Chapter 18: Air Quality

A. INTRODUCTION

This chapter identifies and quantifies the potential direct and indirect air quality impacts of the Proposed Action. Direct effects would stem from emissions generated by stationary sources associated with the Proposed Project, such as boilers for the heating systems of new buildings. These boilers produce air emissions from the combustion of fossil fuel for building heating and hot water. Other direct impacts include those from the parking lot of the new shopping center. Indirect impacts could be caused by emissions from nearby existing stationary sources (impacts on the Proposed Project from nearby industrial facilities) and the emissions from mobile sources or motor vehicle trips generated by the Proposed Project.

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 carbon monoxide (CO) and lead are predominantly influenced by mobile source emissions. Emissions of nitrogen oxides (NO and NO_2, collectively referred to as NO_x) come from both mobile and stationary sources. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, but diesel-powered vehicles, primarily heavy-duty trucks and buses, also contribute. Particulate matter (PM) is emitted from both stationary and mobile sources. Fine particulate matter is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react in the atmosphere. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and volatile organic compounds (VOCs), emitted mainly from industrial and mobile sources.

CARBON MONOXIDE—CO

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In New York City, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections along heavily traveled and congested roadways. Consequently, CO concentrations must be predicted on a localized or microscale basis.

The Proposed Project would increase traffic volumes on streets near the Project Site and could result in localized increases in CO levels. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Action.

NITROGEN OXIDES AND VOLATILE ORGANIC COMPOUNDS

Nitrogen oxides and volatile organic compounds are of principal concern because of their role as precursors in the formation of ozone. The standard for average annual NO_2 concentrations is normally applied only for fossil fuel energy sources. 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 diffusing downwind, elevated ozone concentrations are often increased many miles from sources of the precursor pollutants. The effects of NO_x emissions from mobile sources are therefore generally examined on a regional basis. The change in regional mobile source emissions of these pollutants is related to the total number of vehicle trips and the vehicle miles traveled throughout the New York Metropolitan area.

The Proposed Project would not have a significant effect on the overall volume of vehicular travel in the metropolitan area. It would therefore not have any measurable impact on regional NO_x emissions or on ozone levels. An analysis of project-related impacts from mobile sources for these pollutants was therefore not warranted. Potential impacts from fuel to be burned for the Proposed Project's heating and hot water systems were evaluated.

LEAD

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

In 1985, the Environmental Protection Agency (EPA) announced new rules drastically reducing the amount of lead permitted in leaded gasoline. Monitored concentrations of lead indicate that this action has been effective in significantly reducing atmospheric lead levels. 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 (3-month average).

No significant sources of lead are associated with the Proposed Project; therefore, no analysis was 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 volatile organic compounds, salt particles resulting from the evaporation of sea spray; wind–borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, and wood–burning stoves and fireplaces. PM also acts as

a substrate for the adsorption 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 that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from an exhaust pipe or stack); or from precursor gases reacting in the atmosphere to form secondary PM.

Diesel–powered vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM, most of which is $PM_{2.5.}$ PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles. The Proposed Project would increase passenger and heavy vehicle traffic volumes on streets near the Project Site and could result in localized increases in PM levels. Therefore, a mobile source analysis was conducted to evaluate future PM concentrations with and without the Proposed Action.

SULFUR DIOXIDE—SO_2

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 mobile 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 SO_2 from mobile sources was not warranted. As part of the Proposed Project, natural gas would be burned in the heat and hot water systems. Therefore, an analysis of potential future levels of SO_2 from boilers was not warranted.

AIR TOXICS

In addition to the criteria pollutants, non-criteria, toxic air pollutants (also called air toxics) are regulated. Air toxics are pollutants known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by the EPA. Federal ambient air quality standards do not exist for non-criteria compounds. However, the New York State Department of Environmental Conservation (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.

The project area contains and is adjacent to existing industrial uses. Therefore, this analysis examines the potential for impacts on the Proposed Project from industrial emissions.

MALODOROUS COMPOUNDS

Odors emanate from a variety of sources. The subjective nature and highly variable degree of odor perception by individuals, the potential for multiple sources and synergistic effects, and the

extreme sensitivity of the human nose, all contribute to the complexity of assessing the impacts of odor sources.

There are various potential sources of malodorous pollutants in the vicinity of the Project Site. Some potential nearby sources of short-term malodorous emissions include the 26th Ward Water Pollution Control Plant (WPCP), the former Fountain and Pennsylvania Avenue Landfills, the combined sewer outfalls (CSOs) in Hendrix and Spring Creeks, and mud flats around Spring Creek. The principal malodorous pollutants of concern from these neighboring facilities include hydrogen sulfide (H_2S), reduced sulfides, VOCs, and ammonia. Odors caused by these sources and their potential impacts were evaluated in the *1996 Gateway Estates Final Environmental Impact Statement* (1996 FEIS). An updated assessment of the potential odors impacts on the Proposed Project from nearby sources of malodorous compounds is included in this chapter (See Section H, "2013 Probable Impacts of the Proposed Action").

C. AIR QUALITY STANDARDS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act (CAA), primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: CO, NO_2, ozone, respirable particulate matter or PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary and secondary standards are the same for NO_2, ozone, lead, and PM. There is no secondary standard for CO. The NAAQS 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.

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 the previous level of 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retaining the level of the annual standard at 15 $\mu g/m^3$. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLAN (SIP)

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

In 2002, EPA 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 the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period.

Table 18-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m^3	Ppm	µg/m^3
Carbon Monoxide (CO)				
8-Hour Average [1]	9	10,000	None	
1-Hour Average [1]	35	40,000		
Lead				
3-Month Average	NA	1.5	NA	1.5
Nitrogen Dioxide (NO_2)				
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average [2]	0.08	160	0.08	160
Respirable Particulate Matter (PM_{10})				
Average of 3 Annual Means — revoked, effective December 18, 2006	NA	50	NA	50
24-Hour Average [1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Average of 3 Annual Means	NA	15	NA	15
24-Hour Average [3,4]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
Annual Arithmetic Mean	0.03	80	NA	NA
Maximum 24-Hour Average [1]	0.14	365	NA	NA
Maximum 3-Hour Average [1]	NA	NA	0.50	1,300

Notes:
ppm – parts per million
µg/m^3 – micrograms per cubic meter
NA – not applicable
All annual periods refer to calendar year.
PM concentrations (including lead) are in µg/m^3 since ppm is a measure for gas concentrations. Concentrations of all gaseous pollutants are defined in ppm and approximately equivalent concentrations in µg/m^3 are presented.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(3) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(4) EPA has reduced these standards down from 65 µg/m^3, effective December 18, 2006.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

Manhattan has been designated as a moderate NAA for PM_{10}. On December 17, 2004, EPA took final action designating the five New York City counties, Nassau, Suffolk, Rockland, Westchester, and Orange counties as a $PM_{2.5}$ non-attainment area under the CAA due to exceedance of the annual average standard. New York State has submitted a draft SIP to EPA, dated April 2008, designed to meet the annual average standard by April 8, 2010, which will be finalized after public review.

As described above, EPA has revised the 24-hour average $PM_{2.5}$ standard. In December 2008 EPA designated the New York City Metropolitan Area as nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS, effective in April 2009. The nonattainment area includes the same 10-county area EPA designated as nonattainment with the 1997 annual $PM_{2.5}$ NAAQS. By April 2012 New York will be required to submit a SIP demonstrating attainment with the 2006 24-hour standard by 2014 (EPA may grant attainment date extensions for up to five additional years).

Nassau, Rockland, Suffolk, Westchester, Lower Orange County Metropolitan Area (LOCMA), and the five New York City counties had been designated as a severe non-attainment area for ozone (1-hour average standard). In November 1998, New York State submitted its *Phase II 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. 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 nonroad emissions model, NONROAD—which have been updated to reflect current knowledge of engine emissions and the latest mobile and nonroad engine emissions regulations.

On April 15, 2004, EPA designated these same counties as moderate non-attainment for the 8-hour average ozone standard which became effective as of June 15, 2004 (LOCMA was moved to the Poughkeepsie moderate non-attainment area for 8-hour ozone). EPA revoked the 1-hour standard on June 15, 2005; however, the specific control measures for the 1-hour standard included in the SIP are required to stay in place until the 8-hour standard is attained. The discretionary emissions reductions in the SIP would also remain but could be revised or dropped based on modeling. On February 8, 2008, NYSDEC submitted final revisions to a new SIP for ozone to EPA. NYSDEC has determined that achieving attainment for ozone before 2012 is unlikely, and has therefore made a request for a voluntary reclassification of the New York nonattainment area as "serious".

In March 2008 EPA strengthened the 8–hour ozone standards. EPA expects designations to take effect no later than March 2010 unless there is insufficient information to make these designation decisions. In that case, EPA will issue designations no later than March 2011. SIPs will be due three years after the final designations are made.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *City Environmental Quality Review (CEQR) Technical Manual* state that the significance of a likely consequence (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected. In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see Table 18-1) would be deemed to have a potential significant adverse impact. In addition, in order 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 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 Action 8–hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between No Action concentrations and the 8–hour standard, when No Action concentrations are below 8.0 ppm.

INTERIM GUIDANCE CRITERIA REGARDING $PM_{2.5}$ IMPACTS

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

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 5 $\mu g/m^3$ at a discrete location where 24-hour-long exposure can be reasonably expected (e.g., residencies) or other sensitive locations (e.g., schools, nursing homes), and which are predicted to occur

  a. under operational conditions (i.e., permanent condition predicted to exist for many years) regardless of the frequency of occurrence; or

  b. temporarily (e.g., construction impacts) but with a high frequency and high probability of occurrence;

  would be considered a significant adverse impact on air quality.

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 2 $\mu g/m^3$ but no greater than 5 $\mu g/m^3$ at multiple sensitive locations where day-long exposure can be reasonably expected, and which are predicted to occur with a high frequency and high probability of occurrence, would be considered a significant adverse impact on air quality.

- Annual average $PM_{2.5}$ concentration increments predicted to be—

  a. 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 impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating background monitoring stations); or

  b. greater than 0.3 $\mu g/m^3$ at a discrete location where year-long exposure can be reasonably expected (e.g., residential windows) or other sensitive locations (e.g., schools, school yards, medical facilities), and which are predicted to occur with a high frequency and high probability of occurrence;

  would be considered a significant adverse impact on air quality.

In addition, NYSDEC has published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts. This draft policy would apply only to facilities applying for permits or major permit

modification under SEQRA that emit 15 tons of PM_{10} or more annually. The interim guidance 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.

Actions under CEQR that would increase $PM_{2.5}$ concentrations more than the DEP or NYSDEC interim guidance criteria above will be considered to have potential significant adverse impacts, depending upon the probability of occurrence, the projected duration of such impacts, the magnitude of the area and the potential number of people affected. DEP recommends that actions subject to CEQR that fail the interim guidance criteria prepare an Environmental Impact Statement (EIS) and examine potential measures to reduce or eliminate such potential significant adverse impacts.

The above draft interim guidance criteria have been used to evaluate the significance of predicted impacts of the Proposed Project on $PM_{2.5}$ concentrations and determine the need to minimize particulate matter emissions from the Proposed Project.

MALODOROUS COMPOUNDS

The air quality standards and criteria used to assess odor impacts are the New York State Ambient Air Quality Standard (NYSAAQS) of 10 ppb H_2S in ambient air. In addition, DEP has established criteria for evaluating impacts of odorous compounds from DEP facilities under CEQR. The CEQR odor threshold is 1 ppb for H_2S at sensitive receptors and is used as an indicator compound to address other residual odors that are common to wastewater treatment plant operations, such as ammonia, amines, organic sulfides, mercaptans, indole, skatole, and aldehydes.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

The prediction of motor-vehicle-generated CO concentrations in an urban environment is characterized by 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 pollutant concentrations, particularly under adverse meteorological conditions.

The mobile source analyses employs a modeling approach approved by EPA that has been widely used for evaluating air quality impacts of projects in New York City, New York State, and throughout the country. It includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels, which results in a conservatively high estimate of expected CO concentrations that could ensue from the Proposed Project.

DISPERSION MODEL FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets near the Project Site, 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 CO from idling and moving vehicles. The queuing algorithm includes site–specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles. 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, CAL3QHCR, 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 of CAL3QHC modeling.

To determine motor-vehicle-generated PM concentrations adjacent to streets near the Project Site, the CAL3QHCR model was applied. This refined version of the model can utilize hourly traffic and meteorology data, and is therefore more appropriate for calculating 24-hour and annual average concentrations.

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[2], 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.

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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.

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

Tier II Analyses—CAL3QHCR

A Tier II analysis performed with the CAL3QHCR model, which includes the modeling of hourly 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 Kennedy Airport and upper air data collected at Brookhaven, New York for the period 2002-2006. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The CO and PM microscale analysis was performed for two separate project completion years; 2011 and 2013. The future analysis was performed both without the Proposed Action (the No Build) and with the Proposed Action (Build).

VEHICLE EMISSIONS DATA

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOBILE6.2[1]. This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOBILE6.2 incorporate the most current guidance available from NYSDEC and DEP.

Vehicle classification data were based on field studies and data obtained from other traffic studies. Appropriate credits were used to accurately reflect the inspection and maintenance program. The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

All taxis were assumed to be in hot stabilized mode (i.e., excluding any start emissions). The general categories of vehicle types for specific roadways were further categorized into subcategories based on their relative breakdown within the fleet[2]. In addition, an ambient temperature of 43.0° Fahrenheit was used for the analysis.

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

[2] 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).

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. Road dust emission factors were calculated according to the latest procedure delineated by EPA.[1]

Regardless of the broader debate about the importance of resuspended fugitive road dust to $PM_{2.5}$ emissions and concentrations, fugitive $PM_{2.5}$ emission rates for roadways with average daily traffic (ADT) volume of 5,000 or more were determined to be negligible (utilizing the above EPA method). Therefore, since all roadways at the selected sites were predicted to have ADT higher than 10,000, fugitive road dust was not included in the $PM_{2.5}$ microscale analyses.

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 Action (see Chapter 16, "Traffic and Parking"). Traffic data for the future build years 2011 and 2013 (both without and with the Proposed Action) were employed in the respective air quality modeling scenarios. The weekday mid-day (12:45 PM to 1:45 PM), weekday evening (4:45 PM to 5:45 PM), Saturday mid-day (1:00 PM to 2:00 PM) and Saturday evening (4:00 to 5:00 PM) peak periods were analyzed. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project–generated traffic and therefore have the greatest potential for significant air quality impacts.

For particulate matter, the peak midday and evening period traffic volumes were used as a baseline for determining off-peak volumes. Off-peak traffic volumes in the existing condition and in the future without the Proposed Action, and off-peak increments from the Proposed Project, were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations.

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant concentrations 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 CO background concentration used in this analysis was 2.0 ppm for the 2011 and 2013 predictions. The 24-hour average PM background concentration was 60 $\mu g/m^3$. These values are based on CO and PM concentrations measured at NYSDEC background monitoring stations.

MOBILE SOURCE ANALYSIS SITES

Four intersections were selected for microscale analysis (see Table 18-2). These intersections were selected because they are the key locations in the study area where the largest levels of project-generated traffic are expected, and therefore where the greatest air quality impacts and maximum changes in the CO concentrations would be expected.

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[1] 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, December 2003.

Table 18-2
Mobile Source Analysis: Intersection Locations

Analysis Site	Location
1	Flatlands Avenue and Pennsylvania Avenue
2	Flatlands Avenue and Jerome Street
3	Flatlands Avenue and Elton Street
4	Gateway Drive and Erskine Street

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. Receptors in all analysis models for predicting local concentrations were placed at sidewalk or roadside locations near intersections with continuous public access. Receptors in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters from the nearest moving lane at each analysis location, based on the DEP procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

PARKING LOT

The Project Site would include a large parking lot to serve the retail developments. Emissions from vehicles using the parking facility could potentially affect ambient levels of CO at adjacent receptors as well as nearby project intersections analyzed in the future Build conditions. Because cold-starting automobiles leaving a parking facility would emit far higher levels of CO than hot-stabilized vehicles entering a facility, the impact from a parking facility would be greatest during those periods that averaged the largest number of departing vehicles. An analysis was performed using the methodology set forth in the *CEQR Technical Manual* to calculate pollutant levels.

Impacts of CO from the proposed parking lot were assessed for their potential effects on receptor sites. The CO concentrations were determined for the time periods when overall parking lot usage would be the highest, considering the hours when the greatest number of vehicles would exit the facility. Departing vehicles operate in a "cold-start" mode, emitting higher levels of CO than arriving "hot-stabilized" vehicles.

A "near" and "far" receptor was placed adjacent to nearby avenues directly opposite the parking lot. An 8-hour persistence factor of 0.70 supplied by DEP was used to account for meteorological variability over the average 8-hour period.

Emissions from vehicles entering, parking, and exiting the parking facility were only estimated for the year 2011 (2011 would be more conservative than 2013 since vehicle emission factors are predicted to be higher in the 2011 Build condition, while the projected number of vehicles would be only marginally lower as compared to the 2013 Build condition) using the EPA-developed MOBILE6.2 mobile source emission model. The model was run using an ambient temperature of 43°F. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking lot. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. CO concentrations were determined for the 8-hour averaging period to determine compliance with the NAAQS.

STATIONARY SOURCES

HVAC SOURCE ANALYSES

Individual Sources

To assess air quality impacts associated with emissions from the Proposed Project's larger retail buildings, a screening analysis was performed using the methodology described in the *CEQR Technical Manual* for each individual building associated with the Proposed Action. The CEQR methodology determines the threshold of development size below which the action would not have a significant impact. Based on the type of fuel to be burned, the maximum development size and type of development, and the boiler stack height, this procedure evaluates whether or not a detailed analysis using dispersion modeling is necessary. Based on the distance from the 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,* then there is the potential for significant air quality impacts, and dispersion modeling is required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Each retail development site associated with the Proposed Project was evaluated with the nearest residential development (existing or project related) of a similar or greater height analyzed as a potential receptor. The maximum development floor areas of the proposed retail developments were used as input for the screening analysis. The project retail buildings are expected to use natural gas for the heating systems, and it was assumed that the stacks would be installed 3 feet above roof height (as per the *CEQR Technical Manual*).

Area-Wide Source Analyses

A refined dispersion modeling analysis was performed to assess the impacts associated with the combined emissions of the proposed residential units. Pollutants discharged through multiple exhaust stacks across the residential developments were modeled as area sources using the EPA's AERMOD dispersion model. The AERMOD model was designed as a replacement to the EPA Industrial Source Complex (ISC3) model and is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, and understanding of turbulence and dispersion, and it includes handling of terrain interactions.

AERMOD calculates pollutant concentrations based on hourly meteorological data. Five years of meteorological data (2002-2006) with surface data from Kennedy Airport and concurrent upper air data from Brookhaven, NY, were used for the modeling study. Concentrations of nitrogen dioxide were determined and the predicted values were compared with the national and state ambient air quality standard.

Receptor Locations

Discrete receptor locations were placed both inside and outside the project boundaries at nearby sensitive locations (e.g., residential housing, parks, and schools). Outside the project boundaries, receptors were placed at residential land uses along Flatlands Avenue at ground level and elevated locations. Within the project boundaries, receptors were placed in open space, parks, the elementary school, and the day care center.

Emissions Estimates

DEP Report 12 was used to determine fuel usage rates per unit of floor area. Emission factors as reported in AP-42 for natural gas-fired boilers were used to estimate emissions from each residential housing parcel, based on the parcel's total development size and calculated fuel usage estimate. The release height of the area source emissions were modeled as being 26 feet high (the height of the two-story development parcels). This is a conservative assumption since there are three- and four-story development parcels included in the plans.

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 18-3). Background levels for NO_2 were based on concentrations monitored by the nearest NYSDEC ambient air monitoring station. Measured background concentrations by NYSDEC were added to the predicted contributions from the modeled sources to determine the maximum predicted total pollutant concentrations.

Table 18-3
Background Pollutant Concentrations

Pollutant	Monitoring Station	Averaging Period	Background Concentration (ug/m^3)	Ambient Standard (ug/m^3)
NO_2	PS 59	Annual	71.5	100
Source: NYSDEC Annual New York State Air Quality Report, July 2007.				

INDUSTRIAL SOURCE SCREENING ANALYSIS

To assess air quality impacts on the Proposed Project associated with emissions from nearby industrial sources, a screening analysis was performed using the methodology described in the *CEQR Technical Manual*. The first step in this analysis was to identify any processing or manufacturing facilities located within 400 feet of the Project Site. Once identified, information regarding the release of air contaminants from these facilities was obtained from DEP. This information is based on the most current air permit data available. In addition, a comprehensive search is performed to identify NYSDEC Title V permits and permits listed in the EPA Envirofacts database.

In the next step, the potential ambient concentrations of each air toxic contaminant were determined using a screening database from the EPA Industrial Source Complex dispersion model. Estimates of worst-case short-term (1 hour) and annual averages were predicted and then compared to the short-term (SGC) and annual (AGC) guideline concentrations. The guideline concentrations are established by NYSDEC and represent levels that are considered safe for inhalation exposure by the public. A significant impact occurs if the predicted concentration exceeds an SGC or AGC.

E. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS (2006)

Monitored background data were utilized to determine the background concentrations. Monitored ambient air concentrations of CO, SO_2, particulate matter, NO_2, lead, and ozone for the project area are shown in Table 18-4 for the year 2006. These values are the most recent monitored data that have been made available by NYSDEC for nearby monitoring stations. There were no monitored violations of the NAAQS for the analysis pollutants at these sites in 2006.

Table 18-4
Representative Monitored Ambient Air Quality Data

Pollutants	Location	Units	Period	Concentrations			Number of Times Federal Standard Exceeded	
				Mean	Highest	Second Highest	Primary	Secondary
CO	PS 59	ppm	8-hour	-	1.9	1.7	0	-
			1-hour	-	2.3	2.3	0	-
SO_2	PS 59	$\mu g/m^3$	Annual	26.2	-	-	0	-
			24-hour	-	102.1	83.8	0	-
			3-hour	-	185.8	183.2	-	0
Respirable Particulates (PM_{10})	PS 59	$\mu g/m^3$	Annual	23	-	-	0	0
			24-hour	-	67	60	0	0
Respirable Particulates ($PM_{2.5}$)	JHS 126	$\mu g/m^3$	Annual	14.0	-	-	-	-
			24-hour	-	40.2	39.0	-	-
NO_2	PS59	$\mu g/m^3$	Annual	64.0	-	-	0	0
Lead	Susan Wagner	$\mu g/m^3$	3-month	-	0.02	0.02	0	-
O_3	Botanical Gardens	ppm	1-hour	-	0.110	0.104	0	0

Source: 2007 Annual New York State Air Quality Report, NYSDEC (Draft).

BASELINE MOBILE SOURCES ANALYSIS

A quantified analysis of the CO concentrations from on-street vehicular traffic was conducted for the baseline condition (2006). The analysis was performed for the 8-hour averaging period. Since no violations of the 1-hour CO standard have been measured in New York City within the last 10 years, 1–hour averages were not summarized in this report (although all 1–hour predicted CO concentrations would be well within the applicable standard). The values shown are the highest predicted concentrations for the receptor locations at each intersection. As indicated in Table 18-5, the predicted 8-hour concentrations for CO, including background, are below the corresponding ambient air quality standard.

Table 18-5
Existing (2006) Maximum Predicted 8-Hour Carbon Monoxide Concentrations (parts per million)

Site	Location	Time Period	Existing 8-Hour Concentration (ppm)
1	Flatlands Avenue and Pennsylvania Avenue	Weekday MD	4.2
		Weekday PM	4.7
		Saturday MD	4.2
		Saturday PM	4.3
2	Flatlands Avenue and Jerome Street	Weekday MD	2.4
		Weekday PM	2.4
		Saturday MD	2.5
		Saturday PM	2.6
3	Flatlands Avenue and Elton Street	Weekday MD	2.3
		Weekday PM	2.3
		Saturday MD	2.4
		Saturday PM	2.4
4	Gateway Drive and Erskine Street	Weekday MD	3.4
		Weekday PM	3.7
		Saturday MD	3.6
		Saturday PM	3.8

Notes: 8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the baseline values presented above.

F. 2011 THE FUTURE WITHOUT THE PROPOSED ACTION

MOBILE SOURCES ANALYSIS

CO

CO concentrations without the Proposed Action were determined for the 2011 analysis year using the methodology previously described. Table 18-6 shows the future maximum predicted 8-hour average CO concentration without the Proposed Action (i.e., 2011 No Build values) at the analysis intersections in the project study area. The values shown are the highest predicted concentrations for the receptor locations at each intersection. As indicated in Table 18-6, the predicted 8-hour concentrations of CO, including background, are below the corresponding ambient air quality standard.

PM

PM concentrations without the Proposed Action were determined for the 2011 Build year using the methodology previously described. Tables 18-7 and 18-8 present the future maximum predicted PM_{10} and $PM_{2.5}$ concentrations, respectively, at the analysis intersections without the Proposed Action (i.e., 2011 No Build values). The values shown are the highest predicted concentrations for the receptor locations for the time periods analyzed. As indicated in Table 18-7, the predicted 24-hour concentration of PM_{10}, including background, is below the corresponding ambient air quality standard. $PM_{2.5}$ concentrations in Table 18-8 are incremental values and are not compared to the standards.

Table 18-6

2011 No Build Maximum Predicted 8-Hour CO Concentrations (parts per million)

Site	Location	Time Period	No Build 8-Hour Concentration (ppm)
1	Flatlands Avenue and Pennsylvania Avenue	Weekday MD	3.7
		Weekday PM	4.0
		Saturday MD	3.7
		Saturday PM	3.9
2	Flatlands Avenue and Jerome Street	Weekday MD	3.5
		Weekday PM	3.6
		Saturday MD	3.8
		Saturday PM	3.8
3	Flatlands Avenue and Elton Street	Weekday MD	2.3
		Weekday PM	2.4
		Saturday MD	2.4
		Saturday PM	2.4
4	Gateway Drive and Erskine Street	Weekday MD	3.1
		Weekday PM	3.3
		Saturday MD	3.4
		Saturday PM	3.6

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the No Build values presented above.

Table 18-7
2011 No Build Maximum Predicted 24-Hour PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m^3)
1	Flatlands Avenue and Pennsylvania Avenue	68.74

Note:
24-hour standard is 150 µg/m^3. An ambient background concentration of 60 ppm is included in the No Build values presented above.

Table 18-8
2011 No Build Maximum Predicted 24-Hour and Annual $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m^3)	Annual Average Concentration (µg/m^3)
1	Flatlands Avenue and Pennsylvania Avenue	0.89	0.13

Note:
$PM_{2.5}$ concentrations are expressed as incremental values and do not include ambient background levels in the concentrations presented above.

STATIONARY SOURCE ANALYSIS

Minimal growth and development within the project area would occur in the future without the Proposed Action by 2011. HVAC and industrial source emissions in the No Build condition would likely be similar to existing conditions.

G. 2011 PROBABLE IMPACTS OF THE PROPOSED ACTION

Impacts from project-generated mobile sources at roadway intersections near the Project Site and impacts to the surrounding community that are related to air emissions produced by the project heating systems and the parking lot are presented below. Also presented are the results of the study to determine impacts on the Proposed Project from off-site industrial sources.

MOBILE SOURCES

CO

CO concentrations with the Proposed Action were determined for the 2011 analysis year using the methodology previously described. Table 18-9 shows the future maximum predicted 8-hour average CO concentration with the Proposed Action at the four intersections studied.

The values shown are the highest predicted concentrations for the time period analyzed. Also shown in the table is a Not-to-Exceed value based on the *de minimis* criteria used to determine the significance of the incremental increase in CO concentrations that would result from the Proposed Project. The *de minimis* criteria are derived using procedures outlined in the *CEQR Technical Manual* that set a minimum allowable change in 8-hour average CO concentrations due to a proposed action (i.e., the No Action concentration plus half the difference between the No Action concentration and the 9.0 ppm standard).

The results in Table 18-9 indicate that in the 2011 Build condition, there would be no significant adverse mobile source air quality impacts (i.e., *de minimis* criteria were not exceeded). In addition, with or without the Proposed Action in 2011, maximum predicted CO concentrations in the study area around the Proposed Project would be less than the corresponding ambient air quality standards.

Table 18-9
2011 Build Maximum Predicted 8-Hour CO Concentrations (parts per million)

Site	Location	Time Period	Project Build 8-Hour Concentration (ppm)	Not-To-Exceed *De minimis* Criteria (ppm)
1	Flatlands Avenue and Pennsylvania Avenue	Weekday MD	4.1	6.3
		Weekday PM	4.4	6.5
		Saturday MD	4.0	6.3
		Saturday PM	4.4	6.4
2	Flatlands Avenue and Jerome Street	Weekday MD	3.7	6.3
		Weekday PM	3.7	6.3
		Saturday MD	4.0	6.4
		Saturday PM	4.3	6.4
3	Flatlands Avenue and Elton Street	Weekday MD	2.6	5.6
		Weekday PM	2.7	5.7
		Saturday MD	2.8	5.7
		Saturday PM	3.0	5.7
4	Gateway Drive and Erskine Street	Weekday MD	3.5	6.0
		Weekday PM	3.7	6.2
		Saturday MD	4.0	6.2
		Saturday PM	4.7	6.3

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the project Build values presented above.

PM

PM concentrations with the Proposed Action were determined for the 2011 Build year using the methodology previously described. Table 18-10 shows the future maximum predicted 24-hour average PM_{10} concentrations with the Proposed Action. As indicated in Table 18-10, the predicted 24-hour concentrations of PM_{10}, including background, are below the corresponding ambient air quality standard.

Table 18-10
2011 Build Maximum Predicted 24-Hour Average PM_{10} Concentration

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)[1]
1	Flatlands Avenue and Pennsylvania Avenue	70.55

Note:
[1] 24-hour standard is 150 $\mu g/m^3$. An ambient background concentration of 60 ppm is included in the No Build values presented above.

Future maximum predicted 24-hour and annual average incremental $PM_{2.5}$ concentrations with the Proposed Action were also determined for the 2011 Build year. The maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in Tables 18-11 and 18-12, respectively. The results show that the daily (24-hour) and annual $PM_{2.5}$ increments are predicted to be below the DEP interim guidance criteria and, therefore, the Proposed Project would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

Table 18-11
2011 Build Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m^3)		
		No Build	Build	Increment
1	Flatlands Avenue and Pennsylvania Avenue	0.89	1.06	0.18
Note: The $PM_{2.5}$ interim guidance criterion for the 24 hour averaging period is 5 µg/m^3.				

Table 18-12
2011 Build Maximum Predicted Annual Average $PM_{2.5}$ Concentrations

Receptor Site	Location	Annual Concentration (µg/m^3)		
		No Build	Build	Increment
1	Flatlands Avenue and Pennsylvania Avenue	0.13	0.15	0.02
Note: The $PM_{2.5}$ interim guidance criterion for the annual (neighborhood scale) analysis is 0.1 µg/m^3.				

PARKING LOT

Based on the methodology described previously, the maximum predicted 8-hour average impact from the proposed parking lot on future CO levels at the near and far receptor would be 1.4 ppm, and 1.13 ppm, respectively. Therefore, including a background level of 2.0 ppm and on-street traffic with an estimated CO concentration of 0.57 ppm for the far receptor, the maximum predicted 8-hour average CO levels with the Proposed Action would be 3.4 ppm for the near receptor, and 3.7 ppm for the far receptor, which are below the applicable standard of 9 ppm. As indicated by the predicted concentrations, no significant impacts are expected to occur as a result of the parking lot.

STATIONARY SOURCES

An analysis was performed to determine potential stationary source impacts from the Proposed Project. The analysis indicates that no significant air quality impacts are expected in the year 2011. For specific details of the modeling results, see Section I, "2013 Probable Impacts of the Proposed Action," below.

H. 2013 THE FUTURE WITHOUT THE PROPOSED ACTION

MOBILE SOURCES

CO

CO concentrations without the Proposed Action were determined for the 2013 analysis year using the methodology previously described. Table 18-13 shows the future maximum predicted 8-hour average CO concentration without the Proposed Action (i.e., 2013 No Build values) at the analysis intersections in the project study area. The values shown are the highest predicted concentrations for the receptor locations at each intersection. As shown, the predicted 8-hour concentrations of CO, including background, are below the corresponding ambient air quality standard.

Table 18-13
2013 No Build Maximum Predicted 8-Hour CO Concentrations (parts per million)

Site	Location	Time Period	No Build 8-Hour Concentration (ppm)
1	Flatlands Avenue and Pennsylvania Avenue	Weekday MD	3.6
		Weekday PM	4.1
		Saturday MD	3.6
		Saturday PM	4.0
2	Flatlands Avenue and Jerome Street	Weekday MD	3.8
		Weekday PM	4.1
		Saturday MD	4.3
		Saturday PM	4.4
3	Flatlands Avenue and Elton Street	Weekday MD	2.6
		Weekday PM	2.6
		Saturday MD	2.7
		Saturday PM	2.9
4	Gateway Drive and Erskine Street	Weekday MD	3.1
		Weekday PM	3.4
		Saturday MD	3.5
		Saturday PM	3.6

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the No Build values presented above.

PM

PM concentrations without the Proposed Action were determined for the 2013 No Build condition using the methodology previously described. Tables 18-14 and 18-15 present the future maximum predicted PM_{10} and $PM_{2.5}$ concentrations, respectively, at the analysis intersections without the Proposed Action. The values shown are the highest predicted concentrations for the receptor locations for the time periods analyzed. As shown, the predicted 24-hour concentrations of PM_{10}, including background, are below the corresponding ambient air quality standard. $PM_{2.5}$ concentrations in Table 18-15 are incremental values and are not compared to the standards.

Table 18-14
2013 No Build Maximum Predicted 24-Hour PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m^3)
1	Flatlands Avenue and Pennsylvania Avenue	69.73
Note: 24-hour standard is 150 µg/m^3. An ambient background concentration of 60 ppm is included in the No Build values presented above.		

Table 18-15
2013 No Build Maximum Predicted 24-Hour and Annual $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration (µg/m^3)	Annual Average Concentration (µg/m^3)
1	Flatlands Avenue and Pennsylvania Avenue	0.89	0.13
Note: $PM_{2.5}$ concentrations are expressed as incremental values and do not include ambient background levels in the concentrations presented above.			

STATIONARY SOURCES

Minimal growth and development within the project area would occur in the future without the Proposed Action by 2013. HVAC and industrial source emissions in the No Build condition would likely be similar to existing conditions.

I. 2013 PROBABLE IMPACTS OF THE PROPOSED ACTION

Impacts from project-generated mobile sources at roadway intersections near the Project Site and impacts to the surrounding community that are related to air emissions produced by the project heating systems and parking lot are presented below. Also presented are the results of the study to determine impacts on the Proposed Project from off-site industrial sources.

MOBILE SOURCES

CO

CO concentrations with the Proposed Action were determined for the 2013 analysis year using the methodology previously described. Table 18-16 shows the future maximum predicted 8-hour average CO concentration with the Proposed Action at the four intersections studied.

Table 18-16
2013 Build Maximum Predicted 8-Hour CO Concentrations (parts per million)

Site	Location	Time Period	Project Build 8-Hour Concentration (ppm)	Not-To-Exceed *De minimis* Criteria (ppm)
1	Flatlands Avenue and Pennsylvania Avenue	Weekday MD	4.0	6.3
		Weekday PM	4.4	6.6
		Saturday MD	4.2	6.3
		Saturday PM	4.5	6.5
2	Flatlands Avenue and Jerome Street	Weekday MD	3.5	6.4
		Weekday PM	3.6	6.6
		Saturday MD	3.9	6.7
		Saturday PM	4.2	6.7
3	Flatlands Avenue and Elton Street	Weekday MD	2.6	5.8
		Weekday PM	2.7	5.8
		Saturday MD	3.0	5.9
		Saturday PM	3.0	6.0
4	Gateway Drive and Erskine Street	Weekday MD	3.5	6.1
		Weekday PM	3.9	6.2
		Saturday MD	4.1	6.2
		Saturday PM	4.7	6.3

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the project Build values presented above.

The values shown are the highest predicted concentrations for the time period analyzed. Also shown in the table is a Not-to-Exceed value based on the *de minimis* criteria used to determine the significance of the incremental increase in CO concentrations that would result from the Proposed Project. The *de minimis* criteria are derived using procedures outlined in the *CEQR*

Technical Manual that set a minimum allowable change in 8-hour average CO concentrations due to a proposed action (i.e., the No Action concentration plus half the difference between No Action concentration and the 9.0 ppm standard).

The results in Table 18-16 indicate that in the 2013 Build condition, there would be no significant adverse mobile source air quality impacts (i.e., *de minimis* criteria were not exceeded). In addition, with or without the Proposed Action in 2013, maximum predicted CO concentrations in the study area around the Proposed Project would be less than the corresponding ambient air quality standards.

PM

PM concentrations with the Proposed Action were determined for the 2013 Build year using the methodology described above. Table 18-17 shows the future maximum predicted 24-hour average PM_{10} concentrations with the Proposed Action and as shown, the predicted 24-hour concentrations of PM_{10}, including background, are below the corresponding ambient air quality standard.

Table 18-17
2013 Build Maximum Predicted 24-Hour Average PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)[1]
1	Flatlands Avenue and Pennsylvania Avenue	71.41

Note: [1] 24-hour standard is 150 $\mu g/m^3$. An ambient background concentration of 60 ppm is included in the No Build values presented above.

Future maximum predicted 24-hour and annual average incremental $PM_{2.5}$ concentrations with the Proposed Action were also determined for the 2013 Build year. The maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in Table 18-18 and 18-19, respectively. The results show that the daily (24-hour) and annual $PM_{2.5}$ increments are predicted to be below the DEP interim guidance criteria and, therefore, the Proposed Project would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

Table 18-18
2013 Build Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)		
		No Build	Build	Increment
1	Flatlands Avenue and Pennsylvania Avenue	0.89	1.05	0.16

Notes: The $PM_{2.5}$ interim guidance criterion for the 24 hour averaging period is 5 $\mu g/m^3$.

Table 18-19
2013 Build Maximum Predicted Annual Average $PM_{2.5}$ Concentrations

Receptor Site	Location	Annual Concentration ($\mu g/m^3$)		
		No Build	Build	Increment
1	Flatlands Avenue and Pennsylvania Avenue	0.13	0.15	0.02

Notes: The $PM_{2.5}$ interim guidance criterion for the annual (neighborhood scale) analysis is 0.1 $\mu g/m^3$.

STATIONARY SOURCES

HVAC SOURCE ANALYSES

Individual Sources

The primary stationary source of air pollutants associated with the new buildings would be the emissions from the natural gas-fired heating systems (i.e., boilers). The primary pollutant of concern when burning natural gas is nitrogen dioxide. The screening methodology in the *CEQR Technical Manual* was utilized for the analysis with the size of each proposed building in square feet. The closest receptor building of similar height found in the project study area is greater than 400 feet east of the retail development. It was determined that the Proposed Project would not result in any significant stationary source air-quality impacts because at a distance of 400 feet, all of the project buildings would be well below the maximum permitted size derived from Figures 3Q-10 of the *CEQR Technical Manual*.

Area Wide Sources

The maximum predicted concentration of NO_2 is presented in Table 18-20 along with background concentrations obtained from a nearby NYSDEC monitoring station. As indicated in the table, the results of the modeling analysis for the combined impacts of all residential parcels demonstrate compliance with the NAAQS for NO_2 at ground level and elevated receptors placed both within and outside the project boundaries. Based on the results of the analysis, the impacts from the residential development of the Proposed Project would not result in any significant adverse air quality impacts.

Table 18-20
Maximum Predicted Pollutant Concentrations ($\mu g/m^3$)

Pollutant	Averaging Period	Concentration Due to Stack Emission	Maximum Background Concentration[1]	Total Concentration	Air Quality Standard
NO_2 [b]	Annual	2.53	71.5	74	100

Note: [1] Background concentrations are from NYSDEC monitoring data.

INDUSTRIAL SOURCE SCREENING ANALYSIS

As discussed above, a review of land use, Sanborn maps, and the 1996 FEIS was conducted to identify manufacturing and industrial uses within 400 feet of the Project Site. Five addresses were identified to have potential industrial emissions. Of the five addresses, only one business is on file with DEP BEC and is determined to have potential air pollutant emissions. Table 18-21 shows the air contaminants, estimated emissions, calculated concentrations, and the respective, recommended short-term (a 1-hour period, unless otherwise noted) and annual guideline concentrations. The ambient air concentrations shown in the table represent the maximum predicted impacts on a sensitive receptor at the Project Site from the nearby industrial source.

The conservative screening procedure used to estimate maximum potential impacts from these businesses 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, the Proposed Project would not experience significant adverse air quality impacts.

Table 18-21
Maximum Predicted Impacts on Proposed Project from Industrial Sources
Cumulative Impacts

Potential Contaminants	CAS No.	Estimated Emissions (g/s)	Estimated Short-term Impact (ug/m^3)	SGC (ug/m^3)	Estimated Long-term Impact (ug/m^3)	AGC (ug/m^3)	Notes
Carbon Monoxide	00630-08-0	6.30E-03	15.90	14,000	5.07E-02	---	a
Oxides of Nitrogen/ Nitrogen Oxide	NY210-00-0/ 10102-43-9	6.55E-02	165.37	---	4.98E-01	74	b
Particulates	NY075-00-0	9.32E-03	23.50	380	2.66E-02	45	a
Sulfur Dioxide	07446-09-5	1.26E-04	0.32	910	1.36E-03	80	a
Toluene	00108-88-3	1.89E-03	4.77	37,000	1.42E-02	5,000	a
Butyl Alcohol, N	00071-36-3	1.08E-02	27.35	---	8.08E-02	1,500	a
Butyl Acetate	00123-86-4	2.37E-02	59.79	95,000	1.78E-01	17,000	a

Notes:
a) NYSDEC DAR-1 (Air Guide-1) AGC/SGC Tables
b) AGC/SGC is for Nitrogen Oxide.
AGC - Annual Guideline Concentrations; SGC - Short-term Guideline Concentrations

ODORS

The 1996 FEIS analyzed the potential levels of H_2S at the Project Site attributable to emissions from the 26th Ward WPCP, which is the primary stationary source of concern from an odor standpoint. Modeling was carried out using estimated emissions from the various operations at the plant and five years of local hourly meteorological data. This analysis, conducted in coordination with DEP, consisted of estimating average H_2S emissions from the various unit operations at the WPCP and using modeling to estimate the effect of these H_2S sources at various receptor locations on the Project Site. The analysis determined that the maximum predicted 1-hour average H_2S concentration due to the WPCP at any of the receptor sites would be 2 parts per billion, and was predicted to occur in the proposed park at the northwest corner of the Project Site. The highest modeled concentration at a residential location on the Project Site was 0.6 parts per billion, also on the northwest part of the site. These levels were below the DEC standard for H_2S of 10 parts per billion (ppb), and the maximum concentration at a sensitive receptor was below the significant impact threshold of 1 ppb.

Potential impacts from other nearby sources of odors were evaluated qualitatively in the 1996 FEIS. The outfalls from the 26th Ward WPCP and the combined sewer overflows (CSOs) to Hendrix Creek result in direct effluent and sewage discharges into Hendrix Creek, which forms the western border of the Project Site. In addition, when the combined sanitary and storm flow to the Spring Creek water retention facility exceeds the basin's capacity, some nearby CSOs overflow directly into Spring and Hendrix Creeks. H_2S can be produced from mounds of settled CSO materials that may form in the creeks, which can then be released into the surrounding community. In addition to the CSO discharges into Spring Creek, which borders the Project Site to the east, the mud flats along Spring Creek are another potential source of odors. The gases emitted by the mud flats encompass a series of reduced sulfides. The odors associated with such compounds are more indicative of a rural setting. This source of odors may contribute to the H_2S levels on the Project Site. Potential impacts from the former Fountain Avenue and Pennsylvania Avenue Landfills were also evaluated. The major pollutant emissions from these landfills are methane and carbon dioxide, which are odorless. Trace amounts of volatile organic compounds, which have the putrescent odors associated with landfills that accept municipal solid waste, are also emitted from these inactive landfills. As presented in the 1996 FEIS, the planned

remediation activities at these landfills by DEP were anticipated to limit the potential release of uncontrolled odors; consequently no significant impacts were predicted for the Proposed Project.

The 1996 FEIS concluded that there would be no significant odor impacts from the 26th Ward WPCP, but the potential odors from CSO releases to Hendrix Creek and Spring Creek, and the naturally occurring odors on the mud flats at Spring Creek may result in exceedances of the CEQR odor criteria and the NYSAAQS for H_2S on the Project Site under certain meteorological and tidal conditions. Natural occurrences of adverse odors could not be prevented or mitigated.

The Proposed Project would result in modifications to the site plan compared to the plan analyzed in the 1996 FEIS. Although the number of proposed residential units is unchanged since the 1996 FEIS, the Proposed Project would result in more retail than was analyzed in the 1996 FEIS. At some locations, the Proposed Project would result in taller residential buildings than analyzed in the 1996 FEIS.

The changes to the Project Site layout as compared to the 1996 FEIS would not increase exposure to sources of odors from the WPCP or other sources. The existing shopping center would be expanded to the north, in an area that was proposed for residential development in the 1996 FEIS. A portion of this area is along Gateway Drive on the western edge of the site development, closest to the 26th Ward WPCP. The taller residential buildings would not be anticipated to experience higher concentrations of H_2S or other odorous compounds since the sources of these odors occur primarily at or near ground level; therefore, maximum concentrations would be anticipated at lower levels of buildings.

Since the 1996 FEIS, there are a number of improvements at 26th Ward WPCP, but these improvements have not affected the odor sources at the plant. DEP has planned an upgrade for the 26th Ward WPCP, with an anticipated completion date of 2015, which includes components which may affect the odor sources from the plant. DEP is currently conducting an odor assessment for the upgrade.

The findings of the 1996 FEIS indicated that H_2S concentrations were below the CEQR odor criteria at sensitive receptors; therefore, no exceendances due to operations at the 26th Ward WPCP would be expected on the Proposed Project's developments. H_2S concentrations may exceed the CEQR odor criteria at certain locations in the proposed park along the western boundary of the Project Site; however, concentrations of H_2S from the WPCP would be expected to be below the 10 ppb NYSDEC standard. Potential odor impacts from the former Fountain Avenue and Pennsylvania Avenue Landfills are expected to be minimal, due to the remediation projects completed at these facilities since the 1996 FEIS and the increasing age of these facilities, which diminishes the production of odor-containing landfill gases. As presented in the 1996 FEIS, exceedances of the CEQR odor criteria and the NYSAAQS for H_2S may occur on the Project Site; however, the proposed modifications to the 1996 Plan are not anticipated to increase the frequency or severity of these occurrences.

CONSISTENCY WITH NEW YORK STATE AIR QUALITY IMPLEMENTATION PLAN

Maximum predicted CO concentrations with the Proposed Action would be less than the corresponding ambient air standard. Therefore, the Proposed Action would be consistent with the New York State Implementation Plan (SIP) for the control of CO. ✷