A. INTRODUCTION

The potential for air quality impacts as a result of the proposed action is examined in this chapter. Air quality impacts can be either direct or indirect. Direct impacts stem from emissions generated by stationary sources at a development site, such as emissions from fuel combustion on-site for heating and hot water systems. Indirect impacts could be caused by emissions from nearby existing stationary sources and the emissions from on-road vehicle trips generated by the proposed project or other changes to future traffic conditions due to the proposed action. In addition, potential effects of stationary source emissions from existing nearby industrial facilities on the proposed residential uses are assessed.

B. PRINCIPAL CONCLUSIONS

The analyses conclude that the proposed action would not result in any significant adverse air quality impacts on sensitive uses in the surrounding community, and the proposed Flushing Commons and Macedonia Plaza projects would not be adversely affected by new or existing sources of air emissions around the rezoning area.

The maximum predicted pollutant concentrations and concentration increments from mobile sources with the proposed Flushing Commons and Macedonia Plaza projects would be below the corresponding air quality impact criteria. Impacts due to the proposed Flushing Commons project's parking facilities would result in no significant adverse air quality impacts. To preclude the potential for significant adverse air quality impacts from parking garage ventilation emissions, an E-designation would be incorporated for the proposed action that would include provisions restricting the number and minimum height of ventilation exhausts.

A stationary source screening analysis determined that there would be no potential significant adverse air quality impacts from the proposed Flushing Commons and Macedonia Plaza projects' heating, ventilation, and air conditioning (HVAC) systems. To ensure that significant adverse air quality impacts are avoided, limitations on the type of fuel and location of certain exhaust stacks for fossil fuel-fired equipment would be included in an air quality E-designation for the proposed action. In addition, there would be no significant adverse air quality impacts from industrial facilities on the proposed Flushing Commons and Macedonia Plaza projects.

C. 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 such non-road diesel 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 that does not persist in the atmosphere, CO concentrations can vary greatly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

The proposed action would result in changes in traffic patterns and an increase in traffic volume in the study area. Therefore, a mobile source analysis was conducted at critical intersections in the study area to evaluate future CO concentrations with and without the proposed action.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions. The 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 Flushing Commons and Macedonia Plaza projects 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 project-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.) An analysis of the potential NO_2 impacts from the proposed Flushing Commons and Macedonia Plaza projects' stationary sources of emissions was performed.

LEAD

Airborne lead emissions are principally associated with industrial sources. 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 a 25-year effort to phase out lead in gasoline. Even at locations in the New York City area where traffic volumes are very high, atmospheric lead concentrations are far below the 3-month average national standard of 0.15 micrograms per cubic meter ($\mu g/m^3$).

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

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOC; 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 impacts due to the increased traffic associated with the proposed action, based on the latest available guidance.

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 project, natural gas would be burned in the proposed HVAC systems. The sulfur content of natural gas is negligible; therefore, no analysis was performed to estimate the future levels of SO_2 with the proposed project.

AIR TOXICS

In addition to the criteria pollutants discussed above, non-criteria toxic air pollutants, also called air toxics, are regulated. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by 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 (September 2007) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure.

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

The rezoning area is adjacent to existing industrial uses. Therefore, an analysis to examine the potential for impacts on the proposed Flushing Commons and Macedonia Plaza projects from industrial emissions was performed.

D. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS (NAAQS)

As required by the CAA, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary and secondary standards are the same for NO_2 (annual), ozone, lead, and PM, and there is no secondary standard for CO and the 1-hour NO_2 standard. The current NAAQS are presented in Table 16-1. The NAAQS for CO, annual 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).

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 $\mu g/m^3$ 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. EPA has also revised the 8-hour ozone standard, lowering it from 0.08 to 0.075 parts per million (ppm), effective as of May 2008.

Table 16-1
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				
Rolling 3-Month Average [5]	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average [6]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average [2]	0.075	150	0.075	150
Respirable Particulate Matter (PM_{10})				
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	None	
Maximum 24-Hour Average [1] [7]	0.14	365	None	
Maximum 3-Hour Average [1] [7]	NA	NA	0.50	1,300
Maximum 1-Hour Average [8]	75	196	None	

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. EPA has reduced these standards down from 0.08 ppm, effective May 27, 2008.
[3] Not to be exceeded by the annual 98th percentile when averaged over 3 years.
[4] EPA has lowered the NAAQS down from 65 µg/m^3, effective December 18, 2006.
[5] EPA has lowered the NAAQS down from 1.5 µg/m^3, effective January 12, 2009.
[6] 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
[7] Standard to be revoked 60 days after promulgation of new 1-hour standard.
[8] 3-year average of the annual fourth highest daily maximum 1-hr average concentration.

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

EPA lowered the primary and secondary standards for lead to 0.15 µg/m^3, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span. The current lead NAAQS will remain in place for one year following the effective date of attainment designations for any new or revised NAAQS before being revoked, except in current non-attainment areas, where the existing NAAQS will

not be revoked until the affected area submits, and EPA approves, an attainment demonstration for the revised lead NAAQS.

EPA established a new 1-hour average NO_2 standard of 0.100 ppm, effective April 12, 2010, in addition to the current annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentrations in a year.

On June 3, 2010 EPA announced a new 1-hour average SO_2 standard of 0.075 ppm, effective 60 days after the promulgation of the standard, replacing the current 24-hour primary and annual standards. The statistical form is the 3-year average of the 4th highest daily maximum 1-hour average concentration in a year (the 4th highest daily maximum corresponds approximately to 99th percentile for a year.)

On January 6, 2010, EPA proposed a change in the 2008 ozone NAAQS, lowering the primary NAAQS from the current 0.075 ppm level to within the range of 0.060-0.070 ppm. EPA is also proposing a secondary standard, measured as a cumulative concentration within the range of 7-15 ppm-hours aimed mainly at protecting sensitive vegetation. EPA intends to complete this reconsideration of the 2008 ozone NAAQS by August 31, 2010.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS (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.

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 submitted a final SIP to EPA, dated October 2009 designed to meet the annual average standard by April 5, 2010. Based on recent monitoring data, annual average concentrations of $PM_{2.5}$ in New York City no longer exceed the annual standard.

As described above, EPA has revised the 24-hour average $PM_{2.5}$ standard. In October 2009 EPA finalized the designation of the New York City Metropolitan Area as nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS, effective November 2009. The nonattainment area includes the same 10-county area EPA designated as nonattainment with the 1997 annual $PM_{2.5}$ NAAQS. By November 2012 New York will be required to submit a SIP demonstrating attainment with the 2006 24-hour standard by November 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 the 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. SIPs will be due three years after the final designations are made. On March 12, 2009, NYSDEC recommended that the counties of Suffolk, Nassau, Bronx, Kings, New York, Queens, Richmond, Rockland, and Westchester be designated as a non-attainment area for the 2008 ozone NAAQS (the NYMA MSA nonattainment area). The EPA has proposed to determine that the Poughkeepsie nonattainment area (Dutchess, Orange, Ulster, and Putnam counties) has attained the one-hour and eight-hour National Ambient Air Quality Standards for ozone.

New York City is currently in attainment of the annual-average NO_2 standard. EPA has promulgated a new 1-hour standard, but it is unclear at this time what the City's attainment status will be due to the need for additional near road monitoring required for the new standard. The existing monitoring data indicates background concentrations below the standard. It is likely that New York City will be designated as "unclassifiable" at first (January 2012), and then classified once three years of monitoring data are available (2016 or 2017).

New York City is currently in attainment of the SO_2 standards. EPA recently promulgated a new 1-hour standard which will replace the current primary standards. Based on the recent monitoring data, 1-hour SO_2 concentrations in all areas of the state are below the new standard.

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 predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[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

[1] *CEQR Technical Manual*, section 222, 2001; and State Environmental Quality Review Regulations, 6 NYCRR § 617.7

Table 16-1) 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.

As mentioned earlier, EPA recently promulgated a new 1-hour NAAQS for NO_2. NYSDEC is projecting lower future NO_x (including NO_2) concentrations due to existing plans for reducing emissions aimed at attaining the ozone standards.

Overall, the proposed action may result in some increases in local NO_2 concentrations, specifically near intersections where small increases in traffic volumes may occur. At the present time there are not sufficient data and established technical analysis techniques to determine reliably whether concentrations due to emissions from mobile sources in the project study area would be above or below the 1-hour standard in the Build condition. These analysis limitations preclude the performance of an accurate quantitative assessment of the significance of the 1-hour NO_2 increments from the increase in traffic resulting from the proposed action. HVAC emissions were screened out in the DEIS as insignificant for the annual NO_2 and short-term SO_2 NAAQS, therefore, no additional analysis has been performed.

DE MINIMIS CRITERIA REGARDING CO IMPACTS

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

INTERIM GUIDANCE CRITERIA REGARDING $PM_{2.5}$ IMPACTS

NYSDEC has published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts.[2] 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. NYSDEC deems projects with emissions below this threshold to be insignificant with respect to $PM_{2.5}$ and does not require further assessment under the policy. The policy states that 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 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.

[2] CP33/Assessing and Mitigating Impacts of Fine Particulate Emissions, NYSDEC 12/29/2003.

For projects subject to CEQR, the interim guidance criteria currently employed for determination of potential significant adverse $PM_{2.5}$ impacts 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 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 $\mu g/m^3$ but no greater than 5 $\mu g/m^3$ would be considered a significant adverse impact on air quality based on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations;
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete receptor location (elevated or ground level).

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the CEQR or NYSDEC interim guidance criteria above will be considered to have a potential significant adverse impact. Actions subject to CEQR that fail the interim guidance criteria should prepare an environmental impact statement (EIS) and examine potential measures to reduce or eliminate such potential significant adverse impacts.

The proposed action's annual emissions of PM_{10} are estimated to be well below the 15-ton-per-year threshold under NYSDEC's $PM_{2.5}$ policy guidance. The above interim guidance criteria have been used to evaluate the significance of predicted impacts of the proposed action's traffic on $PM_{2.5}$ concentrations.

E. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

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

The mobile source analyses for the proposed action 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 action.

DISPERSION MODELS FOR MICROSCALE ANALYSES

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

To determine motor-vehicle-generated PM concentrations adjacent to streets near the project area, 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.

Following the EPA guidelines, CO computations were performed using a wind speed of 1 meter per second, a 1,000 meter mixing height and the neutral stability class D. Concentrations were calculated using a wind angle increment of 1 degree. 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 and, in addition, a 43° Fahrenheit ambient temperature was assumed for the emissions computations. At each receptor location, the wind angle that maximized the pollutant concentrations was used in the analysis regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

A Tier II analysis performed with the CAL3QHCR model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 2003-2007. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The microscale analyses were performed for existing conditions and 2013, the year by which the proposed Flushing Commons and Macedonia Plaza projects are expected to be completed. The future analysis was performed both without the proposed action (the No Build condition) and with the proposed action (the Build condition).

VEHICLE EMISSIONS DATA

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

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

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

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

ROAD DUST

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. Road dust emission factors were calculated according to the latest procedure delineated by EPA.[3] In accordance with the City's current guidance, $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, consistent with this same guidance, the $PM_{2.5}$ component of the fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analysis, since it is considered to be an insignificant contribution on that scale.

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 14, "Traffic and Parking"). Traffic data for the future without and with the proposed action were employed in the respective air quality modeling scenarios. The weekday

[3] 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.

evening (5 to 6 PM) and weekend midday (12:30 to 1:30 PM) peak periods were analyzed. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project-generated and future Build traffic and, therefore, have the greatest potential for significant air quality impacts.

For particulate matter, the peak morning, midday and evening period traffic volumes were used as a baseline for determining off-peak volumes. Off-peak traffic volumes in the future without the proposed action (the "No Build" condition), and off-peak increments from the proposed action, were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations. For annual impacts, average weekday 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

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 highest background concentrations monitored at the nearest NYSDEC background monitoring station in the most recent five-year period were used. It was conservatively assumed that the maximum background concentrations occur on all days.

The 8-hour average CO background concentration used in this analysis was 2.5 ppm, which is based on the second-highest 8-hour measurements over the most recent five-year period for which complete monitoring data is available (2003–2007), using measurements obtained at the NYSDEC monitoring station located at Queens College. The 1-hour CO background employed in the analysis was 3.2 ppm.

The PM_{10} 24-hour background concentration of 55 $\mu g/m^3$ was based on the second-highest concentration, measured over the most recent three-year period for which complete data are available (2006–2008). The nearest NYSDEC monitoring site, at PS219/Queens College, was used. $PM_{2.5}$ background concentrations are not presented, since impacts are assessed on an incremental basis.

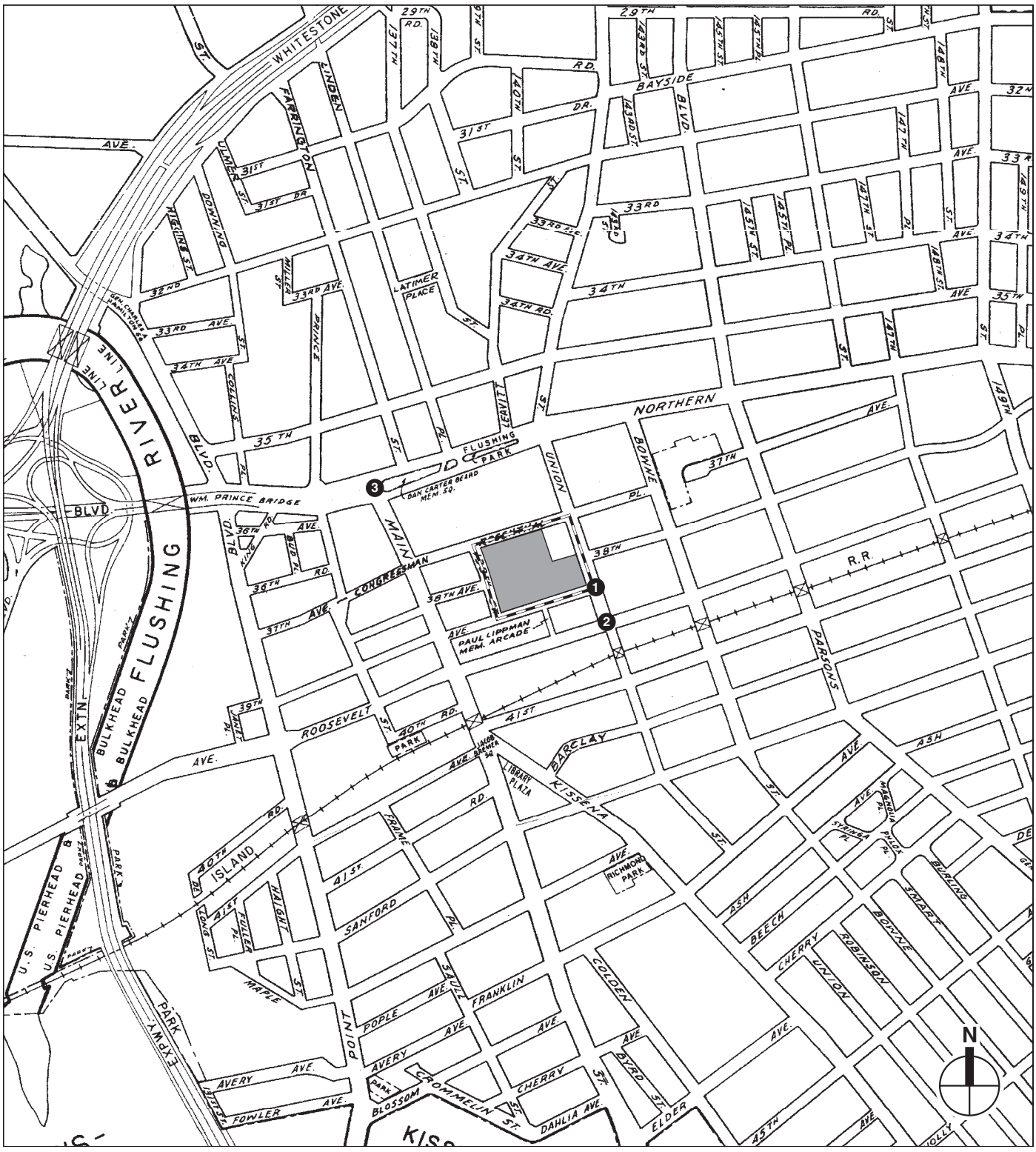
MOBILE SOURCE ANALYSIS SITES

Three intersection locations were selected for microscale analysis (see Table 16-2 and Figure 16-1). These intersections were selected because they are the locations in the study area where the largest levels of project-generated traffic are expected and, therefore, where the maximum changes in the concentrations would be expected and where the highest potential for air quality impacts would occur. Each of these intersections was analyzed for CO.

Table 16-2
Mobile Source Analysis Intersection Locations

Receptor Site	Location
1	39th Avenue at Union Street
2	Roosevelt Avenue at Union Street
3	Northern Boulevard at Main Street

2.11.08



Project Site

Rezoning Area Boundary

❶ *Air Quality Receptor*

Air Quality Receptor Locations

Figure 16-1

Flushing Commons

RECEPTOR LOCATIONS

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at each of the selected sites. Receptors were placed along the approach and departure links at spaced intervals. Local model receptors were placed at sidewalk or roadside locations near intersections with continuous public access and at residential locations. Receptors in the annual $PM_{2.5}$ neighborhood scale models were placed at a distance of 15 meters from the nearest moving lane, based on the DEP procedure for neighborhood scale corridor $PM_{2.5}$ modeling.

PARKING FACILITIES

The proposed Flushing Commons project would include a three level, 1,600-space underground public parking garage at the project site. The outlet air from the garage's ventilation systems could contain elevated levels of CO due to emissions from vehicular exhaust emissions in the garage. The ventilation air could potentially affect ambient levels of CO at locations near the outlet vents. An analysis of the emissions from the outlet vents and their dispersion in the environment was performed, calculating pollutant levels at the various distances from the vents, using the methodology set forth in the *CEQR Technical Manual*.

Emissions from vehicles entering, parking, and exiting the garage were estimated using the EPA MOBILE6.2 mobile-source emission model, as described above, for mobile sources. For all arriving and departing vehicles, an average speed of five miles per hour was conservatively assumed for travel within the parking garage. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit because departing drivers often take some time after starting the engine before leaving. The concentrations within the garage were calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of one cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were predicted for the maximum eight-hour average period. (No exceedances of the one-hour CO standard would occur, and the eight-hour values are the most critical for impact assessment.)

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

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit the facility. Departing vehicles were assumed to be operating in a "cold-start" mode, emitting higher levels of CO than arriving vehicles.

Since a detailed design has not been completed for the proposed parking garage, assumptions were made regarding the design of the mechanical ventilation systems. It was assumed that the exhaust air from the parking garage would be vented through a minimum of three outlet vents at a height of approximately 32 feet. The vent face was modeled to directly discharge to Union Street, and receptors were placed along the sidewalks on both sides of the street (both near the vent and across the street) at a pedestrian height of six feet and at distances of 7 feet and 62 feet from the vent to account for receptors near the vent and for receptors on the opposite side of a street or an avenue, respectively.

A persistence factor of 0.70, supplied by DEP, was used to convert the calculated one-hour average maximum CO concentrations to eight-hour averages, accounting for meteorological variability over the average eight-hour period.

Background and on-street CO concentrations were added to the modeling results to obtain the total ambient levels. The on-street CO concentration was determined using the methodology in Air Quality Appendix 1 of the *CEQR Technical Manual*, utilizing traffic volumes from a traffic survey conducted in the study area.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the proposed Flushing Commons and Macedonia Plaza projects' HVAC systems. In addition, an assessment was conducted to determine the potential for impacts on future residents and visitors of the rezoning area due to industrial activities.

HVAC ANALYSIS

A screening analysis was performed to assess air quality impacts associated with emissions from the HVAC systems of the proposed Flushing Commons and Macedonia Plaza projects. The methodology described in the *CEQR Technical Manual* was used for the analysis. The *CEQR* methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures use information regarding the type of fuel to be burned, the maximum development size, and the HVAC exhaust stack height to evaluate whether a significant adverse impact is likely. Based on the distance from the development to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the *CEQR Technical Manual,* there is the potential for significant air quality impacts, and a refined dispersion modeling analysis is required. Otherwise, the source passes the screening analysis, and no further analysis is required.

The HVAC screening analysis was performed for the residential and retail portions of the proposed Flushing Commons project separately, since maximum impacts would occur at different locations. The project site was evaluated and any nearby projected residential development of similar or greater height was analyzed as a potential receptor. The maximum development floor area of each building or space to be heated was used as input for the screening analysis. The proposed Flushing Commons project would use natural gas exclusively in the HVAC systems, and the stacks were assumed to be located 3 feet above the roof height (as per the *CEQR Technical Manual*). In addition, each of the natural gas-fired HVAC exhausts for the plaza-level retail space would be designed to be at least 30 feet away from any sensitive use, such as windows, balconies, or air intakes. The HVAC analysis also included the development of the Macedonia Plaza affordable housing project on the northeast portion of the rezoning area.

INDUSTRIAL SOURCE ANALYSIS

Potential effects from existing industrial operations in the surrounding area on the proposed Flushing Commons and Macedonia Plaza projects were evaluated. All industrial air pollutant emission sources within 400 feet of the rezoning area were considered for inclusion in the air quality impact analyses, as recommended in the *CEQR Technical Manual*. The *CEQR Technical Manual* also requires an assessment of any actions that could result in the location of sensitive uses within 1,000 feet of a large emission source. No such sources of emissions were identified; therefore, the analysis focused on industrial sources within the 400 foot study area.

Initially, land use and Sanborn maps were reviewed to identify potential sources of emissions from manufacturing/processing operations. Next, a field survey was conducted to identify buildings within 400 feet of the project site and rezoning area that have the potential for emitting air pollutants. The survey was conducted on February 22, 2006. A list of the identified businesses was then submitted to the NYCDEP Bureau of Environmental Compliance (BEC) to obtain all the available certificates of operation for these locations and to determine whether manufacturing or industrial emissions occur. In addition, a search of Federal and State-permitted facilities within the study area was conducted using the EPA's Envirofacts database. A more recent DEP database was also reviewed.

The results of the investigation found no Federal, State, or City-permitted industrial facilities operating in the study area, which is appropriate based on the zoning and land uses in the area. Therefore, no significant impacts on the proposed project are anticipated from industrial source emissions.

F. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS

Monitored background concentrations of SO_2, NO_2, CO, ozone, lead, PM_{10}, and $PM_{2.5}$ for the study area are shown in Table 16-3. These values (2009) are the most recent monitored data that have been made available by NYSDEC. In the case of the 8-hour ozone and 24-hour $PM_{2.5}$, concentrations reflect the most recent 3 years of data, consistent with the basis for these standards. There were no monitored violations of NAAQS at these monitoring sites. For modeling purposes, the analysis utilized the maximum values over the most recent 3-year period.

Table 16-3
Representative Monitored Ambient Air Quality Data

Pollutants	Location	Units	Period	Concentration	Exceeds Federal Standard?	
					Primary	Secondary
CO	Queens College	ppm	8-hour	1.7	N	N
			1-hour	2.8	N	N
SO_2	Queens College	ppm	Annual	0.004	N	-
			24-hour	0.020	N	-
			3-hour	0.034	-	N
Respirable particulates (PM_{10})	Queens College 2	$\mu g/m^3$	Annual	17	N	N
			24-hour	46	N	N
Respirable particulates ($PM_{2.5}$)	PS219/ Queens College	$\mu g/m^3$	Annual	9.6	N	N
			24-hour	26.7	N	N
NO_2	Queens College	ppm	Annual	0.021	N	N
Lead	JHS 126, Brooklyn	$\mu g/m^3$	3-month	0.012	N	-
Ozone (O_3)	Queens College	ppm	1-hour	0.082	N	N
			8-hour	0.067	N	N

Notes:
[1] The 1-hour ozone NAAQS has been replaced with the 8-hour standard; however, the maximum monitored concentration is provided for informational purposes.
Source: NYSDEC, 2009 New York State Ambient Air Quality Data.

PREDICTED CO CONCENTRATIONS IN THE STUDY AREA

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

Table 16-4 shows the maximum predicted existing (2005) CO 8-hour average concentrations at the receptor sites. (No 1-hour values are shown, since predicted values are much lower than the 1-hour standard of 35 ppm.) At all receptor sites, the maximum predicted 8-hour average concentrations are well below the national standard of 9 ppm.

Table 16-4
Maximum Predicted Existing 8-Hour Average
Carbon Monoxide Concentrations for 2005

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	39th Avenue at Union Street	SAT MD	4.2
2	Roosevelt Avenue at Union Street	SAT MD	4.2
3	Northern Boulevard at Main Street	SAT MD	6.9
Note: 8-hour standard is 9 ppm.			

G. THE FUTURE WITHOUT THE PROPOSED PROJECT

MOBILE SOURCES ANALYSIS

CO

CO concentrations without the proposed action were determined for the Build year using the methodology previously described. Table 16-5 shows future maximum predicted 8-hour average CO concentrations at the analysis intersections without the proposed action (i.e., No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 16-5
Future Maximum Predicted 8-Hour Average
No Build Carbon Monoxide Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	39th Avenue at Union Street	SAT MD	3.8
2	Roosevelt Avenue at Union Street	SAT MD	4.3
3	Northern Boulevard at Main Street	WKDAY PM	5.7
Note: 8-hour standard is 9 ppm.			

As shown in Table 16-5, No Build values are predicted to be well below the 8-hour CO standard of 9 ppm and lower than predicted existing average concentrations (shown in Table 16-4). 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 action were determined for the Build year using the methodology previously described. Table 16-6 presents the future maximum predicted 24-hour average PM_{10} concentrations at the analysis intersection without the proposed action (i.e., No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed. Note that $PM_{2.5}$ concentrations in the No Action condition are not presented, since impacts are assessed on an incremental basis.

Table 16-6
Future Maximum Predicted
No Build 24-Hour PM_{10} Concentrations

Receptor Site	Location	Concentration ($\mu g/m^3$)
1	Northern Boulevard at Main Street	94.50
Note: NAAQS—24-hour, 150 $\mu g/m^3$.		

STATIONARY SOURCE ANALYSIS

Minimal growth and development within the rezoning area would occur in the future without the proposed action. HVAC and industrial source emissions in the No Build condition would likely be similar to existing conditions. Consequently, air quality as affected by local sources of emissions is expected to be similar to existing conditions.

H. PROBABLE IMPACTS OF THE PROPOSED ACTION

The proposed action would result in increased mobile source emissions in the immediate vicinity of the rezoning area. This section describes the results of the studies performed to analyze the potential impacts on the surrounding community from these sources. The areas of concern are discussed below.

MOBILE SOURCES ANALYSIS

TRAFFIC INTERSECTIONS

CO

CO concentrations with the proposed action were determined for the Build condition at traffic intersections using the methodology previously described. Table 16-7 shows the future maximum predicted 8-hour average CO concentration with the proposed action at the three 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 time periods analyzed.

The results indicate that the proposed action would not result in any violations of the 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations would be very small and, consequently, would not result in a violation of the CEQR *de minimis* CO criteria. (The *de minimis* criteria were previously described in section C of this chapter.) Therefore, the proposed action would not result in any significant adverse CO air quality impacts.

Table 16-7
Future Maximum Predicted 8-Hour Average
No Build and Build Carbon Monoxide Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)	
			No Build	Build
1	39th Avenue at Union Street	PM	3.7	3.8
		SAT MD	3.8	3.9
2	Roosevelt Avenue at Union Street	PM	4.0	4.3
		SAT MD	4.3	4.4
3	Northern Boulevard at Main Street	PM	5.7	5.9
		SAT MD	5.5	5.7
Note:	8-hour standard is 9 ppm.			

This analysis was examined in consideration of the traffic analysis of the modified two-way configuration (see Appendix D) and the new proposal would not change the conclusion of no significant adverse air quality impacts from mobile source emissions.

PM

PM concentrations with the proposed action were determined for the Build year using the methodology previously described. Table 16-8 shows the future maximum predicted 24-hour average PM_{10} concentrations with the proposed action.

Table 16-8
Future Maximum Predicted
24-Hour Average PM_{10} Concentrations

Receptor Site	Location	24-Hour Concentration ($\mu g/m^3$)	
		No Build	Build
1	Northern Boulevard at Main Street	94.50	95.89
Note: NAAQS—24-hour, 150 $\mu g/m^3$.			

The values shown are the highest predicted concentrations for any of the time periods analyzed. The results indicate that the proposed action 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 $PM_{2.5}$ concentration increments with the proposed action were determined so that they could be compared with the interim guidance criteria that would determine the potential significance of the proposed project's impacts. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in Tables 16-9 and 16-10, 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 action would not result in significant $PM_{2.5}$ impacts at the analyzed receptor locations.

This analysis was examined in consideration of the traffic analysis of the modified two-way configuration (see Appendix D) and the new proposal would not change the conclusion of no significant adverse air quality impacts from mobile source emissions.

Table 16-9
Future Maximum Predicted
24-Hour Average $PM_{2.5}$ Increment

Receptor Site	Location	Increment
1	Northern Boulevard at Main Street	0.03
Note: $PM_{2.5}$ interim guidance criteria—24-hour average, > 2 µg/m^3 (5 µg/m^3 not-to-exceed value), depending on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations.		

Table 16-10
Future Maximum Predicted
Annual Average $PM_{2.5}$ Increment

Receptor Site	Location	Increment
1	Northern Boulevard at Main Street	0.01
Note: $PM_{2.5}$ interim guidance criteria—annual (neighborhood scale), 0.1 µg/m^3.		

PARKING FACILITIES

A screening analysis was performed to assess potential impacts from the proposed Flushing Commons project's parking facilities. 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 sidewalk receptor locations) would be 6.5 ppm and 4.4 ppm for the 1- and 8-hour periods, respectively. The maximum 1- and 8-hour contributions from the parking garage alone would be 3.3 ppm and 1.9 ppm, respectively. The values are the highest predicted concentrations for any time period analyzed. To ensure that impacts from the proposed parking facility, when added to future Build traffic, are not significant with respect to the *CEQR de minimis* criteria, a minimum of three vents would be required, each of which must be a minimum of 32 feet above grade. The maximum predicted CO concentrations are below the CO NAAQS and CEQR *de minimis* criteria. Therefore, with the proposed restrictions, no significant adverse impacts from the proposed parking garage are expected.

Therefore, to preclude the potential for significant adverse air quality impacts from parking garage ventilation emissions, an E-designation would be incorporated for the proposed action. The text of the E-designations is as follows:

Block 4978, Lot 25

> As part of the completion of the underground parking facilities, a minimum of three (3) ventilation exhausts shall be installed with a minimum exhaust height of 32 feet above grade, to avoid any potential significant air quality impacts.

STATIONARY SOURCE ANALYSIS

FLUSHING COMMONS

The primary stationary source of air pollutants associated with the proposed Flushing Commons project would be emissions from the combustion of natural gas by HVAC equipment. The primary pollutant of concern when burning natural gas is NO_2.

The screening methodology in the *CEQR Technical Manual* was used for the proposed size of the residential and commercial areas in square feet. It is anticipated that each of the five main buildings would have its own HVAC systems. For buildings B, C, and D, it was determined that there would not be any significant stationary source air quality impacts because at the nearest distances to buildings of a similar or greater height, these proposed developments would be below the maximum permitted sizes shown in Figure 3Q-9 and Figure 3Q-10 of the *CEQR Technical Manual.* For building A, the nearest building of a similar or greater height would be proposed building B. To ensure no significant air quality impacts would occur, the HVAC stack for building A would need to be at least 181 feet high or at least 99 feet away from any operable windows or air intakes on proposed building B based on Figure 3Q-9 of the *CEQR Technical Manual.* For building E, the nearest building of a similar or greater height would be proposed building C. To ensure no significant air quality impacts would occur, the HVAC stack would need to be at least 50 feet away from any operable windows or air intakes on proposed building C based on Figure 3Q-10 of *CEQR Technical Manual*.

At the roof of the plaza level connecting the tower buildings, retail tenants would have individual heating and cooling systems vented at various locations. Using Figure 3Q-10 of the *CEQR Technical Manual* and a minimum distance of 30 feet to the nearest receptor, no significant adverse impact would result for proposed retail developments up to approximately 40,000 square feet. Since this is larger than the largest planned individual retail space (approximately 30,000 square feet), no significant adverse impact would occur from the proposed project's HVAC emissions with this restriction.

Therefore, to preclude the potential for significant adverse air quality impacts from HVAC emissions, an E-designation would be incorporated for the proposed action. The text of the E-designations is as follows:

Block 4978, Lot 25

> Any new development on this property must ensure that the heating, ventilating and air conditioning stack(s) utilize natural gas, to avoid any potential significant air quality impacts.
>
> For the proposed development located adjacent to the lot lines facing 37th Avenue and 138th Street, the heating, ventilating and air conditioning stack(s) must be a minimum of 181 feet in height above local grade, or should be located no more than 202 feet from the lot line facing 138th Street, to avoid any potential significant air quality impacts.
>
> For the proposed development located adjacent to the lot lines facing 39th Avenue and 138th Street, the heating, ventilating and air conditioning stack(s) should be located no more than 233 feet from the lot line facing 138th Street to avoid any potential significant air quality impacts.
>
> Fossil fuel-fired heating, ventilating and air conditioning stack(s) associated with retail developments should be located no less than 30 feet from any operable windows or air intakes of an equal or greater height to avoid any significant adverse air quality impacts.

MACEDONIA PLAZA

Block 4978, Lot 46 and portion of Lot 25

The primary stationary source of air pollutants associated with the proposed Macedonia Plaza building would be emissions from the combustion of natural gas and fuel oil by HVAC

equipment. The primary pollutant of concern when burning natural gas is NO_2, and when burning fuel oil, SO_2.

For the proposed Macedonia Plaza building, the nearest building of a similar or greater height was determined to be the proposed building B on the same block. To avoid any significant impacts, HVAC exhaust stack(s) would need to be placed at least 98 feet from any operable windows or air intakes on building B when firing fuel oil (No. 2 or No. 4 oil), and at least 59 feet when firing natural gas. These restrictions are considered feasible based on the building configuration.

To avoid potential significant adverse impacts from the HVAC systems associated with the proposed residential building, the LDA between HPD and with parties as determined by HPD, would include the following requirements for the proposed project:

Block 4978, Lot 46 and portion of Lot 25

> For the proposed development located adjacent to the lot lines facing 37th Avenue and Union Street, the heating, ventilating and air conditioning stack(s) should be located no more than 86 feet from the lot line facing Union Street when burning fuel oil, and no more than 125 feet from the lot line facing Union Street when burning natural gas, to avoid any potential significant air quality impacts.

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