A. INTRODUCTION

The potential for air quality impacts from the Proposed Actions is examined in this chapter. Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heat and hot water systems, or emissions from parking garage ventilation systems. Indirect impacts are caused by off-site emissions associated with a project such as emissions from nearby existing stationary sources (i.e., impacts on the projected development sites) or by emissions from on-road vehicle trips generated by the Proposed Actions or other changes to future traffic conditions due to a project.

The maximum projected hourly incremental traffic volumes generated by the Proposed Actions would exceed the 2021 *City Environmental Quality Review* (CEQR) *Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at a number of intersections in the study area, as well as the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311, of the 2021 *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for CO and PM.

In addition, the Proposed Actions would include accessory parking at certain projected development sites within the Project Area. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations from the proposed parking facilities.

A portion of the Project Area lies within 200 feet of not at grade (atypical) roadways. Therefore, the effect of these existing roadways on the Proposed Development was analyzed.

It was assumed that each of the proposed buildings would include fossil fuel-fired heat and hot water systems. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations with the Proposed Actions.

Since the Project Area is within areas zoned for manufacturing uses, potential effects of stationary source emissions from existing nearby industrial facilities on the Proposed Development were assessed. Potential effects from potential light industrial sources associated with the Proposed Actions were analyzed. In addition, potential effects from large and major sources of emissions in the study area on the Proposed Actions were evaluated.

B. PRINCIPAL CONCLUSIONS

A summary of the general findings is presented below.

The mobile source analyses determined that concentrations of CO and $PM_{2.5}$ due to project-generated traffic at intersections would not result in any violations of National Ambient Air Quality Standards (NAAQS), and furthermore, CO concentrations were predicted to be below CEQR *de minimis* criteria. The results show that the daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion at each of the intersections analyzed. However, at one of the intersection sites analyzed, the

maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion. This would be considered a significant adverse air quality impact in the absence of traffic mitigation measures.

Between certification of the DEIS and publication of the FEIS, additional review and evaluation will be performed which is expected to determine that the identified impacts related to mobile source annual average $PM_{2.5}$ increments will be avoided. Additional modeling of $PM_{2.5}$ concentrations (Grid Analysis) will be performed using more refined or comprehensive analysis procedures to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources. Other updates may include the use of newer vehicle emissions model data and projections. It is anticipated that these additional measures will reduce $PM_{2.5}$ concentrations below the annual *de minimis* criterion thresholds.

The parking facilities assumed to be developed as a result of the Proposed Actions were analyzed for potential air quality effects. The analysis found that these parking facilities would not be expected to result in any significant adverse air quality impacts.

An analysis of the nearby atypical roadways determined that there would be no significant adverse air quality impacts on the Proposed Development.

The stationary source analyses determined that the proposed buildings would not result in potential significant adverse air quality impacts from fossil fuel-fired heat and hot water systems. An (E) designation (E-857) would be mapped in connection with the Proposed Actions to ensure that proposed development would not result in any significant adverse air quality impacts from fossil fuel-fired heat and hot water systems emissions.

The analysis of existing sources associated with manufacturing and processing uses in the surrounding study area determined that emissions of air toxic compounds would not result in any potential significant adverse air quality impacts on the Proposed Development. An analysis of the cumulative impacts of existing industrial sources on the Proposed Development was performed. Maximum concentration levels at projected development sites were found to be below the applicable health risk criteria. For projected development sites with anticipated industrial uses, an (E) designation (E-857) would be mapped in connection with the Proposed Actions to ensure that there are no potential significant adverse impacts associated with air toxic compounds associated with these uses.

The analysis of the potential light industrial sources associated with the Proposed Actions' RWCDS determined that certain use group categories have the potential to result in a significant adverse air quality impact at receptor locations due to emissions from one or more air toxic compounds. To ensure that there are no potential significant adverse impacts of identified air toxic compounds in the proposed development, certain restrictions would be required as part of the Proposed Actions.

The potential cumulative effects of the existing industrial sources and proposed light industrial emission sources on the Proposed Development determined that the Proposed Actions would not cause a violation of applicable air quality standards.

The analysis of large and major sources determined that there would be no significant adverse air quality impacts on the Proposed Development.

C. POLLUTANTS FOR ANALYSIS

Air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide [NO] and nitrogen dioxide [NO_2], collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, ozone, and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA), and are referred to as criteria pollutants; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

The Proposed Actions would result in an increase in vehicle trips greater than the 2021 *CEQR Technical Manual* screening threshold of 170 trips at certain intersections. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Actions. In addition, the Proposed Actions would include parking facilities at certain projected development sites in the Project Area. Therefore, an analysis was conducted to evaluate future CO concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Actions. In addition, potential effects of $PM_{2.5}$ from atypical roadways on the Proposed Development were analyzed.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

The Proposed Actions would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of emissions of these pollutants from mobile sources related to the Proposed Actions was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) With the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2 associated with the Proposed Actions would be relatively small due to the very small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways. Furthermore, the monitored NO_2 concentrations at both near-road and rooftop monitoring sites (including monitored NO_2 concentrations at near road locations are well below the 1-hour NO_2 NAAQS of 188 $\mu g/m^3$. Therefore, it is unlikely that the incremental congestion from the Proposed Actions at local intersection locations would result in an exceedance of the NO_2 NAAQS.

Potential impacts on local NO_2 concentrations from the fuel combustion for the projected development sites' heat and hot water systems were evaluated.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of the Proposed Actions. Therefore, an analysis of this pollutant was not warranted.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less

than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may consequently be locally elevated near roadways. Since the traffic generated by the Proposed Actions would exceed the $PM_{2.5}$ emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the 2021 *CEQR Technical Manual*, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for this pollutant and an analysis was conducted to evaluate future $PM_{2.5}$ concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Actions. In addition, potential effects of $PM_{2.5}$ from atypical roadways on the Proposed Development were analyzed.

An assessment of $PM_{2.5}$ emissions from heat and hot water systems at the projected development sites was conducted, following the 2021 *CEQR Technical Manual* and EPA guidance.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and therefore analysis of SO_2 from mobile and/or non-road sources was not warranted.

As part of the Proposed Actions, No. 2 fuel could be burned in heat and hot water systems of the projected development sites. Therefore, potential future levels of SO_2 from these sources were examined.

NONCRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, noncriteria pollutants may be of concern. Noncriteria 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 noncriteria pollutants from industries are regulated by EPA.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, the New York State Department of Environmental Conservation (DEC) has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed guideline concentrations for numerous noncriteria pollutants. The DEC guidance document DAR-1[1]

[1] DEC. DAR-1 (Air Guide-1) AGC/SGC Tables, February 2021.

contains a compilation of annual and short-term (1-hour) guideline concentrations for these compounds.

The DEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to noncriteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

The Project Area contains existing manufacturing-zoned areas, and a manufacturing-zoned area would remain in the future with the Proposed Actions. Therefore, an analysis to examine the Proposed Actions potential for impacts from industrial emissions was performed. As per the Proposed Actions' RWCDS for the Alternate Community Facility Scenario, Projected Development Sites 1B and 1E are assumed to include light industrial uses in the With-Action condition, and therefore the potential effects of such uses on existing and proposed developments were reviewed.

D. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 14-1**. In addition, New York State has adopted 3-hour and 24-hour ambient air quality standards for New York State, but are defined on a running 12-month basis. New York State also has standards for total suspended particles, settleable particles, and 24-hour and annual SO_2, which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants fluoride and hydrogen sulfide.

EPA has revised the NAAQS for $PM_{2.5}$, effective March 6, 2024. The revision included lowering the level of the annual $PM_{2.5}$ primary standard from the current level of 12 micrograms per cubic meter ($\mu g/m^3$) to 9 $\mu g/m^3$ and retaining the level of the 24-hr primary and secondary standard at 35 $\mu g/m^3$. In addition, the PM_{10} 24-hour average primary and secondary standard was retained.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as mentioned above, DEC has issued standards for three noncriteria compounds. DEC has also developed a guidance document DAR-1 (February 2021), which contains a compilation of annual and short term (1-hour) guideline concentrations for numerous other noncriteria compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure.

TABLE 14-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m3	ppm	µg/m3
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average (2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average (3)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average (7)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (4)	NA	9	NA	15
24-Hour Average (5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average (6)	0.075	196	NA	NA
Annual Average (4)	NA	NA	0.010	26

Notes:
ppm—parts per million (unit of measure for gases only)
µg/m3—micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA—not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m3 are presented.
1. *Not to be exceeded more than once a year.*
2. *3-year average of the annual 98th percentile daily maximum 1-hr average concentration.*
3. *3-year average of the annual fourth-highest daily maximum 8-hr average concentration.*
4. *3-year average of annual mean.*
5. *Not to be exceeded by the annual 98th percentile when averaged over 3 years.*
6. *3-year average of the annual 99th percentile daily maximum 1-hr average concentration.*
7. *Not to be exceeded more than once a year on average over 3 years.*

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

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines

established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

In 2002, EPA re-designated New York City as in attainment for the 1-hour and 8-hour CO NAAQS.

Manhattan had been designated as a moderate NAA for PM_{10}. EPA clarified on July 29, 2015 that the designation only applied to the revoked annual standard.

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA) since 2004 under the CAA due to exceedance of the 1997 annual average standard, and were also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard effective April 18, 2014, and is now under a maintenance plan. DEC recently submitted a limited maintenance plan to EPA for the period 2024 to 2034, which is currently under review.

As described above, EPA has revised the $PM_{2.5}$ standard. DEC submitted a recommendation as in attainment of the 9 $\mu g/m^3$ NAAQS. $PM_{2.5}$ attainment designations under the new standard are expected to be effective by May 2026.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as a moderate non-attainment area for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8–hour ozone standards, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ('anti-backsliding'). EPA designated the same NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012, with subsequent reclassifications to "moderate" and "serious" nonattainment since compliance with the NAAQS was not achieved by the required attainment dates. On November 29, 2021, DEC presented a demonstration that the New York Metro Area (NYMA) was not projected to meet the July 20, 2021 attainment deadline and therefore requested that EPA reclassify the NYMA to "severe" nonattainment. EPA reclassified the NYMA from "serious" to "severe" NAA, effective November 7, 2022, which imposed a new attainment deadline of July 20, 2027 (based on 2018–2020 monitored data). On June 4, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. On June 4, 2024, DEC requested the reclassification of the NYMA from "moderate" to "serious" nonattainment" for the 2015 ozone NAAQS. EPA is currently reviewing revisions to New York's SIP plan.

New York City is currently in attainment of the annual-average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" of the 1-hour NO_2 standard effective February 29, 2012.

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. EPA has designated the entire State of New York as in attainment for this standard, with the exception of a portion of St. Lawrence County which was designated as "nonattainment."

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the 2021 *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[2] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 14-1**) would be deemed to have a potential significant adverse impact. Similarly, for non-criteria pollutants, predicted exceedance of the DAR-1 guideline concentrations would be considered a potential significant adverse impact.

In addition, to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations would not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO DE MINIMIS CRITERIA

New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from the impact of projects or actions on mobile sources, as set forth in the 2021 *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No-Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No-Action) concentrations and the 8-hour standard, when No-Action concentrations are below 8 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

The *de minimis* criteria New York City uses to determine the potential for significant adverse $PM_{2.5}$ impacts under CEQR are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.1 µg/m3 at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or

[2] New York City. *CEQR Technical Manual*. Chapter 1, Section 222. December 2021; and SEQR Regulations. 6 NYCRR § 617.7

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

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the above *de minimis* criteria will be considered to have a potential significant adverse impact.

The above *de minimis* criteria have been used to evaluate the significance of predicted impacts of the Proposed Actions on $PM_{2.5}$ concentrations.

NON-CRITERIA POLLUTANT THRESHOLDS

Non-criteria, or toxic, air pollutants include a multitude of pollutants of ranging toxicity. No federal ambient air quality standards have been promulgated for toxic air pollutants. However, EPA and DEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure.

The DEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter for the one-hour and annual average time periods for various air toxic compounds. These values (of DAR-1 February 2021) are provided in **Table 14-2** for the compounds affecting receptors located at the projected development sites. The compounds listed are those emitted by existing sources of air toxics in the Project Area as well as potential light industrial sources associated with the Proposed Actions.

TABLE 14-2
Industrial Source Analysis Relevant DEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (µg/m^3)	AGC (µg/m^3)
Acetic Acid	00064-19-7	3,700	60
Methanol	00067-56-1	33,000	4,000
Isopropyl Alcohol	00067-63-0	98,000	7,000
Acetone	00067-64-1	180,000	30,000
Methyl Chloroform	00071-55-6	9,000	5,000
Hydrogen Cyanide	00074-90-8	340	0.8
Dichloromethane	00075-09-2	14,000	46
Methyl Ethyl Ketone	00078-93-3	13,000	5,000
Trichloroethylene	00079-01-6	20	0.2
Trichloroethane, 1,1,2-	00079-00-5	--	1.4
Benzyl butyl phthalate	00085-68-7	--	4.2E-01
Dichlorobenzene, ortho	00095-50-1	30,000	200
Epoxybutane, 1,2-	00106-88-7	3,000	20
Ethylene Glycol	00107-21-1	1,000	400
4-methylpentan-2-one	00108-10-1	31,000	3,000
2-Methoxy-1-methylethyl acetate	00108-65-6	36,850	2,000
Methylcyclohexane	00108-87-2	--	3,800
Toluene	00108-88-3	37,000	5,000
Isobutyl Acetate	00110-19-0	--	565
heptan-2-one	00110-43-0	--	550

TABLE 14-2
Industrial Source Analysis Relevant DEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (µg/m³)	AGC (µg/m³)
Butyl Carbitol	00112-34-5	370	200
Trichloro Benzene	00120-82-1	3,700	35
Butyl Acetate	00123-86-4	71,300	565
Dioxane	00123-91-1	3,000	0.2
Heptane	00142-82-5	210,000	3,900
Sodium Cyanide	00143-33-9	380	3.5
Potassium Cyanide	00151-50-8	380	3.5
Xylene	01330-20-7	22,000	100
Sodium Hydroxide	01310-73-2	200	-----
Ethyl 3-Ethoxypropionate	0763-69-9	140	64
Hydrogen Chloride	07647-01-0	2,100	20
Hydrogen Fluoride	07664-39-3	5.6	0.071
Ammonia	07664-41-7	2,400	500
Sulfuric Acid	07664-93-9	120	1
Nitric Acid	07697-37-2	86	12.3
Chlorine	07782-50-5	116	0.2
Isobutyl Alcohol	00078-83-1	-----	360
Nitrogen Oxide	10102-43-9	-----	74
Distillate Heavy Parafinic	64742-65-0	-----	3,200
Solvent Naphtha	64742-89-8	--	3,200
Lead Vapors[(1)]	07489-42-1	0.15	--
Ligroine	08032-32-4	--	900
Miscellaneous Organic Compounds[(2)]	NY990-00-0	98,000	7,000
Respirable Particulate Matter (PM_{10})	NY075-00-0	150	--

Notes:
[(1)] NAAQS. Three-month rolling average.
[(2)] Since no SGC or AGC is assigned to this pollutant, it was modeled as isopropyl alcohol for evaluation purposes.
Source: *DEC, DAR-1 AGC/SGC Tables, February 2021*

In order to evaluate impacts of non-carcinogenic toxic air emissions, DAR-1 includes a methodology called the "hazard index" to characterize the cumulative risk from potential air toxic emissions. The hazard index is based on predicted annual concentrations and annual exposure limits. If the combined ratios of pollutant concentration divided by its respective annual exposure threshold for each of the toxic pollutants is found to be less than 2, no significant adverse air quality impacts are predicted to occur due to these pollutant releases.

In addition, DEC characterizes risks of non-criteria carcinogenic pollutants. According to DAR-1, an overall incremental cancer risk from a proposed action of less than one-in-one million is considered to be insignificant. The potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk 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 one-in-one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

Alternatively, if refined air dispersion modeling is used to estimate the maximum concentrations of pollutants, a threshold of 10-in-one-million excess cancer risk for non-criteria carcinogenic compounds can be used.

E. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

INTERSECTION SCREENING

An intersection screening analysis was conducted to determine potential for impacts from CO, and PM due to vehicular traffic anticipated to be generated by the Proposed Actions using the methodology set forth in the 2021 *CEQR Technical Manual*. Projected incremental traffic data were evaluated for each intersection in the traffic network. These data included project total and truck incremental traffic for each of the peak periods (weekday AM, MD, PM, and weekend).

For the CO screening, the total incremental increase in the number of project-generated trips at each intersection was compared with the 2021 *CEQR Technical Manual* of 170 vehicles. For the PM screening, the 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 screening worksheet referenced in Section 201 of the 2021 *CEQR Technical Manual* was utilized to calculate the number of heavy-duty truck equivalents at each intersection. 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*.[3] Roadway classifications were determined by corridor at each intersection, based on NYCDOT functional class criteria and With-Action traffic volumes. For the PM screening, all trucks that would be generated by the Proposed Actions were classified using the HDDV8B vehicle category, although the actual truck types associated with the Proposed Actions would consist of a mix of delivery and trailer trucks. All other vehicles were classified as LDGT1, which is considered most representative of the automobile category among the vehicle types listed in the worksheet.

The prediction of vehicle-generated emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configuration. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and physical configuration combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as

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

closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and since it is necessary to predict the reasonable worst-case condition, most dispersion analyses predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analyses for the Proposed Actions employ models approved by EPA that have been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could ensue from the Proposed Actions.

INTERSECTION ANALYSIS

VEHICLE EMISSIONS

Engine Emissions

Vehicular cruise and idle CO and $PM_{2.5}$ emission factors utilized in the dispersion modeling were computed using EPA's mobile source emissions model, Motor Vehicle Emission Simulator (MOVES4).[4] 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 were 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 were 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 included fugitive road dust. However, fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analyses, since the New York City Department of Environmental Protection (DEP) considers it to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[5] and the 2021 *CEQR Technical Manual*.

TRAFFIC DATA

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Actions (see **Chapter 13, "Transportation"**). Traffic data for the Future without the Proposed Actions

[4] EPA, Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015. Overview of EPA's Motor Vehicle Emission Simulator (MOVES5). EPA-420-R-23-019. August 2023.

[5] 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.

(the No-Action condition) and the With-Action condition were employed in the respective air quality modeling scenarios. The peak morning, midday, and evening period traffic volumes were used as a baseline for determining off-peak volumes for weekdays, and the peak Saturday period was used for weekend days. Off-peak traffic volumes in the No-Action condition, and off-peak increments from the Proposed Actions were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations. For annual impacts, average weekday and weekend 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

DISPERSION MODELING

Potential impacts from the Proposed Actions' mobile sources were predicted using the American Meteorological Society/EPA Regulated Model (AERMOD) Version 24142.[6] 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.[7]

The analysis was performed using an EPA line source representation of emission sources in order to simulate traffic-related air pollutant dispersion.[8] In addition, the weighted average release height and initial vertical source parameters were calculated for each modeled roadway.

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

METEOROLOGY

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

The AERMOD model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists 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.[9] The meteorological data provide hour-by-hour wind speeds and

[6] 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.
[7] EPA. Revisions to the Guideline on Air Quality Models: Final rule.89 FR 95043.
[8] 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
[9] DEC has stated that upper air measurements for 2022 are missing a significant number of days, consequently 2022 meteorological data is not being considered.

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 AERMOD model. The land uses around the site where meteorological surface data are available were 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 DEC, was used for the analysis.[10]

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

ANALYSIS YEAR

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

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant concentrations originating from distant sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of an analysis site. Background concentrations must be added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations 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 14-3**.

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

TABLE 14-3
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

Notes:
(1) *CO concentrations represent the maximum second-highest monitored concentrations from the three years of data.*
(2) *PM2.5 24-hour-average concentration represents the average of the 98th percentile day from three recent years of data.*
Source: *New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017-2019.*

$PM_{2.5}$ and CO concentrations were based on three recent years of monitored data (2017–2019)[11] 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 were used consistent with DEC guidance. 2020 and 2021 data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with DEP guidance.

ANALYSIS SITES

Intersections in the study area were reviewed for microscale analysis based on the 2021 *CEQR Technical Manual* guidance. Two intersections were selected for microscale analysis (see **Table 14-4**). These sites were selected because they are the locations in the study area projected to have the highest levels of project-generated traffic, and, therefore, where the greatest air quality impacts and maximum changes in concentrations would be expected. The potential impact from vehicle emissions of $PM_{2.5}$ was analyzed for each of these intersections, while CO concentrations were modeled at one of the intersections.

TABLE 14-4
Mobile Source Analysis Sites

Analysis Site	Location	Pollutants
1	East New York Ave. & Williams Ave.	CO and $PM_{2.5}$
2	Herkimer St. & Williams Pl.	$PM_{2.5}$

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected sites. Receptors were placed along the approach and departure links and roadway segments at regularly spaced intervals. Ground-level receptors were placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. Based on the DEP guidance for neighborhood-scale corridor $PM_{2.5}$ modeling, receptors in that analysis were placed at a distance of 15 meters, from the nearest moving lane at each analysis location.

[11] The 2020 and 2021 background data were not 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.

PARKING ANALYSIS

The Proposed Development would include parking garages at the future Projected Development Site 1D (68 spaces) and Projected Development Site 1E (106 spaces). Emissions from vehicles using the parking areas could potentially affect ambient levels of CO and $PM_{2.5}$ in the immediate vicinity in the With-Action condition. The parking garage at Projected Development Site 1E was analyzed since it has the maximum overall capacity and the maximum predicted number of vehicle ins/outs, and therefore, the highest potential incremental concentrations of pollutants.

An analysis of the emissions from the outlet vents and their dispersion in the environment was performed, calculating pollutant levels in the surrounding area, using the methodology set forth in the 2021 *CEQR Technical Manual*.

Emissions from vehicles entering, parking, and exiting the garage were estimated using the EPA MOVES5 mobile source emission model, as described in detail above for the analysis of emissions at intersections. 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. The concentrations of CO and PM within the garage were calculated assuming a minimum ventilation rate of one cubic foot per minute of fresh air per gross square foot of garage area, as referenced in the 2021 *CEQR Technical Manual*. To determine compliance with the NAAQS, CO concentrations were determined for the maximum eight-hour average period. (No exceedances of the one-hour standard would occur, and the eight-hour values are the most critical for impact assessment.)

To determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in EPA's Workbook of Atmospheric Dispersion Estimates, AP-26. This methodology estimates CO and PM concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit the facility. PM concentrations were determined peak daily (24-hour) use. Traffic data for the parking garage analysis was derived from the trip generation analysis provided in **Chapter 13, "Transportation."**

A persistence factor of 0.70 was used to convert the maximum 1-hour average CO concentrations to 8-hour averages, per 2021 *CEQR Technical Manual* guidance, and factors of 0.6 and 0.1 to convert maximum 1-hour $PM_{2.5}$ concentrations to 24-hour and annual averages, respectively, per EPA guidance,[12] accounting for meteorological variability over the longer averaging periods. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels for CO. The 24-hour average $PM_{2.5}$ background concentration was used to determine the *de minimis* criteria threshold.

[12] EPA. *AERSCREEN User's Guide*. EPA-454/B-21-005. April 2021.

ANALYSIS OF ATYPICAL ROADWAYS

A portion of the Project Area lies within 200 feet of an elevated section of 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. The effect of these existing roadways on the Proposed Development was therefore analyzed, as recommended in the 2021 *CEQR Technical Manual*.

Emission factors for CO and PM ($PM_{2.5}$ is the relevant pollutant for this analysis) were estimated using estimated speeds and volumes from information developed for the traffic analysis for the Proposed Actions under the Alternate Community Facility Scenario (see **Chapter 13, "Transportation"**) and vehicle classification data published by the New York State Department of Transportation (NYSDOT).[13] Receptors were placed at various locations and elevations on each of the buildings proposed to include residential uses within 200 feet of the atypical roadways to predict concentrations from vehicles. Receptors were also placed at pedestrian levels at locations where new open spaces would be located adjacent to these buildings.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the projected development sites' heat and hot water systems. In addition, an assessment was conducted to determine the potential for impacts due to industrial activities within the affected area, and from any nearby large or major emission sources.

HEAT 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 the evaluating potential air quality impacts associated with the Proposed Actions' RWCDS, it was conservatively assumed that each of the projected development sites would utilize natural gas-fired heating and/or hot water systems.

The analysis of fossil fuel-fired heating and hot water systems of the Proposed Development followed 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.

The analysis was performed using a refined dispersion model, the EPA/AMS AERMOD dispersion model. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about

[13] The ratio between passenger cars and passenger trucks calculated from the county-specific vehicle population data used in the NYSDEC inventory projections for 2020 was applied as an additional breakdown of the fraction coded as autos in the data published by NYSDOT.

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 EPA's preferred regulatory stationary source model.

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. The analyses of potential impacts from exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length, and elimination of calms. AERMOD can be run with and without building downwash (the downwash option accounts for the effects on plume dispersion created by the structure the stack is located on, and other nearby structures). In general, modeling "without" building downwash produces higher estimates of pollutant concentrations when assessing the impact of elevated sources on elevated receptor locations. Therefore, since the AERMOD analysis was performed to evaluate potential project-on-project and project-on-existing air quality impacts, the analysis was performed using the AERMOD model with the no downwash option only.

For the refined analysis, the exhaust stacks for the heat and hot water systems were assumed to be located at the edge of the development massing closest to the receptor, at an initial distance of 10 feet or greater from the nearest receptor. This included a minimum distance of 10 feet from the edge of the roof of the building where the stack was assumed to be located.

The refined dispersion modeling analysis was performed for $PM_{2.5}$ and NO_2. The analysis was performed using calculated emission rates for natural gas. If a source could not meet the NAAQS or $PM_{2.5}$ *de minimis* criteria using the initial heating and hot water system stack assumptions, further restrictive measures were considered, including setting the stack back, use of low NO_x burners, increasing stack height, or a combination of these measures.

EMISSION ESTIMATES AND STACK PARAMETERS

Fuel consumption was estimated based on the procedure outlined in the 2021 *CEQR Technical Manual*. Using information in the Air Quality Appendix of the 2021 *CEQR Technical Manual*, an estimate of the emissions from the Proposed Development's heating and hot water systems was made. The appendix includes tables which were used to estimate emissions based on the development size, type of fuel used and type of construction. A natural gas fuel consumption factor of 47.8 ft^3/ft^2-year and 36.1 ft^3/ft^2-year was used for residential and commercial developments, respectively. Mixed-use developments used the residential fuel consumption factors since they are more conservative. Short-term factors were determined by estimating peak hourly fuel consumption estimates for heating and cooling systems assuming that the calculated annual fuel consumption occurs over a 100-day heating season.

Emission factors from the natural gas combustion section of EPA's AP-42 were used to calculate emission rates for the projected development sites' heat and hot water systems.

To calculate exhaust velocity, the fuel consumption of the Proposed Development was multiplied by EPA's fuel factor for natural gas,[14] providing the exhaust flow rate at standard temperature; the flow rate was then corrected for the exhaust temperature, and exhaust velocity was calculated based on the stack diameter. Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data provided by DEP,[15] and were used to calculate the exhaust velocity.

The emission rates and exhaust stack parameters used in the modeling analyses are presented in **Table 14-5**.

TABLE 14-5
Exhaust Stack Parameters and Emission Rates – Heating and Hot Water Systems

Stack Parameter	Site 1A	Site 1B	Site 1C	Site 1D	Site 1E	Site 2
Building Floor Area (gsf)	5,904	208,440	278,828	299,304	612,407	120,954
Building Height (ft) (2)	20	265	300	350	280	175
Stack Height Above Building (ft)	3	3	3	3	3	3
Stack Height (ft)	23	268	303	353	283	178
Stack Diameter (ft) (1)	1.0	2.0	3.2	3.2	3.2	2.0
Exhaust Velocity (ft/min) (1)	33.7	362.8	185.1	199.4	311.9	212.6
Exhaust Temperature (degrees Fahrenheit) (1)	307.8	307.8	307.8	307.8	307.8	307.8
Emission Rate (grams/second)						
NO_2 (1-hour average)	1.24E-03	5.16E-02	6.89E-02	7.42E-02	1.16E-01	3.03E-02
NO_2 (Annual average)	3.07E-04	1.41E-02	1.89E-02	2.03E-02	3.18E-02	8.28E-03
$PM_{2.5}$ (24-hour average)	9.39E-05	3.92E-03	5.24E-03	5.64E-03	8.82E-03	2.30E-03
$PM_{2.5}$ (Annual average)	2.33E-05	1.07E-03	1.43E-03	1.55E-03	2.42E-03	6.29E-04

Notes:
(1) Stack parameter assumptions were obtained from a survey of boiler exhaust data provided by DEP.
(2) Building height is the highest roof level, excluding the bulkhead. Since bulkhead heights may change during actual construction, the modeling has been conservatively done by placing the stacks at the roof level.

One-hour average NO_2 concentration increments associated with the projected development sites' hot water systems were estimated using AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. The model applied ozone concentrations measured in 2015–2019 at the DEC Queens College monitoring station, which is the nearest ozone monitoring station to the project site.[16] An

[14] EPA. *Standards of Performance for New Stationary Sources.* 40 CFR Chapter I Subchapter C Part 60. Appendix A-7, Table 19-2. 2013.
[15] DEP. *Boiler Database*. August 11, 2017.
[16] 2020 and 2021 background data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with DEP guidance. 2022 and 2023 background data were not used since it needs to be paired with 2022/2023 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.

initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was 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 was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the seasonal hourly background monitored concentrations; then the highest combined daily one-hour NO_2 concentration was determined at each receptor location and the 98th percentile daily one-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally, the 98th percentile concentrations were averaged over the latest five years. This methodology is referenced in EPA modeling guidance[17] and is recognized by the City.

Annual NO_2 concentrations from heating and hot water sources were estimated using the Tier 1 method, which conservatively assumes a full conversion of NO_2 to NO_x.[18]

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 14-6**). To develop background levels, concentrations measured at the most representative DEC ambient monitoring station a recent three-year period (2017–2019) were used for annual and 1-hour average NO_2 background concentrations. The 2020 and 2021 background data were not 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.

TABLE 14-6
Maximum Background Pollutant Concentrations

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

Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.

$PM_{2.5}$ 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) was used to establish the *de minimis* value for the 24-hour increment, consistent with the guidance provided in the 2021 *CEQR Technical Manual*.

[17] Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard, EPA, March 1, 2011.
[18] Appendix W to Part 51, *Guideline on Air Quality Models*, Section 4.2.3.4.

METEOROLOGICAL DATA

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at the JFK Airport NWS Station (2015–2019), and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

RECEPTOR PLACEMENT

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed building façades to represent potentially sensitive locations such as operable windows and intake vents. Receptors were placed at elevated locations on all façades and at multiple elevations on buildings, to identify maximum pollutant concentrations. Generally, receptors would be spaced at a three-meter (approximately 10 feet) interval vertically to represent individual floors of a building, while horizontally, receptor spacing would be a minimum of three meters and a maximum of 10 meters (approximately 33 feet).

INDUSTRIAL SOURCES

ANALYSIS OF POTENTIAL IMPACTS FROM EXISTING USES

Pollutants emitted from existing sources were examined to identify potential adverse impacts on future residents of the proposed buildings. All industrial air pollutant emission sources within 400-feet of a projected development site boundary were considered for inclusion in the air quality impact analyses.

A request was made to DEP's Bureau of Environmental Compliance (BEC) for information regarding the release of air pollutants from these potential sources within the entire study area. A comprehensive search was also performed to identify DEC Title V and State Facility permits. The DEP and DEC air permit data provided was compiled into a database of source locations, air emission rates, and other data pertinent to determining source impacts.

A field survey was conducted on October 21, 2024, to determine the operating status of permitted industries and identify any potential industrial sites not included in the original permit request or the permit databases. Overall, one DEC registered source was identified and determined to be currently in operation. In addition, four unpermitted sources were identified. These facilities are summarized in **Table 14-7**.

TABLE 14-7
Industrial Sources within 400-Feet of the Project Area

Name of Business	Address	Type of Business	Permit ID
DEC Registered Facilities			
Best Service Auto Body	20 Williams Avenue	Autobody Shop	2-6105-00815/00001
Unpermitted Sources			
J Stone Design	2432 Atlantic Avenue	Stone Cutting	N/A
Z Studios Custom Metal Fabrication	30 Havens Place	Metal Fabrication	N/A
A&E Custom Ironworks	2509 Atlantic Avenue	Ironworks	N/A
Good Sign Power Signs & Print	38 Alabama Avenue (1)	Printing	N/A

Notes:
N/A – Not Applicable
(1) A DEP permitted business was previously identified at this address, but it is no longer operating at this location; therefore, it was not analyzed.

For the business that performs automotive paint spraying, representative information for a permitted automotive paint spraying operation that lists individual air toxic compounds was used as a basis to estimate the speciated solvent emissions.[19] The solvent usage from the source permits were multiplied by the weight percentage for each air toxic to estimate the maximum emission rate for the air toxics, by source.

Table 14-8 summarizes weight percentages of VOCs for representative automotive coatings. For short-term modeling, the highest weight percentage associated with each VOC was used, to be conservative.

[19] DEP Permit ID PW000319.

TABLE 14-8
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.*

For annual average modeling, a prorated emission rate of each VOC was determined based on the reported quantities of each product used in the example air permit and the weight percentage for VOC in each product.

Percentages by weight of solids found in representative auto spray primers and paints were 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.[20] The proportion of a solid in a paint by weight is representative of its proportion in the emissions.

[20] 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.

Solvent usage was obtained from the permit data. Solvent usage was 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 was used. This representative solvent usage as well as the weight percentages of the air toxics was also used to estimate emissions at facilities that do not possess either a DEP permit or DEC registration and were determined to perform auto-body related spray coating.

The pollutants and emission rates for each facility analyzed are presented in **Table 14-9**.

TABLE 14-9
Facility Pollutants and Emission Rates

Facility	Description of Process	Pollutant Name	CAS No.:	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Best Service Autobody	Autobody Paint Spray Booth	Solids	NY079-00-0	0.0055	26
		PM_{10} (2)	NY075-00-0	0.00257	12.14
		$PM_{2.5}$ (2)	NY075-02-5	0.00157	7.44
		Toluene	*108-88-3*	*0.39*	143.65
		Ethylbenzene	*100-41-4*	*0.018*	7.42
		Acetone	*67-64-1*	*0.60*	191.64
		2-Methoxy-1-methylethyl acetate	*108-65-6*	*0.12*	41.34
		Methylcyclohexane	*108-87-2*	*0.081*	24.45
		Heptane	*142-82-5*	*0.21*	70.14
		Isobutyl Acetate	*110-19-0*	*0.086*	30.06
		Isopropyl Alcohol	67-63-0	0.043	15.03
		n-butyl acetate	123-86-4	0.75	410.01
		Butanone	78-93-3	0.25	68.92
		Ethyl 3-Ethoxypropionate	763-69-9	0.046	14.42
		Solvent Naphtha	64742-89-8	0.040	10.02
		Benzyl butyl phthalate	85-68-7	0.026	9.41
		2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.013	4.70
		Ligroine	8032-32-4	0.073	40.50
		Xylenes	1330-20-7	0.103	41.69
		4-methylpentan-2-one	108-10-1	0.010	4.89
		heptan-2-one	110-43-0	0.0034	1.69
J Stone Design (3)	Stone Cutting	Particulate Matter	NY075-00-0	0.0033	28
Goodsign Power Signs & Print (4)	Printing	Lead Vapors	7489-42-1	0.001	0.75
		Miscellaneous Organic Compounds	NY990-00-0	0.001	0.75
Z Studios Custom Metal Fabrication (5)	Metal Fabrication	Particulate Matter	NY075-00-0	0.02	96
A&E Custom Ironworks (6)	Iron Works	1,1,2-Trichloroethane	00079-00-5	0.53	53
		Dioxane	00123-91-1	0.014	14
		1,2-Epoxybutane	00106-88-7	0.003	0.3

TABLE 14-9
Facility Pollutants and Emission Rates

Facility	Description of Process	Pollutant Name	CAS No.:	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
		Isopropyl Alcohol	00067-63-0	0.96	48

Notes:

(1) *Emissions for particulate matter were modeled over a 24-hour averaging period*

(2) *Particulate matter for auto body paint spray booths assumes 28.6% of total particulate matter is $PM_{2.5}$ (EPA. Compilations of Air Pollutant Emission Factors AP-42. Appendix B-1, Table 4.2.2.8. https://www3.epa.gov/ttn/chief/ap42/appendix/appb-1.pdf. October 1986.)*

(3) *Emissions for this source are from Melrose Concourse EAS (22HPD009X), 2023.*

(4) *Emissions for this source are from* A&D Printing (DEP Permit PA005388).

(5) *Emissions for this source are from Vogue Metal Crafting Company (DEP Permit PA112072).*

(6) *Emissions for this source are from Jamaica Iron Works (DEP Permit PA016676).*

REFINED DISPERSION ANALYSIS

After compiling the information on facilities with manufacturing or process operations in the study area, maximum potential pollutant concentrations from the emission sources were determined using the EPA AERMOD refined dispersion model. The AERMOD model was run using the same model assumptions and options as described earlier for the refined modeling of heating and hot water systems.

To assess the effects of multiple sources emitting the same pollutants, cumulative source impacts were determined. Predicted worst-case impacts on the projected development sites were compared with the short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) recommended in DEC's DAR-1 AGC/SGC Tables. These guidelines present the airborne concentrations that are applied as a screening threshold to determine if the future residents of the projected development sites could be significantly impacted by nearby sources of air pollution.

Discrete receptors (i.e., locations at which concentrations were calculated) were placed on the potentially affected projected development sites. The receptor network consisted of receptors located at spaced intervals along the sides of the projected development sites from the ground floor to the upper level.

Emission rates and stack parameters, obtained from the DEP permits, were input into the AERMOD dispersion model. For industrial sources where stack parameters were not available, default values referenced in the 2021 *CEQR Technical Manual* were used. Where the stack exhaust location was not known, it was assumed to be located at the center of the roof.

HEALTH RISK ASSESSMENT

Potential cumulative impacts were 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 Alternate Community Facility Scenario includes 113,760 gross square feet (gsf) of industrial uses (including 13,450 gsf at Projected Development Site 1B and up to 98,483 gsf at Projected Development Site 1E). Therefore, potential impacts from pollutant emissions from manufacturing that would be co-located within the same building with sensitive receptors, and of manufacturing uses on nearby sensitive receptors in other proposed buildings, were evaluated.

USES

Air emissions were analyzed from potential manufacturing uses that would be permitted and reasonably could locate in the Proposed Development, to assess their potential impacts on the potential sensitive uses in the district as well as in the surrounding areas. 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.[21] 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 14-10**, along with the buildings that were assumed to include these uses.

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

TABLE 14-10
Industrial Uses Categories Analyzed

Building	Use
1B, 1E	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 in the proposed development, a detailed review of permitted emissions was performed. DEP air permit records were reviewed and permitted facilities representing uses considered as foreseeable in the Proposed Development 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).[22] 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 within the Alternate Community Facility Scenario. 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 GSD developments. 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 accounted for facilities that have multiple permits. For these facilities, the emission sources from the permitted emission sources were assumed to be co-located, and for processes that have the same pollutant, potential air quality impacts was determined on an additive (cumulative) basis by facility. All of the use group types identified were assumed to be located in the future building on Projected Development Site 1E, while for the future building on Projected Development Site 1B, only certain use group sources were modeled, since it would only contain up to 13,450 gsf of floor area.

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

A summary of emissions profiles developed for the industrial source analysis is presented in **Table 14-11**. 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. A complete summary of the emission values used in the analysis for each of the analyzed use groups is presented in **Appendix F**.

TABLE 14-11
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	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 Benzene	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	1792.6
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	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	---	998.00
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 for the building on Projected Development Site 1E and five selected uses for the building on Projected Development Site 1B. Modeled stacks used emission rates associated with a single use and were similar or less than the emission rates presented.

DISPERSION ANALYSIS

Industrial sources of emissions were analyzed using the 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 the projected developments. The industrial sources were modeled at the future buildings on Projected Development Site 1E and Projected Development Site 1B. Since the specific locations and emission characteristics of the potential industrial sources of emissions are not known, the analysis was performed using a variety of source locations at the closest allowable distance from Projected Development Sites 1B and 1E to future sensitive uses on the other buildings on the projected development sites, as well as on off-site, on all façades and at multiple elevations. Additional locations were modeled as needed to assess the need for potential stack location restrictions.

Emissions from each use group were analyzed to determine potential air toxics concentrations at nearby projected development sites, as well as nearby neighborhood locations. The analysis initially assumed 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 were 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 were placed at various façades and elevations of nearby buildings, and at ground level locations. If the initial results were found to exceed DEC SGCs or AGCs, the stacks were required to vent to the top roof of the building, or moved further away from the nearest residential receptors.

Exhaust parameters were developed based on the DEP permit records used to develop the emissions profiles shown in **Table 14-11**. 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 Alternate Community Facility Scenario would include exhaust stacks that would incorporate exhaust velocity. Therefore, the median exhaust velocity and stack diameter was used to represent exhaust parameters from allowed uses.

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

HEALTH RISK ASSESSMENT

Potential cumulative impacts from potential light industrial sources associated with the Proposed Actions were evaluated based on the Hazard Index Approach for non-carcinogenic compounds and risk factors for carcinogenic compounds as described earlier.

CUMULATIVE EMISSIONS ANALYSIS

Potential effects from the existing industrial sources and the potential light industrial sources were analyzed on a cumulative basis.

The EPA's AERMOD refined dispersion model was used to estimate the short-term and annual concentrations of critical pollutants at sensitive receptor locations. The analysis was performed using the same model options described above for the analysis of the proposed demand response engines.

EMISSION ESTIMATES AND STACK PARAMETERS

Emission rates and stack parameters for the existing and proposed light industrial sources were each consistent with the values determined for the separate analysis of these systems (see **Tables 14-9** and **14-11**, respectively). Note that only six air pollutants were found to be associated with each of the source categories—toluene, butyl acetate, isopropyl alcohol, acetone, MEK, and PM_{10}.

RECEPTOR PLACEMENT

Discrete receptors were modeled along proposed and existing building façades to represent potentially sensitive locations such as operable windows and intake vents. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations.

ADDITIONAL SOURCES

The 2021 *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a "large" or "major" emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant

Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the projected development sites, a review of existing permitted facilities was conducted. Sources of information reviewed included EPA's Envirofacts database, the DEC Title V and State Facility Permit websites, the New York City Department of Buildings website, and DEP permit data.

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 was performed to assess the potential effects on the projected development sites located within 1,000 feet of this facility.

The AERMOD dispersion model was used in the analysis, with the same meteorological data and background concentrations used for the heating and hot water system analysis. In addition, as described in the methodology for the analysis of heating and hot water sources, total 1-hour NO_2 concentrations were determined using the EPA Tier 3 approach.

The facility emissions for NYCT East New York Bus Depot were determined from the most recent DEC permit modification application. The facility operates three regulated boilers that operate on natural gas. **Table 14-12** presents the emission rates and the stack parameters used in the AERMOD analysis.

TABLE 14-12
Stack Parameters and Emission Rates from the NYCT East New York Bus Depot

Parameter	
No. of Sources	3 Boilers
Maximum Total Capacity	47.3 MMbtu/hr
Stack Height (ft) [(1)]	67
Stack Diameter (ft) [(1)]	3
Exhaust Flow Rate (m/s) [(2)]	6.9
Exhaust Temperature (°F) [(2)]	520
Fuel Type	Natural Gas
NO_x Short Term Emission Rate (g/s)	0.1404
NO_x Annual Emission Rate (g/s)	0.1404
$PM_{2.5}$ Short Term Emission Rate (g/s)	0.0053
$PM_{2.5}$ Annual Emission Rate (g/s)	0.0053
Note: [(1)] Includes 1 boiler on standby.	

F. EXISTING CONDITIONS

The representative criteria pollutant concentrations measured in recent years at DEC air quality monitoring stations nearest to the Project Area are presented in **Table 14-13**. The values presented are consistent with the form of the NAAQS. As shown in the table, the recently monitored levels did not exceed the NAAQS, with the exception of the 8-hour ozone NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the stationary source and mobile source analyses, since these are recently reported monitored values, rather than more

conservative values used for dispersion modeling. The concentrations presented in **Table 14-13** provide a comparison of the air quality in the Project Area with the NAAQS, while background concentrations are obtained from several years of monitoring data and represent a conservative estimate of the highest concentrations for future ambient conditions.

TABLE 14-13
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College	ppm	1-hour	1.7	35
	Queens College		8-hour	1.3	9
SO_2	Queens College	µg/m^3	1-hour	13.1	196
PM_{10}	Queens College	µg/m^3	24-hour	36	150
$PM_{2.5}$	JHS 126	µg/m^3	Annual	8.1	9
			24-hour	20.1	35
NO_2	Queens College	µg/m^3	Annual	25.3	100
	Queens College		1-hour	99.0	188
Lead	IS 52	µg/m^3	3-month	0.0049	0.15
Ozone	Queens College	ppm	8-hour	0.073	0.070

Notes:

(1) The CO and PM10 concentrations represent the second-highest value from 2023.

(2) PM2.5 annual concentrations are the average of 2021–2023 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentile concentrations in the same period.

(3) The SO2 1-hour and NO2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively.

(4) The ozone concentration is based on the 3-year average (2021–2023) of the 4th highest daily maximum 8-hour average concentrations.

Source: *New York State Air Quality Report Ambient Air Monitoring System, DEC, 2021–2023.*

G. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO-ACTION CONDITION)

MOBILE SOURCES

CO concentrations in the 2036 No-Action condition were determined using the methodology previously described. **Table 14-14** shows future maximum predicted 8-hour CO concentrations, including background concentrations, at the analysis intersections in the No-Action condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

TABLE 14-14
Maximum Predicted 8-Hour Average CO No-Action Concentrations

Analysis Site	Location	8-Hour Concentration (ppm)
1	East New York Ave. & Williams Ave.	1.4
2	Herkimer St. & Williams Pl.	1.2

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.2 ppm.

$PM_{2.5}$ concentrations for the No-Action condition are not presented, since impacts are assessed on an incremental basis.

STATIONARY SOURCES

In the No-Action condition, the identified projected development sites are assumed to either remain unchanged from existing conditions, or become occupied by uses that are as-of-right under existing zoning and reflect current trends that are deemed likely to support more active uses. The Proposed Actions would likely result in more development, and therefore, the emissions from heat and hot water systems associated with the Proposed Actions would cumulatively be greater than the emissions from heat and hot water systems under the No-Action condition, although the increase would be affected due to the requirements to reduce fossil fuel usage established under Local Law 97 and Local Law 154.

H. THE FUTURE WITH THE PROPOSED ACTIONS (WITH-ACTION CONDITION)

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations for the Proposed Actions were predicted using the methodology previously described. **Table 14-15** shows the future maximum predicted 8-hour average CO concentrations at the intersections studied. The values shown are the highest predicted concentrations. The results indicate that the Proposed Actions under the Alternate Community Facility Scenario would not result in any violations of the 8-hour CO NAAQS. In addition, the incremental increases in 8-hour average CO concentrations are small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria. Therefore, mobile source CO emissions from the Alternate Community Facility Scenario would not result in a significant adverse air quality impact.

TABLE 14-15
Maximum Predicted 8-Hour CO With-Action Concentrations (ppm)

Analysis Site	Location	No-Action	With-Action	De Minimis
1	East New York Ave. & Williams Ave.	0.16	0.62	3.8
2	Herkimer St. & Williams Pl.	0.04	0.21	3.8

Notes:
8-hour standard is 9 ppm.
Concentration includes a background concentration of 1.2 ppm.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations were calculated so that they could be compared with the NAAQS and the *de minimis* criteria, respectively. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 14-16** and **14-17**, respectively. **Tables 14-16** and **14-17** also present the maximum predicted concentrations in the No-Action and With-Action conditions. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

TABLE 14-16
Maximum Predicted 24-Hour Average $PM_{2.5}$ With-Action and Incremental Concentrations ($\mu g/m^3$)

Analysis Site	Location	No-Action	With-Action	Increment	De Minimis Criterion
1	East New York Ave. & Williams Ave.	-	-	3.37	8.6 (1)
		20.75 (2)	22.09 (2)	-	35 (3)
2	Herkimer St. & Williams Pl.	-	-	3.14	8.6 (1)
		18.75 (2)	20.30 (2)	-	35 (3)

Notes:
(1) *$PM_{2.5}$ de minimis criterion—24-hour average, not to exceed more than half the difference between the background concentration (17.8 $\mu g/m^3$) and the 24-hour standard of 35 $\mu g/m^3$.*
(2) *The 24-hour $PM_{2.5}$ concentration presented represents the maximum of the total 98th percentile. Concentrations presented include a background concentration of 17.8 $\mu g/m^3$.*
(3) *NAAQS.*

TABLE 14-17
Maximum Predicted Annual Average $PM_{2.5}$ With-Action and Incremental Concentrations ($\mu g/m^3$)

Analysis Site	Location	No-Action	With-Action	Increment	*De Minimis* Criterion
1	East New York Ave. & Williams Ave.	-	-	0.23	0.1 (1)
		7.75 (2)	7.97 (2)	-	9 (3)
2	Herkimer St. & Williams Pl.	-	-	0.097	0.1 (1)
		7.63 (2)	7.72 (2)	-	9 (3)

Notes:
(1) *$PM_{2.5}$ de minimis criterion—annual (neighborhood scale), 0.1 $\mu g/m^3$.*
(2) *Concentrations presented include a background concentration of 7.0 $\mu g/m^3$.*
(3) *NAAQS.*

The results in **Table 14-16** show that the 24-hour $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion and total concentrations are below the NAAQS at each of the analysis sites. As shown in **Table 14-17**, total concentrations are below the NAAQS at each of the analysis sites. However, at

one of the two intersection sites analyzed, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion. This would be considered a significant adverse air quality impact in the absence of traffic mitigation measures (see **Chapter 20, "Mitigation"**).

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking garage at Projected Development Site 1E was analyzed, assuming a receptor on the façade of the building, a near side sidewalk receptor on the same side of the street (seven feet) as the parking facility, and a far side sidewalk receptor on the opposite side of the street from the parking facility.

The maximum predicted eight-hour average CO concentration of all the receptors modeled for the analyzed parking facility is 1.4 ppm. This value includes a predicted concentration of 0.2 ppm from emissions within the parking garage and a background level of 1.2 ppm. The maximum predicted concentration is substantially below the applicable standard of 9 ppm and the *de minimis* CO criteria.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 0.70 $\mu g/m^3$ and 0.065 $\mu g/m^3$, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 8.6 $\mu g/m^3$ for the 24-hour average concentration and 0.3 $\mu g/m^3$ for the annual concentration. Therefore, the proposed parking garage at Projected Development Site 1E would not result in any significant adverse air quality impacts.

ANALYSIS OF ATYPICAL ROADWAYS

As described in Section E, an analysis was undertaken to determine maximum CO and PM concentrations on each of the buildings proposed to include residential or commercial uses from vehicle emissions along the nearby elevated portion of Atlantic Avenue and the below grade portion of East New York Avenue.

CARBON MONOXIDE

The maximum predicted 1-hour and 8-hour average CO concentrations are presented in **Table 14-18**. The results show that maximum With-Action CO concentrations at the Proposed Development near the elevated highway would be well below the 1-hour and 8-hour CO NAAQS in the 2036 With-Action condition.

TABLE 14-18
Maximum Predicted 8-Hour Average CO Concentrations from the Atypical Roadways on the Proposed Development

Averaging Period	Maximum Total Concentration (ppm)	NAAQS (ppm)
1-Hour	1.8	35
8-Hour	1.3	9

Note: Total concentration includes a background concentration of 1.72 ppm for the 1-hour averaging period and 1.2 ppm for the 8-hour averaging period.

PARTICULATE MATTER

PM concentrations at the buildings proposed to include residential or commercial uses within 200 feet due to vehicle emissions along the atypical roadways were determined for the With-Action condition using the methodology previously described. Since the analysis is for an existing emissions

source, the emissions do not represent an increase due to the Proposed Development; therefore, the maximum total concentration (including the background concentrations) are presented. **Tables 14-19** and **14-20** present the With-Action maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations on the Proposed Development, respectively.

TABLE 14-19
Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations from Atypical Roadways on the Proposed Development

Concentration (µg/m³)	NAAQS
19.7	35
Note: Concentration includes a background concentration of 17.8 µg/m³.	

TABLE 14-20
Maximum Predicted Annual Average $PM_{2.5}$ from Atypical Roadways on the Proposed Development

Concentration (µg/m³) (1)	NAAQS
8.4	9
Note: (1) Concentration includes a background concentration of 7.6 µg/m³.	

The results show that maximum With-Action $PM_{2.5}$ concentrations at the Proposed Development near the elevated highway would be below the 24-hour and annual $PM_{2.5}$ NAAQS in the 2036 With-Action condition.

STATIONARY SOURCES

HEAT AND HOT WATER SYSTEMS

As described previously, a refined dispersion modeling analysis of potential fossil fuel-fired heating and hot water systems was prepared. **Tables 14-21** and **14-22** present the maximum predicted concentrations from the Proposed Development's demand response engines on the projected development sites and off-site locations, respectively.

TABLE 14-21
Maximum Modeled Pollutant Concentrations on the Projected Development Sites from Heating and Hot Water Systems (µg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background	Total Concentration	Criterion
NO_2	1-hour	124.4 (1)	N/A	124.4	188 (2)
	Annual	2.9	28.7	31.6	100
$PM_{2.5}$	24-hour	8.4	N/A	8.4	8.6 (3)
	Annual	0.22	N/A	0.22	0.3 (4)

Notes: N/A – Not Applicable.
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 µg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

TABLE 14-22
Maximum Modeled Pollutant Concentrations on Off-Site Locations from Heating and Hot Water Systems (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Concentration	Background	Total Concentration	Criterion
NO_2	1-hour	97.4 (1)	N/A	97.4	188 (2)
	Annual	0.6	28.7	29.3	100
$PM_{2.5}$	24-hour	0.5	N/A	0.5	8.6 (3)
	Annual	0.04	N/A	0.04	0.3 (4)

Notes: N/A – Not Applicable.
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 μg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

To ensure that there is no potential for significant adverse impacts of $PM_{2.5}$ or NO_2 from the Proposed Development's heating and hot water system emissions, certain restrictions would be required through an Air Quality (E) designation (E-857) that would be placed on the projected development sites. These restrictions were assumed in the analysis results presented in **Tables 14-21** and **14-22** and would avoid the potential for significant air quality impacts from stationary sources based on the conservative assumptions used in the analysis.

The restrictions would be as follows:

Projected Development Site 1A (Block 1555, Lot 19)

To avoid any potential significant air quality impacts, in the event a new development on Projected Development Site 1A (Block 1555, Lot 19) utilizes fossil fuel-fired heating and hot water equipment, it may only use natural gas for such equipment, and the stack(s) for such a system must be located at least 23 feet above grade. If a new development on this site utilizes electric equipment for its heating and hot water systems, the aforementioned stack location restrictions would not apply.

Projected Development Site 1B (Block 1576, Lots 1 and 34)

To avoid any potential significant air quality impacts, in the event a new development on Projected Development Site 1B (Block 1576, Lots 1 and 34) utilizes fossil fuel-fired heating and hot water equipment, it may only use natural gas for such equipment, and the stack(s) for such a system must be located at least 268 feet above grade and at least 55 feet from the eastern lot line of Lot 1. If a new development on this site utilizes electric equipment for its heating and hot water systems, the aforementioned stack location restrictions would not apply.

Projected Development Site 1C (Block 1577, Lots 17 and 26)

To avoid any potential significant air quality impacts, in the event a new development on Projected Development Site 1C (Block 1577, Lots 17 and 26) utilizes fossil fuel-fired heating and hot water equipment, it may only use natural gas for such equipment, and the stack(s) for such a system must be located at least 303 feet above grade and at least 20 feet from the southern lot line of Lot 17. If a new development on this site utilizes electric equipment for its heating and hot water systems, the aforementioned stack location restrictions would not apply.

Projected Development Site 1D (Block 1577, Lots 32, 35, 51 and 53)

To avoid any potential significant air quality impacts, in the event a new development on Projected Development Site 1D (Block 1577, Lots 32, 35, 51 and 53) utilizes fossil fuel-fired heating and hot water equipment, it may only use natural gas for such equipment, and the stack(s) for such a system must be located at least at least 353 feet above grade. If a new development on this site utilizes electric equipment for its heating and hot water systems, the aforementioned stack location restrictions would not apply.

Projected Development Site 1E (Block 1577, Lots 1, 7, 56 and 58)

To avoid any potential significant air quality impacts, in the event a new development on Projected Development Site 1E (Block 1577, Lots 1, 7, 56 and 58) utilizes fossil fuel-fired heating and hot water equipment, it may only use natural gas for such equipment, and the stack(s) for such a system must be located at least 283 feet above grade and at least 166 feet away from the tallest tiers of Projected Development Site 1D on Lots 32, 35, 51 and 53. If a new development on this site utilizes electric equipment for its heating and hot water systems, the aforementioned stack location restrictions would not apply.

Projected Development Site 2 (Block 1576, Lot 9)

To avoid any potential significant air quality impacts, in the event a new development on Projected Development Site 2 (Block 1576, Lot 9) utilizes fossil fuel-fired heating and hot water equipment, it may only use natural gas for such equipment, and the stack(s) for such a system must be located at least 178 feet above grade and at least 55 feet away from the tallest tiers of Projected Development Site 1B on Lots 1 and 34. If a new development on this site utilizes electric equipment for its heating and hot water systems, the aforementioned stack location restrictions would not apply.

INDUSTRIAL SOURCES

ANALYSIS OF POTENTIAL IMPACTS FROM EXISTING USES

As discussed above, a study was conducted to analyze industrial uses within 400-feet of the projected development sites. DEP-BEC and DEC permit databases were used to identify existing sources of emissions. A total of five facilities were analyzed. The information from these permits (emission rates, stack parameters, etc.) were input to the AERMOD dispersion model.

Table 14-23 presents the maximum predicted pollutant concentrations at the projected development sites using the AERMOD refined dispersion model. The table also lists the SGC and AGC for each air toxic pollutant. As presented in the table, maximum concentrations for each air toxic compound were predicted to be below the thresholds. The industrial source analysis did not predict any potential significant adverse air quality impacts on the Proposed Development from existing industries in the area.

TABLE 14-23
Maximum Modeled Impacts on the Projected Development Sites from Existing Industrial Sources

Pollutant	CAS Number	AERMOD Model Short-Term Impact (µg/m³)	SGC (µg/m³)	AERMOD Model Annual Impact (µg/m³)	AGC (µg/m³)
Ethylbenzene	100-41-4	--	--	0.011	1,000
Epoxybutane, 1,2-	106-88-7	2.26	3,000	0.001	20
2-Pentanome, 4-Methyl =MIBK	108-10-1	3.92	31,000	0.0069	3,000
Methoxypropylacetate	108-65-6	47.85	36,850	0.058	2,000
Methylcyclohexane	108-87-2	--	--	0.034	3,800
Toluene	108-88-3	156.31	37,000	0.20	5,000
Isobutyl Acetate	110-19-0	34.77	71,300	0.042	565
Methyl Amyl Ketone	110-43-0	--	--	0.0024	550
Dioxane	123-91-1	10.54	3,000	0.039	0.2
Butyl Acetate	123-86-4	301.14	71,300	0.58	565
Xylene	1330-20-7	41.15	22,000	0.06	100
Heptane, N-	142-82-5	95.70	210,000	0.10	3,900
Naphtha Light Aliphatic	64742-89-8	--	--	0.014	3,200
Isopropyl Alcohol	67-63-0	718.87	98,000	0.15	7,000
Acetone	67-64-1	242.44	180,000	0.27	30,000
Lead Vapors	7489-42-1	0.0026	0.15	--	--
Ethyl 3-Ethoxypropionate	763-69-9	18.44	140	0.020	64
MEK	78-93-3	101.44	13,000	0.097	5,000
Trichloroethane, 1,1,2-	00079-00-5	--	--	0.15	1.4
Petroleum Ether	8032-32-4	--	--	0.06	900
Butyl Benzyl Phthalate	85-68-7	--	--	0.01	0.42
VOC [2]	NY998-00-0	0.10	98,000	1.50E-04	7,000
$PM_{2.5}$	NY075-02-5	18.18	35	7.66	9
PM_{10}	NY075-00-0	34.09	150	--	--

Notes:
[1] *Conservatively assumes all particulate emissions would be $PM_{2.5}$. Federal 24-hour and annual standard for $PM_{2.5}$ used.*
[2] *Modeled as Isopropyl Alcohol.*
Source: *DEC, DAR-1 AGC/SGC Tables, February 2021.*

HEALTH RISK ASSESSMENT

Cumulative impacts were also determined for the combined effects of multiple air contaminants in accordance with the approach described in Section E. Using the predicted concentrations of each pollutant, the maximum hazard index and total cancer risk was calculated for each projected development site associated with the Proposed Actions. The hazard index approach was used to determine the effects of multiple non-carcinogenic compounds and the cancer risk factors were used to determine the effects of carcinogenic compounds. **Table 14-24** and **Table 14-25** present the results of the assessment of cumulative non-carcinogenic and carcinogenic effects on the Proposed Actions' RWCDS, respectively. The estimated pollutant concentrations and the concentration to AGC pollutant

ratios presented in the tables represent the values at the receptor location where the maximum cumulative results were predicted and consequently are in most cases different than the overall maximum values presented in **Table 14-24**. As shown in **Table 14-25**, the maximum hazard index at an individual receptor location is less than 2.0, the level considered by DEC's DAR-1 to be significant. Therefore, based upon the cumulative air toxics analyses, the Proposed Actions would not result in a significant hazard associated with existing industrial uses.

TABLE 14-24
Estimated Maximum Hazard Index – Existing Industrial Uses

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m³)	AGC (µg/m³)	Concentration to AGC Pollutant Ratio
Non-Carcinogenic Compounds				
Ethylbenzene	100-41-4	0.011	1,000	1.07E-05
Epoxybutane, 1,2-	00106-88-7	0.001	20	4.25E-05
2-Pentanome, 4-Methyl =MIBK	108-10-1	0.007	3,000	2.29E-06
Methoxypropylacetate	108-65-6	0.058	2,000	2.88E-05
Methylcyclohexane	108-87-2	0.034	3,800	8.98E-06
Toluene	108-88-3	0.20	5,000	4.09E-05
Isobutyl Acetate	110-19-0	0.042	565	7.42E-05
Methyl Amyl Ketone	110-43-0	0.002	550	4.33E-06
Butyl Acetate	123-86-4	0.58	565	1.02E-03
Xylene	1330-20-7	0.058	100	5.85E-04
Heptane, N-	142-82-5	0.098	3,900	2.52E-05
Naphtha Light Aliphatic	64742-89-8	0.014	3,200	4.39E-06
Isopropyl Alcohol	67-63-0	0.15	7,000	2.10E-05
Acetone	67-64-1	0.27	30,000	9.10E-06
Ethyl 3-Ethoxypropionate	763-69-9	0.020	64	3.15E-04
MEK	78-93-3	0.097	5,000	1.93E-05
Trichloroethane, 1,1,2-	00079-00-5	0.15	1	1.07E-01
Petroleum Ether	8032-32-4	0.057	900	6.31E-05
VOC [1]	NY998-00-0	1.50E-04	7,000	2.14E-08
			Total Hazard Index	0.11
			Hazard Index Threshold Value	2.0

Note:
[1] *Modeled as Isopropyl Alcohol.*
Source: *DEC, DAR-1, February 2021.*

TABLE 14-25
Estimated Maximum Cancer Risk – Existing Industrial Uses

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m³)	AGC (µg/m³)	Concentration to AGC Pollutant Ratio
Carcinogenic Compounds				
Butyl Benzyl Phthalate	85-68-7	0.013	0.42	0.031
Dioxane	00123-91-1	0.039	0.20	0.197
			Total Cancer Risk	0.228
			Cancer Risk Threshold Value	10.0

Source: *DEC, DAR-1, February 2021.*

ANALYSIS OF POTENTIAL IMPACTS FROM FUTURE USES

The results of the AERMOD model were used to predict the worst-case potential air toxics concentrations from the use groups that would be permitted in the Alternate Community Facility Scenario at modeled receptor locations. The unitary concentrations (µg/m^3 per g/s) were multiplied by the emission rates obtained from the emissions profile to determine. The results were compared with the SGC and AGC values reported in the DEC's DAR-1 guidance document to determine the potential for significant impacts.[23] For each source location modeled, pollutants that were modeled to exceed AGCs and/or SGCs are summarized, along with the affected receptors.

A summary of the analysis results is presented in **Tables 14-26** and **14-27**. A complete summary of the modeled concentrations for each pollutant for each of the analyzed use categories is presented in **Appendix F**.

A description of the requirements of those (E) designations are found in **Appendix F**.

[26] 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 Annual and Short-Term Guideline Concentrations (AGC/SGC), February 2021.

TABLE 14-26
Maximum Modeled Pollutant Concentrations (µg/m^3) From Potential Light Industrial Sources in the Project Area

Pollutant	CAS No.	Short-term Impact (µg/m^3) (1)(2)	SGC (µg/m^3)	Annual Impact (µg/m^3) (1)(2)	AGC (µg/m^3)
CO	00630-08-0	2,022.37	40,000	-----	-----
Particulate Matter (PM_{10})	NY075-00-0	41.94	150	-----	-----
NO_2	10102-44-0	104.83	188	28.75	100
SO_2	07446-09-5	17.86	196	0.03	80
Acetic Acid	00064-19-7	28.78	3,700	0.17	60
Methanol	00067-56-1	61.34	33,000	0.71	4,000
Isopropyl Alcohol	00067-63-0	780.42	98,000	6.20	7,000
Acetone	00067-64-1	164.43	180,000	0.49	30,000
Methyl Chloroform	00071-55-6	42.83	9,000	0.29	5,000
Hydrogen Cyanide	00074-90-8	13.09	340	0.0006	0.8
Dichloromethane	00075-09-2	204.50	14,000	0.58	46
Methyl Ethyl Ketone	00078-93-3	104.19	13,000	0.34	5,000
Trichloroethylene (1)	00079-01-6	18.85	20	0.197	0.2
Dichlorobenzene, ortho	00095-50-1	5.14	30,000	0.031	200
Ethylene Gylcol	00107-21-1	15.50	1,000	0.101	400
Toluene	00108-88-3	297.40	37,000	0.529	5,000
Butyl Carbitol	00112-34-5	26.81	370	0.170	200
Trichloro Benzene	00120-82-1	28.27	3700	0.167	35
Butyl Acetate	00123-86-4	87.38	71,300	0.538	565
Sodium Cyanide	00143-33-9	0.46	380	0.001	3.5
Potassium Cyanide	00151-50-8	0.17	380	0.001	3.5
Sodium Hydroxide	01310-73-2	0.30	200	-----	-----
Hydrogen Chloride	07647-01-0	50.93	2,100	0.064	20
Hydrogen Fluoride	07664-39-3	0.17	5.6	0.0003	0.071
Ammonia	07664-41-7	159.10	2,400	0.906	500
Sulfuric Acid	07664-93-9	0.69	120	0.02	1
Nitric Acid	07697-37-2	3.58	86	0.05	12.3
Chlorine	07782-50-5	0.17	116	0.0002	0.2
Isobutyl Alcohol	00078-83-1	-----	-----	5.24	360
Nitrogen Oxide	10102-43-9	-----	-----	0.50	74
Distillate Heavy Parafinic	64742-65-0	-----	-----	0.0004	3,200
Carbon Black	01333-86-4	-----	-----	0.02	7

Notes:
(1) Maximum impacts for Trichloroethylene are based on emission limits of 0.11 lb/hr and 390 lb/yr.
(2) Short-term and annual impacts of criteria pollutants include their respective background concentrations.

TABLE 14-27
Maximum Modeled Pollutant Concentrations (µg/m³) From Potential Light Industrial Uses on Off-site Locations

Pollutant	CAS No.	Short-term Impact (µg/m³) (1)(2)	SGC (µg/m³)	Annual Impact (µg/m³) (1)(2)	AGC (µg/m³)
CO	00630-08-0	1,977.90	40,000	-----	-----
Particulate Matter (PM_{10})	NY075-00-0	34.28	150	-----	-----
NO2	10102-44-0	103.96	188	28.71	100
SO2	07446-09-5	14.22	196	0.01	80
Acetic Acid	00064-19-7	4.47	3,700	0.04	60
Methanol	00067-56-1	9.52	33,000	0.18	4,000
Isopropyl Alcohol	00067-63-0	121.13	98,000	1.58	7,000
Acetone	00067-64-1	25.52	180,000	0.12	30,000
Methyl Chloroform	00071-55-6	6.65	9,000	0.07	5,000
Hydrogen Cyanide	00074-90-8	2.03	340	0.0001	0.8
Dichloromethane	00075-09-2	31.74	14,000	0.15	46
Methyl Ethyl Ketone	00078-93-3	16.17	13,000	0.09	5,000
Trichloroethylene (1)	00079-01-6	2.93	20	0.05	0.2
Dichlorobenzene, ortho	00095-50-1	0.80	30,000	0.01	200
Ethylene Gylcol	00107-21-1	2.41	1,000	0.03	400
Toluene	00108-88-3	46.16	37,000	0.14	5,000
Butyl Carbitol	00112-34-5	4.16	370	0.04	200
Trichloro Benzene	00120-82-1	4.39	3,700	0.04	35
Butyl Acetate	00123-86-4	13.56	71,300	0.14	565
Sodium Cyanide	00143-33-9	0.07	380	0.0003	3.5
Potassium Cyanide	00151-50-8	0.03	380	0.0002	3.5
Sodium Hydroxide	01310-73-2	0.05	200	-----	-----
Hydrogen Chloride	07647-01-0	7.90	2,100	0.02	20
Hydrogen Fluoride	07664-39-3	0.03	5.6	0.0001	0.071
Ammonia	07664-41-7	24.69	2,400	0.23	500
Sulfuric Acid	07664-93-9	0.11	120	0.004	1
Nitric Acid	07697-37-2	0.56	86	0.01	12.3
Chlorine	07782-50-5	0.03	116	0.0001	0.2
Isobutyl Alcohol	00078-83-1	-----	-----	1.34	360
Nitrogen Oxide	10102-43-9	-----	-----	0.13	74
Distillate Heavy Parafinic	64742-65-0	-----	-----	0.0001	3,200
Carbon Black	01333-86-4	-----	-----	0.004	7

Notes:
(1) Maximum impacts for Trichloroethylene are based on emission limits of 0.11 lb/hr and 390 lb/yr.
(2) Short-term and annual impacts of pollutants include their respective background concentrations.

The results indicated that the two buildings that are anticipated to include industrial uses under the Proposed Actions' RWCDS – on Projected Development Sites 1B and 1E – would require restrictions in order to provide an adequate level of protection. Based on the modeling performed for the light industrial sources, it was determined that for both Projected Development Site 1B and Projected Development Site 1E, the exhaust vertical stacks for industrial processes associated with precision instrument/jewelry manufacturing must be located to the tallest portion of the roof to prevent potential significant adverse air quality impacts at sidewalk and nearby sensitive receptors. Additional restrictions limiting emissions of certain air toxic compounds would be required in order to prevent potential significant adverse air quality impacts at elevated receptors from industrial uses associated with precision instrument/jewelry manufacturing to be located at Projected Development Sites 1B

and 1E. These restrictions were assumed in the analysis results presented in **Tables 14-26** and **14-27** and would avoid the potential for significant air quality impacts from industrial sources based on the conservative assumptions used in the analysis. (E) designations are proposed to avoid impacts with respect to industrial uses under the Proposed Actions' RWCDS. The restrictions would be as follows:

Projected Development Site 1B (Block 1576, Lots 1 and 34)

To avoid any potential significant air quality impacts, in the new development on Projected Development Site 1B (Block 1576, Lots 1 and 34), exhaust vertical stacks for industrial processes must be located to the tallest portion of the roof either on the north, south or west façade. Any new industrial development must ensure pollutant emissions are below the air pollutant emission limits listed in **Table 14-28**.

Projected Development Site 1E (Block 1577, Lots 1, 7, 56 and 58)

To avoid any potential significant air quality impacts, in the new development on Projected Development Site 1E (Block 1577, Lots 1, 7, 56 and 58), exhaust vertical stacks for industrial processes must be located to the tallest portion of the roof. Any new industrial development must ensure pollutant emissions are below the air pollutant emission limits listed in **Table 14-28**.

TABLE 14-28
Air Pollutant Emissions Limits – Future Uses

Air Pollutant	CAS Number	Short-Term Emission Limit (lb/hr)	Annual Emission Limit (lb/yr)
Projected Development Site 1B			
Trichloroethylene	00079-01-6	0.11	390
Projected Development Site 1E			
Trichloroethylene	00079-01-6	0.10	650

HEALTH RISK ASSESSMENT

Using the predicted concentrations of each pollutant, the maximum hazard index and total cancer risk was calculated for the potential light industrial uses associated with the Proposed Actions' RWCDS. The hazard index approach was used to determine the effects of multiple non-carcinogenic compounds, and the cancer risk factors were used to determine the effects of carcinogenic compounds. **Table 14-29** and **Table 14-30** present the results of the assessment of cumulative non-carcinogenic and carcinogenic effects, respectively. The estimated pollutant concentrations and the concentration to AGC pollutant ratios presented in the tables represent the values at the receptor location where the maximum cumulative results were predicted and consequently are in most cases different than the overall maximum values presented in **Table 14-29**. As shown in **Table 14-29**, the maximum hazard index at an individual receptor location is less than 2.0, the level considered by DEC's

DAR-1 to be significant. Therefore, based upon the cumulative air toxics analyses, the Proposed Actions would not result in a significant hazard associated with potential light industrial uses.

TABLE 14-29
Estimated Maximum Hazard Index – Potential Light Industrial Uses

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m³)	AGC (µg/m³)	Concentration to AGC Pollutant Ratio
Non-Carcinogenic Compounds				
Acetic Acid	00064-19-7	0.17	60	2.80E-03
Methanol	00067-56-1	0.70	4,000	1.76E-04
Isopropyl Alcohol	00067-63-0	6.13	7,000	8.75E-04
Acetone	00067-64-1	0.48	30,000	1.60E-05
Methyl Chloroform	00071-55-6	0.28	5,000	5.69E-05
Hydrogen Cyanide	00074-90-8	0.0006	0.8	7.03E-04
Methyl Ethyl Ketone	00078-93-3	0.33	5,000	6.65E-05
Dochlorobenzine, ortho	00095-50-1	0.03	200	1.51E-04
Ethylene Gylcol	00107-21-1	0.10	400	2.48E-04
Toluene	00108-88-3	0.52	5,000	1.05E-04
Butyl Carbitol	00112-34-5	0.17	200	8.42E-04
Trichloro Benzene	00120-82-1	0.16	35	4.71E-03
Butyl Acetate	00123-86-4	0.53	565	9.41E-04
Sodium Cyanide	00143-33-9	0.0011	3.5	3.18E-04
Potassium Cyanide	00151-50-8	0.0008	3.5	2.28E-04
Hydrogen Chloride	07647-01-0	0.06	20	3.18E-03
Hydrogen Fluoride	07664-39-3	0.0002	0.071	3.52E-03
Ammonia	07664-41-7	0.90	500	1.79E-03
Sulfuric Acid	07664-93-9	0.02	1	1.69E-02
Nitric Acid	07697-37-2	0.05	12.3	3.92E-03
Chlorine	07782-50-5	0.0002	0.2	9.99E-04
Isobutyl Alcohol	00078-83-1	5.18	360	1.44E-02
Nitrogen Oxide	10102-43-9	0.50	74	6.74E-03
Distillate Heavy Parafinic	64742-65-0	0.0004	3,200	1.25E-07
			Total Hazard Index	0.07
			Hazard Index Threshold Value	2.0

Source: *DEC, DAR-1, February 2021.*

TABLE 14-30
Estimated Maximum Cancer Risk – Potential Light Industrial Uses

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m³)	AGC (µg/m³)	Concentration to AGC Pollutant Ratio
Carcinogenic Compounds				
Dichloromethane	00075-09-2	0.57	46.00	0.01
Trichloroethylene	00079-01-6	0.19	0.20	0.97
			Total Cancer Risk	0.99
			Cancer Risk Threshold Value	10.0

Source: *DEC, DAR-1, February 2021.*

CUMULATIVE ANALYSIS OF POTENTIAL IMPACTS FROM EXISTING AND FUTURE USES

A cumulative impact analysis was performed that considered the five existing industrial/manufacturing facilities within 400-feet of the Project Area and the Proposed Actions' light industrial uses. Maximum predicted PM_{10} concentrations on existing and proposed sensitive receptors were determined based on the NAAQS, whereas potential impacts of predicted noncriteria pollutant concentrations were determined based on DEC's AGC and SGC standards.

Table 14-31 presents the maximum predicted pollutant concentrations on existing and proposed sensitive receptors using the AERMOD refined dispersion model. The table also lists the SGC and AGC for each air toxic pollutant. As presented in the table, maximum concentrations for each air toxic compound were predicted to be below the thresholds. The cumulative effects of existing and potential light industrial sources facilitated under the Proposed Actions' RWCDS did not predict any potential significant adverse air quality impacts.

TABLE 14-31
Maximum Modeled Pollutant Concentrations — Cumulative Effects from Existing Industrial Sources and Potential Light Industrial Sources

Pollutant	CAS Number	AERMOD Model Short-Term Impact (µg/m³)	SGC (µg/m³)	AERMOD Model Annual Impact (µg/m³)	AGC (µg/m³)
Toluene	108-88-3	867.5	37,000	279.1	5,000
Butyl Acetate	123-86-4	1,671.3	71,300	282.8	565
Isopropyl Alcohol	67-63-0	11,240.9	98,000	3,253.2	7,000
Acetone	67-64-1	1,345.6	180,000	255.1	30,000
MEK	78-93-3	563.0	13,000	176.9	5,000
PM_{10}	NY075-00-0	70.2	150	--	--

Source: *DEC, DAR-1 AGC/SGC Tables, February 2021*

ADDITIONAL SOURCES

Potential stationary source impacts on the Proposed Development from the nearby large source were determined using the AERMOD model. The maximum estimated annual concentrations of NO_2, short-term and annual concentrations of $PM_{2.5}$, and short-term concentrations of PM_{10} from the modeling were added to the background concentrations to estimate total concentrations on the Proposed Development. Total 1-hour NO_2 concentrations were determined following the refined EPA "Tier 3"

approach described earlier for the heating and hot water system analysis. The results of the AERMOD analyses are presented in **Table 14-32**.

TABLE 14-32
Maximum Modeled Pollutant Concentrations on the Proposed Development (µg/m^3)—Additional Sources

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	NAAQS
NO_2	Annual	1.29	28.7	30	100
	1-hour [(1)]	137.7	--	137.7	188
$PM_{2.5}$	24-hour	0.46	17.8	18.3	35
	Annual	0.04	7.6	7.6	9
PM_{10}	24-hour	0.81	39.3	40.1	196

Notes:
[(1)] *The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.*

As shown in **Table 14-32**, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective standards. Therefore, no potential for significant adverse air quality impacts on the Proposed Development from the existing large source is predicted.