Chapter 15: Air Quality

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 and potential 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 2020 *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 *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 development sites within the rezoning area. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations from the proposed parking facilities.

It is anticipated that each of the projected and potential development sites 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.

The With Action condition includes projected and potential development sites containing a mix of commercial and light industrial uses. Therefore, potential impacts were evaluated from pollutant emissions from industrial uses that would be co-located within the same building with sensitive receptors, and of industrial uses on nearby sensitive receptors in other projected and potential development sites.

Since portions of the affected area are within areas zoned for manufacturing uses, potential effects of stationary source emissions from existing nearby industrial facilities on the Proposed Actions were assessed, as well as from proposed industrial sources for which industrial source permit applications submitted by Powerhouse Arts in May 2021 are currently under DEP review. In addition, potential effects from large and major sources of emissions in the study area on the Proposed Actions were evaluated.

PRINCIPAL CONCLUSIONS

The analyses conclude that the Proposed Actions would not result in any significant adverse air quality impacts on sensitive uses in the surrounding community, and the Proposed Actions would not be adversely affected by existing sources of air emissions in the rezoning area. A summary of the general findings is presented below.

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from fossil fuel-fired heat and hot water systems at the projected and potential development sites. At certain sites, an (E) Designation (E-601) would be mapped in connection with the Proposed Actions to ensure that future developments would not result in any significant adverse air quality impacts from fossil fuel-fired heat and hot water systems emissions. For the City-owned parcels (located within Projected Development Site 47), restrictions would be necessary to ensure that emissions from fossil fuel-fired heat and hot water systems would not result in any significant adverse air quality impacts. These restrictions would be set forth in a Land Disposition Agreement (LDA) to ensure that the developer(s) satisfy these restrictions with oversight provided through the New York City Department of Housing Preservation and Development (HPD).

The analysis of existing sources and the proposed manufacturing 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 Project. An analysis of the cumulative impacts of existing industrial sources on projected and potential development sites was performed. Maximum concentration levels at projected and potential development sites were found to be below the applicable health risk criteria.

The analysis of the industrial sources associated with the RWCDS determined that certain use group categories had 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 Gowanus Special District (GSD), certain restrictions would be required as part of the Proposed Actions. The mobile source analyses determined that concentrations of CO and fine particulate matter less than ten microns in diameter (PM_{10}) 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* criteria. At four of the five intersection sites analyzed, the maximum annual incremental $PM_{2.5}$ concentration is below the *de minimis* criteria; however, the annual $PM_{2.5}$ maximum annual incremental concentration is predicted to exceed the *de minimis* criteria at the intersection of Smith and 5th Streets. This would be considered a significant adverse air quality impact. Therefore, traffic mitigation measures were examined to avoid a potential significant impact at this intersection location. Mitigation measures are discussed in Chapter 21, "Mitigation."

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.

B. 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 higher than the *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 development sites. 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.

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.

Potential impacts on local NO_2 concentrations from the fuel combustion for the projected and potential 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 emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for PM and an analysis was conducted to evaluate future PM concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Actions.

An assessment of PM emissions from heat and hot water systems at the projected and potential development sites was conducted, following the *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 and potential 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] 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, which would remain in the Proposed Actions. Therefore, an analysis to examine the potential for impacts to the Proposed Actions from industrial emissions was performed. In addition, certain projected and potential development sites are assumed to include light industrial uses and were therefore analyzed to evaluate the potential effects of such uses on existing and proposed developments.

C. 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 15-1**. The NAAQS for CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particles, settleable particles, non-methane hydrocarbons, 24-hour and annual SO_2, and ozone which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants beryllium, fluoride, and hydrogen sulfide.

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

Table 15-1
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 (4)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (5)	NA	12	NA	15
24-Hour Average (6)	NA	35	NA	35
Sulfur Dioxide (SO_2) (8)				
1-Hour Average (7)	0.075	196	NA	NA
Maximum 3-Hour Average (1)	NA	NA	0.50	1,300

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. Not to be exceeded more than once a year on average over 3 years.
5. 3-year average of annual mean.
6. Not to be exceeded by the annual 98th percentile when averaged over 3 years.
7. 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.

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

Effective December 2015, EPA lowered the 2008 ozone NAAQS from 0.075 ppm to 0.070. EPA issued final area designations for the revised standard on April 30, 2018.

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.

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 CO. Under the resulting maintenance plans, New York is committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

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. EPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

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.

On April 11, 2016, as requested by New York State, EPA reclassified the area as a moderate NAA. On July 19, 2017 DEC announced that the NYMA is not projected to meet the July 20, 2018 attainment deadline and DEC therefore requested that EPA reclassify the NYMA to "serious" nonattainment. EPA reclassified the NYMA from “moderate” to “serious” NAA effective September 23, 2019, which imposes a new attainment deadline of July 20, 2021 (based on 2018-2020 monitored data). NYSDEC’s proposed draft revisions to the SIP (June 2021) state that based on monitoring data, New York State has not demonstrated compliance with the 2008 ozone NAAQS. On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. 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. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available.

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. In December 2017, EPA designated the entire State of New York as in attainment for this standard, with the exception of Monroe County which was designated "unclassifiable".

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *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 15-1**) 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 proposed projects or actions on mobile sources, as set forth in the *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 8.0 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

New York City uses *de minimis* criteria 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 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or

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[2] New York City. *CEQR Technical Manual*. Chapter 1, Section 222. March 2014; 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 Feburary 2021) are provided in **Table 15-2** for the compounds affecting receptors located at projected and potential development sites. The compounds listed are those emitted by existing sources and the proposed sources of air toxics in the rezoning area.

Table 15-2
Industrial Source Analysis
Relevant DEC Air Guideline Concentrations

Pollutant	CAS Number	SGC ($\mu g/m^3$)	AGC ($\mu g/m^3$)
4,4'-Methylenediphenol Diisocyanate	00101-68-8	12	0.6
Acetone	00067-64-1	180,000	30,000
Butyl Cellosolve	00111-76-2	4,700	1,600
Cadmium Selenide	01306-23-6	---	0.0004
Cadmium Sulfide	01306-23-6	---	0.0003
Chromium	07440-47-3	---	45
Cobalt Compounds	13586-82-8	---	0.0013
Dichloromethane	00075-09-2	14,000	46
Dioctyl Phthalate	00117-81-7	---	0.42
Ethyl Alcohol	00064-17-5	---	45,000
Ethyl Benzene	00100-41-4	---	1,000
Ethylene Glycol	00107-21-1	1,000	400
Formaldehyde	00050-00-0	30	0.06
Hydrochloric Acid	07647-01-0	2,100	20
Hydroquinone	00123-31-9	---	2.4
Isopropyl Alcohol	00067-63-0	98,000	7,000
Lead Acetate	01335-32-6	---	0.05
Manganese Compounds	07439-96-5	---	0.05
Methanol	00067-56-1	33,000	4,000
Methyl Ethyl Ketone	00078-93-3	13,000	5,000
Methanol	00067-56-1	33,000	4,000
Methyl Isobutyl Ketone	00108-10-1	31,000	3,000
Misc. VOC(1)	NY990-00-0	98,000	7,000
N-Butyl Acetate	00123-86-4	71,300	565
Nickel Compounds	07440-02-0	0.2	0.004
Phenol	00108-95-2	5,800	12
Selenious Acid	07783-00-8	---	20
Selenium Dioxide	07446-08-4	---	33
Styrene	00100-42-5	17,000	28
Toluene	00108-88-3	37,000	5,000
Trethylamine	00121-44-8	2,800	7
Xylene	01330-20-7	22,000	100
Notes:			

(1) Since VOCs are not assigned an SGC or AGC, the guideline concentrations for isopropyl alcohol were used for evaluation purposes.
Sources: 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.

D. 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 *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 *CEQR Technical Manual* of 170 vehicles. For the PM screening, the $PM_{2.5}$ screening worksheet referenced in Section 201 of the *CEQR Technical Manual* was utilized to calculate the number of heavy-duty truck equivalents at each intersection. This worksheet calculates the number of project-generated vehicles based on vehicle classification and roadway classification information.

For the PM screening, all trucks that would be generated by the Proposed Actions were classified using the HDDV8B vehicle category, although the actual trucks 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. Roadway classifications were determined at each intersection, based on New York City Department of Transportation Functional Classification maps[3] and With Action traffic volumes.

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 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 CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOVES2014b.[4] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (e.g., gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, 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.

Vehicle classification data were based on field studies. Appropriate credits were used to accurately reflect the inspection and maintenance program.[5] County-specific hourly temperature and relative humidity data obtained from DEC were used.

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the neighborhood scale

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[3] New York State Department of Transportation Functional Classification. http://gis3.dot.ny.gov/html5viewer/?viewer=FC

[4] Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014a, November 2015. MOVES2014 User Interface Reference Manual Appendix: MOVES2014b, August 2018.

[5] The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle's exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

$PM_{2.5}$ 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[6] and the *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 11, "Transportation"). Traffic data for the Future without the Proposed Actions (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 Models for Microscale Analyses

Maximum CO concentrations adjacent to streets within the surrounding area, resulting from vehicle emissions, were predicted using the Tier 1 CAL3QHC model Version 2.0.[7] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles.

Maximum contributions from vehicular emissions to PM concentrations adjacent to each analysis site were calculated using the CAL3QHCR model Version 2.0.[8] This refined version of the model can utilize hourly traffic and meteorology data, and is therefore more appropriate for calculating the 24-hour and annual average concentrations required to address the timescales of the PM NAAQS.

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).

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[6] 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.

[7] EPA. User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections, Office of Air Quality, Planning Standards, Research Triangle Park, North Carolina, EPA-454/R-92-006.

[8] EPA. User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections. EPA454R92006.

Tier I CO Analysis—CAL3QHC

In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor. Following the EPA guidelines,[9] CAL3QHC computations were performed using a wind speed of 1 meter per second, and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.7 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

Tier II PM_{10}/$PM_{2.5}$ Analysis—CAL3QHCR

For computation of PM concentrations, the CAL3QHCR 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 LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 2015–2019. All hours were modeled, and the highest predicted concentration for each averaging period is presented.

Analysis Year

The microscale analyses were performed for 2035, the year by which the Proposed Actions are likely to be completed. The future analysis was performed for both the No Action condition and 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 for the nearest monitored location are presented in **Table 15-3**. PM concentrations are based on a recent three-year period of monitored data (2017–2019) consistent with the statistical format of the NAAQS. CO concentrations are based on the latest available three years of monitored data (2017–2019). These values were used as the background concentrations for the mobile source analysis.

Table 15-3
Maximum Background Pollutant Concentration for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
$CO^{(1)}$	1-hour	Queens College 2, Queens	1.7 ppm	35 ppm
	8-hour	Queens College 2, Queens	1.2 ppm	9 ppm
$PM_{10}^{(2)}$	24-hour	Division Street, Manhattan	39.3 µg/m^3	150 µg/m^3
$PM_{2.5}^{(3)}$	24-hour	J.H.S.126, Brooklyn	17.8 µg/m^3	35 µg/m^3

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[9] *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, EPA Office of Air Quality Planning and Standards, Publication EPA-454/R-92-005.

Notes:

(1) CO concentrations represent the maximum second-highest monitored concentrations from the most recent three years of data.

(2) PM_{10} concentration represents the average of the highest monitored concentration from the most recent three years of data.

(3) $PM_{2.5}$ concentration represents the average of the 98th percentile day from the most recent three years of data.

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

Analysis Sites

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. Five intersections were selected for microscale analysis (see **Table 15-4** and **Figure 15-1**). 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_{10} and $PM_{2.5}$ was analyzed for each of these intersections, while CO concentrations were modeled at two of the intersections (Bond Street and 3rd Street and Hoyt Street and 4th Street).

Table 15-4
Mobile Source Analysis Sites

Analysis Site	Location	Pollutants
1	Bond Street and 3rd Street	CO, PM
2	Hoyt Street and 4th Street	CO, PM
3	Bond Street and Baltic Street	PM
4	Smith Street and 5th Street	PM
5	3rd Avenue and Carrol Street	PM

Receptor Placement

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected site; 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. Receptors in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters, from the nearest moving lane at each analysis location, based on the *CEQR Technical Manual* procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

PARKING ANALYSIS

The Proposed Actions would include parking facilities to account for the new parking demand and supply. Emissions from vehicles using the parking areas could potentially affect ambient levels of CO and PM in the immediate vicinity in the With Action condition. Of the parking associated with the projected development sites, the prototypical parking garages at Projected Development Sites 41 (228 spaces) and 48 (249 spaces) were analyzed. These sites were analyzed since they have the maximum overall capacity and the maximum predicted number of vehicle ins/outs, and therefore, the highest potential incremental concentrations of pollutants. In addition, the parking facilities for Projected Development Sites 29 (150 spaces) and 37 (100 spaces) were selected for analysis

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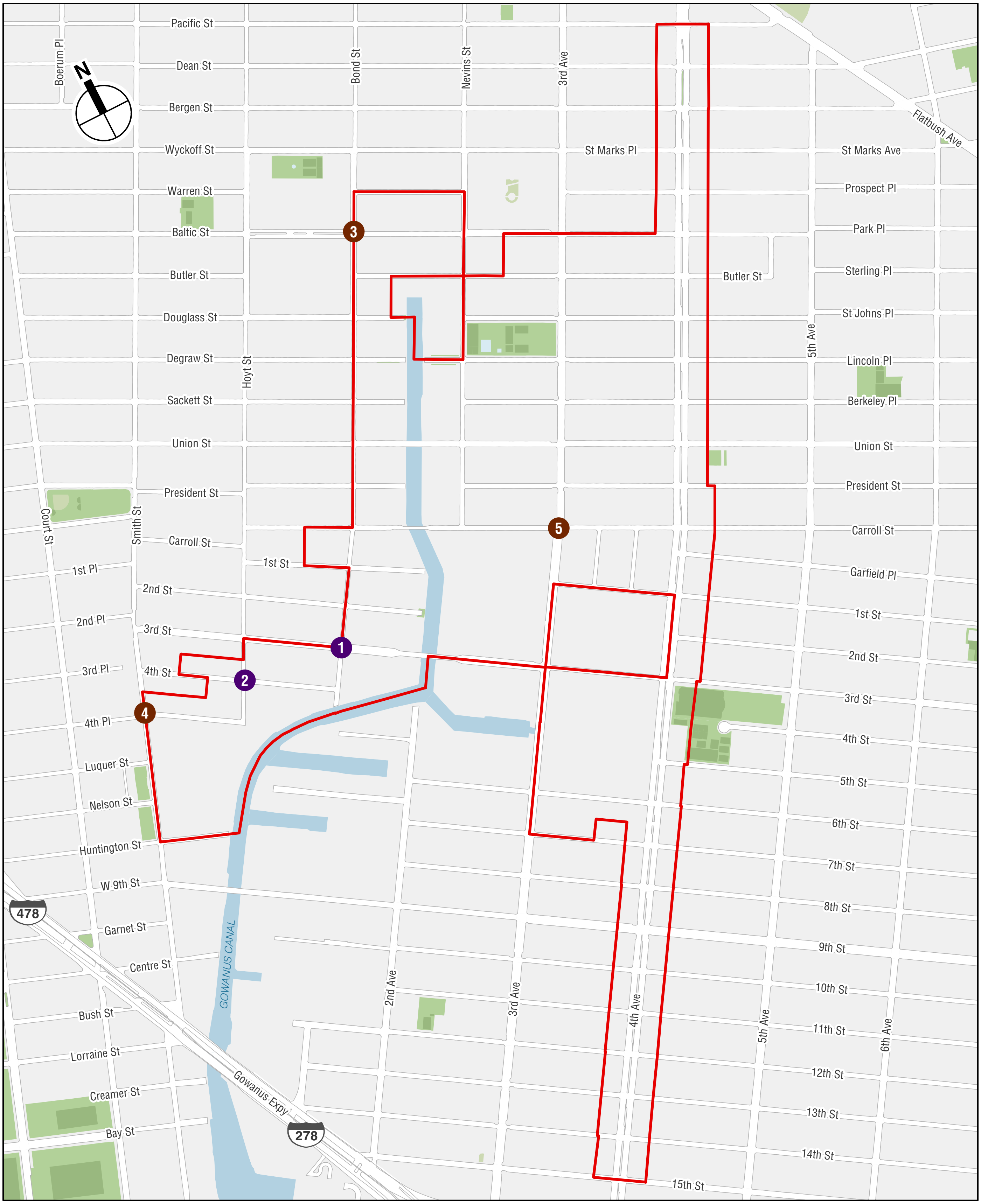

Data source: NYC Department of City Planning

🟥 Project Area / Primary Study Area

● 1 CO/PM Analysis Site

● 3 PM-only Analysis Site

0 1,000 FEET

Air Quality
Mobile Source Analysis Sites

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Figure 15-1

due to their proximity to each other, to assess potential the potential cumulative effects of these parking facilities.

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 *CEQR Technical Manual*. Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOVES mobile source emission model, as referenced in the *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of five miles per hour was conservatively assumed for travel within the parking garages. 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 garages were calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of one cubic foot per minute of fresh air per gross square foot of garage area. 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.

The 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 on a 24-hour and annual average basis). Traffic data for the parking garage analysis was derived from the trip generation analysis described in the Transportation Chapter of this DEIS. 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.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the projected and potential 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 emission sources.

INDIVIDUAL HEAT AND HOT WATER SYSTEMS

Screening Analysis

A screening analysis was performed to assess air quality impacts associated with emissions from heat and hot water systems for each projected and potential development site. The methodology described in the *CEQR Technical Manual* was used for the analysis, and considered impacts on sensitive uses (i.e., existing residences and proposed developments).

The methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the heat and hot water systems’ exhaust stack height, to evaluate whether a significant adverse impact may occur. Based on the distance from the development site to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size shown in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Since information on the heat and hot water systems' design was not available, each projected and potential development site was evaluated with the nearest existing (project-on-existing) or proposed development (project-on-project) of a similar or greater height analyzed as a potential receptor. The maximum gross floor area of each projected and potential development site from the Reasonable Worst-Case Development Scenario (RWCDS) was used as input for the screening analysis.

It was assumed that No. 2 fuel oil or natural gas would be used in the projected and potential development sites' heat and hot water systems, and that the exhaust stack(s) would be located three feet above roof height (the default assumption in the *CEQR Technical Manual*). Also, for development sites that are assumed to contain multiple buildings served by a single heating and hot water system, the screening analysis was initially performed on the building with the shortest height, to be conservative. If the results pass the screening analysis, the projected or potential development site is determined to result in no potential significant adverse air quality impacts using No. 2 fuel oil or natural gas. For sources that did not pass the screening analyses using the *CEQR Technical Manual* procedures, a refined modeling analysis was performed. For fuel oil, the primary pollutants of concern are SO_2, NO_2, and PM, while for natural gas, the primary pollutants of concern are NO_2 and PM.

Refined Dispersion Analysis

Projected and potential development sites that did not pass the screening analysis were further analyzed 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 flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions.

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. 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, unless the source and receptor were immediately adjacent to each other. In these cases, the stack was assumed to be located at an initial distance of 10 feet from the nearest receptor.

The refined dispersion modeling analysis was performed for $PM_{2.5}$, PM_{10}, NO_2, and SO_2 (for sites where fuel oil was modeled). The analysis was performed using calculated emission rates for fuel oil and 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, the stack would then be set back in 10-foot (or similar) increments until the source met the respective criteria. If necessary, further restrictive measures were considered, including use of low NO_x burners, increasing stack heights, or a combination of these measures.

Emission Estimates and Stack Parameters

Fuel consumption was estimated based on procedures outlined in the *CEQR Technical Manual* as discussed above. Using worst-case assumptions, fuel was assumed to be No. 2 fuel oil for SO_2 and PM, and natural gas for NO_2.

Emission factors from the fuel oil and natural gas combustion sections of EPA's AP-42 were used to calculate emission rates for the projected and potential development sites' heat and hot water systems. Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, as described in EPA's *Guideline on Air Quality Models* at 40 CFR part 51 Appendix W, Section 5.2.4.

One-hour average NO_2 concentration increments associated with the projected and potential 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. Ozone concentrations were taken from the DEC Queens College monitoring station, which is the nearest ozone monitoring station to the rezoning area that has complete five years of hourly data available (2015–2019). An 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[10] and is recognized by the City.

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 15-5**). 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 average NO_2 , 1-hour NO_2, 1-hour SO_2 and 24-hour PM_{10} background concentrations.

Table 15-5
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m³)	NAAQS (µg/m³)
NO_2	1-hour	Queens College	103.7	188

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[10] Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard, EPA, March 1, 2011.

	Annual	Queens College	28.7	100
SO_2	1-hour	Queens College	13.5	196
$PM_{2.5}$	24-hour	JHS 126, Brooklyn	17.8	35
PM_{10}	24-hour	Division Street	39.3	150
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 $\mu g/m^3$ (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 *CEQR Technical Manual*.

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at the LaGuardia Airport National Weather Service 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

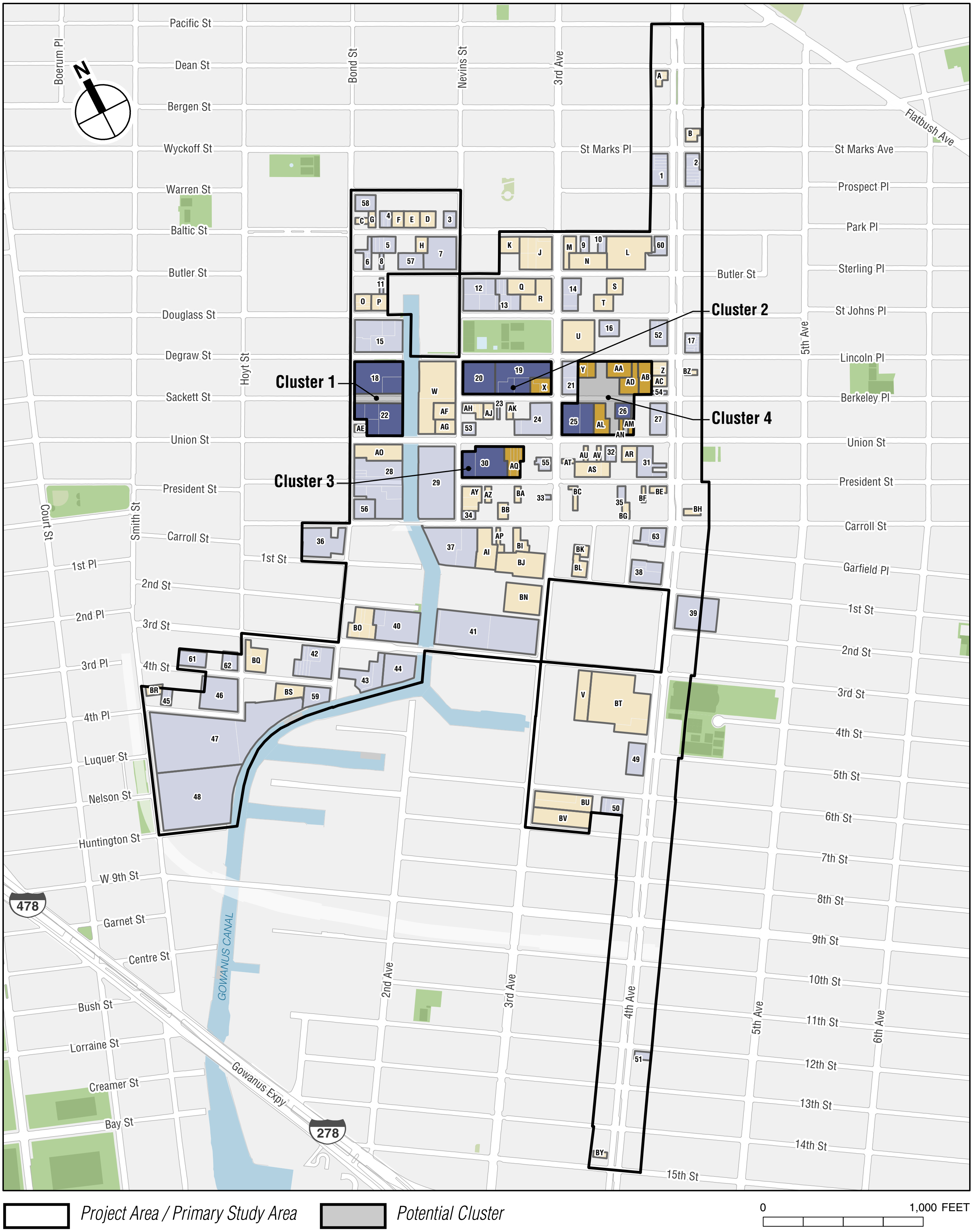
Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed building façades to represent potentially sensitive locations such as operable windows and intake vents. Receptors were placed at elevated locations on all façades and at multiple 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).

CUMULATIVE IMPACTS FROM HEAT AND HOT WATER SYSTEMS

In addition to the individual source analysis, groups or "clusters" of heat and hot water sources with similar stack heights were analyzed, to address the cumulative impacts of multiple sources. The rezoning area and RWCDS were reviewed to determine areas where clusters with high density of development sites with similar building heights would be located which could result in cumulative impacts on nearby buildings of a similar or greater height. A total of four clusters were selected for analysis. The development sites associated with each cluster and their location are presented in **Table 15-6** and **Figure 15-2**.

Table 15-6
Cluster Analysis Sites

Cluster	Development Sites
1	Projected Development Sites 18 and 22
2	Projected Development Sites 19 and 20, and Potential Development Site X
3	Projected Development Site 30 and Potential Development Site AQ
4	Projected Development Sites 25 and 26, and Potential Development Sites Y, AA, AB, AD, AL, AM and AN



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Data source: NYC Department of City Planning

☐ *Project Area / Primary Study Area*

▨ *Projected Development Site*

▨ *Potential Development Site*

▨ *Potential Cluster*

▨ *Projected Development Site (Potential Cluster)*

▨ *Potential Development Site (Potential Cluster)*

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Potential Clusters

Figure 15-2

The cluster analysis was performed using the EPA-approved AERSCREEN model (Version 16216, EPA, 2016). AERSCREEN predicts worst-case one-hour impacts downwind from a point, area, or volume source. The model generates worst-case meteorology using representative minimum and maximum ambient air temperatures, and site-specific surface characteristics such as albedo, Bowen ratio, and surface roughness. If the worst-case concentrations predicted by AERSCREEN are above significant impact levels for each pollutant analyzed, further analysis with AERMOD is required to determine the potential for air quality impacts from the Proposed Actions. However, if the worst-case concentrations predicted by the AERSCREEN model are below impact levels for an analyzed pollutant, there is no potential for impact and no further analysis is required.

The AERSCREEN model predicts impacts over a 1-hour average using default meteorology. In order to predict pollutant concentrations over longer periods of time, EPA-referenced persistence factors were used. These consist of 0.6 and 0.1 for the 24-hour and annual average periods, respectively.

The AERSCREEN model considered each cluster as a single area source. The cluster analysis was performed to identify impacts of SO_2, NO_2, PM_{10}, and $PM_{2.5}$. Using information in the Air Quality Appendix of the *CEQR Technical Manual*, an estimate of the emissions from the cluster development's heat and hot water systems was made. The appendix includes tables that can be used to estimate emissions based on the development size, type of fuel used and type of construction. Fuel consumption factors of 58.5 ft^3/ft^2-year and 0.43 gal/ft^2-year were used for natural gas and fuel oil, respectively, for residential developments. Mixed-use developments used the residential fuel consumption factors since they are more conservative. Short-term factors were determined by using peak hourly fuel consumption estimates for heating and cooling systems.

Emission factors for each fuel were obtained from the EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. The SO_2 emissions rates were calculated based on a maximum fuel oil sulfur content of 0.0015 percent (based on use of ultra-low sulfur No. 2 oil) the fuel using the appropriate AP-42 formula.

The average minimum distance from the sites within the source clusters to the nearest buildings were used in the modeling analysis. The analysis focused on existing buildings or other projected and potential development sites that are of a similar or greater height than the source cluster.

To estimate the maximum expected pollutant concentration at a given receptor, the calculated impact must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 15-5**).

In the event that an exceedance of a pollutant standard was predicted with both No. 2 fuel oil and natural gas, a refined modeling analysis using the EPA AERMOD model was performed. For this analysis, buildings within the cluster were modeled individually since the AERMOD model is capable of modeling multiple sources of emissions.

INDUSTRIAL SOURCES

Analysis of Potential Impacts from Existing Uses

Pollutants emitted from existing sources and the proposed industrial facilities were examined to identify potential adverse impacts on future residents of the projected and potential development sites. All industrial air pollutant emission sources within 400 feet of a projected and potential 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, and permits listed in the EPA Envirofacts database. 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 April 10 and April 16, 2019, 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, 15 permitted sources were identified and determined to be currently in operation. These facilities are included in **Table 15-7.** The table also includes 19 emission sources for which an industrial source air permit application has been submitted by Powerhouse Arts to DEP for review.

Table 15-7
Industrial Sources within 400 Feet of a Projected or Potential Development Site

Name of Business	Address	Type of Business	DEP Air Permit ID
J & I Maintenance Corporations	341 Bergen Street	Auto Body Shop	PB001013
Tamer & Tamer Inc.	465 Baltic Street	Woodworking	PA037596 PA041197
Crystal Glass & Mirror Corp.	156 Third Avenue	Fabrication	PW001717
Quality Woodworking Corp.	255 Douglass Street	Woodworking	PA004381
East Frames	543 Union Street	Picture Frames	PB008213
New York Auto	295 Nevins Street	Auto Body Shop	PB005110
Park West Auto Body	576 Union Street	Auto Body Shop	PB023011
U-Haul	213 Sixth Street	Auto Body Shop	PA030397
Heights Woodworking	55 Ninth Street	Woodworking	PB015908 PB016008
Dykes Lumber Company Inc.	167 Sixth Street	Woodworking	PB004407
Dykes Lumber Company Inc.	180 Sixth Street	Woodworking	PA135873
R. Ferraro Collision Corp.	442 Third Avenue	Auto Body Shop	PB005309
Brooklyn Woods, Inc.	168 Seventh Street	Woodworking	PB000215
Powerhouse Arts	322 Third Avenue	Art Production	PW006121 PW006221 PW006321 PW006421 PW006521 PW006621 PW006721 PW006821 PW006921 PW007021 PW007121 PW007221 PW007321 PW007421 PW007521 PW007621 PW007721 PW007821 PW007921

One or more permitted industrial sources were found at the Potential Development Sites F, J, AG, and AU. To be conservative, for each of these sites, which may not be developed by the Proposed Action's Build Year, the industrial analysis was performed two ways, as follows:

- Assuming the site is developed, in which case the industrial source(s) is not assumed to be operating in the With Action condition. In this case, potential air quality impacts from other industrial sources in the study area were studied to evaluate their potential effects on the development site.
- Assuming the site is not developed, in which case the industrial source(s) is assumed to be operating in the With Action condition, and its potential effects on other projected and potential development sites were determined.

In most cases, sources that perform automotive paint spraying did not include the solvent emissions as individual air toxic compounds in the air permit. For these sources, the permit information for the automotive paint spraying operations identified in the air permit review that did list individual air toxic compounds was used as a basis to estimate their speciated solvent emissions. 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.

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.

Predicted worst-case impacts on the projected and potential 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 and potential development sites could be significantly impacted by nearby sources of air pollution.

To assess the effects of multiple sources emitting the same pollutants, cumulative source impacts were determined.

Discrete receptors (i.e., locations at which concentrations were calculated) were placed on the potentially affected projected and potential development sites. The receptor network consisted of receptors located at spaced intervals along the sides of the development site 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. To evaluate air quality impacts of $PM_{2.5}$ from auto body paint spray booths, the permitted particulate matter emissions, which were reported as total solids, were converted to $PM_{2.5}$ emissions based on the estimated fraction of $PM_{2.5}$ present in the exhaust[11]. For spray booths that were associated with woodworking or furniture painting, all reported

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[11] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Appendix B.1. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors. October 1986.

particulate matter emissions were conservatively assumed to be $PM_{2.5}$. The pollutants and emission rates for each permitted facility are presented in **Table 15-8**.

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.

Table 15-8
Modeled Emission Rates of Existing and Proposed Industrial Sources

Facility	Description of Process	DEP Permit ID	CAS No.: Pollutant Name	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
J & I Maintenance Corp.	Paint Spray Booth	PB001013	NY079-00-0: Solids	0.0031[2]	97.6
			01330-20-7: Xylene	2	3,000
			00100-41-4: Ethylbenzene	0.24	360
			00078-93-3: Butanone	0.135	202.5
			00108-88-3Toluene	0.035	52.5
Tamer & Tamer Inc.	Paint Spray Booth	PA037596	NY075-00-0:Particulates	0.0033[3]	16
			00123-86-4:N-Butyl Acetate	0.27	216
			00111-76-2:Butyl Cellosolve	0.09	72
			000178-93-3:MEK	0.59	472
			00108-10-1:MIBK	0.64	512
			01330-20-7:Xylene	0.22	88
			00067-64-1:Dimethyl Ketone	0.45	360
			00067-63-0:Isopropyl Alcohol	0.18	144
			00067-63-0:Methanol	0.03	120
			00117-81-7:Dioctyl phthalate	0.13	104
Tamer & Tamer Inc.	Woodworking	PA041197	NY075-00-0:Solids	0.00067[3]	3.2
Crystal Glass & Mirror Corp.	Paint Spray Booth	PW001717	NY075-00-0:Pigment	0.001[3]	6
			00107-21-1:Ethylene Glycol	0.25	250
			07732-18-5:Water	0.13	130
East Frames	Paint Spray Booth	PB008213	NY075-00-0: Pigment	0.0067[3]	32
			00123-86-4: Normal Butyl Acetate	0.27	432
			00111-76-2: Butyl Cellosolve	0.09	144
			00078-93-3: MEK	0.59	944
			00108-10-1: MIBK	0.64	1,024
			01330-20-5: Xylene	0.22	352
			00-067-64-2: Acetone	0.45	720
			00-067-63-0: Isopropanol	0.18	228
			00-067-56-1: Methanol	0.03	48
			00-117-81-7: DI-2-Ethylphthalate	0.13	208
New York Auto	Paint Spray Booth	PB005110	NY079-00-0: Solids	0.0062[2]	97.6
			01330-20-7: Xylene	2	3,000
			00100-41-4: Ethylbenzene	0.24	360
			00078-93-3: Butanone	0.135	202.5
			00108-88-3Toluene	0.035	52.5

Table 15-8 (cont'd)
Modeled Emission Rates of Existing and Proposed Industrial Sources

Facility	Description of Process	DEP Permit ID	CAS No.: Pollutant Name	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Park West Auto Body	Paint Spray Booth	PB023011	NY079-00-0: Solids	0.0012[2]	23.4
			01330-20-7: Xylene	0.08	144
			00100-41-4: Ethylbenzene	0.01	17.3
			00078-93-3: Butanone	0.005	9.7
			00108-88-3Toluene	0.001	2.5
U-Haul Company	Paint Spray Booth	PA030397	NY079-00-0: Solids	0.00038[2]	6.5
			01330-20-7: Xylene	2	3000
			00100-41-4: Ethylbenzene	0.24	360
			00078-93-3: Butanone	0.135	202.5
			00108-88-3Toluene	0.035	52.5
Heights Woodworking	Woodworking	PB015908	NY075-00-0: Sawdust	0.0003[3]	2
Heights Woodworking	Paint Spray Booth	PB016008	00064-17-5: Ethyl Alcohol	1.14	1140
			00123-86-4: N Butyl Acetate	0.76	760
			00108-88-3: Toluene	0.76	760
			01330-20-7: Xylene	0.38	380
			NY990-00-0: Misc. VOC	2.54	254
			NY075-00-0: Solids	0.01	60
Dykes Lumber Co. Inc.	Woodworking	PB004407	NY075-00-0: Wood Fines	0.00008[3]	0.4
Dykes Lumber Co. Inc.	Woodworking	PA135873	NY075-00-0: Wood Fines	0.1[3]	480
R.Ferraro Collision Corp.	Paint Spray Booth	PB005309	NY079-00-0: Solids	0.0015[2]	97.6
			01330-20-7: Xylene	2	3000
			00100-41-4: Ethylbenzene	0.24	360
			00078-93-3: Butanone	0.135	202.5
			00108-88-3:Toluene	0.035	52.5
Brooklyn Woods, Inc.	Woodworking	PB000215	NY075-00-0: Wood Fines	0.0003[3]	0.16
Powerhouse Arts	Paint Spray Booth	PW006121	NY079-00-0: Solids	0.00007	0.31
			00108-88-3:Toluene	0.000001	0.05
			00123-31-9: Hyrdoquinone	0.0000004	0.002
			00075-09-2:Dicholoromethane	0.0022	0.79
			00080-62-6:Methyl Methacrylate	0.00003	0.11
			00108-95-2; Phenol	0.008	35.72
			00101-68-8:MDI	0.03	117.16
			00100-42-5:Styrene Monomer	0.0007	3
			00100-41-4:Ethylbenzene	0.0002	0.67
			00107-21-1:Ethylene glycol	0.00004	0.17
			01330-20-7:Xylene	0.0007	2.43
			00500-00-0:Formaldehyde	0.000007	0.03
			01306-23-6:Cadmium Sulfide	0.00002	0.08
			01306-24-7:Cadmium Selenide	0.00002	0.08
			Vary:Chromium (III) Compounds(4)	0.00002	0.08
			07440-47-3: Chromium Metal(4)	0.000009	0.04
			13586-82-8:Cobalt Compounds	0.00002	0.08
			07439-96-5:Manganese Compounds	0.000005	0.02
			07440-02-0:Nickel Compounds	0.00001	0.06

Table 15-8 (cont'd)
Modeled Emission Rates of Existing and Proposed Industrial Sources

Facility	Description of Process	DEP Permit ID	CAS No.: Pollutant Name	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Park West Auto Body	Paint Spray Booth	PB023011	NY079-00-0: Solids	0.0012[2]	23.4
Powerhouse Arts	Woodworking	PW006221	NY079-00-0: Solids	0.00018	0.76
Powerhouse Arts	Metal Shop	PW006321	NY079-00-0: Solids	0.154	675
			NY990-00-0: Misc. VOC	0.0705	309
Powerhouse Arts	Metal Shop	PW006421	NY079-00-0: Solids	0.00005	0.23
Powerhouse Arts	Laser Cutting	PW006521	NY079-00-0: Solids	0.0214	94
Powerhouse Arts	Metal Shop	PW006621	07783-00-8:Selenious Acid	0.002	7.2
			00108-88-3:Toluene	0.01	61.37
			01330-20-7: Xylene	0.007	30.24
			00121-44-8:Trethylamine	0.0008	3.38
			00746-08-4:Selenium Dioxide	0.0004	1.85
			07647-01-0:Hydrochloric Acid	0.002	9.38
			01335-32-6:Lead Acetate	0.001	4.38
Powerhouse Arts	Metal Shop	PW006721	NY079-00-0: Solids	0.0(5)	0.0(5)
Powerhouse Arts	Print Shop	PW006821	NY990-00-0: Misc. VOC	0.2384	1044
Powerhouse Arts	Print Shop	PW006921	NY079-00-0: Solids	0.00001	0.04
			NY990-00-0: Misc. VOC	0.0534	234
Powerhouse Arts	Textile Dye Lab	PW007021	NY990-00-0: Misc. VOC	0.0(5)	0.0(5)
Powerhouse Arts	Ceramic Shop	PW007121	NY079-00-0: Solids	0.0167	16
Powerhouse Arts	Ceramic Shop	PW007221	NY079-00-0: Solids	0.009	40
Powerhouse Arts	Ceramic Shop	PW007321	NY079-00-0: Solids	0.0457	200
Powerhouse Arts	Digital Fab, Lab Shop	PW007421	NY079-00-0: Solids	0.00001	0.05
Powerhouse Arts	Print Shop	PW007521	NY079-00-0: Solids	0.00001	0.04
			NY990-00-0: Misc. VOC	0.0534	234
Powerhouse Arts	Print Shop	PW007621	NY990-00-0: Misc. VOC	0.00025	1.1
Powerhouse Arts	Paint Spray Booth	PW007721	NY079-00-0: Solids	0.0013	6
Powerhouse Arts	Welding Shops	PW007821	NY079-00-0: Solids	0.0016	7.1
Powerhouse Arts	Ceramic Shops	PW007921	NY079-00-0: Solids	0.00006	0.27

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) Particulate matter emissions from all woodworking and non-auto body paint spray booths were conservatively assumed to be $PM_{2.5}$.

(4) Modeled together as chromium compounds

(5) Emission calculations included in the permit applications PW006721 and PW007021 listed *de minimis* pollutant emission rates.

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

Analysis of Potential Impacts from Future Uses

The Proposed Actions would result in some developments containing a mix of residential, non-residential, and light industrial development. Specifically, the development expected to occur under the RWCDS for the Proposed Actions includes 88,977 gross square feet (gsf) of industrial uses at six projected development sites (excluding warehousing and self-storage uses) and 65,292 gsf of industrial use at five potential development sites. 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 projected and potential development sites were evaluated.

Air emissions were analyzed from potential manufacturing uses that would be permitted and reasonably could locate in the proposed Special Gowanus Mixed-Use District (GSD), to assess their potential impacts on the potential sensitive uses in the district as well as in the surrounding areas. Production/light industrial uses that would be permitted in the GSD include:

- specified commercial and light manufacturing uses permitted in Mixed Use districts;
- uses that support the growth of local innovative, start-up, and artisanal businesses;
- uses that support manufacturing, life science, and laboratory space; and
- a range of other uses.[12]

The RWCDS assumes that light industrial uses would be developed on Projected Development Sites 22, 29, 41, 44, 47, and 48, with a total of 88,977 gsf and on potential development sites P, AK, BI, BL, and BO with a total of 65,292 gsf.

Uses

The GSD would modify the floor area regulations of the underlying M1-4 district to permit FARs of 3 and 4. For the industrial source analysis, the potential uses that would be allowed under the Proposed Actions were reviewed to identify light industrial use categories that might foreseeably locate within the proposed GSD. A table summarizing the foreseeable manufacturing use categories that the zoning text amendments would permit in the GSD Mixed Use District is presented in **Table 15-9**. The uses are deemed as more likely to locate within GSD due to the additional FAR.

The proposed GSD text, like the Mixed Use District text that it references, would restrict the co-location of sensitive uses near potentially noxious uses. The proposed GSD text would provide that any residential use, and certain sensitive community facility uses,[13] may only locate in the same building as, or share a

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[12] All uses within Use Group 11 (custom manufacturing), and a selection of additional artisanal uses from Use Groups 6–10, 12, 16, and 17, as well as breweries and distilleries.

[13] Zoning Resolution § 123-21 provides that the uses listed in Use Group 2 (residential), and the following community facility uses are subject to this co-location restriction: college or school student dormitories and fraternity or sorority houses; long-term care facilities; philanthropic or nonprofit institutions with

common wall with, a building containing certain manufacturing or commercial uses upon certification by a licensed architect or engineer to the New York City Department of Buildings (DOB) that that manufacturing or commercial use: does not have a New York City or New York State environmental rating of "A," "B," or "C" under Section 24-153 of the New York City Administrative Code for any process equipment requiring a DEP operating certificate or DEC State Facility Permit.

The affected uses are listed in Zoning Resolution § 123-22 and are identified in the use summary presented in **Table 15-9**. For the RWCDS, it was assumed that to the extent they could have air toxic emissions of any significance, they would only locate in the GSD if they were located in a building that would have exclusively non-restricted community facility, commercial, or manufacturing uses, because most uses with measurable toxic emissions would have an environmental rating of A, B, or C.

Emissions Profile

To estimate emissions from light industrial uses that are considered foreseeable in the proposed GSD, 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 GSD 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).[14] 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 with the Proposed Project. 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 were determined on an additive (cumulative) basis by facility.

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sleeping accommodations; monasteries, convents or novitiates; non-profit hospital staff dwellings; and non-profit or voluntary hospitals.

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

Table 15-9
Proposed GSD
Industrial Use Categories Analyzed

Use Group	Use
6A	Custom tailor/dressmaker shops
11A	Book binding/tooling (by hand)
	Ceramic products, including pottery, small glazed tile, or similar
	Custom manufacturing/altering for retail
	Custom hair product manufacturing
	Medical appliance manufacturing
	Musical instruments, not including pianos or organs (1)
	Precision instrument/jewelry manufacturing
	Printing, with no limitation on floor area (1)
	Watchmaking
12B	Commercial art gallery
	Jewelry/art metal craft shops
16A	Building contractor supply stores (5k sf open storage limit)
	Building material sales, open or enclosed (5k sf of open storage limit)
	Household/office equipment or machinery repair shops
	Machinery rental or sales establishments
17B	Apparel or other textile products from textiles or other materials, including hat bodies or similar products
	Bottling work, for all beverages
	Canvas or canvas product manufacturing
	Dry ice/natural ice manufacturing
	Fur good manufacturing (excl. tanning/dyeing)
	Glass product manufacturing
	Hair, felt or feather products, except washing, curing or dyeing
	Hosiery manufacturing
	Jute, hemp, sisal, or oakum product manufacturing
	Mattress manufacturing
	Scenery construction manufacturing
	Shoddy (rag) manufacturing
	Soap or detergent packaging
	Textiles, dyeing or printing (1)
	Upholstering, bulk, excluding upholstering shops dealing directly with consumers
	Wax product manufacturing
17C	Agriculture, incl. greenhouses, nurseries, and truck (produce) gardens
	Docks for passenger vessels (no limit)
	Docks for sightseeing, excursion, or sport fishing vessels (no limit)
	Public transit, railroad, or electrical utility substations (no limit)
	Truck terminals (no limit)
18A	Breweries and alcoholic beverage manufacturing

Note:
(1) Use proposed to be restricted such that it may only locate in the same building as, or share a common wall with, a building containing certain manufacturing or commercial uses upon certification by a licensed architect or engineer to the New York City Department of Buildings (DOB) that that manufacturing or commercial use does not have a New York City or New York State environmental rating of “A,” “B,” or “C” under Section 24-153 of the New York City Administrative Code for any process equipment requiring a DEP operating certificate or DEC State Facility Permit.

A summary of emissions profiles developed for the industrial source analysis is presented in **Table 15-10**. 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. For some uses that are foreseeable within the district and identified for analysis, no permits were found in the DEP air permits. It is therefore reasonable to conclude that these uses do not typically include processes requiring permits, and any associated emissions would be less than other uses for which permit information was available, and therefore that any impacts from the uses without permits are encompassed by the processes analyzed. A complete summary of the emission values used in the analysis for each of the analyzed use groups, is presented in **Appendix H-1**.

Table 15-10
Industrial Source Analysis Emissions Profile

Pollutant	Maximum Modeled Emissions	
	(lb/hr)	(lb/yr)
Formaldehyde	0.062	123.6
Glycerin	0.371	712
Cyanides	0.0395	59.2
Ethanol	3	11,592
Formic Acid	0.001	1.4
Acetic Acid	0.19	389. 7
Methanol	0.31	3,053
Isopropyl Alcohol	0.96	1,720
Acetone	19.4	25,290
Butyl Alcohol, N-	2.16	3,240
Methyl Chloroform	9.75	14,625
Methane	0.404	22.2
Chloromethane	0.001	2.4
Hydrogen Cyanide	0.001	0.5
Chlorobromomethane	0.001	1.4
Vinyl Chloride	4.75	208.5
Acetonitrile	1.363	3.0
Acetaldehyde	0.83	35,644
Dichloromethane	3.925	4,015
Formamide	0.25	476
Isophorone	0.126	262.1
Isobutyl Alcohol	4.86	7,776
Methyl Ethyl Ketone	10.72	2,160
Trichloroethane, 1, 1, 2	0.3	120
Trichloroethylene	2.97	5,417.5
Dibutyl Phalate	0.023	52
Butyl Benzyl Phthala	0.0075	5.5
Napthalene	0.835	1,336
Biphenyl	0.066	110
Dichlorobenzine, Ortho	0.03	6
Ethyl Benzene	0.86	174.7
Styrene	3	11,375
1,4-Dichlorobenzene(P)	0.028	5.6
Acrylonitrile	---	33
Ethylene Glycol	0.0115	43
Vinyl Acetate	0.001	6
Methyl Isobutyl Ketone	3.9	2,966.35
Isopropyl Acetate	4.275	6,975
Toluene	18.78	26,594
Cyclohexone	0.8	1,283
Phenol	0.003	1.5
Propyl Acetate	0.001	0.094
Methyl Cellosolve	0.003	1.1
Tetrahydrofuran	0.015	52.8
Isobutyl Acetate	0.5	608
Hexane	4.6	1,000
Glycol Monoethylether	0.0595	112
Cyclohexane	1.131	2,352.4
Cellosolve Acetate	0.076	2,274
Glycol Ethers	7.87	12,704
Ethylenglycolmonbuty	1.18	1,424
Butyl Carbitol	0.76	2,941.4
Dioctyl Phthalate	2.6	2,615.8
Trichcloro Benzene	0.165	330

Table 15-10 (cont'd)
Industrial Source Analysis Emissions Profile

Pollutant	Maximum Modeled Emissions	
	(lb/hr)	(lb/yr)
Triethylamine	0.65	1,040
Hydroquinone	0.041	62.65
Butyl Acetate	1.02	1,504
Tetrachloroethylene	0.75	1,500
Monoethanolamine	0.4	576
Ethyl Acetate	1.656	3,667.5
N-Heptane	2	2,564.5
Sodium Cyanide	0.185	360
Potassium Cyanide	0.001	1.6
Hydrazine	0.006	2.4
Carbon Monoxide	13.686	10,718
Iron Oxide	0.245	490
Lead Oxide	0.001	0.004
Sodium Hydroxide	0.34	3,888
Nickel Oxide	0.001	1.6
Zinc Oxide	0.005	1.92
Xylene, M,O&P Mixt.	4.32	2,660
Carbon Black	0.002	4.2
Lead Oxide	0.001	2
Aluminum Oxide	0.040	1.8
Ethyleneglycol Monopropyl Ether	0.28	253.0
Aluminum	0.050	400
Lead	0.058	4.36
Manganese Compounds	0.001	0.64
Nickel	0.004	0.96
Tin	0.002	2.4
Antimony	0.014	21.84
Cadmium	0.001	1.2
Copper	0.001	1.8
Zinc	0.014	6.6
Sulfur Dioxide	0.050	21.85
Zinc Chloride	0.001	3.38
Hydrogen Chloride	0.07	45.5
Phosphoric Acid	0.021	6.08
Hydrogen Fluoride	0.004	23
Ammonia	0.515	8,581
Sulfuric Acid	0.004	9
Nitric Acid	0.019	20.6
Bromine	0.005	81.9
Barium Sulfate	0.005	5
Chlorine	0.001	0.4
Hydrogen Sulfide	0.010	16.47
Turpentine	0.42	416
Naphtha	6.7	2750
Ligroine	6.4	3675
Polyvinyl Chloride	0.010	104.6
Nitrous Oxide	0.440	880
Nitrogen Oxide	1.3	2,600
Nitrogen Dioxide	0.20	187.5
Chromic Acid	0.75	3.9
Particulates	0.298	35,970

Dispersion Analysis

Industrial sources of emissions were analyzed using the refined AERMOD dispersion model, using a unitary emission rate of 1 gram per second to determine potential air toxics concentrations for each use at sensitive receptor locations at existing and projected and potential developments. 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 to future sensitive uses on the projected development sites, on all façades and at multiple elevations. Additional locations were modeled to assess the need for potential stack location restrictions.

Each site was analyzed to determine potential air toxics concentrations at nearby projected and potential 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. These restrictions are noted in the results below.

As noted above, it was assumed for the purpose of this analysis that the analyzed development sites cannot co-locate with residential space, since under the RWCDS, they would be developed as exclusively commercial with no residential component. Therefore, under the proposed GSD regulations, it could also be developed with commercial and manufacturing uses that would not have the environmental restrictions on air toxics emissions outlined above. Consequently, the air quality analysis was performed for all of the potential uses that were identified with air toxics emissions.

Exhaust parameters were developed based on the DEP permit records used to develop the emissions profiles shown in **Table 15-10**. Based on review of the permit information, many processes include stack parameters that would give significant plume rise. It would be reasonable to assume that most if not all expected industrial uses that would locate to the proposed GSD would include exhaust stacks that would incorporate exhaust velocity. Therefore, the median exhaust velocity and stack diameter were used to represent exhaust parameters from allowed uses.

The results were used to predict the worst-case potential air toxics concentrations. Dependent on the zoning text restrictions for each use, the unitary results (µg/m^3 per g/s) for each development was scaled by the median emission rates from the emissions profile.

The results were compared with the SGC and AGC values reported in the DEC's DAR-1 Tables guidance document to determine the potential for significant impacts.[15] For each source location modeled, pollutants that were modeled to exceed AGCs and/or SGCs are summarized, along with the affected receptors.

EPA's AERMOD dispersion model was used to estimate the short-term and annual concentrations of air toxic pollutants at sensitive receptor locations in the Project Area. Predicted impacts on

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

sensitive receptors were compared with the SGC and AGC reported in DEC's DAR-1 AGC/SGC Tables guidance document to determine the potential for significant impacts.

ADDITIONAL SOURCES

The *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 and potential 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.

No facilities with a State Facility, Title V, or PSD Permit within the 1,000-foot study area around the Project Area were identified. Therefore, no analysis of the potential impacts of large or major sources of emissions on the projected and potential development sites was required.

E. 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 15-11**. 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. 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 15-11** provide a comparison of the air quality in the rezoning 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 15-11
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College	ppm	1-hour	1.5	35
	Queens College		8-hour	1.1	9
SO_2	Queens College	$\mu g/m^3$	1-hour	13.5	196
PM_{10}	Division Street	$\mu g/m^3$	24-hour	39.3	150
$PM_{2.5}$	JHS 126	$\mu g/m^3$	Annual	7.6	12
			24-hour	17.8	35
NO_2	Queens College	$\mu g/m^3$	Annual	26.7	100
	Queens College		1-hour	103.8	188
Lead	IS 52	$\mu g/m^3$	3-month	0.0041	0.15
Ozone	Queens College	ppm	8-hour	0.074	0.075

Notes:

(1) The CO concentration for short-term average is the second-highest from recently available data.
(2) The PM_{10} concentration for the short-term average is the highest from recently available data.
(3) $PM_{2.5}$ annual concentrations are the average of 2017–2019 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentile concentrations in the same period.
(4) The SO_2 1-hour and NO_2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively, of the highest daily 1-hour maximum from 2017 to 2019.
(5) The lead concentrations is based on the highest quarterly average concentration measured in 2019.
(6) The ozone concentration is based on the 3-year average (2017–2019) of the 4th highest daily maximum 8-hour average concentrations.

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

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO ACTION CONDITION)

MOBILE SOURCES

CO concentrations in the 2035 No Action condition were determined using the methodology previously described. **Table 15-12** 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 15-12
Maximum Predicted 8-Hour Average CO No Action Concentrations

Analysis Site	Location	Time Period	8-Hour Concentration (ppm)
1	Bond Street and 3rd Street	AM	1.3
2	Hoyt Street and 4th Street	AM	1.2

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

PM_{10} concentrations in the No Action condition were determined by using the methodology previously described. Predicted future PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in the No Action condition are presented in **Table 15-13**. The values shown are the highest predicted concentrations for the receptor locations. As shown in the table, No Action condition concentrations are predicted to be well below the PM_{10} NAAQS.

Table 15-13
Maximum Predicted 24-Hour Average
PM_{10} No Action Concentrations (μg/m^3)

Analysis Site	Location	Concentration
1	Bond Street and 3rd Street	47.4
2	Hoyt Street and 4th Street	45.6
3	Bond Street and Baltic Street	47.6
4	Smith Street and 5th Street	47.8
5	3rd Avenue and Carroll Street	52.5

Notes:
NAAQS—24-hour average 150 μg/m^3.
Concentration includes a background concentration of 39.3 μg/m^3.

$PM_{2.5}$ 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.

G. 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 15-14** 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 Project would not result in any violations of the 8-hour CO standard. 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 Proposed Project would not result in a significant adverse air quality impact.

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

Analysis Site	Location	Time Period	No Action	With Action	*De Minimis*
1	Bond Street and 3rd Street	AM	1.3	1.5	5.1
2	Hoyt Street and 4th Street	AM	1.2	1.3	5.1

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

PM_{10} concentrations with the Proposed Actions were determined using the methodology previously described and used in the No Action condition. **Table 15-15** presents the predicted PM_{10} 24-hour concentrations at the analyzed intersections in the With Action condition. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

Table 15-15
Maximum Predicted 24-Hour Average PM_{10}
With Action Concentration ($\mu g/m^3$)

Analysis Site	Location	No Action	With Action
1	Bond Street and 3rd Street	47.4	52.8
2	Hoyt Street and 4th Street	45.6	52.2
3	Bond Street and Baltic Street	47.6	51.0
4	Smith Street and 5th Street	47.8	64.5
5	3rd Avenue and Carroll Street	52.4	57.1

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentrations presented include a background concentration of 39.3 $\mu g/m^3$.

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 15-16 and 15-17**, respectively. **Tables 15-16 and 15-17** also present the maximum predicted concentrations in the No Action and With Action condition. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

Table 15-16
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	Bond Street and 3rd Street	19.7	20.8	1.2	8.6
2	Hoyt Street and 4th Street	19.3	20.7	1.4	8.6
3	Bond Street and Baltic Street	19.8	20.5	0.8	8.6
4	Smith Street and 5th Street	19.7	24.0	4.5	8.6
5	3rd Avenue and Carroll Street	20.9	21.7	0.9	8.6

Notes:
NAAQS—24-hour average 35 $\mu g/m^3$.
No Action and With Action concentrations presented include a background concentration of 17.8 $\mu g/m^3$.
$PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration (17.2 $\mu g/m^3$) and the 24-hour standard of 35 $\mu g/m^3$.

Table 15-17
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	Bond Street and 3rd Street	7.66	7.73	0.07	0.1
2	Hoyt Street and 4th Street	7.62	7.69	0.08	0.1
3	Bond Street and Baltic Street	7.67	7.74	0.07	0.1
4	Smith Street and 5th Street	7.67	8.11	0.44	0.1
5	3rd Avenue and Carroll Street	7.72	7.79	0.07	0.1

Notes:
NAAQS—annual average 12 $\mu g/m^3$.
No Action and With Action concentrations presented include a background concentration of 7.6 $\mu g/m^3$.
$PM_{2.5}$ *de minimis* criteria—annual (neighborhood scale), 0.1 $\mu g/m^3$.

The results in **Table 15-16** show that the 24-hour $PM_{2.5}$ increments are predicted to be below the *de minimis* criterion and total cocentrations are below the NAAQS at each of the analysis sites. As shown in **Table 15-17**, at four of the five intersection sites analyzed, the maximum annual incremental $PM_{2.5}$ concentration is below the *de minimis* criterion; however, the annual $PM_{2.5}$ maximum incremental concentration is predicted to exceed the *de minimis* criteria at the intersection of Smith Street and 5th Street. This would be considered a significant adverse air quality impact. Therefore, traffic mitigation measures were examined to avoid potential significant impact at this intersection location. Mitigation measures are discussed in Chapter 21, "Mitigation."

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facilities at Projected Development Sites 29, 37, 41, and 48 were analyzed, assuming 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. Due to the proximity of sites 29 and 37, cumulative effect of these two sites was analyzed. To be conservative, maximum concentrations from the near side receptor of each of this facility was added to the far side receptor of the other facility on Carroll Street.

The maximum predicted eight-hour average CO concentration of all the receptors modeled for the four analyzed parking facilities is 1.3 ppm. This value includes a predicted concentration of 0.03

ppm from emissions within the parking garage, on-street contribution of 0.06 ppm, 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 0.097 $\mu g/m^3$ and 0.016 $\mu g/m^3$, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria 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 garages would not result in any significant adverse air quality impacts.

STATIONARY SOURCES

INDIVIDUAL HEAT AND HOT WATER SYSTEMS

Screening Analysis

The screening analysis was performed to evaluate whether potential air quality impacts from the heat and hot water systems associated with the projected and potential development sites could potentially impact other projected and potential development sites, or existing or other proposed buildings.

A total of 31 projected and 47 potential development sites failed the screening analysis using No. 2 fuel oil as the fuel source. Therefore, each of these development sites required a refined modeling analysis for the use of No. 2 fuel oil. Of the sites that failed the screening analysis for No. 2 oil, 20 projected and 44 potential development sites were found to also fail using natural gas as the fuel source. Therefore, a refined modeling analysis for the use of natural gas was performed for these sites.

Refined Dispersion Analysis

As indicated above, 78 projected and potential development sites (31 projected and 47 potential development sites) required a refined modeling analysis to determine the potential for air quality impacts. The results of the refined modeling analysis determined the following:

- If the fuel type is No. 2 oil, and height of the exhaust stack is restricted to tallest building on the site, no significant are predicted at six of the sites (four projected and two potential sites).[16]
- If the fuel type is restricted to natural gas, no significant adverse impacts are predicted at six of the sites (six potential development sites).
- If the fuel type is restricted to natural gas only, and low NO_x burners are required to address NO_2 emissions, no significant adverse impacts are predicted at six of the sites (one projected and five potential development sites).
- If the fuel type is restricted to natural gas only, and heating and hot water system stacks are set back from the building edge to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at two potential development sites.[17]

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[16] Alternatively, for Projected Site 41 (Block 972, Lots 1, 43, 58) and Potential site AL (Block 434, Lot 16), if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the heating and hot water system stacks are further set back from the building edge, the height of the exhaust stacks is increased, and low NO_x burners firing natural gas only are utilized. For Potential Site W (Block 425, Lot 1), if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the heating and hot water system stacks are further set back from the building edge, and low NO_x burners firing natural gas only are utilized. Alternatively, for Potential Site BE (Block 448, Lot 34), compliance can be achieved if natural gas is used for heating and hot water systems.

[17] Alternatively, for Potential Development Site AS (Block 441, Lots 50, 53), compliance can be achieved if the height of the heating and hot water system exhaust stack is increased.

- If the fuel type is restricted to natural gas only, heating and hot water system stacks are set back from the building edge to address $PM_{2.5}$ and NO_2 emissions, and low NO_x burners are required to address NO_2 emissions, no significant adverse impacts are predicted at 14 of the sites (eight projected and six potential development sites).[18,19]
- If the fuel type is restricted to natural gas only, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at 10 of the sites (two projected and eight potential development sites).[20,21]
- If the fuel type is restricted to natural gas only, the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, and low NO_x burners are required to address NO_2 emissions, no significant adverse impacts are predicted at 10 of the sites (three projected and seven potential sites).[22]
- If the fuel type is restricted to natural gas only, heating and hot water system stacks are set back from the building edge, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at one potential development site.
- If the fuel type is restricted to natural gas only, heating and hot water system stacks are set back from the building edge, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, and low NO_x burners are required to address NO_2 emissions, no significant adverse impacts are predicted at 15 of the sites (six projected and nine potential development sites).[23,24]

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[18] Alternatively, for Potential Development Sites X (Block 426, Lots 36, 41), and AY (Block 447, Lots 3, 4, 7), compliance can be achieved if the height of the heating and hot water system exhaust stack is increased.

[19] Alternatively, for Projected Development Site 13 (Block 412, Lots 18, 19, 20, 45, and 48), compliance can be achieved if the height of the heating and hot water system stack is increased and low NO_x burners are utilized; OR if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the heating and hot water system stacks are further set back from the building edge and low NO_x burners are utilized.

[20] Alternatively, for Projected Development Site 14 (Block 413, Lots 1, 2, and 7) if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the heating and hot water system stacks are further set back from the building edge and low NO_x burners are utilized.

[21] Alternatively, for Projected Development Site 31 (Block 441, Lots 24, 33, and 35), if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the height of the heating and hot water system stacks are increased and low NO_x burners are utilized.

[22] Alternatively, for Projected Development Site 25 (Block 434, Lots 1 and 12) and Potential Development Site BT (Block 980, Lots 23, 49), if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the heating and hot water system stacks are further set back and low NO_x burners are utilized.

[23] For the City-owned parcel located within projected site 47 (Block 471, Lots 1, 100), the implementation of the restrictions would be required through the Land Disposition Agreement between HPD and future developer with oversight provided through HPD.

[24] Alternatively, for Potential Development Sites L (Block 407, Lot 41), and BV (Block 992, Lot 1), if heating and hot water systems stacks are not located on the tallest building, compliance can be achieved if the heating and hot water system stacks are further set back, the height of the exhaust stacks is increased,. For Site L, compliance can be achieved if the heating and hot water system stacks are further set back

Table 15-18 presents a summary of the analysis results and proposed restrictions, with additional detail provided in **Tables 15-19** (projected development sites) **and 15-20** (potential development sites).

Table 15-18
Heating and Hot Water System Analysis Summary

Analysis	Projected Development Sites		Potential Development Sites	
	Pass	**Fail**	**Pass**	**Fail**
#2 Oil Screening	32	31	23	47
#2 Oil Refined Analysis	1	30	4	43
Total	**33**	**30**	**27**	**43**
Sites with Requirements	**Pass**	**Fail**	**Pass**	**Fail**
#2 Oil and Stack Height Requirement	4	-	2	-
Natural Gas Screening	43	20	26	44
Natural Gas Refined Analysis	0	20	6	38
Natural Gas and Low NO_x Requirement	1	-	5	-
Natural Gas and Stack Setback Requirement	0	-	2	-
Natural Gas, Stack Setback, and Low NO_x Requirement	8	-	6	-
Natural Gas and Stack Height Requirement	2	-	8	-
Natural Gas, Stack Height, and Low NO_x Requirement	3	-	7	-
Natural Gas, Stack Setback, and Stack Height Requirement	0	-	1	-
Natural Gas, Stack Setback, Stack Height and Low NO_x Requirement[1]	6	-	9	-

Note:
[1] For the City-owned parcels located within Projected Development Site 47, the implementation of the restrictions would be required through the Land Disposition Agreement between HPD and the future developer with oversight provided through HPD.

Overall, to preclude the potential for significant adverse air quality impacts on other projected and potential development sites, or existing buildings, from the heat and hot water emissions, an (E) Designation (E-601) would be assigned as part of the Proposed Actions for 79 projected and potential development sites (including 34 projected and 45 potential development sites). These designations would specify the various restrictions, such as type of fuel to be used, the use of low NO_x burners, the distance that the vent stack on the building roof must be from its lot line(s), and/or the increase of the exhaust stack height.

For the City-owned parcels located within Projected Development Site 47, the implementation of the restrictions would be required through the Land Disposition Agreement between HPD and the future developer with oversight provided through HPD.

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from the building edge, and the height of the exhaust stack is increased; for Site BV compliance can be achieved if the heating and hot water system stacks are located on the eastern building.

Table 15-19
Heating and Hot Water System Analysis—Results for Projected Development Sites

		#2 Oil Modeled Concentration (μg/m^3)						Natural Gas Modeled Concentration (μg/m^3)					
Site	**Building Height**	**PM$_{2.5}$ 24 hour**	**PM$_{2.5}$ Annual**	**SO$_2$ 1-hr**	**NO$_2$ 1-hr**	**PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/SO$_2$ 1-hour/NO$_2$ 1-hour Standard**	**Pass/Fail**	**PM$_{2.5}$ 24 hour**	**PM$_{2.5}$ Annual**	**NO$_2$ 1-hr**	**PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/NO$_2$ 1-hour Standard**	**Pass/Fail**	**Requires (E) Designation (Yes/No)**
1	135	>8.6	>0.3	18.83	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
2	165	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
3	85	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
4	75	>8.6	>0.3	33.3	-	8.6/0.3/196/188	Fail	0.75	0.03	114	8.6/0.3/188	Pass	Yes
5	75	>8.6	>0.3	147.7	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
6	85	Passes Screening	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
7	60/75	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	4.2	0.07	120	8.6/0.3/188	Pass	Yes
8	45	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
9	85	>8.6	0.27	20.9	-	8.6/0.3/196/188	Fail	4.6	0.08	132	8.6/0.3/188	Pass	Yes
10	75	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
11	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
12	120	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
13	85/115	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	6.8	0.14	155	8.6/0.3/188	Pass	Yes
14	95/122	>8.6	>0.3	48.5	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
15	160/210	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
16	95	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
17	145	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
18	118/188	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
19	65/120	>8.6	>0.3	101.3	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
20	110/120	>8.6	>0.3	178.5	-	8.6/0.3/196/188	Fail	4.94	0.13	144	8.6/0.3/188	Pass	Yes
21	100	>8.6	0.28	17.3	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
22	65/195	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
23	75	1.9	0.06	14.4	151	8.6/0.3/196/188	Pass	0.75	0.03	128	8.6/0.3/188	Pass	No
24	75	>8.6	>0.3	23.0	-	8.6/0.3/196/188	Fail	7.7	0.25	154	8.6/0.3/188	Pass	Yes
25	75/80	>8.6	>0.3	163.6	-	8.6/0.3/196/188	Fail	7.4	0.18	140	8.6/0.3/188	Pass	Yes
26	95	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No

Table 15-19 (cont'd)
Heating and Hot Water System Analysis—Results for Projected Development Sites

		#2 Oil Modeled Concentration (µg/m^3)						Natural Gas Modeled Concentration (µg/m^3)					
Site	Building Height	PM$_{2.5}$ 24 hour	PM$_{2.5}$ Annual	SO$_2$ 1-hr	NO$_2$ 1-hr	PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/SO$_2$ 1-hour/NO$_2$ 1-hr Standard	Pass/Fail	PM$_{2.5}$ 24 hour	PM$_{2.5}$ Annual	NO$_2$ 1-hr	PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/NO$_2$ 1-hour Standard	Pass/Fail	Requires (E) Designation (Yes/No)
27	155	>8.6	>0.3	17.2	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
28	100/210/215	>8.6	>0.3	28.85	-	8.6/0.3/196/188	Fail	1.29	0.04	101	8.6/0.3/188	Pass	Yes[1]
28	100/210/215	>8.6	>0.3	28.85	-	8.6/0.3/196/188	Fail	8.59	0.21	155	8.6/0.3/188	Pass	Yes[2]
29	120/140/200	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	3.6	0.08	125	8.6/0.3/188	Pass	Yes[3]
29	120/140/200	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	4.5	0.11	125	8.6/0.3/188	Pass	Yes[4]
30	75/85	>8.6	>0.3	58.3	-	8.6/0.3/196/188	Fail	6.4	0.19	134	8.6/0.3/188	Pass	Yes
31	95/105	>8.6	>0.3	57.8	-	8.6/0.3/196/188	Fail	7.4	0.14	164	8.6/0.3/188	Pass	Yes
32	85	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
33	45	>8.6	0.18	22.9	-	8.6/0.3/196/188	Fail	3.17	0.09	135	8.6/0.3/188	Pass	Yes
34	75	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
35	60	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
36	85	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
37	175/210	>8.6	0.13	19	-	8.6/0.3/196/188	Fail	2.25	0.08	117	8.6/0.3/188	Pass	Yes[1]
37	175/210	>8.6	0.13	19	-	8.6/0.3/196/188	Fail	4.9	0.08	142	8.6/0.3/188	Pass	Yes[2]
38	35/155	>8.6	>0.3	17.2	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
39	175	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
40	120/190	>8.6	>0.3	32.0	-	8.6/0.3/196/188	Fail	7.37	0.16	162	8.6/0.3/188	Pass	Yes
41	140/170/220	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
42	50	>8.6	>0.3	24.09	-	8.6/0.3/196/188	Fail	8.4	0.27	158	8.6/0.3/188	Pass	Yes
43	115	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
44	205	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
45	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
46	135	>8.6	>0.3	22.18	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
47	145/265/218/230	>8.6	>0.3	64.1	-	8.6/0.3/196/188	Fail	3.46	0.12	137	8.6/0.3/188	Pass	Yes[1]
47	145/265/218/230	>8.6	>0.3	64.1	-	8.6/0.3/196/188	Fail	5.85	0.11	160	8.6/0.3/188	Pass	Yes[2]
48	227/245/300	>8.6	>0.3	22.22	-	8.6/0.3/196/188	Fail	0.53	0.02	97	8.6/0.3/188	Pass	Yes[1]
48	227/245/300	>8.6	>0.3	22.22	-	8.6/0.3/196/188	Fail	7	0.20	176	8.6/0.3/188	Pass	Yes[2]
49	175	>8.6	0.23	16.74	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
50	65	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No

Table 15-19 (cont'd)
Heating and Hot Water System Analysis—Results for Projected Development Sites

		#2 Oil Modeled Concentration (µg/m^3)						Natural Gas Modeled Concentration (µg/m^3)					
Site	**Building Height**	**PM$_{2.5}$ 24 hour**	**PM$_{2.5}$ Annual**	**SO$_2$ 1-hr**	**NO$_2$ 1-hr**	**PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/SO$_2$ 1-hour/NO$_2$ 1-hr Standard**	**Pass/Fail**	**PM$_{2.5}$ 24 hour**	**PM$_{2.5}$ Annual**	**NO$_2$ 1-hr**	**PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/NO$_2$ 1-hour Standard**	**Pass/Fail**	**Requires (E) Designation (Yes/No)**
51	135	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
52	145	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
53	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
54	105	>8.6	>0.3	20.73	-	8.6/0.3/196/188	Fail	5.53	0.2	138	8.6/0.3/188	Pass	Yes
55	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
56	80	>8.6	>0.3	81.69	-	8.6/0.3/196/188	Fail	5.2	0.16	146	8.6/0.3/188	Pass	Yes
57	85	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
58	65	>8.6	>0.3	17.39	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
59	60	>8.6	0.2	25.08	-	8.6/0.3/196/188	Fail	4.17	0.1	141	8.6/0.3/188	Pass	Yes
60	113	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
61	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
62	55	>8.6	>0.3	18.22	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
63	175	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No

Notes:
1. The results presented are for the cumulative analysis on off-site receptors.
2. The results presented are for the building on building analysis.
3. The results presented are for the cumulative analysis on Site 29 showing the potential impacts on off-site receptors.
4. Although Site 29 initially passed the screening analysis, an E-designation is required at as a result of the cumulative analysis on Site 29.

Table 15-20
Heating and Hot Water System Analysis—Results for Potential Development Sites

		#2 Oil Modeled Concentration (µg/m^3)						Natural Gas Modeled Concentration (µg/m^3)					
Site	Building Height	PM$_{2.5}$ 24 hour	PM$_{2.5}$ Annual	SO$_2$ 1-hr	NO$_2$ 1-hr	PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/SO$_2$ 1-hour/NO$_2$ 1 hour Standard	Pass/ Fail	PM$_{2.5}$ 24 hour	PM$_{2.5}$ Annual	NO$_2$ 1-hr	PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/NO$_2$ 1-hour Standard	Pass/ Fail	Requires (E) Designation (Yes/No)
A	145	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
B	155	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
C	75	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
D	75	>8.6	>0.3	32.02	-	8.6/0.3/196/188	Fail	4.7	0.17	153	8.6/0.3/188	Pass	Yes
E	75	>8.6	>0.3	51.88	-	8.6/0.3/196/188	Fail	3.3	0.14	180	8.6/0.3/188	Pass	Yes
F	75	>8.6	>0.3	23.26	-	8.6/0.3/196/188	Fail	2.4	0.08	107	8.6/0.3/188	Pass	Yes
G	65	>8.6	>0.3	21.09	-	8.6/0.3/196/188	Fail	6.8	0.25	153	8.6/0.3/188	Pass	Yes
H	75	>8.6	>0.3	27.57	-	8.6/0.3/196/188	Fail	2.3	0.07	147	8.6/0.3/188	Pass	Yes
J	105	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	7.1	0.22	162	8.6/0.3/188	Pass	Yes
K	135	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
L	95	>8.6	0.23	19.57	-	8.6/0.3/196/188	Fail	6.2	0.12	141	8.6/0.3/188	Pass	Yes
M	85	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	6.3	0.21	153	8.6/0.3/188	Pass	Yes
N	105	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
O	45	>8.6	>0.3	86.84	-	8.6/0.3/196/188	Fail	6.4	0.22	134	8.6/0.3/188	Pass	Yes
P	55	Passes Screening	Passes Screening	Passes Screening	--	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
Q	75	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	8.5	0.25	168	8.6/0.3/188	Pass	Yes
R	145	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
S	75	>8.6	>0.3	25.99	-	8.6/0.3/196/188	Fail	6.2	0.19	133	8.6/0.3/188	Pass	Yes
T	75	>8.6	>0.3	61.85	-	8.6/0.3/196/188	Fail	4.0	0.14	125	8.6/0.3/188	Pass	Yes
U	100	>8.6	>0.3	22.14	-	8.6/0.3/196/188	Fail	6.0	0.09	157	8.6/0.3/188	Pass	Yes
V	145	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
W	205	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
X	110	>8.6	>0.3	34.53	-	8.6/0.3/196/188	Fail	7.8	0.26	149	8.6/0.3/188	Pass	Yes
Y	75	>8.6	>0.3	44.36	-	8.6/0.3/196/188	Fail	5.9	0.13	136	8.6/0.3/188	Pass	Yes
Z	115	>8.6	>0.3	52.61	-	8.6/0.3/196/188	Fail	7.8	0.29	155	8.6/0.3/188	Pass	Yes
AA	75	>8.6	>0.3	21.42	-	8.6/0.3/196/188	Fail	7.2	0.15	134	8.6/0.3/188	Pass	Yes
AB	80	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	4.9	0.15	160	8.6/0.3/188	Pass	Yes
AC	155	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
AD	75	>8.6	>0.3	71.41	-	8.6/0.3/196/188	Fail	4.7	0.17	187.6	8.6/0.3/188	Pass	Yes
AE	60	2.7	0.12	14	137	8.6/0.3/196/188	Pass	1.4	0.06	116	8.6/0.3/188	Pass	No
AF	47	>8.6	>0.3	25.67	-	8.6/0.3/196/188	Fail	8.4	0.24	143	8.6/0.3/188	Pass	Yes

Notes:
1. The results presented are for the cumulative analysis on off-site receptors.
2. The results presented are for the building on building analysis.

Table 15-20 (cont'd)
Heating and Hot Water System Analysis—Results for Potential Development Sites

		#2 Oil Modeled Concentration (µg/m^3)						Natural Gas Modeled Concentration (µg/m^3)					
Site	Building Height	PM$_{2.5}$ 24 hour	PM$_{2.5}$ Annual	SO$_2$ 1-hr	NO$_2$ 1-hr	PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/SO$_2$ 1-hour/NO$_2$ 1 hour Standard	Pass/ Fail	PM$_{2.5}$ 24 hour	PM$_{2.5}$ Annual	NO$_2$ 1-hr	PM$_{2.5}$ 24-hour/PM$_{2.5}$ Annual/NO$_2$ 1-hour Standard	Pass/ Fail	Requires (E) Designation (Yes/No)
AG	46	>8.6	>0.3	40.95	-	8.6/0.3/196/188	Fail	3.1	0.09	129	8.6/0.3/188	Pass	Yes
AH	65	>8.6	>0.3	18.54	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
AI	55	>8.6	>0.3	52.55	-	8.6/0.3/196/188	Fail	6.9	0.18	142	8.6/0.3/188	Pass	Yes
AJ	75	>8.6	>0.3	28.25	-	8.6/0.3/196/188	Fail	2.2	0.08	158	8.6/0.3/188	Pass	Yes
AK	65	>8.6	0.16	17.29	-	8.6/0.3/196/188	Fail	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
AL	85	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
AM	95	>8.6	0.2	19.32	-	8.6/0.3/196/188	Fail	5.3	0.09	142	8.6/0.3/188	Pass	Yes
AN	95	>8.6	0.26	18.72	-	8.6/0.3/196/188	Fail	3.3	0.12	134	8.6/0.3/188	Pass	Yes
AO	200	>8.6	>0.3	41.65	-	8.6/0.3/196/188	Fail	7.3	0.14	152	8.6/0.3/188	Pass	Yes
AP	40	2.3	0.1	14	114	8.6/0.3/196/188	Pass	1.2	0.05	108	8.6/0.3/188	Pass	No
AQ	85	>8.6	>0.3	157.18	-	8.6/0.3/196/188	Fail	3.5	0.11	158	8.6/0.3/188	Pass	Yes
AR	85	>8.6	>0.3	76.85	-	8.6/0.3/196/188	Fail	2.8	0.11	181	8.6/0.3/188	Pass	Yes
AS	65	>8.6	>0.3	22.26	-	8.6/0.3/196/188	Fail	6.8	0.18	171	8.6/0.3/188	Pass	Yes
AT	75	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
AU	75	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
AV	75	6.8	0.22	17.53	-	8.6/0.3/196/188	Fail	2.5	0.11	128	8.6/0.3/188	Pass	Yes
AY	65	>8.6	>0.3	>196	-	8.6/0.3/196/188	Fail	6.4	0.22	138	8.6/0.3/188	Pass	Yes
AZ	45	>8.6	0.25	18.38	-	8.6/0.3/196/188	Fail	4.4	0.11	127	8.6/0.3/188	Pass	Yes
BA	15	3.0	0.16	14	126	8.6/0.3/196/188	Pass	1.4	0.08	115	8.6/0.3/188	Pass	No
BB	45	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BC	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BE	105	2.6	0.09	13.93	121.5	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	Yes
BF	45	5.3	0.17	16.65	>188	8.6/0.3/196/188	Fail	1.7	0.08	149	8.6/0.3/188	Pass	Yes
BG	45	>8.6	0.15	17.61	-	8.6/0.3/196/188	Fail	2.6	0.08	170	8.6/0.3/188	Pass	Yes
BH	105	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BI	30	6.7	0.16	18.60	>188	8.6/0.3/196/188	Fail	2.5	0.07	186	8.6/0.3/188	Pass	Yes
BJ	85	>8.6	>0.3	21.88	-	8.6/0.3/196/188	Fail	7.5	0.19	146	8.6/0.3/188	Pass	Yes
BK	45	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BL	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BN	140	>8.6	>0.3	23.63	-	8.6/0.3/196/188	Fail	8.3	0.18	126	8.6/0.3/188	Pass	Yes
BO	85	>8.6	>0.3	139.24	-	8.6/0.3/196/188	Fail	7.6	0.23	146	8.6/0.3/188	Pass	Yes
BQ	80	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No

Table 15-20 (cont'd)
Heating and Hot Water System Analysis—Results for Potential Development Sites

		#2 Oil Modeled Concentration (μg/m^3)						Natural Gas Modeled Concentration (μg/m^3)					Requires (E) Designation (Yes/No)
Site	Building Height	$PM_{2.5}$ 24 hour	$PM_{2.5}$ Annual	SO_2 1-hr	NO_2 1-hr	$PM_{2.5}$ 24-hour/$PM_{2.5}$ Annual/SO_2 1-hour/NO_2 1 hour Standard	Pass/ Fail	$PM_{2.5}$ 24 hour	$PM_{2.5}$ Annual	NO_2 1-hr	$PM_{2.5}$ 24-hour/$PM_{2.5}$ Annual/NO_2 1-hour Standard	Pass/ Fail	
BR	55	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BS	80	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BT	175	>8.6	>0.3	36.08	-	8.6/0.3/196/188	Fail	5.3	0.12	151	8.6/0.3/188	Pass	Yes
BU	80	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No
BV	65	>8.6	>0.3	89.84	-	8.6/0.3/196/188	Fail	8.5	0.24	158	8.6/0.3/188	Pass	Yes
BY	105	>8.6	>0.3	26.50	-	8.6/0.3/196/188	Fail	1.9	0.08	154	8.6/0.3/188	Pass	Yes
BZ	105	Passes Screening	Passes Screening	Passes Screening	-	8.6/0.3/196/188	Pass	Passes Screening	Passes Screening	Passes Screening	8.6/0.3/188	Pass	No

Cumulative Impacts from Heat and Hot Water Systems

An analysis was conducted to evaluate potential air quality impacts from groups or "clusters" of heat and hot water systems in close proximity with similar stack heights. Four clusters were identified.

AERSCREEN Analysis

The analysis was initially performed using the AERSCREEN model as described above. The maximum NO_2 one hour, NO_2 annual, $PM_{2.5}$ 24-hour, $PM_{2.5}$ annual, SO_2 one-hour, and PM_{10} 24-hour concentrations predicted by the AERSCREEN analysis are presented in **Table 15-21**. As shown in **Table 15-21**, Cluster 3 passed the screening analysis for natural gas.

Table 15-21
Cumulative Heating and Hot Water System Analysis
Maximum Pollutant Concentrations – Screening Results ($\mu g/m^3$)

		Maximum Concentration					**Total Concentration**				**NAAQS / *De Minimis***
Pollutant	**Averaging Period**	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Background Concentration**	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	
NO_2	1-Hour	254	99	45	346	103.8	358	203	1450	450	188
NO_2	Annual	8.71	3.39	1.64	11.9	28.7	37.41	32.09	30.34	40.6	100
SO_2	1-Hour	1.91	1.09	N/A	5.3	13.5	15.41	14.59	N/A	18.8	196
$PM_{2.5}$	24-Hour	14.5	8.3	5.1	43.3	NA	14.5	8.3	5.1	43.3	8.6
$PM_{2.5}$	Annual	0.66	0.38	0.23	2.0	NA	0.66	0.38	0.23	2.0	0.3
PM_{10}	24-Hour	14.5	8.3	5.1	43.3	39.3	53.8	47.6	44.4	82.6	150

Notes:
N/A—Not Applicable
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.
For the one-hour SO_2 averaging period, the three-year average of the maximum 99th percentile concentration was taken from DEC's *New York State Ambient Air Quality Report for 2019*. http://www.dec.ny.gov/chemical/8536.html
The $PM_{2.5}$ *de minimis* criteria for the 24-Hour period is half the difference between the NAAQS of 35 $\mu g/m^3$ and the ambient monitored background of 17.8 $\mu g/m^3$, and 0.3 $\mu g/m^3$ for the annual period.

Refined Dispersion Analysis

Based on the cumulative effects of the sources Clusters 1 and 4 failed the screening analysis for both No. 2 fuel oil and natural gas for the NO_2 one-hour, $PM_{2.5}$ 24-hour, and $PM_{2.5}$ annual standards. Cluster 2 failed the screening analysis for natural gas for the NO_2 one-hour and $PM_{2.5}$ annual standards.[25] Therefore, a refined analysis was performed for these pollutants using the AERMOD model. The analysis was performed using the general assumptions and procedures outlined earlier for individual development sites. The maximum NO_2 1-hour, $PM_{2.5}$ 24-hour, and $PM_{2.5}$ annual concentrations predicted by the AERMOD model are presented in **Table 15-22**.

Table 15-22
Cumulative Heating and Hot Water System Analysis
Maximum Pollutant Concentrations – Refined Results ($\mu g/m^3$)

		Maximum Total Concentration			
Pollutant	**Averaging Period**	**Cluster 1**	**Cluster 2**	**Cluster 4**	**NAAQS / *De Minimis***
NO_2	1-Hour	138	164	169	188
$PM_{2.5}$	24-Hour	6.0	--	6.2	8.6
	Annual	0.15	0.13	0.27	0.3

Notes:
The $PM_{2.5}$ *de minimis* criteria for the 24-Hour period is half the difference between the NAAQS of 35 $\mu g/m^3$ and the ambient monitored background of 17.8 $\mu g/m^3$, and 0.3 $\mu g/m^3$ for the annual period.
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.

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[25] Cluster was not analyzed for No. 2 fuel oil since each of the development sites comprising this cluster were found to fail the air quality analysis using this fuel type.

For Cluster 1, Projected Development Sites 18 and 22 would be required to be fitted with low NO_x (30 ppm) burners firing only natural gas, to avoid a potential significant adverse air quality impact. For Cluster 2, Projected Development Site 19 would be required to be fitted with low NO_x (30 ppm) burners firing only natural gas and would require the heating and hot water systems stack(s) to be setback; and Projected Development Site 20 would require the heating and hot water systems stack(s) to be setback, to avoid a potential significant adverse air quality impact. For Cluster 4, Potential Development Site AB would require the heating and hot water systems stack(s) to be further setback; Potential Development Site AL would be required to be fitted with low NO_x (30ppm) burners firing only natural gas; and Projected Development Site 26 would require heating and hot water systems stack(s) to exclusively use natural gas. An (E) Designation (E-601) would be assigned as part of the Proposed Actions for each of these sites.

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 and potential development sites. DEP-BEC and EPA permit databases were used to identify existing sources of emissions, and DEP permit applications by Powerhouse Arts for one facility with multiple emission sources were also identified. A total of 12 facilities (consisting of 33 sources) were analyzed. The information from these permits (emission rates, stack parameters, etc.) was input to the AERMOD dispersion model.

Table 15-23 presents the maximum predicted pollutant concentrations at the projected and potential development sites using the AERMOD refined dispersion model. As shown in **Table 15-23**, the maximum predicted short-term concentration for each air toxic compound is less than the respective SGC. The maximum annual concentrations are predicted to be below the respective AGCs, with the exception of dioctyl phthalate, which is predicted to slightly exceed the AGC at Projected Development Site 53 and Potential Development Site E. However, it should be noted that the sources of dioctyl phthalate predicted to exceed the AGC are located on potential development sites. The potential impacts at Projected Development Site 53 are due to a paint spraying operation located at Potential Development Site AG, while the potential impacts on Potential Site E are due to a paint spraying operation located on Potential Development Site F. Therefore, it is assumed that these sources would no longer operate should potential sites E and AG be developed.

For all other projected and potential development sites, the modeling demonstrates that there would be no predicted significant adverse air quality impacts on these development sites from existing industrial sources in the area.

Health Risk Assessment

Cumulative impacts were also determined for the combined effects of multiple air contaminants in accordance with the approach described in the "Methodology for Predicting Pollutant Concentrations" section of this chapter. Using the predicted concentrations of each pollutant, the maximum hazard index and total cancer risk was calculated for each affected projected and potential 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 15-23
Maximum Modeled Impacts on Projected and Potential Sites from Industrial Sources

Pollutant	CAS Number	AERMOD Model Short-Term Impact (μg/m^3)	SGC (μg/m^3)	AERMOD Model Annual Impact (μg/m^3)	AGC (μg/m^3)
$PM_{2.5}$$^{(1)}$	NY075-02-5	33.1	35	9.16	12
4,4' Methylene diphenyl diisocyanate	101-68-8	11.58	12	0.156	0.6
Acetone	00067-64-1	1,437	180,000	2.35	30,000
Butyl Cellosolve	00111-76-2	287	14,000	0.47	1,600
Cadmuim Selenide	1306-24-7	0.01	---	0.00011	0.0004
Cadmium Sulfide	1306-23-6	0.01	---	0.00011	0.0003
Chromium	7440-47-3	0.01	---	0.00016	45
Cobalt Compounds	13586-82-8	0.01	---	0.00011	0.0013
Dichloromethane	75-09-2	0.85	14,000	0.00104	46
Dioctyl Phthalate	00117-81-7	415	---	0.68	0.42
Ethyl Alcohol	00064-17-5	111	---	0.44	45,000
Ethyl Benzene	00100-41-4	1,707	---	8.57	1,000
Ethylene Glycol	00107-21-1	3,836	10,000	6.70	400
Formadehyde	50-00-0	0.0027	30	0.000040	0.06
Hydrochloric Acid	7647-01-0	0.74	2,100	0.018	20
Hydroquinone	123-31-9	0.00015	---	0.0	2.4
Isopropyl Alcohol	00067-63-0	575	98,000	0.94	7,000
Lead Acetate	1335-32-6	0.37	---	0.0083	0.05
Mangansese Compounds	7439-96-5	0.0019	---	0.000030	0.052
Methanol	00-067-56-1	96	33,000	0.77	4,000
Methyl Ethyl Ketone	00078-93-3	1,884	59,000	4.37	5,000
Methyl Methacrylate	80-62-6	0.01	41,000	0.00015	700
Methyl Isobutyl Ketone	00108-10-1	2,044	31,000	3.34	3,000
Misc. VOC$^{(2)}$	NY990-00-0	253	98,000	4.37	7,000
N-Butyl Acetate	00123-86-4	862	95,000	1.42	565
Nickel Compounds	7440-02-0	0.0039	0.2	0.000080	0.0004
Phenol	108-95-2	3.09	5,800	0.047	20
Selenious Acid	7783-00-8	0.75	---	0.014	33
Selenium Dioxide	7446-08-4	0.15	---	0.0035	28
Styrene	100-42-5	0.27	17,000	0.0040	1,000
Toluene	00108-88-3	760	37,000	2.73	5,000
Trethylamine	121-44-8	0.30	2,800	0.0064	7
Xylene	01330-20-7	14,226	22,000	71.46	100

Notes:

(1) Conservatively assumes all particulate emissions would be PM2.5 . Federal 24-hour and annual standard from Particul$PM_{2.5}$ $PM_{2.5}$) used.

(2) Modeled as Isopropyl Alcohol.

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

Table 15-24 and **Table 15-25** present the results of the assessment of cumulative non-carcinogenic and carcinogenic effects on the Proposed Actions, 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 15-23**. As shown in **Table 15-24**, 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.

Table 15-24
Estimated Maximum Hazard Index

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m^3)	AGC (µg/m^3)	Concentration to AGC Pollutant Ratio
Non-Carcinogenic Compounds				
4,4' Methylene diphenyl diisocyanate	101-68-8	0.00046	0.6	7.67E-04
Acetone	00067-64-1	2.35	30,000	7.83E-05
Butyl Cellosolve	00111-76-2	0.47	1,600	2.93E-04
Chromium	7440-47-3	0	45	0
Cobalt Compounds	13586-82-8	0	0.0013	0
Dioctyl Phthalate	00117-81-7	0.68	0.42	1.61
Ethyl Alcohol	00064-17-5	0.015	45,000	3.36E-07
Ethyl Benzene	00100-41-4	0.035	1,000	3.53E-05
Ethylene Glycol	00107-21-1	0.0085	400	2.12E-05
Hydrochloric Acid	7647-01-0	0.00005	20	2.50E-06
Hydroquinone	123-31-9	0	2.4	0
Isopropyl Alcohol	00067-63-0	0.94	7,000	1.34E-04
Lead Acetate	1335-32-6	0.00002	0.049	4.08E-04
Mangansese Compounds	7439-96-5	0	0.052	0
Methyl Ethyl Ketone	00078-93-3	0.053	5,000	1.06E-05
Methanol	00067-56-1	0.77	4,000	1.93E-04
Methyl Methacrylate	80-62-6	0	700	0
Methyl Isobutyl Ketone	00108-10-1	3.34	3,000	1.11E-03
Misc. VOC(1)	NY990-00-0	0.016	7,000	4.81E-07
N-Butyl Acetate	00123-86-4	1.42	565	2.51E-03
Phenol	108-95-2	0.00014	20	7.0E-06
Selenious Acid	7783-00-8	0.00004	33	1.21E-06
Selenium Dioxide	7446-08-4	0.00001	28	3.57E-07
Styrene	100-42-5	0.00001	1000	1.0E-08
Toluene	00108-88-3	0.016	5,000	3.06E-06
Trethylamine	121-44-8	0.00002	7000	2.86E-06
Xylene	01330-20-7	0.88	100	8.81E-03
			Total Hazard Index	1.63
			Hazard Index Threshold Value	2.0

Note:
(1) Modeled as Isopropyl Alcohol.
Source: DEC, DAR-1, February 2021.

Table 15-25
Estimated Maximum Cancer Risk

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m^3)	AGC (µg/m^3)	Concentration to AGC Pollutant Ratio
Carcinogenic Compounds				
Cadmium Selenide	1306-24-7	0.00009	0.00041	2.68E-01
Cadmium Sulfide	1306-23-6	0.00009	0.00031	3.55E-01
Dichloromethane	75-09-2	0.00089	46	2.26E-05
Formaldehyde	50-00-0	0.00003	0.06	6.67E-04
Nickel Compounds	7440-02-0	0.00007	0.0042	1.90E-02
			Total Cancer Risk	0.64
			Cancer Risk Threshold Value	10.0

Note:(1) Modeled as Isopropyl Alcohol.
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 proposed GSD at modeled receptor locations. The unitary concentrations ($\mu g/m^3$ 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.[26] 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 **Table 15-26**. A complete summary of the modeled concentrations for each pollutant for each of the analyzed use categories is presented in **Appendix H-2**.

Of the 24 use categories analyzed, a total of fifteen use categories were determined to cause potential exceedances of SGCs and/or AGCs at sensitive receptors on existing uses and/or at certain projected and potential development sites.

Based on the modeling performed for the project light industrial sources, it was determined that exhaust stacks for industrial processes associated with fifteen use groups must be located to the tallest portion of the roof for each development site to prevent potential significant adverse air quality impacts at sidewalk and nearby sensitive receptors. With this restriction, no potential significant adverse air quality impacts were identified for Sites 29, 47, and 48. However, 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 asscoaited with five use groups locating at Sites 22, 41, 44, P, AK, BI, BL, and BO. An (E) Designation (E-601) would be assigned as part of the Proposed Actions for each of these sites.

PROPOSED (E) DESIGNATION REQUIREMENTS

At affected projected and potential development sites, the proposed (E) Designation (E-601) for heating and hot water systems would specify the type of fuel to be used, whether low NO_x burners are required, the distance that the vent stack on the building roof must be from its lot line(s), and/or the minimum stack height. The proposed (E) Designations for industrial sources associated at certain projected and potential development sites would include requirements to exhaust industrial source emissions from the tallest portion of the building, and emissions limits for specific air toxic compounds. A summary of the proposed (E) Designations for heating and hot water systems and industrial sources is presented in **Appendix H-3**.

For each of the projected and potential development sites with a proposed (E) Designation, the (E) Designation process, as set forth in Zoning Resolution Section 11-15 and Chapter 24 of Title 15 of the Rules of the City of New York, allows for the modification of the measures required under an (E) Designation in the event of new information or technology, additional facts or updated standards that are relevant at the time the site is ultimately developed. Since the air quality analysis is based on conservative assumptions due to the absence of information on the actual design of buildings that would be constructed, the actual design of buildings may result in modification of the (E) Designation measures under these procedures. When an (E) Designation is placed for more than one pollutant (e.g., for $PM_{2.5}$ and NO_2), any modifications must address the measures required with respect to each pollutant.

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[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 15-26

Maximum Modeled Pollutant Concentrations (µg/m^3)

Pollutant	CAS No.	Short-term Impact (µg/m^3)	SGC (µg/m^3)(1)	Annual Impact (µg/m^3)	AGC (µg/m^3)(1)
Formaldehyde (2)	00050-00-0	3.3 (2)	30	0.056 (2)	0.06
Glycerin	00056-81-5	---	---	1	240
Cyanides	00057-12-5	11	380	0.1	3.5
Ethanol	00064-17-5	---	---	361	45,000
Acetic acid	00064-19-7	441	3,700	9	60
Methanol	00067-56-1	940	33,000	37	4,000
Isopropyl alcohol	00067-63-0	11,965	98,000	322	7,000
Acetone	00067-64-1	2,521	180,000	30	30,000
Butyl alcohol, n-	00071-36-3	---	---	107	565
Methyl chloroform	00071-55-6	657	9,000	15	5,000
Chloromethane	00074-87-3	0	22,000	0.00	90
Hydrogen cyanide	00074-90-8	122	340	0.03	0.8
Chlorobromomethane	00074-97-5	---	---	0.00	2,500
Dichloromethane (2)	00075-09-2	1,317 (2)	1,400	7.3 (2)	60
Isophorone	00078-59-1	331	2,800	---	---
Isobutyl alcohol	00078-83-1	---	---	272	360
Methyl ethyl ketone	00078-93-3	1,670	13,000	57	5,000
Trichloroethylene (2)	00079-01-6	8.9 (2)	20	0.06 (2)	0.20
Dibutyl phalate	00084-74-2	---	---	1	12
Butyl Benzyl Phthala	00085-68-7	---	---	0.14	0.42
Naphthalene	00091-20-3	2,193	7,900	2.8	3.0
Biphenyl	00092-52-4	---	---	2.9	3.1
Dichlorobenzine, Ortho	00095-50-1	79	30,000	0.2	200
Ethyl benzene	00100-41-4	---	---	5	1,000
Styrene	00100-42-5	2,627	17,000	299	1,000
1,4-Dichlorobenzene(P)	00106-46-7	---	---	0.01	0.091
Ethylene Glycol	00107-21-1	30	1,000	1	400
Vinyl Acetate	00108-05-4	3	5,300	0.2	200
Methyl isobutyl ketone	00108-10-1	7,618	31,000	78	3,000
Isopropyl acetate	00108-21-4	11,229	62,700	183	995
Toluene	00108-88-3	4,933	37,000	698	5,000
Cyclohexone	00108-94-1	2,101	20,000	34	190
Phenol	00108-95-2	8	5,800	0.04	20
Propyl acetate	00109-60-4	3	62,700	≤0.01	995
Methyl Cellosolve	00109-86-4	8	93	0.03	20
Tetrahydrofuran	00109-99-9	39	30,000	1	350
Isobutyl acetate	00110-19-0	1,313	71,300	16	565
Hexane	00110-54-3	---	---	26	700
Glycol monoethylether	00110-80-5	104	370	3	200
Cyclohexane	00110-82-7	---	---	62	6,000
Cellosolve Acetate	00111-15-9	8	140	0.04	64
Ethylenglycolmonbuty	00111-76-2	3,100	4,700	37	1,600
Butyl carbitol (2)	00112-34-5	104 (2)	370	1 (2)	200
Dioctyl Phthalate (2)	00117-81-7	---	---	0.39 (2)	0.42
Trichclorobenzene	00120-82-1	433	3,700	8.66	35-
Hydroquinone	00123-31-9	---	---	1.6	2.4
Butyl acetate	00123-86-4	2,679	71,300	39	565
Tetrachloroethylene (2)	00127-18-4	102 (2)	300	0.6 (2)	3.8
Monoethanolamine	00141-43-5	1,051	1,500	0.05	18
Ethyl acetate	00141-78-6	---	---	96	3,400
N-heptane	00142-82-5	5,254	210,000	67	3,900
Sodium cyanide	00143-33-9	7	380	0.06	3.5
Potassium cyanide	00151-50-8	3	380	0.04	3.5
Carbon monoxide	00630-08-0	4,118	40,000 (3)	---	---
Iron oxide	01309-37-1	---	---	0.7	12.0

Table 15-26 (cont'd)
Maximum Modeled Pollutant Concentrations (µg/m^3)

Pollutant	CAS No.	Short-term Impact (µg/m^3)	SGC (µg/m^3)(1)	Annual Impact (µg/m^3)	AGC (µg/m^3)(1)
Lead Oxide	0.1309-60-0	---	---	0.01	0.041
Sodium hydroxide	01310-73-2	5	200	---	---
Nickel Oxide (2)	01313-99-1	0.14 (2)	0.2	0.0003 (2)	0.0053
Zinc oxide	01314-13-2	263	380	0.37	4.8
Xylene,m,o&p mixt.	01330-20-7	2,836	22,000	45	100
Kaolin (clay)	01332-58-7	---	---	0.1	4.8
Aluminum oxide	01344-28-1	---	---	0.05	2.4
Lead stearate	07428-48-0	---	---	0.02	0.09
Lead	07439-42-1	---	---	0.003	0.038
Tin	07440-31-5	5	20	0.06	0.24
Antimony	07440-36-0	---	---	0.6	1.2
Cadmium (2)	07440-43-9	---	---	0.00008 (2)	0.00024
Copper	07440-50-8	2.6	100	0.05	0.48
Zinc	07440-66-6	---	---	0.2	45
Sulfur dioxide	07446-09-5	27 (3)	196 (4)	0.6	80 (3)
Zinc chloride (fume)	07646-85-7	3	200	0.1	2.4
Hydrogen chloride	07647-01-0	184	2,100	1	20
Phosphoric acid	07664-38-2	55	300	0.2	10
Hydrogen fluoride	07664-39-3	3	5.6	0.01	0.071
Ammonia	07664-41-7	1,353	2,400	225	500
Sulfuric acid	07664-93-9	11	120	0.2	1.0
Nitric acid	07697-37-2	50	86	0.5	12.3
Bromine	07726-95-6	0	130	0.00	1.6
Barium sulfate	07727-43-7	---	---	0.1	12
Chlorine	07782-50-5	3	116	0.01	0.2
Hydrogen sulfide	07783-06-4	---	---	0.4	2.0
Naphtha	08030-30-6	---	---	72	900
Ligroine	08032-32-4	---	---	96	900
Polyvinyl chloride	09002-86-2	---	---	≤0.01	2.4
Nitrogen oxide	10102-43-9	---	---	68	74
Nitrogen dioxide (2)	10102-44-0	169 (3)	188 (4)	31 (3)	100 (4)
Particulates (as PM$_{2.5}$) (2)	NY075-00-0	32 (3)	35 (4)	10.8 (3)	12 (4)

Notes:

(1) *DAR-1 AGS/SGC Tables,* DEC Division of Air Resources, Bureau of Stationary Sources, February 2021.

(2) Emissions of air toxics that would be included in a Restrictive Declaration restricting emissions of the pollutant are not included in this summary table for the particular pollutant.

(3) Results include the monitored pollutant background concentration.

(4) Standards correspond to the Federal and State Ambient Air Quality Standards, as listed in *DAR-1*., DEC Division of Air Resources, Bureau of Stationary Sources, February 2021.

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