A. INTRODUCTION

The proposed action would not result in significant adverse impacts related to mobile or stationary source emissions. With respect to HVAC emissions, the proposed action would include (E) designations for air quality, which would restrict the placement of a building's vent stack and/or restrict the type of fuel used for HVAC systems.

As discussed in Chapter 1, "Project Description," the proposed action would generate a net increase of approximately 4,708 dwelling units (DUs), ~~292,676~~ 195,215 square feet (sf) of retail space and 198,726 sf of museum space, and net decreases of ~~816,847~~ 796,947 sf of office, 131,100 sf of hotel, ~~40,809~~ 74,818 sf storage/manufacturing, ~~318,580~~ 225,940 sf of parking/auto related uses, and ~~25,064~~ 4,080 sf of vacant space on the 25 projected development sites. The proposed action also includes the site selection and acquisition of the High Line to create a publicly accessible ~~6.7~~5.9-acre open space.

Air quality issues associated with this scenario relate to:

- Potential for increases and/or changes in vehicular travel associated with the action-generated development to result in significant mobile source air quality impacts,
- Potential for the emissions from the heating systems of the action-generated developments to significantly impact existing land uses and/or other action-generated developments;
- Potential for emissions from heating systems of the action-generated developments to significantly impact other action-generated developments;
- Potential of existing commercial, institutional or large-scale residential developments to impact action-generated residential/commercial uses on projected and potential development sites;
- Potential for the relocated Quill Bus Depot to impact action-generated mixed-use development on projected and potential development sites; and
- Potential for action-generated residential/commercial uses on projected and potential development sites to be adversely affected by air toxic emissions generated by existing nearby industrial and commercial uses.

These issues were also considered for the project's Base FAR Scenario, which would result in a lower number of action-induced developments and smaller buildings, which would have lower HVAC stack release heights.

Air quality analyses were conducted, following the procedures outlined in the *2001 CEQR Technical Manual*, to determine whether the Proposed Action would result in violations of ambient air quality standards or health-related guideline values. The methodologies and procedures utilized in these analyses are described below.

POLLUTANTS OF CONCERN

The following air pollutants have been identified by the U.S. Environmental Protection Agency (USEPA) as being of concern nationwide: carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), photochemical oxidants, particulate matter, sulfur oxides (SOx), and lead (Pb). In New York City, ambient concentrations of CO, HC, and photochemical oxidants are predominantly influenced by motor vehicle activity; NOx are emitted from both mobile and stationary sources; emissions of SOx are associated mainly with stationary sources; and emissions of particulate matter are associated with stationary sources, and to a lesser extent, diesel-fueled mobile sources (heavy trucks and buses). Lead emissions, which historically were principally influenced by motor vehicle activity, have been substantially reduced due to the elimination of lead from gasoline.

Carbon Monoxide

CO is a colorless and odorless gas that is generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles. In New York City, more than 80 percent of CO emissions are from motor vehicles. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions.

Hydrocarbons, Nitrogen Oxides, and Photochemical Oxidants

Hydrocarbons include a wide variety of volatile organic compounds, emitted principally from the storage, handling, and use of fossil fuels. NOx constitute a class of compounds that include nitrogen dioxide (NO2) and nitric oxide, both of which are emitted by motor vehicles and stationary sources. Both hydrocarbons and NOx are of concern primarily because most of those compounds react in sunlight to form photochemical oxidants, including ozone. This reaction occurs comparatively slowly and ordinarily takes place far downwind from the site of actual pollutant emission. The effects of these pollutants are normally examined on an area wide, or mesoscale, basis. Since the projected and potential developments would not significantly affect the amounts of these pollutants generated within the region, an analysis of these pollutants is usually not warranted. However, because nitrogen oxides are emitted from heating systems, the potential NO2 impacts associated with the anticipated new residential developments were considered.

Particulate Matter

Particulate matter is a broad class of air pollutants that exist as liquid droplets or solids, with a wide range of sizes and chemical composition. Particulate matter is emitted by a variety of sources, both natural and man-made. Natural sources include the condensed and reacted forms of natural organic vapors, salt particles resulting from the evaporation of sea spray, wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and debris from live and decaying plant and animal life, particles eroded from beaches, desert, soil and rock,

and particles from volcanic and geothermal eruptions and forest fires. Major man-made sources of particulate matter include the combustion of fossil fuels such as vehicular exhaust, power generation and home heating, chemical and manufacturing processes, all types of construction (including that from equipment exhaust and re-entrained dust), agricultural activities, and wood-burning fireplaces. Fine particulate matter is also derived from combustion material that has volatilized and then condensed to form primary particulate matter (often after release from a stack or exhaust pipes) or from precursor gases reacting in the atmosphere to form secondary particulate matter. It is also derived from mechanical breakdown of coarse particulate matter, e.g., from building demolition or roadway surface wear.

Of particular health concern are those particles that are smaller than or equal to 10 microns (PM_{10}) in size and 2.5 microns ($PM_{2.5}$) in size. The principal health effects of airborne particulate matter are on the respiratory system.

Sulfur Oxides

High concentrations of SO2 affect breathing and may aggravate existing respiratory and cardiovascular disease. SO2 emissions are generated from the combustion of sulfur-containing fuels -- oil and coal -- largely from stationary sources such as coal and oil-fired power plants, steel mills, refineries, pulp and paper mills, and nonferrous smelters. In urban areas, especially in the winter, smaller stationary sources such as HVAC systems contribute to elevated SO2 levels. Ambient SO2 levels recorded in New York City have complied with ambient air quality standards for the past 22 consecutive years. Because sulfur oxides are emitted from combustion sources, the potential SO2 impacts associated with the heating systems of anticipated new mixed-use residential and commercial developments were considered.

Lead

Lead emissions are principally associated with industrial sources and motor vehicles using gasoline containing lead additives. As the availability of leaded gasoline has decreased, motor vehicle-related lead emissions have decreased resulting in a significant decline of concentrations of lead. Atmospheric lead concentrations in New York City are well below national standards. Lead concentrations are expected to continually decrease; therefore an analysis of lead is not warranted.

Air Toxics

In addition to criteria pollutants, small quantities of a wide range of the non-criteria air pollutants, known as toxic air pollutants, which are emitted from nearby industrial and commercial facilities, are also of concern. These pollutants can be grouped into two categories: carcinogenic air pollutants, and non-carcinogenic air pollutants. These include hundreds of pollutants, ranging from high to low toxicity. No federal standards have been promulgated for toxic air pollutants. However, EPA and the NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria.

AIR QUALITY STANDARDS AND GUIDELINES

Air Quality Standards

National and New York State ambient air quality standards (NAAQS) are pollutant concentrations for each of the criteria pollutants specified by EPA that have been developed primarily to protect human health. The secondary goal is to protect the nation's welfare and account for the effect of air pollution on soil, water, vegetation and other aspects of general welfare. Time frames, based on how these pollutants adversely affect health, have also been established for these pollutants. These standards, together with their health-related averaging periods, are presented in Table 18-1.

Significant Impact Thresholds

In addition to the Federal and State standards, under New York City's Environmental Quality Review (CEQR) guidelines, incremental impact criteria, known as "de minimis" criteria, have been established to measure the impact significance of estimated increments.

Table 18-1, Applicable Ambient Air Quality Standards

Pollutant	Averaging Period	National and NY State Standards	
		Primary	Secondary
Ozone	1 Hour	0.12 ppm (235 ug/m^3)	Same as Primary
	8 Hour	0.08 ppm (157 ug/m^3)	
Carbon Monoxide	8 Hour	9 ppm (10 mg/m^3)	Same as Primary
	1 Hour	35 ppm (40 mg/m^3)	Same as Primary Standard
Nitrogen Dioxide	Annual Average	0.053 ppm (100 ug/m^3)	Same as Primary
Sulfur Dioxide	Annual Average	80 ug/m^3 (0.03 ppm)	-
	24 Hour	365 ug/m^3 (0.14 ppm)	-
	3 Hour	--	1300 ug/m^3 (0.5 ppm)
Suspended Particulate Matter (PM_{10})	24 Hour	150 ug/m^3	Same as Primary
	Annual Arithmetic Mean	50 ug/m^3	Same as Primary
Suspended Fine Particulate Matter ($PM_{2.5}$)	24 Hour	65 ug/m^3	Same as Primary
	Annual Arithmetic Mean	15 ug/m^3	Same as Primary
Lead	Calendar Quarter	1.5 ug/m^3	Same as Primary

Source: US Environmental Protection Agency, "National Primary and Secondary Ambient Air Quality Standards." (49 CFR 50). New York Department of Environmental Conservation

Abbreviations:

ppm: parts per million

ug/m^3: micrograms per cubic meter

CO Thresholds

Significant CO increments are characterized as:

- An increase of 0.5 ppm or more for the 8-hour period, when baseline concentrations are above 8.0 ppm; or
- An increase of one-half the difference between the baseline and the standard concentration (9 ppm) for the 8-hour period when baseline concentrations are below 8 ppm.

Project-related impacts less than these values are not considered to be significant.

$PM_{2.5}$ Thresholds

In 1997, the EPA established the NAAQS for fine particulates (PM2.5). The EPA has been working with the States to collect and analyze air quality monitoring data for PM2.5 and formal designations of non-attainment areas occurred on December 17 2004. New York City and adjoining counties were ~~Formal designations~~ designated as non-attainment for $PM_{2.5}$ ~~are expected by the end of 2004~~, and NYMTC, the local metropolitan planning organization (MPO ~~states with areas so designated~~ will have three years thereafter to revise the State Implementation Plan (SIP) to address fine particulates. Until the NYSDEC proposes a SIP to address compliance with the new PM2.5 standards, EPA's Office of Air Quality Planning and Region II have indicated that the states have no further obligations under the Clean Air Act (CAA) concerning PM2.5.

In the absence of standards for the analysis of PM2.5 emissions applicable to the New York Metropolitan Area, the values referenced in the NYSDEC Commissioner's Policy (CP-33) (NYSDEC, 2003) and DEP's Interim Guidelines (February 2004) were reviewed. The policy defines certain de minimis criteria for evaluating the potential for significant adverse impacts resulting from the emission of fine particulate matter.

These interim significant threshold values (STVs) are as follows:

- Predicted incremental impacts of PM2.5 greater than 5 µg/m3 averaged over a 24-hour (daily) period at a discrete location of public access, either at ground or elevated levels (microscale analysis);
- Predicted incremental ground-level impacts of PM2.5 greater than 0.1 µg/m3 on an annual average neighborhood-scale basis.

Based on the last three years of monitored data from the NYSDEC, annual PM2.5 levels currently exceed the NAAQS at locations in the vicinity of the project area. Actions that would result in incremental impacts greater than these STVs have the potential to cause significant adverse impacts by exacerbating existing exceedances of the annual PM2.5 standard or increasing 24-hour PM2.5 contributions. Actions which exceed these thresholds would require an examination of potential measures to reduce or eliminate such potential significant adverse impacts.

Non-Criteria Pollutant Thresholds

In order to evaluate short-term and annual impacts of non-carcinogenic toxic air pollutants, the NYSDEC has established short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) for exposure limits. These are maximum allowable 1-

hour and annual guideline concentrations, respectively, that are considered acceptable concentrations below which there should be no adverse effects on the health of the general public.

Based on SGCs and AGCs, EPA also developed methodologies that can be used to estimate the potential impacts of air toxic pollutants from multiple emission sources. The "Hazard Index Approach" can be used to estimate the potential impacts of non-carcinogenic pollutants. If the combined ratio of estimated pollutant concentrations divided by the respective SGCs or AGCs value for each of the toxic pollutants is found to be less than 1, no significant air quality impacts are predicted to occur. For carcinogenic pollutants, unit risk factors based on toxicity of pollutants can be used. EPA does not consider an overall incremental cancer risk from a proposed action of less the one-in-one million to be significant. Using these factors, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of the carcinogenic toxic pollutants combined is less than one-on-one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

POLLUTANTS FOR ANALYSIS

The air pollutants identified as being of concern are considered as follows:

- CO was considered as the pollutant of concern for the mobile source analysis because of the additions and/or changes in local vehicular traffic that are anticipated as a result of the proposed action;
- In light of the ~~an anticipated~~ nonattainment designation of the study area for PM2.5 and NYCDEP's STVs, a PM2.5 analysis was conducted as part of the mobile source analysis to determine whether the proposed action has the potential to exceed these thresholds;
- NO2, and SO2 are the pollutants of concern for the air quality analysis of emissions from the heating systems of project-related developments; and
- Air toxic emissions from existing industrial/manufacturing land uses are considered to determine the potential for significant impacts on projected and potential development sites.

PM10 was not considered for the mobile source analysis because of the small affect the Proposed Action would have on the number of heavy duty and/or diesel fueled vehicles in the study area.

EXISTING POLLUTANT LEVELS AND REGULATORY SETTING

Monitored Data

Representative monitored ambient air quality data for the area are shown in Table 18-2. These data were compiled by the NYSDEC for 2003, the latest calendar year for which data are currently available. Monitored levels for pollutants that are considered for this analysis (i.e., SO_2, NO_2, and PM_{10}) do not exceed National and State ambient air quality standards. Monitored values indicate that current $PM_{2.5}$ annual levels exceed the NAAQS.

Table 18-2, Representative Ambient Air Quality Data (2003)

Pollutant	Monitor	Averaging Time	Value	NAAQS
CO	225 E. 34th St. (Traffic Site Monitor)	8-hour	3.3 ppm	9 ppm
		1-hour	4.0 ppm	35 ppm
	PS 59 (Rooftop Monitor)	8-hour	2.6 ppm	9 ppm
		1-hour	4.6 ppm	35 ppm
NO_2	PS 59	Annual	.038 ppm	0.053 ppm
PM_{10}	1 Pace Plaza	Annual	27 $\mu g/m^3$	50 $\mu g/m^3$
		24-hour	81 $\mu g/m^3$	150 $\mu g/m^3$
PM2.5	PS 59	Annual	19.6 µg/m3	15 µg/m3
		24-hour	49.0 µg/m3	65 µg/m3
SO2	PS 59	3-hour	.071 ppm	0.50 ppm
		24-hour	.097 ppm	0.14 ppm
		Annual	.014 ppm	0.03 ppm

Note: Values are the highest pollutant levels recorded during the 2003 calendar year.
Source: U.S. EPA Airdata Database 2003/NYSDEC Data.

Regulatory Setting

The federal Clean Air Act (CAA) defines nonattainment areas as geographic regions that have been designated as not meeting one or more of the NAAQS. The proposed project is located in an area designated as a severe nonattainment area for the 1-hour ozone standard, a moderate nonattainment area for the 8-hour ozone standards, and a maintenance area for carbon monoxide (CO). Manhattan is also classified as nonattainment area for PM10. The study area has not been designated for $PM_{2.5}$, although current monitored values currently exceed the $PM_{2.5}$ annual standard.

B. MOBILE SOURCE ANALYSIS

Selection of Analysis Sites

A microscale modeling analysis was conducted that estimated CO and $PM_{2.5}$ levels near the heavily congested intersections (i.e., analysis sites) in the study area that are anticipated to be affected by the Proposed Action. The following scenarios were analyzed: existing conditions (2004) and future conditions (2013) with and without the Proposed Action. In order to select these analysis sites, traffic volumes, the levels of service and vehicular speeds at the major signalized intersections were evaluated with and without the Proposed Action. Analysis site selection was based on a screening analysis that was conducted using the *2001 CEQR Technical Manual* screening threshold criteria to determine where the air quality levels would most greatly be affected by the Proposed Action. This screening analysis used total traffic volumes at intersections, operating levels of service, changes associated with speeds, and project-generated trips from the traffic analysis to make the final determination on the analysis sites for all pollutants of concern in the microscale intersection analysis ~~In addition, receptors were placed at the elevated Highline structure~~

~~above the intersection of Tenth Avenue and 17th Street.~~ The intersection sites that were selected for analysis are shown in Table 18-3 and Figure 18-1.

Table 18-3, Microscale Intersection Analysis Sites

Site Number	Intersection
1	Route 9A & W. 14th Street
2	Route 9A & W 18th Street
3	Route 9A & W 26th Street
4	Route 9A & W. 34th Street
5	9th Ave & W. 23rd Street
6	10th Ave & W. 17th Street
~~7~~	~~Highline @ 10th Ave. & W. 17th Street~~

Receptors

The locations at which pollutant concentrations are estimated are known as "receptors." Following guidelines established by the EPA, receptors were located where the maximum concentration is likely to occur and where the general public is likely to have access. For this analysis, receptors were distributed along sidewalks near the intersection selected for analysis and surrounding each analysis site. ~~and the proposed High Line open space.~~

Traffic Data

Traffic data for the air quality analysis were derived from traffic counts and other information developed as part of the traffic study analysis, using *CEQR Technical Manual* guidelines. The AM, MD and PM peak traffic periods were considered. These are the periods when the maximum changes in pollutant concentrations are expected based on overall traffic volumes and anticipated changes in traffic patterns due to the proposed action. These were the same periods selected for the traffic analysis.

The *2000 Highway Capacity Manual* and HCS 2000 software were used to develop the traffic data necessary for the air quality analysis. The vehicle classification was determined through field data collection. Existing vehicle speeds were obtained from field measurements for the area, and adjusted to estimate future free flow speeds.

Vehicle Classification Data

Vehicle classification data required to determine composite emission factors were based on traffic survey data for the following categories: light duty gasoline vehicles (LDGVs), sport utility vehicles (SUVs), medallion taxis, light-duty trucks, heavy-duty trucks, and buses.

Light duty gasoline trucks were divided into four groups (LDGT 1, 2, 3, and 4) based on local downstate registration data. ~~Based on data from the New York State Department of Environmental Conservation (NYSDEC), the registered split between LDGT 1 and 2 and LDGT 3 and 4 is 71 percent to 29 percent, respectively. As provided in the NYSDOT Environmental Procedures Manual (EPM) SUVs were classified as light duty gasoline~~

~~trucks with 75 percent emissions considered as LDGT 1 and LDGT 2, with the remaining 25 percent as LDGT 3 and LDGT 4.~~ The split between LDGT 1, LDGT 2, LDGT 3 and LDGT 4 and between heavy-duty gasoline vehicles (HDGVs) and heavy-duty diesel vehicles (HDDVs) was based on New York State Department of Environmental Conservation (NYSDEC's) registration data in ~~for~~ the MOBILE 6 for each appropriate analysis year. All buses were analyzed as heavy-duty diesel vehicles (HDDVs).

Vehicular Emissions

CO emission factors were estimated using the EPA MOBILE 6 mobile emission factor algorithm model released by the EPA on January 29, 2002. This version includes the effects of the new vehicle standards, and covers vehicle turnover. MOBILE 6.2.03 (the most current updated version), which includes emission factors for particulate matter, was released May 2004 and used in this analysis.

The following assumptions were applied in using MOBILE 6.2.03:

- NYSDEC input files with engine operating start and distribution parameters and vehicle miles traveled (VMT) for New York County were used to estimate baseline conditions;
- 2003 New York State registration and diesel sales fraction data;
- For project-generated outbound light-duty vehicles (LDGVs), emission factors with 100 percent cold-start conditions were used;
- For project-generated inbound LDGVs, emission factors with 100 percent hot-stabilized conditions were used;
- 100 percent hot-stabilized LDGV emission factors were used for medallion taxis, with taxi registration and mileage data.
- SUVs were assumed to be LDGTs that have the same engine operating parameters as automobiles;
- An average winter temperature of 52.5 degrees Fahrenheit was used as approved by the DEP and NYSDEC.

PM2.5 emission factors were estimated using EPA's MOBILE 6.2.03 emission model. Exhaust, brake, and tire wear emissions from moving vehicles were estimated for all vehicle types; idle emissions, however, were estimated only for heavy-duty diesel trucks and buses, because this information is estimated only for these vehicles (PM idle emissions from other vehicle types are considered negligible). Emissions of fugitive dust were estimated using the latest AP-42 equation (dated December 2003) for paved roads. This formula uses empirical data for fugitive dust and has recently been adjusted by the EPA to discount the contribution from exhaust and brake and tire wear emissions. Emissions from fugitive dust are dependent on vehicle weight and the surface silt loading factor. According to the latest NYCDEP guidelines a silt loading factor of 0.10 for principal and minor arterials with more than 5.000 vehicles per day was used for all roadways.

An average vehicle fleet weight of 6,000 pounds was used.

Dispersion Analysis

Mobile source dispersion models are the basic analytical tools used to estimate pollutant concentrations from the emissions generated by motor vehicles as expected under given conditions of traffic, roadway geometry, and meteorology. CAL3QHC Version 2 is a line-source dispersion model that predicts pollutant concentrations near congested intersection and heavily traveled roadways. CAL3QHC input variables include free flow and calculated idle emission factors, roadway geometries, traffic volumes, site characteristics, background pollutant concentrations, signal timing, and meteorological conditions. CAL3QHC predicts inert pollutant concentrations, averaged over a one-hour period near roadways. This model was used to predict concentrations at affected study-area intersections.

CAL3QHC predicts peak one-hour pollutant concentrations using assumed meteorology and peak-period traffic conditions. Different emission rates occur when vehicles are stopped (idling), accelerating, decelerating, and moving at different average speeds. CAL3QHC simplifies these different emission rates into the following two components:

- Emissions when vehicles are stopped (idling) during the red phase of a signalized intersection.
- Emissions when vehicles are in motion during the green phase of a signalized intersection.

CAL3QHCR, which is a refinement to CAL3QHC in that it uses actual meteorological data (as opposed to an assumed worst-case set of meteorological conditions), was used in all mobile source analyses. Five years of actual meteorological data from LaGuardia Airport (1998-2002) were to estimate 1-hour and 8-hour CO concentrations, and peak 24-hour and annual average PM2.5 concentrations.

The analyses followed EPA's Intersection Modeling Guidelines (EPA-454/R-92-005) for CO modeling methodology and receptor placement. All major roadway segments (links) within approximately 1,000 feet from each analysis site (i.e., congested intersection) were considered. A mixing height of 1,000 meters and a surface roughness factor of 321 centimeters were included in all calculations.

A conservative analysis, which assumes that peak period vehicular emissions, traffic volumes, and intersection operating parameters occur every hour of each analysis year, was utilized. Use of peak hour baseline and project-generated conditions result in conservative predictions of pollutant levels and project impacts.

Background Values

In assuming the total impact of the proposed action, it is necessary to include consideration of the background pollutant levels for the study area. The background level is the component of the total concentration not accounted for through the microscale modeling analysis. Applicable background concentrations were added to the modeling results to obtain total pollutant concentrations at each receptor site for each analysis year. Background concentrations were based either on monitored values collected by the NYSDEC or values obtained from NYCDEP. The CO background values were provided by NYCDEP using the latest NYSDEC procedures based on the most recent ambient

monitoring data and future decreases in vehicular emissions. ~~The PM_{10} background values were based on the most recent NYSDEC monitoring data and EPA calculation procedures.~~. Meanwhile, NO_2 and SO_2 background values were obtained from NYCDEP. These values were added to the modeling results to obtain total pollutant concentrations at each receptor site for each analysis year. The background values used in this analysis are provided in Table 18-4.

Table 18-4 Background Concentrations

Pollutant	Averaging Time	Value
CO	8-hour	2.9 ppm
NO_2	Annual	77 µg/m^3
SO_2	3-hour	228 µg/m^3
	24-hour	121 µg/m^3
	Annual	34 µg/m^3

Results

Existing Conditions

The results of the mobile source air quality modeling analysis under existing (2004) conditions are provided in Table 18-5. The values shown are the maximum CO concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

The results are summarized as follows:

- Carbon monoxide levels do not exceed the 8-hour CO standard of 9 ppm. The highest estimated concentration (6.6 ppm) occurs near the intersection of Route 9A and W. 14th Street (Analysis Site #1) under the PM peak period.

Future without the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the Future without the Proposed Action in 2013 are provided in Table 18-6. The values shown are the maximum CO concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

Table 18-5 2004 Existing Conditions – Maximum 8-Hour CO Levels

Site #	Analysis Site	8-hr CO Level (ppm)	Maximum Time Period
1	Route 9A & W. 14th Street	6.6	PM
2	Route 9A & W 18th Street	5.8	PM
3	Route 9A & W 26th Street	5.5	PM
4	Route 9A & W. 34th Street	6.1	AM
5	9th Ave & W. 23rd Street	5.1	AM
6	10th Ave & W. 17th Street	4.7	PM

Notes:

1. Maximum results of all time periods analyzed.

2. All values include appropriate background concentration.

3. 8-hour CO background concentration = 2.9 ppm

Time Periods:

AM - AM peak period (8-9 AM)

MD – Midday peak period (12-1PM)

PM - PM peak period (5-6 PM)

Table 18-6 2013 Future Without the Proposed Action – Maximum 8-Hour CO Levels

Site #	Analysis Site	8-hr CO Level (ppm)	Maximum Time Period
1	Route 9A & W. 14th Street	5.0	PM
2	Route 9A & W 18th Street	4.9	PM
3	Route 9A & W 26th Street	4.4	PM
4	Route 9A & W. 34th Street	4.4	AM/PM
5	9th Ave & W. 23rd Street	4.1	MD
6	10th Ave & W. 17th Street	3.8	AM

Notes:

1. Maximum results of all time periods analyzed.

2. All values include appropriate background concentrations.

3. 8-hour CO background concentration = 2.9 ppm

Time Periods:

AM - AM peak period (8-9 AM)

MD – Midday peak period (12-1PM)

PM - PM peak period (5-6 PM)

The results are summarized as follows:

- CO levels would not exceed the 8-hour standard at any of the analysis sites. The highest estimated concentration (5.0 ppm) would occur near the intersection of Route 9A and W. 14th Street (Analysis Site #1) under the PM peak period.

  These results assume that the future year CO emission rates would be affected by decreases in future year emission factors due to increasing stringent emission control requirements and increases in traffic volumes due to anticipated increases in travel demand.

Future with the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the Future with the Proposed Action in 2013 is provided in Tables 18-7. The values shown are the maximum CO concentrations increments estimated near each analysis site with the proposed action.

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard at any of the analysis sites. The highest estimated 8-hour concentration (5.1 ppm) would occur near the intersection of Route 9A and West 14th Street (Analysis Site #1) and the intersection of Route 9A and West 18th Street under the PM peak period.

  The highest project-generated CO increment would occur at the intersection of Route 9A and West 18th Street during the PM peak period. The NYCDEP CO de minimis values would not be exceeded at this site or any other analysis site, indicating that the proposed action does not have the potential to cause CO impacts that are considered to be significant.

In addition, in accordance with NYCDEP interim guidance procedures, a PM2.5 analysis was conducted. The intersection with the highest estimated projected traffic impacts (i.e., Route 9A and 18th Street (Analysis Site #2) was selected for this analysis. This analysis site was selected as the "worst-case" location to determine incremental PM2.5 24-hour and annual impacts because it contains the highest number of project-generated vehicles during any peak hour. The CAL3QHCR model was used with the same methodology described above. The result of this analysis is that the Proposed Action would not cause increases in concentrations above the 24-hour and annual $PM_{2.5}$ significant threshold values (STVs) at any of the analysis sites. The maximum annual impact and 24-hour impacts which occur during the PM peak period, shown in Table 18-8, estimated near this intersection are below NYCDEP's annual and 24-hour STVs of 0.1 and 5 ug/m^3, respectively.

Table 18-7, 2013 Future With the Proposed Action – Maximum 8-Hour CO Levels

Site #	Analysis Site	8-hr CO Level (ppm)	Maximum Time Period
1	Route 9A & W. 14th Street	5.1	PM
2	Route 9A & W 18th Street	5.1	PM
3	Route 9A & W 26th Street	4.4	PM
4	Route 9A & W. 34th Street	4.5	AM
5	9th Ave & W. 23rd Street	4.1	MD
6	10th Ave & W. 17th Street	3.8	AM

Notes:

1. Maximum results of all time periods analyzed.

2. All values include appropriate background concentrations.

3. 8-hour CO background concentration = 2.9 ppm

Time Periods:

AM - AM peak period (8-9 AM)

MD – Midday peak period (12-1PM)

PM - PM peak period (5-6 PM)

Table 18-8 2013 Future With the Proposed Action Maximum $PM_{2.5}$ Incremental Impacts

Site #	Analysis Site	24-hour Increment (µg/m3)	Annual Increment (µg/m3)
2	Route 9A & W 18th Street	0.36	0.009

Notes:

Significant Threshold Values:

24-hour = 5 ug/m3

Annual = 0.1 ug/m3

Parking Facilities Analysis

Pollutant concentrations could be affected near the new parking facilities that would be associated with the Proposed Action. To estimate the potential impacts from the emissions of these facilities, the largest proposed underground parking garage was selected for detailed analysis. The largest facility would be a 179-space parking garage located between W. 17th Street and W. 18th Street and between Tenth Avenue and Route 9A in Development Site #21.

Because the garage would be used almost exclusively by gasoline-powered automobiles and not diesel-fueled trucks, CO was the only pollutant considered for this analysis. PM_{10} and $PM_{2.5}$ concentrations would not be materially affected by these facilities.

CO concentrations near the facility were estimated following the CEQR guidelines for a mechanically ventilated, enclosed garage. Pollutant concentrations were estimated at receptors located at 5 and 50 feet from the exhaust vents, with the assumed height of the vent a minimum of 12 feet above street level. Contributions from emissions generated by street traffic on W. 17th Street under Build peak hour conditions were added to these

estimated concentrations to estimate the cumulative impacts of the garage and the corresponding street contribution.

This analysis was conducted for the 2013 analysis year, when this facility is anticipated to be in operation, for the PM peak period, when estimated garage emissions would be greatest because all of the exiting vehicles would be operating in the higher-polluting, cold-start mode.

Cumulative impacts from any smaller parking facilities that would be located near each other would be less than the analyzed scenario. Therefore, the analyzed condition represents the worst case.

The maximum total 8-hour CO concentration (i.e., including background levels and street traffic contributions) estimated for any of the receptor sites are not estimated to cause or exacerbate the NAAQS of 9.0 ppm.

C. ANALYSIS OF PROJECT-GENERATED HEATING SYSTEM EMISSIONS

Introduction

The primary issues with regard to fuel combustion sources associated with HVAC systems include (1) the impact of HVAC systems from proposed (i.e., projected and potential) development sites on existing buildings; (2) the impact of HVAC systems from projected and potential development sites on other projected and potential development sites; (3) the impact of existing commercial, institutional, or large-scale residential developments on projected and potential development sites; and (4) the impact of relocated or additional sources resulting from the Hudson Yard Redevelopment, such as the Quill Bus Depot, on projected and potential development sites.

With regard to item 1, since some projected and potential developments are shorter than existing nearby buildings, an analysis of the potential impacts of the HVAC emissions of the projected and potential development sites on existing buildings was conducted using the *2001 CEQR Technical Manual* procedures. The potential air quality impacts associated with items 2 and 4 above were addressed using screening analysis and/or detailed modeling procedures, as discussed below.

With regard to item 3, an examination of existing buildings determined that the following potentially significant combustion sources are located near projected and potential developments: the 19-story Starrett Lehigh building complex, the 19-story London Terrace building complex, and the 12-story Chelsea Elliot Houses building complex. The results of an air quality analysis conducted to evaluate the potential impacts of these sources on projected and potential development sites are presented below.

As no exhaust sources from existing development sites directly adjacent to the Highline would front onto the High Line, no impacts are anticipated at elevated sites along the Highline. In addition, the HVAC stacks associated with action-generated development would be located on the roofs of these developments and would be higher than the elevation of the open space associated with the proposed High Line.

With regard to item 4, the results of the air quality analysis conducted for the relocated Quill Bus Depot for the Hudson Yards FGEIS are presented below.

In addition to estimating potential impacts from individual HVAC systems, the potential impacts from the combined emissions of multiple project-related HVAC sources with similar stack heights that are located near each other were also analyzed to determine the potential impact from the combined effects of the HVAC emissions on nearby proposed/potential development sites. The analysis was performed in the same manner described for the individual HVAC sites except that after the emissions generated by the individual buildings within each cluster were calculated (based on floor area), a screening-level analysis was conducted using a single representative stack located in the approximate geographic center of each cluster as the emission source and estimated pollutant concentrations on nearby projected and potential development sites.

The following two development scenarios were considered:

- The Reasonable Worst Case Development Scenario; and

- The Base Floor Area Ratio (FAR) Reasonable Worst Case Development Scenario.

Analyses assumed that all projected and potential development sites under each scenario would be built, thereby maximizing potential HVAC system emissions. However, it is anticipated that potential development sites are unlikely to get fully built-out in a cumulative manner, particularly if projected development sites are built.

The results of these conservative analyses are that with the use of "E" designations to ensure adequate distance between HVAC exhaust point and nearby taller buildings, and the emission reduction measures that would be undertaken by New York City Transit to minimize emissions from the HVAC system of the relocated Quill Bus garage, the potential impacts from existing and projected and potential development site heating systems are not considered to be significant.

Methodology

Emissions from the heating (and hot water) systems of existing and projected and potential development sites may affect air quality levels at other nearby buildings. Potential impacts would be a function of fuel type, stack height, size of development, and location of the emission sources relative to the nearby buildings. Fuel uses may include oil or natural gas for space heating and hot water, and natural gas for cooking. Since the fuel types that would supply heat and hot water to the new developments have not been determined, analyses were conducted assuming that both No. 2 fuel oil and natural gas would be used.

Each projected and potential development site was evaluated and all nearby projected or potential residential developments of similar or greater height were considered as potential sensitive receptor sites. If the distance from a projected and potential development to the nearest building of similar or greater height would be less than the threshold distance provided in the *2001 CEQR Technical Manual*, there is a potential for significant air quality impacts, and a detailed dispersion modeling analysis was conducted. Otherwise, the source passes the screening analysis, and no further analysis is required.

The maximum projected and potential development floor area of each site under each development scenario was used as input for the screening analysis. It was assumed that all stacks would be located 3 feet above roof height (as per the *2001 CEQR Technical Manual*). If a source did not pass the CEQR screen, detailed atmospheric dispersion analyses using either EPA's ISC3 or PRIME model were conducted.

The average size of each new dwelling unit was assumed to be 850 square feet; the average size of each converted dwelling unit was assumed to be 1,000 square feet.

Screening-Level Analysis

An analysis was conducted to determine whether any of the projected and potential development sites would have the potential to significantly impact air quality levels at any of the other nearby projected and potential development sites (i.e., project-on-project impacts). The analysis evaluated impacts of the projected-on-projected, potential-on-potential, projected-on-potential, and potential-on-projected developments. The *2001 CEQR Technical Manual* provides a nomographic procedure that was used to determine the threshold distance between projected and potential development site heated by oil or natural gas and nearby projected and potential development site of similar or greater

heights, based on the square footage and height of the building (provided that the buildings are at least 30 feet apart) for a potential impact to occur. If more than one projected and potential taller building would be located near a projected and potential shorter building, the potential impacts from the HVAC emissions of the shorter building on each of the taller buildings were considered, and only the worst case impacts were reported.

The following procedures were conducted:

- Figures 3Q-7 and 3Q-9 of the *2001 CEQR Technical Appendix* were used to determine potential for significant SO2 (i.e., the critical pollutant for facilities burning fuel oil) and NOx (i.e., the critical pollutant for facilities burning natural gas) impacts.
- The estimated maximum size of each building was plotted on the nomograph against the distance to the potentially affected nearby taller building.
- Using the nomograph, the threshold distance at which a potentially significant impact is likely to occur was estimated and compared to the distance of the affected building.
- If the distance between buildings was greater than the threshold distance indicated on the nomograph, no potentially significant impact is anticipated, and no detailed analysis was conducted.
- If the distance was less than the threshold distance indicated on the nomograph, a potentially significant impact is possible, and a detailed dispersion modeling analysis was conducted.

Detailed Analysis

Detailed dispersion modeling analyses using EPA's ISC3 and PRIME models were conducted for those projected and potential development sites that failed CEQR screening analysis and not attached to one another. ISC is a versatile model capable of predicting pollutant concentrations from continuous point, area, and volume sources. ISC PRIME uses enhanced plume and wake dispersion algorithms that are capable of estimating pollutant concentrations in a building's cavity and wake regions. The ISC model was used to estimate direct plume impacts on elevated receptors without incorporating downwash effects; ISC PRIME was used to estimate pollutant concentrations with downwash effects on plume dispersion incorporated.

Three pollutants emitted from fuel oil and/or natural gas combustion -- SO2, NOx, and PM10 -- were considered. Short-term (i.e., 24-hour) and long-term (i.e., annual average) concentrations of SO_2, NO_2, and PM10 were estimated.

The following dispersion modeling options and assumptions were applied:

- Emissions would be released through a single stack located at the edge of building closed to the nearest taller building; and
- A conservative set of default values (stack exhaust temperature of $293^{O}K$, velocity of 0.001 m/s and a stack diameter of 0.0 m) were used, as recommended by the *2001 CEQR Technical Manual*.

Emission Rates

Emission rates were estimated as follows:

- A fuel consumption rate for each proposed or projected residential building was estimated using factors provided in NYCDEP's Report T.S. #12. As recommended in the *2001 CEQR Technical Manual*, these factors were decreased by 30% to reflect the more fuel-efficient boilers that have become available since the issuance of this report. These factors were then multiplied by the square footage of the projected and potential development sites to estimate total gallons of fuel consumed annually. The equation recommended in NYCDEP's Report T.S #12 was used to estimate daily fuel consumption rates from annual consumption rates.
- This daily values were divided by 24 to obtain hourly values for use in the short-term dispersion analysis, and
- Average annual pollutant emission rates were estimated, as recommended in *2001 CEQR Technical Manual*, by dividing the total amount of pollution estimated to be emitted in a year by 8760 hours.

Emission factors were obtained from EPA's "Compilation of Air Pollutant Emission Factors" (AP-42), assuming fuel oil No. 2, with a sulfur content of 0.2 percent, would be used to heat the new buildings. It was conservatively assumed that all emissions of NOx released from the stack would be in form of NO_2 at the receptor sites.

Coordinate System and Receptors

A coordinate system was developed that included location of each stack on the roof of an affected building and nearby elevated receptors. Because highest impacts would occur along the level of the plume centerline at approximately the height of the stack, elevated receptors were placed at various elevations (in a range of 25 to 100 meters above the ground, in 3 meter increments). It was assumed that all nearby taller buildings would have operable windows at these levels and were therefore considered as potential sensitive receptor sites.

Meteorology

The worst-case year meteorology (2002) and wind direction (south-north) were determined using 5 consecutive years of meteorological data from La Guardia Airport.

Background Values

Background concentrations (i.e., pollutant levels from other sources in the study area) for the pollutants of concern were obtained from monitoring data collected by the NYSDEC in 2003, the latest year with compiled data. These values, which are provided in Table 18-9, were added to estimate project impacts, and the resulting total concentrations were compared with appropriate NAAQS.

Reasonable Worst Case Development Scenario

Project on Project Impacts

A total of forty-five (45) projected and potential development sites were considered for this analysis. These developments are anticipated to range from 75 to 869 dwelling units, with lot sizes ranging from approximately 10,000 to 75,000 square feet, and total floor area ranging from approximately 37,000 to 380,000 square feet.

An analysis was conducted to determine whether any of the projected and potential development sites would have the potential to significantly impact air quality levels at any of the other nearby projected and potential development sites (i.e., project-on-project impacts). Table 18-10 provides a list of the projected and potential development sites, and the results of the screening and detailed modeling analysis. The highest impacts were found with direct plume impact on elevated receptors (i.e., without the incorporation of downwash effects).

Screening analysis results indicate that of the 45 projected and potential development sites associated with this scenario, nine sites passed and five sites failed the screening analysis, ten buildings would be taller than nearby existing, projected, or potential developments, and 21 buildings are attached to each other. Emissions from 26 of the 45 sites have the potential to exceed threshold screening levels using No. 2 fuel oil or natural gas. Twenty one of these 25 projected and potential development sites exceed threshold screening levels because the development sites are attached to one another. For these sites, the minimum distances required to pass the screening process using the CEQR monographs are presented in Table 18-10 for both No. 2 fuel oil and natural gas.

Detailed dispersion modeling analyses were conducted for the five projected and potential development sites that failed CEQR screening analysis – sites No. 2, 9, 18, 19, and 36. Set-back distances that would not cause exceedances of the NAAQS at a nearby taller buildings were estimated for those projected and potential development sites that would be attached to one another. In order to ensure that there would be no significant air quality impact from these 26 HVAC sources, these developments would require an (E) Designation that would specify either the type of fuel to be used (e.g., natural gas instead of fuel oil) or the distance that the vent stack on the building roof must be from the edge of an adjacent building.

The result of this analysis is that the proposed RWSD scenario, with its (E) Designation, would cause no violations of the NAAQS, and would have no significant adverse environmental impacts on air quality. The maximum predicted total concentrations of each pollutant (including background) of NO_x, SO_2, and PM_{10} is less than the corresponding NAAQS (Table 18-9).

Table 18-9, Air Quality Impacts: Summary of Maximum Predicted Concentrations

Pollutants	Averaging Period	Background Concentration ($\mu g/m^3$)	Predicted Concentration ($\mu g/m^3$)	Maximum Predicted Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen Dioxide (NO_2)	Annual	77	7	84	100
Sulfur Dioxide (SO_2)	3-hour	228	830	1058	1300
	24-hour	121	243	364	365
	Annual	34	7	41	80
Particulate Matter (PM_{10})	24-hour	43	18	61	150
	Annual	21	1	22	50

To preclude the potential for significant adverse air quality impacts, an (E) Designation would be placed on the following projected and potential development sites with the specified requirements:

- Requires a minimum offset distance for the stack locations for either natural gas or No. 2 fuel oil, as specified in Table 18-8 (columns two and three):
  - Block 701; Lot 1 (Site 1)
  - Block 699; Lot 5 (Site 4)
  - Block 699; Lots 22 through 27,44 (Site 5)
  - Block 698; Lot 1 (Site 7)
  - Block 696; Lot 58 (Site 10)
  - Block 692; Lot 57 (Site 14)
  - Block 691; Lots 43,50 (Site 17)
  - Block 690; Lot 29 (Site 20)
  - Block 715; Lots 1,2,3,60,63,64,65 (Site 22)
  - Block 715; Lots 5,7 (Site 23)
  - Block 714; Lots 14,16 (Site 25)
  - Block 701; Lots 52,55,56,58 (Site 27)
  - Block 701; Lots 24,28 (Site 29)
  - Block 700; Lots 53,54,55,56,57,59,60,61 (Site 30)
  - Block 700; Lots 48,49 (Site 31)
  - Block 700; Lots 42,44,45,47 (Site 32)
  - Block 700; Lot 9 (Site 33)
  - Block 699; Lots 14,49 (Site 38)
  - Block 696; Lot 1 (Site 41)
  - Block 691; Lots 15,19,22,24 (Site 43)
  - Block 690; Lots 42,46 (Site 44)

- Requires the exclusive use of natural gas or a minimum offset distance for the stack locations, as specified in Table 18-8 (column four):
  - Block 701, Lots 30,33,35,37,42,43,45 (Site 2)
  - Block 697, Lots 27,31 (Site 9)
  - Block 691, Lots 25,27,29,33,35,37 (Site 18)

- Block 690, Lots 12,20,54 (Site 19)
- Block 690, Lots 1, 63 (Site 36)

Table 18-10, Results of HVAC Source Impact Analysis for Projected and Potential Sites Under the Reasonable Worst Case Development Scenario

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil[(1)]	ISC3 Modeling Results for Natural Gas[(1)]
Site 1	73 feet [(1)]	49 feet [(1)]	N/A	N/A
Site 2	Fail [(3)]	Fail[(3)]	113 feet [(4)]	Pass
Site 3 [(2)]	---	---	---	---
Site 4	62 feet [(1)]	45 feet [(1)]	N/A	N/A
Site 5	83 feet [(1)]	56 feet [(1)]	N/A	N/A
Site 6	Pass	Pass	---	---
Site 7	82 feet [(1)]	56 feet [(1)]	N/A	N/A
Site 8	Pass	Pass	---	---
Site 9	Fail [(3)]	Pass	90 feet [(4)]	---
Site 10	48 feet [(1)]	34 feet [(1)]	N/A	N/A
Site 11 [(2)]	---	---	---	---
Site 12 [(2)]	---	---	---	---
Site 13	Pass	Pass	---	---
Site 14	40 feet [(1)]	25 feet [(1)]	N/A	N/A
Site 15	Pass	Pass	---	---
Site 16	Pass	Pass	---	---
Site 17	46 feet [(1)]	34 feet [(1)]	N/A	N/A
Site 18	Fail [(3)]	Pass	80feet [(4)]	---
Site 19	Fail [(3)]	Pass	80 feet [(4)]	---
Site 20	50 feet [(1)]	34 feet [(1)]	N/A	N/A
Site 21 [(2)]	---	---	---	---
Site 22	45 feet [(1)]	30 feet [(1)]	N/A	N/A
Site 23	18 feet [(1)]	13 feet [(1)]	N/A	N/A
Site 24	Pass	Pass	---	---
Site 25	24 feet [(1)]	14 feet [(1)]	N/A	N/A
Site 26 [(2)]	---	---	---	---
Site 27	64 feet [(1)]	45 feet [(1)]	N/A	N/A
Site 28 [(2)]	---	---	---	---
Site 29	40 feet [(1)]	25 feet [(1)]	N/A	N/A
Site 30	55 feet [(1)]	38 feet [(1)]	N/A	N/A
Site 31	46 feet [(1)]	30 feet [(1)]	N/A	N/A
Site 32	45 feet [(1)]	30 feet [(1)]	N/A	N/A
Site 33	57 feet [(1)]	41 feet [(1)]	N/A	N/A
Site 34	Pass	Pass	---	---
Site 35 [(2)]	---	---	---	---
Site 36	Fail [(3)]	Pass	79 feet [(4)]	---
Site 37 [(2)]	---	---	---	---
Site 38	76 feet [(1)]	50 feet [(1)]	N/A	N/A
Site 39	Pass	Pass	---	---
Site 40 [(2)]	---	---	---	---

TABLE 18-10, CONTINUED

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil[1]	ISC3 Modeling Results for Natural Gas[1]
Site 41	29 feet [1]	17 feet [1]	N/A	N/A
Site 42 [2]	---	---	---	---
Site 43	45 feet [1]	39 feet [1]	N/A	N/A
Site 44	38 feet [1]	32 feet [1]	N/A	N/A
Site 45	Pass	Pass	---	---

Notes:

1 Some sites are immediately adjacent to each other and the analysis could not be further refined without additional design data; therefore the minimum distance for which the source would pass the CEQR screening procedures was provided for these sites using CEQR monographs. The following (E) designation would be placed on these development sites: Any new development on the property must locate the HVAC stack no closer to the edge of roof than the distance indicated.

2 Building is taller than nearby buildings; no analysis is required.

3 For sites that failed the CEQR screening procedures, a detailed ISC3 modeling analysis was performed.

4 The following (E) designation would be placed on these development sites: Any new development on the property must either locate the HVAC stack no closer to the edge of roof (on the highest tier) as indicated or use natural gas as the type of fuel for the HVAC systems.

Cumulative Impacts from HVAC Sources

The following four clusters were evaluated to determine the potential impact from the combined effects of the HVAC emissions from buildings on nearby proposed and potential development sites.

- Cluster #1: potential development sites 28, 29, 30, 31, 32, 33 and 34 – comprising a total floor area of 841,897 square feet with a stack height of 135 feet;
- Cluster #2: projected and potential development sites 5, 37 and 38 – comprising a total floor area of 694,492 square feet with a stack height of 135 feet;
- Cluster #3: projected development sites 15,18, and 20 – comprising a total floor area of 397,990 square feet with a stack height of 120 feet; and
- Cluster #4: projected and potential development sites 22, 23, and 45 – comprising a total floor area of 280,628 square feet with a stack height of 115 feet.

The results of the analysis indicated that the potential air quality impacts of combined emissions from these HVAC clusters, using either No. 2 fuel oil or natural gas, would not be significant.

Existing Sources of HVAC Emissions

The two existing HVAC sources that are of the same heights or taller than proposed buildings were identified in the area immediately adjacent to the proposed rezoning area boundary – an 11-story building (located near the projected 10-story development site No. 9) and the 10-story R. Fulton Houses building complex (located near the potential 10-story development site No. 45).

A screening-level analysis was conducted using the CEQR nomographic procedure to estimate the potential impacts of the projected development site No. 9 and potential development site No. 45 on these existing sources of HVAC emissions. The result of this analysis is that emissions from projected and potential development sites would not significant impact any of the existing developments.

Potentially Significant Existing Combustion Emission Sources

An examination of existing buildings located within 400 feet of any of the proposed development sites identified the following potentially significant combustion sources in the study area: the 19-story Starrett Lehigh building complex in the proximity to the 7-story projected development site No.7, the 19-story London Terrace building complex in the proximity to the 13-story projected development site No.11, and the 12-story Chelsea Elliot Houses building complex in the proximity to the 10-story projected development site No. 9.

A detailed dispersion analysis with EPA's ISC model was performed to evaluate impact of these existing large combustion sources on the proposed projected and potential development sites No. 7, 9, and 11. The result of this analysis is that emissions from existing large combustion sources would not significantly impact any of the projected and potential development sites.

An additional examination determined that there was no large emission source (e.g., power plant, co-generation facility, etc) located within 1,000 feet of any of the proposed and potential development sites.

Quill Bus Depot

As part of the Hudson Yards Rezoning and Development Program, the Quill Bus Garage, currently located at 525 Eleventh Avenue would be relocated to between West 30th and West 31st Streets and Route 9A and Tenth Avenue. An analysis was conducted for that project that estimated the potential air quality analysis of the garage on nearby land uses, including the buildings associated with this rezoning action. As it is expected that the depot would not be moved prior to the 2010 analysis year for that project, it was modeled for its present location for 2010 and for its proposed location for the 2025 analysis year. As information on building heights was not available for the Hudson Yard's analysis, it was assumed that future nearby buildings (including those associated with this rezoning action) would be at least as tall as the stacks on the Quill Bus Depot.

The detailed modeling analysis was conducted using the ISC3 dispersion model. The results of the modeling analysis indicate that there could be exceedances of the NAAQS for SO_2 (24-hour standard) at two receptors in the proposed West Chelsea rezoning area from the relocated Quill Bus Depot's HVAC emissions. However, one or more of the following measures would be implemented by New York City Transit to avoid any exceedance:

- Operating the facility's HVAC systems with natural gas only (rather than as a dual-fuel natural gas-fuel oil system);
- Reducing the sulfur content of fuel oil used in the HVAC systems (e.g., a reduction of the fuel oil sulfur content from 0.2 percent to 0.05 percent would eliminate the estimated SO_2 NAAQS exceedance); or
- Modifying the HVAC system's operating cycles to reduce the quantity of fuel oil used; or some combination of these measures.

With these measures in place, there would be no exceedances of the NAAQS and, therefore, no significant adverse impact from the HVAC emissions of the relocated Quill Bus Depot.

D. BASE FAR SCENARIO

Project on Project Impacts

A total of forty-five (45) projected and potential development sites were considered for this analysis. These developments are anticipated to range from 46 to 420 dwelling units, with lot sizes ranging from approximately 7,400 to 76,000 square feet, and total floor area ranging from approximately 7,800 to 379,000 square feet.

An analysis was conducted to determine whether any of the projected and potential development sites would have the potential to significantly impact air quality levels at any of the other nearby projected and potential development sites (i.e., project-on-project impacts). Table 18-11 provides a list of the projected and potential development sites, and

a summary of the results of the screening and detailed modeling analysis. The highest impacts were found at the level of plume centerline, with direct plume impact on elevated receptors (i.e., without the incorporation of downwash effects).

Of the 45 projected and potential development sites associated with this scenario, fifteen sites passed and two sites failed the screening analysis, seven buildings would be taller than nearby existing, projected, or potential developments, and 21 buildings are attached to the nearby building. Detailed dispersion modeling analysis was conducted for the two projected and potential development sites that failed CEQR screening analysis – projected development site No. 19 and potential development site No. 36. Set-back distances that would not cause exceedances of the NAAQS at a nearby taller building were estimated for those buildings that would be attached to one another.

These results indicate that the emissions from 23 of the 45 projected and potential development sites have the potential to exceed threshold screening levels using No. 2 fuel oil or natural gas. Twenty one of these 45 sites exceed threshold screening levels because the development sites are attached to one another. For these sites, the minimum distances required to pass the screening process using the CEQR monographs are presented in Table 18-12 for both No. 2 fuel oil and natural gas.

In order to ensure that there would be no significant air quality impact from these 23 HVAC sources, these developments would require an (E) Designation that would specify either the type of fuel to be used (e.g., natural gas instead of fuel oil) or the distance that the vent stack on the building roof must be from the edge of an adjacent building.

The result of this analysis is that the HVAC sources of the projected and potential development sites, with its (E) Designation, would cause no violations of the NAAQS, and would have no significant adverse environmental impacts on air quality. The maximum predicted total concentrations of each pollutant (including background) of NO_x, SO_2, and PM_{10} is less than the corresponding NAAQS (Table 18-11).

Table 18-11, Air Quality Impacts: Summary of Maximum Predicted Concentrations

Pollutants	Averaging Period	Background Concentration ($\mu g/m^3$)	Predicted Concentration ($\mu g/m^3$)	Maximum Predicted Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Nitrogen Dioxide (NO_2)	Annual	77	7	84	100
Sulfur Dioxide (SO_2)	3-hour	228	737	965	1300
	24-hour	121	241	362	365
	Annual	34	6	40	80
Particulate Matter (PM_{10})	24-hour	43	17	60	150
	Annual	21	0.5	22	50

To preclude the potential for significant adverse air quality impacts, an (E) Designation would be placed on the following sites with the specified requirements:

- Requires a minimum offset distance for the stack locations for either natural gas or No. 2 fuel oil, as specified in Table 18-9 (columns two and three):

- Block 701; Lot 1 (Site 1)
- Block 699; Lot 5 (Site 4)
- Block 699; Lots 22 through 27,44 (Site 5)
- Block 696; Lot 58 (Site 10)
- Block 692; Lots 7,61,63 (Site 13)
- Block 691; Lots 43,50 (Site 17)
- Block 690; Lot 29 (Site 20)
- Block 715; Lots 5,7 (Site 23)
- Block 714; Lots 14,16 (Site 25)
- Block 701; Lots 52,55,56,58 (Site 27)
- Block 701; Lots 16,22,23 (Site 28)
- Block 701; Lots 24,28 (Site 29)
- Block 700; Lots 53,54,55,56,57,59,60,61 (Site 30)
- Block 700; Lots 48,49 (Site 31)
- Block 700; Lots 42,44,45,47 (Site 32)
- Block 700; Lot 9 (Site 33)
- Block 699; Lots 14,49 (Site 38)
- Block 696; Lot 1 (Site 41)
- Block 691; Lots 15,19,22,24 (Site 43)
- Block 690; Lots 42,46 (Site 44)
- Block 715; Lots 50,59 (Site 45)

- Requires the exclusive use of natural gas or a minimum offset distance for the stack locations, as specified in Table 18-9 (column four):
  - Block 6901, Lots 12,20,54 (Site 19)
  - Block 690; Lots 1,63 (Site 36)

Table 18-12, Results of HVAC Source Impact Analysis for Projected and Potential Sites Under the Base FAR Reasonable Worst Case Development Scenario

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil[1]	ISC3 Modeling Results for Natural Gas[1]
Site 1	73 feet [1]	49 feet [1]	N/A	N/A
Site 2 [2]	---	---	---	---
Site 3	Pass	Pass	---	---
Site 4	50 feet [1]	35 feet [1]	N/A	N/A
Site 5	85 feet [1]	62 feet [1]	N/A	N/A
Site 6	Pass	Pass	---	---
Site 7	Pass	Pass	---	---
Site 8	Pass	Pass	---	---
Site 9 [2]	---	---	---	---
Site 10	48 feet [1]	34 feet [1]	N/A	N/A
Site 11	Pass	Pass	---	---
Site 12	Pass	Pass	---	---
Site 13	49 feet [1]	35 feet [1]	N/A	N/A
Site 14	Pass	Pass	---	---
Site 15	Pass	Pass	---	---
Site 16	Pass	Pass	---	---
Site 17	45 feet [1]	30 feet [1]	N/A	N/A
Site 18	Pass	Pass	---	---
Site 19	Fail [3]	Pass	73 feet [4]	---
Site 20	46 feet [1]	30 feet [1]	N/A	N/A
Site 21 [2]	---	---	---	---
Site 22	Pass	Pass	---	---
Site 23	17 feet [1]	11 feet [1]	N/A	N/A
Site 24	Pass	Pass	---	---
Site 25	5 feet [1]	4 feet [1]	N/A	N/A
Site 26 [2]	---	---	---	---
Site 27	49 feet [1]	35 feet [1]	N/A	N/A
Site 28	40 feet [1]	30 feet [1]	N/A	N/A
Site 29	20 feet [1]	18 feet [1]	N/A	N/A
Site 30	48 feet [1]	31 feet [1]	N/A	N/A
Site 31	36 feet [1]	24 feet [1]	N/A	N/A
Site 32	40 feet [1]	25 feet [1]	N/A	N/A
Site 33	55 feet [1]	38 feet [1]	N/A	N/A
Site 34	Pass	Pass	---	---
Site 35	Pass	Pass	---	---
Site 36	Fail [3]	Pass	70 feet [4]	---
Site 37 [2]	---	---	---	---
Site 38	65 feet [1]	45 feet [1]	N/A	N/A
Site 39	Pass	Pass	---	---
Site 40 [2]	---	---	---	---

TABLE 18-12, CONTINUED

HVAC Source Identification	CEQR Screening Results for No. 2 Fuel Oil	CEQR Screening Results for Natural Gas	ISC3 Modeling Results for No.2 Fuel Oil[1]	ISC3 Modeling Results for Natural Gas[1]
Site 41	13 feet [1]	5 feet [1]	N/A	N/A
Site 42 [2]	---	---	---	---
Site 43	45 feet [1]	31 feet [1]	N/A	N/A
Site 44	40 feet [1]	29 feet [1]	N/A	N/A
Site 45	56 feet [1]	39 feet [1]	N/A	N/A

Notes:

1 Some sites are immediately adjacent to each other and the analysis could not be further refined without additional design data; therefore the minimum distance for which the source would pass the CEQR screening procedures was provided for these sites using CEQR monographs. The following (E) designation would be placed on these development sites: Any new development on the property must locate the HVAC stack no closer to the edge of roof than the distance indicated.

2 Building is taller than nearby buildings; no analysis is required.

3 For sites that failed the CEQR screening procedures, a detailed ISC3 modeling analysis was performed.

4 The following (E) designation would be placed on these development sites: Any new development on the property must either locate the HVAC stack no closer to the edge of roof (on the highest tier) as indicated or use natural gas as the type of fuel for the HVAC systems.

Cumulative Impacts from HVAC Sources

The potential impacts from the four "clusters" were performed to determine the potential impact from the combined effects of the HVAC emissions from these buildings on nearby proposed and potential development sites.

The following four clusters were considered:

- Cluster #1: potential development sites 28, 29, 30, 31, 32, 33 and 34 – comprising a total floor area of 537,707 square feet with a stack height of 85 feet;
- Cluster #2: projected and potential development sites 5, 37 and 38 – comprising a total floor area of 411,949 square feet with a stack height of 85 feet;
- Cluster #3: projected development sites 15,18,19, and 20 – comprising a total floor area of 458,080 square feet with a stack height of 110 feet; and
- Cluster #4: projected and potential development sites 22, 23, 25, and 45 – comprising a total floor area of 280,628 square feet with a stack height of 85 feet.

The results of the analysis indicated that the potential air quality impacts of combined emissions from these HVAC clusters, using either No. 2 fuel oil or natural gas, would not be significant.

Existing Sources of HVAC Emissions

The two existing HVAC emission sources that are taller than projected and potential development sites were identified in the area immediately adjacent to the proposed rezoning area boundary – an 11-story building (located near the 10-story projected development site No. 9) and the 10-story R. Fulton Houses building complex (located near the 7-story projected development site No. 25 and the 7-story potential development site No. 45).

A screening analysis using the CEQR nomographic procedure was conducted to evaluate the potential impact of the projected and potential development sites on these existing buildings. The result of this analysis is that emissions from projected and potential development sites would not significantly impact any of the existing developments.

Potentially Significant Existing Combustion Emission Sources

An examination of existing buildings located within 400 feet of any of the projected and potential development sites identified the following potentially significant combustion sources in the study area: the 19-story Starrett Lehigh building complex located near the 7-story projected development site No. 7, the 19-story London Terrace building complex located near the 9-story projected development site No. 11, and the 12-story Chelsea Elliot Houses building complex located near the 9-story projected development site No. 8.

A detailed dispersion analysis with EPA's ISC model was performed to evaluate impact of these existing large combustion sources on the projected and potential development sites. The result of this analysis is that emissions from existing large combustion sources would not significantly impact any of the projected and potential development sites.

An additional examination determined that there was no large emission source (e.g., power plant, co-generation facility, etc) located within 1,000 feet of any of the proposed development sites.

Quill Bus Depot

As part of the Hudson Yards Rezoning and Development Program, the Quill Bus Garage, currently located at 525 Eleventh Avenue would be relocated to between West 30th and West 31st Streets and Route 9A and Tenth Avenue. The discussion of the potential impacts from this facility provided for the Worst Case Development Scenario also applies to the Base FAR Scenario.

E. ANALYSIS OF AIR TOXICS

Introduction

This section addresses potential impacts of existing toxic emission sources on the future residential development sites and well as sensitive land uses along the elevated high-line structure. These emissions are of concern because the Proposed Action would allow development of residential uses within existing manufacturing districts. Emissions of toxic pollutants from the operation of these existing facilities may result in pollutant concentrations that may affect the action's projected and potential residential uses.

The following procedures were used to estimate the potential air quality impacts of these toxic emissions:

- In order to encompass the areas surrounding all of the projected and potential residential sites as well as the elevated high-line area itself, one circular analysis area with a radius of approximately 1,000 feet around the boundaries of rezoning area (that includes all of the potential impacted areas) was selected for the air toxics analysis. This analysis area includes the proposed Special West Chelsea District (including the areas surrounding the projected and potential development sites, and the midblock areas where the M1-5 zoning district will be retained), as well as the proposed Highline open space.
- Air permits for all facilities within this analysis area on NYSDEC, NYCDEP, and EPA Environ facts databases were acquired and reviewed; and
- Dispersion analyses were conducted to determine the potential of the toxic emissions released from the permitted emission sources to adversely affect the new residential areas.

Permit Information

Information on emission data for the manufacturing and industrial facilities with the air toxics study area were developed as follows:

- NYSDEC's Air Guide-1 (AG-1), which includes a database with information on all facilities in the state that have an air quality permit (as of 1996), was searched to identify facilities located within the area that had received state air quality permits.
- The NYCDEP Bureau of Air Resource's (BAR) files of current air quality permits for all facilities operating within the air toxics study area were examined.

The information on the NYCDEP permits (e.g., pollutant emission rates and stack parameters) were considered to be the most current and comprehensive, and served as the primary basis of data for this analysis. The following information were obtained from these permits"

- A total of 66 establishments were identified as potential emission sources.

- 31 facilities were for operations that were cancelled, indicating that these facilities no longer operate under their permit, had ceased operations, or are no longer engaged in operations that would require a permit. These facilities were omitted from further consideration.
- 30 other active facilities emissions rates are related only building heating systems. These facilities were also omitted from further consideration for the air toxic analysis.
- Five facilities were identified that emit 8 different toxic pollutants (butyl acetate, ethylenglycolmonobutyl, isopropyl alcohol, ethanol, toluene, methyl ethyl ketone, particulates, and miscellaneous organics) from spray booths and printing operations. No carcinogenic pollutants were identified as being emitted from these facilities.
- One of the five identified facilities is permitted to emit miscellaneous organics (VOCs). For the purposes of this analysis, it was conservatively assumed that 100 percent of organics are in the form of isopropyl alcohol (the main component of the solvents largely used in the printing process), and that the health affects of this pollutant adequately represents the health effects of VOCs, for which no AGCs or SGCs have been established.
- An additional facility that was in the 1996 NYSDEC database but not included in NYCDEP's list of permitted facilities was identified in the *Hudson Yards Redevelopment FGEIS* as still being in operation. This facility was included in the analysis using the stack parameter and emission data from the NYSDEC data base.

Figure 18.2 provides the locations of the five facilities considered in the detailed analysis.

Analysis

A dispersion modeling analysis was conducted using AG-1 to determine whether the existing currently operating permitted facilities within the air toxics study area would have the potential to adversely affect the sensitive analysis sites. In addition to containing a database, AG-1 includes software that can be used to determine whether facilities have the potential to exceed short-term or annual guidelines values (i.e., SGCs or AGCs). The more refined analysis (i.e., with ISCLT2) was used to estimate impacts of non-carcinogenic toxic air pollutants using hazard indexes.

Results

The result of the screening-level air toxic analysis is that no exceedance of an NYSDEC SGC or an AGC acceptable limit was predicted, and that the total hazard index impact of the non-carcinogenic toxics pollutants emitted from all of sources combined is 1.2×10^{-2}, which is well below the level of 1.0 that is considered by EPA to be significant. In addition, no carcinogen pollutants were identified that may impact project-related sensitive analysis sites.

F. CONCLUSION

The result of the air quality analysis is that the Proposed Action would not cause or exacerbate an exceedance of an air quality standard nor cause the exceedance of a significant impact criterion. As such, the Proposed Action would not cause a significant air quality impact.