A. INTRODUCTION

The Proposed Action, under the Reasonable Worst-Case Development Scenario (RWCDS), would affect 22 projected and 16 potential development sites, and include new buildings, building conversions, and assemblages. Air quality, which is a general term used to describe pollutant levels in the atmosphere, would be affected by these changes. The following air quality analyses are presented in this chapter to determine the significance of these changes:

1. The potential for emissions from project-related vehicle trips;
2. The potential impacts of the emissions of a proposed parking garage;
3. The potential for emissions from the heating, ventilation and air conditioning (HVAC) systems of the projected and potential developments to significantly impact other projected/potential development sites (project-on-project impacts);
4. The potential for emissions from the HVAC systems of the projected and potential developments to significantly impact existing sensitive land uses within 400 feet;
5. The potential combined impacts from HVAC emissions of projected and potential developments that are located in close enough proximity to one another (clusters) to significantly impact existing sensitive land uses and other projected/potential developments;
6. The potential for emissions sources from existing commercial, institutional, or residential developments within 400 feet from proposed developments to significantly impacts the proposed developments, and
7. The potential for significant air quality impacts from air toxic emissions generated by nearby existing industrial sources on the proposed development sites.

Air quality analyses were conducted, following the procedures outlined in the 2012 *New York City Environmental Quality Review (CEQR) Technical Manual*, to determine whether the Proposed Action under the RWCDS would result in exceedances of ambient air quality standards or health-related guideline values. The methodologies and procedures utilized in these analyses are described below.

B. PRINCIPAL CONCLUSIONS

The result of the analyses conducted is that the Proposed Action would not have any significant air quality impacts. This is based on the following findings:

- Emissions from project-related vehicle trips would not cause a significant air quality impact;
- With the specified (E) designations, emissions from the heating, ventilation and air conditioning systems of the projected and potential developments would not significantly impact other projected/potential development sites or existing sensitive land uses;
- Emissions from "large" existing emission sources would not significantly impact the projected/ potential development sites; and
- Air toxic emissions generated by nearby existing industrial sources would not significantly impact the projected/potential development sites.

C. POLLUTANTS OF CONCERN

Criteria Pollutants

The following air pollutants, known as criteria pollutants, have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead. National Ambient Air Quality Standards (NAAQS) are concentrations set for each of the criteria pollutants specified by the EPA that have been developed to protect human health and welfare. New York has adopted the NAAQS as state ambient air quality standards. EPA recently promulgated a new 1-hour standards for SO_2 and NO_2 and revoked 24-hour and annual standards for SO_2. However, according to page 17-7 of the 2012 CEQR TM, at this time and for the purposes of CEQR, it is premature to conduct a quantitative assessment of a project's potential SO2 and NO2 emissions' effect on the new 1-hour NO2 primary standard. Therefore, a qualitative discussion/analysis of a project's SO2 and NO2 emissions in terms of the new 1-hour standard is not appropriate.

TABLE 12-1
Applicable National and State Ambient Air Quality Standards

Pollutant	Averaging Period	National and NY State Standards	
		Primary	Secondary
Ozone (O_3)	8 Hour (3)	0.075 ppm (147 µg/m^3)	Same as Primary Standard
Carbon Monoxide (CO) (1)	8 Hour	9 ppm (10 mg/m^3)	Same as Primary Standard
	1 Hour	35 ppm (40 mg/m^3)	Same as Primary Standard
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard
	1 Hour Average (2)	0.10 ppm (188 µg/m^3)	-
Sulfur Dioxide (5)	1 Hour (6)	0.075 ppm (197 µg/m^3)	-
	Maximum 3-hour average (1)		0.5 ppm (1,300 µg/m3)
Suspended Particulate Matter (PM_{10})	24 Hour	150 µg/m^3	Same as Primary Standard
Suspended Fine Particulate Matter ($PM_{2.5}$)	24 Hour (4)	35 µg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	15 µg/m^3	Same as Primary Standard
Rolling 3-Month Average	Calendar Quarter	0.15 µg/m^3	Same as Primary Standard

Notes:
ppm – parts per million
µg/m3 – micrograms per cubic meter
NA – not applicable
All annual periods refer to calendar year.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
(3) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(4) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(5) EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
(6) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards

Criteria Pollutants for Analysis

CO and $PM_{2.5}$ were considered for the mobile source analyses while SO_2 and NO_2 were considered for determining the potential impacts of project-related HVAC emissions -- SO_2 for oil burning systems and NO_2 for natural gas systems.

Air Toxic Pollutants

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. While no federal standards have been promulgated for toxic air pollutants, the EPA and NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria that are used in the toxic analysis. The procedures to estimate inhalation exposure concentration, hazard index, and cancer risk of toxic pollutants are outlined in the EPA Human Health Risk Assessment Protocol (HHRAP) (EPA 520-R-05-006) described in the health risk section of this Chapter.

D. MOBILE SOURCE ANALYSIS

Impacts Near Congested Intersections

According to the 2012 *CEQR Technical Manual* screening threshold criteria for this area of the City, if 170 or more project-generated vehicles pass through a signalized intersection within the project area of concern in any given peak period, there is a potential for mobile source air quality impacts for CO and a detailed analysis is required. For $PM_{2.5}$, the threshold for potential impacts is approximately 23 heavy duty diesel truck equivalents.

The travel demand forecast and vehicle trip assignments conducted for the Proposed Action indicates that the number of project-generated vehicles would be above CEQR screening threshold values during the afternoon (4:45 - 5:45 pm) peak period at the intersection of West 126th Street and Amsterdam Avenue for CO. Therefore, a detailed microscale modeling analysis was conducted that estimated CO levels near this intersection. CO levels were estimated for existing conditions and for future (2021) conditions with and without the Proposed Action. All intersections passed the screening criteria for $PM_{2.5}$.

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 intersections selected for analysis.

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 guidelines.

Vehicle Classification Data

Vehicle classification data required to determine composite emission factors were based on estimates for the following categories: light-duty gasoline vehicles (LDGVs), sport utility vehicles (SUVs), medallion taxis, light-duty trucks, heavy-duty trucks, and buses. The split between LDGV and 2 and SUV was based on NYSDEC's 2008 registration data in MOBILE 6 for each appropriate analysis year

Vehicular Emissions

CO emission factors were estimated using EPA's MOBILE 6.2.03 (EPA420-R-03-010), EPA's emission factor algorithm. This version includes the effects of the vehicle standards, vehicle turnover, and emission factors for particulate matter. The latest NYSDEC modeling inputs and assumptions were applied.

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 intersections 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 the 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.

The analyses followed the 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.

Results

A summary of the results of the mobile source air quality modeling analysis for the Existing (2011) and Future (2021) without and with the Proposed Action is provided in Tables 12-2 and 12-3, respectively. The values shown are the maximum CO concentrations estimated near the analysis site.

TABLE 12-2
Maximum Estimated Existing (2011) 8-Hour CO Level

Analysis Site	8-hour CO Level (ppm)
126th Street and Amsterdam Avenue	3.5

Note: Concentrations were estimated for the PM peak period (4:45-5:45)
NAAQS: CO = 9 ppm
All values are the maximum estimated concentrations under all time periods considered and include an 8-hour background concentration of 2.7 ppm.
Persistence Factor =0.70

TABLE 12-3
Maximum Estimated Future (2021) 8-Hour CO Levels With and Without the Proposed Action

Analysis Site	8-hour CO No Build Level (ppm)	8-hour CO Build Level (ppm)	8-hour CO Increment (ppm)
126th Street and Amsterdam Avenue	3.3	3.4	0.1

Notes Concentrations were estimated for the PM peak period (4:45-5:45)
NAAQS: CO = 9 ppm
All values are the maximum estimated concentrations under all time periods considered and include an 8-hour background concentration of 2.7 ppm.
Persistence Factor =0.70

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard. The maximum estimated concentration of 3.4 ppm is below the NAAQS of 9 ppm.
- The DEP CO de minimis criteria would not be exceeded, indicating that the Proposed Action would not have the potential to cause CO impacts that are considered to be significant.

The result of this analysis is that the mobile source impacts of the Proposed Action would not significantly impact local air quality levels.

Garage Analysis

An air quality analysis was conducted, following guidelines provided in the *CEQR Technical Manual* for an enclosed garage, to estimate the potential impacts of a proposed 114-spaces below-grade accessory parking garage at West 126th/127th Street and Amsterdam Avenue at Site 40, the largest parking facility associated with the Proposed Action. Emissions from the garage were assumed to be exhausted through one garage vent. 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. Potential PM_{10} and $PM_{2.5}$ impacts were not considered because the concentrations of these pollutants would not be materially affected by the operation of this facility.

CO emission factors for the various vehicles operating modes (cold/hot start/idle) under the future (2021) Build scenario were estimated using EPA's MOBILE 6.2.03 emission factor algorithm. Maximum hourly CO emission rates were calculated for the time period with the maximum number of departing autos in an hour, since departing autos are assumed to be "cold" and arriving cars are assumed to be "hot" ("cold" autos emit CO at considerably higher rates than "hot" autos). Maximum hourly CO emission rates over a consecutive 8-hour period were computed for the 8-hour time period that averages the largest number of departing autos per hour. The maximum emission rate was determined based on the ins/outs for the 8-hour time period and the mean traveling distance within the garage. The analysis assumed that all departing autos would idle for one minute before traveling to the exits of the garage, and all arriving and departing autos would travel at 5 miles per hour within the garage.

Estimates of off-site CO impacts are based on EPA's equation for dispersion of pollutants from a stack. The garage vent was converted into a "virtual point source" and the concentrations within the garage were used to estimate the initial dispersion at the garage vents. The initial horizontal and vertical distributions are assumed to be equal and calculated by setting CO concentrations at the exit of the vent equal to the CO level within the facility. One vent was assumed for this analysis. Eight-hour CO impacts are estimated at a receptor near the vent (5 feet from the vent, 6 feet below the midpoint height of the vent)

and at a receptor across a street on the far sidewalk from the vent (50 feet away, also 6 feet below the vent midpoint). Cumulative CO impacts on the near and far sidewalks adjacent to the garage vents were calculated by adding the impact from the garage exhaust to on-street sources, and background levels.

A maximum total 8-hour CO concentration of 5.0 ppm was estimated at a receptor located 5 feet from the vent by adding the estimated garage impact and the background concentration of 2.7 ppm; a maximum total 8-hour CO concentration of 3.7 ppm was estimated at the receptor located 50 feet from the vent by adding the garage impact, street traffic impacts, and the background concentration of 2.7 ppm. The maximum total estimated 8-hour CO concentrations are therefore below the 8-hr CO NAAQS of 9.0 ppm. In addition, the potential impacts of the garage emissions on the elevated receptors (windows, balconies) at nearby buildings were estimated using the EPA SCREEN model. The receptors were located at the height of the garage vent (12 feet) where the highest impacts are likely to occur. The result of this analysis is that CO emissions from the proposed garage would not cause significant air quality impacts at either ground level or elevated receptors.

E. ANALYSIS OF HEATING SYSTEM EMISSIONS

Emission Sources Considered

Emissions from the HVAC systems of the projected and potential developments may affect air quality levels at nearby existing land uses as well as the other affected developments. The impacts of these emissions would be a function of fuel type, stack height, building size (gross floor area), and location of each emission source relative to a nearby sensitive receptor site. Data to conduct this analysis were obtained as follows:

- The size (gross floor area and height) and location (block and lot number) for each projected and potential development site under the Proposed Action RWCDS were provided by the NYCDCP; and
- The size and location of each existing building were determined using the New York City Open Accessible Space Information System Cooperative (OASIS) data base.

Among the proposed developments sites are five sites that would be redeveloped, including alteration, conversion, and partial demolition to allow for existing building to be converted to multiple uses. Of these, Site 40 would be enlarged by more than 30 percent, which is the DCP criterion for an enlargement (as opposed to conversion) site, and Site 50 is a new development site. As such, analyses were conducted for these developments. Sites 53, 54, and 55, however, which would not be enlarged by 30 percent, will be considered as conversion sites that do not meet DCP criteria for inclusion in the air quality analysis, and these developments were not considered in the analysis.

There are two development scenarios for Site 40– one is a conversion of existing buildings and the second is a completely new development. Under the conversion scenario, five buildings of different heights and sizes would be built on Lots 40, 45, 50, 60, and 89 -- with the heights of these buildings varying from 112 to 162 feet. Under the new development scenario, the individual lots will be combined to Lot 40-45, Lot 50-60, and Lot 89-- with the heights of these buildings varying from 92 to 170 feet. Due to significant alterations and enlargements of Site 40 (as well as a change in use), it is likely that all of the buildings will be equipped with new boilers. All of these buildings were included in the analysis.

Site 50, which is proposed as a new development, would be redeveloped with a new 9-story 128 foot tall building with multiple uses (commercial use, office space, community facility and non-profit manufacturing space). This site was included in the analysis.

In addition, Site 6 will have two alternatives – one with deed restriction and the second without deed restrictions.

With addition of these converted sites, a total of fifty (50) buildings on the development sites were included in the analysis.

Initial Site Groupings

The 2012 *CEQR Technical Manual* includes a screening methodology to estimate the potential impacts of HVAC system emissions from a single building that is at least 30 feet from the nearest building of similar or greater height. A detailed dispersion analysis is required for buildings that are less than 30 feet from a taller building. However, when a building-on-building analysis involves multiple buildings, situations may occur where one (or more) of the buildings is located less than 30 feet from a nearby building but more than 30 feet from another nearby building. In these cases, each building's impact on each nearby building was estimated individually—using either the screening level or detailed analysis, as appropriate. As such, each RWCDS building was placed in one or both of the following groups:

- Group 1 Development Sites – projected and potential sites that are more than 30 feet from a taller building. The *CEQR* screening methodology was initially used to estimate the potential impacts of these buildings (and detailed dispersion analyses were conducted only for buildings that failed the screening analysis).
- Group 2 Development Sites – projected and potential sites that are closer than 30 feet from a taller building. Detailed dispersion analyses with EPA AERMOD model conducted to estimate the potential impacts of these building HVAC's systems.

Methodology Used for Each Development Site

The projected and potential developments sites under the RWCDS that were evaluated using either screening or detailed analyses are presented in Tables 12-4 and 12-5, respectively.

Screening Analysis of Development Sites

Building-on-Building Impact Analysis

Methodology

A screening analysis was conducted for the Group 1 development sites, using 2012 *CEQR Technical Manual* nomographs, to determine whether the HVAC emissions of any of the projected and potential developments would have the potential to significantly affect air quality levels at any of the other nearby projected and potential development sites (i.e., project-on-project impacts).

Each projected and potential development was evaluated and all nearby projected or potential developments of similar or greater height were considered as potential sensitive receptor sites. If more than one taller building is located near a shorter building, the potential impacts from the HVAC emissions of the shorter building on the closest taller building were considered. If the distance from a projected and/or potential development to the nearest development of similar or greater height is less than the threshold distance provided in the CEQR nomographs, the potential exists for significant air quality impacts, and a detailed dispersion modeling analysis was conducted. Otherwise, the development site passed the screening analysis, and no further analysis is required.

TABLE 12-4
Projected Developments under RWCDS and Level of Analysis Required

Site ID	Block	Lot	Total Floor Area (sq. feet)	Building Height (feet)	Distance to Nearest Building of Similar or Greater Height (feet)	Level of Analysis Required
1	2069	20	46,688	85	> 30 ft (from 2)	Screening
2	2054	69	83,276	100	more than 400 ft from nearest taller building	Passed screening analysis
4	2078	55	19,482	80	> 30 ft (from 22)	Screening
5	2092	26	115,932	140	> 30 ft (from 25)	Screening
6 [3] (with deed restriction)	2077	14	149,145	120	more than 400 ft from nearest taller building	Passed screening analysis
6 [4] (without deed restriction)	2077	14	173,389	120	more than 400 ft from nearest taller building	Passed screening analysis
7	2076	61	97,084	170	more than 400 ft from nearest taller building	Passed screening analysis
8	2076	45	19,342	100	> 30 ft (from 6 [3] and 6 [4])	Screening
					< 30 ft (from 9)	Detailed
9	2076	40, 41	86,259	120	more than 400 ft from nearest taller building	Passed screening analysis
10	2072	38	9,734	80	> 30 ft (from 30)	Screening
11	1988	14	18,703	80	> 30 ft (from 12)	Screening
12	1988	18	15,360	80	> 30 ft (from 11)	Screening
13	1970	9	9,742	80	more than 400 ft from nearest taller building	Passed screening analysis
14	1967	85	105,891	125	< 30 ft (from 40 [1] on Lots 50, 60, and 89)	Detailed
15	1967	66	68,881	111	< 30 ft (from 14 and 40 [1] on Lot 60)	Detailed
17	1953	54	10,116	80	more than 400 ft from nearest taller building	Passed screening analysis
18	1966	78, 80, 81, 82, 83	92,772	130	more than 400 ft from nearest taller building	Passed screening analysis
19	1966	77	14,383	65	< 30 ft (from 18)	Detailed
40 Conversion Scenario [1]	1967	40	126,459	112	> 30 ft (from Site 50)	Screening
				112	< 30 ft (from Lot 45)	Detailed
		45	96,475	112	> 30 ft (from Site 50)	Screening
				122	> 30 ft (from Site 50)	Screening
				122	<30 ft (from Lot 50)	Detailed

		50	73,580	116	> 30 ft (from Site 50)	Screening
					< 30 ft (from Site 14)	Detailed
				126	> 30 ft (from Site 50)	Screening
		60	90,582	162	more than 400 ft from nearest taller building	Passed screening analysis
		89	90.582	162	more than 400 ft from nearest taller building	Passed screening analysis
40 New Development Scenario [(2)]	1967	40	231,939	170	more than 400 ft from nearest taller building	Passed screening analysis
		45	64,620	100	< 30 ft (from Lots 50-60)	Detailed
					> 30 ft(from Site 50)	Screening
		50,60	143,396	92	< 30 ft (from Lots 40-45, 89 and Site 14)	detailed
					> 30 ft (from Site 50)	Screening
		89	170,485	92	> 30 ft (from 31 and 15)	Screening
					< 30 ft (from Lots 50-60 and Site 14)	Detailed
50	1966	41, 95	264,000	128	< 30 ft (from 18)	Detailed

Note:

[(1)] Conversion Site scenario
[(2)] New Development Site scenario: Lots 40 and45 are combined; and Lots 50 and 60 are combined.
[(3)] With deed restriction scenario
[(4)] No deed restriction scenario
Source: PB, 2012

TABLE 12-5
Potential Developments under RWCDS and Level of Analysis Required

Site ID	Block	Lot	Total Floor Area (sq. Feet)	Building Height (feet)	Distance to Nearest Building of Similar or Greater Height (feet)	Level of Analysis Required
20	2065	6	10,116	70	> 30 ft (from 21)	Screening
21	2065	10	10,116	80	more than 400 ft from nearest taller building	Passed screening analysis
22	2078	17	20,232	80	> 30 ft (from 6)	Screening
23	2077	6	66,867	120	> 30 ft (from 7)	Screening
24	2077	24	23,150	100	> 30 ft (from 9)	Screening
25	2091	36	78,042	165	> 30 ft (from 7)	Screening
26	2076	25, 125	13,658	80	< 30 ft (from 9 and 27)	Detailed
27	2076	27, 127	11,738	80	< 30 ft (from 26)	Detailed
28	2051	56, 57	14,250	100	<30 ft (from 29)	Detailed
29	2051	58, 59	18,716	100	<30 ft (from 28)	Detailed
30	2071	42, 141	12,140	80	>30 ft (from 10)	Screening
31	1968	16	119,007	75	>30 ft (from 14 and 40 [(1)] on Lot 89)	Screening
					>30 ft (from 40 [(2)] on Lot 89))	Screening
32	1966	107, 108	26,552	70	>30 ft (from 40 [(1)] on Lots 40, 45, 50, and 60)	Screening
					>30 ft (from 40 [(2)] on Lots 40-45, and 50-60)	Screening
33	1967	9, 10, 12	41,681	85	>30 ft (from 15 and 50)	Screening
56	2092	21	2,653	34	>30 ft (from 5)	Screening
57	2060	10	4,946	30	>30 ft (from 53)	Screening

Note:
[(1)] Projected Development Site 40 - Conversion Site scenario
[(2)] Projected Development Site 40 - New Development Site scenario: Lots 40 and 45 are combined. Lots 50 and 60 are combined
Source: PB, 2012

The total floor area of each projected and/or potential development site was used as input for the screening analysis. It was conservatively assumed that the HVAC system of each development site would utilize a single stack with a height 3 feet above roof height (as per *CEQR Technical Manual* guidance). If a development did not pass this screening-level procedure, detailed atmospheric dispersion analyses, using the EPA's AERMOD model, were conducted.

The following CEQR procedures were conducted:

- Figures 17-5 (SO_2 Boiler Screen, Residential Development, Fuel No.2) and 17-7 (NO_2 Boiler Screen, Residential Development, Natural Gas) of the Air Quality Appendix of the 2012 *CEQR Technical Manual* were used to determine potential for significant SO_2 (i.e., the critical pollutant for fuel oil) and NO_2 (i.e., the critical pollutant for natural gas) impacts.
- The estimated total size of each building was plotted on the nomograph against the distance to a potentially affected nearby taller building.
- The threshold distance at which a potentially significant impact is likely to occur was estimated and compared to the actual distance between the shorter building and the nearest taller 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 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.

If the HVAC emissions of a building can affect several nearby taller buildings, only the highest impacts on the nearest building were considered. These highest values, based on the screening analysis, are presented in Tables 12-6 and 12-7. If a building passed this screening analysis, the impacts on the other surrounding buildings (located further from the building being considered) are also assumed to pass the screening analysis.

Pollutants Considered

Screening and detailed analyses were conducted for both fuel oil No. 2 and natural gas, with the critical pollutant for fuel oil being SO_2 and the critical pollutant for natural gas being NO_2.

Results

The results of the screening analyses for building-on-building impacts of Group 1 developments (as well as the critical distance parameters used in these analyses), which are presented in Tables 12-6 and 12-7, are as follows:

- Fourteen (14) Group 1 developments passed the screening analysis for building-on-building impacts using both fuel oil and natural gas (Table 12-6);
- Ten (10) Group 1 developments, including both projected and potential developments, did not pass the screening analysis for building-on-building impacts using either fuel oil or natural gas (Table 12-7).

TABLE 12-6
Group 1 Developments That Passed CEQR Screening Analysis for Building-on-Building Impacts

Site ID	Building Floor Area	Building Height	CEQR Threshold Distance for No. 2 Fuel Oil	CEQR Threshold Distance for Natural Gas	Measured Distance to Nearest Taller Building	Source and Receptor Sites	CEQR Screening-Analysis Results for No. 2 Fuel Oil	CEQR Screening-Analysis Results for Natural Gas
	sq. feet	feet	feet	feet	feet			
1	46,688	85	70	53	97	1 on 2	Pass	Pass
4	19,482	80	47	35	151	4 on 22	Pass	Pass
6 [3]	149,145	120	130	87	160	6 [3] on 23	Pass	Pass
6 [4]	173,389	120	145	100	160	6 [4] on 23	Pass	Pass
8	19,342	100	47	35	94	8 on 6 [3]	Pass	Pass
						8 on 6 [4]	Pass	Pass
20	10,116	70	30	30	69	20 on 21	Pass	Pass
22	20,232	80	48	30	56	22 on 6	Pass	Pass
23	66,867	120	80	65	98	23 on 7	Pass	Pass
24	23,150	100	50	33	91	24 on 9	Pass	Pass
25	78,042	165	96	70	141	25 on 7	Pass	Pass
30	12,140	80	32	30	189	30 on 10	Pass	Pass
32	26,552	70	52	38	62	32 on 40 [1] on Lot 40. 45	Pass	Pass
					126	32 on 40 [1] on Lot 50	Pass	Pass
					250	32 on 40 [1] on Lot 60	Pass	Pass
					62	32 on 40[2] on Lots 40-45	Pass	Pass
					126	32 on 40 [2] on Lots 50-60	Pass	Pass
56	2,653	34	30	30	98	56 on 5	Pass	Pass
57	4,946	30	30	30	350	57 on 53	Pass	Pass

Note:
[1] Conversion Site scenario
[2] New Development Site scenario
[3] With Deed Restriction scenario
[4] No Deed Restriction scenario
Source: PB, 2012

TABLE 12-7

Group 1 Developments That Did Not Pass CEQR Screening Analysis for Building-on-Building Impacts

Site ID	Building Floor Area	Building Height	CEQR Threshold Distance for No. 2 Fuel Oil	CEQR Threshold Distance for Natural Gas	Measured Distance to Nearest Taller Building	Source and Receptor Sites	CEQR Screening-Analysis Results for No. 2 Fuel Oil	CEQR Screening-Analysis Results for Natural Gas
	sq. feet	feet	feet	Feet	feet			
5	115,932	140	113	83	99	5 on 25	Fail	Pass
11	18,703	80	46	30	46	11 on 12	Fail	Pass
31	119,007	75	120	85	54	31 on 14	Fail	Fail
					55	31 on 40 (1) on Lot 89	Fail	Fail
33	41,681	85	68	50	56	33 on 15	Fail	Pass
					66	33 on Site 50	Fail	Pass
40 (1) on Lot 45	96,475	122	100	70	62	Lot 45 on Site 50	Fail	Pass
40(1) on Lot 50	73,580	126	85	65	100	Lot 50 on Site 50	Fail	Pass
40 (1) on Lot 40	126,459	112	115	85	100	Lot 40 on Site 50	Fail	Pass
40 (2) on Lot 40,45	64,260	100	80	60	62	Lot 40-45 on Site 50	Fail	Pass
40 (2) on Lot 50,60	143,596	92	120	85	100	Lot 50-60 on Site 50	Fail	Pass
40 (2) on Lot 89	170,485	92	140	95	55	Lot 89 on Site 31	Fail	Fail
					66	Lot 89 on Site 15	Fail	Fail

Note:
(1) Conversion Site scenario
(2) New Development Site scenario
Source: PB, 2012

Based on these results, further detailed analysis is required to evaluate the potential impacts of the ten (10) Group 1 development sites that failed the screening analysis on other projected/potential sites. The results of the detailed analysis for these sites are provided in Tables 12-9 and 12-10 below.

Impacts on Existing Land Uses

Methodology

A survey of existing land uses within 400 feet of the projected and potential development sites was conducted using the New York City OASIS mapping network system and GIS shape files to identify residential land uses and other sensitive receptor sites. The survey identified a number of existing residential buildings near projected/potential development sites that can be impacted by the HVAC emissions from proposed developments. The same screening analysis previously discussed was conducted, using 2012 CEQR nomographs, to determine the potential impacts of the HVAC emissions of any of the projected and potential developments on these existing land uses.

Screening Analysis of the Existing Land Uses

The following are the results of the screening analyses used to estimate the potential impacts on existing land uses:

- A total of six (3 projected and 3 potential) projected/potential developments were identified as being located near existing buildings that are the same height or taller;
- Of these, three developments (Sites 28, 29, and 56) are Group 1 sites located more than 30 feet from existing buildings and three developments (Sites 2, 13, and 57) are Group 2 sites that are located closer than 30 feet from the existing buildings for which detailed analysis is required. Table 12-8 provides results for the three Group 1 developments while the results of the detailed analysis for the Group 2 three developments are provided in Tables 12-13 and 12-14.

The result of the screening analysis is that potential air quality impacts of the HVAC emissions from projected and potential developments on existing land uses may occur and, therefore, detailed analysis is required for the Group 2 developments.

Detailed Analysis of Projected and Potential Developments

Detailed dispersion analyses, using the latest version of the EPA AERMOD model, were conducted for developments that did not pass the screening analysis either for building-on-building impacts or impacts on existing buildings or for which screening analysis is not applicable.

Pollutants Considered

Total 24-hour SO_2 and the annual NO_2 impacts represent the critical pollutants and time periods for determining potential project impacts—SO_2 is the critical pollutant for fuel oil and NO_2 is the critical pollutant for natural gas.

It was conservatively assumed that 100 percent of nitrogen oxides emitted from the HVAC systems would be in form of NO_2 at the receptor sites.

TABLE 12-8
Impacts on Existing Land Uses from the Group 1 Developments Using CEQR Nomographs

Development Site ID	Block: Lot	Building Height	Building Floor Area	Block & Lot of Nearby Existing Buildings	Number of Stories of Existing Buildings	Distance from Development Site to Existing Buildings	CEQR Threshold Distance for Natural Gas	Potential NOx Impact	CEQR Threshold Distance for No. 2 Fuel Oil	Potential SO_2 Impact
		feet	sq.			feet	feet		feet	
28	205	100	14,2	2053:1	14	92	30	No	43	No
29	209	100	18,7	2053:1	14	92	30	No	48	No
56	209	34	2,65	2091:4	10	97	30	No	30	No

Source: PB 2012

Methodology

Dispersion Model

AERMOD is a steady-state plume model that is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). It can be used to calculate pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability of calculating pollutant concentrations in a cavity region and at locations when the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures.

Regulatory default options of the AERMOD model were used. Following CEQR guidelines, analyses were conducted assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and the elimination of calms. The AERMOD downwash algorithm was used to estimate the potential effects of the multiple building structures on plume dispersion.

Emission Rates

Emission factors for the pollutants of concern were obtained from EPA's "Compilation of Air Pollutant Emission Factors" (AP-42) for fuel oil (with sulfur content of 0.2 percent) and natural gas (AP-42, Tables 1.3-1 and 1.4-1). Emission rates were estimated as follows:

- A fuel consumption rate for each development was estimated using fuel factors presented in the 2012 *CEQR Air Quality Appendix.*
- These fuel factors (0.38 gallons per square feet for No. 2 fuel oil and 52.8 cubic feet per square feet for natural gas for New York City) were multiplied by the square footage of each site to estimate the total gallons (or cubic feet) of fuel consumed by that building annually.
- It was assumed that all fuel is consumed in a 100 day (2,400 hour) heating season.
- Average annual peak period pollutant emission rates were estimated, as recommended in the *CEQR Technical Manual*, by dividing the total amount of pollution estimated to be emitted in a year by 8,760 hours.

Stack Parameters

Stack heights, building sizes (square footages and heights) under RWCDS, and estimated pollutant emission rates used in these analyses are provided in the backup documentation for this analysis. It was assumed that emissions from each development would be released through a single stack located on the roof approximately 10 feet from the nearest taller building, as per DOB recommendations.

The following stack parameters, which were developed using the NYCDEP "Combustion Applications" database and the rated heat input (in million BTUs [MMBtus] per hour) of the heating systems, were used:

- Boilers from 1 to 5 MMBtu/hour = 0.5-foot diameter, exit velocity 3.9 m/sec
- Boilers from 5.1 to 10 MMBtu/hour = 1.0-foot diameter, exit velocity 5.8 m/sec
- Boilers from 10.1 to 15 MMBtu/hour = 2.0-foot diameter, exit velocity 10.2 m/sec

Stack heights were assumed to be 3 feet above the building roof. All stack exit temperatures were assumed to be 300°F (423°K).

Meteorological Data

Analyses were conducted using the latest available five consecutive years of meteorological data (2006-2010). Surface data were obtained from La Guardia Airport and upper air data were obtained from Brookhaven station, New York. These meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevations over the 5-year period. Data were developed using the EPA AERMET processor. The land use around the site was classified as urban using defined categories to determine surface parameters used by the AERMET program.

Receptor Locations

Source-receptor configurations (stack diameters, plume rise and dispersion, and stack proximity to the receptors) were considered in selecting receptor sites. In order to determine receptor locations where total impacts would occur, receptors were placed on the façade of the nearest impacted development sites along the plume centerline at height of the exhaust stack and then above to account for plume rise. It was determined that the highest impacts occur at a height 0.3 meter greater than stack height.

For the analysis of existing land uses, receptors were placed on the nearby existing buildings at the levels of the stacks of the projected and potential development sites (i.e., where the greatest impacts are likely to occur). If a stack on a projected/potential development was taller than a nearby existing building, receptors were placed at the top floor of the existing building.

Background Values

Background concentrations (i.e., pollutant levels from other sources in the study area) for the pollutants of concern, which were obtained from NYCDEP, incorporated the most recently available monitoring data from NYSDEC PS59 monitoring station in Manhattan (DEP Memo dated May 21, 2010). The first highest 24-hour SO_2 background concentration of 110 ug/m3 was added to the 1st highest AERMOD-predicted SO_2 impact and resulting total 24-hour SO_2 concentration was compared with appropriate 24-hour SO_2 NAAQS of 365 ug/m3. An annual background NO_2 concentration of 68 ug/m3 from the same monitoring station was used as well.

Results

Building-on-Building Impacts of Group 1 Developments That Did Not Pass the Screening Analysis

Developments that did not pass the screening analysis for building-on-building impacts were evaluated in a detailed analysis.

As shown in Tables 12-9 and 12-10, the result of detailed dispersion analyses for these buildings is that no exceedances of either the 24-hour SO_2 or annual NO_2 NAAQS are predicted.

TABLE 12-9
Group 1 Developments That Passed The Detailed Analysis for Building-on-Building Impacts with Fuel Oil

Site ID	Total Floor Area (sq. feet)	Stack Height (feet)	Source and Receptor Sites	24-hr SO_2 Emission Rate (g/sec)	24-hr SO_2 Impacts ($\mu g/m^3$)	Total Estimated 24-hr SO_2 Conc. ($\mu g/m^3$)*	24-hr SO_2 NAAQS ($\mu g/m^3$)
5	115,932	140	5 on 25	0.066	64	174	365
11	18,703	80	11 on 12	0.011	15	125	
31	119,007	75	31 on 14	0.067	141	251	
			31 on 40 (1) on		140	250	
			31 on 40 (2) on		140	250	
33	41,681	85	33 on 15	0.024	72	182	
40 (1) on Lot 40	126,459	112	Lot 40 on Site 50	0.072	54	163	
40 (1) on Lot 45	96,475	122	Lot 45 on Site 50	0.055	41	151	
40 (1) on Lot 50	73,580	126	Lot 50 on Site 50	0.042	67	177	
40 (2) on Lots	64,260	100	Lot 40-45 on	0.036	56	166	
40 (2) on Lot	143,596	92	Lot 50-60 on	0.081	105	215	

*Total estimated 24-hr SO_2 concentrations include SO_2 background value of 110 $\mu g/m^3$

TABLE 12-10
Group 1 Developments That Passed The Detailed Analysis for Building-on-Building Impacts with Natural Gas

Site ID	Total Floor Area (sq. feet)	Stack Height (feet)	Source and Receptor Sites	NO_2 Emission Rate (g/sec)	Total Estimated Annual NO_2 Conc. ($\mu g/m^3$)*	Annual NO_2 NAAQS ($\mu g/m^3$)
31	119,007	75	31 on 14	0.009	71	100
			31 on 40 (1) on		71	
40 (2) on Lot 89	170,485	92	Lot 89 on Site 15	0.013	73	

***** Total estimated annual NO_2 concentrations include a background value of 68 $\mu g/m^3$

Building-on-Building Impacts of Group 2 Developments

The New York City Building Code (Building Code) requires that a rooftop stack be at least 10 feet away from a taller building (highest obstacle). As such, the HVAC stack on each projected and potential development located closer than 30 feet or immediately adjacent to another projected or potential development site were initially placed 10 feet from the lot line to account for conditions that may occur should a taller abutting building be built, and potential impacts were estimated using detailed dispersion analyses. If exceedances of the NAAQS were predicted, setback distances were increased until the threshold distance at which no exceedances of the NAAQS were predicted.

NO_2 Impacts with Natural Gas

All Group 2 development sites with natural gas passed the detailed analysis with a 10-foot distance between the HVAC exhaust stack and the nearest taller building. Therefore, no significant adverse NO_2 impacts for Group 2 development sites are predicted when using natural gas in HVAC system.

SO_2 Impacts with Fuel Oil

The result of the analyses for Group 2 developments using fuel oil is that two sites (Sites 26 and 27) passed the detailed analysis for building-on-building impacts but the other sites required additional stack set-back distances beyond the Building Code minimum to pass the analysis. These results are as follows:

- Table 12-11 presents the results of analyses that were conducted for Sites 26 and 27 of the Group 2 developments. With a stack located 10 feet away from abutting building, Sites 26 as it impact Site 27 and Site 27 passed the detailed building-on-building analysis without additional stack setback. Therefore, no additional stack setback beyond the Building Code minimum is required for these developments.
- Table 12-12 shows the results of analyses that were conducted for the other fourteen (14) Group 2 developments that did not pass the building-on-building analysis, and stack setback distances are required for fuel oil burning systems to comply with the NAAQS.
- Two scenarios were considered for Site 40 – one is a conversion scenario (Table 12-12) and the second is a new development scenario with full demolition with lots 40-45 and 50-60 combined, (as shown in Table 12-13).

TABLE 12-11
Group 2 Developments with Fuel Oil Systems That Passed the Detailed Analysis for Building-on-Building Impacts

Site ID	Total Floor Area (sq. feet)	Building Height (feet)	Source and Receptor Sites	24-hr SO_2 Emission Rate (g/sec)	24-hr SO_2 Impacts ($\mu g/m^3$)	Total Estimated 24-hr SO_2 Conc.* ($\mu g/m^3$)	24-hr SO_2 NAAQS ($\mu g/m^3$)
2	13,658	80	26 on 27	0.008	89	199	365
2	11,738	80	27 on 26	0.007	152	262	

*Total estimated 24-hr SO_2 concentrations include SO_2 background value of 110 $\mu g/m^3$

TABLE 12-12
Group 2 Developments that did Not Pass 10-foot Threshold Distance with Fuel Oil for Building-on-Building Impacts and Required Stack Setback Distances Beyond the Building Code Minimum (Assumes Conversion Scenario for Site 40)

Site ID	Total Floor Area	Building Height	Source and Receptor Sites	Stack Setback Distances from Nearest Taller Building	24-hr SO_2 Emission Rate	24-hr SO_2 Impacts	Total Estimated 24-hr SO_2 Conc. (3)	24-hr SO_2 NAAQS
	sq. feet	feet		feet	g/sec	µg/m^3	µg/m^3	µg/m^3
8	19,342	100	8 on 9	20	0.011	229	339	365
14	105,891	125	14 on 40 (1) on Lots 50, 60, 89	47	0.060	238	348	
15	68,881	111	15 on 14	46	0.039	243	353	
			15 on 40 (1) on Lot 60	36		230	340	
19	14,383	65	19 on 18	13	0.008	240	350	
26	13,658	80	26 on 9	15	0.008	235	345	
29	18,716	100	29 on 28	15	0.011	221	331	
28	14,250	100	28 on 29	13	0.008	211	321	
40* on Lot 40	126,459	112	Lot 40 on 45	52	0.072	251	361	
		112	Lot 40 on 89	56		254	364	
40* on Lot 45	96,475	122	Lot 45 on 40	44	0.055	253	363	
		112	Lot 45 on 50	46		250	360	
		122	Lot 45 on 89	52		252	362	
40* on Lot 50	73,580	116	Lot 50 on 45	40	0.042	247	357	
			Lot 50 on 60	39		249	359	
			Lot 50 on 89	45		254	364	
40* on Lot 60	90,682	162	Lot 60 on 89	53	0.051	252	362	
40* on Lot 89	90,682	162	Lot 89 on 60	43	0.051	254	364	

*Site 40 represents conversion scenario

TABLE 12-13
Required Stack Setback Distances Beyond the Building Code Minimum (Assumes New Development Scenario for Site 40 - with Lots 40,50 and 50,60 Combined)

Site ID	Total Floor Area	Building Height	Source and Receptor Sites	Stack Setback Distances from Nearest Taller Building	24-hr SO_2 Emission Rate	24-hr SO_2 Impacts	Total Estimated 24-hr SO_2 Conc. (*)	24-hr SO_2 NAAQS
	sq. feet	feet		feet	g/sec	µg/m^3	µg/m^3	µg/m^3
40 on Lot 50,60	143,396	92	Lot 50,60 on 40,45	55	0.081	251	361	365
			Lot 50,60 on 89	62		255	365	
			Lot 50-60 on Site 14	62		255	365	
40 on Lot 89	170,485	92	Lot 89 on 50,60	59	0.097	249	359	
			Lot 89 on Site 14	63		255	365	
50	264,000	128	50 on 18	64	0.150	251	354	

Note:

- Total estimated 24-hr SO_2 concentrations include SO_2 background value of 110 µg/m^3

Impacts of Group 2 Developments on Existing Buildings

Impacts of the Group 2 developments on existing buildings were evaluated in the detailed analysis using the methodology previously discussed. Results for the two developments (Sites 13 and 57) are provided in Table 12-14.

As shown in Table 12-14, the result of detailed dispersion analyses for these buildings is that no exceedances of the 24-hour SO_2 are predicted. No exceedances were also predicted for the annual NO_2 NAAQS of 100 ug/m3.

The results of the detailed dispersion analyses are that no additional analyses (with stack setbacks), therefore, are required for sites 13 and 57 either with fuel oil or natural gas.

Results of analysis for the other Group 2 development site (Site 2) provided in Table 12-15 showed that it did not pass the analysis for impacts on existing land uses and the stack setback distance is required for this site with fuel oil burning in HVAC system to comply with the NAAQS.

TABLE 12-14
Group 2 Developments That Passed the Detailed Analysis for Impacts on Existing Buildings with Fuel Oil

Site ID	Total Floor Area (sq. feet)	Building Height (feet)	Source and Receptor Sites Block/Lot	24-hr SO_2 Emission Rates (g/sec)	24-hr SO_2 Impacts ($\mu g/m^3$)	Total Estimated 24-hr SO_2 Conc.* ($\mu g/m^3$)	24-hr SO_2 NAAQS ($\mu g/m^3$)
Site 13	9,742	80	13 on 1970:2 and Lot 16	0.006	214	324	365
Site 57	4,946	30	57 on 2060:11 and Lot 1	0.003	151	261	

*Total estimated 24-hr SO_2 concentrations include SO_2 background value of 110 $\mu g/m^3$

TABLE 12-15
Group 2 Development Sites that Did Not Pass 10-foot Threshold Distance with Fuel Oil for Impacts on Existing Land Uses and Required Stack Setback Distances Beyond the Building Code Minimum

Site ID	Block: Lot	Building Height (feet)	Building Area (ft^2)	Source and Receptor Sites Block/Lot	Stack Setback Distances from Nearest Taller	24-hr SO_2 Emission Rate (g/sec)	Total Estimated 24-hr SO_2 Conc. ($\mu g/m^3$)*	24-hr SO_2 NAAQS ($\mu g/m^3$)
2	2054:69	100	83,276	2 on 2054:62	43	0.047	344	365

*Total estimated 24-hr SO_2 concentrations include SO_2 background value of 110 $\mu g/m^3$

Based on the results of analyses, (E) designations would be required on some development sites to ensure that there would be no significant air quality impacts on adjacent sites—either on other development sites or on existing buildings. Since the HVAC emissions of these development sites did not exceed the applicable air quality standard using natural gas, (E) designation would be required that would specify either:

- That natural gas would be used exclusively; or
- A minimum distance to the stack on the building roof must be from the edge of an adjacent site.

The result of these analyses is that with the use of (E) designations to ensure adequate distance between HVAC exhaust point and nearby taller buildings or the use of natural gas, the potential impacts from the heating systems of the projected and potential development sites would not cause violations of the NAAQS and would therefore have no significant adverse air quality impacts.

Required Setback Distances

To preclude the potential for significant adverse air quality impacts, the (E) designations shown on Table 12-16 would be required for the Projected and Potential Group 2 development sites. These (E) designations would specify the required stack setback distance for fuel oil or the exclusive use of natural gas.

TABLE 12-16
Minimum Stack Setback Requirements for Group 2 Developments – Sites Requiring (E) Designations

Site ID	Block	Lot	Setback Requirements
2	2054	69	43 feet from 14-story existing building on Block 2054, Lot 62
8	2076	45	20 feet from Development Site 9
14	1967	85	47 feet from Development Site 40 (1) on Lots 50, 60, 89
15	1967	66	46 feet from Development Site 14; 36 feet from Development Site 40 (1) on Lot 60
19	1966	77	13 feet from Development Site 18
26	2076	25, 125	15 feet from Development Site 9
28	2051	56, 37	13 feet from Development Site 29
29	2051	58, 59	15 feet from Development Site 28
40 (1)	1967	40	52 feet from 40 (1) on Lot 45
40 (1)	1967	40	56 feet from 40 (1) on Lot 89
40 (1)	1967	45	44 feet from 40 (1) on Lot 40; 46 feet from 40 (1) on Lot 50; 52 feet from 40 (1) on Lot 89
40 (1)	1967	50	40 feet from 40 (1) on Lot 45; 39 feet from 40 (1) on Lot 60; 45 feet from 40 (1) on Lot 89
40 (1)	1967	60	53 feet from 40 (1) on Lot 89
40 (1)	1967	89	43 feet from 40 (1) on Lot 60
40 (2)	1967	50,60	55 feet from 40 (2) on Lot 40,45; 62 feet from 40 (2) on Lot 89; 62 feet
40 (2)	1967	89	59 feet from 40 (2) on Lot 50,60; 63 feet from 40 (2) on Site 14;
50	1966	41, 95	64 feet from Development Site 18

Note:
40 (1) Conversion Site scenario
40 (2) New Development Site scenario
Source: PB, 2012

The HVAC analysis was performed to determine whether the Proposed Action would result in any potential significant adverse air quality impacts. The analysis determined that certain sites would require (E) designations that would specify the type of fuel to be used or the distance that the boiler stack on the building roof must be from the lot line edge. The proposed (E) designations for the applicable projected and potential development sites with respect to HVAC systems are presented at the end of this chapter.

With these (E) designations, the potential impacts from the heating systems of the projected and potential development sites would not exceed the applicable NAAQS and, therefore, would not have potential significant adverse environmental impacts on air quality.

Cluster Analysis

The Proposed Action could result in projected and potential development sites with the same building heights (or approximately the same heights) that are located in close proximity to one another. Therefore, in addition to estimating the potential impacts of the HVAC emissions of these development sites individually, emissions from these development sites were also considered as "clusters" of emission sources. As a practical rule, clusters should be selected based on the sizes of the buildings that comprise the cluster, proximity of the cluster buildings to each other, and the difference in stack heights no more than 10-15 feet with no street in between.

As the potential impacts of these development sites clusters could not be evaluated using 2012 *CEQR Technical Manual* screening nomographs, the impacts of the HVAC systems emissions of these clusters were estimated using detailed analyses. This analysis was performed in the same manner described for the Group 2 developments, except that this analysis was conducted using a single representative stack located in the approximate geographic center of each cluster as the emission source. SO_2 from fuel oil heating systems was considered as the critical pollutant for determining whether the potential impacts of the cluster impacts would be significant.

The following emission clusters were identified based on the heights, sizes, and locations (with no streets in between) of these buildings:

- Cluster #1: Projected Development 50 (Block 1966, Lot 41, 95) and Projected Development 18 (Block 1966, Lot 83), with a total area of 356,772 square feet and a representative stack height of 128 feet.
- Cluster #2: Projected Development Site 40 [(1)] (Block 1967, Lots 40, 45, and 50 with conversion scenario), Projected Development Site 14 (Block 1967, Lot 85), and Projected Development Site 15 (Block 1967, Lot 66) with a total area of 471,286 square feet and a representative stack height of 120 feet.

The potential impacts of the HVAC emissions of these clusters on other nearby development sites, including existing buildings, were evaluated. The result of this analysis is that the total 24-hour SO_2 impacts of combined emissions from these clusters (using fuel oil), as well as annual NO_2 impacts (using natural gas), would not cause an exceedances of a NAAQS at any nearby development site or existing land uses. The result of this analysis, which is provided in Table 12-17, is that there would be no exceedances of the NAAQS for all applicable pollutants.

TABLE 12-17
Cluster Analysis Results with Fuel Oil

Cluster ID	Total Floor Area (sq. feet.)	Total Cluster 24-hr SO_2 Emission Rate (g/sec)	Max Estimated Cluster Impacts ($\mu g/m^3$)	Total Estimated 24-hr SO_2 Conc.* ($\mu g/m^3$)	24-hr SO_2 NAAQS ($\mu g/m^3$)
Cluster 1	376,772	0.202	60.2	170	365
Cluster 2	470,286	0.267	20.5	131	

*Total estimated 24-hr SO_2 concentrations include SO_2 background value of 110 $\mu g/m^3$

Impacts from Nearby Existing Combustion Emission Sources

Following *CEQR Technical Manual* guidance, a survey of land uses and building heights was conducted to determine whether there are any existing emissions of combustion sources, including commercial, institutional or residential developments, located within 400 feet and beyond (up to 1,000 feet) of the development sites. Based on this survey, two combustion emission sources were identified as having the potential to impact the proposed development sites: the North River Water Pollution Control Plant (WPCP) and New York City Housing Authority Grant Houses.

The potential impacts of these facilities were not considered to be significant because of the following:

- The North River WPCP stacks are located more than 1,000 feet from closest development site (Site 56) and, therefore, no further analysis is required.
- The New York City Housing Authority Grant Houses include two 21-story buildings that are located near Development Sites 40 and 50. However, these Housing Authority buildings are taller than the proposed development sites and, therefore, no further analysis is required.

F. HEALTH RISK ASSESSMENT OF TOXIC AIR EMISSIONS FROM EXISTING INDUSTRIAL SOURCES

Emissions of toxic pollutants from the operation of nearby existing industrial emission sources could affect the proposed projected and potential development sites. An analysis was therefore conducted to determine whether the potential impacts of these emissions would be significant.

Data necessary to perform this analysis, which include facility type, source identification and location, pollutant emission rates, and exhaust stack parameters, were obtained from regulatory agencies (e.g., from existing air permits) and/or developed using information for prototypical facilities.

Emissions from existing industrial facilities located within 400 feet of the study area that are permitted to exhaust toxic pollutants, together with non-permitted facilities that currently operate within 400 feet of the development sites, were considered in this analysis.

Data Sources

Information regarding emissions of toxic air pollutants from existing industrial sources was developed using the following procedure:

- The rezoning area boundary was used to identify the extent of the study area for determining the toxic air quality impacts associated with the Proposed Action.
- A study area was developed that includes all air toxic emission sources located within 400 feet of all of the affected development sites.
- A search was performed to identify NYSDEC Title V permits and permits listed in the EPA Envirofacts database in this study area.
- The OASIS mapping and data analysis application was used to identify existing residential and/or industrial uses within the study area and develop buildings parameters for the existing emission sources;

- Air permits for active permitted industrial facilities within the study area that are included in the NYCDEP Clean Air Tracking System database or permit applications were acquired and reviewed to obtain the information necessary to conduct the toxic air analysis. The data on these permits or permit applications, which include facility source type and locations, stack parameters, pollutant type and its emission rates, etc., are considered the most current and served as the primary basis of data for this analysis.
- Field observations were conducted to identify and validate the existence of the permitted facilities and determine if there are any non-permitted facilities currently operating within the study area.
- Emission rates and stack parameters for the non-permitted emission sources were developed based on prototypical facility types and emission data contained in NYSDEC's database.

Health Risk Assessment Methodology

Toxic air 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. While no federal standards have been promulgated for toxic air pollutants, the EPA and NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria.

The EPA developed cancer risk inhalation guideline values based on compound-specific inhalation unit risk factors *(*URFs*)* for carcinogenic pollutants, chronic non-cancer (annual) and short-term acute (1-hour) inhalation guideline values that are defined as *RfCs* (reference dose concentrations) and AIECs (acute inhalation exposure concentrations), respectively, were used in the analysis. These data were obtained from EPA IRIS (Integrated Risk Information System) database and/or EPA Prioritized Chronic Dose-Response Values and Acute Dose-Response Values for Screening Risk Assessment.

In order to evaluate short-term and annual impacts of non-carcinogenic and carcinogenic toxic air pollutants, the NYSDEC, following EPA guidelines, has also established short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) for exposure limits that were also used in the analysis when EPA data were not available. AGCs for the carcinogenic pollutants is based on cancer risk threshold of one per million. These are allowable guideline concentrations that are considered acceptable concentrations below which there should be no adverse effects on the health of the public. This value could be increased to ten-in-one million, as per New York State Department of Environmental Conservation's Guidelines for the Control of Toxic Ambient Air Contaminants (DAR-1) with NYCDEP concurrence, if the emissions from the facility or facilities causing this increase are controlled using Best Available Control Technology (BACT).

Once the risk of each carcinogenic compound is estimated, they are summed together. If the total incremental cancer risk is estimated to be less than or equal to one in one million (1.0 E-06), the risk due to all carcinogenic pollutant releases is considered to be insignificant. Once the chronic non-cancer hazard quotient (HQ) of each compound is established, they are summed together to arrive at the total hazard index (HI). HQ's are also estimated for the carcinogenic pollutants where they have an appropriate guideline values *RfC's*). If the HI is less than or equal to one, then the non-carcinogenic risk is considered to be insignificant. Similar to this, once the acute hazard quotient (AHQ) of each compound is established, they are summed together to arrive at the total acute hazard index (AHI). If the AHI is less than or equal to one, then the acute non-carcinogenic risk is considered to be insignificant.

The procedures to estimate cancer risk and chronic non-cancer and acute hazard indexes of toxic pollutants that are outlined in the EPA Human Health Risk Assessment Protocol (HHRAP) were used. The HHRAP is a guideline that can be used to perform health risk assessment for individual compounds with known health effects to determine the level of health risk posed by an increased ambient

concentration of that compound at a potentially sensitive receptor. The derived health risk values from the HHRAP are used in this analysis to determine the total risk posed by the release of multiple air toxic contaminants.

Carcinogens

Individual lifetime cancer risk through direct inhalation of carcinogen is estimated using the following equation (HHRAP, Table B-5-1 and C-2-1):

Cancer Risk (CR) = EC x URF and EC = C_a x EF x ED/AT x 365 days/year

Where:

EC = annual exposure concentrations of compound, $\mu g/m^3$
C_a = annual ambient air concentration of specific pollutant (estimated by the dispersion model), $\mu g/m^3$
URF = compound-specific inhalation unit risk factor in $(\mu g/m^3)^{-1}$
EF = exposure frequency, days/year (EPA recommends to use 350)
ED = exposure duration, year (EPA recommends value of 30 for adult resident)
AT = averaging time, year (EPA assumes 70 years of lifetime exposure)

Once the individual CR of each compound is established, these values are summed together to estimate the total cancer risk of all carcinogens. If the total risk of all carcinogenic pollutants combined is less than or equal to one in one million (1.0 E-06), the carcinogenic risk is not considered to be significant.

Non-Carcinogens

Chronic non-cancer hazard quotients (HQ) through inhalation are estimated using the following equation (HHRAP, Table B-5-1 and C-2-2):

HQ = EC x 0.001/RfC and EC = C_a x EF x ED/AT x 365 days/year

Where:

EC = exposure concentrations of compound, $\mu g/m^3$
C_a = total ambient air concentration of specific pollutant (estimated by the dispersion model), $\mu g/m^3$
RfC = reference dose concentration, established by the EPA, mg/m^3
EF = exposure frequency, days/year (EPA recommends to use 350)
ED = exposure duration, year (EPA recommends value of 30 for adult resident)
AT = averaging time, year (EPA recommends value of 30 for non-carcinogens)
0.001 = units conversion factor, mg/µg

Acute hazard quotients through inhalation (AHQ) are estimated using the following equation (HHRAP, Table C-2-3):

AHQ = C_{acute} x 0.001/AIEC

Where:

C_{acute} = 1-hour air concentration, (estimated by the dispersion model), $\mu g/m^3$
AIEC = 1-hour acute inhalation exposure guideline value, mg/m^3
0.001 = units conversion factor, mg/µg

Once the chronic non-cancer (HQ) or acute hazard quotients (AHQ) of each compound are established, they are summed together to arrive at the total chronic non-cancer (HI) or acute hazard index (AHI). If the total chronic non-cancer or acute hazard indexes are less than or equal to one, then the non-cancer or acute risk is not considered to be significant.

Dispersion Analyses

A dispersion modeling analysis of toxic pollutants that may affect the projected/potential developments was conducted using the same version of the EPA AERMOD dispersion model (version 11103) that was used in the HVAC analysis. The exposure concentrations produced from the AERMOD model were then used to estimate cancer risk thru inhalation and chronic non-cancer and acute hazard indexes for each pollutant utilizing guideline values.

The methodology to conduct dispersion analysis is similar to those used for the detailed HVAC building analysis. Input data for AERMOD (stack parameters, pollutant emission rates, source location and elevation) are those that are contained in the NYCDEP permits or permit applications. Emission sources for the dispersion analysis were located using geographical information system (GIS) shape files with the Universal Transverse Mercator coordinate projected system information (Datum NAD83, UTM Zone 18). A receptor grid that includes both elevated and ground level receptors was developed where ground level elevated receptors were placed on the affected development sites located near each emission source at multiple elevations depending on the location and height of the emission sources. Preliminary tests were conducted for each source-receptor configuration, with receptors placed at multiple elevations on the faces of the nearby projected/potential buildings, to evaluate the locations and elevations where the highest impacts would occur.

The highest resulting concentration values found at any receptors were used in the health risk assessment. Five consecutive years of meteorological data from the LaGuardia Airport were used.

Emission Data and Stack Parameters

Emission data and stack parameters for the facilities included in the analysis were obtained and/or developed as follows:

- Directly from the permit for each facility;
- When emission data were not included in a permit listed in the NYCDEP database, the necessary data were obtained from the permit application for this facility that is on file at NYCDEP; and
- When data were not available from either the permit itself or the permit application, emission rates for each type of facility were conservatively estimated using EPA's "Compilation of Air Pollutant Emission Factors (AP-42)."

Industrial Facilities and Air Toxic Emissions Evaluated

Facilities

Six permits were identified from the NYCDEP database for facilities located within 400 feet of the development sites - all dry cleaning facilities.

However, four of the six permits for the dry cleaning facilities (Permits PB002100, PA011688, PA002602, and PA028895) are for facilities that are no longer operating in this area. Therefore, they were eliminated from further consideration.

Due to fact that any impacts from the emergency generators would be temporary, these units were also excluded from analysis.

The field survey that was conducted for this project also identified six (6) non-permitted facilities that are currently operating within the air toxics study area – one dry cleaning facility (Nelson Cleaners) and five auto body repair shops.

As a result, a total of eight permitted facilities (two dry cleaners) and six non-permitted facilities (one dry cleaner and five auto body shops) were included in the analysis.

Pollutants and Emission Rates

Multiple pollutants are released from the identified facilities, one of which is carcinogen -- tetrachloroethylene (PERC) from the dry cleaners. Pollutant emission rates for this analysis were estimated as follows:

- Spray Booth Operations – It was conservatively assumed that all auto body repair shops will be equipped with spray booth. Because no data are available for spray booth operations at these facilities regarding type and quantity of paint used, type and duration of application, and/or control efficiency of the equipment, the prototypical composition of VOC emissions for auto spray paint booths operations was assumed based on representative data from prototypical facilities listed in the NYCDEC DAR-1 database. As a conservative measure, the highest emission rates for the typical pollutants emitted from spray booth found in the database were used. This results in a worst-case analysis of the potential emissions of the individual pollutants. All emissions of solids were assumed to be PM10. Based on this information, seven pollutants typically associated with spray booth operations (i.e., acetone, butyl and ethyl acetates, isobutyl acetate, toluene, xylene, methyl ethyl ketone, and particulate matter) were evaluated.

- Dry Cleaning Facilities – All dry cleaning facilities are currently equipped with 4th generation emission control systems -- with built-in carbon absorber and refrigeration units, as required by the New York State's PERC Dry Cleaning Facilities Regulation (Part 232). These facilities are considered dry-to-dry type non-vented refrigerated totally enclosed systems with, presumably, no emissions. However, according to the permits for these facilities, the efficiency of these control systems is listed as 98 percent, which indicates that 2 percent of the PERC may still be released into the atmosphere from doors, windows, roof vents, and other openings throughout the facility - as fugitive emissions. Therefore, for the conservative purpose of this analysis, 98 percent control efficiency was applied to estimate PERC emissions from these dry cleaning facilities and the remaining 2 percent were treated as fugitive emissions that were modeled as volume sources. Lateral and vertical dispersion parameters of the volume sources were developed based on the configuration and dimensions of a typical dry cleaning facility with natural ventilation.

- The PERC emission rate from the one non-permitted dry cleaner facility was assumed to be equal to the highest PERC rate found among the permitted facilities.

A detailed dispersion modeling analysis was conducted to estimate the potential impact of the air toxic emissions of the identified facilities on the projected and potential development sites.

Results of the Cancer Risk and Hazard Index Evaluation

Table 12-18 provide permit information for the existing permitted and non-permitted industrial sources considered in the analysis, including type and location of each facility, its permit number, emission point(s), contaminant name, CAS registry number, and hourly and annual emission rates for each pollutant.

Table 12-19 provides estimated annual (long-term) exposure concentrations, cancer risks for each pollutant and total incremental cancer risk (CR), and chronic non-cancer quotients for each pollutant and total non-cancer hazard index (HI). Chronic non-cancer quotients (HQ) are also estimated for the carcinogenic pollutants where they have an appropriate guideline values (e.g., *RfC*). The pollutant concentrations shown in table are the maximum values estimated at any of receptor locations. The full set of exposure concentrations, cancer risk values at each receptor locations and source group, and non-cancer chronic and acute quotients for each pollutant are provided in the backup documentation for this analysis. Also provided are the assumptions, parameters, and equations used in estimating these values.
As shown on Table 12-19, the total individual cancer risk and the total cancer risk caused by the identified facilities (0.03 in-million) are below the conservative one-in-million threshold established by EPA. Therefore, the cancer risk increase under the Proposed Action is not considered to be significant.

As also shown in Table 12-19, the total chronic non-cancer quotients (HQ) and total hazard index (HI) caused by both the carcinogenic and non-carcinogenic pollutants emitted from all of sources combined is estimated to be 0.01. This value is below the level (of 1) that is considered by the EPA to be significant.

Table 12-20 provides estimated 1-hour (short-term) exposure concentrations and acute hazard quotients (AHQ) for each pollutant and the total acute hazard index (AHI). As shown in this table, the total acute hazard index caused by all the pollutants emitted from all of sources combined is estimated to be 0.01. This value is below the level (of 1) that is considered by the EPA to be significant.

TABLE 12-18
Existing Active Industrial Source Permit Information

Facility Name	Facility Location			Permit Information							
								Hourly Rate		Annual Rate	
							CAS	Permitted	Estimated*	Permitted	Estimated*
	Block	Lot	Address	Permit	Facility Type	Pollutant	No.	lbs/hr	g/sec	lbs/year	g/sec
GG&L Cleaners Co	2079	29	1760 Amsterdam Ave	PB002100	Dry Cleaning	PERC	00127-18-4	0.920	0.00232	1,388	0.00040
Monarch Cleaners	2090	29	3507 Broadway	PA020499	Dry Cleaning	PERC	00127-18-4	0.460	0.00116	483	0.00014
Non-Permitted Facilities											
Nelson Cleaner	1966	36	471 West 125 Street	No PMT	Dry Cleaning	PERC	00127-18-4	2.120	0.00534	3,240	0.00093
Unique Auto	1987	9	547 West 133 Street	No PMT	Auto Body Shop	Acetone	00067-64-1	0.060	0.00756	75.0	0.00108
						MEK	00078-93-3	0.060	0.00756	75.0	0.00108
						Toluene	00108-88-3	0.084	0.01058	105.0	0.00151
						IBAC	00110-19-0	0.020	0.00252	7.5	0.00011
						BA	00123-86-4	0.450	0.05669	563.0	0.00809
						EA	00141-78-6	0.060	0.00756	75.0	0.00108
						Xylene	01330-20-7	0.009	0.00113	11.0	0.00016
						Particulates	NY75-00-0	0.001	0.00012	21.5	0.00031
JD Auto Repair	1987	7	553 West 133 Street	No PMT	Auto Body Shop	Acetone	00067-64-1	0.060	0.00756	75.0	0.00108
						MEK	00078-93-3	0.060	0.00756	75.0	0.00108
						Toluene	00108-88-3	0.084	0.01058	105.0	0.00151
						IBAC	00110-19-0	0.020	0.00252	7.5	0.00011
						BA	00123-86-4	0.450	0.05669	563.0	0.00809
						EA	00141-78-6	0.060	0.00756	75.0	0.00108
						Xylene	01330-20-7	0.009	0.00113	11.0	0.00016
						Particulates	NY75-00-0	0.001	0.00012	21.5	0.00031
Intrepid Auto Repair	1987	7	553 West 133 Street	No PMT	Auto Body Shop	Acetone	00067-64-1	0.060	0.00756	75.0	0.00108
						MEK	00078-93-3	0.060	0.00756	75.0	0.00108
						Toluene	00108-88-3	0.084	0.01058	105.0	0.00151
						IBAC	00110-19-0	0.020	0.00252	7.5	0.00011
						BA	00123-86-4	0.450	0.05669	563.0	0.00809
						EA	00141-78-6	0.060	0.00756	75.0	0.00108
						Xylene	01330-20-7	0.009	0.00113	11.0	0.00016
						Particulates	NY75-00-0	0.001	0.00012	21.5	0.00031
CJV Auto Repair	1988	60	529 West 134 Street	No PMT	Auto Body Shop	Acetone	00067-64-1	0.060	0.00756	0.060	0.00108
						MEK	00078-93-3	0.060	0.00756	0.060	0.00108
						Toluene	00108-88-3	0.084	0.01058	0.084	0.00151
						IBAC	00110-19-0	0.020	0.00252	0.006	0.00011
						BA	00123-86-4	0.450	0.05669	0.450	0.00809
						EA	00141-78-6	0.060	0.00756	0.060	0.00108
						Xylene	01330-20-7	0.009	0.00113	0.009	0.00016
						Particulates	NY75-00-0	0.001	0.00012	0.017	0.00031
Getty Auto Repair	2068	67	889 ST Nicholas Avenue	No PMT	Auto Body Shop	Acetone	00067-64-1	0.060	0.00756	0.060	0.00108
						MEK	00078-93-3	0.060	0.00756	0.060	0.00108

						Toluene	00108-88-3	0.084	0.01058	0.084	0.00151
						IBAC	00110-19-0	0.020	0.00252	0.006	0.00011
						BA	00123-86-4	0.450	0.05669	0.450	0.00809
						EA	00141-78-6	0.060	0.00756	0.060	0.00108
						Xylene	01330-20-7	0.009	0.00113	0.009	0.00016
						Particulates	NY75-00-0	0.001	0.00012	0.017	0.00031

* Estimated based on assumption that 2% of emissions are released into atmosphere

Notes:

PERC= Tetrachloroethylene
MEK= Methyl Ethyl Ketone
IBAC = Isobutyl Acetate
BA = Butyl Acetate
EA = Ethyl Acetate

TABLE 12-19
Cancer Risk (CR) and Chronic Non-Cancer Quotients (HQ) and Total Hazard Index (HI) of the Toxic Pollutants

CAS No.	Chemical Name	Max Estimated Concentrations ($\mu g/m^3$)	URF $(\mu g/m^3)^{-1}$ (1)	Estimated Cancer Risk (CR) per million	RfC (mg/m^3) (2)	Source	Hazard Quotients (HQ)
67-64-1	**Acetone**	5.43E-01			30	DAR-1 (5)	1.74E-05
78-93-3	**Methyl Ethyl Ketone (MEK)**	5.43E-01			5	DAR-1 (5)	1.04E-04
141-78-6	**Ethyl Acetate**	4.35E-03			3.4	DAR-1 (5)	1.23E-06
123-86-4	**Butyl Acetate**	3.26E-02			17	DAR-1 (5)	1.84E-06
110-19-0	**Isobutyl Acetate (IBAC)**	4.35E-04			17	DAR-1 (5)	2.45E-08
NY75-00-0	**Particular Matter**	1.56E-01			0.015	DAR-1 (5)	9.95E-03
127-18-4	**Tetrachloroethylene (PERC)**	2.64E-01	2.6E-07	2.82E-08	0.04	EPA (3, 4)	6.33-03
108-88-3	**Toluene**	7.60E-01			5	EPA (3, 4)	1.46E-04
1330-20-7	**Xylenes**	7.96E-02			0.1	EPA (3, 4)	7.63E-04
Total Estimated Cancer Risk (per million)				**0.03**			
Cancer Risk Threshold (per million)				**1.0**			
Total Estimated Non-Cancer Hazard Index (HI)							**0.01**
Non-Cancer Hazard Index Threshold							**1**

Source PB, 2012

Note:

1. URF = compound specific inhalation unit risk factor in $(\mu g/m^3)^{-1}$
2. RfC = reference dose concentration, established by the EPA or NYSDEC, mg/m^3
3. EPA IRIS = Integrated Risk Information System
4. EPA = EPA Prioritized Chronic Dose-Response Values
5. DAR-1 = NYSDEC Policy DAR-1 "Guidelines for the Control of Toxic Ambient Air Contaminants"

TABLE 12-20
Acute Quotients (AHQ) and Total Hazard Index (AHI) of the Toxic Pollutants

CAS No.	Chemical Name	Max Estimated Concentrations ($\mu g/m^3$)	AIEC (mg/m^3) (1)	Source	Acute Hazard Quotients (AHQ)
067-64-1	**Acetone**	3.71E+01	180	DAR-1 (3)	2.06E-04
78-93-3	**Methyl Ethyl Ketone (MEK)**	3.71E+01	13	DAR-1 (3)	2.86E-03
123-86-4	**Butyl Acetate**	2.23E+00	95	DAR-1 (3	2.34E-05
NY75-00-0	**Particular Matter**	6.19E-01	0.16	DAR-1 (3	3.87E-03
127-18-4	**Tetrachloroethylene (PERC)**	5.94E+00	20	EPA (2)	2.97E-04
108-88-3	**Toluene**	5.20E+01	37	EPA (2)	1.40E-03
1330-20-7	**Xylenes**	5.57E+00	22	EPA (2)	2.53E-04
Total Estimated Acute Hazard Index (AHI)					**0.01**
Total Acute Hazard Index Threshold					**1**

Source: PB, 2012
Notes:
1. AIEC = Acute Inhalation Exposure Concentrations, mg/m^3
2. EPA = Acute Dose-Response Values for Screening Risk Assessment
3. DAR-1 = NYSDEC Policy DAR-1 "Guidelines for the Control of Toxic Ambient Air Contaminants"

Summary of Health Risk Results

The result of this analysis is that no exceedances of EPA/NYSDEC/NYCDEP guideline thresholds values for both carcinogenic and non-carcinogenic toxic pollutants are predicted under the Proposed Action.

Air Quality (E) Designations

The heating, ventilation, and air conditioning (HVAC) analysis was performed to determine whether the proposed action would result in any potential significant adverse air quality impacts. The analysis determined that certain sites would require (E) designations that would specify the type of fuel to be used or the distance that the vent stack on the building roof must be from the edge of a lot line. The proposed (E) designations for the applicable projected and potential development sites with respect to HVAC systems are presented below.

Air Quality E-Designations for Development Sites – HVAC Restrictions

As discussed in Chapter 1, "Project Description," two development scenarios, a "Conversion Scenario" and a "New Development Scenario," were analyzed for Projected Development Site 40. The New Development Scenario analyzed a complete demolition and redevelopment of all of the lots comprising Site 40. Because the site contains existing buildings of various height, density, and character that lend themselves to a wide range of development options including alteration, conversion, and partial demolition, a Conversion Scenario was also analyzed. Under the New Development Scenario, Projected Development Site 40 would be developed with 228 dwelling units (0 affordable units), 57,665 gsf of retail, 170,786 gsf of commercial uses, 140,485 gsf of community facility uses, and a 114-space accessory parking garage. Under the Conversion Scenario, existing buildings would be converted to multiple uses, including a total of 158 dwelling units (0 affordable units), 33,182 gsd of retail, 235,754 gsf of commercial uses, 170,510 gsf of community facility uses, and a 79-space accessory parking garage.

(E) designation requirements that apply to Projected Development Site 40 and the lots therein may vary depending on the scenario under which development occurs. The (E) designation requirements for the Proposed Action are as follows:

Block 1967, Lot 40 (Projected Development Site 40):

- Conversion Scenario only:
  Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 52 feet from the lot line facing W 127th Street and at least 56 feet from the lot line facing Morningside Avenue for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1967, Lot 45 (Projected Development Site 40):

- Conversion Scenario only:
  Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 44 feet from the lot line facing Amsterdam Avenue, at least 46 feet from the lot line facing Morningside Avenue, and at least 52 feet from the lot line facing W 128th Street for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1967, Lot 50 (Projected Development Site 40):

- New Development Scenario:
  Any new residential and/or commercial development on the above-referenced property must ensure that the heating, ventilating and air conditioning stack(s) are located at least 55 feet from the lot line facing Amsterdam Avenue and at least 62 feet from the lot line facing W 128th Street for fuel oil No.

2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

- Conversion Scenario:
  Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 45 feet from the lot line facing W 128th Street and Amsterdam Avenue, at least 39 feet from the lot line facing Morningside Avenue for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1967, Lot 60 (Projected Development Site 40):

- New Development Scenario:
  Any new residential and/or commercial development on the above-referenced property must ensure that the heating, ventilating and air conditioning stack(s) are located at least 55 feet from the lot line facing Amsterdam Avenue and at least 62 feet from the lot line facing W 128th Street for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.
- Conversion Scenario:
  Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 53 feet from the lot line facing W 128th Street for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1967, Lot 89 (Projected Development Site 40):

- New Development Scenario:
  Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 59 feet from the lot line facing W 127th Street and at least 63 feet from the lot line facing W 128th Street, for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.
- Conversion Scenario:
  Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 43 feet from the lot line facing W 127th Street for fuel oil No. 2 or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 2054, Lot 69 (Projected Development Site 2):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 43 feet for oil No.2 from the lot line facing Edgecombe Avenue and West 150th Street for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 2076, Lot 45 (Projected Development Site 8):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 20 feet for oil No.2 from the lot line facing Amsterdam Avenue for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1967, Lot 85 (Projected Development Site 14):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 47 feet for oil No.2 from the lot line facing Amsterdam Avenue and W 127th Street for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1967, Lot 66 (Projected Development Site 15):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 46 feet for oil No.2 from the lot line facing 128th Street and 36 feet from the lot line facing Amsterdam Avenue for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1966, Lot 77 (Projected Development Site 19):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 13 feet for oil No.2 from the lot line facing Amsterdam Avenue for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 1966, Lot 41, 95 (Projected Development Site 50):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 64 feet for oil No. 2 from the lot line facing Morningside Avenue for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 2076, Lots 25, 125 (Potential Development Site 26):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 15 feet for oil No. 2 from the lot line facing West 145th Street for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 2051, Lot 56, 37 (Potential Development Site 28):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 13 feet for oil No.2 from the lot line facing Edgecombe Avenue for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

Block 2051, Lot 58, 59 (Potential Development Site 29):
Any new residential and/or commercial development on the above-referenced properties must ensure that the heating, ventilating and air conditioning stack(s) are located at least 15 feet for oil No.2 from the lot line facing St. Nicholas Avenue for fuel oil or use natural gas as the type of fuel for space heating and hot water (HVAC) systems, to avoid any potential significant adverse air quality impacts.

With (E) designations, the potential impacts from the projected and potential development sites heating systems would not exceed the applicable NAAQS and would therefore not have potential significant adverse environmental impacts on air quality.