Chapter 18: Air Quality

A. INTRODUCTION

This chapter examines the potential for air quality impacts from the proposed actions. Ambient air quality is affected by numerous sources and activities that introduce air pollutants into the atmosphere. A comprehensive assessment of potential air quality impacts from the proposed actions was performed. The analyses described in the sections that follow were performed utilizing the general procedures recommended in the *City Environmental Quality Review (CEQR) Technical Manual*; however, in some cases more detailed analyses were undertaken to characterize potential air quality impacts from the proposed actions, or because of changes in policies and procedures for conducting and evaluating air quality impacts from a proposed action.

Air quality impacts can be either direct or indirect. Direct impacts stem from emissions generated by stationary sources associated with the proposed actions, such as emissions from fuel burned on site for heating, ventilation, and air conditioning (HVAC) systems. Indirect effects include emissions from motor vehicles ("mobile sources") generated by the proposed actions and effects of existing sources stationary sources on the proposed actions.

This chapter has been updated since the Draft Environmental Impact Statement (DEIS) to reflect changes to the Reasonable Worst-Case Development Scenario. Between the DEIS and the FEIS, further analyses of industrial sources were undertaken in coordination with NYCDEP. The further analyses have resulted in the elimination of (E) designations from many projected and potential development sites. Specifically, the further analyses consisted of the following:

- Analyses from the DEIS were refined to reflect the NYSDEC policy at sites where there were predicted exceedances of a SGC or AGC for a criteria pollutant, but where the NAAQS were met for the same pollutant.
- NYCDEP conducted site inspections at certain concrete batching plants that provided more accurate information for determining concentrations of particulate matter at development sites.
- NYCDEP conducted site inspections of a metal plating facility and a facility with process ovens, and the analyses from the DEIS were revised to reflect existing operations that are in compliance with all applicable legal requirements.
- Sensitivity analyses were conducted incorporating additional control technologies or increased stack heights at certain facilities.

As a result of the above refinements and site inspections, (E) designations were eliminated from many projected and potential development sites, and one (E) designation was limited to specific lot lines for potential development site 384. Because the City cannot currently require the measures analyzed under the sensitivity analyses, (E) designations could not be eliminated as a result. Finally, since the DEIS, the City was unable to identify any design features or technologies that developments could incorporate to reduce or eliminate the impacts that would be avoided by the (E) designation. This, however, would not preclude future developments from incorporating such design features or technologies that become recognized as effective by industry standards.

PRINCIPAL CONCLUSIONS

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

Carbon monoxide (CO) and fine particulate matter less than 10 microns in diameter (PM_{10}) concentrations due to project-generated traffic would not result in any violations of National Ambient Air Quality Standards (NAAQS). It was also determined that CO impacts would not exceed CEQR *de minimis* criteria, while increments of fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) would not exceed the City's current interim guidance criteria. In addition, the parking garage analysis determined that the parking facilities under the proposed action would not cause any significant adverse air quality impacts.

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from HVAC systems at the projected and potential development sites. At certain sites, an (E) designation would be mapped as part of the zoning proposed to ensure the developments would not result in any significant air quality impacts from HVAC emissions due to individual or groups of development sites.

An analysis of the cumulative impacts of industrial sources on projected and potential development sites was performed. Large emissions sources within 1,000 feet of a projected or potential development site were also analyzed, along with institutional, commercial, and large scale residential developments within 400 feet of a residential projected or potential development site. At most of the sites, the maximum concentration levels were below the air toxic guideline levels and health risk criteria established by regulatory agencies, and below National Ambient Air Quality Standards (NAAQS). However, at certain projected and potential development sites in the vicinity of existing industrial sources, concentrations of individual air toxic pollutants were found to result in potential significant impacts. Therefore, at these locations an (E) designation for air quality will be mapped as part of the zoning proposal to ensure the developments would not result in any significant adverse air quality impacts.

B. 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 CO are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs) and nitrogen oxides (NO and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. 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 SO_2 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, diesel fuel regulations that recently took effect will reduce SO_2 emissions from mobile sources to extremely low levels. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs, emitted mainly from industrial processes and mobile sources.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. Since CO is a reactive gas that does not persist in the atmosphere, CO concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

The proposed actions would increase traffic volumes on streets within and surrounding rezoning 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 actions.

NITROGEN OXIDES, VOC, AND OZONE

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

The proposed actions would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels 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 actions' 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, 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 (three-month average).

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

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, 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 PM_{10}, 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.

An analysis was conducted to assess the worst-case PM impacts due to the increased automobile and truck traffic associated with the proposed actions, and from the proposed actions' HVAC systems.

SULFUR DIOXIDE

SO_2 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 SO_2 concentrations in New York City are below the national standards. Vehicular sources of SO_2 are not significant, and, therefore, an analysis of this pollutant from mobile sources is not warranted.

As part of the proposed actions, fuel oil would be burned in the proposed HVAC systems. Therefore, an analysis was performed to estimate the future levels of SO_2 with the proposed actions.

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 U.S. Environmental Protection Agency (EPA). Federal ambient air quality standards do not exist for non-criteria compounds. However, the NYSDEC has issued standards for certain non-criteria 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 (December 2003) 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.

The project area contains and existing manufacturing-zoned areas, which would remain in the proposed actions. Therefore, an analysis to examine the potential for impacts to the proposed actions from industrial emissions was performed.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are intended to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation’s welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. For NO_2, ozone, lead, and PM, the primary and secondary standards are the same; there is no secondary standard for CO. EPA promulgated additional NAAQS that became effective September 16, 1997: a new 8-hour standard for ozone, which replaced the 1-hour standard, and new 24-hour and annual standards for $PM_{2.5}$. The standards for these pollutants are presented in Table 18-1. These standards have also been adopted as the ambient air quality standards for New York State. In addition, New York State has established ambient air quality standards for total suspended particulate, non-methane hydrocarbons, beryllium, gaseous fluorides, and hydrogen sulfide.

Table 18–1
National Ambient Air Quality Standards

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
Maximum 8-Hour Concentration[1]	9	10,000	None	
Maximum 1-Hour Concentration[1]	35	40,000		
Lead				
Maximum Arithmetic Mean Averaged Over 3 Consecutive Months	NA	1.5	NA	1.5
Nitrogen Dioxide (NO_2)				
Annual Arithmetic Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average[2]	0.08	157	0.08	157
Respirable Particulate Matter (PM_{10}) [5]				
24-Hour Concentration[1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Average of Three Annual Arithmetic Means	NA	15	NA	15
24-Hour Concentration[3,4]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
Annual Arithmetic Mean	0.03	80	NA	NA
Maximum 24-Hour Concentration[1]	0.14	365	NA	NA
Maximum 3-Hour Concentration[1]	NA	NA	0.50	1,300

Notes:
ppm – parts per million
µg/m^3 – micrograms per cubic meter
NA – not applicable
Concentrations of all gaseous pollutants are defined in ppm — approximately equivalent concentrations in µg/m^3 are presented.
[1] Not to be exceeded more than once a year.
[2] Three-year average of the annual fourth highest daily maximum 8-hr average concentration.
[3] Not to be exceeded by the 98th percentile averaged over 3 years.
[4] EPA has reduced these standards down from 65 µg/m^3, effective December 18, 2006.
[5] EPA has revoked the annual PM_{10} standard, effective December 18, 2006.
Sources: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

On September 21, 2006, EPA revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter (µg/m^3) to 35 µg/m^3, and retaining the level of the annual fine standard at 15 µg/m^3. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS (SIP)

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

EPA has designated New York City as in attainment for the NO_2, SO_2, and lead. EPA has re-designated New York City as in attainment for CO. The CAA requires that a maintenance plan ensure continued compliance with the CO NAAQS for former non-attainment areas. New York City is also committed to implementing site-specific control measures throughout New York City to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period.

On December 17, 2004, EPA took final action designating the five boroughs of New York City as well as Nassau, Suffolk, Rockland, Westchester, and Orange counties as $PM_{2.5}$ non-attainment areas under the CAA. State and local governments are required to develop implementation plans by early 2008, which will be designed to meet the standards by 2010. As described above, EPA has revised the PM standards. $PM_{2.5}$ attainment designations would be effective by April 2010, $PM_{2.5}$ SIPs would be due by April 2013, and would be designed to meet the $PM_{2.5}$ standards by April 2015, although this may be extended in some cases up to April 2020.

Nassau, Rockland, Suffolk, Westchester, and the five counties of New York City had been designated as severe non-attainment for the ozone 1-hour standard. In November 1998, New York State submitted its *Phase 2 Alternative Attainment Demonstration for Ozone*, which was finalized and approved by EPA effective March 6, 2002, addressing attainment of the 1-hour ozone NAAQS by 2007. New York State has recently submitted revisions to the SIP. These SIP revisions included additional emission reductions that EPA requested to demonstrate attainment of the standard, and an update of the SIP estimates using the latest versions of the mobile source emissions model, MOBILE6.2, and the non-road emissions model, NONROAD—which have been updated to reflect current knowledge of engine emissions—and the latest mobile and non-road engine emissions regulations. EPA revoked the 1-hour ozone standard on June 15, 2005; however, the specific control measures for the 1-hour standard included in the SIP will be required to stay in place until the 8-hour standard is attained. The discretionary emissions reductions in the SIP will also remain but could be revised or dropped based on modeling. A new SIP for ozone will be adopted by the state no later than June 15, 2007, with a target attainment deadline of June 15, 2010.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

Any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see Table 18-1) would be deemed to have a potential significant adverse impact. In addition, to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants. Any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

DE MINIMIS CRITERIA REGARDING CO IMPACTS

New York City has developed *de minimis* criteria to assess the significance of the incremental increase in CO concentrations that would result from proposed projects or actions, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Build 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Build) concentrations and the 8-hour standard, when No Build concentrations are below 8.0 ppm.

INTERIM GUIDANCE CRITERIA REGARDING $PM_{2.5}$ IMPACTS

NYSDEC has published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts. This policy would apply only to facilities applying for permits or major permit modifications under SEQRA that emit 15 tons of PM_{10} or more annually. The policy states that such a project will be deemed to have a potentially significant adverse impact if the project's maximum impacts are predicted to increase $PM_{2.5}$ concentrations by more than 0.3 $\mu g/m^3$ averaged annually or more than 5 $\mu g/m^3$ on a 24-hour basis. Projects that exceed either the annual or 24-hour threshold will be required to prepare an Environmental Impact Statement (EIS) to assess the severity of the impacts, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the $PM_{2.5}$ impacts of the source to the maximum extent practicable.

In addition, the New York City Department of Environmental Protection (NYCDEP) is currently recommending interim guidance criteria for evaluating the potential $PM_{2.5}$ impacts for projects subject to CEQR. The updated interim guidance currently employed by NYCDEP for determination of potential significant adverse $PM_{2.5}$ impacts under CEQR are follows:

- 24-hour average concentrations increments which are predicted to be greater than 5 $\mu g/m^3$ at a discrete receptor location would be considered a significant adverse impact on air quality under operational conditions (i.e., permanent condition predicted to exist for many years) regardless of the frequency of occurrence;
- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 2 $\mu g/m^3$ but no greater than 5 $\mu g/m^3$ would 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 0.1 $\mu g/m^3$ at ground-level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or

  Predicted annual average $PM_{2.5}$ concentration increments greater than 0.3 $\mu g/m^3$ at a discrete or ground level receptor location.

Actions under CEQR that would increase $PM_{2.5}$ concentrations by more than the NYCDEP or NYSDEC interim guidance criteria above will be considered to have potential significant adverse impacts. NYCDEP recommends that its actions subject to CEQR that fail the interim guidance criteria prepare an EIS and examine potential measures to reduce or eliminate such potential significant adverse impacts.

The above NYCDEP and NYSDEC interim guidance criteria have been used for the purpose of evaluating the significance of predicted impacts of the proposed actions on $PM_{2.5}$ concentrations from mobile sources, and determine the need to minimize PM emissions from the proposed actions.

NON-CRITERIA POLLUTANT THRESHOLDS

Non-criteria, or toxic, air pollutants include a multitude of pollutants of ranging toxicity. No federal ambient air quality standards have been promulgated for toxic air pollutants. However, the 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 and annual average time periods for various air toxic compounds. These values are provided in Table 18-2 for the compounds affecting receptors located at projected and potential development sites. The compounds listed are those emitted by existing sources of air toxics in the project area.

Table 18-2
Industrial Source Analysis: Relevant NYSDEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (μg/m^3)	AGC (ug/m^3)	Toxicity Rating
Mercaptoethanol	00060-24-2	--	--	--
Ethanol	00064-17-5	--	45,000.0	Low
Acetic Acid	00064-19-7	3,700.0	60.0	Not Rated
Isopropyl Alcohol	00067-63-0	98,000.0	7,000.0	Moderate
Dimethyl Ketone (Acetone)	00067-64-1	180,000.0	28,000.0	Low
Butyl Alcohol, N-	00071-36-3	--	1,500.0	Low
Propane	00074-98-6	--	110,000.0	Low
Acetaldehyde	00075-07-0	4,500.0	0.45	Moderate
Ethylene Oxide	00075-21-8	18.0	0.019	High
Methyl Ethyl Ketone	00078-93-3	59,000.0	5,000.0	Moderate
Trichloroethylene	00079-01-6	54,000.0	0.50	Moderate
Ethyl Benzene	00100-41-4	54,000.0	1,000.0	Moderate
Propylene Glycol Monomethyl Ether	00107-98-2	55,000.0	2,000.0	Moderate
Methyl Isobutyl Ketone	00108-10-1	31,000.0	3,000.0	Moderate
Propanol Acetate	00108-65-6	55,000.0	2,000.0	Low
Toluene	00108-88-3	37,000.0	400.0	Low
Methyl Amyl Ketone	00110-43-0	--	550.0	Not Rated
Ethylene Glycol Mono Butyl Ether	00111-76-2	14,000.0	13,000.0	Moderate
Diethyl Ether	00115-10-6	150,000.0	29,000.0	Low
Butyl Acetate	00123-86-4	95,000.0	17,000.0	Low
Carbon Dioxide	00124-38-9	5,400,000.0	21,000.0	Not Rated
Tetrachloroethylene	00127-18-4	1,000.0	1.0	Moderate
Sodium Nitronbenzene Sulfonic Acid	00127-68-4	--	9.0	Moderate
Sodium Saccaharin	00128-44-9	--	--	--
Monoethanolamine (aka Ethanolamine)	00141-43-5	1,500	18.0	Moderate
Sodium Cyanide	00143-33-9	380.0	50.0	High
Silver Cyanide	00506-64-9	380.0	50.0	High
N-Butyl Ester	00590-01-1	--	--	--
Carbon Monoxide	00630-08-0	14,000.0	--	Not Rated
Tetrafluoroethane	00811-97-2	--	80,000.0	Low
Methyl Pyrrolidone	00872-50-4	--	100.0	Moderate
Sodium Hydroxide	01310-73-2	200.0	--	Low
Sodium Hydroxide	01310-73-2	200.0	--	Low

Table 18-2 (cont'd)
Industrial Source Analysis: Relevant NYSDEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (μg/m^3)	AGC (ug/m^3)	Toxicity Rating
Xylene,M,O&P Mixt.	01330-20-7	4,300.0	100.0	Moderate
Asbestos	01332-21-4	--	0.000016	High
Ammonium Hydroxide	01336-21-6	2,400.0	100.0	Low
Ammonium Bifluoride	01341-49-7	--	--	High
1,1 Dichloro-1-Fluoroethane	01717-00-6	--	--	--
Sodium Metasilicate	06834-92-0	--	--	--
Manganese	07439-96-5	-	0.050	Moderate
Nickel	07440-02-0	6.0	0.0040	High
Chromium	07440-47-3	--	1.20	High
Cobalt	07440-48-4	--	0.0010	Moderate
Sulfur Dioxide	07446-09-5	910.0	80.0	Not Rated
Zinc Chloride (Fume)	07646-85-7	200.0	2.4	Moderate
Hydrogen Chloride	07647-01-0	2,100.0	20.0	Low
Ammonia	07664-41-7	2,400.0	100.0	Low
Sulfuric Acid Mist	07664-93-9	120.0	1.0	Moderate
Sodium Hypophosphite	07681-53-0	--	--	--
Nitric Acid	07697-37-2	86.0	12.0	Moderate
VM&P Naphtha	08032-32-4	--	33,000	Low
Celluose Acetate Buterate	09004-36-8	--	--	--
Boric Acid	10043-35-3	--	--	--
Nitrogen Oxide NO	10102-43-9	--	74.0	Not Rated
Nitrogen Dioxide	10102-44-0	--	100.0	Not Rated
Ammonium Chloride	12125-02-9	380.0	24.0	Moderate
Vinyl Toluene	25013-15-4	48,000.0	580.0	Not Rated
Acrylic Polymer	25133-36-8	--	--	--
Hydrocarbons	68476-44-8	--	--	--
Hydrocarbons C1-3	68527-16-2	--	--	--
Particulates	NY075-00-0	380.0	-- [1]	Not Rated
Aliphatic Hydrocarbons	NY550-00-0	--	--	--
Miscellaneous Organics	NY439-00-0	--	--	--
Volatile Organic Compounds	NY997-00-0	--	--	--
Total Organic Solvents	NY998-00-0	--	--	--

Note: 1. The annual PM$_{10}$ standard was revoked on December 18, 2006, which was the basis for the particulate AGC.

Source: NYSDEC, DAR-1 AGC/SGC Tables (12/22/03).

In order to evaluate impacts of non-carcinogenic toxic air emissions, EPA developed a methodology called the "Hazard Index Approach." 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 respective short-term or annual exposure threshold for each of the toxic pollutants is found to be less than 1, no significant air quality impacts are predicted to occur due to these pollutant releases.

In addition, the EPA has developed unit risk factors for carcinogenic pollutants. The 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.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

The prediction of vehicle-generated CO and PM emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configurations. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and geometry combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions and it is necessary to predict the reasonable worst-case condition, most of these dispersion models predict conservatively high concentrations of pollutants.

The mobile source analyses for the proposed actions employ models approved by EPA that have been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could result from the proposed actions. The assumptions used in the PM analysis were based on the latest $PM_{2.5}$ interim guidance developed by the NYCDEP.

DISPERSION MODELS FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets within the project area, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0.[1] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of pollutants from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first-level CAL3QHC modeling. It is also used to calculate PM mobile source impacts since it is more appropriate for calculating 24-hour and annual average PM concentrations.

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

METEOROLOGY

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

Tier I Analyses—CAL3QHC

CO calculations were performed using the CAL3QHC model. In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor.

Following the EPA guidelines[1], CO computations were performed using a wind speed of 1 meter per second and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.70 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

Tier II Analyses—CAL3QHCR

A Tier II analysis using the CAL3QHCR model, which includes the modeling of hour-by-hour concentrations based on hourly traffic data and five years of monitored hourly meteorological data, was performed to predict maximum 24-hour and annual average PM levels. The data consists of surface data collected at JFK Airport and upper air data collected at Brookhaven, New York, for the period 2000-2004. All hours were modeled, and the highest resulting concentration for each averaging period was presented.

ANALYSIS YEAR

The microscale analyses were performed for existing conditions and 2015, the year in which the full build-out of the proposed actions is expected to be completed. The future analyses were performed both without the proposed actions (the No Build condition) and with the proposed actions (the Build condition).

VEHICLE EMISSIONS DATA

Engine Emissions

Vehicular CO and PM emission factors were computed using the EPA mobile source emissions model, MOBILE6.2[2]. This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak

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

[2] EPA, User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model, EPA420-R-03-010, August 2003.

time, and various other factors that influence emissions, such as changes in fuel and tailpipe emission standards, and inspection maintenance programs. The inputs and use of MOBILE6.2 incorporates the most current guidance available from the NYSDEC and NYCDEP.

Appropriate credits were used to accurately reflect the New York State inspection and maintenance program, which requires inspections of automobiles and light trucks to determine if pollutant emissions from the vehicles’ exhaust systems are below emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

Vehicle classification data were based on field studies conducted for the project. The general categories of vehicle types for specific roadways were further categorized into subcategories based on their relative fleet-wide breakdown.[1]

An ambient temperature of 43° F was used. The use of this temperature is recommended in the *CEQR Technical Manual* for the Borough of Queens and is consistent with current NYCDEP guidance.

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} emission estimates include both exhaust and re-entrained road dust. Road dust emission factors were calculated according to the latest procedure delineated by EPA.[2] Fugitive road dust was not included in the $PM_{2.5}$ microscale analyses based on the current EPA protocol for determining fugitive dust emissions from paved roads.

TRAFFIC DATA

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed actions (see Chapter 16, “Traffic and Parking”). Traffic data for the future without and with the proposed actions were employed in the respective air quality modeling scenarios. The weekday AM (8 to 9 AM) and PM (5 to 6 PM) peak periods were analyzed. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project-generated and future build traffic and, therefore, have the greatest potential for significant air quality impacts.

Since the PM analysis requires hourly traffic data over an entire 24-hour period, it was necessary to estimate this information for the non-peak traffic periods. The projected weekday and weekend peak no build traffic volumes were used as a baseline, and no build traffic volumes for other hours were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected for the project. Project-generated traffic volumes were determined over the 24-hour period using data obtained from the traffic analysis. For annual impacts, average weekday and weekend 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

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[1] The MOBILE6.2 emissions model utilizes 28 vehicle categories by size and fuel. Traffic counts and predictions are based on broader size categories and then broken down according to the fleet-wide distribution of subcategories and fuel types (diesel, gasoline, or alternative).

[2] EPA, Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, November 2006.

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant levels not directly accounted for through the modeling analysis (which directly accounts for vehicle-generated emissions on the streets within 1,000 feet and line-of-sight of the receptor location). Background concentrations must be added to modeling results to obtain total pollutant concentrations at a study site.

The 8-hour average background concentration used in this analysis was 2.5 ppm for the 2015 prediction, which is based on the highest second-highest 8-hour measurements over the most recent three-year period for which complete monitoring data is available (2003-2005), utilizing measurements obtained at the Queens College monitoring station. The 1-hour CO background employed in the analysis was 3.2 ppm.

The nearest NYSDEC monitoring site at JHS 126 in Brooklyn was used for the 24-hour PM_{10} background concentrations. The PM_{10} 24-hour background concentration was based on the second-highest concentration, measured over the most recent three-year period for which complete data are available (2002–2004).

MOBILE SOURCE ANALYSIS SITES

Eight intersection locations were selected for microscale analysis (see Table 18-3 and Figure 18-1). These intersections were selected because they are the locations in the primary and secondary study areas where the largest levels of project-generated traffic are expected and, therefore, where the maximum changes in the concentrations would be expected and the highest potential for air quality impacts would occur.

Table 18-3
Mobile Source Analysis Intersection Locations

Analysis Site	Location
1	Hillside Avenue @ 150th Street
2	Hillside Avenue @ Sutphin Boulevard
3	Hillside Avenue @ Parsons Boulevard
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)
5	Jamaica Avenue @ Sutphin Boulevard
6	Jamaica Avenue @ 150th Street
7	Jamaica Avenue @ Merrick Boulevard
8	Sutphin Boulevard @ 94th Avenue

Each of these intersections was analyzed for CO. For the PM_{10} and $PM_{2.5}$ analyses, two of the intersections were analyzed. Based on review of estimated project-generated traffic, the intersection at Hillside Avenue and Parsons Boulevard was selected since it has the highest Build traffic volumes and would therefore result in the highest predicted PM_{10} emissions. The intersection of Atlantic Avenue and the Van Wyck Service Road was chosen because it has the highest overall build increment in the 2015 analysis year and, therefore, the greatest potential for maximum changes in $PM_{2.5}$ concentrations. Each of these intersections was analyzed for PM_{10} and $PM_{2.5}$.

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Project Area

KEY TO AIR QUALITY MOBILE SOURCE SITES

1. Hillside Avenue/150th Street
2. Hillside Avenue/Sutphin Boulevard
3. Hillside Avenue/Parsons Boulevard
4. Van Wyck/94th Avenue/Atlantic Avenue
5. Jamaica Avenue/Sutphin Boulevard
6. 150th Street/Sutphin Boulevard
7. Jamaica Avenue/Merrick Boulevard
8. 94th Avenue/Sutphin Boulevard

0 2000 FEET

SCALE

Air Quality Mobile Source Analysis Sites

Figure 18-1

Jamaica Plan

RECEPTOR LOCATIONS

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at each of the selected sites. 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. Receptors in the annual $PM_{2.5}$ neighborhood scale models were placed at a distance of 15 meters from the nearest moving lane, based on the NYCDEP procedure for neighborhood scale corridor $PM_{2.5}$ modeling.

PARKING FACILITIES

The proposed actions would include parking facilities to account for the new parking demand and supply. Emissions from vehicles using the parking areas could potentially affect ambient levels of CO at the project intersections analyzed in the future Build conditions. Of the parking associated with the projected development sites, the prototypical parking garage at Sites 299 and 302 were analyzed (see Table 18-4). These sites collectively have the greatest potential parking demand and, therefore, the highest potential air quality impact.

Table 18-4
Parking Garage—Analyzed Sites

Garage Site	No. of Spaces	Block/Lot No.
299	300	9998/22, 25, 42, 43, 47
302	700	9999/1, 9-11, 13, 15; 10000/1

An analysis of the emissions from the outlet vents and their dispersion in the environment was performed, calculating pollutant levels in the surrounding area, using the methodology set forth in the *CEQR Technical Manual*. Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOBILE6.2 mobile source emission 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 5 miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. The concentration of CO within the garages was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of 1 cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period. (No exceedances of the 1-hour standard would occur, and the 8-hour values are the most critical for impact assessment.)

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

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit the facility. Departing vehicles were assumed to be operating in a "cold-start" mode, emitting higher levels of CO than arriving vehicles. Traffic data for the parking garage analysis were derived from the trip generation analysis described in the traffic section of this FEIS. Background and on-street CO concentrations were added to the modeling results to obtain the total ambient levels.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the proposed actions' HVAC systems. In addition, an assessment was conducted to determine the potential for impacts due to industrial activities within the re-zoning area.

HVAC SOURCE ANALYSES

Individual Sources

<u>Screening Analysis</u>

A screening analysis was performed to assess air quality impacts associated with emissions from the HVAC system of each projected and potential development site. The methodology described in the *CEQR Technical Manual* was used for the analysis and considered impacts on sensitive uses (both existing residential developments as well as other residential developments under construction). The CEQR screening analysis methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the HVAC exhaust stack height to evaluate whether a significant adverse impact is likely. Based on the distance from the proposed development to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Since information on the HVAC systems' design is not available, each projected and potential development site was evaluated with the nearest existing or proposed residential development of a similar or greater height analyzed as a potential receptor. The maximum development floor areas of the proposed sites from the reasonable worst-case development scenario were used as input for the screening analysis.

It was assumed that either natural gas or No. 4 fuel oil would be used in the HVAC systems, and that the stacks would be installed 3 feet above roof height (as per the *CEQR Technical Manual*). For buildings with different tier configurations (provided in the conceptual design), the analysis assumed that the HVAC stack would be installed on the highest tier. If a source did not pass any of the screening analyses (oil or gas) using the *CEQR Technical Manual* procedures, a refined modeling analysis was performed, as described below.

<u>Dispersion Modeling</u>

Development sites that did not pass HVAC the screening analysis were analyzed using a refined dispersion model, the Industrial Source Complex Short Term (ISC3) dispersion model developed by EPA, and described in User's Guide for the Industrial Source Complex (ISC3) Dispersion Models (EPA-454/B-95-003a). The ISC3 model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data. Computations with the ISC3 model to determine impacts from exhaust stacks were made assuming stack tip downwash, buoyancy-induced dispersion, gradual plume rise, urban dispersion coefficients and wind profile exponents, no collapsing of stable stability classes, and elimination of calms. The meteorological data set consisted of the five recent years of concurrent meteorological data: surface data collected at JFK Airport (2000-2004) and upper air data collected at Brookhaven, Suffolk County, New York.

The *CEQR Technical Manual* states that the ISC3 model should be run with and without building downwash (the downwash option accounts for the dispersion effects from a stack plume due to the structure the stack is located at, as well as other nearby structures). In general, modeling without building downwash produces higher estimates of pollutant concentrations when assessing the impact of elevated sources on elevated receptor locations. Therefore, the HVAC analysis was performed using the ISC3 model with the no downwash option only.

Cumulative Impacts from 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.

This analysis was performed using the EPA SCREEN3 Model (version 96043). The SCREEN3 model is a screening version of the ISC3 model, and is used for determining maximum concentrations from a single source using predefined meteorological conditions.

The project area was analyzed to determine cluster selection and cumulative impacts on nearby buildings of a similar or greater height. The clusters were each modeled as an area source. A total of 15 clusters were selected for analysis. The location and development sites associated with each cluster are presented in Figure 18-2.

NYCDEP Report 12 was used to determine fuel usage rates per unit of floor area. Emission factors as reported in AP-42 for fuel oil and natural gas fired boilers were used to estimate emissions from each cluster, based on the cluster's total developments size and calculated fuel usage estimate.

Background Concentrations

To estimate the maximum expected pollutant concentration at a given receptor, the calculated impact must be added to a background value that accounts for existing pollutant concentrations from other sources (see Table 18-5).

INDUSTRIAL SOURCE ANALYSIS

Pollutants emitted from the exhaust vents of existing permitted industrial facilities were examined to identify potential adverse impacts on future residents. To assess and estimate the potential effects on the proposed actions from existing industrial operations in the surrounding area, an analysis investigation was conducted.

Table 18-5
Background Pollutant Concentrations

Pollutants	**Averaging Period**	**Monitoring Station**	**Background Concentration (μg/m^3)**	**Ambient Standard (μg/m^3)**
NO_2	Annual	Queens College	53	100
SO_2	3 hour	Queens College	202	1,300
	24 hour		84	365
	Annual		18	80
PM_{10}	24 Hour	JHS 126, Brooklyn	50	150

Source: 2002–2005 Annual New York State Air Quality Report, Ambient Air Monitoring System, NYSDEC.

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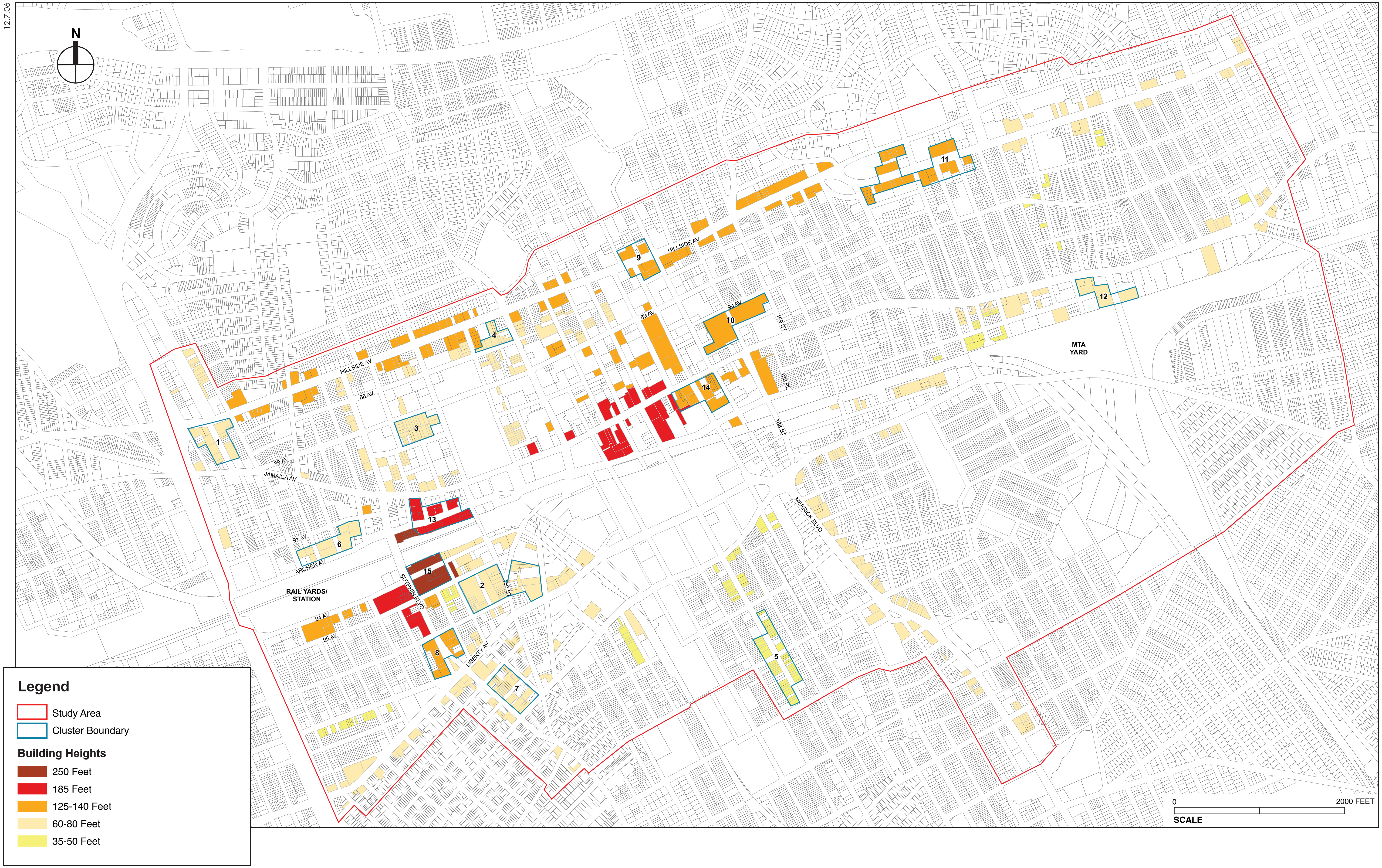

Location of HVAC Clusters of Sites

Figure 18-2

All industrial air pollutant emission sources within 400 feet of the proposed action area boundaries and within the proposed actions' area were considered for inclusion in the air quality impact analyses. The *CEQR Technical Manual* also requires an assessment of any actions that could result in the location of residential developments within 1,000 feet of a large emission source or within 400 feet of commercial, institutional, or large-scale residential developments where the proposed structure would be of a height similar to or greater than the height of an existing emission stack. These boundaries were used to identify the extent of the study area for determining air quality impacts associated with the proposed actions.

Information regarding the release of air pollutants from existing industrial sources was obtained from the NYCDEP's Bureau of Environmental Compliance (BEC) and NYSDEC records. A comprehensive search was also performed to identify NYSDEC state facility and Title V permits and registrations listed in the EPA Envirofacts database. Facilities that appeared in the Envirofacts database but did not also possess a NYCDEP certificate to operate were cross-referenced against the NYSDEC's Air Guide-1 software emissions database, which presents a statewide compilation of permit data for toxic air pollutants, to obtain emissions data and stack parameters.

Field surveys were conducted in November 2005 and November 2006 to determine the operating status of permitted industries and identify any potential industrial sites not included in the permit databases. The results of the field survey were compared against DCP data sources. In certain areas within the proposed action area, the proposed mixed-use provisions would allow existing industrial businesses; therefore, these sources were included in the analysis since they could remain in the future. In addition, potential development sites with existing permitted industries were assumed to remain undeveloped in the With-Action Scenario.

In addition to manufacturing or processing activities that were identified within 400 feet of a projected or potential development site, the following emission sources were identified based on the definitions provided in the *CEQR Technical Manual*:

Large Sources within 1,000 Feet of a Projected or Potential Development Site:

- Elmhurst Dairy, which operates a small cogeneration plant that produces electricity and heat for on-site use;
- Six concrete batching plants;
- One asphalt plant.

Other Sources within 400 Feet of a Projected or Potential Development Site:

- The LIRR Hillside Maintenance Complex;
- The NYCT Jamaica Bus Depot.

The above information was compiled into a database of source locations, air emission rates, and other pertinent data in order to determine source impacts. The information was based on the most current air permit data available.

For the concrete batching plants, the permitted emission sources were modeled, i.e., cement storage silos, as well as other operations that do not require on air permit, such as cement truck loading operations, fugitive emissions from storage piles, and on-site heavy-duty diesel vehicle operations. The EPA AP-42 emission factors for concrete batching plant operations, aggregate handling and storage piles, and heavy-duty diesel vehicle operation on paved and unpaved roads were used to obtain a general estimate of emissions of particulate matter (PM_{10} and $PM_{2.5}$) from these facilities.

The industrial source analysis was conducted using the ISC3 dispersion model. Computations with the ISC3 model to determine impacts from exhaust stacks were made assuming stack tip downwash, buoyancy-induced dispersion, gradual plume rise, urban dispersion coefficients and wind profile exponents, no collapsing of stable stability classes, and elimination of calms. Since the highest impacts are predicted to occur on elevated (flagpole) receptors, the ISC3 model was run without downwash, consistent with the HVAC analysis. The meteorological data set consisted of the five recent years of concurrent meteorological data: surface data collected at JFK Airport (2000-2004) and upper air data collected at Brookhaven, Suffolk County, New York. Predicted worst-case impacts were compared with the short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) recommended in the NYSDEC's DAR-1 AGC/SGC Tables. These guideline concentrations present the airborne concentrations which are applied as a screening threshold to determine if the future residents of the proposed action sites could be significantly impacted from nearby sources of air pollution. Predicted worst-case impacts of criteria pollutants were also added to background concentrations measured at NYSDEC monitoring stations and compared with the NAAQS.

A number of permitted sources were found at projected and potential development sites. Under the proposed actions, it is assumed that all of the projected developments would be completed by the 2015 build year. Therefore, the industrial sources at these sites were eliminated since a developed site would not continue to be a source of industrial emissions. However, at potential development sites, which may not be developed by the project's build year, existing industrial sources could operate in the future and were, therefore, included in the analysis. In cases where concentrations were predicted to exceed an SGC/AGC or NAAQS at potential development sites with industrial source permits, further analysis was performed to determine if the source of the impact was the industrial source permit that currently exists on that potential development site. If the source of the impact was on the development site, no significant impact would occur, since a development site could not be both developed with residential uses and continue to have industrial operations.

In addition, after conducting the initial modeling analysis, the results at a number of other projected and potential development sites indicated exceedances of SGCs/AGCs or NAAQS. Therefore, a more detailed review of the permit information was conducted for certain sources. This review disclosed that, in certain cases, emission controls were in place at certain industrial operations or the calculated emissions were checked and found to result in emission factors that were substantially reduced.

Potential cumulative impacts were evaluated based on EPA's Hazard Index Approach for noncarcinogenic compounds and EPA's Unit Risk Factors for carcinogenic compounds. Both methods are based on equations that use EPA health risk information at referenced concentrations for individual compounds to determine the level of health risk posed by an expected ambient concentration of these compounds at a sensitive receptor. For non-carcinogenic compounds, EPA considers a concentration-to-reference dose level ratio of less than 1 to be acceptable. For carcinogenic compounds, the EPA unit risk factors represent the concentration at which an excess cancer risk of 1-in-1 million is predicted. In cases where an EPA reference dose or unit risk factor does not exist, the NYSDEC AGC was used.

E. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS

Monitored background concentrations of SO_2, NO_2, CO, ozone, lead, PM_{10}, and $PM_{2.5}$ for the study area are shown in Table 18-6. These values (2005) are the most recent monitored data that have been made available by NYSDEC (with the exception of PM_{10}, which is based on 2004 data since more recent data are not yet available). In the case of the 8-hour ozone and 24-hour $PM_{2.5}$, concentrations reflect the most recent 3 years of data, consistent with the basis for these standards. There were no monitored violations of NAAQS at these monitoring sites (the maximum 24-hour $PM_{2.5}$ concentration is above the recently revised NAAQS, however). For modeling purposes the analysis utilized the maximum values over the most recent three-year period (Table 18-6).

Table 18-6
Representative Monitored Ambient Air Quality Data

Pollutants	Location	Units	Period	Concentration	Exceeds Federal Standard?	
					Primary	Secondary
CO	P.S. 59, Manhattan	ppm	8-hour	2.1	N	N
			1-hour	2.9	N	N
SO_2	Queens College	μg/m^3	Annual	18	N	-
			24-hour	84	N	-
			3-hour	202	-	N
Respirable particulates (PM_{10})	JHS 126, Brooklyn	μg/m^3	Annual	21 (1)	N	N
			24-hour	50 (1) (5)	N	N
Respirable particulates ($PM_{2.5}$)	JHS 126, Brooklyn	μg/m^3	Annual	15.3	N (3)	N (3)
			24-hour	40.8	N (4)	N (4)
NO_2	Queens College	μg/m^3	Annual	53	N	N
Lead	Susan Wagner, Staten Island	μg/m^3	3-month	0.01	N	-
Ozone (O_3)	Queens College, Queens	ppm	1-hour	0.123 (2)	-	-
		ppm	8-hour	0.086	N	N

Notes:

[1] Ambient monitoring data are not yet available from NYSDEC for 2005. The latest available value from 2004 was used instead.

[2] The 1-hour ozone NAAQS has been replaced with the 8-hour standard; however, the maximum monitored concentration is provided for informational purposes.

[3] The value exceeds the NAAQS; however, compliance is determined based on the most recent three-year average, and is less than the NAAQS.

[4] The most recent monitoring data does not exceed the previous standard of 65 μg/m^3 which was in place at the time the monitoring was performed. However, the concentration does exceed the revised 24-hour $PM_{2.5}$ standard of 35μg/m^3.

[5] The annual PM_{10} standard was revoked, effective December 18, 2006.

Source: NYSDEC, 2004-2005 New York State Ambient Air Quality Data.

PREDICTED POLLUTANT CONCENTRATIONS IN THE STUDY AREA

As noted previously, receptors were placed at multiple sidewalk locations next to the intersections under analysis. The receptor with the highest predicted CO concentrations was used to represent these intersection sites for the existing conditions. CO concentrations were calculated for each receptor location, at each intersection, for each peak period specified above.

Table 18-7 shows the maximum predicted existing (2005) CO 8-hour average concentrations at the receptor sites. (No 1-hour values are shown since predicted values are much lower than the 1-hour standard of 35 ppm.) At all receptor sites, the maximum predicted 8-hour average concentrations are well below the national standard of 9 ppm.

Table 18-7
Maximum Predicted Existing 8-Hour Average CO Concentrations for 2005

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	Hillside Avenue @ 150th Street	PM	4.3
2	Hillside Avenue @ Sutphin Boulevard	AM	4.8
3	Hillside Avenue @ Parsons Boulevard	AM	5.1
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	PM	7.6
5	Jamaica Avenue @ Sutphin Boulevard	AM	4.4
6	Jamaica Avenue @ 150th Street	AM	3.9
7	Jamaica Avenue @ Merrick Boulevard	PM	3.8
8	Sutphin Boulevard @ 94th Avenue	AM	4.0
Note: 8-hour standard is 9 ppm.			

F. FUTURE WITHOUT THE PROPOSED ACTIONS

MOBILE SOURCES ANALYSIS

CO

CO concentrations without the proposed actions were determined for the 2015 Build year using the methodology previously described. Table 18-8 shows future maximum predicted 8-hour average CO concentrations at the analysis intersections without the proposed actions (i.e., 2015 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 18-8
Future (2015) Maximum Predicted 8-Hour Average Carbon Monoxide No Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	Hillside Avenue @ 150th Street	PM	3.6
2	Hillside Avenue @ Sutphin Boulevard	AM	3.9
3	Hillside Avenue @ Parsons Boulevard	AM	4.2
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	PM	5.5
5	Jamaica Avenue @ Sutphin Boulevard	AM	3.7
6	Jamaica Avenue @ 150th Street	AM	3.3
7	Jamaica Avenue @ Merrick Boulevard	PM	3.4
8	Sutphin Boulevard @ 94th Avenue	AM	3.3
Note: 8-hour standard is 9 ppm.			

As shown in Table 18-8, 2015 No Build values are predicted to be well below the 8-hour CO standard of 9 ppm, and lower than predicted existing average concentrations (shown in Table 18-7**)**. The predicted decrease in CO concentrations would result from the increasing proportion of newer vehicles with more effective pollution controls as well as the continuing benefits of the New York State I&M Program.

PM

PM concentrations without the proposed actions were determined for the 2015 Build year using the methodology previously described. Table 18-9 presents the future maximum predicted PM_{10} concentrations at the analysis intersections without the proposed actions (i.e., 2015 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed. Note that $PM_{2.5}$ concentrations without the Proposed Actions are not presented, since impacts are assessed on an incremental basis.

Table 18-9
Future (2015) Maximum Predicted No Build
24-Hour PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)
3	Hillside Avenue @ Parsons Boulevard	58.93
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	69.58
Note: National Ambient Air Quality Standards—24-hour, 150 $\mu g/m^3$.		

STATIONARY SOURCE ANALYSIS

Minimal growth and development within the Project Area would occur in the future without the proposed actions by 2015. HVAC and industrial source emissions in the No Build condition would likely be similar to existing conditions.

G. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

MOBILE SOURCES ANALYSIS

CO

CO concentrations with the proposed actions were determined for the 2015 Build year at traffic intersections using the methodology previously described. Table 18-10 shows the future maximum predicted 8-hour average CO concentration with the proposed actions at the eight intersections studied. (No 1-hour values are shown since no exceedances of the standard would occur and the *de minimis* criteria are only applicable to 8-hour concentrations. Therefore, the 8-hour values are the most critical for impact assessment.) The values shown are the highest predicted concentration for any of the time periods analyzed. The results indicate that the proposed actions would not result in any violations of the 8-hour CO standard. In addition, the incremental increase in 8-hour average CO concentrations would not result in a violation of the CEQR *de minimis* CO criteria. Consequently, the proposed actions would not result in any significant CO air quality impacts.

PM

PM concentrations with the proposed actions were determined for the 2015 Build year using the methodology previously described. Table 18-11 shows the future maximum predicted 24-hour average PM_{10} concentrations with the proposed actions.

The values shown are the highest predicted concentrations for any of time periods analyzed. The results indicate that the proposed actions would not result in any violations of the PM_{10} standard or any significant adverse impacts at any of the receptor locations analyzed.

Table 18-10
Future (2015) Maximum Predicted 8-Hour Average No Build and Build Carbon Monoxide Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)	
			No Build	Build
1	Hillside Avenue @ 150th Street	PM	3.6	4.8
2	Hillside Avenue @ Sutphin Boulevard	AM	3.9	4.7
		PM	3.8	4.7
3	Hillside Avenue @ Parsons Boulevard	AM	4.2	4.3
		PM	4.1	5.3
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	PM	5.5	6.8
5	Jamaica Avenue @ Sutphin Boulevard	AM	3.7	4.4
6	Jamaica Avenue @ 150th Street	AM	3.3	3.8
7	Jamaica Avenue @ Merrick Boulevard	PM	3.4	4.1
8	Sutphin Boulevard @ 94th Avenue	AM	3.3	3.8
		PM	3.2	3.8

Note: 8-hour standard is 9 ppm.

Table 18-11
Future (2015) Maximum Predicted 24-Hour Average PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)[1]	
		No Build	Build
3	Hillside Avenue @ Parsons Boulevard	58.93	59.82
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	69.58	69.92

Note: [1] National Ambient Air Quality Standards—24-hour, 150 $\mu g/m^3$.

Table 18-12
Future (2015) Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations

Receptor Site	Location	Increment
3	Hillside Avenue @ Parsons Boulevard	0.052
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	0.023

Notes:
$PM_{2.5}$ interim guidance criteria—24-hour average, 2 $\mu g/m^3$ (5 $\mu g/m^3$ not-to-exceed value).

Future maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments were determined so that they could be compared to the interim guidance criteria that would determine the potential significance of the proposed actions' impacts. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in Table 18-12 and 18-13, respectively. The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be well below the interim guidance criteria and, therefore, the proposed actions would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

Table 18-13
Future (2015) Maximum Predicted Annual Average $PM_{2.5}$ Concentrations

Receptor Site	Location	Increment
3	Hillside Avenue @ Parsons Boulevard	0.009
4	Atlantic Avenue @ Van Wyck Service Road (Northbound & Southbound)	0.004

Notes:
$PM_{2.5}$ interim guidance criteria—annual (neighborhood scale), 0.1 μg/m^3.

PARKING FACILITIES

Based on the methodology previously discussed, the maximum overall predicted future CO concentrations, including ambient background levels and on-site traffic, at sidewalk receptor locations, would be 8.8 ppm and 5.6 ppm for the 1- and 8-hour periods, respectively. The maximum 1- and 8-hour contribution from the parking garages would be 5.6 ppm and 3.1 ppm, respectively. The maximum concentrations were predicted at Site 302 (700 spaces). The values are the highest predicted concentrations for any time period analyzed. These maximum predicted CO levels are below the applicable CO standards, and therefore, no significant adverse impacts from the proposed actions' parking facilities are expected.

STATIONARY SOURCES

HVAC SOURCE ANALYSES

Individual Sources

Screening Analysis

The screening analysis was performed to determine whether impacts from projected and potential development sites could potentially impact other projected and potential development sites, or existing buildings. The analysis was initially performed assuming both natural gas and No. 4 fuel oil as the HVAC systems' fuel type.

A total of 43 development sites (18 projected and 25 potential) failed the screening analysis using No. 4 fuel oil as the fuel source. No. 2 oil was then assumed for the sites that failed the initial screening analysis, but 40 of the 43 development sites also failed using this fuel. Of the 40 development sites that failed the screening analysis assuming No. 4 or No. 2 oil, five would pass by restricting the fuel type to natural gas only (four projected and one potential).

Dispersion Modeling

For each of the 43 development sites that failed the HVAC screening analysis, a refined analysis was performed utilizing the ISC3 dispersion model. The results indicated that 30 of the 43 sites which failed the screening analysis also failed the refined analysis, for No. 2 oil. If minimum distances are increased from the most conservative distance (building line to building line) no significant adverse impacts are predicted at 21 of these 30 development sites. Furthermore, all of the sites analyzed with the ISC3 model would pass the analysis if natural gas is utilized as the fuel type.

To preclude the potential for significant adverse air quality impacts on other projected and potential developments from the HVAC emissions, an (E) designation would be incorporated into the rezoning proposal for each of the 124 affected sites (including 35 projected and 89 potential sites). These designations would specify the type of fuel to be used or the distance that the vent stack on the building roof must be from its edge. The (E) designations for these sites are presented in Appendix C.

Cumulative Impacts from HVAC Sources

Fifteen HVAC site clusters (HVAC sources in close proximity with similar stack heights) were identified and a quantitative analysis was performed to determine their potential impact. The total floor area of the individual sites was summarized and a single representative stack was placed in the approximate geographic center of the cluster (see Figure 18-2). The fifteen clusters consisted of the following projected and potential development sites:

1. Sub-areas S, T: Projected Development Sites 2, 3, 5, and 6 to 8; and Potential Development Sites 4 and 9 – comprising a total floor area of 365,943 square feet with a stack height at 70 feet;
2. Sub-area LC: Projected Development Sites 315 to 322 and 414; and Potential Development Sites 304 to 314, 410, 411, 413 and 415 – comprising a total floor area of 518,136 square feet with a stack height at 60 feet;
3. Sub-area D: Projected Development Sites 41, 45, 50 to 53 and 56 to 58; and Potential Development Sites 38, 39, 42 to 44, 46 to 49, 54 and 55 – comprising a total floor area of 454,708 square feet with a stack height at 80 feet;
4. Sub-area D: Projected Development Sites 154 and 155; and Potential Development Sites 147, 149 to 153 and 156 – comprising a total floor area of 237,288 square feet with a stack height at 80 feet;
5. Sub-area Q: Projected Development Sites 442 to 445, 455 to 458, 490 to 494, 496, 504 and 505; and Potential Development Sites 440, 441, 446 to 454, 459 to 461, 489, 495 and 497 to 503 – comprising a total floor area of 296,800 square feet with a stack height at 50 feet;
6. Sub-area AT4: Potential Development Sites 278 to 284 – comprising a total floor area of 526,888 square feet with a stack height at 80 feet;
7. Sub-areas O, Y: Projected Development Sites 386 and 394; and Potential Development Sites 382 to 396 – comprising a total floor area of 302,777 square feet with a stack height at 60 feet;
8. Sub-area AT3: Potential Development Sites 347 to 355 – comprising a total floor area of 599,226 square feet with a stack height at 130 feet;
9. Sub-areas JC3, U: Projected Development Sites 202, 230 and 231; and Potential Development Sites 199 and 201 – comprising a total floor area of 400,225 square feet with a stack height at 125 feet;
10. Sub-area JC2: Projected Development Sites 191 and 192; and Potential Development Site 190 – comprising a total floor area of 692,650 square feet with a stack height at 130 feet;
11. Sub-area U: Projected Development Sites 217, 228, 250 and 252; and Potential Development Sites 218 to 227, 229, 251, 253, 254, 266 and 267 – comprising a total floor area of 1,233,225 square feet with a stack height at 125 feet;

12. Sub-area X: Projected Development Site 592; and Potential Development Sites 590, 591 and 594 – comprising a total floor area of 226,830 square feet with a stack height at 60 feet;
13. Sub-areas AT3, AT4, URA, JC1: Potential Development Sites 294 to 297 and 301 – comprising a total floor area of 1,018,640 square feet with a stack height at 185 feet;
14. Sub-area JC2: Projected Development Sites 470 and 471; and Potential Development Sites 465 to 467, 472 and 474 – comprising a total floor area of 754,530 square feet with a stack height at 130 feet; and
15. Sub-area URA: Projected Development Sites 299 and 302 – comprising a total floor area of 1,825,404 square feet with a stack height at 250 feet.

The results of the analysis determined that maximum impacts from 10 of the 15 clusters exceeded the 24-hour NAAQS for SO_2. Four of these clusters were also predicted to exceed the 3-hour NAAQS for SO_2. For the 10 clusters that failed the initial screening analysis, the analysis was re-run assuming that the fuel types would be restricted to No. 2 oil or natural gas. Four of the 11 clusters were predicted to exceed the 24-hour NAAQS for SO_2 assuming No. 2 oil as the fuel type. None of the clusters analyzed resulted in impacts that exceed NAAQS when assuming natural gas as the fuel type.

The overall results of the analysis are presented in Table 18-14. For development sites comprising six of the clusters (3, 4, 6, 7, 9, and 14), an (E) designation would be written that the fuel type be restricted to either No. 2 oil or natural gas, while four of the clusters (8, 11, 13, and 15) would be restricted to natural gas only.

Therefore, to preclude the potential for significant adverse air quality impacts on other projected and potential developments from the HVAC emissions, an (E) designation would be incorporated into the rezoning proposal for each of the 124 affected sites (including 35 projected and 89 potential sites). These designations would specify the type of fuel to be used or the distance that the vent stack on the building roof must be from its edge. The (E) designations for these sites are presented in Appendix C.

INDUSTRIAL SOURCE ANALYSIS

As discussed above, a study was conducted to analyze industrial uses within 400 feet of the projected and potential development sites, large sources within 1,000 feet of a projected or potential development site, and commercial, institutional and large-scale residential sources within 400 feet of a projected or potential development site. NYCDEP-BEC and EPA permit databases were used to identify existing sources of emissions. A total of 46 facilities (consisting of 97 sources) were analyzed. The information from these permits (emission rates, stack parameters, etc.) was input to the ISC3 dispersion model.

Using the modeling approach outlined above, provided in Table 18-15 is a list of projected and potential development sites that are potentially affected by industrial sources in the area. The sources of these potential impacts include the following processes:

- Metal plating operations;
- Concrete batch plants;
- Cogeneration plant;
- Process ovens; and
- Dry cleaners.

Table 18-14
HVAC Cluster Analysis

Cluster ID	Projected Sites	Potential Sites	Cluster Development Size (ft^2)	Results (Pass/Fail)		
				No. 4 Oil	No. 2 Oil	Natural Gas
1	2-3,5,6-8	4 and 9	365,943	Pass	Pass	Pass
2	315-322,414	304-314,410-411,413,415	518,136	Pass	Pass	Pass
3	41,45,50-53,56-58	38-39,42-44,46-49,54-55	454,708	Fail	Pass	Pass
4	154-155	147,149-153,156	237,288	Fail	Pass	Pass
5	442-445,455-458,490-494,496,504-505	440-441,446-454,459-461,489,495,497-503	296,800	Pass	Pass	Pass
6	-	278-284	526,888	Fail	Pass	Pass
7	-	382-396	302,077	Fail	Pass	Pass
8	-	347-355	599,226	Fail	Fail	Pass
9	202,230-231	199,201	400,225	Fail	Pass	Pass
10	191-192	190	692,650	Pass	Pass	Pass
11	217,228,250,252	218-227,229,251, 253-254,266-267	1,233,225	Fail	Fail	Pass
12	592	590-591,594	226,830	Pass	Pass	Pass
13	-	294-297,301	1,018,640	Fail	Fail	Pass
14	470-471	465-467,472,474	754,530	Fail	Pass	Pass
15	299,302	-	1,825,404	Fail	Fail	Pass

The analysis of the concrete batch plants included emissions from both permitted operations (i.e., cement storage silos), as well as activities that are exempt, such as cement truck loading operations, fugitive emissions from storage piles, and on-site heavy-duty diesel vehicle operations. Information on site activities was obtained from inspections of concrete batching plants conducted by NYCDEP.

As shown in Table 18-15, the SGC or AGC is predicted to be exceeded for acetaldehyde, nitric acid, tetrachoroethylene, sodium hydroxide, sulfuric acid mist, particulate matter, and sulfur dioxide. The SGC for tetrachloroethylene, sodium hydroxide and sulfuric acid mist are each predicted to be exceeded at one potential development site. The SGC for particulate matter is predicted to be exceeded at two projected and four potential development sites. The SGC for nitric acid is predicted to be exceeded at two projected and three potential development sites. The SGC for sulfur dioxide is predicted to be exceeded at two potential development sites. Exceedances of the AGC for acetaldehyde are predicted at three projected and six potential development sites. The AGC for tetrachloroethylene is predicted to be exceeded at four projected and 8 potential development sites.

As stated above, the AGC for tetrachloroethlyene was predicted to be exceeded at four projected and 8 potential development sites; however, impacts are less than 10 times higher than the AGC at each of these locations. NYSDEC guidance interprets impacts of less than 10 times higher than the AGC for carcinogenic compounds that have a risk-based threshold (which includes tetrachloroethylene) as allowable, as long as best available control technology (BACT) is in place. Therefore, the impacts of tetrachloroethlyene at these development sites are not considered significant, except at one location, where the SGC was also predicted to be exceeded.

Table 18-15
Projected and Potential Development Sites Exceeding an SGC or AGC

Site	Block	Lot	Pollutants
Projected Development Sites			
6	9620	1	Nitric Acid
7	9620	11	Nitric Acid
184	9793	49	Tetrachloroethylene
230	9837	1	Tetrachloroethylene
231	9837	10	Tetrachloroethylene
250	9913	25, 35, 41	Tetrachloroethylene
381	10058	1, 21	Particulate matter
525	10222	13, 14, 15, 16	Acetaldehyde
526	10223	10	Acetaldehyde
529	10223	14, 16	Acetaldehyde
592	10328	49	Particulate matter
Potential Development Sites			
59	9685	1	Nitric Acid
62	9685	52	Sodium Hydroxide, Sulfuric Acid, Mist, Nitric Acid
63	9685	59	Nitric Acid
74	9694	14	Tetrachloroethylene
126	9760	61	Tetrachloroethylene
129	9761	57	Tetrachloroethylene
183	9793	29	Tetrachloroethylene
197	9813	16	Tetrachloroethylene
198	9813	25	Tetrachloroethylene
240	9844	69	Tetrachloroethylene
267	9937	60	Tetrachloroethylene
384	10059	5, 6	Particulate matter
391	10059	31, 32, 131, 132	Particulate matter
422	10113	71	Sulfur dioxide
423	10115	53	Sulfur dioxide
516	10217	45	Acetaldehyde
519	10219	94	Acetaldehyde
520	10219	97	Acetaldehyde
524	10221	7	Acetaldehyde
527	10223	12	Acetaldehyde
528	10223	13	Acetaldehyde
590	10325	1, 6, 10	Particulate matter
591	10328	44	Particulate matter

For Potential Development Site 391 and 423, the SGC for a criteria pollutant is exceeded. However, further analysis using the ISC3 modeled determined that maximum predicted concentrations at these sites, when added to ambient background levels, were below the NAAQS. Based on NYSDEC guidance these exceedances are not considered to be significant.

Table 18-16 presents the maximum predicted impacts at the projected and potential development sites. The table also lists the SGC and AGC for each air toxic pollutant. The table reflects the restrictions imposed with the proposed (E) designations in place.

Concentrations of criteria pollutants at projected and potential development sites were also compared to NAAQS. Predicted pollutant concentrations from the ISC3 model output were added to the background concentrations to estimate total air quality concentrations at the projected and potential development sites. The results of this analysis determined that at one projected and one

Table 18-16

Maximum Predicted Impacts on Projected and Potential Development Sites from Industrial Sources(1)

Pollutant	CAS Number	ISC3 Model Cumulative Short-Term Impact (µg/m^3)	SGC (µg/m^3)	ISC3 Model Cumulative Annual Impact (µg/m^3)	AGC (ug/m^3)
Mercaptoethanol	00060-24-2	3,179	--	0.79	--
Ethanol	00064-17-5	4,623	--	61	45,000
Acetic Acid	00064-19-7	302	3,700	0.15	60
Isopropyl Alcohol	00067-63-0	6.6	98,000	0.02	7,000
Dimethyl Ketone (Acetone)	00067-64-1	11	180,000	0.04	28,000
Butyl Alcohol, N-	00071-36-3	157	--	0.3	1,500
Propane	00074-98-6	1.8	--	0.01	110,000
Acetaldehyde	00075-07-0	194	4,500	0.43	0.45
Ethylene Oxide	00075-21-8	9.0	18	0.015	0.020
Methyl Ethyl Ketone	00078-93-3	1.2	59,000	0.0056	5,000
Trichloroethylene	00079-01-6	436	54,000	0.26	0.50
Ethyl Benzene	00100-41-4	1.5	54,000	0.034	1,000
Propylene Glycol Monomethyl Ether	00107-98-2	98	55,000	0.16	2,000
Methyl Isobutyl Ketone	00108-10-1	0.1	31,000	0.0004	3,000
Propanol Acetate	00108-65-6	0.83	55,000	0.0051	2,000
Toluene	00108-88-3	88	37,000	0.33	400
Methyl Amyl Ketone	00110-43-0	5.6	--	0.017	550
Ethylen Glycol Mono Butyl Ether	00111-76-2	0.12	14,000	0.00072	13,000
Diethyl Ether	00115-10-6	0.72	150,000	0.0046	29,000
Butyl Acetate	00123-86-4	10	95,000	0.031	17,000
Carbon Dioxide	00124-38-9	98,525	5,400,000	533	21,000
Tetrachloroethylene	00127-18-4	816	1,000	0.94	1.00
Sodium Nitronbenzene Sulfonic Acid	00127-68-4	19	--	0.0093	9
Monoethanolamine (Ethanolamine)	00141-43-5	22	1,500	0.13	18
Sodium Cyanide	00143-33-9	48	380	0.024	50
Silver Cyanide	00506-64-9	21	380	0.0010	50
N-Butyl Ester	00590-01-1	10	--	0.033	--
Carbon Monoxide	00630-08-0	7,485	14,000	11	--
Tetrafluoroethane	00811-97-2	0.47	--	0.0033	80,000
Methyl Pyrrolidone	00872-50-4	87	--	0.51	100
Sodium Hydroxide	01310-73-2	36	200	0.14	--
Sodium Hydroxide	01310-73-2	1.7	200	0.004	--
Xylene,M,O&P Mixt.	01330-20-7	25	4,300	0.58	100
Asbestos	01332-21-4	0.007	--	0.000000028	0.000016
Ammonium Hydroxide	01336-21-6	1,449	2,400	0.0012	100
Ammonium Bifluoride	01341-49-7	124	--	0.03	--
1,1 Dichloro-1-Fluoroethane	01717-00-6	1.1	--	0.007	--
Sodium Metasilicate	06834-92-0	186	--	0.092	--
Manganese	07439-96-5	0.13	-	0.00081	0.05
Nickel	07440-02-0	0.13	6	0.00081	0.004
Chromium	07440-47-3	0.13	--	0.00081	1.20
Cobalt	07440-48-4	0.13	--	0.00081	0.001
Sulfur Dioxide	07446-09-5	681	910	18	80

Table 18-16 (cont'd)
Maximum Predicted Impacts on Projected and Potential Development Sites from Industrial Sources(1)

Pollutant	CAS Number	ISC3 Model Cumulative Short-Term Impact (µg/m^3)	SGC (µg/m^3)	ISC3 Model Cumulative Annual Impact (µg/m^3)	AGC (ug/m^3)
Zinc Chloride (Fume)	07646-85-7	0.76	200	0.00000014	2.4
Hydrogen Chloride	07647-01-0	115	2,100	0.11	20
Ammonia	07664-41-7	83	2,400	0.37	100
Sulfuric Acid Mist	07664-93-9	67	120	0.69	1
Vm&P Naphtha	08032-32-4	25	--	0.11	33,000
Sodium Hypophosphite	07681-53-0	1,106	--	0.55	--
Nitric Acid	07697-37-2		86	0.70	12
Celluose Acetate Buterate	09004-36-8	1.2	--	0.0035	--
Boric Acid	10043-35-3	58	--	0.049	--
Nitrogen Oxide NO	10102-43-9	14	--	0.074	74
Nitrogen Dioxide	10102-44-0	40	--	0.3	100
Ammonium Chloride	12125-02-9	0.076	380	0.00000014	24
Vinyl Toluene	25013-15-4	16	48,000	0.3	580
Acrylic Polymer	25133-36-8	10	--	0.031	--
Hydrocarbons	68476-44-8	503	--	2.6	--
Hydrocarbons C1-3	68527-16-2	55	--	0.4	--
Particulates	NY075-00-0	359	380	23	--(3)
Oxides of Nitrogen	NY210-00-0	6,539	--	25	--
Miscellaneous Organics	NY439-00-0	0.81	--	0.0022	--
Aliphatic Hydrocarbons	NY550-00-0	70	--	0.4	--
Volatile Organic Compounds	NY997-00-0	2,342	--	24.8	--
Total Organic Solvents	NY998-00-0	3,781	--	22.8	--

Notes:

(1) Concentrations at sites that would require an (E) designation are not included in this summary table for the particular pollutant.

(2) Concentration exceeds AGC, but is less than 10 in a million risk (i.e., 10 times the AGC threshold); therefore, impacts not considered significant.

(3) The annual PM_{10} standard was revoked on December 18, 2006, which was the basis for the particulate AGC.

potential development sites, the 24-hour PM_{10} concentration was predicted to exceed the NAAQS. In addition, the 3-hour SO_2 concentration and 24-hour SO_2 was predicted to exceed NAAQS at one potential development site. Each of these locations was also identified as exceeding an SGC or AGC for one or more air toxic compounds, as presented above. The results of the analysis are presented in Table 18-17, reflecting the restrictions imposed with the proposed (E) designations in place. As shown in the table, the predicted pollutant concentrations for all of the pollutant time averaging periods are below their respective standards. Therefore, with the (E) designations in place, no significant air quality impacts would occur on the proposed actions' buildings.

The DEIS analyzed process operations associated with a metal plating operation. A large number of projected and potential sites were predicted to have exceedances of SGCs and AGCs from emissions due to plating of various metals. As a reult of further review of this facility and applicable permits, the analyses were revised to reflect emissions due to the plating of silver only. Accordingly, the only sites that would be affected by the metal plating operations are projected development sites 6, 7, and potential development sites 59, 62, and 63 (see Table 18-15).

Table 18-17
Future (2015) Maximum Predicted Pollutant Concentrations
Existing HVAC Source Analysis

Pollutant	Averaging Period	Background Concentration (ug/m^3)	Maximum Predicted Concentration (ug/m^3)	Total Predicted Concentration (ug/m^3)	Ambient Standard (ug/m^3)
NO_2 (1)	Annual	53	30	83	100
SO_2	3-hour	202	875	1,077	1,300
	24-hour	84	253	337	365
	Annual	18	18	36	80
PM_{10} (2), (3)	24-hour	50	70	120	150
CO	1-hour	3,321	7,485	10,806	40,000
	8-hour	2,405	3,638	6,043	10,000

Notes:

[1] NO_2 impacts were estimated using a NO_2/NO_x ratio of 0.61.

[2] EPA revoked the annual NAAQS for PM_{10}, effective December 18, 2006.

[3] Excluding projected and potential development sites which would have an (E) designation due to potential impacts from sources of PM_{10}, SO_2, and NO_2.

To preclude the potential for significant adverse industrial source air quality impacts an (E) designation for air quality would be incorporated into the rezoning proposal. The text of the (E) designation is presented in Appendix C along with a listing of the 14 sites (comprising six projected and 8 potential sites).

As stated above, there are a number of projected and potential development sites that are potentially significantly impacted by existing industrial source permits in the area. These conclusions are based on conservative assumptions regarding the permit data and modeling. For this FEIS, it is proposed that an (E) designation be applied to these projected and potential development sites that would avoid these impacts.

As currently proposed, the (E) designations would require that new residential and/or commercial development, enlargement, or change of use would meet specified conditions designed to preclude adverse air quality effects. Specifically, fee owners of properties on which the (E) designations would be mapped would need to demonstrate to NYCDEP that any new development, enlargement, or change of use has inoperable windows and does not include air intakes, unless such intakes incorporate alternative design features and/or technologies recognized as effective under industry standards. New York law requires operable windows in habitable portions of residential buildings and residential development, enlargement, or change of use on the referenced property is therefore restricted under current conditions.

These conditions would apply only if the emissions and/or contaminants identified in the air quality analyses were to continue to be present at the time that the fee owner of the property subject to the (E) designation seeks to satisfy the (E) requirements. If the fee owner could demonstrate to NYCDEP that the emissions, contaminants, or exposure pathways no longer existed or have been reduced below impact levels, the conditions would not apply.

This chapter has been updated since the Draft Environmental Impact Statement (DEIS) to reflect changes to the Reasonable Worst-Case Development Scenario. Between the DEIS and the FEIS, further analyses of industrial sources were undertaken in coordination with NYCDEP. The further analyses have resulted in the elimination of (E) designations from many projected and potential development sites. Specifically, the further analyses consisted of the following:

- Analyses from the DEIS were refined to reflect the NYSDEC policy at sites where there were predicted exceedances of a SGC or AGC for a criteria pollutant, but where the NAAQS were met for the same pollutant.
- NYCDEP conducted site inspections at certain concrete batching plants that provided more accurate information for determining concentrations of particulate matter at development sites.
- NYCDEP conducted site inspections of a metal plating facility and a facility with process ovens, and the analyses from the DEIS were revised to reflect existing operations that are in compliance with all applicable legal requirements.
- Sensitivity analyses were conducted incorporating additional control technologies or increased stack heights at certain facilities.

As a result of the above refinements and site inspections, (E) designations were eliminated from many projected and potential development sites, and one (E) designation was limited to specific lot lines for potential development site 384. Because the City cannot currently require the measures analyzed under the sensitivity analyses, (E) designations could not be eliminated as a result. Finally, since the DEIS, the City was unable to identify any design features or technologies that developments could incorporate to reduce or eliminate the impacts that would be avoided by the (E) designation. This, however, would not preclude future developments from incorporating such design features or technologies that become recognized as effective by industry standards.

Cumulative impacts were also determined for the combined effects of different toxic air pollutants. The maximum hazard index and total cancer risk were determined by a refined modeling approach using the ISC3 model for each pollutant identified as a possible or likely carcinogen. Concentrations were averaged over the five meteorological years for which impacts were modeled (2000-2004).

Table 18-18 presents the results of the assessment of cumulative carcinogenic and non-carcinogenic effects on the proposed actions. As presented in the table, for non-carcinogenic compounds, EPA’s Hazard Index Approach resulted in a calculated value of 0.832, which is less than 1.0, which is considered to be insignificant. For carcinogenic compounds, the maximum total estimated cancer risk is 7.80 per million. While the maximum cancer risk is above the level considered by USEPA to be significant (1 per million), it should be noted that the concentrations are compared against EPA unit risk factors and NYSDEC AGCs (each of which was developed by these agencies based on a factor of safety above which health effects may potentially occur), and the health risk analysis is based upon a lifetime exposure at the predicted concentrations at a single location, which is a very conservative approach. Therefore, based upon the cumulative air toxics analysis, the proposed action would not result in a significant cancer risk.

The procedures used to estimate maximum potential impacts from industrial sources showed that their operations would not result in any predicted violations of the NAAQS or any exceedances of the recommended SGC or AGC. Therefore, based on the data available on the surrounding industrial uses, development resulting from the proposed action would not experience significant air quality impacts from these facilities.

Table 18-18
Estimated Maximum Cancer Risk and Hazard Index

Pollutant	CAS Number	ISC3-Model Estimated Pollutant Concentration (ug/m^3)	AGC (ug/m^3)	Concentration to AGC Pollutant Ratio
Carcinogenic Compounds				
Acetaldehyde	00075-07-0	1.44E-02	5.0E-01 (1)	2.88E-02
Ethylene Oxide	00075-21-8	1.86E-03	1.9E-02	9.79E-02
Trichloroethylene	00079-01-6	1.72E-03	5.0E-01	3.43E-03
Tetrachloroethylene	00127-18-4	7.67E+00	1.0E+00	7.67E+00
Asbestos	01332-21-4	7.14E-10	1.6E-05	4.46E-05
Nickel	07440-02-0	4.94E-06	4.0E-03 (1)	1.24E-03
Total Estimated Cancer Risk				**7.80E-06**
Cancer Risk Threshold Value				**1.00E-06**
Non-Carcinogenic Compounds				
Ethanol	00064-17-5	1.29E+00	4.5E+04	2.87E-05
Acetic Acid	00064-19-7	3.53E-05	6.0E+01	5.89E-07
Isopropyl Alcohol	00067-63-0	1.39E-03	7.0E+03	1.99E-07
Dimethyl Ketone (Acetone)	00067-64-1	1.26E-02	2.8E+04	4.49E-07
Butyl Alcohol, N-	00071-36-3	3.08E-04	1.5E+03	2.05E-07
Propane	00074-98-6	4.84E-03	1.1E+05	4.40E-08
Methyl Ethyl Ketone	00078-93-3	2.38E-03	5.0E+03 (1)	4.77E-07
Ethyl Benzene	00100-41-4	2.76E-02	1.0E+03	2.76E-05
Propylene Glycol Monomethyl Ether	00107-98-2	6.09E-05	2.0E+03	3.05E-08
Methyl Isobutyl Ketone	00108-10-1	1.63E-04	3.0E+03 (1)	5.43E-08
Propanol Acetate	00108-65-6	2.11E-03	2.0E+03	1.06E-06
Toluene	00108-88-3	5.59E-03	5.0E+03 (1)	1.12E-06
Methyl Amyl Ketone	00110-43-0	9.76E-04	5.5E+02	1.77E-06
Ethylen Glycol Mono Butyl Ether	00111-76-2	2.98E-04	1.3E+04 (1)	2.30E-08
Diethyl Ether	00115-10-6	1.90E-03	2.9E+04	6.55E-08
Butyl Acetate	00123-86-4	1.76E-03	1.7E+04	1.03E-07
Carbon Dioxide	00124-38-9	6.34E-02	2.1E+04	3.02E-06
Sodium Nitrobenzene	00127-68-4	2.19E-06	9.0E+00	2.43E-07
Monoethanolamine (Ethanolamine)	00141-43-5	1.10E-01	1.8E+01	6.11E-03
Sodium Cyanide	00143-33-9	5.69E-06	5.0E+01	1.14E-07
Silver Cyanice	00506-64-9	2.45E-07	5.0E+01	4.89E-09

Table 18-18 (cont'd)
Estimated Maximum Cancer Risk and Hazard Index

Pollutant	CAS Number	ISC3-Model Estimated Pollutant Concentration (ug/m^3)	AGC (ug/m^3)	Concentration to AGC Pollutant Ratio
Non-Carcinogenic Compounds				
Tetrafluoroethane	00811-97-2	1.36E-03	8.0E+04	1.70E-08
Methyl Pyrrolidone	00872-50-4	4.39E-01	1.0E+02	4.39E-03
Xylene,M,O&P Mixt.	01330-20-7	4.68E-01	1.0E+02 (1)	4.68E-03
Ammonium Hydroxide	01336-27-6	6.55E-08	1.0E+02	6.55E-10
Manganese	07439-96-5	7.88E-04	5.0E-02	1.58E-02
Chromium	07440-47-3	7.88E-04	1.2E+00	6.57E-04
Cobalt	07440-48-4	7.88E-04	1.0E-03	7.88E-01
Sulfur Dioxide	07446-09-5	1.60E-01	8.0E+01	2.00E-03
Zinc Chloride (Fume)	07646-85-7	9.74E-08	2.4E+00	4.06E-08
Hydrogen Chloride	07647-01-0	7.60E-06	2.0E+01	3.80E-07
Ammonia	07664-41-7	1.37E-04	1.0E+02 (1)	1.37E-06
Sulfuric Acid Mist	07664-93-9	8.00E-05	1.0E+00	8.00E-05
Nitric Acid	07692-372	1.65E-04	1.2E+01	1.37E-05
Vm&P Naphtha	08032-32-4	3.60E-02	3.3E+04	1.09E-06
Nitrogen Oxide NO	10102-43-9	8.77E-06	7.4E+01	1.19E-07
Nitrogen Dioxide	10102-44-0	1.04E+00	1.0E+02	1.04E-02
Ammonium Chloride	12125-02-9	9.74E-08	2.4E+01	4.06E-09
Vinyl Toluene	25013-15-4	1.82E-01	5.8E+02	3.14E-04
			Total Hazard Index	**8.32E-01**
			Hazard Index Threshold Value	**1.00E+00**

Note: [1] Rfc Values (ug/m^3) established by the EPA's Inhalation Risk Information System (IRIS) were used instead of the AGC.

CONSISTENCY WITH NEW YORK STATE AIR QUALITY IMPLEMENTATION PLAN

As addressed above, maximum predicted CO concentrations with the proposed actions would be less than the applicable ambient air standard. Therefore, the proposed actions would be consistent with the New York State Implementation Plan for the control of ozone and CO. ✷