CHAPTER 20: AIR QUALITY

A. INTRODUCTION

The Proposed Action includes the rezoning of an area that includes approximately 18 acres of land located in the Broadway Triangle neighborhood of Brooklyn, Community District 1. The Project Area is generally bounded by Flushing Avenue to the south, Throop Avenue to the east, Lynch Street to the north, and Union Avenue, Walton Street, and Harrison Avenue to the west. The general goal of the Proposed Action is to encourage housing production, including affordable housing at a density and scale consistent with the surrounding neighborhood, while permitting local commercial and community facility uses to support the growing residential community.

The air quality analyses for the Proposed Action were prepared utilizing the general procedures recommended in the *CEQR Technical Manual*, and are described in the methodology section of this chapter. The analyses were also conducted in accordance with federal and state rules and regulations including the National Environmental Policy Act (NEPA) and the New York State Environmental Quality Review Act (SEQRA). This chapter includes an assessment of existing (baseline) conditions, and compares conditions in the future without the Proposed Action (future no build condition) to conditions in the future with the Proposed Action (future build condition).

Both direct and indirect air quality impacts are examined in this chapter. Direct impacts stem from emissions generated by stationary sources associated with the Proposed Action, such as emissions from fuel burned on site for heating, ventilation, and air conditioning ("HVAC") systems and other project-related facilities within the analysis area. Indirect effects include emissions from motor vehicles ("mobile sources") generated by the Proposed Action and effects of existing stationary sources on the Proposed Action and development sites.

B. OVERVIEW

The Proposed Action would not result in significant adverse air quality impacts as detailed in the analysis provided below.

POLLUTANTS FOR ANALYSIS

Ambient 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. Typically, ambient concentrations of Carbon Monoxide ("CO") are predominantly influenced by mobile source emissions. Particulate matter ("PM"), volatile organic compounds ("VOCs") and nitrogen oxides (NO and NO2, collectively referred to as "NOx") are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NOx, sulfur oxides ("SOx"), ammonia, organic compounds, and other gases react or condense in the atmosphere. The formation of such secondary PM takes hours or days to occur and thus has no measurable effect on air quality in the immediate vicinity of the source. Emissions of SO2 are associated mainly with stationary sources and sources using non-road diesel fuel, such as diesel trains, marine engines, and non-road vehicles such as construction engines; diesel-powered vehicles, primarily heavy-duty trucks and buses, also contribute somewhat to these emissions. However, new diesel fuel regulations will reduce SO2 emissions from mobile sources. Ozone is formed in the atmosphere by complex

photochemical processes that include NOx and VOCs, emitted mainly from industrial processes and mobile sources.

CARBON MONOXIDE

Carbon monoxide (CO) is a colorless and odorless gas that results from the incomplete combustion of gasoline and other fossil fuels. In most cities, approximately 80 percent of CO emissions are from motor vehicles. Because CO disperses quickly, the concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to crowded intersection locations and along heavily congested roadways. Consequently, it is important to evaluate CO concentrations on a localized or microscale basis.

The Proposed Action would increase traffic volumes on streets within and surrounding the Project Area and could result in localized increases in CO levels. Therefore, a mobile source analysis was conducted at critical intersections in the study area to evaluate future CO concentrations with and without the proposed action~~s~~.

NITROGEN OXIDES, VOC, AND OZONE

Nitrogen Oxides ($NO_{x)}$ are of principal concern because of their role, together with volatile organic compounds (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 carried downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NOx 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 change in regional mobile source emissions of these pollutants would be related to the total vehicle miles traveled added or subtracted on various roadway types throughout the New York metropolitan area, which is designated as a moderate non-attainment area for ozone by the United States Environmental Protection Agency ("EPA").

The Proposed Action 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 would result. An analysis of project-related emissions of these pollutants from mobile sources is therefore not warranted.

There is a standard for average annual NO_2 concentrations, which is normally examined only for fossil fuel energy sources. An analysis of the potential NO_2 impacts from the Proposed Action's stationary sources of emissions was performed.

LEAD

Airborne lead emissions are principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles produced since 1975, and all produced after 1980, are designed to use unleaded fuel. As these newer vehicles have replaced the older ones, motor vehicle-related lead emissions have decreased. As a result, ambient concentrations of lead have declined significantly. Nationally, the average measured atmospheric lead level in 1985 was only about one quarter the level in 1975.

In 1985, the EPA announced new rules that drastically reduced the amount of lead permitted in leaded gasoline. The maximum allowable lead level in leaded gasoline was reduced from the previous limit of

1.1 to 0.5 grams per gallon effective July 1, 1985, and to 0.1 grams per gallon effective January 1, 1986. Monitoring results indicate that this action has been effective in significantly reducing atmospheric lead concentrations. Effective January 1, 1996, the Clean Air Act banned the sale of the small amount of leaded fuel that was still available in some parts of the country for use in on-road vehicles, concluding the 25-year effort to phase out lead in gasoline. Even at locations in the New York City area where traffic volumes are very high, atmospheric lead concentrations are far below the national standard of 1.5 micrograms per cubic meter (the current three-month average is 0.02 ug/m3).

No significant sources of lead are associated with the Proposed Action, and, therefore, an analysis of this pollutant from stationary or mobile sources is not warranted.

RESPIRABLE PARTICULATE MATTER—PM10 AND PM2.5

Particulate Matter (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, construction and 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, or $PM_{2.5}$, and particles with an aerodynamic diameter of less than or equal to 10 micrometers, or PM10, which includes the smaller $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract; delivering with it other compounds adsorbed to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is directly emitted from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from an exhaust) or from precursor gases reacting in the atmosphere to form secondary PM. There is also a New York standard for total suspended particulate matter ("TSP"), which represents both coarse and fine particles. However, the New York State Department of Environmental Conservation ("NYSDEC") no longer conducts monitoring for this pollutant.

As part of the Proposed Action, fuel oil would be burned in the proposed HVAC systems. Therefore, an analysis was performed to estimate the future levels of PM with the Proposed Action.

SULFUR DIOXIDE

SO2 emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. Monitored SO2 concentrations in New York City are below the national standards. Vehicular sources of SO2 are not significant, and, therefore, an analysis of this pollutant from mobile sources is not warranted.

As part of the Proposed Action, fuel oil would be burned in the proposed HVAC systems. Therefore, an analysis was performed to estimate the future levels of SO2 with the Proposed Action.

AIR TOXICS

In addition to the criteria pollutants discussed above, non-criteria air pollutants, also called air toxics, are also regulated. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by the EPA. Federal ambient air quality standards do not exist for non-criteria compounds. However, the NYSDEC has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed ambient guideline concentrations for numerous air toxic non-criteria compounds. The NYSDEC guidance document DAR-1 (September 2007) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure.

EPA has developed guidelines for assessing exposure to air toxics. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

AIR QUALITY REGULATIONS, STANDARDS, AND CRITERIA

This air quality assessment has been conducted based on requirements, standards, and procedures regulated by the Clean Air Act and Amendments (CAAA), the National Ambient Air Quality Standards (NAAQS), the New York State Implementation Plan (SIP), the New York State Environmental Quality Review Act (SEQRA), New York City Environmental Quality Review (CEQR), and New York State and City guidelines and thresholds. The effect on ambient air quality from the Proposed Action has been evaluated for both stationary and mobile sources; including roadway emissions and garage sources, on-site HVAC systems, industrial sources, air permits status investigations, and construction effects, etc. The applicable regulations and requirements in air quality analysis are described below.

NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

As required by the CAAA, primary and secondary NAAQS have been established for six major air pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead.

In December 2006, and March 2008, the U.S. EPA established a new 24-hour standard for $PM_{2.5}$, or particulate matter with an aerodynamic equivalent diameter less than 2.5 micrometers (µm); and a new more stringent 8-hour ozone standard. In addition, a new lead standard was established in October 2008. Table 20-1 exhibits the standards for these pollutants, which also have been adopted as the ambient air quality standards by the State of New York. Primary standards protect the public health, and represent levels at which there are no known significant effects on human health. Secondary standards are designed to protect the environment from any known or anticipated adverse effects of a pollutant, including the effects on the natural (soil, water, vegetation) and manmade (physical structures) environments. Areas that do not meet the NAAQS for a particular pollutant are called “nonattainment areas” for the specific criteria pollutant; areas that meet both primary and secondary standards are known as “attainment areas.” Areas determined to be in recent attainment are known as “maintenance areas.”

AIR TOXICS AND NON-CRITERIA POLLUTANT THRESHOLDS

Air toxics and non-criteria air pollutants include a multitude of pollutants ranging in toxicity. While the federal ambient air quality standards have not been promulgated, the U.S. EPA and the NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure.

The NYSDEC *DAR-1* guidance document presents guideline concentrations in micrograms per cubic

meter for the one-hour (SGC) and annual average (AGC) time periods for various air toxic compounds. The National Institute of Occupational Safety & Health also recommends permissible exposure levels for a series of compounds. These values are provided in Table 20-2 for the compounds studied for the Proposed Action area for projected and potential development sites. These compounds are emitted by existing industrial sources within the project boundaries.

Table 20-1
National and New York State Ambient Air Quality Standards

Pollutant	Primary	Secondary
Carbon Monoxide (CO)		
Maximum 1-hour Average[1]	35 ppm	n/a
Maximum 8-hour Average[1]	9 ppm	n/a
Sulfur Dioxide (SO_2)		
Maximum 3-hour Average[1]	n/a	1300 µg/m^3
Maximum 24-hour Average[1]	365 µg/m^3	n/a
Annual Arithmetic Mean	80 µg/m^3	n/a
Respirable Particulates (PM_{10})		
Maximum 24-hour[2]	150 µg/m^3	150 µg/m^3
Respirable Particulates ($PM_{2.5}$)		
Maximum 24-hour[3]	35 µg/m^3	35 µg/m^3
Annual Geometric Mean	15 µg/m^3	15 µg/m^3
Total Suspended Particulate (TSP)[4]		
Maximum 24-hour	250 µg/m^3	n/a
Annual Geometric Mean	75 µg/m^3	n/a
Ozone (O_3)		
1-hour Average[5]	0.12 ppm	0.12 ppm
8-hour Average (2008 Std)	0.075 ppm	0.075 ppm
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	100 µg/m^3	100 µg/m^3
Lead (Pb)		
Rolling 3-month Average[6]	0.15 µg/m^3	0.15 µg/m^3
Quarterly Average	1.5 µg/m^3	1.5 µg/m^3

Notes:
1 Not to be exceeded more than once a year.
2 Not to be exceeded by 99th percentile of 24-hr PM_{10} concentrations in a year (averaged over three years)
3 Not to be exceeded by 98th percentile of 24-hr $PM_{2.5}$ concentrations in a year (averaged over three years)
4 TSP standards are regulated by New York standards only.
5 Applied only to areas that were designated nonattainment for ozone in July 1997.
6 Final rule signed October 15, 2008.
ppm: parts per million, µg/m^3 : micrograms per cubic meter

Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year.

Sources: *Code of Federal Regulations* Title 40, Part 50, July, 1991, Revised September 2006, March and October 2008, Ambient Air Quality Standards; *N.Y.C.R.R.* Title 6, *ECL*, Part 257, Air Quality Standards.

Table 20-2
Air Toxics and Non-Criteria Pollutant Thresholds
NYSDEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (µg/m^3)	AGC (ug/m^3)
Acetone	00067-64-1	180,000	28,000
Alginic Acid*	09005-32-7	N/A	4.8
Aromatic Hydro Mix	64742-95-6	N/A	3,800
Butoxyeth 2-, Acetate	00112-07-2	N/A	310
Butyl Acetate	00123-86-4	95,000	17,000
Butyl Alcohol	00071-36-3	N/A	1,500
Calcium Carbonate*	00471-34-1	N/A	4.8
Calcium Phosphates*	07757-93-9	N/A	4.8
Carbon Monoxide	00630-08-0	14,000	N/A
Carbon Dioxide	00124-38-9	5,400,000	21,000
Cellulose Acetate*	09004-36-8	N/A	24
Croscasmellose Sodium*	74811-65-7	380	45
Ethanol	00064-17-5	N/A	45,000
Ethoxyethyl Acetate	00111-15-9	140	64
Gluco Hydrochloride*	00066-84-2	2,100	20
Hydroxypropyl Cellulose	09004-64-2	N/A	24
Hydroxy Methycellulose	09004-65-3	N/A	24
Iron Oxide	01309-37-1	N/A	12
Isopropyl Alcohol	00067-63-0	98,000	7,000
Lactose*	64044-51-5	N/A	24
Lead Vapor	07439-92-1	N/A	0.38
Magnesium Stearate*	00557-04-0	N/A	24
Methanol	00067-56-1	33,000	4,000
Methyl Amyl Ketone	00110-43-0	N/A	550
Methylene Chloride	00075-09-2	14,000	2.1
Methoxy-1 Propyl Acetate	00108-65-6	55,000	2,000
Methyl Isobutyl Ketone	00108-10-1	31,000	3,000
Microcrystalline Cellulose	09004-34-6	N/A	24
Nitrogen Dioxide	10102-44-0	N/A	100
Particulates, Solid	NY075-00-0	380	45
Particulate (PM-10)	NY075-00-5	380	N/A
Particulate (PM-2.5)	NY075-02-5	160	15
Polyethylene Oxide*	25322-68-3	N/A	200
Propylene Glycol	00057-55-6	55,000	2,000
Providone Dust	09003-39-8	380	45
Sodium Chloride	07647-14-5	N/A	20
Sodium Lauryl Sulfate*	73296-89-6	N/A	120
Sodium Glycolate Starch*	09063-38-1	120	24
Sorbital	00050-70-4	30	0.06
Starch, Soluble	09005-25-8	N/A	24
Starch	09005-84-9	N/A	24
Sulfur Dioxide	07446-09-5	910	80
Talc	14807-96-6	N/A	4.8
Tetrachloroethylene	00127-18-4	1,000	1
Tin Vapor	07440-31-5	20	0.24
Titanium Dioxide	13463-67-7	N/A	24
Xylene M,O&P	01330-20-7	4,300	100

Source: NYSDEC, DAR-1 AGC/SGC Tables (September 2007)

*: There are no NYSDEC DAR-1 guideline levels for this toxin. Permissible levels are referenced from the National Institute of Occupational Safety & Health (NIOSH) (1995).

The U.S. EPA developed a methodology called the "Hazard Index Approach" to evaluate impacts of non-carcinogenic toxic air emissions. The acute hazard index is based on short-term exposure, while the chronic non-carcinogenic hazard index is based on annual exposure limits. If the combined ratio of pollutant concentration divided by its annual exposure threshold for each of the toxic pollutants is found to be less than 1.0, no significant air quality impacts are predicted to occur due to these pollutant releases. For carcinogenic pollutants, the U.S. EPA has developed the "unit risk factors" evaluation approach as described in its Integrated Risk Information System (IRIS) website. The U.S. EPA considers an overall incremental cancer risk from a proposed action of less than 1-in-1 million to be insignificant. 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 1- in-1 million, no significant air quality impacts are predicted to occur due to these pollutant releases.

NEW YORK STATE IMPLEMENTATION PLAN

The CAAA requires that each state submit a SIP for attainment of the NAAQS to the U.S. EPA. The 1977 and 1990 amendments require comprehensive plan revisions for areas where one or more of the standards have yet to be attained. In addition, Section 176(c) of the CAAA requires that federally-sponsored or federally-approved activities in nonattainment or maintenance areas conform to the applicable SIPs. To demonstrate conformity, a proposed action must not exacerbate or delay the achievement of standards. Since the New York Metropolitan Area (NYMA) was designated as a nonattainment area, SIPs have been submitted to U.S. EPA documenting the necessary measures to achieve attainment status for O_3 and PM_{10}, as well as for CO maintenance. In addition, because U.S. EPA designated Brooklyn and the entire NYMA as a $PM_{2.5}$ nonattainment area in January 2005, New York State also proposed a SIP to demonstrate the future compliance (year 2010) of NAAQS for $PM_{2.5}$. The applicable SIPs are described below.

To attain the CO NAAQS, the NYSDEC, in conjunction with the City of New York, submitted a carbon monoxide SIP and revisions to the U.S. EPA. Final approval of the CO control programs and contingency measures was obtained, and a series of measures were implemented to improve the CO status. Effective May 20, 2002, U.S. EPA re-designated the entire NYMA, including the counties of Bronx, Kings, New York, Queens, Richmond, Nassau, and Westchester, as a CO attainment area with a maintenance plan which provides for continued attainment of the CO NAAQS. The remainder of New York State has been a CO attainment area since 1990. The CAAA also requires a series of SIP revisions, including air quality control measures to reduce ozone precursor emissions (volatile organic compounds and nitrogen oxides) during target years, and evidence of ozone attainment by 2007. In June 1997 and again in September 2003, NYSDEC addressed the status of these requirements and submitted the ozone SIP revision for the entire State.

SIGNIFICANT ADVERSE IMPACT CRITERIA

In addition to the NAAQS, state and local agencies have developed criteria to assess the significance of air quality impacts generated by Proposed Actions. These are known as *de minimis* criteria, and they establish the minimum change in air concentration that represents a significant environmental impact. These impact evaluation criteria are described in the CO and PM analysis methodologies sections.

CONFORMITY RULES

The 1990 CAAA Section 176(c) requires all federally-sponsored or federally-approved activities in nonattainment or maintenance areas to conform to the applicable SIP. U.S. EPA has developed criteria and procedures for determining conformity. These federal air quality requirements are promulgated in

Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans of Transportation Plans, Programs and Projects Funded or Approved Under Title 23 USC or the Federal Transit Act (40 *CFR* Parts 51 and 93) and Amendments (August 15, 1997 and July 1, 2004). To determine whether an action conforms to the SIP's purpose, the proposed action: shall not cause or contribute to any new violation of the standard; shall not increase the frequency or severity of any existing violation; and shall not delay timely attainment of the standards. To demonstrate conformity, a proposed action or project that will receive federal funds or involve federal approval must not exacerbate or delay the attainment of standards in the NYMA.

The Project Area is located within an area designated by the U.S. Environmental Protection Agency (USEPA) as nonattainment for eight-hour ozone (O3) inside ozone transport region and fine particulate matter ($PM_{2.5}$) and designated as a CO maintenance area.

As the Proposed Action includes a federal action, the project will be subject to the general conformity provisions, which is required to ensure compliance to the New York State Implementation Plans (SIPs).

C. METHODOLOGY

The air quality analysis methodology and approach used in preparing this study followed the guidelines and protocols that have been established for the evaluation of air quality impacts associated with a variety of projects in the city, state, and throughout the region and country. The combination of approach and assumptions results in a conservative estimate of expected pollutant concentrations and resulting air quality impacts that could be caused by the Proposed Action. Several major sources of air emissions and relevant impacts for the project relevant pollutants need to be evaluated, including:

- Mobile source impacts of the Proposed Action for CO and PM;
- HVAC system and other stationary sources impacts generated by the Proposed Action;
- Industrial facilities and nearby major stationary sources impacts;
- Parking facilities analysis; and
- Conformity Applicability Test and Emission Burden Analysis.

Methodologies used in air quality analysis for various sources cited above are outlined below.

MOBILE SOURCE ANALYSIS

PROCEDURES AND MODELS USED

The mobile source analysis was conducted using the U.S. EPA MOBILE6.2 model for vehicular emissions calculation, AP-42 procedures for fugitive dust emissions, and dispersion model CAL3QHC for impact evaluation at all selected intersections and sensitive sites. Worst-case 24-hour and annual average PM2.5 impacts were analyzed at receptors located at sidewalks and corners of each of the selected intersections. Mobile source $PM_{2.5}$ emissions included vehicle exhaust $PM_{2.5}$, brake, tire, idling and fugitive dust. When potential significant impacts were identified using the CAL3QHC model, the refined model CAL3QHCR was used at the affected intersections. The modeling procedure for analysis of PM_{10} and $PM_{2.5}$ requires the use of CAL3QHCR to determine 24-hour and annual average impacts.

The prediction of on-road motor-vehicle-generated CO and Particulate Matter (PM_{10} and $PM_{2.5}$) emissions were characterized by traffic conditions, thermal states (hot/cold start estimates), vehicle classifications, regional parameters, meteorological phenomena, and physical configurations. The traffic data on roadway links near each analyzed intersection site were organized into a mathematical model input format by

traffic link(s) for the analysis year(s). Automobile and truck emission factors, such as idle or cruise emissions, were predicted using U.S. EPA model MOBILE6.2 as applicable for New York City.

The impact concentrations were predicted by using U.S. EPA air pollutant dispersion models CAL3QHC/ CAL3QHCR to simulate mathematically how traffic, meteorology, and geometry combine to affect pollutant concentrations. The traffic data include peak hour volumes, vehicular emission factors, directional splits, turning volumes, and signal timing. At each analysis intersection site, maximum pollutant concentrations for existing, no build and build conditions were calculated. The predicted CO and PM10 pollutant concentration levels and project impacts are compared with NAAQS standards and with applicable New York City *de minimis* criteria as set forth in the *CEQR Technical Manual*. At locations where CO impacts would exceed standards or thresholds, U.S. EPA's refined simulation model CAL3QHCR can be used. $PM_{2.5}$ analyses were based on the document "NYCDEP Interim Guidance For $PM_{2.5}$ Analyses" (March 3, 2008), in which DEP establishes criteria for evaluating the potential $PM_{2.5}$ impacts for projects subject to CEQR. The analysis used these updated interim guidance criteria employed by DEP for determination of potential significant adverse $PM_{2.5}$ impacts under CEQR as follows:

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 5 ug/m3 at a discrete receptor location would be considered a significant adverse impact on air quality;

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 2 ug/m3 but no greater than 5 ug/m3 would also be considered a significant adverse impact on air quality based on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations;

- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.3 ug/m3 at a discrete or ground-level receptor location;

- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.1 ug/m3 at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources).

Actions under CEQR that would increase $PM_{2.5}$ concentrations by more than the interim guidance criteria above are considered to have potential significant adverse impacts and potential measures to reduce or eliminate such potential significant adverse impacts be examined.

The $PM_{2.5}$ impact concentrations were predicted by using U.S. EPA air pollutant dispersion model CAL3QHCR to simulate mathematically how traffic, meteorology, and geometry combine to affect pollutant concentrations. The traffic data included peak hour volumes, vehicular emission factors, directional splits, turning volumes, and signal timing. At each analysis intersection site, maximum pollutant concentrations for existing, no build and build conditions were calculated. $PM_{2.5}$ neighborhood scale mobile sources analyses were conducted based on NYCDEP Interim Guidance, by using emission model 6.2, including exhaust, brake and tire wear emissions and dispersion model CAL3QHCR. The receptors were located at a distance of 15 meters from the edge of the roadway.

In CAL3QHCR impact modeling, the most recent 5-year hourly meteorological data with surface data from LaGuardia airport and upper-air data from Brookhaven are utilized. The CAL3QHCR model needs to be run using a 24-hr traffic distribution survey or NYCDEP data for daytime and nighttime in the project area as established in *Report #34*; or by using NYSDEC SIP summary in Time of Day Factors Used to Estimate Hourly VMT for the entire New York City area.

MOBILE SOURCES ANALYSIS SITES

The mobile source analysis evaluates the Proposed Action for potential impacts from carbon monoxide (CO) and particulate matters (PM_{10} and $PM_{2.5}$) due to vehicular traffic anticipated to be generated as a result of the Proposed Action. A total of six intersections and sensitive sites (i.e., schools, hospitals, churches, SIP demonstration sites, etc.) were analyzed for the mobile sources air quality analysis, as shown in Table 20-3. Based on a review of the Project Area, roadway configurations, and land use and traffic patterns, a series of preliminary sites were identified along several major traffic corridors in the Project Area as potential analysis sites. Final selection of specific intersections and sensitive sites for analysis depends on the baseline traffic conditions; the vehicular trip generation and distribution under the Proposed Action; the SIP documentation review; and the level of service associated with the intersection. Intersections to be considered for analysis include those with a minimum of 100 or more project-related vehicle trips; or increased heavy trucks numbers exceeding the thresholds cited in the guidance in the traffic peak hour in accordance with the *CEQR Technical Manual*, and NYCDEP Interim Guidance For $PM_{2.5}$ Analysis (March 3, 2008). If an attainment demonstration site listed in the State Implementation Plan (NYSIP) is located within the Project Area, then it is also considered as an analysis site in the EIS.

Table 20-3
Mobile Source Analysis Intersection Locations

Analysis Intersection Site	Location
1	Broadway and Union Ave
2	Harrison Ave and Union Ave
3	Throop Ave and Walton St
4	Harrison Ave and Gerry St
5	Flushing Ave and Broadway
6	Flushing Ave and Humboldt St

Multiple receptors were placed at each of the selected intersection sites in the mobile sources dispersion modeling. Receptors were placed along the approach and departure links at spaced intervals. Local model receptors were placed at sidewalk or roadside locations near intersections with continuous public access and at residential locations.

TRAFFIC DATA ASSEMBLY

Traffic data for the air quality analysis were derived from document reviews, existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Action. Traffic data for the future no build and future build conditions were employed in the respective air quality modeling scenarios. The worst-case time periods were selected for the mobile source analysis because they produce the maximum project-generated and future build traffic levels, and therefore, have the greatest potential for significant air quality impacts. Traffic parameters used in air

quality analysis include peak hour volumes, turning movement, vehicular emission factors, traffic speed, level of service, directional splits, and signal timing.

PARKING FACILITIES ANALYSIS

The Proposed Action would include parking facilities to account for the new parking demand and supply. Emissions from vehicles using the proposed parking areas could potentially affect ambient levels of CO at the project intersections analyzed in the future condition with the Proposed Action. Of the parking associated with the projected development sites, prototypical accessory parking garages at projected development Sites 33 (Union Avenue and Middleton Street), and 2 (Flushing Avenue and Throop Avenue) were analyzed. These sites, collectively, have the greatest potential parking demand and, therefore, the highest potential air quality impact.

Parking assumptions and parameters are based on the parking study completed in Chapter 18, "Traffic and Parking," and from discussions with HPD. The parking facilities air quality impact analysis was performed using methodologies and procedures described in *CEQR Technical Manual*, Air Quality Appendix.

Based on parking garage locations and sizes, as provided by HPD, air quality impact analyses for the two largest parking facilities included in the Proposed Action with the greatest capacity were conducted. CO emissions resulting from vehicles entering, parking, idling, and exiting the parking facilities were estimated using the U.S EPA MOBILE6.2 model and an ambient temperature of 43°F, as referenced in the *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of five miles per hour (mph) was conservatively assumed for travel within the garages or parking lots. All departing vehicles were assumed to idle for one minute before proceeding to the exit. The concentrations within the enclosed garage were calculated assuming a minimum ventilation rate of one cubic foot per minute of fresh air per gross square foot of garage area, based on New York City Building Code requirements. To determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in U.S. EPA's *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates CO 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.

Based on the U.S. EPA's idling and running emission factors and estimated queuing time, the CO idling emission rate (ER) and emission strength per unit area for the parking area were determined. The ambient impact concentrations were calculated based on guidelines and formats pertaining to the dispersion of pollutants from area sources, and methodology found in *CEQR Technical Manual*. Since the number of diesel vehicles utilizing parking garages typically only accounts for a small portion (less than five percent) of the vehicle fleet in the parking facilities, their released $PM_{2.5}$ is not expected to be a major concern. To determine whether a PM impact analysis for parking facilities is necessary, a screening test was conducted by comparing the peak hour ins and outs of diesel vehicles to the CEQR thresholds.

ON-SITE HVAC SOURCE ANALYSIS

The potential effects from on-site heating, ventilation, and air conditioning (HVAC) and boilers system emissions associated with each projected and potential development site ~~and~~ were analyzed.

PRELIMINARY SCREENING FOR INDIVIDUAL HVAC AND BOILER SOURCES

A CEQR preliminary screening is required for individual HVAC and boiler emission sources. The size of each projected and potential development site (e.g., the zoning square footage of new construction), and

proposed height of exhaust release are utilized for the screening analysis. Based on CEQR criteria, the maximum size of project development that would not result in significant HVAC and boiler air quality impacts on a typical nearby receiver or building can be determined. The development plan for each of the Proposed Action can then be compared to the determined size threshold.

If the determined location of an HVAC source at one of the projected or potential development sites is found to have the potential to cause an impact on downwind receiver or building through the screening analysis, or if a projected or potential development site is found to be immediately adjacent to the nearest sensitive receptor, then a refined air dispersion modeling analysis is required. For the refined analysis, the U.S. EPA's AERMOD (American Meteorological Society / EPA Regulatory Model) dispersion model is used to determine potential impacts, as described below.

CUMULATIVE ANALYSIS FOR HVAC SOURCES

In addition to the individual HVAC source analysis, groups or clusters of HVAC sources with similar stack heights were analyzed in order to address the cumulative impacts of multiple sources. Seven HVAC clusters were selected for the Project Area based on the density of development areas with buildings of similar height and the nearest receptors. ~~This~~ The analysis is performed using the U.S. EPA SCREEN3 Model (version 96043) or AERMOD model. The HVAC clusters are modeled as an area source. The analysis also required an estimation of air emission rates for each cluster. The NYCDEP Report 12 and the *CEQR Technical Manual* Air Quality Appendix 7 (Refined Screening Analyses for Heat and Hot Water Systems were utilized to determine fuel usage rates per unit of floor area. Emission factors as reported in EPA's Compilation of Air Pollutant Emission Factors AP-42 Chapter 1.3 and Chapter 1.4 for fuel oil and natural gas fired boilers were used to estimate the emissions from each cluster, based on the cluster's total development size and calculated fuel usage. Because $PM_{2.5}$ *de minimis* criteria relate to the incremental emissions between No Build and Build Condition, the incremental emission rates for the clusters were also calculated, using the incremental change (increase) in development area between the No-Build and Build Condition. For $PM_{2.5}$ analysis purposes, this increment in development size between Build and No Build condition for the development site was then used to calculate the change in energy use (Btu/year) and fuel usage from No Build to Build Condition for each development site. The cumulative impacts from all clusters were evaluated by using AERMOD model as described below.

AERMOD Dispersion Modeling for HVAC Impact

In addition to the CEQR screening analyses for the Proposed Action individual HVAC systems, clusters, or nearby large emission sources, a detailed dispersion modeling analysis using the AERMOD model was performed when necessary. The estimated short-term and annual pollutant concentrations of the criteria pollutant(s) of concern were added to appropriate background levels to obtain total pollutant concentrations for comparison with NAAQS standards to determine compliance. The meteorological data set used in AERMOD modeling consists of the latest available five year data set from LaGuardia Airport (2002 – 2006) with concurrent upper air data from Brookhaven, New York. Since information on the HVAC systems' design was not available to determine the stack height, it was conservatively assumed that the stack height would be three feet above the roof top (i.e., building height plus 3 feet) of the proposed sites, as per the *CEQR Technical Manual*. The AERMOD modeling was conducted with and without building downwash effect to determine the possible worst-case maximum impacts on the receptors.

Combined Stationary Source and Mobile Source $PM_{2.5}$ Emissions

The intersection sites studied in the mobile sources analyses are also included in the stationary sources AERMOD modeling analysis. The combined impacts of PM2.5 emissions from mobile

sources and stationary sources at the selected intersection sites were then determined and compared to $PM_{2.5}$ *de minimis* criteria.

Neighborhood-Scale $PM_{2.5}$ Analysis

A neighborhood-scale analysis was conducted based on "NYCDEP Interim Guidance For $PM_{2.5}$ Analyses", to determine annual $PM_{2.5}$ impact concentrations on a large neighborhood-scale area basis, in addition to the microscale analysis at hot-spot locations, as described above.

While the emission evaluation and dispersion models used in the neighborhood analysis are identical to those in microscale scale analyses, the size of averaging impacted area for the neighborhood analyses is defined as 1 km x 1 km, and uses a center that represents the maximum annual ground-level concentration resulting from the microscale analysis, with a grid spacing of 25 meters. By applying this method the neighborhood-scale analysis modeled more than 1,600 ground-level receptors. The average annual $PM_{2.5}$ impact concentration level of these 1600 receptors was calculated and then compared with the NYCDEP impact threshold of 0.1 ug/m3.

EMERGENCY GENERATORS IMPACT EVALUATION

If the projected or potential development sites include emergency generator(s) with a use of 500 hours or more per year, such as those typically found at hospitals or large apartment buildings, then these generators would require a New York State Title V Permit. Air quality impact analysis of the emergency generator(s) would then be required based on the proposed size of engine capacity (MMBTU/hr), fuel use and number of operating hours. The use of generators is not anticipated on any of the projected and potential sites therefore analysis of emergency generators has not been provided.

BACKGROUND CONCENTRATIONS

To estimate the maximum expected pollutant concentration at a given receptor for the HVAC analyses, other industrial or stationary sources analyses, and cumulative impact analyses, the calculated impact is added to the background value that accounts for existing pollutant concentrations from nearby background sources (see Table 20-4). Background values were collected from nearby NYSDEC ambient air monitoring stations. Annual values represent the overall highest reported concentrations for the years 2003 through 2007. Short-term (1-, 3-, 8-, and 24-hour) values in this table are the maximum level among 5 years by comparing each of the yearly 2nd highest concentrations, as the regulations allow one exceedance in each year.

Table 20-4
Background Pollutant Concentrations

Pollutants	Averaging Period	Monitoring Station	Background Concentration ($\mu g/m^3$)	Ambient Standard ($\mu g/m^3$)
NO_2	Annual	Queens College 2	51.0	100
SO_2	3 hour	Queens College 2	155.0	1,300
	24 hour		102.0	365
	Annual		18.0	80
CO	1- hour	MTA 302	5.4 ppm	35 ppm
	8-hour		2.6 ppm	9 ppm
PM_{10}	24 Hour	JHS 126	50	150

Source: 2003–2007 Annual New York State Air Quality Report, Ambient Air Monitoring System, NYSDEC.

INDUSTRIAL SOURCE AND OTHER STATIONARY SOURCE ANALYSIS

INDUSTRIAL SOURCE SCREENING AND SURVEY

A screening analysis was conducted for examining potential impacts on future residential and commercial land uses in the RWCDS that would be affected by air pollutants emitted from existing nearby industrial, commercial, institutional, or large-scale residential uses. To assess the potential of impacts on the projected and potential developments from existing manufacturing operations in the surrounding area, an industrial source screening analysis was conducted.

The screening analysis began with an investigation and a review of inventories, to identify sources of industrial emissions in the industrial source and stationary source analysis area (within 400 feet of the Project Area) and major stationary sources within 1,000 feet of the Project Area boundary. Upon completion of the inventory review, examination of emission sources was conducted to verify the operating status, confirm the existence of the registered sources, and to ensure that the state or city permit record or registration databases were correct and up to date.

The surveys required several steps, including a review of the NYCDEP listing of all air permits within development area zip codes; mapping all sources for relevance/location; working with NYCDEP to go through the city or state inventory files or review each source file that is provided by NYCDEP; examining field records to determine if the permitted facilities operate at the conditions required in their permits; and evaluating and developing actual emissions of these facilities, either from the permits or from an estimate by U.S. EPA's procedures or models. The analysis area for large sources extends approximately 1,000 feet from the Project Area; the analysis area for industrial facilities extends approximately 400 feet from the Project Area.

A listing of federal, state, and city-permitted industrial sources and registered facilities was developed based on the field survey and information obtained from NYCDEP's Bureau of Environmental Compliance (BEC), NYSDEC permit data, and the U.S. EPA's Envirofacts database.

MAJOR STATIONARY SOURCES ANALYSES AND DETAILED IMPACT MODELING

The *CEQR Technical Manual* requires an assessment of a proposed action if it would be located within 1,000 feet of a "large" emission source (such as solid waste, incinerators, cogeneration facilities, asphalt and concrete plants, or power generating plants), or a potential major source of odors. Similar to the procedures described above, a review of NYSDEC and NYCDEP permit or registration data inventories was conducted to identify large emission sources. This analysis was conducted in conjunction with the industrial source analysis described earlier, to determine potential cumulative impacts on the RWCDS. Upon completion of industrial and large stationary source screening analyses and identification of significant sources, a detailed air quality impact analysis was conducted for the identified sources. Air pollutant concentration estimates were made using the AERMOD refined dispersion model for each of the criteria pollutants and air toxics indicated in the permits or registration. In the event that potential violations of standards are predicted, measures to reduce pollutant levels to within standards will be examined for these sources. The meteorological data set consist of the latest available five year data set from LaGuardia Airport (2002-2006) with concurrent upper air data from Brookhaven, New York.

The AERMOD refined dispersion model was used to estimate maximum potential impacts on both projected and potential development sites using source input data from the air permits associated with each of these sources, and for each individual pollutant contained in the air permits. The facility and source parameters were based on permit records, and the operating conditions, and emission estimates were based on field operating records or U.S. EPA AP-42 procedures.

The ambient impact concentrations resulting from stationary sources, as determined by the AERMOD model, were used for the compliance determination. For criteria air pollutants, the predicted total ambient concentrations (modeled concentration plus background levels) are compared to the NAAQS, as required under CAAA. The Proposed Action impacts on criteria air pollutants concentrations are compared to state or city impact thresholds or *de minimis* criteria.

For hazardous air pollutants (HAP) or air toxics, guideline values developed by NYSDEC (as described in the *CEQR Technical Manual*) and federal agencies are used to determine potential impacts. The NYSDEC guideline concentrations contain two groups: short-term (1-hr) and long-term (annual) values, known as SGC's and AGC's, respectively (NYSDEC-*DAR-1 Air Guide-1, Guidelines for the Control of Toxic Air Contaminants*). Established federal exposure levels are used to determine the significance of impact concentrations. As such, the maximum identified concentrations from modeling area was compared to the Short-Term Exposure Levels (STELs) or ceiling levels recommended by the U.S. Occupational Safety and Health Administration (OSHA) for the chemicals that were examined.

CUMULATIVE HEALTH RISK ASSESSMENT

Potential cumulative impacts of all industrial source compounds modeled in the air quality analysis that are simultaneously affecting all development sites were evaluated based on U.S. EPA's Hazard Index Approach for non-carcinogenic compounds and U.S. EPA's Unit Risk Factors for carcinogenic compounds. Both methods are based on equations that use U.S. EPA referenced concentrations for individual compounds to determine the level of health risk posed by the concentrations of multiple compounds at a sensitive receptor. The cumulative impacts are derived by summing the indices for individual compounds. For non-carcinogenic compounds, the U.S. EPA considers a concentration-to-reference dose level ratio of less than 1.0 to be acceptable. For combined carcinogenic compounds, the U.S. EPA unit risk factors represent the concentration at which an excess cancer risk of 1-in-1 million is predicted.

ODOR ANALYSIS

To evaluate the potential for significant adverse odors impacts on the residential population that would be added to the development area as a result of the Proposed Action, proximate potential sources of odors were searched based a literature review, field investigation, and correspondence with HPD and NYCDEP. As a result of the search, there is no identified source for odor impacts within the Proposed Action area, and no further odor impact analysis is warranted.

D. EXISTING CONDITIONS

The existing air quality status and ambient concentration levels for the analysis area are described in this section.

COMPLIANCE STATUS

The Brooklyn area has been designated as being in attainment of NAAQS for criteria pollutants sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10}) and lead (Pb). However, Brooklyn is designated as a nonattainment area for ozone (O_3). In addition, effective April 2005, the U.S. EPA officially designated Brooklyn and the entire NYMA as a $PM_{2.5}$ nonattainment area.

This area was also previously designated by U.S. EPA on November 15, 1990 as moderate nonattainment for carbon monoxide (CO). Effective May 20, 2002, the entire NYMA was re-designated as a CO attainment area with a maintenance plan that provides for continued attainment of the CO NAAQS.

EXISTING REGIONAL AIR QUALITY CONDITIONS

The baseline air quality conditions for the affected environment have been evaluated. The existing conditions analysis includes a review and evaluation of recorded ambient air quality data. NYSDEC monitors ambient air quality in the analysis area and elsewhere, and tabulates the data in annual reports such as the *New York State Air Quality Report, Ambient Air Monitoring System*. Table 20-5 exhibits ~~the analysis area's~~ representative monitored concentrations for the New York Metropolitan Area. The ambient air quality data presented are the worst-case concentration data monitored by NYSDEC within Brooklyn or the NYMA in the three most recent years 2005 - 2007. The monitored data indicated that carbon monoxide, sulfur dioxide, nitrogen dioxide and lead concentrations are well within the standards, and no monitored data exceed the NAAQS. However, ozone concentrations in the NYMA exceeded the standards, thereby classifying it as an ozone nonattainment area. The analysis area's PM_{10} levels were within the NAAQS, while $PM_{2.5}$ concentrations exceeded the standards. While the data presented in Table 20-5 provide a regional air quality context, local air quality background conditions as presented in Table 20-4 were used for the impact analysis.

Table 20-5
Representative Monitored Ambient Air Quality Data for the New York Metropolitan Area (2005 - 2007)

Pollutant	NYSDEC Monitored Data		
	Monitoring Station	**Period**	**1st/2nd Highest**
Carbon Monoxide (CO)	MTA, 302 Gold Street, Near Flatbush Avenue, Brooklyn	1-hour 8-hour	5.9 / 5.4 ppm 2.5 / 2.5 ppm
Particulates ($PM_{2.5}$)	JHS 126, 424 Leonard Street, Brooklyn	24-hour[a] Annual	**37.7** µg/m^3 **15.3** µg/m^3
Particulates (PM_{10})	JHS 126, 424 Leonard Street, Brooklyn	24-hour	66 / 50 µg/m^3
Ozone (O_3)	Susan Wagner Hs, Brielle Ave. & Manor Road, Staten Island	1-hour 8-hour	**0.136** / 0.117 ppm **0.094** ppm (4th)
Nitrogen Dioxide (NO_2)	PS 59, 288 E. 57th Street, Manhattan	Annual Average	71.2 µg/m^3
Lead (Pb) Quarterly Average	JHS 126, 424 Leonard Street, Brooklyn	Quarterly Average	0.03 µg/m^3
Sulfur Dioxide (SO_2)	PS 59, 288 E. 57th Street, Manhattan	3-hour 24-hour Annual	184.6 / 184.6 µg/m^3 122.2 / 122.2 µg/m^3 36.4 µg/m^3

Notes:
ppm = parts per million
µg/m^3 = micrograms per cubic meter
"Bold" numbers indicate concentration levels exceed the NAAQS
a: 98th percent value to compare with new 2006 Standard
Sources: New York State Air Quality Report, Ambient Air Monitoring Systems (2005 - 2007); U.S. EPA, Air Web Site, Monitor Value Report.

PREDICTED EXISTING POLLUTANT CONCENTRATIONS IN THE ANALYSIS AREA

As described previously, a mobile source analysis was performed at the six most-congested traffic intersections. To determine the ambient concentrations under worst-case peak hour traffic conditions, receptors were placed at multiple sidewalk locations next to the six intersections. The receptors with the

highest predicted CO concentrations were used to represent these intersection sites under existing conditions. CO concentrations were calculated for each receptor location, at each intersection, for each peak period specified above.

Table 20-6 shows the maximum predicted existing (2008) CO 1-hour and 8-hour average concentrations at the receptor sites for the worst-peak hour period. At all receptor sites, the maximum predicted 1-hour and 8-hour average concentrations are well below the national standard of 35 ppm and 9 ppm, respectively.

E. FUTURE CONDITION WITHOUT THE PROPOSED ACTION

MOBILE SOURCE POLLUTANT CONCENTRATIONS

The future CO concentrations within the analysis area without the Proposed Action were determined for the 2018 analysis year using the methodology previously described. Table 20-7 shows future maximum predicted 1-hour and 8-hour average CO concentrations at the analysis intersections without the Proposed Action. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed. As shown in the table, the future no build values are predicted to be well below the NAAQS CO standards.

Table 20-6
Maximum Predicted Existing 1-hour and 8-Hour Average
CO Concentrations for 2008

Worst Receptor Intersection	Location	1-Hour Concentration[a] (ppm)	8-Hour Concentration[b] (ppm)
1	Broadway and Union Ave	6.80	3.58
2	Harrison Ave and Union Ave	5.90	2.95
3	Throop Ave and Walton St	5.80	2.88
4	Harrison Ave and Gerry St	5.90	2.95
5	Flushing Ave and Broadway	6.70	3.51
6	Flushing Ave and Humboldt St	6.10	3.09

Note:
a: Including 1-hour background 5.4 ppm
b: Including 8-hour background 2.6 ppm
NAAQS Standard for 1-hour CO is 35 ppm, and NAAQS for 8-hour CO is 9 ppm.

OTHER POLLUTANT CONCENTRATIONS

Ambient concentrations for other pollutant concentrations under the future no build condition would be similar to the monitored existing ambient air conditions, since only a minimal growth and development within the Project Area would occur in the future condition without the Proposed Action. All HVAC and industrial source emissions in the future condition without the Proposed Action would remain the same as the existing conditions.

Table 20-7
Maximum Predicted No-Actions 1-hour and 8-Hour Average
Future (2018) No Build CO Concentrations

Worst Receptor Intersection	Location	1-Hour Concentration[a] (ppm)	8-Hour Concentration[b] (ppm)
1	Broadway and Union Ave	6.50	3.37
2	Harrison Ave and Union Ave	5.80	2.88
3	Throop Ave and Walton St	5.70	2.81
4	Harrison Ave and Gerry St	5.80	2.88
5	Flushing Ave and Broadway	6.40	3.30
6	Flushing Ave and Humboldt St	6.00	3.02

Note:
a: Including 1-hour background 5.4 ppm
b: Including 8-hour background 2.6 ppm
NAAQS Standard for 1-hour CO is 35 ppm, and NAAQS for 8-hour CO is 9 ppm.

F. FUTURE CONDITION WITH THE PROPOSED ACTION

MOBILE SOURCE AND CUMULATIVE IMPACT CONCENTRATIONS AT INTERSECTION SITES

The future CO concentrations within the Project Area with the Proposed Action were determined for the analysis year using the methodology previously described. Table 20-8 shows future maximum predicted 1-hour and 8-hour average CO cumulative concentrations at the analysis intersections with the Proposed Action, resulting from all sources including roadway emissions, parking facilities, other stationary sources (such as a clusters of boilers), and background concentrations from current sources. The values shown are the highest predicted concentrations for the receptor locations for the time periods analyzed. As shown in the table, the values are predicted to be well below the NAAQS CO standards.

PARKING FACILITY IMPACTS

Based on the methodology previously discussed, the maximum overall predicted 1-hour and 8-hour CO concentrations for the accessory parking associated with projected development site 33 (Union Avenue and Middleton Street), including ambient background levels, on-street traffic, and other sources, would be ~~6.524~~ 6.511 ppm and ~~3.386~~ 3.377 ppm for the worst-case receptor, respectively. For the accessory parking associated with projected development site 2 (Flushing Avenue and Throop Avenue), the maximum overall predicted 1-hour and 8-hour CO concentrations would be ~~6.424~~ 6.414 ppm and ~~3.316~~ 3.310 ppm at the worst-case receptor, respectively. These values are the highest predicted concentrations for any time period analyzed. The maximum predicted CO levels are below the applicable CO standards, and therefore, no significant adverse impacts from parking facilities are expected as a result of the Proposed Action.

Table 20-8
Maximum Predicted RWCDS Actions 1-hour and 8-Hour Average
Future (2018) Build CO Concentrations

Worst Receptor Intersection	Location	1-Hour Concentration (ppm)				8-Hour Concentration[b] (ppm)			
		Roadway	Parking	Stationary	Total[a]	Roadway	Parking	Stationary	Total[b]
1	Broadway and Union Ave	1.10	0.010	0.0013	6.511	0.77	0.007	0.0004	3.377
2	Harrison Ave and Union Ave	0.40	0.003	0.0014	5.804	0.28	0.002	0.0006	2.883
3	Throop Ave and Walton St	0.30	0.007	0.0014	5.708	0.21	0.005	0.0004	2.815
4	Harrison Ave and Gerry St	0.50	0.000	0.0013	5.901	0.35	0.000	0.0005	2.951
5	Flushing Ave and Broadway	1.00	0.014	0.0005	6.414	0.70	0.010	0.0003	3.310
6	Flushing Ave and Humboldt St	0.60	0.006	0.0019	6.008	0.42	0.004	0.0005	3.025

Note:
[a]: Including 1-hour background 5.4 ppm,
[b]: Including 8-hour background 2.6 ppm
NAAQS Standard for 1-hour CO is 35 ppm, and NAAQS for 8-hour CO is 9 ppm.

CEQR *DE MINIMIS* IMPACT EVALUATION

The future build CO and $PM_{2.5}$ impact concentrations within the analysis area were determined by using the methodology previously described and compared to the CEQR impact criteria. Table 20-9 presents the CO impacts at analyzed intersections for comparison with CEQR *de minimis* criteria. Table 20-10 indicates future maximum predicted 24-hour and annual average $PM_{2.5}$ impact concentrations at the analysis intersections by comparing the ambient concentration with and without the Proposed Action. The values shown are the highest predicted combined impact concentrations from mobile sources (roadway emissions) and nearby stationary sources at the receptor locations. As shown in the tables, the impacts from the Proposed Action were found to be below the NYCDEP impact criteria.

Table 20-9
Maximum Predicted 8-hour CO Impact Concentrations
Future (2018) Build Versus No-Build

Worst Receptor at Intersection Site	Location	8-Hour Impact (ppm)	CEQR *de minimis* Criteria (ppm)
1	Broadway and Union Ave	0.007	2.82
2	Harrison Ave and Union Ave	0.003	3.06
3	Throop Ave and Walton St	0.005	3.09
4	Harrison Ave and Gerry St	0.071	3.06
5	Flushing Ave and Broadway	0.010	2.85
6	Flushing Ave and Humboldt St	0.005	2.99

Table 20-10
Maximum Predicted 24-hour and Annual Average $PM_{2.5}$ Impact Concentrations*
Future (2018) Build versus No-Build

Worst Receptor at Intersection Site	Location	24-Hour Impact (μg/m^3)	Annual Average Impact (μg/m^3)
1	Broadway and Union Ave	0.415 ~~0.362~~	0.086 ~~0.078~~
2	Harrison Ave and Union Ave	0.463 ~~0.440~~	0.062 ~~0.067~~
3	Throop Ave and Walton St	0.185 ~~0.134~~	0.029 ~~0.019~~
4	Harrison Ave and Gerry St	0.330 ~~0.255~~	0.052 ~~0.037~~
5	Flushing Ave and Broadway	0.345 ~~0.286~~	0.049 ~~0.041~~
6	Flushing Ave and Humboldt St	0.170 ~~0.110~~	0.031 ~~0.018~~
	Neighborhood Average	___	0.026

Note: NYCDEP Impact Criteria –
For 24-hour $PM_{2.5}$ impact is 5 μg/m^3, and conditional level at 2 μg/m^3.
For Annual Average $PM_{2.5}$ impact is 0.3 μg/m^3 (for stationary sources) and a neighborhood level is 0.1 μg/m^3.
*: Resulting from mobile and stationary sources combined

STATIONARY SOURCE IMPACT ANALYSES

HVAC SOURCES IMPACTS

Individual Source Screening Analysis

A preliminary screening was conducted for projected and potential development sites identified in the RWCDS following the procedures described in *CEQR Technical Manual*, Section 322.1 *Screening Analyses for Heat and Hot Water Systems*. All proposed development parameters, locations, size, and building heights were examined, as listed in Table 20-11. The size of each development anticipated from the Proposed Action, including permitted zoning square footage, and estimated height of exhaust release, were utilized in this screening analysis. Based on CEQR criteria, the No.4 fuel, No. 2 fuel, and natural gas were used for determining the maximum size of project development that would not result in significant HVAC and boiler air quality impacts on a typical nearby receiver or building. Where developments exceeded thresholds, E-Designations and restrictions for the development are listed in Table 20-11.

This screening analysis was performed to determine whether emissions from projected and potential development sites could potentially impact other projected and potential development sites, no build sites, or existing buildings.

Cumulative Impacts from HVAC Clusters

To address the cumulative impacts of multiple sources that could be introduced as a result of the Proposed Action, a series of clusters of HVAC sources with similar stack heights were analyzed. Seven HVAC clusters were selected for the project area based on the density of development areas with buildings of similar height and the nearest receptors. The detailed analyses of HVAC clusters were performed using the EPA AERMOD Model. The HVAC groups or clusters were modeled as an area source. The estimation of air emission rates for each cluster was based on NYCDEP Report 12 and CEQR Appendix to determine fuel usage rates per unit of floor area, as well as the emission factors as reported in AP-42 for fuel oil and natural-gas-fired boilers to reflect the cluster's total development size and calculated fuel usage. The cumulative impacts from all clusters were evaluated by using AERMOD model as described below.

A total of seven HVAC cluster sites were identified. The total floor area of the individual sites was summed together and an area-wide emission rate was determined for each cluster. The sizes of all development sites are shown in Table 20-11. Because $PM_{2.5}$ de minimis criteria relate to the incremental emissions between No Build and Build Condition, the incremental emission rates for the clusters were also calculated, using the incremental change (increase) in development area between the No-Build and Build Condition (see Appendix F). The seven clusters consist of the following development sites:

1. Cluster 1: Projected development sites 1, 2, 3, 4, 5, 6, and 7;
2. Cluster 2: Projected development sites 8, 9, 10, 11, 12, and 13;
3. Cluster 3: Projected development sites 14, 15, 16, 17, 18, 19, 20, and 21;
4. Cluster 4: Projected development sites 22, 23, 24, 26, and 27; and potential development sites 25, 28, and 37;
5. Cluster 5: Projected development site 36;
6. Cluster 6: Projected development sites 29, 30, 31, and 32;
7. Cluster 7: Projected development sites 33, 34, and 35.

The cumulative impact analysis results for the seven cluster sites are presented in Table 20-12. The results indicate that the maximum total concentrations, including impacts from the seven clusters and background levels, would not exceed any of the NAAQS for NO_2, SO_2 PM_{10}, and CO, when assuming the use of No. 4 fuel oil (worst-case scenario). The cumulative ambient HVAC concentrations associated with the RWCDS would be well below (within) the NAAQS. The predicted total cumulative concentrations would be even lower if No. 2 fuel oil or natural gas were used in lieu of No. 4 fuel oil. Therefore, no significant adverse cumulative air quality impacts resulting from HVAC clusters emissions are expected for the neighborhood or any location within the analysis area.

INDUSTRIAL SOURCES IMPACTS ANALYSES

By utilizing the approach described in the preceding methodology section for industrial sources analysis, air pollutants and contaminant emissions from a total of 38 facilities (resulting from an initial screening of 53 facilities by examining their distances to analysis area boundary), were examined for their cumulative impacts by an AERMOD modeling analysis. When combined, these facilities emit a total of 47 air contaminants. The 38 facilities are listed in Table 20-13. The emission rates of various pollutants released from analyzed facilities are presented in Appendix F. Among ~~them~~ the facilities, two large sources are also under New York State Department of Environmental Conservation (NYSDEC) permits:

- NYC HH Woodhull Hospital (NYSDEC Facility ID: 2610400015) which is located at 760 Broadway.
- Pfizer Inc. (NYSDEC Facility ID: 2610400207) which is located at 630 Flushing Avenue.

Table 20-11
CEQR Preliminary Screening Results for Individual HVAC Source
(Comparison between Proposed RWCDS and Maximum Development Sizes without Causing Significant Impacts)

Project Development Sites				Proposed Floor Area (Sq. Ft) - Build Condition						Distance to Nearest Building (feet)	Fuel Type Passed	E- Requirements
Projected Development Sites												
Site No.	**Block - Lot**	**Lot Area**	**Building Area**	**Zoning**	**Retail**	**Com/ Office**	**Res SF**	**CF**	**Total Area**	**Distance (ft)**	**Fuel Type**	**Requirement**
1	2274 - 16	7800	1440	C4-3 (R6)	6,240		17,160		23,400	119	Fuel #4	Fuel #4; no restriction
2	2274 - 1	4167	5900	C4-3 (R6)	3,334	10,834				177	Fuel #4	Fuel #4; no restriction
	2274 - 5	2125	0	C4-3 (R6)	1,700	5,525						
	2274 - 6	713	0	C4-3 (R6)	570	1,854						
	2274 - 24	6119	6119	C4-3 (R6)	4,895	15,909						
		13124	12019		10,499	34,122	0	0	44,621			
3	2272 - 3	5000	0	R7A/C2-4	4,000		19,000		23,000	34	Fuel #2	Fuel #2 at 34' from southern and eastern lot lines or natural gas with no restrictions
4	2272 - 6	6975	0	R7A			32,085		32,085	40	Fuel #2	Fuel #2 at 37' from southern, eastern and western lot lines or natural gas with no restrictions
5	2272 - 9	5000	4945	R7A			19,000	4000		47	Natural Gas	Fuel #2 at 55' from southern and western lot lines or natural gas at 42' from southern and western lot lines
	2272 - 11	5000	0	R7A			19,000	4000				
		10000	4945		0	0	38000	8000	46,000			
6	2272 - 45	2500	0	R7A	0		11,500			50	NONE	Natural gas at 60' from northern and western lot lines
	2272 - 46	3750	0	R7A	0		17,250					
	2272 - 147	3750	0	R7A	0		17,250					
	2272 - 49	3282	0	R7A	0		15,097					
	2272 - 51	2150	0	R7A	0		9,890					
	2272 - 52	2000	0	R7A/C2-4	1,600		7,600					
	2272 - 53	2000	0	R7A/C2-4	1,600		7,600					
	2272 - 108	520	0	R7A	0		2,392					
		19952	0		3,200	0	88,579	0	91,779			
7	2272 - 54	2000	0	R7A			9,200			23	Distance <30ft	Natural gas; no restriction
	2272 - 55	2500	4875	R7A			11,500					
		4500	4875		0	0	20,700	0	20,700			
8	2269 - 52	5000	21750	R7A	0		23,000		23,000	25	Distance <30ft	Natural gas; no restriction
9	2269 - 1	40000	0	R7A/C2-4	32,000		152,000		184,000	25	Distance <30ft	Natural gas at 82' from southern and western lot lines
10	2269 - 14	3750	0	R7A			17,250			43	NONE	Natural gas at 60' from southern, western and eastern lot lines
	2269 - 16	3750	0	R7A			17,250					
	2269 - 17	2500	0	R7A			11,500					
	2269 - 18	2500	0	R7A			11,500					
	2269 - 19	7500	7500	R7A			34,500					
	2269 - p/o 40	2500	2500	R7A			11,500					
	2269 - 23	2500	0	R7A			11,500					
	2269 - 24	2500	2500	R7A			11,500					
		27500	12500		0	0	126,500	0	126,500			
11	2269 - 25	5500	0	R7A/C2-4			10,583			55	Natural Gas	Fuel #2 at 70' from western lot line or Natural gas at 55' from western lot line
	2269 - 27	1750	0	R7A/C2-4			10,583					
	2269 - 28	1750	0	R7A/C2-4			10,583					
	2269 - 29	1750	0	R7A/C2-4			10,583					
	2269 - 30	1750	0	R7A/C2-4			10,583					
	2269 - 31	3575	0	R7A/C2-4			10,583					
	2269 - 33	3283	0	R7A/C2-4			10,583					
	2269 - 35	1350	0	R7A/C2-4			10,583					
	2269 - 36	7500	0	R7A/C2-4			10,583					
		28208	0		0	0	95,247	0	95,247			
12	2269 - 39	2500	4125	R7A			9,500	2000		48	Natural Gas	Fuel #2 at 55' from northern, western and eastern lot lines or Natural gas at 42' from northern, western and eastern lot lines
	2269 - p/o 40	2500	2500	R7A			9,500	2000				
	2269 - 41	2500	0	R7A			9,500	2000				
	2269 - 42	2500	3375	R7A			9,500	2000				
		10000	10000		0	0	38,000	8,000	46,000			

Table 20-11
CEQR Preliminary Screening Results for Individual HVAC Source
(Comparison between Proposed RWCDS and Maximum Development Sizes without Causing Significant Impacts)

Project Development Sites				Proposed Floor Area (Sq. Ft) - Build Condition						Distance to Nearest Building (feet)	Fuel Type Passed	E- Requirements
13	2269 - 43	2500	2500	R7A			11,500			50	NONE	Fuel #2 at 72' from northern, western and eastern lot lines or Natural gas at 60' from northern, western and eastern lot lines
	2269 - 43	2500	15000	R7A			11,500					
	2269 - 45	5000	0	R7A			23,000					
	2269 - 47	2500	0	R7A			11,500					
	2269 - 48	2500	0	R7A			11,500					
	2269 - 49	2500	0	R7A			11,500					
	2269 - 50	2500	0	R7A			11,500					
		37500	33375		0	0	92,000	0	92,000			
14	2266 - 1	30000	0	R7A/C2-4	24,000		114,000			77	Natural Gas	Natural gas at 70' from eastern lot line
	2266 - 9	800	1600	R7A/C2-4	640		3,040					
		30800	1600		24,640	0	117,040	0	141,680			
15	2266 - 14	2500	0	R7A			9,500	2000		53	Natural Gas	Natural gas at 40' from southern and eastern lot lines
	2266 - 15	2500	0	R7A			9,500	2000				
	2266 - 16	2500	0	R7A			9,500	2000				
	2266 - 17	2500	0	R7A			9,500	2000				
	~~2266 - 18~~	~~2500~~	~~0~~	~~R7A~~			~~9,500~~	~~2000~~				
		~~12500~~ 10,000	0		0	0	~~47500~~ 38,000	~~10000~~ 8,000	~~57500~~ 46,000			
16	2266 - 18	2500	0	R7A			9,500	2000		53	Natural Gas	Natural gas at 50' from southern, western and eastern lot lines
	2266 - 19	2500	0	R7A			11,500					
	2266 - 20	2500	0	R7A			11,500					
	2266 - 21	1575	0	R7A			7,245					
	2266 - 22	2500	0	R7A			11,500					
	2266 - 23	2500	0	R7A			11,500					
	2266 - 24	2500	2500	R7A			11,500					
	2266 - 25	2500	0	R7A			11,500					
		~~16575~~ 19,075	2500		0	0	~~76245~~ 85,745	2000	~~76245~~ 87,745			
17	2266 - 29	7500	0	R7A/C2-4	6,000		28,500			47	Natural Gas	Fuel #2 at 55' from southern and western lot lines or Natural gas at 42' from southern and western lot lines
	2266 - 30	2500	2500	R7A/C2-4	2,000		9,500					
		10000	2500		8,000	0	38,000	0	46,000			
18	2266 - 31	2500	2500	R7A/C2-4	2,667		9,500			48	Natural Gas	Natural gas at 40' from northern and western lot lines
	2266 - 32	4952	0	R7A/C2-4	2,667		18,818					
	2266 - 34	2548	0	R7A/C2-4	2,667		9,682					
	2266 - 36	2500	0	R7A/C2-4	0		11,500					
		12500	2500		8,001	0	49,500	0	57,501			
19	2266 - 37	2500	7500	R7A	0		11,500			30	Natural Gas	Natural gas; no restriction
	2266 - 38	2500	2500	R7A	0		11,500					
		2500	7500		0	0	23,000	0	23,000			
20	2266 - 39	2500	0	R7A	0		11,500			40	Natural Gas	Natural gas at 35' from northern, western and eastern lot lines
	2266 - 40	2500	0	R7A	0		11,500					
	2266 - 41	2500	0	R7A	0		11,500					
		7500	0		0	0	34,500	0	34,500			
21	2266 - 46	20000	0	R7A	0		92,000		92,000	46	NONE	Natural gas at 60' from northern, western and eastern lot lines
22	2250 - 4	5000	5000	R7A/C2-4	4,000		19,000		23,000	25	Distance <30ft	Natural gas at 30' from northern and eastern lot lines
23	2250 - 10	2500	0	R7A	0		11,500			42	Natural Gas	Natural gas at 35' from southern, western and eastern lot lines
	2250 - 11	2500	0	R7A	0		11,500					
	2250 - 12	2500	2500	R7A	0		11,500					
		7500	2500		0	0	34,500	0	34,500			
24	2250 - 14	15000	15000	R7A		0	69,000			33	NONE	Natural gas at 60' from western and southern lot lines
	2250 - 46	5000	5000	R7A		0	23,000					
	2250 - 48	2500	1000	R7A		0	11,500					
		22500	21000		0	0	103,500	0	103,500			

Table 20-11
CEQR Preliminary Screening Results for Individual HVAC Source
(Comparison between Proposed RWCDS and Maximum Development Sizes without Causing Significant Impacts)

Project Development Sites				Proposed Floor Area (Sq. Ft) - Build Condition						Distance to Nearest Building (feet)	Fuel Type Passed	E- Requirements
26	2250 - 129	3750	0	R7A/C2-4		3,000	14,250			50	Natural Gas	Natural gas at 40' from northern and western lot lines
	2250 - 32	2500	2500	R7A/C2-4		2,000	9,500					
	2250 - 33	5000	5000	R7A/C2-4		4,000	19,000					
		11250	7500		0	9,000	42,750	0	51,750			
27	2250 - 36	2500	0	R7A			11,500			25	Distance <30ft	Natural gas at 30' from northern, western and eastern lot lines
	2250 - 37	2500	2180	R7A			11,500					
		5000	2180		0	0	23,000	0	23,000			
29	2242 - 2	2255	0	R6A/C2-4	1,804		6,314			94	Fuel #4	Natural gas at 60' from eastern lot line
	2242 - 3	20357	1950	R6A/C2-4	16,286		57,000					
		22612	1950		18090	0	63314	0	81,404			
30	2242 - 53	2500	0	R6A			9,000			70	Fuel #4	Natural gas; no restriction
	2242 - 54	2500	0	R6A			9,000					
		5000	0		0	0	18000	0	18,000			
31	2242 - 45	2200	2200	R6A			7,920			55	Fuel #4	Natural gas at 35' from northern lot line
	2242 - 46	2200	0	R6A			7,920					
	2242 - 47	2500	0	R6A			9,000					
		4700	0		0	0	24840	0	24,840			
32	2242 - 22	2500	1375	R6A	0		9,000		9,000	46	Fuel #4	Natural gas; no restriction
33	2238 - 49	57330	96728	R6A/C2-4	45,864		160,524		206,388	89	Natural Gas	Natural gas at 80' from eastern lot line
34	2238 - 27	16550	0	R6A/C2-4	13,240		46,340		59,580	45	Natural Gas	Natural gas at 40' from western and southern lot lines
35	2238 - 41	5000	4000	R6A	0		18,000		18,000	55	Fuel #4	Fuel #4; no restriction
36	2245 - 136	5228	0	R6A/C2-4	2,091		14,638	2091		204	Fuel #4	Fuel #4; no restriction
	2245 - 40	3500	0	R6A/C2-4	1,400		9,800	1400				
	2245 - 42	2500	0	R6A/C2-4	1,000		7,000	1000				
	2245 - 43	2000	0	R6A/C2-4	800		5,600	800				
	2245 - 44	4000	0	R6A/C2-4	1,600		11,200	1600				
	2245 - 47	2470	0	R6A/C2-4	988		6,916	988				
	2245 - 48	1955	0	R6A/C2-4	782		5,474	782				
	2245 - 149	1813	0	R6A/C2-4	725		5,076	725				
	2245 - 35	175	0	R6A/C2-4	70		490	70				
		23641	0		9,456	0	66,194	9456	85,106			
Potential Development Sites												
25	2250 - 27	2500	2500	R7A/C2-4	2,000		9,500			41	Natural Gas	Natural Gas at 40' from southern lot line
	2250 - 28	2500	2500	R7A/C2-4	2,000		9,500					
	2250 - 29	3750	3750	R7A/C2-4	3,000		14,250					
	2250 - 25	2500	0	R7A/C2-4	2,000		9,500					
		11250	8750		9,000		42,750		42,750			
28	2250 - 38	5000	5000	R7A		0	23,000			46	NONE	Natural gas at 50' from northern, western, and eastern lot lines
	2250 - 40	2500	2500	R7A		0	11,500					
	2250 - 41	12500	12500	R7A		0	57,500					
		20000	20000		0	0	92,000	0	92,000			
37	2250 - 6	2500	5000	R7A/C2-4			9,500			38	Fuel #2	Fuel #2 at 40' from southern and eastern lot lines or Natural gas with no restrictions
	2250 - 7	2500	5000	R7A/C2-4			9,500					
	2250 - 8	2500	5000	R7A/C2-4			9,500					
		7500	15000				28,500		28,500			

Table 20-12
Maximum Worst-Case Predicted Cumulative Impacts from HVAC Cluster Sources
Future Build Condition

Pollutant Analyzed	Averaging Period	Cumulative Impact Concentrations from 7 HVAC Cluster Emissions	Total Cumulative Concentrations with Background Levels & Cluster Impact	NAAQS
NO_2 ($\mu g/m^3$)	Annual	11.08	62.08	100
SO_2 ($\mu g/m^3$)	3-Hour	74.05	229.05	1300
	24-Hr	40.69	142.69	365
	Annual Average	16.61	34.61	80
CO (ppm)	1-hour	0.016	5.416	35
	8-hour	0.008	2.608	9
PM_{10} ($\mu g/m^3$)	24-Hour	11.59	61.59	150

The cumulative impact concentrations resulting from these industrial sources were predicted for all projected and potential development sites, major public access areas, intersections, and ground-level neighborhood environment. The maximum predicted concentrations at the worst-case location for each pollutant modeled in the analysis are provided in Table 20-14. As shown in the table, these concentrations are all below the applicable NYSDEC short-term (1-hour) guideline concentration (SGC) or long-term annual guideline concentration (AGC) levels. In the case of PM, the analysis compared the ambient concentrations of this pollutant to that of the NAAQS. The analysis results indicate that total cumulative concentrations of PM (with background levels and cluster impact), are below the NAAQS. Based on NYSDEC guidance, a comparison to the NAAQS is necessary. For all cases examined, there would be no exceedance of the standards or state guideline concentration levels. Therefore, no significant industrial sources impacts would occur.

CUMULATIVE IMPACTS OF INDUSTRIAL SOURCES AND HVAC CLUSTERS

Ambient concentrations at projected and potential development sites were also examined for the cumulative effects of criteria pollutants which would be released from the 38 industrial facilities, as well as from the seven HVAC cluster sources under the build scenario. The cumulative impacts were analyzed by an AERMOD modeling. The maximum predicted concentrations at the worst-case location for each criteria pollutant modeled in the analysis are provided in Table 20-15, for comparison with the NAAQS. For all cases examined, no exceedance of the standard is predicted. Therefore, the cumulative impacts of all sources would not be significant.

CUMULATIVE HEALTH RISK ASSESSMENT

Health risks were determined for the combined effects of air contaminants affecting a proposed development site, based on U.S. EPA methodology. The maximum hazard index and total cancer risk were determined using the above AERMOD predicted impacts with the applicable reference concentrations and unit risk factors discussed in the methodology. According to the IRIS (Integrated Risk Information System) documents and classifications defined by the U.S. EPA, two contaminants or hazardous air pollutants - Perchlorethylene (CAS 00127-18-4) and Methylene Chloride (CAS 00075-09-2) released by the industrial sources within the analysis area, as listed in Table 20-2, are classified as human carcinogens or probable human carcinogen substances. Therefore, the health risk assessment considers the cumulative effects of both carcinogenic and non-carcinogenic compounds on the Proposed

Table 20-13
Industrial Sources Analyzed within Project Analysis area

Source ID	NYCDEP Facility Installation Number	Facility Address	
1	PA201773P	11	BARTLETT STREET
2	PA027787P	191	HARRISON AVENUE
3	PA014987R	630	FLUSHING AVENUE
4	PA059383P	630	FLUSHING AVENUE
5	PA053093J	630	FLUSHING AVENUE
6	PA001696Y	630	FLUSHING AVENUE
7	PA030291Z	59	THROOP AVENUE/AKA 628 B'WAY
8	PA052693Z	630	FLUSHING AVENUE
9	PA067794J	120	UNION AVENUE
10	PA023792L	630	FLUSHING AVENUE
11	PA023395H	630	FLUSHING AVENUE
12	PA050795K	630	FLUSHING AVENUE
13	PB028905J	191	HARRISON AVENUE
14	PB029005P	191	HARRISON AVENUE
15	PB029105N	191	HARRISON AVENUE
16	PB029205L	191	HARRISON AVENUE
17	PB029305J	191	HARRISON AVENUE
18	PB029405H	191	HARRISON AVENUE
19	PB029505X	191	HARRISON AVENUE
20	PB034605N	191	HARRISON AVENUE
21	PA029796X	630	FLUSHING AVENUE
22	PA053373Y	630	FLUSHING AVENUE
23	PA053573Z	630	FLUSHING AVENUE
24	PA019494L	760	BROADWAY
25	PB011807Z	760	WOODHULL (RECEIVING DOCK)
26	PB013007L	760	BWAY (RECEIVING DOCK)
27	PA052893N	630	FLUSHING AVENUE
28	PA052993K	630	FLUSHING AVENUE
29	PB023702J	52	THROOP AVENUE
30	PB023802H	52	THROOP AVENUE
31	PA000498Z	630	FLUSHING AVENUE
32	PA000598X	630	FLUSHING AVENUE
33	PA067694M	120	UNION AVENUE
34	PB005702Z	688	FLUSHING AVE
35	PB005802R	688	FLUSHING AVE
36	PB022005L	688	FLUSHING AVENUE
37	PB008502J	78-82	GERRY STREET
38	PB014605Y	209	HARRISON AVENUE

Table 20-14
Industrial Source Impacts
Maximum Predicted Concentrations at Worst Location of
Development Sites and Ground-Level Public Areas

Pollutant	CAS Number	Modeled Cumulative Short-Term Impact (µg/m^3)	SGC (µg/m^3)	Modeled Cumulative Annual Impact (µg/m^3)	AGC (ug/m^3)
Acetone	00067-64-1	1,431.5	180,000	20.07	28,000
Alginic Acid	09005-32-7	0.00133	N/A	0.00005	4.8
Aromatic Hydro Mix	64742-95-6	271.5	N/A	1.31	3,800
Butoxyeth 2-, Acetate	00112-07-2	153.1	N/A	0.739	310
Butyl Acetate	00123-86-4	364.2	95,000	1.76	17,000
Butyl Alcohol	00071-36-3	58.4	N/A	0.145	1,500
Calcium Carbonate	00471-34-1	2.41	N/A	0.053	4.8
Calcium Phosphates	07757-93-9	6.49	N/A	0.147	4.8
Carbon Monoxide	00630-08-0	117.1	14,000	2.11	N/A
Carbon Dioxide	00124-38-9	234.5	5,400,000	4.54	21,000
Cellulose Acetate	09004-36-8	0.029	N/A	0.00005	24
Croscasmellose Sodium	74811-65-7	0.0051	380	0.00018	45
Ethanol	00064-17-5	909.1	N/A	0.199	45,000
Ethoxyethyl Acetate	00111-15-9	0.0016	140	0.0001	64
Gluco Hydrochloride	00066-84-2	0.0038	2,100	0.00013	20
Hydroxypropyl Cellulose	09004-64-2	0.086	N/A	0.00026	24
Hydroxy Methycellulose	09004-65-3	0.701	N/A	0.0294	24
Iron Oxide	01309-37-1	0.02381	N/A	0.00096	12
Isopropyl Alcohol	00067-63-0	239.0	98,000	0.0585	7,000
Lactose	64044-51-5	0.409	N/A	0.0146	24
Lead Vapor	07439-92-1	0.269	N/A	0.0031	0.38
Magnesium Stearate	00557-04-0	0.029	N/A	0.0011	24
Methanol	00067-56-1	45.9	33,000	0.369	4,000
Methyl Amyl Ketone	00110-43-0	75.5	N/A	0.187	550
Methylene Chloride*	00075-09-2	32.66	14,000	0.0632	2.1
Methoxy-1 Propyl Acetate	00108-65-6	0.69	55,000	0.0017	2,000
Methyl Isobutyl Ketone	00108-10-1	29.9	31,000	0.075	3,000
Microcrystalline Cellulose	09004-34-6	0.78	N/A	0.027	24
Nitrogen Dioxide	10102-44-0	548.7	N/A	10.01	100
Particulates, Solid	NY75-00-0	37.09	380	0.976	45
Particulate (PM-10)	NY75-00-5	19.81	380	0.87	N/A
Particulate (PM-2.5)	NY75-02-5	17.83	160	0.78	15
Polyethylene Oxide	25322-68-3	0.86	N/A	0.030	200
Propylene Glycol	00057-55-6	0.0067	55,000	0.00022	2,000
Providone Dust	09003-39-8	0.03191	380	0.00133	45
Sodium Chloride	07647-14-5	0.0188	N/A	0.00059	20
Sodium Lauryl Sulfate	73296-89-6	0.00047	120	0.00002	N/A
Sodium Glycolate Starch	09063-38-1	0.0457	120	0.00174	24
Sorbital	00050-70-4	0.0043	30	0.00016	0.06
Starch, Soluble	09005-25-8	3.84	N/A	0.0803	24
Starch	09005-84-9	0.0364	N/A	0.0018	24
Sulfur Dioxide	07446-09-5	3.32	910	0.0658	80
Talc	14807-96-6	0.00084	N/A	0.00003	4.8
Tetrachloroethylene*	00127-18-4	17.5	1,000	0.275	1
Tin Vapor	07440-31-5	0.2685	20	0.00312	0.24
Titanium Dioxide	13463-67-7	0.0866	N/A	0.001	24
Xylene M,O&P	01330-20-7	445.5	4,300	2.155	100

*: carcinogenic compound

Table 20-15
Cumulative Impact Concentrations from Industrial Sources and HVAC Clusters

Pollutant Analyzed	Averaging Period	Cumulative Impact Concentrations from 7 HVAC Clusters & 38 Industrial Facilities Emissions	Total Cumulative Concentrations with Background Levels & Cluster Impact	NAAQS
NO_2 (µg/m^3)	Annual	11.44	62.44	100
SO_2 (µg/m^3)	3-Hour	74.05	229.05	1300
	24-Hr	40.73	142.73	365
	Annual Avg.	16.62	34.62	80
CO (ppm)	1-hour	0.102	5.502	35
	8-hour	0.048	2.648	9
PM_{10} (µg/m^3)	24-Hour	11.76	61.76	150

Action, respectively. As presented in Table 20-16, the U.S. EPA's Hazard Index Approach resulted in a calculated value of 0.318 for non-carcinogenic compounds. The Proposed Action's maximum total hazard index value is considerably below the Hazard Index threshold value of 1.0, and is therefore considered to be insignificant.

As presented in Table 20-17, the total Incremental Carcinogenic Risk for 2 compounds resulted in a calculated value of 3.05 E-07 level. Since the Proposed Action's maximum incremental risk is less than EPA threshold value of one in one million (1.0 E-06), the carcinogenic risk is considered to be negligible.

Therefore, based upon the cumulative air toxics analysis, the Proposed Action would not result in a significant health hazard or cancer risk

Table 20-16
Estimated Maximum Hazard Index

Pollutant	CAS Number	Modeled Cumulative Annual Impact (ug/m^3)	Reference Concentration (Rfc) or AGC (ug/m^3)	Pollutant Concentration to Rfc-AGC Ratio
Acetone	00067-64-1	20.07	31,000	6.47E-04
Alginic Acid	09005-32-7	0.00005	4.8	1.04E-05
Aromatic Hydro Mix	64742-95-6	1.31	3,800	3.45E-04
Butoxyeth 2-, Acetate	00112-07-2	0.739	310	2.38E-03
Butyl Acetate	00123-86-4	1.76	17,000	1.04E-04
Butyl Alcohol	00071-36-3	0.145	1,500	9.67E-05
Calcium Carbonate	00471-34-1	0.053	4.8	1.10E-02
Calcium Phosphates	07757-93-9	0.147	4.8	3.06E-02
Carbon Monoxide	00630-08-0	2.11	1,120	1.88E-03
Carbon Dioxide	00124-38-9	4.54	21,000	2.16E-04
Cellulose Acetate	09004-36-8	0.00005	24	2.08E-06
Croscasmelose Sodium	74811-65-7	0.00018	45	4.00E-06
Ethanol	00064-17-5	0.199	45,000	4.42E-06

Pollutant	CAS Number	Modeled Cumulative Annual Impact (ug/m^3)	Reference Concentration (Rfc) or AGC (ug/m^3)	Pollutant Concentration to Rfc-AGC Ratio
Ethoxyethyl Acetate	00111-15-9	0.0001	64	1.56E-06
Gluco Hydrochloride	00066-84-2	0.00013	20	6.50E-06
Hydroxypropyl Cellulose	09004-64-2	0.00026	24	1.08E-05
Hydroxy Methycellulose	09004-65-3	0.0294	24	1.23E-03
Iron Oxide	01309-37-1	0.00096	12	8.00E-05
Isopropyl Alcohol	00067-63-0	0.0585	7,000	8.36E-06
Lactose	64044-51-5	0.0146	24	6.08E-04
Lead Vapor	07439-92-1	0.0031	0.38	8.16E-03
Magnesium Stearate	00557-04-0	0.0011	24	4.58E-05
Methanol	00067-56-1	0.369	4,000	9.23E-05
Methyl Amyl Ketone	00110-43-0	0.187	550	3.40E-04
Methoxy-1 Propyl Acetate	00108-65-6	0.0017	2,000	8.50E-07
Methyl Isobutyl Ketone	00108-10-1	0.075	3,000	2.50E-05
Microcrystalline Cellulose	09004-34-6	0.027	24	1.13E-03
Nitrogen Dioxide	10102-44-0	10.01	100	1.00E-01
Particulates, Solid	NY75-00-0	0.976	45	2.17E-02
Particulate (PM-10)	NY75-00-5	0.87	45	1.93E-02
Particulate (PM-2.5)	NY75-02-5	0.78	15	5.20E-02
Polyethylene Oxide	25322-68-3	0.03	200	1.50E-04
Propylene Glycol	00057-55-6	0.00022	2,000	1.10E-07
Providone Dust	09003-39-8	0.00133	45	2.96E-05
Sodium Chloride	07647-14-5	0.00059	20	2.95E-05
Sodium Lauryl Sulfate	73296-89-6	0.00002	9.6	2.08E-06
Sodium Glycolate Starch	09063-38-1	0.00174	24	7.25E-05
Sorbital	00050-70-4	0.00016	0.06	2.67E-03
Starch, Soluble	09005-25-8	0.0803	24	3.35E-03
Starch	09005-84-9	0.0018	24	7.50E-05
Sulfur Dioxide	07446-09-5	0.0658	80	8.23E-04
Talc	14807-96-6	0.00003	4.8	6.25E-06
Tin Vapor	07440-31-5	0.00312	0.24	1.30E-02
Titanium Dioxide	13463-67-7	0.001	24	4.17E-05
Xylene M,O&P	01330-20-7	2.155	100	2.16E-02
			Total Hazard Index:	0.318
			Hazard Index Threshold Value:	1.0

Table 20-17
Estimated Maximum Health Carcinogenic Risk

Pollutant	CAS Number	Estimated Pollutant Annual Concentration ($\mu g/m^3$)	Reference Concentration (Rfc) or AGC $(ug/m^3)^{-1}$	Pollutant Concentration to Rfc-AGC Ratio
Methylene Chloride	00075-09-2	0.0632	4.7E-07	2.97E-08
Tetrachloroethylene	00127-18-4	0.275	1.0E-06	2.75E-07

Estimated Total Incremental Cancer Risk:	3.05E-07
Carcinogenic Risk Threshold Value:	1.00E-06

PROJECT CONFORMITY WITH NEW YORK STATE IMPLEMENTATION PLANS

The Proposed Action is located within an area designated by the U.S. Environmental Protection Agency (USEPA) as nonattainment for 8-hour ozone (O3) inside ozone transport region and fine particulate matter ($PM_{2.5}$) and designated as a CO maintenance area.

The assessment of general conformity requires the preparation of emission inventories to compare the "no-build" with the "build condition" emissions of $PM_{2.5}$, CO, NOx and VOC under the Proposed Action for the future build year 2018 for operational emissions resulting from project relevant stationary sources (HVAC, boiler, and others used in the development) and mobile sources from project induced vehicular trips that would cause increases in air pollutants. A conformity *de minimis* emission test was conducted first for comparison with applicable de minimis thresholds defined by the conformity rules, and a full conformity determination can be followed if required.

To evaluate the conformity applicability and compliance with the conformity rules, ~~The~~ the emission inventories were calculated for project relevant activities and sources to estimate emissions for the following criteria and precursor air pollutants:

- Carbon monoxide (CO)
- Nitrogen oxides (NOx)
- Volatile organic compounds (VOC)
- Particulate matter, ($PM_{2.5}$)

Under the CAA general conformity regulations, emissions generated from a project cannot exceed a net increase of 100 tons per year of nitrogen oxides (NOx) and 50 tons per year of volatile organic compounds (VOCs) emissions, which are considered precursor pollutants within the ozone transport region. These emission limits for NOx and VOC are the "applicable *de minimis* thresholds" for the study area. The *de minimis* threshold for CO maintenance area is 100 tons per year. The *de minimis* threshold has also been established by EPA for $PM_{2.5}$ nonattainment areas as 100 tons per year. Table 20-18 summarizes the estimated total emissions generated from the Proposed Action for conformity with the *de minimis* thresholds. The Proposed Action complies with the thresholds established by the conformity rules and no exceedances in emissions are expected.

Table 20-18
Estimated Project Generated Emissions
In Comparison to Conformity De Minimis Threshold

Criteria Pollutant	Emissions Generated From Stationary Sources of 37 Projected and Potential Development (tons / year)	Emissions Generated From Project Induced Mobile Sources (tons / year)	Estimated Total Emissions Generated By Project (tons / year)	De Minimis Threshold (tons / year)
CO	5.33	20.85	26.18	100
NOx	21.32	0.61	21.93	100
VOC	1.28	0.92	2.20	50
$PM_{2.5}$	8.15	0.04	8.19	100

The results of the air quality emission and impact analyses are consistent with the impact findings of the Proposed Action traffic evaluation and with the purpose of the Proposed Action. To ensure compliance with Ambient Air Quality Standards, federal and New York State Rules, and SIP requirements, the air quality analysis results described above demonstrate that the Proposed Action will not cause or contribute to any new violation of the standard; will not increase the frequency or severity of any existing violation; and will not delay timely attainment of the standards. Therefore, the Proposed Action will have an insignificant impact on air quality and will comply with the New York State Implementation Plans for the control of CO, $PM_{2.5}$, and ozone, and the requirements of the Clean Air Act. The Proposed Action conforms to the federal conformity rules.

G. CONCLUSION

The air quality impacts from RWCDS development site sources, boilers, clusters and industrial facilities within the analysis area, parking facilities, and mobile sources were evaluated in accordance with U.S. EPA procedures and the *CEQR Technical Manual*. Conservative estimates were made by adding the highest modeling results to the background levels recommended by the NYCDEP, to obtain the predicted total ambient concentrations for CO, NO_x, PM, and SO_2 at analyzed receptor locations on development sites, intersections, and other areas of public concern. The total ambient air concentrations predicted at worst-case receptor locations for all analyzed pollutants would be within the NAAQS for criteria pollutants, and within New York State SGC and AGC guideline levels for all hazardous pollutants released within the analysis area. All predicted impacts are below the NYCDEP CEQR criteria or thresholds. At certain sites, an (E) designation would be mapped as part of the zoning proposal to ensure the developments would not result in any significant air quality impacts from HVAC emissions due to individual or groups of development sites. The hazard index or risk is well below the U.S. EPA threshold value. As such, the air quality impacts of the Proposed Action are considered minor. With respect to the State Implementation Plan (SIP), the Proposed Action would not cause or contribute to any new violation of the standard, would not increase the frequency or severity of any existing violation, and would not delay timely attainment of the standards. As such, the Proposed Action meets all requirements of federal conformity rules. The Proposed Action would not have a significant adverse impact on ambient air quality, and would meet the CAAA criteria and CEQR requirements.

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