A. INTRODUCTION

This chapter examines the potential for the Proposed Action to result in significant adverse impacts to air quality due to stationary sources of heating, ventilation, and air conditioning (HVAC) equipment, mobile sources (additional passenger vehicles and trucks), and parking facilities. The air quality analyses followed the procedures outlined in the *City Environmental Quality Review* (CEQR) *Technical Manual*, as well as subsequent guidance from the New York City Department of City Planning (DCP), to determine the potential for the Proposed Action to cause exceedances of ambient air quality standards, *de minimis* values, or health-related guideline values.

As described in Chapter 1, "Project Description," the Applicant is proposing several actions to facilitate a new mixed-use predominantly residential development on an approximately 8.7-acre site in the Astoria neighborhood of Queens Community District (CD) 1. The Proposed Action includes a zoning map amendment, a City map amendment, a zoning text amendment, and other land use actions.

The Proposed Action would facilitate a new approximately 2,189,068 gross square foot (gsf) mixed-use development on approximately 377,726 sf of lot area. The proposed predominantly residential mixed-use development (the "proposed project") would comprise approximately 1,689 dwelling units (DU); approximately 109,470 gsf of local retail space including a 25,000 sf supermarket; a site for an elementary school with approximately 456 seats (K-5); approximately 900 accessory parking spaces; and approximately 83,846 sf (1.92 acres) of publicly accessible open space. The total residential square footage for the 1,689 dwelling units would be approximately 1,689,416 gsf, of which 294,842 gsf (295 DU) dwelling units would be affordable. The anticipated Build Year is 2023.

B. PRINCIPAL CONCLUSIONS

Air quality analyses addressed mobile sources, parking facilities, stationary HVAC systems, and air toxics. The results of the analyses are summarized below.

- Emissions from project-related vehicle trips would not cause significant air quality impacts to receptors at the local or neighborhood scale;
- Emissions from parking facilities would not cause a significant air quality impact to project site buildings or existing sensitive land uses;
- An (E) Designation (E-343) will be assigned to the project site and will require the use of natural gas and restrict boiler types, stack heights, and/or locations for all project site buildings. With these measures in place, the emissions from the HVAC systems of project site buildings would not cause significant air quality impacts to other project site buildings or existing sensitive land uses;
- As no existing large or major sources are located within 1,000 feet of the project site, emissions from existing stationary HVAC sources would not cause a significant air quality impact to the proposed project; and
- No significant air quality impacts to the proposed project are anticipated from air toxics.

C. STANDARDS AND CRITERIA

National Ambient Air Quality Standards

Ambient air is defined by the United States Environmental Protection Agency (EPA) as that portion of the atmosphere, external from buildings, to which the general public has access. National Ambient Air Quality Standards (NAAQS) were promulgated by the EPA to protect public health and welfare, allowing for an adequate margin of safety. The NAAQS include sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, fine particulates, and lead. They consist of primary standards established to protect public health with an adequate safety margin, and secondary standards established to protect "plants and animals and to prevent economic damage." The six pollutants are deemed criteria pollutants because threshold criteria can be established for determining adverse effects on human health. They are described below.

- Carbon Monoxide (CO) is a colorless, odorless gas produced from the incomplete combustion of gasoline and other fossil fuels. The primary source of CO in urban areas is from motor vehicles. Because this gas disperses quickly, CO concentrations can vary greatly over relatively short distances.
- Fine Particulates (PM_{10}, $PM_{2.5}$) also are known as Inhalable or Respirable Particulates. Particulate matter is a generic term for a broad range of discrete liquid droplets or solid particles of various sizes. The PM_{10} standard covers particles with diameters of ten micrometers or less, which are the ones most likely to reach the lungs. The $PM_{2.5}$ standard covers particles with diameters of 2.5 micrometers or less.
- Lead (Pb) is a heavy metal. Emissions are principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles produced since 1975, and all produced after 1980, are designed to use unleaded fuel. As a result, ambient concentrations of lead have declined significantly.
- Nitrogen dioxide (NO_2) is a highly oxidizing, extremely corrosive toxic gas. It is formed by chemical conversion from nitric oxide (NO), which is emitted primarily by industrial furnaces, power plants, and motor vehicles.
- Ozone (O_3) is a principal component of smog. It is not emitted directly into the air, but is formed through a series of chemical reactions between hydrocarbons and nitrogen oxides in the presence of sunlight.
- Sulfur dioxides (SO_2) are heavy gases primarily associated with the combustion of sulfur-containing fuels such as coal and oil. No significant quantities are emitted from mobile sources.

In addition to NAAQS, New York State Ambient Air Quality Standards further regulate concentrations of the criteria pollutants discussed above. The New York State Department of Environmental Conservation (NYSDEC) Air Resources Division is responsible for air quality monitoring in the State. Monitoring is performed for each of the criteria pollutants to assess compliance. Table 14-1 shows the National and New York State Ambient Air Quality Standards.

New York City *de Minimis* Criteria

For carbon monoxide from mobile sources, the City's *de minimis* criteria are used to determine the significance of the incremental increases in CO concentrations that would result from a Proposed Action. These set the minimum change in an eight-hour average carbon monoxide concentration that would constitute a significant environmental impact. According to these criteria, significant impacts are defined as follows:

- An increase of 0.5 parts per million (ppm) or more in the maximum eight-hour average carbon monoxide concentration at a location where the predicted No-Action eight-hour concentration is equal to or above eight ppm.

- An increase of more than half the difference between baseline (i.e., No-Action) concentrations and the eight-hour standard, when No-Action concentrations are below eight ppm.

Table 14-1: National and New York State Ambient Air Quality Standards

Pollutant	Averaging Period	Standard	2012 Value	Monitor
Sulfur Dioxide	3-hour average	1,300 μg/m^3 (500 ppb)	17.1 ppb	Queens College 2
	1-hour average[e]	197 μg/m^3 (75 ppb)	24.7 ppb	
Inhalable Particulates (PM_{10})	24-hour average	150 μg/m^3	33 μg/m^3	
Inhalable Particulates ($PM_{2.5}$)	3-yr average annual mean	12 μg/m^3	9.1 μg/m^3	
	Maximum 24-hr. 3-yr. avg.[c]	35 μg/m^3	24 μg/m^3	
Carbon Monoxide	8-hour average[a]	9 ppm	1.1 ppm	
	1-hour average[a]	35 ppm	1.7 ppm	
Ozone	Maximum daily 8-hr avg.[b]	0.075 ppm	0.081 ppm	
Nitrogen Dioxide	12-month arithmetic mean	100 μg/m^3(53 ppb)	17.5 ppb	
	1-hour average[d]	188 μg/m^3(100 ppb)	64 ppb (120.32 μg/m^3)	
Lead	Quarterly mean	0.15 μg/m^3	0.008 μg/m^3 (2011)	Morrisania

Notes: ppm = parts per million; μg/m^3 = micrograms per cubic meter.
[a] Not to be exceeded more than once a year.
[b] Three-year average of the annual fourth highest maximum eight-hour average concentration effective May 27, 2008.
[c] Not to be exceeded by the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year (averaged over 3 years).
[d] Three-year average of the 98th percentile of the daily maximum one-hour average, effective January 22, 2010.
[e] Three-year average of the 99th percentile of the daily maximum one-hour average, final rule signed June 2, 2010.
Sources: NYSDEC; New York State Ambient Air Quality Development Report, 2011; New York City Department of Environmental Protection (DEP), 2012.

For $PM_{2.5}$ analyses at the microscale level, the City's *de minimis* criteria for determining significance are:

- Predicted increase of half the difference between the background concentration and the 24-hour standard;
- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.1 μg/m^3 at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately one square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.3 μg/m^3 at a discrete or ground-level microscale receptor location for stationary sources.

The de minimis value for 24-hour $PM_{2.5}$ was based on the 98th percentile concentrations averaged over 3 years (2010-2012). Based on the 2014 *CEQR Technical Manual*, this average is 24 ug/m^3. It was subtracted from the standard of 35 ug/m^3 and divided by 2. Therefore, the *de minimis* for the Proposed Action is 5.5 μg/m^3 as noted in the CEQR Technical Manual (2014). Annual incremental concentrations of $PM_{2.5}$ from mobile sources at intersection locations are only assessed on a neighborhood, rather than local, scale.

State Implementation Plan (SIP)

The Clean Air Act (CAA), as amended in 1990, (1) defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS; and (2) requires states to submit to the EPA a State Implementation Plan (SIP) delineating how the state plans to achieve air quality that meets the NAAQS, followed by a plan for maintaining attainment status once the area is in attainment. Queens County is part of the New York City CO maintenance area, a marginal NAA for ozone, and an NAA for PM_{10} and $PM_{2.5}$. The State is under mandate to develop SIPs to address ozone, carbon monoxide, and PM_{10}; a SIP to address non-attainment of the 2008 ozone NAAQS will be due in 2015. The State is also working with the EPA to formulate standard practices for regional haze and $PM_{2.5}$.

Based on recent monitoring data from 2006-2009 and 2007-2011, annual and 24-hour average concentrations of $PM_{2.5}$ no longer exceed the standard. To reflect the recent $PM_{2.5}$ 24-hour average monitoring data, New York submitted a "Clean Data" request to the EPA. On August 29, 2013, EPA proposed to determine that the area has attained that standard, and on April 18, 2014, the EPA redesignated Bronx, Kings, New York, Queens, and Richmond Counties as $PM_{2.5}$ maintenance areas. Now that this determination has been finalized, some requirements for related SIP submissions may be suspended.

New York State Department of Environmental Conservation (NYSDEC)

In addition to criteria pollutants, a wide range of non-criteria air pollutants known as toxic air pollutants may be emitted from industrial sources. These pollutants, ranging from high to low toxicity, can be grouped into two categories: carcinogenic air pollutants and non-carcinogenic air pollutants. NYSDEC has established Short-Term Guideline Concentrations (SGCs) and Annual Guideline Concentrations (AGCs) for numerous toxic or carcinogenic non-criteria pollutants for which EPA has no established standards. They are maximum allowable one-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. SGCs are intended to protect the public from acute short-term effects of pollutant exposures, and AGCs are intended to protect the public from chronic long-term effects of the exposures. Pollutants with no known acute effects have no SGC criteria but do have AGC criteria. NYSDEC's *DAR-1 AGC/SGC Tables* (October 18, 2010) contains the most recent compilation of the SGC and AGC guideline concentrations.

Where the NYSDEC-established AGC is based on a health risk criteria (i.e., a one in a million cancer risk) and the source has Best Available Control Technology (BACT) installed, the New York City Department of Environmental Protection (DEP) may consider the potential impacts to be insignificant if the projected ambient concentration is less than ten times the AGC. This is because NYSDEC developed the AGCs for these pollutants by reducing the health risk criteria by a factor of ten as an added safety measure.

D. EXISTING CONDITIONS

Existing Air Quality

As stated previously, Queens County is part of a CO maintenance area and is non-attainment (moderate) for the eight-hour ozone standard and non-attainment for PM_{10} and $PM_{2.5}$. It is in compliance with all other NAAQS.

Background Concentrations

For SO_2, NO_x, PM_{10}, the background concentrations were obtained from the *CEQR Technical Manual* (2014) as follows for Queens:

- 65 $\mu g/m^3$ for the 1-hour SO_2 concentration,
- 89 $\mu g/m^3$ for the 3-hour SO_2 concentration,
- 42 $\mu g/m^3$ for the annual NO_2 average,
- 120 ug/m^3 for the 1-hour NO_2 average,
- 50 $\mu g/m^3$ for the 24-hour PM_{10} average, and,

- 24 ug/m# for the 24-hour PM2.5 average.

No background value is applicable to $PM_{2.5}$ because the criteria are based on the incremental differences between No-Action and With-Action conditions.

As a conservative approach for CO, the highest second maximum values value from the last five years were used as background values. Based on the Queens College 2 monitoring station, the CO background, as indicated in the CEQR *Technical Manual*, would be 3.4 ppm for the one-hour average and 1.7 ppm for the eight-hour average.

Project Site

The six tax lots affected by the Proposed Action are located in Astoria, Queens and are bounded by the East River/Pot Cove to the north, 9th Street to the east, 27th Avenue to the south, and 4th Street to the west. Figure 1-1 in Chapter 1, "Project Description," shows the location of the project site.

E. METHODOLOGY

Mobile Source Screen

Carbon Monoxide (CO)

Localized increases in CO levels may result from increased vehicular traffic volumes and changed traffic patterns in the study area as a consequence of the Proposed Action. The mobile source analysis outlined in the *CEQR Technical Manual* considers actions that add new vehicles to roadways or change traffic patterns, either of which may have significant adverse air quality impacts. The primary pollutant of concern for passenger vehicles is CO. For this area of the City, the threshold volume for modeling CO concentrations using MOVES2010b and CAL3QHC or CAL3QHCR is an increment of 170 vehicles through an intersection during a peak traffic hour.

Based on information in Chapter 13, "Transportation," the Proposed Action would generate traffic increments of up to 550 vehicles through an intersection during a peak hour. Table 14-2 shows the intersections analyzed for traffic in the study area that would exceed the 170-vehicle criterion in the With-Action condition. As indicated in the table, the highest increments generally occur in the weekday PM peak period.

As shown in Table 14-2, the worst-case increment (550 vehicles) occurs at 27th Avenue and 9th Street, an unsignalized intersection, during the weekday PM peak period, with the increments on both the 27th Avenue and 9th Street approaches exceeding 170 (refer to Figure 13-4 in Chapter 13, "Transportation"). The intersections with the second-highest, third-highest, and fourth-highest increments are 27th Avenue/12th Street, 27th Avenue/14th Street, and 27th Avenue/8th Street, respectively (see Table 14-3). However, the north-south legs of these intersections would receive relatively low traffic increments of less than 100 vehicles; the majority of the incremental vehicles would be on 27th Avenue. Therefore, these intersections are not worst-case intersections for air quality modeling purposes.

With a projected increment of 373 vehicles, the unsignalized intersection of 27th Avenue/4th Street ranks seventh in the PM period. All 373 incremental vehicles would be in the 27th Avenue right-turn approach, and would turn northbound onto 4th Street. Although the traffic increment at this intersection is lower than some of the other intersections, the potential for impact appears to be higher because a substantial number of vehicles would turn onto 4th Street, which is a local road. In addition, the 2013 *Halletts Point Rezoning Final Environmental Impact Statement* (FEIS) identified this intersection as one of the worst-case traffic intersections, warranting mitigation in the form of signalization.

Table 14-2: Study Area Intersections with With-Action Traffic Increments > 170

Intersection		Traffic Increment		
ID[1]	**Location**	**AM**	**Midday**	**PM**
1	4^{th} Street at 26^{th} Avenue	169	**185**	**373**
A	9^{th} Street at 26^{th} Avenue	**365**	**180**	**260**
2	4^{th} Street at 27^{th} Avenue	169	**185**	**373**
3	8^{th} Street at 27^{th} Avenue	**225**	**211**	**409**
4	12^{th} Street at 27^{th} Avenue	**426**	**297**	**514**
5	14^{th} Street at 27^{th} Avenue	**400**	**278**	**489**
6	18^{th} Street at 27^{th} Avenue	**315**	**211**	**398**
7	21^{st} Street at Astoria Boulevard	**305**	**203**	**395**
8	23^{rd} Street at Astoria Boulevard	**198**	97	**195**
9	Crescent Street at Astoria Boulevard	**198**	97	**195**
10	27^{th} Street at Astoria Boulevard	**173**	66	118
11	28^{th} Street at Astoria Boulevard	**173**	66	118
12	29^{th} Street at Astoria Boulevard	**173**	66	118
16	29^{th} Street at Hoyt Street North	86	71	**172**
23	18^{th} Street at Astoria Boulevard	**192**	66	111
26	9^{th} Street at 27^{th} Avenue	**482**	**323**	**550**

Notes: Entries in bold type exceed 170-vehicle threshold screen
[1] Refer to Chapter 13, "Transportation."

Based on the foregoing discussion, two intersections were selected for modeling with MOVES2010b and CAL3QHCR: 27^{th} Avenue/9^{th} Street; and 27^{th} Avenue/4^{th} Street.

Particulate Matter ($PM_{2.5}$)

A $PM_{2.5}$ screening analysis was conducted using the spreadsheet referenced on page 17-12 of the *CEQR Technical Manual*. The algorithm uses traffic volume according to vehicular class and determines the number of heavy duty diesel vehicles (HDDVs) that would generate equivalent emissions. The equivalent number of HDDVs varies by type of road. Based on guidance from DEP, the minor leg of an intersection determines its classification as a local road, collector, arterial, or expressway. A more detailed analysis is required if a proposed action would meet or exceed the thresholds shown below:

- 12 HDDV for paved roads with average daily traffic fewer than 5,000 vehicles;
- 19 HDDV for collector-type roads;
- 23 HDDV for principal and minor arterial roads; and
- 23 HDDV for expressways and limited-access roads.

Within the project area, 27^{th} Avenue is classified by the New York City Department of Transportation (NYCDOT) as an urban collector, and the north-south streets intersecting it are local roads. Based on the criteria shown above, multiple intersections warrant modeling for PM_{10} and $PM_{2.5}$. The worst-cast intersections identified for the CO analysis (27^{th} Avenue at 4^{th} and 9^{th} Streets) were also modeled for PM_{10} and 24-hour $PM_{2.5}$ emissions. Given the proximity of the two worst-case intersections, the annual (neighborhood) $PM_{2.5}$ assessment was centered around the worst-case (27^{th} Avenue at 9^{th} Street) intersection. If no impacts are projected for these worst-case intersections, then none are likely for other intersections.

Line Source Modeling with MOVES2010b and CAL3QHCR

The EPA's CAL3QHCR model was used to determine future CO, PM_{10}, and $PM_{2.5}$ concentrations from traffic. CAL3QHCR is a Gaussian dispersion model that determines pollutant concentrations at specified receptor points. It accounts for pollutant emissions from both free-flowing vehicles and vehicles idling at signalized intersections. However, following EPA guidance, the queuing algorithm is not used with the CAL3QHCR model. Therefore, average speeds that included intersection delay were calculated for the roadway links.

Inputs to the model included coordinates for receptors and free-flow approach and departure links, as well as traffic volumes, speeds, and vehicular emission factors for each link. MOVES2010b was used to obtain pollutant emission factors for free-flow links in grams per vehicle-mile. The vehicular mix and speeds used in MOVES2010b were based on field classification counts and speed runs carried out in the traffic study area (refer to Chapter 13, "Transportation"). Inputs pertaining to inspection/maintenance, anti-tampering programs, age distribution, meteorology, etc., were obtained from DEP. The pollutant processes included running exhaust and crankcase running exhaust for all three pollutants, as well as brake and tire wear for PM_{10} and $PM_{2.5}$.

MOVES2010b was run for January 1st for the 2023 Build Year for up to four peak periods representative of peak AM, midday, PM, and overnight peak vehicle volumes under the future No-Action and With-Action conditions. Post-processing was carried out to obtain emission factors for use in an analysis with CAL3QHCR.

Fugitive dust from re-entrainment of dust was calculated using the formulas from Section 13.2.1-3 of EPA's AP-42 Document. The formulas were based on an average fleet weight that varied according to the vehicular mix for a given roadway and a silt loading factor of 0.4 g/m^2 for local roads and 0.16 g/m^2 for collectors, as recommended in the *CEQR Technical Manual*. The resulting fugitive dust emissions for 24-hour PM_{10} and $PM_{2.5}$ were added to the emission factors calculated by MOVES2010b.

As noted above, all links were set up as free-flowing traffic links in CAL3QHCR. For the CO, PM_{10}, and 24-hour $PM_{2.5}$ impact assessments, free-flow links were modeled for a distance of 1,000 feet from the modeled intersection in each direction. The mixing zone for free-flow links was equal to the width of the traveled way plus an additional ten feet (three meters) on each side of the travel lanes.

The annual (neighborhood) $PM_{2.5}$ assessment included all free-flow links within 500 meters of the 27th Avenue/9th Street intersection where project-generated traffic increments are anticipated. Traffic and speeds for these individual roadway links were determined for the AM, midday, PM, and overnight peak periods. This resulted in 64 roadway links for modeling with CAL3QHCR. Sensitive receptors are homes, parks, schools, or other land uses where people congregate and which would be sensitive to air quality impacts. For the purposes of the air quality analysis, any point to which the public has continuous access can be deemed a sensitive receptor site. Numerous receptor points are typically modeled at each intersection to identify the points of maximum potential pollutant concentrations. For the CO, PM_{10}, and 24-hour $PM_{2.5}$ impact assessments, receptor points were modeled on the corners of the intersections, and additional points were modeled at twenty-foot intervals for a distance of 350 feet along both sides of each intersection leg. Receptors for CO and for the 24-hour averaging periods of PM_{10} and $PM_{2.5}$ were placed at mid-sidewalk and outside the air quality mixing zone.

Receptors for $PM_{2.5}$ for the annual period were placed outside of the roadway links at twenty-five foot intervals over a one-kilometer neighborhood receptor grid. Receptors that fell within a roadway right-of-way, as well as receptors that were over water, were removed from the grid. This resulted in 1,304 receptors. The modeled values for these receptors were averaged together to obtain the annual averages.

CAL3QHCR was run with five years of meteorological data (2009–2013) from LaGuardia Airport. Each computer run covered wind angles from 0 to 360 degrees and identified the worst-case wind angle for each receptor point. A surface roughness of 321 centimeters (cm) was used in the modeling.

CAL3QHCR provides maximum 24-hour and annual concentrations for fine particulates. The 24-hour results for PM_{10} were added to background concentrations and compared with the NAAQS. For $PM_{2.5}$, 24-hour and annual impacts were determined from the differences between the modeled No-Action and With-Action concentrations. The differences were compared with the City's *de minimis* criteria.

Parking Facilities

The proposed project would include parking garages with a combined 900 spaces in Buildings 1, 2, and 3, as well as a combined parking garage for Buildings 4 and 5 on the upland parcels. Emissions from vehicles using the proposed project's four garages could potentially affect ambient levels of CO, PM_{10}, and $PM_{2.5}$ on the near and far sidewalks or at a nearby window. Projected parking facility capacity and the peak hour arrivals and departures were used to identify the parking garage most likely to result in impacts on local air quality. Table 14-3 compares the hourly incoming and outgoing vehicles at the proposed project's two largest parking garages (in Building 1 and Building 2). As show in Table 14-3, the Building 2 garage would result in higher hourly parking arrivals and departures, due to in/out vehicle volumes generated by customers for Building 2's retail and supermarket uses. As such, the Building 2 garage represents the worst-case scenario for the parking analysis. As a conservative approach, the highest incoming (163) and outgoing (131) volumes for Building 2 were used together for the analysis.

Table 14-3: Weekday Hourly Garage Parking Demand

Time Period	Building 1			Building 2		
	In	Out	Total	In	Out	Total
12-1AM	2	2	4	2	2	4
1-2	2	2	4	2	2	4
2-3	2	2	4	2	2	4
3-4	2	2	4	2	2	4
4-5	2	2	4	2	2	4
5-6	6	15	21	17	20	37
6-7	12	41	53	35	37	72
7-8	14	43	57	46	51	97
8-9	29	**110**	139	72	113	185
9-10	26	38	64	85	62	147
10-11	27	44	71	90	84	174
11AM-12PM	28	38	66	91	98	189
12-1	39	39	78	79	79	158
1-2	37	39	76	106	123	229
2-3	40	37	77	116	**131**	247
3-4	57	35	92	117	129	246
4-5	91	54	145	150	122	272
5-6	**102**	57	159	**163**	125	288
6-7	70	37	107	90	71	161
7-8	65	30	95	63	48	111
8-9	37	22	59	35	34	69
9-10	15	15	30	10	27	37
10-11	8	8	16	6	16	22
11PM-12AM	5	6	11	3	4	7

Note: Numbers in bold type represent the highest volumes

The 26th Avenue garage entrance for Building 2 leads to 88 spaces in the cellar, while the 4th Street entrance leads to the 144 combined spaces on the buildings third and fourth floors. For the purposes of the air quality analysis, the parking facilities for Building 2 were treated as a single 99,661 gsf garage at the cellar level. In addition, for conservative analysis purposes, the vehicles were assumed to use only one entrance. Since the widths of both 26th Avenue and the proposed 4th Street would both be 60 feet, the analysis results for either entrance would be the same.

The Building 2 garage vent was conservatively assumed to be twelve feet directly above ground level at the street entrance. Receptor points included the near and far sidewalks as well as a window above the vent. As a conservative assumption, the window was assumed to be five feet above the vent. Based on the adjacent street and sidewalk widths, the pedestrian on the near sidewalk would be five feet away from the garage vent while the pedestrian standing on the far sidewalk (across either 4th Street or 26th Avenue) would be 55 feet away, reflecting the 60-foot wide minus half the sidewalk width across the street. The window above the vent was assumed to have zero (0) horizontal distance from the vent. Line source CO concentrations from vehicles on the street were modeled using MOVES2010b and CAL3QHCR.

The garage analysis was based on the guidelines provided in the *CEQR Manual Technical Appendices*. Per guidance from DEP, a persistence factor of 0.7 was used to convert one-hour CO values to eight-hour CO values. EPA's MOVES2010b emissions model was used to obtain emission factors for mobile (entering and exiting) vehicles as well as idling vehicles. All vehicles were assumed to be passenger vehicles. Exiting vehicles were assumed to idle for one minute before departing, and speeds within the facility were assumed to be five mph.

Stationary Source Screen

A screening analysis for future project site buildings was carried out using Figure 17-7 (NO_2 boiler screen for residential natural gas) from the *CEQR Technical Manual Appendices*. The size of the development is plotted against the distance in feet to the edge of the receptor building. As a worse-case analysis for screening purposes, the distance between a stack and the nearest building of similar or greater height is assumed to be the distance between the lot lines of the two buildings, and the stacks are assumed to be at least three feet higher than the roof. The garage square footages are not included in the analysis because they are typically not heated. Figure17-7 is applicable to buildings where the boiler stack is at least thirty feet from the nearest building of similar or greater height. If the distance is less than thirty feet, the analysis must be carried out using AERSCREEN and/or AERMOD modeling. If the plotted point is on or above the applicable curve, the potential for a significant air quality impact exists, and further analysis is required using AERSCREEN or AERMOD modeling.

Stationary Source Modeling with AERMOD

Stationary sources requiring further analysis were modeled with AERMOD version 12345. AERMOD, designed to support EPA's regulatory modeling programs, is a steady-state Gaussian plume model with three separate components: AERMOD (a dispersion model), AERMAP (a terrain preprocessor), and AERMET (a meteorological preprocessor). AERMOD can handle emissions from point, line, area, and volume sources. The model is run with five years of meteorological data that include surface mixing height, wind speed, stability class, temperature, and wind direction.

Urban/rural. Both the meteorological site (LaGuardia Airport) and the project site are in urban locations, and AERMOD's URBAN option was selected.

Stack parameters. EPA defines good engineering practice (GEP) stack height as the height necessary to insure that emissions from a building's stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. The Building Profile Input Program (BPIP) was run in conjunction with AERMOD. The model was run both with and without building downwash to determine which condition would provide worst-case results.

HVAC stacks on the proposed buildings were assumed to be three feet higher than the rooftop. Per guidance from DEP, the temperature and diameters of the stacks were assumed based on the DEP Combustion Applications (CA) Permit database and the heat input (with units of 10^6 British Thermal Units [BTU]) of the boilers. Based on the square footage of the respective areas to be heated in the buildings, the BTU ratings of the boilers were calculated to range from one to less than 17 million BTU per hour. For boilers of this size, the stacks were assumed to have an exhaust temperature of 300° F and inside stack diameters of 0.5 feet (1 to 5 million BTU), 1.0 feet (5 to 10 million BTU), and 2.0 feet (over 10 million BTU). The exhaust velocities were calculated from the fuel consumption and other stack parameters as per DEP's guidance.

Pollutants. Pollutants included NO_2, SO_2, PM_{10}, and $PM_{2.5}$. Emission factors for natural gas were based on an annual consumption rate of 45.2 cubic feet of natural gas per square foot for a residential structure, as indicated in the *CEQR Technical Manual*. The annual consumption of natural gas, in cubic feet, was converted to pounds using a multiplier of 100 for an uncontrolled boiler or 50 for a low NO_x boiler, and 32 for a low NO_x boiler with gas flue recirculation as recommended in Table 1.4-1 of the EPA's AP-42 publication for external combustion sources. Buildings 1, 3, and 5 (Residential) required the control measures for low NO_x boilers with gas flue recirculation. Building 4 did not require special control measure for the proposed boilers. The resulting annual emissions were converted to hourly and annual emission rates in grams per second based on 2,400 hours per year of use for the heating season. Because these emissions represent both NO and NO_2 combined, the annual emissions were next multiplied by 0.8 to reflect the component of the total that is nitrogen dioxide. $PM_{2.5}$ emissions were based on an emission factor of 7.6 pounds of $PM_{2.5}$ per million cubic feet of natural gas. The resulting emissions were converted to hourly and annual emission rages in grams per second, with annual emissions based on 2,400 hours per year of use for heating.

Meteorological Data. The model was run with data from LaGuardia Airport for 2009 through 2013; the upper air station used with LaGuardia is Brookhaven. The data was obtained from Trinity Consultants, which provided the following description of the data and processing methods:

The BREEZE FILLSFC program identifies outlying and missing parameters, identifies the percentage of missing unprocessed data (to verify compliance with EPA's 90 percent regulation), and specifies how missing data is filled. The program is created to follow the EPA's guidelines for filling missing data in raw surface files as specified in their *Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models*. BREEZE FILLSFC is a FORTRAN executable program that reads raw surface meteorological data in CD-144 format and fills in missing observations of a length specified by the processor (typically five hours). The program measures the data capture of eight parameters: ceiling height, wind direction, wind speed, temperature, total opaque sky, station pressure, relative humidity, and total sky cover. Based on guidelines set forth by the EPA, the parameters are filled in using the following methods:

- *Ceiling Height, Total Opaque Sky, Station Pressure, Relative Humidity, and Total Sky Cover*: Filled using persistence—the value prior to a gap of missing hours is persisted through the missing period;
- *Temperature*: Filled using interpolation—missing hours are filled in by interpolating between the values prior to and following the gap;
- *Wind Speed*: Filled by averaging—an arithmetic average of the four surrounding values (two before and two after) is taken and the gap is filled accordingly; and

- *Wind Direction*: Filled by vector averaging—a unit vector average of the four surrounding values (two before and two after) is taken and the gap is filled accordingly. Only valid wind directions are used in this average; calms and variables are ignored and other steps are taken to ensure only valid data is used.

The program generates a report which details the data capture percentage prior to filling as well as the number of hours filled for each parameter sorted by the method used to fill the missing data.

The BREEZE FILLFSL program reads in the raw upper air data files in FSL format and identifies missing soundings. For individual missing soundings, the program fills in the sounding from the same time on the previous day. For consecutive missing days, the first day is filled with the previous day, the last day is filled with the following day and the soundings in between are left as missing. Using persistence for upper air filling has been employed quite extensively and is generally acceptable since upper air conditions vary substantially less than surface conditions, and AERMET uses very limited information from the files in any case. The program also has an option to fill in missing soundings with data from another station should that methodology be necessary.

Surface characteristics. Surface characteristics for the project site and meteorological site were identified according to EPA's *AERMOD Implementation Guide*. In accordance with the EPA's *AERMOD Implementation Guide* dated 08009, Trinity Consultants used their AERSURFACE program for determining surface characteristics to be used in AERMET processing. By default, twelve sectors were implemented for determining surface roughness, and the seasonal averaging period was used. Both the meteorological site and the project site are in urban locations, and AERMOD's URBAN option was selected. The population used for the urban area was 1,700,000, and the default urban surface roughness length of 1.0 meter was used for the site.

Receptors. Receptor points on the receiving building were placed at twenty-foot horizontal intervals and 10-foot vertical on all facades where operable windows/air intake vents were assumed to be in place.

F. FUTURE WITHOUT THE PROPOSED ACTION (NO-ACTION CONDITION)

Description of No-Action Development

In the future without the Proposed Action, the project site would not be rezoned. For analysis purposes the existing light industrial and warehousing uses on the waterfront portion of the project site are expected to remain. These consist of approximately 194,700 sf of warehouse and storage space and an estimated 100 accessory parking spaces. The upland portions of the project site, which are currently zoned R6, are expected to be redeveloped on an as-of-right basis in the future without the Proposed Action. These upland parcels are estimated to accommodate approximately 166 residential units in the No-Action condition. Pursuant to zoning, approximately 83 accessory parking spaces are assumed to be provided for the as-of-right residential development. In conjunction with this as-of-right residential development, the portions of the unbuilt segment of 8th Street to the south of 26th Avenue and/or portions of the unimproved segment of 26th Avenue are expected to be built-out in order to satisfy New York City Department of Buildings (DOB) street frontage requirements.

The air quality analysis of the future without the Proposed Action also includes relevant components of the Halletts Point project (primarily Buildings 7A and 7B), as well as relevant mitigation measures such as traffic signalization of area intersections, to mitigate traffic impacts identified in the 2013 *Halletts Point Rezoning FEIS*.

As a conservative approach, the analysis of the future without the Proposed Action does not take credit for the anticipated residential development and parking that would occur under that condition. Thus, no stationary source or parking air quality analysis is included for the No-Action condition. CAL3QHCR modeling was carried out for mobile sources in order to compare the No-Action and With-Action conditions.

Mobile Source Analysis

CO modeling was performed for the intersections of 27th Avenue at 9th Street and 27th Avenue at 4th Street using CAL3QHCR, as described previously under Section E, "Air Quality Analysis Methodology." Table 14-4 shows the maximum values resulting from the CO modeling for the 2023 future No-Action condition for the modeled intersections. The table shows that the CO concentrations would be within the NAAQS of 35 ppm for the one-hour period and nine ppm for the eight-hour period.

Table 14-4: Mobile Source CO (ppm)—2023 No-Action Condition

27th Avenue and 9th Street			
Receptor ID: 41 (northwest corner of intersection)		Receptor ID: 59 (80 feet west of northwest corner)	
Wind angle	278°	Wind angle	NA
Modeled one-hour CO	0.3	Modeled eight-hour CO	0.2
Background one-hour CO	3.4	Background eight-hour CO	1.7
Total one-hour CO	3.7	Total eight-hour CO	1.9
27th Avenue and 4th Street			
Receptor ID: 181 (westbound lanes between 8th and 9th Streets)		Receptor ID: 178 (westbound lanes between 8th and 9th Streets)	
Wind angle	128°	Wind angle	NA
Modeled one-hour CO	0.2	Modeled eight-hour CO	0.1
Background one-hour CO	3.4	Background eight-hour CO	1.7
Total one-hour CO	3.6	Total eight-hour CO	1.8

Source: Sandstone Environmental Associates, Inc.

Table 14-5 shows the maximum concentrations resulting from the modeling for PM_{10} for the future No-Action condition using CAL3QHCR. The total concentrations of PM_{10} are below the NAAQS of 150 μg/m^3.

Table 14-5: Mobile Source PM_{10} (μg/m^3)—2023 No-Action Condition

Intersection	Receptor ID	24-Hour Modeled Value (μg/m^3)	Background (μg/m^3)	Total (μg/m^3)	NAAQS (μg/m^3)
27th Avenue and 9th Street	41 (northwest corner of intersection	16.9	50.0	66.9	150
27th Avenue and 4th Street	96 (southeast corner of intersection)	15.1	50.0	65.1	150

Source: Sandstone Environmental Associates, Inc.

Table 14-6 shows the modeled results for $PM_{2.5}$. At the 27th Avenue/9th Street intersection, the highest modeled value for the 24-hour concentration was 3.8 μg/m^3 at the 27th Avenue/9th Street intersection and 3.4 μg/m^3 at the 27th Avenue/4th Street intersection. As previously stated, the annual average concentration, which represents the neighborhood scale, was carried out over a one kilometer square centered on the worst-case intersection of 27th Avenue/9th Street.[1] As shown in Table 14-6, the average annual No-Action $PM_{2.5}$ concentration is 0.095 μg/m^3.

[1] This included the 27th Avenue/4th Street intersection.

Table 14-6:Mobile Source $PM_{2.5}$ (μg/m³)—2023 No-Action Condition

Time Period	Intersection	Receptor ID	Concentration (μg/m3)	*De Minimis*
24-Hour	27th Avenue and 9th Street	20 (southwest corner of intersection)	3.8	NA
	27th Avenue and 4th Street	96 (eastbound departure lanes)	3.4	NA
Annual	27th Avenue and 9th Street	NA	0.095	NA

Notes: NA = not applicable to No-Action concentrations
Source: Sandstone Environmental Associates, Inc.

G. FUTURE WITH THE PROPOSED ACTION (WITH-ACTION CONDITION)

Description of the Proposed Action

As described in Chapter 1, "Project Description," the Proposed Action would facilitate the development of approximately 2,189,068 gsf of new mixed-use development on the 377,726 sf project site. The following components of this development are relevant to the air quality analysis:

- Approximately 1,689,416 gsf of residential floor area with approximately 1,689 DUs;
- Approximately 109,470 gsf of local retail space, including an approximately 25,000 gsf supermarket;
- A site for an elementary school with approximately 456 seats and an associated recreation area;
- Approximately 900 accessory parking spaces;
- An estimated 83,846 sf of publicly accessible open space;
- The establishment of 4th Street from 26th Avenue to the waterfront esplanade;
- The elimination of 8th Street from 27th Avenue to the waterfront; and
- The establishment of a public access easement within the waterfront public access area between 4th and 9th Streets.

Mobile Source Analysis

CO modeling with CAL3QHCR was performed for the same intersections as those analyzed for the No-Action condition (27th Avenue at 9th Street and 27th Avenue at 4th Street). The results are presented in Table 14-7, which shows that the CO concentrations would be within the NAAQS of 35 ppm for the one-hour period and nine ppm for the eight-hour period.

Table 14-8 shows the maximum concentrations resulting from the modeling for PM_{10} for the future With-Action condition using CAL3QHCR. The modeled concentration was equivalent to 37.4 μg/m³ at 27th Avenue and 9th Street and 23.3 μg/m³ at 27th Avenue and 4th Street. The total concentrations of PM_{10} with background are below the NAAQS of 150 μg/m³ at both intersections.

Table 14-9 shows the With-Action modeled results for $PM_{2.5}$. At the 27th Avenue/9th Street intersection, the highest modeled value for Receptor 19 at the southwest corner of the intersection was 8.4 μg/m³ for the 24-hour concentration. At 27th Avenue and 4th Street, the highest modeled value was 4.1 μg/m³ for the same receptor. The differences between the No-Action and With-Action concentrations were compared at both intersections. The results show that they are within the *de minimis* value of 5.5 μg/m³.

Table 14-7: Mobile Source CO (ppm)—2023 With-Action Condition

27th Avenue and 9th Street			
Receptor ID: 76 (southwest corner of intersection)		Receptor ID: 79 (northwest corner of intersection)	
Wind angle	24°	Wind angle	NA
Modeled one-hour CO	1.0	Modeled eight-hour CO	0.6
Background one-hour CO	3.4	Background eight-hour CO	1.7
Total one-hour CO	4.4	Total eight-hour CO	2.3
27th Avenue and 4th Street			
Receptor ID: 105 (westbound lanes near 8th Street)		Receptor ID: 105 (westbound lanes near 8th Street)	
Wind angle	128°	Wind angle	NA
Modeled one-hour CO	0.7	Modeled 8-hour CO	0.3
Background one-hour CO	3.4	Background 8-hour CO	1.7
Total one-hour CO	4.1	Total 8-hour CO	2.0

Source: Sandstone Environmental Associates, Inc.

Table 14-8: Mobile Source PM_{10} (µg/m³)—2023 With-Action Condition

Intersection	Receptor ID	24-Hour Modeled Value (µg/m³)	Background (µg/m³)	Total (µg/m³)	NAAQS (µg/m³)
27th Avenue and 9th Street	41 (northwest corner of intersection)	37.4	50.0	87.4	150
27th Avenue and 4th Street	181(westbound lanes near 8th Street)	23.3	50.0	73.3	150

Source: Sandstone Environmental Associates, Inc.

Table 14-9: Mobile Source $PM_{2.5}$ (µg/m³)—2023 With-Action Condition

Time Period	Intersection	Receptor	No-Action Concentration	With-Action Concentration	Difference	De Minimis
24-Hour	27th Avenue & 9th Street	20 (southwest corner of intersection)	3.8	8.4	4.6	5.5
	27th Avenue & 4th Street	96 (eastbound lanes near 8th Street)	3.4	4.1	0.7	5.5
Annual	27th Avenue & 9th Street	NA	0.095	0.152	0.057	<0.1

Source: Sandstone Environmental Associates, Inc.

Table 14-9 also shows the maximum annual concentration of $PM_{2.5}$, which was based on the average concentrations for all receptors over a one kilometer grid. Due to the large number of receptor locations (1,304), many of which are not near the modeled roadways, the average annual concentration is low compared to the concentrations that would be shown for receptors that are close to intersections with high volumes. As shown in the table, based on the refined annual $PM_{2.5}$ analysis, no exceedance of the annual *de minimis* value of 0.1 µg/m³ was observed.

Parking Facilities

As indicated in Table 14-10, for the eight-hour averaging period the total CO concentrations would be 2.2 ppm for the near sidewalk, 2.1 ppm for the far sidewalk, and 2.2 ppm for a window above the vent. These values are within the NAAQS and the New York City *de minimis* criteria. Therefore, no significant adverse impacts are expected from this garage with the vent installed at this location above the entrance.

Table 14-10: CO Air Quality for Garage (ppm)

Vent Located above Ramp Entrance						
	Near Sidewalk		**Far Sidewalk**		**Window Above Vent**	
Distance to Vent (ft.)	5.0		55.0		0	
Vent Height (ft.)	12.0		12.0		12.0	
Receptor Height (ft.)	6.0		6.0		17.0	
Averaging Period	**One-Hour**	**Eight-Hour**	**One-Hour**	**Eight-Hour**	**One-Hour**	**Eight-Hour**
Garage CO result (ppm)	0.7	0.5	0.4	0.3	0.7	0.5
Line Source (ppm)	NA	NA	0.1	0.1	NA	NA
Background Value (ppm)	3.4	1.7	3.4	1.7	3.4	1.7
Total Concentration (ppm)	4.1	2.2	3.9	2.1	4.1	2.2
NAAQS, CO (ppm)	35.0	9.0	35.0	9.0	35.0	9.0
Impact	No		No		No	

Source: Sandstone Environmental Associates, Inc.

Table 14-11 shows $PM_{2.5}$ concentrations due to the garage for receptors located on the near sidewalk, the far sidewalk, and a window above the vent. The vent is assumed to be above the garage entrance. These values are within the New York City *de minimis* criteria. Therefore, no significant adverse impacts are expected from this garage with the vent installed at this location above the entrance.

Table 14-11: $PM_{2.5}$ Air Quality for Garage (μg/m^3)

Vent Located above Ramp Entrance						
	Near Sidewalk		**Far Sidewalk**		**Window Above Vent**	
Distance to Vent (ft.)	5.0		55.0		0	
Vent Height (ft.)	12.0		12.0		12.0	
Receptor Height (ft.)	6.0		6.0		17.0	
Averaging Period	**24-Hour**	**Annual**	**24-Hour**	**Annual**	**24-Hour**	**Annual**
Garage PM_{25} result (ug/m^3)	0.000003	0.000001	0.000002	0.000001	0.000003	0.000001
Line Source (ug/m^3)	NA	NA	0.4147	0.1692	NA	NA
Background Value (ug/m^3)	NA	NA	NA	NA	NA	NA
Total Concentration (ug/m^3)	0.000003	0.000001	0.414702	0.169201	0.000003	0.000001
De minimis, (ug/m^3)	5.5	0.3	5.5	0.3	5.5	0.3
Impact	No		No		No	

Source: Sandstone Environmental Associates, Inc.

Stationary Source HVAC

Proposed projects can result in stationary source air quality impacts when they:

- Locate new sensitive uses (particularly schools, hospitals, parks, and residences) near a major or large stationary source. Major sources are identified as those sources located at Title V facilities that require Prevention of Significant Deterioration permits. Large sources are identified as sources located at facilities which require a State facility permit.
- Create new stationary sources of pollutants (such as emission stacks for industrial plants, hospitals, or other large institutional uses, or even a building's boilers) that may affect surrounding uses.
- Introduce structures near such stacks that the structures may change the dispersion of emissions from the stacks to that surrounding uses are affected; and/or
- Create new emission sources of similar height that are within a short distance of each other.

Existing HVAC Emission Sources on Proposed Project

Air quality impacts from HVAC sources are unlikely at distances of 400 feet or more, but a large or major emission source within 1,000 feet warrants further evaluation. No existing large or major sources were identified within the 1,000-foot study area. As such, an analysis of existing HVAC emissions on the proposed project is unwarranted, pursuant to CEQR.

Proposed Project on Existing and Future Structures

All of the proposed project site buildings would use natural gas. Although the stacks may be located on the mechanical bulkheads on the rooftops, the analysis assumed a worst-case condition, and stack emission points were modeled as three feet above the rooftop (see Table 14-12).

Table 14-12: HVAC Screen for Proposed Project on Project Effects

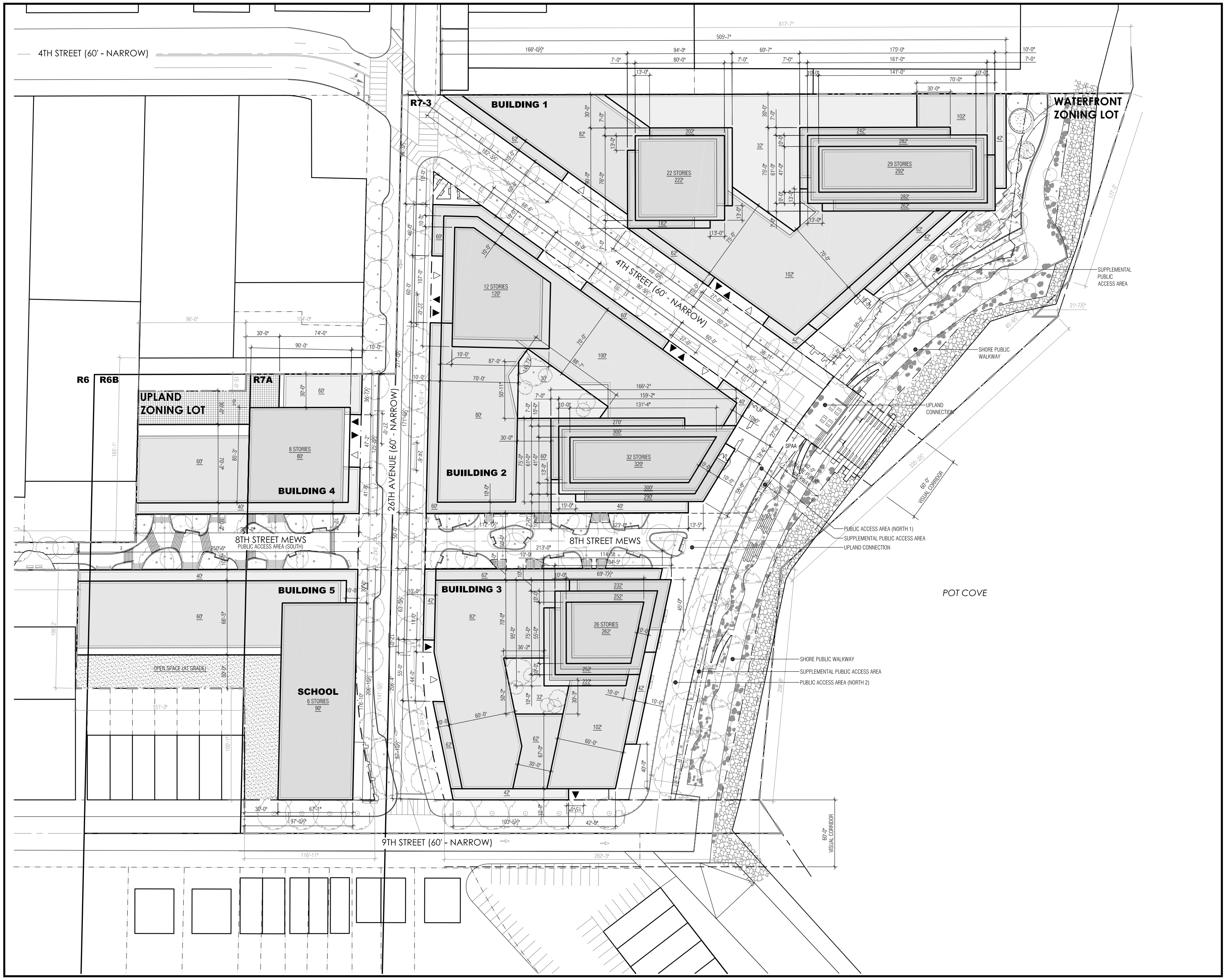
Astoria Cove Building ID	Tax Block	Lots	Stack Ht. (ft.)[1]	Heated Area (sf)	Affected Building	Distance Between Lots (ft.)	Fuel Type	Comments
4	909	35	83	82,194	1	245	Natural Gas	Screens Out
					2	60		Use AERMOD
					3	70		Use AERMOD
					5(School)	80		Screens Out
3	906	1,5	265	364,728	2	50		Use AERMOD
					1	192		Screens Out
2	907	1, p/o 8	323	641,262	None, tallest building	>400		Screens out
1	907	8	298	676,288	2	60		Use AERMOD
					3	192		Screens Out
5 (Residential)	908	12	63	59,414	4	50		Use AERMOD
					2	80		Screens Out
					3	60		Screens Out
					5(School)	<30		Use AERMOD
5 (School)	908	12	93	62,248	2	85		Screens Out
					3	60		Screens Out

Source: Sandstone Environmental Associates
Notes:
[1] Stack heights reflect heights used in screening analysis and do not reflect any height restrictions per the AERMOD analysis and air quality (E) designations.

The proposed structures would be closer to each other than to any existing buildings of similar or greater height. Therefore, the potential project-on-project impacts would constitute a worst-case analysis. If no impacts are projected for the project-on-project analysis, none are likely to occur for existing buildings in the vicinity of the project. Therefore, the analysis focuses on the potential impacts to future structures.

Table 14-13 shows the stack heights and square footages for the proposed buildings, as well as their distances to the nearest buildings of similar or greater height and the results of the HVAC screen. The residential and the school components of Building 5 are assumed to have separate HVAC systems. As shown in the table, Astoria Cove Buildings 1, 3, 4, and 5 (Residential) do not screen out and must be modeled with AERMOD. Building 2 and the Building 5 (School) screen out. Individual buildings were modeled with AERMOD as shown in Table 14-12. In addition Buildings 3 and 1 were modeled as a cluster to ensure that they would not cause air quality impacts to Building 2.

Modeled results for boilers using natural gas with building boiler stacks located at the highest tier of buildings as per the proposed site plan (refer to Figure 14-1) are shown in Tables 14-13 and 14-14 and described below. The pollutants of concern included NO_2 and $PM_{2.5}$ associated with natural gas. As shown in Table 14-13, no impacts are projected for the one-hour or annual concentrations of NO_2, and none are projected for the 24-hour or annual concentrations of $PM_{2.5}$. However, some restrictions on stack height and/or boiler type are necessary to avoid impacts. Buildings 1, 3, and 5 must use low-NO_x boilers with flue gas recirculation. The stack on Building 3 must be at least twenty feet above the rooftop, and the stack on Building 1 must be at least six feet above the rooftop. All buildings (including Building 2)



Astoria Cove

Figure 14-1
Preliminary Site Plan

require restrictions on the HVAC stack location per the analysis. These restrictions on the stack locations are discussed in the section on (E) designations. With implementation of the fuel, boiler type, and stack restrictions, to be set forth in an (E) designation (described at the end of the chapter), no significant adverse $PM_{2.5}$ and/or NO_2 impacts are expected.

Table 14-13: Nitrogen Dioxide (NO_2) Concentrations (μg/m³)—Proposed Project on Proposed Buildings

Astoria Cove Building ID	Receiving Building	1-Hour Concentrations (μg/m³)			Comments
		Average	Background[1]	Total	
1	2	40.7	120.0	160.7	No impact
3	2	67.7	120.0	187.7	No impact
4	2	43.2	120.0	163.2	No impact
	3	43.0	120.0	163.0	No impact
5 (Residential)	4	20.4	120.0	140.4	No impact
	5 (School)	27.4	120.0	147.4	No impact
Cumulative (1 &3)	2	67.7	120.0	187.7	No impact
			NO_2 NAAQS (μg/m³) Standard	**188**	
Astoria Cove Building ID	**Receiving Building**	**Annual Concentrations (μg/m³)**			**Comments**
		Modeled	**Background[1]**	**Total**	
1	2	0.3	42.0	42.3	No impact
3	2	3.9	42.0	45.9	No impact
4	2	0.4	42.0	42.4	No impact
	3	0.3	42.0	42.3	No impact
5 (Residential)	4	0.1	42.0	42.1	No impact
	5 (School)	0.3	42.0	42.3	No impact
Cumulative (1 &3)	2	0.3	42.0	42.3	No impact
			NO_2 NAAQS (μg/m³) Standard	**100**	

Source: Sandstone Environmental Associates, Inc.
Notes:
[1] 2014 *CEQR Technical Manual* for use for projects in Queens.

Table 14-14: $PM_{2.5}$ Concentrations (μg/m³)—Proposed Project on Proposed Buildings

Astoria Cove Building ID	Receiving Building	24-Hour Concentrations (μg/m³)	Comments
1	2	2.7	No impact
3	2	4.2	No impact
4	2	1.0	No impact
	3	1.0	No impact
5 (Residential)	4	1.1	No impact
	5 (School)	2.6	No impact
Cumulative (1 &3)	2	4.1	No impact
	$PM_{2.5}$ *de minimis*	**5.5**	
Astoria Cove Building ID	**Receiving Building**	**Annual Concentrations (μg/m³)**	**Comments**
1	2	0.08	No impact
3	2	0.07	No impact
4	2	0.04	No impact
	3	0.03	No impact
5 (Residential)	4	0.03	No impact
	5 (School)	0.08	No impact
Cumulative (1 &3)	2	0.10	No impact
	$PM_{2.5}$ *de minimis*	**0.3**	

Source: Sandstone Environmental Associates, Inc.

Air Toxics

Potential adverse effects on the proposed project from existing industrial emissions are a source of concern due to the number and proximity of manufacturing /industrial facilities. This section addresses the potential for toxic emissions from nearby manufacturing/industrial sources to significantly impact the proposed project.

According to the *CEQR Technical Manual*, existing facilities with the potential to cause adverse air quality impacts are those that would require permitting under City, State and Federal regulations. The *CEQR Technical Manual* lists the following types of uses as a source of concern for the residential/commercial uses that would occur under the Proposed Action:

- Major/Large emission sources (e.g., solid waste or medical waste incinerators, cogeneration facilities, asphalt and concrete plants, or power generating plants) within 1,000 feet;
- A medical, chemical, or research laboratory nearby;
- A manufacturing or processing facility within 400 feet; and
- An odor producing facility within 1,000 feet.

To identify facilities in the categories listed above, the research included online searches of NYSDEC's Air Permit Facilities Registry and the EPA's Facility Registry System for permitted facilities, an online search of data provided by the DOB, the New York City Open Accessibly Space Information System (OASIS), telephone directory listings, available aerial photos provided by Google and Bing, internet websites, NYSDEC's DAR-1, and a search for DEP permits Bureau of Environmental Compliance (BEC). Review of available information indicated that most of the existing area industrial properties would be redeveloped under the Halletts Point and Astoria Cove projects; the remaining properties are primarily warehouses.

Based on available information, a list of industrial sites was submitted to DEP (BEC) for a permit search (see Table 14-15). Manufacturing/Industrial sites that would be redeveloped as part of the Proposed Action were not included in the analysis. As no current and/or active operational permits for the requested sites were identified by DEP (BEC), no potential impacts from existing manufacturing/Industrial uses are anticipated.

Table 14-15: Industrial Sites within 400 Feet of Proposed Project

Block	Lot	Address(es)	Observed Land Use
911	1	3-15 26th Avenue	Industrial-Build it Green NYC
911	49	3-17 26th Avenue	Industrial-Build it Green NYC
909	17	26-01 4th Street	Warehouse
909	13	26-15 4th Street	Warehouse
909	1	26-25 4th Street	Warehouse
912	1	2-15 26th Avenue	Hellgate Filming Studio
910	27	26-12 4th Street	Warehouse
910	9	26-24 4th Street	Warehouse
910	8	3-02 26th Avenue	Warehouse
914	30	26-34 3rd Street	Warehouse
910	1	26-35 3rd Street	Warehouse
914	35	2-12th Avenue	Warehouse

Source: Sandstone Environmental Associates, Inc.

Air Quality (E) Designations

The analysis determined that all sites would require (E) designations that would specify the type of fuel to be used and the height and/or location of the boiler stack. The proposed (E) designations for the project site with respect to HVAC systems are presented below.

The (E) designations for the development sites are based on the proposed site plan, as shown in Figure 14-1. Any changes to the heights or configurations of the buildings or tiers may necessitate revisions to the (E) designations.

> Building 1: Block 907, Lots 8 and p/o 1: Any new residential and/or commercial development on the above-referenced properties must use natural gas with low NO_x boilers and flue recirculation for HVAC systems and ensure that the heating, ventilating and air conditioning stack is located at the highest tier or at least 298 feet high and at least 228 feet from 4th Street to avoid any potential significant adverse air quality impacts.

> Building 2: Block 907, Lots 1 and p/o 8: Any new residential and/or commercial development on the above-referenced properties must use natural gas for HVAC systems and ensure that the heating, ventilating and air conditioning stack is located at the highest tier or at least 323 feet high to avoid any potential significant adverse air quality impacts.

> Building 3: Block 906, Lots 1 and 5: Any new residential and/or commercial development on the above-referenced properties must use natural gas with low NO_x boilers and flue recirculation for HVAC systems and ensure that the heating, ventilating and air conditioning stack is located at the highest tier or at least 282 feet high and is at least 139 feet from 9th Street and 177 feet from 26th Avenue to avoid any potential significant adverse air quality impacts.

> Building 4: Block 909, Lot 35: Any new residential and/or commercial development on the above-referenced properties must use natural gas for HVAC systems and ensure that the heating, ventilating and air conditioning stack is located at the highest tier or at least 83 feet high and at least 27 feet from t 26th Avenue and 278 feet from 9th Street to avoid any potential significant adverse air quality impacts.

> Building 5 (Residential): Block 908, Lot 12: Any new residential and/or commercial development on the above-referenced properties must use natural gas with low NO_x boilers and flue recirculation for HVAC systems and ensure that the heating, ventilating and air conditioning stack is located at least 70 feet high and at least 162 feet from 9th Street and 140 feet from 26th Avenue to avoid any potential significant adverse air quality impacts.

> Building 5 (School): Block 908, Lot 12: Any new residential, commercial , and/or institutional development on the above-referenced properties must use natural gas for HVAC systems and ensure that the heating, ventilating and air conditioning stack is located at the highest tier or at least 93 feet high to avoid any potential significant adverse air quality impacts.

With (E) designation E-343, the potential impacts from the project site building's heating systems would not exceed the applicable NAAQS or *de minimis* criteria and would therefore not have potential significant adverse environmental impacts on air quality.