Chapter 19: Air Quality

A. INTRODUCTION

This chapter discusses the potential for air quality impacts associated with the Willets Point Development Plan. In accordance with the approach outlined in Chapter 2, "Procedural and Analytical Framework," the cumulative impact of both the Willets Point Development Plan and the anticipated development on Lot B in the 2017 analysis year is compared with the continuation of the existing on-site uses in the future without the proposed Plan. The cumulative impact is also assessed for the No Convention Center Scenario, as discussed in Chapter 2.

Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heat and hot water systems, or emissions from parking garage ventilation systems. Indirect impacts are those associated with the emissions from nearby existing stationary sources (impacts on the proposed project) or emissions from on-road vehicle trips generated by the project or other changes to future traffic conditions due to the project.

The potential for indirect mobile source impacts from the Willets Point Development Plan and the anticipated development on Lot B was analyzed. The proposed Plan and Lot B would also include a number of parking facilities. The exact locations and plans for these facilities are not available at this time. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations in the vicinity of ventilation outlets for a prototypical reasonable worst-case parking garage. The predicted increments from the garage ventilation were also added, where appropriate, to the predicted concentrations from the mobile source analysis, to assess the cumulative impact of both sources.

A stationary source analysis was also conducted to evaluate the potential future pollutant concentrations resulting from oil- and/or gas-burning heat and hot water systems for the proposed Plan and anticipated development on Lot B. In addition, potential effects of stationary source emissions from existing nearby industrial facilities on the proposed uses were assessed.

PRINCIPAL CONCLUSIONS

As discussed below, the maximum predicted pollutant concentrations and cumulative concentration increments from mobile sources with the proposed Plan and the anticipated development on Lot B would be in compliance with the applicable guidance thresholds and ambient air quality standards. The parking facilities associated with the proposed Plan and the anticipated development on Lot B would also not result in any significant adverse air quality impacts. Similarly, emissions associated with the parking facilities on Citi Field parking Lot C, closest to the proposed District, and with the traffic along the elevated portion of Northern Boulevard adjacent to proposed uses would result in concentrations in the proposed District that would be in compliance with applicable standards and thresholds. Thus, the proposed Plan would not result in significant adverse impacts from mobile source emissions.

Based on a stationary source screening analysis, there would be no potential for significant adverse air quality impacts from the heat and hot water systems of the proposed Plan and the anticipated development on Lot B, provided that restrictions described in the text are imposed on the placement of heating, ventilation, and air conditioning (HVAC) stacks of some uses. Nearby existing sources from manufacturing or processing facilities were analyzed for their potential impacts on the development that would be introduced under the proposed Plan. The results of the industrial source analysis demonstrated that there would be no significant adverse air quality impacts from existing industrial uses within 1,000 feet of the District.

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. Ambient concentrations of carbon monoxide (CO) are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (NO and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and sources utilizing non-road diesel such as diesel trains, marine engines, and non-road vehicles (e.g., construction engines). On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs.

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 which 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 Plan would result in changes in traffic patterns and an increase in traffic volume in the District and nearby areas. Therefore, a mobile source analysis was conducted at critical intersections to evaluate future CO concentrations with and without the proposed Plan and the anticipated development on Lot B. An analysis was also conducted to evaluate future CO concentrations with the operation of the prototypical proposed parking facilities.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any 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 U.S. Environmental Protection Agency (EPA). The proposed Plan would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of Plan-related emissions of these pollutants from mobile sources was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it is mostly of concern further downwind from large stationary point sources, and is not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) Potential impacts on local NO_2 concentrations from the fuel combustion for the proposed action’s heat and hot water boiler systems were evaluated.

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 (CAA) 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 currently far below the 3-month average national standard of 1.5 micrograms per cubic meter ($\mu g/m^3$).

No significant sources of lead are associated with the proposed Plan and, therefore, an analysis was not warranted.

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption 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. An analysis was conducted to assess the worst case $PM_{2.5}$ and PM_{10} impacts due to the increased traffic associated with the proposed Plan.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal. Monitored SO_2 concentrations in New York City are below the national standards. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. 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 Plan, No. 2 fuel could be burned in the heat and hot water systems. Therefore, potential future levels of SO_2 from boilers were examined.

AIR TOXICS

In addition to the criteria pollutants discussed above, air toxics are of concern. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by EPA. Federal ambient air quality standards do not exist for non criteria air toxics; however, the New York State Department of Environmental Conservation (DEC) has issued standards for certain non-criteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed guideline concentrations for numerous air toxic compounds. The DEC guidance document DAR-1 (September 2007) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure. The potential impact from nearby industrial sources on air toxic concentrations within the proposed District was examined.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

The CAA establishes the primary and secondary National Ambient Air Quality Standards (NAAQS) 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 required 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, and there is no secondary standard for CO. The NAAQS are presented in Table 19-1. The NAAQS for CO, NO_2, and SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particulate matter (TSP), settleable particles, non-methane hydrocarbons (NMHC), and ozone, which correspond to federal standards that have since been revoked or replaced, and for beryllium, fluoride, and hydrogen sulfide (H_2S).

Table 19-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	μg/m³	ppm	μg/m³
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)	0.075	160	0.075	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/m³ – micrograms per cubic meter
NA – not applicable

All annual periods refer to calendar year.

PM concentrations (including lead) are in μg/m³ since ppm is a measure for gas concentrations. Concentrations of all gaseous pollutants are defined in ppm and approximately equivalent concentrations in μg/m³ are presented.

(1) Not to be exceeded more than once a year.

(2) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.

(3) Not to be exceeded by the annual 98th percentile when averaged over 3 years. EPA has reduced these standards down from 0.08 ppm, effective 60 days after publishing in the Federal Register.

(4) EPA has reduced these standards down from 65 μg/m³, effective December 18, 2006.

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

EPA has 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 µg/m^3 to 35 µg/m^3 and retaining the level of the annual standard at 15 µg/m^3. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked. EPA has also revised the 8-hour ozone standard, lowering it from 0.08 to 0.075 parts per million (ppm), effective 60 days after publishing in the Federal Register.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

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

In 2002, EPA 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.

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 is required to develop a SIP by early 2008, which will be designed to meet the annual average standard by 2010. As described above, EPA has revised the 24-hour average $PM_{2.5}$ standard. Attainment designations for the revised 24-hour $PM_{2.5}$ standard would be effective by April 2010, and State and local governments in areas that are designated as non-attainment are required to develop SIPs by April 2013 which would be designed to attain the revised 24-hour $PM_{2.5}$ standards by April 2015, although this may be extended in some cases up to April 2020 (these milestones may occur at earlier dates).

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 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 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, the State submitted final revisions to a new SIP for ozone to EPA.

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 would 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.[1] 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 19-1) 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 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

DEC 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 (DEP) is currently recommending interim guidance criteria for evaluating the potential $PM_{2.5}$ impacts for projects

[1] *CEQR Technical Manual*, section 222, 2001; and State Environmental Quality Review Act § 617.7

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 µg/m^3 at a discrete receptor location would be considered a significant adverse impact on air quality under operational conditions (i.e., a 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 µg/m^3 but no greater than 5 µg/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 µg/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 µg/m^3 from stationary sources at a discrete or ground-level receptor location.

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

The proposed Plan's annual emissions of PM_{10} are estimated to be well below the 15-ton-per-year threshold under DEC's $PM_{2.5}$ policy guidance. The above DEP and DEC interim guidance criteria were used to evaluate the significance of predicted incremental impacts of the proposed Plan on $PM_{2.5}$ concentrations and to determine the need to minimize PM emissions.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

INTRODUCTION

This section presents the methodologies, data, and assumptions used to conduct the air quality analyses for the proposed Plan. The following analyses were conducted:

- Mobile Source Analysis
  - Assessment of the change in CO and PM concentrations as a result of changes in traffic volumes and geometry due to the proposed Plan; and
  - Assessment of the potential impacts on the potential elevated receptors (such as operable windows on buildings) that could be constructed as a result of the proposed Plan adjacent to the elevated portions of Northern Boulevard.
- Parking Facilities
  - Assessment of the potential impacts associated with the proposed parking uses in the District.

- Assessment of the potential impacts associated with the Citi Field parking lot, immediately to the west of the District, on development that would be introduced under the proposed Plan.

- Stationary Source Analysis
  - Assessment of the potential impacts from the fossil fuel-fired heating and ventilation sources introduced within the District and the anticipated development on Lot B;
  - Assessment of the potential impacts from nearby industrial sources on the development that would be introduced under the proposed Plan.

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 Plan 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 Plan. The assumptions used in the PM analysis were based on the latest $PM_{2.5}$ interim guidance developed by DEP.

DISPERSION MODELS FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets surrounding or near the District, 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 exceedances of *de minimis* thresholds

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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.

are predicted 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.

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 consist of surface data collected at LaGuardia 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 was presented.

ANALYSIS YEAR

The microscale analyses were performed for existing conditions and conditions in 2017, the proposed Plan Build year. The analysis of the future year 2017 conditions was performed both without and with the proposed Plan.

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

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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.

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 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 DEC and DEP.

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 DEP 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. 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.[2] Fugitive $PM_{2.5}$ emission rates for local roadways with average daily traffic (ADT) volumes of 500 or more were determined to be negligible (utilizing the EPA AP-42 method). Therefore, since all roadways at the selected sites were predicted to have ADT higher than 500, 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 Plan and the anticipated development on Lot B (see Chapter 17, "Traffic and Parking"). Traffic data for the future without and with the proposed Plan were employed in the respective air quality modeling scenarios. The data for the future with the proposed Plan accounted for traffic associated with the anticipated development on Lot B. Three peak periods were analyzed to assess the impact of morning, evening, and Saturday traffic as well as traffic generated by the proposed Plan that would coincide with game events at Citi Field. The weekday morning (7:45 AM-8:45 AM), afternoon pre-game (6:00 PM-7:00 PM) and Saturday pre-game (12:00 PM-1:00 PM) peak periods were analyzed. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project-generated and total future traffic and, therefore, have the greatest potential for significant air quality impacts.

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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.

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 Saturday peak traffic volumes in the future without the proposed Plan were used as a baseline. Traffic volumes for other hours without the proposed Plan were determined by adjusting the peak period volumes by the 24-hour distributions based on the Automatic Traffic Recorder (ATR) data. Traffic generated by the proposed Plan and the anticipated development on Lot B were similarly determined over the 24-hour period, using the predicted hourly parking accumulation data, obtained from the traffic analysis.

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.

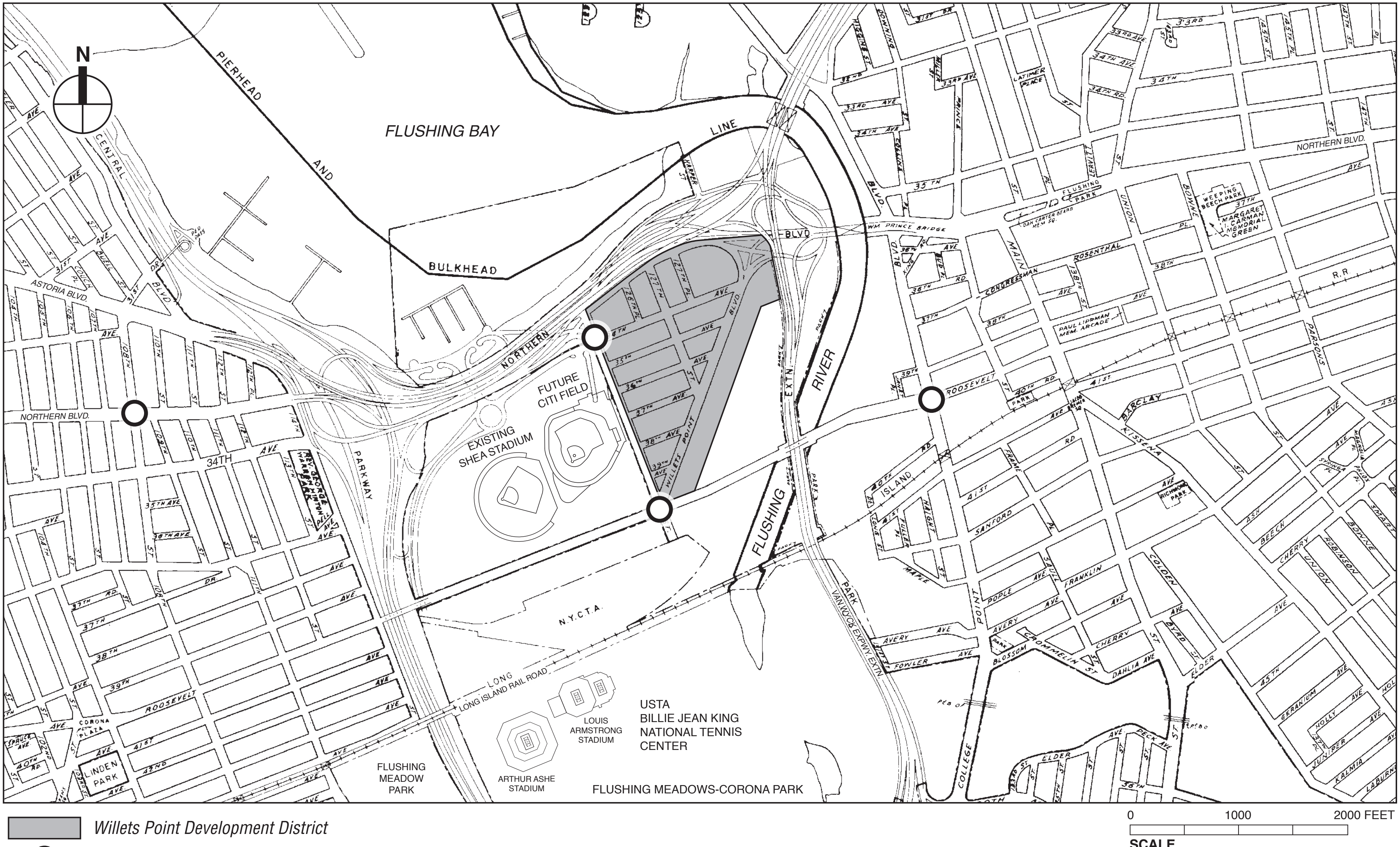
The 8-hour average CO background concentration used in this analysis was 1.8 ppm. This background concentration represents the maximum of the second highest 8-hour average concentrations recorded at the Queens College monitoring station in 2004, 2005, and 2006. The 1-hour average CO background concentration used in the analysis was 3.1 ppm and was also based on the maximum second highest values collected over the same 2004-2006 period at Queens College.

The 24-hour average PM_{10} background concentration of 46 µg/m^3 was based on the maximum of the annual second-highest 24-hour average concentrations recorded at the I.S. 52 monitoring station, in the Bronx, in 2002, 2003, and 2004. I.S. 52 is the closest monitoring station to the proposed District that has available recorded data over a recent 3-year period. While there is one monitoring station in Queens (P.S. 219) that is closer to the District, PM_{10} concentrations at that station were reported only for 2006 and are therefore not sufficient to develop the background value, which is typically based on data collected over a 3-year period.

MOBILE SOURCE ANALYSIS SITES

Four intersection locations were selected for the microscale CO analysis (see Table 19-2 and Figure 19-1). These intersections were selected after considering all intersection locations analyzed for the traffic study (see Chapter 17) because they are among the locations in the primary and secondary study areas where the greatest number of vehicles generated by the proposed Plan and, therefore, the maximum changes in the concentrations and greatest potential for air quality impacts are expected. Existing traffic volumes, existing and future predicted levels of service, and proximity of the intersections to pedestrian uses were also considered in the selection of intersections for the air quality analysis. As discussed in Chapter 1, “Project Description,” the proposed Plan includes a new connection between the Van Wyck Expressway and the Willets Point Development District. CO concentrations at receptors closest to access ramps would be similar to the concentrations predicted in the analysis of the elevated Northern Boulevard, which is described in the following section.

For the PM_{10} and $PM_{2.5}$ analyses the intersection of 126th Street with Roosevelt Avenue was selected, since of the four sites analyzed for potential CO impacts, that intersection would result in the greatest number of trucks and, therefore, the greatest potential for maximum changes in particulate matter concentrations.



Willets Point Development District

Intersection Location

Figure 19-1

Mobile Source Analysis Intersection Locations

Table 19-2
Mobile Source Analysis Intersection Locations

Analysis Site	Location
1	126th Street and Roosevelt Avenue
2	126th Street and 34th Avenue
3	College Point Boulevard and Roosevelt Avenue
4	108th Street and Northern Boulevard

ANALYSIS OF THE ELEVATED NORTHERN BOULEVARD

Under the proposed Plan, the part of the District adjacent to the elevated portion of Northern Boulevard would be developed with residential uses. Due to its proximity to elevated sensitive receptors, the potential impact of the traffic on the elevated road on the proposed future uses was analyzed, as recommended in the *CEQR Technical Manual*. Receptors were placed at various locations and elevations to simulate potential future elevated uses and to assess potential impacts from projected future CO levels. The analysis was performed to determine maximum CO concentrations.

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. 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 DEP procedure for neighborhood scale corridor $PM_{2.5}$ modeling.

PARKING FACILITIES

PROPOSED PLAN AND THE ANTICIPATED DEVELOPMENT ON LOT B PARKING

The proposed Plan would include parking facilities to provide for new parking demand. Emissions from vehicles using the parking areas could potentially affect ambient levels of CO in the future with the proposed Plan. The garage associated with the proposed convention center was analyzed since the convention center would generate the greatest potential parking demand in the District and would therefore likely result in the highest concentrations of pollutants at nearby receptors. The analysis was undertaken using the methodology set forth in the *CEQR Technical Manual*, applying modeling techniques to the vent structures and calculating pollutant levels at various distances from the vents.

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 garage. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. The concentration of CO within the garage was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of one cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS and the *de minimis* criteria, CO concentrations were determined for the maximum 8-hour average period.

To determine pollutant levels in the vicinity of the vents, the exhaust from the parking garage was 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 the vents by assuming that the concentration in the garage is equal to the concentration leaving the exhaust, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces. Background and on-street CO concentrations were then added to the modeling results to obtain the total ambient levels at each receptor location. The on-street CO concentration was determined using the methodology in Air Quality Appendix 1 of the *CEQR Technical Manual,* utilizing existing traffic volumes at the intersection of 34th Avenue and 126th Street (mobile source analysis Site 2). This site was chosen because of the two analyzed sites bordering the proposed District, CO concentrations at Site 2 were predicted to be greater during all time periods, as discussed below.

Since there are no specific garage designs for the proposed Plan, reasonable worst-case assumptions for air quality modeling were made regarding the design of the garage's mechanical ventilation systems. The exhaust from the parking garage was assumed to be vented through a single outlet vent with a height of 10 feet. The vent was assumed to exhaust directly onto the street, and a "near" receptor was placed along the sidewalks at a pedestrian height of six feet and at a distance of five feet from the vent. A "far" receptor was placed directly across the street from the assumed vent location, at a distance of 40 feet. This is a conservative distance, since the minimum street right of way mandated by the zoning Special District regulations would be 60 feet. A persistence factor of 0.7 was used to convert the calculated 1-hour average maximum concentrations to 8-hour averages, accounting for meteorological variability over the average 8-hour period.

To assess the effect of garages that would potentially be introduced under the anticipated development on Lot B, a conceptual reasonable-worst case analysis was performed, assuming that the demand for parking associated with office uses on Lot B would be met by a single mechanically ventilated garage. The analysis of the Lot B garage followed the same methodology described above for the conceptual convention center garage. The on-street traffic contribution to CO concentrations was determined using existing traffic at the intersection of Roosevelt Avenue and 126th Street (mobile source analysis Site 1). This site was chosen because of its proximity to Lot B.

CITI FIELD PARKING

The existing Citi Field parking lot C and the access point to that parking lot are directly across 126th Street from the proposed District. The parking lot has capacity for 1,125 vehicles[1]. The potential effect of emissions from vehicles using the parking lot on CO concentrations at proposed structures within the proposed District closest to the parking lot was analyzed using the methodology set forth in the *CEQR Technical Manual*.

Potential impacts from the existing parking lot on CO concentrations were assessed for the time periods when overall lot 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.

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[1] Shea Stadium Redevelopment Final Environmental Impact Statement.

To estimate maximum potential impacts on the development that would be introduced under the proposed Plan, a receptor was placed at the building façade that would be at the nearest allowable distance to the existing parking lot C access point, directly across 126th Street. A persistence factor of 0.70, supplied by DEP, was used to convert the calculated 1-hour average maximum concentrations to 8-hour averages, accounting for meteorological variability over the average 8-hour period.

Emissions from vehicles entering, parking, and exiting the parking lots 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*. All arriving and departing vehicles were conservatively assumed to travel at an average speed of five miles per hour within the parking facility. In addition, all departing vehicles were assumed to idle for one minute before exiting. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 1- and 8-hour average periods.

STATIONARY SOURCES

HVAC SYSTEMS

There are presently no designs for individual buildings that would be developed under the proposed Plan and exact building locations are not known. However, the cumulative development scenario for analysis, presented in Chapter 2, includes an estimate of the total expected development size in the District and on Lot B for various uses that would require HVAC systems—residential, retail, office, community facility, convention center, hotel, and school.

Future uses would be developed based on the zoning Special District regulations. The regulations would guide such urban design elements as the placement of uses within the District, building heights and setbacks, street hierarchies, and basic site planning and design provisions. The zoning Special District regulations would guide development for four basic components of the proposed Plan: streets and streetscapes, a regional entertainment and commercial center, a convention center, and a residential neighborhood, as described in more detail in Chapter 9, "Urban Design and Visual Resources."

In addition, the height of the structures developed under the proposed Plan would be limited by Federal Aviation Administration (FAA) restrictions imposed due to the proximity of the District to LaGuardia airport. Therefore, the available information from the cumulative development scenario for analysis, the Special District regulations, and the FAA restrictions was integrated to assess the potential air quality impacts from HVAC systems associated with the following uses on other proposed uses within the District:

- convention center
- hotel
- community facility
- school
- office tower
- a city block of development within the residential community of the District
- a city block of development within the entertainment and commercial zone of the District

Since there are no specific designs available to conduct a detailed assessment of potential HVAC impacts from the proposed Plan, a screening analysis was performed based on the methodology described in the *CEQR Technical Manual.* The screening procedures utilize information regarding the type of fuel to be burned, the maximum development size, type of development, the stack height, and the distance from the stack to the nearest building of similar or greater size, to evaluate whether a significant adverse impact is likely. The screening procedure provides a conservative assessment of potential future impacts from emissions due to HVAC sources, both within the District, and beyond.

In addition to the analysis of the proposed Plan, the potential impact of HVAC systems at the anticipated development on Lot B on the proposed District was evaluated. The potential for the closest anticipated large use in the District to impact the anticipated development on Lot B was also examined.

INDUSTRIAL SOURCE ANALYSIS

Potential air quality effects from existing industrial operations near the District on the development that would be introduced under the proposed Plan were analyzed. Industrial air pollutant emission sources within 400 feet and larger emissions sources within 1,000 feet of the District boundaries were considered for inclusion in the air quality impact analysis, as recommended in the *CEQR Technical Manual*. No industrial emission sources were found within 400 feet of the District. The industrial sources currently existing within the District would not continue to operate under the proposed Plan and were therefore excluded from the analysis. A request was made to the DEP's Bureau of Environmental Compliance (BEC), and a DEC permit search was performed to obtain information about manufacturing or industrial emissions for larger sources, such as asphalt plants, within 1,000 feet of the District. In addition, a search of federal and State-permitted facilities within the study area was conducted using the EPA's Envirofacts database[1] and the DEC DAR-1 air toxics software program. Five businesses, some possessing multiple air permits, were identified within 1,000 feet of the District.

After compiling the emission and stack parameter information for facilities with manufacturing or process operations within 1,000 feet of the District, the EPA SCREEN3 model was used to estimate maximum potential impacts from each source identified. SCREEN3 is a single source Gaussian plume model that uses pre-set meteorological data to give the worst case 1-hour average concentrations.

Table 3Q-3 in the *CEQR Technical Manual*, which is typically used for industrial source analyses, was not used because the distances of the sources considered in the analysis were beyond 400 feet from the District.

Distances analyzed for each source were the minimum distances between the boundary of the District and the source site. Predicted worst-case impacts on the development that would be introduced under the proposed Plan were compared with the short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) recommended in the DEC's *DAR-1 AGC/SGC Tables.*[2] These guideline concentrations present the airborne concentrations, which

[1] http://oaspub.epa.gov/enviro/ef_home2.air

[2] DEC Division of Air Resources, Bureau of Stationary Sources, September 2007.

are applied as a screening threshold to determine whether future occupants of the District would be significantly impacted by nearby sources of air pollution.

To assess the effects of multiple sources emitting the same pollutants, cumulative source impacts were determined. Concentrations of the same pollutant from industrial sources that were within 1,000 feet of the District were combined and compared with the guideline concentrations discussed above.

E. EXISTING CONDITIONS

Ambient concentrations of SO_2, NO_2, CO, ozone, lead, PM_{10}, and $PM_{2.5}$ measured at monitoring stations closest to the District are shown in Table 19-3. These values represent the maximum concentrations recorded during 2006 at the specified representative monitoring stations. There were no monitored violations of NAAQS at these monitoring sites at the time the concentrations were recorded. The 8-hour ozone concentration slightly exceeds the recently revised ozone NAAQS, which is not yet in effect.

Table 19-3
Maximum Criteria Pollutant Concentrations Recorded at Representative Monitoring Stations in 2006

Pollutant	Monitoring Station	Units	Averaging Period	Concentration	NAAQS
CO	Queens College 2, Queens	ppm	8-hour	1.8	9
			1-hour	2.5	35
SO_2	Queens College 2, Queens	µg/m^3	Annual	13	80
			24-hour	66	365
			3-hour	121	0.5
PM_{10} [1]	P.S. 219, Queens	µg/m^3	24-hour	57	150
$PM_{2.5}$ [2]	P.S. 219, Queens	µg/m^3	Annual	13	15
			24-hour	34	35
NO_2	Queens College 2, Queens	µg/m^3	Annual	43	100
Lead	J.H.S. 126, Brooklyn	µg/m^3	3-month	0.02	1.5
Ozone [3]	Queens College 2, Queens	ppm	8-hour	0.078	0.075
			1-hour	0.11	0.12

Notes: The concentrations shown correspond to the most recent levels reported and are not directly used as background concentrations, which are based on DEC reports for 3-5 years.
[1] The annual PM_{10} standard was revoked by EPA. Note that PM_{10} values at P.S. 219 were not reported for periods prior to 2006.
[2] EPA has reduced these standards down from 65 µg/m^3, effective December 18, 2006.
[3] The 1-hour ozone NAAQS has been replaced with the 8-hour standard; however, the maximum monitored concentration is provided for informational purposes. EPA has reduced the 8-hour standard down from 0.08 ppm, effective 60 days after publishing in the Federal Register.
Source: DEC, 2006 New York State Ambient Air Quality Data.

MODELED CO CONCENTRATIONS FOR EXISTING TRAFFIC CONDITIONS

As noted previously, receptors were placed at multiple sidewalk locations next to the intersections selected for the 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 analyzed.

Table 19-4 shows the maximum modeled existing (2006) CO 8-hour average concentrations at the receptor sites for the peak period when those concentrations are greatest. (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 19-4
Modeled Existing 8-Hour Average CO Concentrations (2006)

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	126th Street and Roosevelt Avenue	AM	3.1
2	126th Street and 34th Avenue	AM	3.6
3	College Point Boulevard and Roosevelt Avenue	PM pre-game	4.9
4	108th Street and Northern Boulevard	AM	4.3
Note:	8-hour standard (NAAQS) is 9 ppm.		

F. FUTURE WITHOUT THE PROPOSED PLAN

MOBILE SOURCES

CO

CO concentrations without the proposed Plan were determined for the 2017 Build year using the methodology previously described. Table 19-5 shows future maximum predicted 8-hour average CO concentrations at the analyzed intersections in 2017 without the proposed Plan during the peak period when those concentrations were predicted to be greatest. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

As shown in Table 19-5, 2017 CO concentrations without the proposed Plan are predicted to be well below the 8-hour CO standard of 9 ppm, and were also lower than modeled existing average concentrations for those peak periods. 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 Plan were determined for the 2017 Build year using the methodology previously described. Table 19-6 presents the future maximum predicted 24-hour and annual average PM_{10} concentrations at the analyzed intersections in 2017 without the proposed Plan. The values shown are the highest predicted concentrations for the receptor locations.

Table 19-5
Future Modeled 8-Hour
Average CO Concentrations Without the Proposed Plan (2017)

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	126th Street and Roosevelt Avenue	PM pre-game	3.4
2	126th Street and 34th Avenue	PM pre-game	3.6
3	College Point Boulevard and Roosevelt Avenue	PM pre-game	4.0
4	108th Street and Northern Boulevard	PM pre-game	3.7
Note: 8-hour standard (NAAQS) is 9 ppm.			

Table 19-6
Future Modeled
24-Hour PM_{10} Concentrations Without the Proposed Plan (2017)

Receptor Site	Location	Concentration (μg/m^3)
1	126th Street and Roosevelt Avenue	51.96
Note: NAAQS—24-hour average 150 μg/m3. The annual average standard was revoked in 2006.		

STATIONARY SOURCES

In the future without the proposed Plan by 2017, the Willets Point area would likely remain in its present condition. HVAC emissions in the future without the proposed Plan would likely be similar to existing conditions. The sources of industrial emissions would remain in Willets Point and the industrial uses within 1,000 feet of the proposed District would also likely remain.

G. PROBABLE IMPACTS OF THE PROPOSED PLAN

PROPOSED PLAN

The proposed Plan in 2017 would result in increased mobile source emissions in the immediate vicinity of the District, emissions from proposed parking facility exhausts, as well as emissions from fuel combustion in HVAC equipment that would be required to heat and cool the future uses that would be introduced by the proposed Plan and the anticipated development on Lot B. The proposed Plan would also potentially result in the placement of new receptors within 200 feet of the elevated portions of Northern Boulevard and near the access point to the Citi Field parking Lot C and their associated mobile source emissions. The following sections describe the results of the studies performed to analyze the potential impacts from these sources for the 2017 Build year. In addition, existing industrial facilities were assessed for their potential for adverse impacts on the development that would be introduced under the proposed Plan.

MOBILE SOURCES ANALYSIS

CO

CO concentrations with the proposed Plan were determined for the 2017 Build year at traffic intersections using the methodology previously described. Table 19-7 shows the future maximum predicted 8-hour average CO concentration with the proposed Plan at the four intersections studied. (No 1-hour values are shown, since no exceedances of the NAAQS 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 receptors analyzed for the peak periods for which the greatest concentrations and/or concentration increments were predicted. The results indicate that the proposed Plan would not result in any violations of the 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations are very small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria. (The *de minimis* criteria are described above in Section C: "Air Quality Regulations, Standards, and Benchmarks.")

Table 19-7
Future Modeled 8-Hour Average CO Concentrations
With and Without the Proposed Plan

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)			
			Without the Plan	With the Plan	Increment	*De Minimis*
1	126th Street and Roosevelt Avenue	AM Saturday pre-game	2.6 3.3	2.9 4.4	0.2 1.1	3.2 2.8
2	126th Street and 34th Avenue	Saturday pre-game	3.5	4.4	0.9	2.8
3	College Point Boulevard and Roosevelt Avenue	PM pre-game	4.0	4.3	0.3	2.5
4	108th Street and Northern Boulevard	Saturday pre-game	3.6	3.9	0.3	2.7
Notes: 8-hour standard (NAAQS) is 9 ppm.						

PM

PM concentrations with the proposed Plan were determined for the 2017 Build year using the methodology previously described. Table 19-8 shows the future maximum predicted 24-hour average PM_{10} concentrations without and with the proposed Plan.

Table 19-8
Future Modeled 24-Hour Average PM_{10} Concentrations (2017)

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)[1]	
		Without the Plan	With the Plan
1	126th Street and Roosevelt Avenue	51.96	56.08
Note: [1] NAAQS—24-hour average 150 $\mu g/m^3$.			

The values shown are the highest predicted concentrations for any of the receptors analyzed. The results indicate that the proposed Plan would not result in any violations of the PM_{10} standard at any of the receptor locations analyzed.

Future maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations were determined so that they could be compared with the DEP interim guidance criteria for $PM_{2.5}$. Consistent with current DEP guidance, $PM_{2.5}$ concentrations are presented as an incremental change in concentrations between the No Build and Build conditions. The maximum predicted localized 24-hour average and neighborhood-scale annual average $PM_{2.5}$ concentration increments are presented in Tables 19-9 and 19-10, respectively. The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be well below the updated DEP interim guidance criteria and, therefore, the proposed Plan would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

Table 19-9
Future (2017) Modeled
24-Hour Average $PM_{2.5}$ Concentration Increments in μg/m^3

Receptor Site	Location	Increment
1	126th Street and Roosevelt Avenue	0.27

Notes:
EPA has lowered the NAAQS to 35 μg/m^3, effective December 18, 2006.
$PM_{2.5}$ interim guidance criteria—24-hour average, > 2 μg/m^3 (5 μg/m^3 not-to-exceed value), based on the magnitude, frequency duration, location, and size of the area of the predicted concentrations.

Table 19-10
Future (2017) Neighborhood Scale $PM_{2.5}$ Concentration Increments in μg/m^3

Receptor Site	Location	Increment
1	126th Street and Roosevelt Avenue	0.04

Notes:
NAAQS—annual average 15 μg/m3.
PM2.5 interim guidance criteria—annual average (neighborhood scale) 0.1 μg/m3.

PROPOSED USES ALONG ELEVATED PORTIONS OF NORTHERN BOULEVARD

As described in Section D, "Methodology for Predicting Pollutant Concentrations," an analysis was also undertaken to determine maximum CO concentrations on sensitive uses that would be introduced under the proposed Plan adjacent to the elevated Northern Boulevard. The maximum predicted 1-hour and 8-hour average CO concentrations are presented in Table 19-11. The results show that future CO concentrations at the proposed sites situated near elevated roadways are well below the 1-hour and 8-hour CO standards for the 2017 Build condition.

Table 19-11
Future (2017) Maximum Predicted 1-Hour and 8-Hour Carbon Monoxide Concentrations on Proposed Uses along Northern Boulevard (ppm)

Location	Time Period	1-Hour	8-Hour
Proposed Uses along the Elevated Portion of Northern Boulevard	AM	4.2	2.6
	PM pre-game	4.2	2.6
	WE pre-game	4.2	2.6

Notes: NAAQS: 1-hour: 35 ppm. 8-hour: 9 ppm.

PARKING FACILITIES

Proposed Plan and the Anticipated Development on Lot B Parking

Using the methodology set forth in the *CEQR Technical Manual*, the maximum predicted future CO concentrations from a conceptual garage at the proposed convention center, including ambient background levels and contributions from on-street traffic at sensitive receptors closest to the exhaust would be 9.9 ppm for the 1-hour period, and 4.8 ppm for the 8-hour period. The maximum CO concentrations for the 1-hour and 8-hour averaging period for the convention center parking garage without the background and on-street contributions would be 5.7 ppm and 2.2 ppm, respectively. These maximum predicted CO levels would be in compliance with the applicable CO federal ambient air quality standards and the CO *de minimis* criteria. The baseline concentration used to compute the *de minimis* value was assumed to be the background CO concentration. The *de minimus* value obtained was 3.6 ppm. Since the proposed convention center garage under the worst-case assumptions would not result in significant air quality impacts, it is concluded that other garages that would be constructed under the proposed Plan, with a smaller capacity and fewer peak hour trips, would also not result in significant air quality impacts.

The maximum predicted future CO concentrations from a conceptual garage analyzed for the anticipated development on Lot B, including ambient background levels and contributions from on-street traffic at sensitive receptors closest to the exhaust, would be 6.2 ppm for the 1-hour period and 3.2 for the 8-hour period. The maximum CO concentrations for the 1-hour and 8-hour averaging period for a conceptual garage analyzed for the anticipated Lot B development without the background and on-street contributions would be 1.9 ppm and 0.5 ppm, respectively. These maximum predicted CO levels would be in compliance with the applicable CO federal ambient air quality standards and the CO *de minimis* criteria.

Citi Field Parking

A screening analysis was performed to assess potential impacts from the existing Citi Field parking lot C, directly across 126th Street from the District. Based on the methodology previously discussed, the maximum overall predicted future CO concentrations, including ambient background levels and potential contributions from nearby on-street traffic, at proposed new structures along 126th Street, would be 4.5 ppm and 2.8 ppm for the 1- and 8-hour periods, respectively. These maximum predicted CO levels are in compliance with the applicable CO standards.

STATIONARY SOURCES

HVAC Systems

As described previously, the HVAC analysis for the proposed Plan was performed using the *CEQR Technical Manual* screening procedure, the available information regarding the proposed Plan, the zoning Special District regulations, and the FAA height restrictions. It was determined for the purpose of this analysis that the entire District would be restricted to using No. 2 oil or natural gas as fuel for HVAC systems, and that No. 4 oil or No. 6 oil would be prohibited. To account for a range of possible development sizes and locations very conservative assumptions were made regarding the gross square foot area and stack heights analyzed. Based on the results of the conservative HVAC screening analysis, E-designations would be placed on all lots within the District. As properties are acquired by the City, it is anticipated that a Restrictive Declaration would supersede the E-designation, but require implementation of the same measures regarding fuel use and the placement of HVAC exhaust stacks. The text of the E-designations would be as follows:

- Any new development in the District must ensure that the heating, ventilating and air conditioning systems utilize No. 2 fuel oil or natural gas, to avoid any potential significant air quality impacts.
- Any new development involving a convention center or a hotel must ensure that the HVAC exhaust stack is located at least 140 feet from operable windows, balconies, or air intakes of buildings of similar or greater height when using No. 2 oil, or at least 110 feet when using natural gas.
- Any new development involving a community/cultural center must ensure that the HVAC exhaust stack is located at least 85 feet from operable windows, balconies, or air intakes of buildings of similar of greater height when using No. 2 oil, or at least 65 feet when using natural gas.
- Any new development involving uses other than a convention center, hotel or community/cultural center must ensure that the HVAC stack is located at least 120 feet from operable windows, balconies, or air intakes of buildings of similar or greater height when using No. 2 oil, or at least 100 feet when using natural gas to avoid any potential significant air quality impacts.

With these restrictions in place, no significant adverse air quality impacts are predicted from any of the analyzed developments.

Assuming the proposed school would be the only use on its block and that natural gas would be used (which is typical for New York City public schools), there would be no potential significant adverse impacts on air quality from the school. The street widths prescribed for the District would provide a sufficient distance from the school stack to neighboring blocks.

The gross floor area for the entire development anticipated on Lot B was conservatively treated as a part of a single tall building in the analysis of the potential impact of the Lot B HVAC systems on the proposed uses in the District. The use of No. 4 oil was conservatively assumed for Lot B uses, since the District-wide restriction to No. 2 oil would not apply to Lot B. It was determined that the distance provided by the width of 126th Street, which separates Lot B from the District, and the setbacks for the development along 126th Street, prescribed in the zoning Special District regulations would be sufficient to avoid significant adverse impacts.

To analyze the potential for air quality impacts from the Plan on the anticipated development on Lot B, the gross floor area for the entire maximum amount of office use permitted under the Urban Renewal Plan was conservatively considered to be a single tall building along 126th Street, directly across from Lot B. Based on the distance provided by the width of 126th Street and required building and tower setbacks in the District, there would be no potential air quality impact from large uses in the District on the anticipated development on Lot B.

Although the minimum stack to receptor distances recommended are seemingly large, the minimum distance requirements could be met with reasonable ease considering that:

- Multiple buildings on the same block will most likely be built to the same height, with HVAC stacks located above the uppermost floors.

- The zoning Special District regulations prescribe street widths that range from 60 to 90 feet.
- Building setback would be required above a certain height.
- Building tower dimensions would be limited in the entertainment and commercial zone, effectively providing additional separation of potentially large and tall buildings that would have the potential to impact each other's air quality.

The above stated circumstances would serve to limit the potential for air quality impact of neighboring uses on one another.

Moreover, when the actual building designs and the overall layout of the District are developed for the proposed Plan, the restrictions on stack placement could be relaxed upon further analysis for any particular building for which the current analysis assumptions are shown to be overly conservative.

Therefore, provided that restrictions are imposed on the placement of stacks within the District, as described above, there would be no potential for air quality impacts from HVAC system emissions.

Industrial Source analysis

Permit information was obtained from DEP for five businesses within 1,000 feet of the District. Some of the facilities had more than one emission permit. A large number of facilities (mostly auto-related) were also identified within the District. However, permits from those facilities were not analyzed because the entire District would be redeveloped, requiring the existing on-site businesses to relocate before the proposed uses become occupied. The emission rates and stack parameters from the analyzed permits and the distances of the sources to the District were used in the screening analysis. Table 19-12 shows the air pollutants emitted by the five businesses, the calculated concentrations in the District, and the short-term (1-hour) and annual guideline concentrations for these pollutants.

As shown in Table 19-12, the maximum predicted short-term and annual concentrations of pollutants emitted by industrial sources within 1,000 feet of the District are within the acceptable range based on DEC guidance. Therefore no significant adverse air quality impacts from industrial sources on the development that would be introduced under the proposed Plan are anticipated.

Table 19-12
Contaminant Concentrations Resulting From Businesses With BEC Permits

Potential Contaminants	Estimated Short-term Impact (ug/m^3)	SGC[a] (ug/m^3)	Estimated Long-term Impact (ug/m^3)	AGC[a] (ug/m^3)
Carbon Monoxide	20.3	14,000	1.6	N/A
Particulates	5.4	380	0.4	45
Carbon Dioxide	16,837	5,400,000	1,347	21,000
Nitrogen Dioxide	215.9	N/A	17.3	100
Sulfur Dioxide	21.6	910	1.7	80

Notes:
[a] DEC DAR-1 (Air Guide-1) AGC/SGC Tables, September 2007.
AGC-Annual Guideline Concentrations
SGC-Short-term Guideline Concentrations

NO CONVENTION CENTER SCENARIO

The No Convention Center Scenario would generate fewer total vehicle trips than the proposed Plan in all peak periods. Therefore, the results of the analysis of the proposed Plan mobile source emissions are a conservative estimate of potential mobile source impacts under the No Convention Center Scenario. Since no significant adverse impacts from mobile sources were predicted for the proposed Plan with the convention center, it is concluded that there would be no significant adverse impacts from the No Convention Center Scenario. The predicted concentrations at elevated receptors along Northern Boulevard under the No Convention Center Scenario would be the same as the concentrations presented for the proposed Plan. Therefore, there would be no significant adverse impacts from the elevated road on proposed uses under the No Convention Center Scenario.

Under the No Convention Center Scenario, maximum concentrations of CO and other pollutants from parking facilities would be anticipated to be lower than the proposed Plan, since other garages would be smaller in capacity than the analyzed prototypical garage at the convention center. Therefore, the analysis presented for the proposed Plan, which predicted compliance with the CO *de minimis* and with NAAQS, is a conservative estimate that accounts for any smaller garages associated with the No Convention Center Scenario. The No Convention Center Scenario would not affect the results of the analysis of the existing Citi Field parking lot C and parking associated with the anticipated development on Lot B. Therefore, no significant adverse impacts would result.

Under the No Convention Center Scenario, the proposed convention center use would be replaced by additional residential and retail uses. It is assumed that the zoning Special District regulations that apply to residential and retail uses under the proposed Plan, would also apply for those same uses should they be developed in place of the convention center. Provided that the restrictions on HVAC placement are implemented for each use type that requires restrictions under the No Convention Center Scenario, there would be no potential for air quality impacts from HVAC uses.

The industrial sources analyzed for the proposed Plan would not be any different under the No Convention Center Scenario. Since the distance from the District boundary to the industrial source property line was considered in the analysis, and no consideration was given to the types of uses proposed within the District, the development of residential and retail uses instead of the convention center would not alter the conclusions of the industrial source analysis. Therefore, there would be no potential for significant impacts from industrial sources within 1,000 feet of the District with the No Convention Center Scenario. ✷