from industrial uses potentially facilitated under the Proposed Actions' RWCDS. This is also considered conservative as many permitted operations are for older manufacturing operations and therefore may not be reflective of current manufacturing methods that would be anticipated as part of the Proposed Development and/or Alternate Community Facility Scenario. Therefore, the 93rd percentile emission rate from among the identified permits for each analyzed use category was calculated for each pollutant to represent potential air toxics emissions.

In addition, the analysis will account for facilities that have multiple permits. For these facilities, the emission sources from the permitted emission sources will be assumed to be co-located, and for processes that have the same pollutant, potential air quality impacts will be determined on an additive (cumulative) basis by facility. The potential cumulative effects of the 10 selected light industrial will be modeled. All of the businesses will be assumed to be located in the building on Projected Development Site1E, while for the future building on Projected Development Site 1B, a more limited set of emission sources will be modeled, which is reasonable since it would have a much smaller total floor area.

A summary of emissions profiles developed for the industrial source analysis is presented in **Table 6**. The table presents a summary of air toxics emissions for processes in the identified use categories, using the 93rd percentile emission rate for each pollutant for each use reported in DEP air permits for each air toxic.

[20] Technical Support Document (TSD) for NO_2 – Related AERMOD Modifications, USEPA, July 2015.

A complete summary of the emission values used in the analysis for each of the analyzed use groups will be presented in an appendix to the EIS.

Table 6
Industrial Source Analysis Emissions Profile

Pollutant	Maximum Modeled Emissions	
	Short-Term (lb/hr)	Annual (lb/yr)
Projected Development Site 1E		
Criteria Pollutants		
CO	0.307	---
Particulate Matter (PM_{10})	0.127	---
NO_2	0.006	92.0
SO_2	0.025	56.6
Non-Criteria Air Toxics		
Acetic Acid	0.168	336.0
Methanol	0.358	1,405.5
Isopropyl Alcohol	4.555	12,264.0
Acetone	0.960	960.0
Methyl Chloroform	0.250	569.0
Hydrogen Cyanide	0.076	1.1
Dichloromethane	1.194	1,138.6
Methyl Ethyl Keton	0.608	665.3
Trichloroethylene	0.750	1,500.0
Dochlorobenzine, ortho	0.030	60.5
Ethylene Gylcol	0.090	198.9
Toluene	1.736	1,047.4
Butyl Carbitol	0.157	337.2
Trichloro Benzen	0.165	330.0
Butyl Acetate	0.510	1,063.7
Sodium Cyanide	0.003	2.2
Potassium Cyanide	0.001	1.6
Sodium Hydroxide	0.002	---
Hydrogen Chloride	0.297	127.4
Hydrogen Fluoride	0.001	0.5
Ammonia	0.929	1,792.6
Sulfuric Acid	0.004	33.8
Nitric Acid	0.021	96.6
Chlorine	0.001	0.4
Isobutyl Alcohol	---	10,368.0
Nitrogen Oxide	---	998.0
Distillate Heavy Parafinic	---	0.80
Carbon Black	---	31.8
Projected Development Site 1B		
Criteria Pollutants		
CO	0.307	---
Particulate Matter (PM_{10})	0.127	---
NO_2	0.006	92.0
SO_2	0.025	56.6
Non-Criteria Air Toxics		
Acetic Acid	0.168	336.0
Methanol	0.358	1,405.5
Isopropyl Alcohol	4.555	12,264.0
Acetone	0.960	491.04
Methyl Chloroform	0.250	569.0
Hydrogen Cyanide	0.076	1.1
Dichloromethane	1.194	1,138.6
Methyl Ethyl Ketone	0.608	665.3
Trichloroethylene	0.750	1,500.0
Dochlorobenzine, ortho	0.030	60.5
Ethylene Gylcol	0.090	198.9
Toluene	1.736	1,047.4
Butyl Carbitol	0.157	337.2
Trichlorobenzene	0.165	330.0
Butyl Acetate	0.510	1,063.7
Sodium Cyanide	0.003	2.2

Potassium Cyanide	---	---
Sodium Hydroxide	0.002	---
Hydrogen Chloride	0.297	127.4
Hydrogen Fluoride	0.001	0.5
Ammonia	0.929	1,792.6
Sulfuric Acid	0.004	33.8
Nitric Acid	0.021	96.6
Chlorine	0.001	0.4
Isobutyl Alcohol	---	10,368.0
Nitrogen Oxide	---	998.0
Distillate Heavy Parafinic	---	0.80
Carbon Black	---	31.8

Note:
Emission rates represent the maximum short-term and annual emission rates across the analyzed 10 selected uses. Modeled stacks will use emission rates associated with a single use and will be similar or less than the emission rates presented.

Dispersion Analysis

Industrial sources of emissions will be analyzed using the refined AERMOD dispersion model, using a unitary emission rate of 1 gram per second to determine potential air toxics concentrations for each use at sensitive receptor locations at existing and projected development sites. The industrial sources will be modeled at Projected Development Sites 1B and 1E. Since the specific locations and emission characteristics of the potential industrial sources of emissions are not known, the analysis will be performed using a variety of source locations at the closest allowable distance from the buildings at Projected Development Sites 1B and 1E to future sensitive uses on the other buildings in the Project Area, as well as on off-site, on all façades and at multiple elevations. Additional locations will be modeled as needed to assess the need for potential stack location restrictions.

Emissions from each use group will be analyzed to determine potential air toxics concentrations at nearby projected development sites, as well as nearby neighborhood locations. The analysis will initially assume that exhaust stacks would be vented on the roof or ceiling of the industrial portion of the building in order to require the minimum amount of ductwork, as compared to exhausting to the roof of the building. Stacks will be initially placed in two different configurations: as vertical stacks located at a minimum of 10 feet from any adjacent residential buildings, and as horizontal stacks venting to the side of the building at a height of 10 feet above grade. Receptors will be placed at various façades and elevations of nearby buildings, and at ground level locations. If the initial results are found to exceed DEC SGCs or AGCs, the stacks will be required to vent to the top roof of the building, or moved further away from the nearest residential receptors.

Exhaust parameters will be developed based on the DEP permit records used to develop the emissions profiles shown in **Table 6**. Based on review of the permit information, many processes include stack parameters that would give significant plume rise. It would be reasonable to assume that most if not all expected industrial uses that would locate to the Proposed Development and/or Alternate Community Facility Scenario would include exhaust stacks that would incorporate exhaust velocity. Therefore, the median exhaust velocity and stack diameter will be used to represent exhaust parameters from allowed uses.

The results will be used to predict the worst-case potential air toxics concentrations. The unitary results ($\mu g/m^3$ per g/s) for each development site will be scaled by the median emission rates from the emissions profile.

Determining the Significance of Air Quality Impacts

EPA's AERMOD dispersion model will be used to estimate the short-term and annual concentrations of air toxic pollutants at sensitive receptor locations in the Project Area. A cumulative impact analysis will be performed for sources that emit the same air contaminant. The results will be compared with the SGC and

AGC values reported in the DEC's DAR-1 Tables guidance document to determine the potential for significant impacts.[21]

LARGE OR MAJOR SOURCES

To assess the potential effects of large and major emissions sources on the Proposed Development, a review of the DEC Title V permit and state facility permit websites was performed to identify any federal or state-permitted facilities. One existing large source of emissions (i.e., a facility having a State Facility Air Permit) within 1,000 feet of the Project Area was identified: the New York City Transit (NYCT) East New York Bus Depot located at 1 Jamaica Avenue. An analysis of this source will be performed to assess the potential effects on the Proposed Development.

Analysis of the Development Site

A refined analysis of the identified large source will be performed using the AERMOD model. For this analysis, five years of meteorological data (2015-2019) from the JFK Airport NWS and concurrent upper air data will be utilized for the simulation program. The analysis will be performed using the same options described above for the heating and hot water system analyses.

Receptors

Receptors will be placed at elevated locations on all facades and at multiple elevations on each of the proposed buildings. Generally, receptors will be spaced at a three-meter interval vertically to represent individual floors of a building, while horizontally, receptor spacing will be a minimum of three meters and a maximum of 10 meters.

Emission Estimates and Stack Parameters

Emission rates and stack parameters will be obtained from DEC permit information, including the state facility permit, permit application and subsequent modifications, annual reports, emissions test data, etc.

For sources that do not have emission data referenced in the permit materials, emissions rates will be determined based on fuel usage information (if available) or equipment capacity, along with appropriate emission factors from EPA AP-42. $PM_{2.5}$ emissions will include both the filterable and condensable components. For sources where stack parameters are not available, conservation assumptions for stack exhaust diameter, exhaust velocity and temperature will be used, based on guidance in the 2021 *CEQR Technical Manual*.

Determining the Significance of Air Quality Impacts

A cumulative impact analysis will be performed for sources that emit the same air contaminant. 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.

[21] DEC, DAR-1 Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212; Appendix A, Toxicity Classification and Guideline Development Methodology for AGC/SGC, February 2021.