Chapter 14: Air Quality*

14.1 Introduction

As described in Chapter 1, "Project Description," the Jerome Avenue Rezoning consists of a series of land use actions (collectively, the "Proposed Actions") intended to facilitate the implementation of the objectives of the Jerome Avenue Neighborhood Plan (the "Plan"). The affected area comprises an approximately 92-block area primarily along Jerome Avenue and its east west commercial corridors in Bronx Community Districts (CDs) 4, 5, and 7 (the "rezoning area"). The rezoning area is generally bounded by 184th Street to the north and East 165th Street to the south, and also includes portions of 183rd Street, Burnside Avenue, Tremont Avenue, Mount Eden Avenue, 170th Street, Edward L. Grant Highway, and East 167th Street.

This chapter discusses potential impacts to air quality as a result of the Proposed Actions. The air quality analyses are concerned with both mobile source and stationary source impacts, as follows:

- The potential for traffic volumes and a redistribution of traffic associated with the Proposed Actions (along with the inclusion of new parking garages) to result in significant mobile source air quality impacts Development sites within the rezoning area would not include on−site parking. Therefore, an evaluation potential future pollutant concentrations from the proposed parking facilities was not required);
- The potential for emissions from the heating, ventilation, and air conditioning (HVAC) systems of the Proposed Actions to result in stationary source pollutants that would significantly impact existing land uses;
- The potential for emissions from the HVAC systems of individual proposed buildings to result in stationary source pollutants that would significantly impact other proposed buildings;
- The potential for emissions from existing stationary sources of pollution from either large-scale boiler systems or industrial processes to result in significant impacts on the Proposed Actions.

These air quality analyses are conducted per the guidance of the *City Environmental Quality Review (CEQR) Technical Manual*, as well as other relevant guidance and protocols provided by New York State Department of Environmental Conservation (NYSDEC), New York City Department of Environmental Protection (DEP), and United States Environmental Protection Agency (USEPA). As appropriate, applicable environmental reports for other nearby projects have been reviewed. In addition, the air quality characteristics of the Proposed Actions are identified and discussed within the context of the Clean Air Act (CAA) requirements and other applicable state and local air quality standards.

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* This chapter has been revised since the DEIS to include additional stationary HVAC, air toxics and mobile source inputs based on the added Expanded Rezoning Area and A-Application Alternatives; refinements to the air toxics study based on sites not previously identified; and addition of text related to PM 2.5.

14.2 Principal Conclusions

The detailed analyses conclude that the Proposed Actions would not result in any significant adverse air quality impacts on sensitive uses in the surrounding community, and the Proposed Actions would not be adversely affected by existing sources of air emissions in the rezoning area. A summary of the general findings is presented below.

The assessment of mobile sources demonstrated that project related emissions of CO and fine particulate matter less than ten microns in diameter (PM_{10}) due to project–generated traffic at intersections would not result in exceedances per CEQR criteria. The screening assessment results also show that project related daily (24–hour) $PM_{2.5}$ increments would not surpass the thresholds set forth by Section 210 of the *CEQR Technical Manual*.

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from fossil fuel–fired heat and hot water systems at the projected and potential development sites. At certain sites, an (E) designation (E–442) would be mapped as part of the zoning proposal to ensure the developments would not result in any significant adverse air quality impacts from fossil fuel–fired heat and hot water systems emissions due to individual or clusters of development sites.

An analysis of the cumulative impacts of industrial sources on projected and potential development sites was performed. Maximum concentration levels at projected and potential development sites were below the air toxic guideline levels and health risk criteria established by regulatory agencies, and below National Ambient Air Quality Standards (NAAQS). Shortly before the completion of the draft EIS, a new industrial permit (PB034510) for a spray booth was issued for an auto-body business located at 1370 Cromwell Avenue. To address potential concerns associated with emissions from the spray booth, a detailed assessment of emissions from this auto-body facility was conducted for the Final EIS, and was included in the overall results. The results of the analyses indicate that none of the projected or potential development sites would be impacted by industrial source emissions.

Large and major emissions sources within 1,000 feet of a projected or potential development site were also analyzed. Results of this analysis show that none of the projected or potential development sites would be impacted by the two large emissions sources identified within the project area

The parking facilities assumed to be developed as a result of the Proposed Actions are not expected to result in any significant adverse air quality impacts.

14.3 Pollutants of Concern

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide (NO) and nitrogen dioxide (NO_2), collectively referred to as NOx) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NOx, sulfur oxides (SOx), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and some sources utilizing non−road diesel such as large international marine engines. On−road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on−road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NOx and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, ozone, and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act, and are referred to as 'criteria pollutants'; emissions of VOCs, NOx, and other precursors to criteria pollutants are also regulated by EPA.

CARBON MONOXIDE

Carbon monoxide (CO) is a colorless and odorless gas, which is primarily associated with the incomplete combustion of vehicle fuel. CO is highly reactive and its concentrations are limited to relatively short distances near crowded intersections and along slow moving, heavily traveled roadways. Pursuant to the CAA, each state is committed to offset any CO emissions resulting from vehicle miles traveled (VMT) growth in non-attainment areas. In 2010, New York City was re-designated as a maintenance area. To ensure that air quality conditions continue to improve within the New York City metropolitan area, it is important to monitor potential impacts of new traffic-generating projects. Emissions of CO could increase as a result of a project related increase in vehicle volumes in the rezoning area. As a result, concentrations of CO are evaluated on a local, or microscale, basis.

NITROGEN OXIDES, VOC'S AND OZONE

NOx are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are transported downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of

NOx and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions. In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary point sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) While NO_2 emissions are a concern from stationary sources of combustion, with the promulgation of the 2010 1−hour average standard for NO_2, local sources such as vehicular emissions have also become of greater concern for this pollutant. However, any increase in NO_2 associated with the Proposed Actions would be relatively small, as demonstrated below for CO and PM, due to the very small increases in the number of project induced vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways.

Potential impacts on local NO_2 concentrations from the fuel combustion for Projected and Potential development sites' HVAC systems were evaluated.

LEAD

Lead emissions are associated with industrial uses and motor vehicles that use gasoline containing lead additives. Most vehicles available since 1975 and all after 1980 that are manufactured in this country are designed to use unleaded fuel. As a result, lead emissions have decreased significantly. There would also be no industrial sources associated with the operation of the Proposed Actions. Therefore, lead is not a pollutant of concern for the project.

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

Inhalable particulate matter (PM) is a respiratory irritant and is of most concern when classified as being less than 10 microns in diameter (PM_{10}). PM is primarily generated by stationary sources, such as industrial facilities and power plants; however, PM can also be produced by the combustion of diesel fuel used in some buses and trucks, as well as residential and commercial HVAC systems using fuel oil and natural gas as fuel. PM also develops from the mechanical breakdown of coarse particulate matter (e.g., from building demolition or roadway surface wear as well as other construction-related activities).

Also of concern is PM that is classified as being less than 2.5 microns in diameter ($PM_{2.5}$). $PM_{2.5}$ is extremely persistent in the atmosphere and has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that bind to the surfaces of the particles. Many of these particles can be toxic and oftentimes are also carcinogenic in nature. The city, has promulgated guidance for the screening and assessment of these fine particulates that is outlined in the *CEQR Technical Manual*. The mobile source screening portion of the guidelines requires that if the Proposed Actions would generate fewer heavy duty diesel vehicles (HDDV) per hour (or its equivalent in vehicular emissions) than listed below, the need for a detailed $PM_{2.5}$ analysis is unlikely:

- 12 HDDV: for paved roads with < 5000 vehicles/day
- 19 HDDV: for collector type roads
- 23 HDDV: for principal and minor arterials
- 23 HDDV: for expressways and limited access roads

The Proposed Actions would generate traffic, some of which would be diesel vehicles. In addition, the HVAC systems of the Proposed Actions may also contribute to emissions of PM. As a result, both PM_{10} and $PM_{2.5}$ are evaluated as pollutants of particular concern.

SULFUR DIOXIDE

Sulfur dioxide (SO_2) are respiratory irritants associated with the combustion of sulfur-containing fuels (such as heating oil and coal). SO_2 is a precursor to acid rain and to $PM_{2.5}$, both of which create damage to individual health and the environment. This pollutant is typically associated with large industrial operations, but can also result from smaller sources. All NYSDEC sulfur dioxide monitoring sites have remained in compliance with the New York State/Federal annual mean standard for over twenty years, consecutively. As it is assumed that the proposed development could potentially use No. 2 fuel oil for its HVAC heating and hot water systems, SO_2 is a pollutant of concern.

NON-CRITERIA POLLUTANTS

In addition to criteria pollutants, a wide range of the non-criteria air pollutants, known as hazardous air pollutants (HAPs), which could be emitted from industrial and commercial facilities, are also of potential concern. These pollutants can be grouped into two categories: carcinogenic air pollutants and non-carcinogenic air pollutants. These two groups include hundreds of pollutants, ranging from high to low toxicity. No federal standards have been promulgated for toxic air pollutants. However, USEPA and NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria. The NYSDEC guidance document DAR−1 (2016)[1] contains a compilation of annual and short term (1−hour) guideline concentrations for these compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed

[1] NYSDEC DAR−1 (Air Guide−1) AGC/SGCAGC/SGC Tables, June 2016.

guidelines for assessing exposure to non-criteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

The rezoning area contains a zoned manufacturing area, some of which would remain once the Proposed Actions are in effect. Therefore, air toxics are potential pollutants of concern.

14.4 Air Quality Standards and Guidelines

NATIONAL AND STATE AIR QUALITY STANDARDS

National and New York State primary and secondary ambient air quality standards are pollutant concentration limits for each of the criteria pollutants specified by USEPA. The NAAQS for all of the criteria pollutants are listed in Table 14-1, "National Ambient Air Quality Standards." Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Table 14-1: National Ambient Air Quality Standards

National Ambient Air Quality Standards Pollutant	Primary / Secondary	Averaging Period	Concentration	
Carbon Monoxide (CO)	Primary	1-Hour	35 ppm	*Not to be exceeded more than once per year*
		8-Hour	9 ppm	
Lead (Pb)	Primary and Secondary	Rolling 3 Month Average	0.15 μg/m^3 (1)	*Not to be exceeded*
Nitrogen Dioxide (NO_2)	Primary	1-Hour	188 μg/m^3	*98th percentile of 1-hour daily maximum concentrations, averaged over 3 years*
	Primary and Secondary	Annual	100 μg/m^3 (2)	*Annual mean*
Ozone (O_3)	Primary and Secondary	8-Hour	0.070 ppm (3)	*Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years*
Particulates ($PM_{2.5}$)	Primary	Annual	12 μg/m^3	*Annual mean, averaged over 3 years*
	Secondary	Annual	15 μg/m^3	*Annual mean, averaged over 3 years*
	Primary and Secondary	24-Hour	35 μg/m^3	*98th percentile, averaged over 3 years*
Particulates (PM_{10})	Primary and Secondary	24-Hour	150 μg/m^3	*Not to be exceeded more than once per year on average over 3 years*
Sulfur Dioxide (SO_2)	Primary	1-Hour	75 ppb (4)	*99th percentile of 1-hour daily maximum concentrations, averaged over 3 years*
	Secondary	3-Hour	0.5 ppm	*Not to be exceeded more than once per year*

Notes:
(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(2) The official level of the annual NO_2 standard is 100 μg/m^3.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation per the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment per the previous SO_2 standards or is not meeting the requirements of a SIP call per the previous SO_2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Source: US Environmental Protection Agency; New York State Department of Environmental Conservation, 2016

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

Based on the USEPA Clean Air Act, the State Environmental Quality Review Act (SEQRA) regulations, and the guidance of the *CEQR Technical Manual*, predicted criteria pollutant levels that are greater than those represented in Table 14-1, "National Ambient Air Quality Standards," above would be considered a potential significant adverse impact. Similarly, for non-criteria pollutants, predicted exceedance of the NYSDEC's DAR-1 guideline concentrations would be considered a potential significant adverse impact.

To ensure that pollutant concentration levels are kept below the NAAQS in attainment areas and that concentrations are not significantly increased in non-attainment areas, threshold levels not to be exceeded have also been defined for criteria pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO De Minimis Criteria

With respect to CO, in addition to the Federal and State standards, New York City has developed *de minimis* threshold criteria to assess the significance of project-related impacts on local air quality. These criteria set the minimum change in an 8-hour average CO concentration that would constitute a significant adverse environmental impact. Significant increases of CO concentrations in New York City are defined as:

- An increase of 0.5 ppm or greater in the maximum eight hour concentration if the projected future ambient No-Action condition concentration is equal to 8 ppm or between 8 ppm and 9 ppm.
- An increase of more than half the difference between the baseline concentrations and the 8-hour standards when No-Action condition concentrations are below 8 ppm.

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

$PM_{2.5}$ De Minimis Criteria

With respect to $PM_{2.5}$, the city has developed criteria guidance for the study and assessment of project-related significant adverse impacts. These threshold criteria are related to analyses which determine potential microscale and neighborhood scale incremental (the difference between the future with and without the Proposed Actions) impacts at sensitive receptor locations. The criteria are as follows:

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 2 µg/m^3 but no greater than 5.0 µg/m^3 could be considered a significant adverse impact on air quality based on the frequency, duration and location of the predicted concentrations.
- Predicted increase of more than half the difference between the background concentration and the 24-hour standard.

- The maximum annual impact criteria of 0.3 µg/m^3 is applicable to stationary sources and construction only, or;
- The criteria threshold concentration for the neighborhood scale increment on a yearly basis is 0.1 µg/m^3 (for stationary sources, receptor locations are based on a 1km x 1km grid centered at the maximum predicted microscale annual concentration – averaged over all receptors; for mobile sources, receptors are located at a distance of 15 meters from the edge of roadway).

Non-Criteria Pollutant Thresholds

In order to evaluate short-term and annual impacts of non-carcinogenic toxic air pollutants, NYSDEC has established through their DAR-1 guidance document, short-term guideline concentrations (SGC) and annual guideline concentrations (AGC) for exposure limits. Air toxic concentration values can be found in the NYSDEC DAR-1 AGC/SGC tables; they represent 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.

In order to evaluate impacts of non−carcinogenic toxic air emissions, EPA developed a methodology called the “Hazard Index Approach.” The acute hazard index is based on short−term exposure, while the chronic non− carcinogenic hazard index is based on annual exposure limits. If the combined ratio of pollutant concentration divided by its respective short−term or annual exposure threshold for each of the toxic pollutants is found to be less than 1, no significant air quality impacts are predicted to occur due to these pollutant releases.

In addition, the EPA has developed unit risk factors for carcinogenic pollutants. The EPA considers an overall incremental cancer risk from a proposed action of less than one−in−one million to be insignificant. Using these factors, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of the carcinogenic toxic pollutants combined is less than one−in−one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

14.5 Existing Conditions and Regulatory Setting

MONITORED DATA

USEPA and NYSDEC operate a network of monitoring stations throughout New York City to measure ambient air quality with the results published on an annual basis. The most recent USEPA and NYSDEC air monitoring databases identify existing air quality levels for the rezoning area based on data from the monitoring stations nearest the rezoning area. Background air quality levels for the rezoning area are shown in Table 14-2, "Monitored Ambient Air Quality Data." Selected locations represent available background sites nearest to the rezoning area.

Table 14-2: Monitored Ambient Air Quality Data

Pollutant	Location	Units	Period	Concentrations			Number of Exceedances of Federal Standard	
				Mean	Highest	Second Highest	Primary	Secondary
CO	Botanical Garden, Bronx	ppm	8-hour	-	1.1	1.0	0	0
			1-hour	-	1.9	1.8	0	0
SO_2	Botanical Garden, Bronx	ppm	3-hour	-	-	-	0	-
			1-hour	-	10.6	9.6	-	0
Respirable Particulates (PM10)	IS 52, Bronx	μg/m^3	24-hour	-	37	32	0	0
Respirable Particulates (PM2.5)	IS 52, Bronx	μg/m^3	Annual	8.5	-	-	0	0
			24-hour	21.9	22.2	19.3	0	0
NO_2	IS 52, Bronx	ppb	Annual	18.3	-	-	0	0
			1-hour	64.3	75.9	73.5	0	0
Lead (Pb)	IS 52, Bronx	μg/m^3	3-month	.0047	0.0161	.0134	0	0
O_3	IS 52, Bronx	ppm	8-hour	0.068	0.082	0.073	3	0

Source: NYSDEC Region 2 – Air Quality Data, 2016, http://www.dec.ny.gov/docs/air_pdf/2016airqualreport.pdf

REGULATORY SETTING

Attainment Status/State Implementation Plan (SIP)

The CAA defines non-attainment areas as geographic regions that have not met one or more of the NAAQS. When an area within a state is designated as non-attainment by USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which describes how it will meet the NAAQS per deadlines established by the CAA. Bronx County complies with the NAAQS for SO_2, NO_2, CO, PM_{10} and lead, but is designated as a moderate nonattainment area for eight-hour O_3 and redesignated as a maintenance area for $PM_{2.5}$. Violations of the CO standard have not been recorded at the NYSDEC monitoring sites for many years. As part of its ongoing effort to maintain its attainment designation for CO, New York State has committed to the implementation of area-wide and site-specific control measures to continue to reduce CO levels.

Historical monitoring data for New York City indicate that the O_3 eight-hour standard is exceeded. To be in compliance, the three-year average of the annual fourth highest maximum eight-hour average concentration should not exceed the O_3 eight-hour standard. In August 2007, the state submitted the final proposed revision of the SIP for O_3, documenting how the area would attain the eight-hour O_3 standard of 0.08 ppm by 2013. In March 2008, USEPA revised the eight-hour O_3 NAAQS to 0.075 ppm, and on May 2012 designated the New York City region as marginally nonattainment. In November 2014, USEPA proposed to revise the 0.075 ppm standard to within the range of 0.065 ppm to 0.070 ppm. On October 1, 2015, and effective December 28, 2015, the final rule was signed establishing the standard as 0.07 ppm. The previous (2008) O_3 standards remain in effect in some areas, including New York City. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

As of 2015, New York City has been designated as a maintenance area for $PM_{2.5}$. New York State submitted a 2010 draft SIP to USEPA demonstrating that the annual average standard would be met by April 8, 2010. USEPA concurred with the state's finding, and on December 15, 2010, finalized its determination that this area had attained the annual NAAQS. The state also submitted on May 5, 2011 a clean data petition for this area pertaining to the 24-hour $PM_{2.5}$ NAAQS. On December 31, 2012, USEPA finalized its approval of this petition, determining that the NYC Region nonattainment area had attained the 24-hour NAAQS. USEPA made its initial designations for annual standards on December 18th, 2014. USEPA lowered the annual average primary standard to 12 $\mu g/m^3$, effective March 2013. USEPA designated the area as in attainment for the new 12 $\mu g/m^3$ NAAQS effective January 15, 2015.

On February 9, 2010, USEPA revised the CAA primary NAAQS for NO_2 by supplementing the previous annual primary standard of 53 ppb with a new one-hour primary standard at 100 ppb based on the 3-year average of the 98^{th} percentile of the daily maximum one-hour average concentrations, and establishing a new monitoring program (75 Fed. Reg. 6475 [Feb. 9, 2010]). The final rule became effective on April 12, 2010. The current monitoring network focuses upon concentrations for general population exposure at neighborhood and larger scale uses to support the current annual NO_2 standard and, therefore, does not include monitors near major roadways that could measure the localized concentrations, which are estimated to be responsible for the majority of one-hour peak NO_2 exposures (75 Fed. Reg. 6479 [Feb. 9, 2010]). As a result, states were required to locate NO_2 monitors near roadways and have them operational by January 1, 2013. This means that sufficient air quality data from the new network is not yet available to determine final compliance with the revised NAAQS in certain areas. On January 20, 2012, based on the most recent air quality monitoring data (2008-2010), USEPA determined that no area in the country was violating the 2010 NAAQS for NO_2. On October 5, 2012, USEPA proposed to establish a series of deadlines that would require states and local agencies to begin operating the near-road component of the NO_2 monitoring network in phases between January 1, 2014 and January 1, 2017. This would replace the 2010 rule requirement that all new NO_2 monitors were required to begin operating no later than January 1, 2013. Preparations are currently underway for the commencement of near road monitoring in New York City.

Until the NO_2 designations are made, USEPA states that "major new and modified sources applying for New Source Review (NSR)/ Prevention of Significant Deterioration (PSD) permits will initially be required to demonstrate that their proposed emissions increases of nitrogen oxide (NO_x) will not cause or contribute to a violation of both the annual or one-hour NO2 NAAQS and the annual PSD increment." (75 Fed. Reg. 6525 (Feb. 9, 2010) (referring to 40 C.F.R. 51.166[k]). In 2012, USEPA provided additional guidance, "The Near-road NO_2 Technical Assistance Document" (TAD), to assist states and emissions sources to comply with the CAA requirements for implementing new or revised NO_2 NAAQS.

On June 22, 2010, USEPA promulgated a new one-hour NAAQS for SO_2, replacing the 24-hour and annual standards. The final rule became effective on August 23, 2010. States were required to submit their initial area designation recommendations for SO_2 to USEPA no later than June 2011. On March 20, 2012, USEPA took final action to retain the current secondary NAAQS for oxides of sulfur (SO_x). On July 25, 2013, USEPA designated 29 areas in 16 states as "nonattainment" for the 2010 SO_2 standard. Air quality monitors in each of these areas measured violations of the standard based on 2009–2011 data. State plans demonstrating how these areas will meet the SO_2 standard were due to USEPA by April 4, 2015. Currently, USEPA indicates that it intends to address designation for the remainder of the country in separate future actions. As a result, USEPA will complete designations for all remaining areas in the country in up to three additional rounds: the first round by July 2, 2016, the second round by December 31, 2017, and the final round by December 31, 2020. USEPA has not yet made a designation recommendation for the New York City region.

14.6 Methodology for Predicting Pollutant Concentrations

The air quality assessment examines potential significant adverse CO and $PM_{2.5}$ air quality impacts resulting from the implementation of the Proposed Actions. Specific methodology and background information are discussed below.

MOBILE SOURCES

Vehicular traffic, whether on a road or in a parking garage, may affect air quality. Once operational, the Proposed Actions may result in significant adverse mobile source air quality impacts due to the increase or redistribution of traffic and the addition of new parking areas located near mobile sources.

The Proposed Actions would be located in the Bronx, New York. Per the guidance of the *CEQR Technical Manual*, in this area of the city, actions that would result in the generation of 170 or more peak-hour vehicle trips at an intersection may cause significant adverse air quality impacts and require a detailed air quality analysis for CO. Also, as described above, the city has developed guidelines for determining potential project-related $PM_{2.5}$ impacts. These guidelines are based on the number of project-induced heavy duty or its equivalent in vehicle trips. Finally, the proposed Action is located near the Cross Bronx Expressway which is a truck corridor. As a result, impacts from heavy Vehicle highway emissions may affect projected and potential developments that are directly adjacent to the highway. All mobile source analyses are performed for the 2026 future year.

Vehicular Emissions

CO and PM emission factors are estimated using the USEPA Motor Vehicle Emissions Simulator (MOVES) released in 2010 and updated in 2014. The latest version is MOVES 2014a. Emissions are supplied for average projected free flow speeds provided by the traffic analysis. Applicable and up to date environmental and vehicular traffic data for MOVES are supplied by NYSDEC to accurately model project conditions. Additional link-based data files requirements for MOVES are compiled by obtaining volume, speed and traffic distribution data from the traffic analysis.

Appropriate credits are used to accurately reflect the inspection and maintenance program. County−specific hourly temperature and relative humidity data obtained from NYSDEC are used. [2]

Emissions of fugitive dust are estimated using EPA's latest Air Pollutant Emission Factor (AP-42) equation for paved roads. Emissions from fugitive dust are dependent upon vehicle weight and the surface silt loading in accordance with the latest NYCDEP guidelines regarding roadway silt loading factors and average fleet vehicle weight. Fugitive road dust is not included in the neighborhood scale $PM_{2.5}$ microscale analyses, because DEP considers it to have an insignificant contribution on that scale.

Traffic Data

Traffic data for the air quality analysis are derived from vehicle counts and other information developed as part of the traffic analysis. Peak traffic periods considered in the air quality analysis are the same peak periods selected for the traffic analysis and consist of the weekday AM, midday, PM, and Saturday midday peak hours. These are the periods when the maximum changes in pollutant concentrations are expected based on overall traffic volumes and anticipated changes in traffic patterns due to the Proposed Actions.

The 2010 Highway Capacity Manual and Highway Capacity Software is used to develop the traffic data necessary for the air quality analysis. The vehicle classification is determined through field data collection. Existing vehicle speeds are obtained from field measurements for the area, and adjusted to estimate future free flow speeds.

Dispersion Model

Maximum CO concentrations resulting from vehicle emissions are predicted using the Tier 1 CAL3QHC model Version 2. The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC calculates emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site−specific traffic parameters, such as signal timing and delay (from the 2000 Highway Capacity Manual traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre−timed or actuated signal) characteristics to project the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst−case assumptions regarding meteorological parameters. This refined (Tier 2) version of the model, CAL3QHCR, is employed if maximum predicted future CO concentrations are greater

[2] The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

than the applicable ambient air quality standards or when de minimis thresholds are exceeded using the first level of CAL3QHC modeling.

To determine motor vehicle generated PM2.5 concentrations within the traffic study area, the CAL3QHCR model is applied. This refined version of the model can use hourly traffic and meteorology data, and is therefore more appropriate for calculating 24-hour and annual average concentrations associated with PM2.5.

Meteorology

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

TIER I CO ANALYSIS — CAL3QHC

In applying the CAL3QHC model, the wind angle is varied to determine the wind direction resulting in the maximum concentrations at each receptor.

Following the EPA guidelines, CAL3QHC computations are performed using a wind speed of one meter per second, and the neutral stability class D. The 8−hour average CO concentrations are estimated by multiplying the predicted one−hour average CO concentrations by a factor of 0.7 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters is chosen to represent a Central Business District (CBD). At each receptor location, concentrations are calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that reasonable worst−case meteorology was used to estimate impacts.

TIER II PM2.5 ANALYSIS—CAL3QHCR

Tier II analyses performed with the CAL3QHCR model include the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consist of surface data collected at JFK Airport and upper air data collected at Brookhaven, New York for the period 2011–2015. All hours are modeled, and the highest resulting concentration for each averaging period presented.

Analysis Year

The microscale analyses are performed for existing conditions and 2026, the year by which the Proposed Actions are likely to be completed. The future analysis is performed both without the Proposed Actions (the No-Action condition) and with the Proposed Actions (the With-Action condition).

Background Concentrations

To properly represent the total impact of the Proposed Actions in the analysis, it is necessary to consider representative background levels for each of the analyzed pollutants. The background level is the component of the total concentration not accounted for through the microscale modeling analysis. Applicable background concentrations are added to the modeling results to obtain the total pollutant concentrations at each receptor site for the analysis year. The CO background values are provided by DEP using the latest NYSDEC procedures based on the most recent ambient monitoring data and future decreases in vehicular emissions. $PM_{2.5}$, PM_{10}, NO_2 and SO_2 background values are also obtained from NYSDEC. These values are added to the modeling results, as appropriate, to obtain the total pollutant concentrations at each receptor site for the future analysis year. The background values used in the air quality analyses are provided in Table 14-3, "Background Pollutant Concentrations."

Table 14-3: Background Pollutant Concentrations

Pollutant	Averaging Time	Monitoring Location	Background Concentration	NAAQS/De Minimis
Carbon Monoxide (CO)	1-Hour[1]	Botanical Garden, Bronx	1.76 ppm	35 ppm
	8-Hour[1]	Botanical Garden, Bronx	1 ppm	9 ppm
Nitrogen Dioxide (NO_2)	1-Hour[2]	IS 52, Bronx	120.9 µg/m^3	188 µg/m^3
	Annual[3]	IS 52, Bronx	37.5 µg/m^3	100 µg/m^3
Particulate Matter (PM_{10})	24-Hour[4]	IS 52, Bronx	32 µg/m^3	150 µg/m^3
Particulate Matter ($PM_{2.5}$)	24-Hour[5]	Botanical Garden, Bronx	24 µg/m^3	35 µg/m^3
	Annual[6]	Botanical Garden, Bronx	-	5.5 µg/m^3
Sulfur Dioxide ((SO_2)	1-Hour[7]	Botanical Garden, Bronx	28.8 µg/m^3	197 µg/m^3

Notes:

[1] 1-hour CO and 8-hour CO background concentrations are based on the highest second max value from the latest five years of available monitoring data from NYSDEC (2012-2016).

[2] 1-hour NO_2 background concentration is based on three-year average (2014-2016) of the 98th percentile of daily maximum 1-hour concentrations from available monitoring data from NYSDEC.

[3] Annual NO_2 background concentration is based on the maximum annual average from the latest five years of available monitoring data from NYSDEC (2012-2016).

[4] 24-hour PM_{10} is based on the highest second max value from the latest three years of available monitoring data from NYSDEC (2014-2016).

[5] The 24-hour $PM_{2.5}$ background concentration is based on maximum 98th percentile concentration averaged over three years of data from NYSDEC (2014-2016).

[6] $PM_{2.5}$ annual average impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria without considering the annual background.

[7] The 1-hour SO_2 background concentration is based on maximum 99th percentile concentration averaged over three years of data from NYSDEC (2014-2016).

Source: NYSDEC Ambient Air Quality Report, 2016, http://www.dec.ny.gov/chemical/8536.html

Analysis Sites

To determine locations at which microscale modeling analysis would be required to estimate CO and PM concentration levels at the most heavily congested intersections in the rezoning area, screening procedures described in the *CEQR Technical Manual* are utilized in order to select the worst case analysis sites. These procedures include a determination as to whether future traffic volumes from the studied traffic intersections would exceed the CEQR CO screening threshold of 170 vehicles during peak traffic hours. For $PM_{2.5}$, in concert with its interim guidelines, NYCDEP has developed a screening threshold procedure according to roadway type which examines the minimum allowable project-induced Heavy Duty Diesel (HDD) truck trips per hour that would not result in significant emissions of $PM_{2.5}$. Traffic periods considered in the air quality analysis consist of the weekday AM, midday, PM, and Saturday midday peak hours. Future conditions for the study year 2026, with and without the Proposed Actions, are considered in the selection process. The screening process concluded that none of the studied traffic intersections would exceeded the CEQR screening thresholds for either CO or $PM_{2.5}$. Consequently, no further analysis of mobile source intersection traffic emissions is required.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the Projected and Potential development sites' HVAC systems. In addition, an assessment was conducted to determine the potential for impacts due to industrial activities within the affected area, and from any nearby large emission sources.

Individual HVAC Systems

The potential for emissions from the HVAC systems of individual proposed buildings to result in stationary source pollutants that would significantly impact existing land uses (project-on-existing impacts) and other proposed buildings (project-on-project impacts) are conducted utilizing a stepped analysis procedure following the sequence described below:

1. Impacts would be initially analyzed using the HVAC screening procedures described in the CEQR Technical Manual assuming the use of No. 2 fuel oil.
2. If the nomographic screening result fails with the use of No. 2 fuel oil, a more detailed analysis would be conducted utilizing EPA's AERMOD[3] dispersion model.
3. If the detailed AERMOD analysis result fails with the use of No. 2 fuel oil, HVAC screening procedures will be utilized assuming a cleaner burning fuel (natural gas), and an air quality (E) designation would

[3] EPA, AERMOD: Description of Model Formulation, 454/R−03−004, September 2004; and EPA, User's Guide for the AMS/EPA Regulatory Model AERMOD, 454/B−03−001, September 2004 and Addendum December 2006.

be proposed for the site, providing the fuel type restriction that would be required to avoid a significant adverse air quality impact.

4. If the *CEQR Technical Manual* nomographic screening result fails with natural gas, a more detailed analysis will be conducted utilizing the EPA's AERMOD dispersion model.
5. If the detailed AERMOD analysis result fails with the use of natural gas, additional refined analysis and further stack restrictions (i.e., stack setback, stack height and/or low NOx burner) would be required to avoid a significant adverse air quality impact. An air quality (E) designation would be proposed for the site in the Final Environmental Impact Statement (EIS), providing the fuel type and stack height restriction.

Screening Analysis

A screening analysis was performed to assess air quality impacts associated with emissions from HVAC systems associated with each Projected and Potential development site. The methodology described in the CEQR Technical Manual was used for the analysis and considered impacts on sensitive uses (i.e., existing residences and other proposed developments).

The methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the HVAC systems exhaust stack height to evaluate whether a significant adverse impact may occur. Based on the distance from the development site to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the CEQR Technical Manual, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Since information on the HVAC systems' design was not available, the distance from lot line to lot line was used for the screening analysis for conservative purposes. The maximum floor area of each Projected and Potential development site from Reasonable Worst-Case Development Scenario (RWCDS) was used as input for the screening analysis.

It was assumed that No. 2 fuel oil or natural gas would be used in the Projected and Potential development sites' HVAC systems, and that exhaust stacks would be located three feet above roof height (as per the CEQR Technical Manual). For sources that did not pass the screening analyses using the CEQR Technical Manual procedures, a refined modeling analysis was performed. For fuel oil, the primary pollutants of concern are SO_2 and $PM_{2.5}$, while for natural gas, the primary pollutant of concern is NO_2 and $PM_{2.5}$.

Refined Dispersion Analysis

A detailed dispersion modeling analysis using the USEPA AERMOD model is conducted for projected and potential development sites that do not pass the screening analysis. AERMOD is a versatile model capable of predicting pollutant concentrations from continuous point, area, and volume sources. AERMOD uses enhanced plume and wake dispersion algorithms that are capable of estimating pollutant concentrations in a building's cavity and wake regions.

Accordingly, the nearest existing building and/or proposed building of a similar or greater height is analyzed as the potential receptor. Because information on the HVAC systems' design is not available, appropriately conservative dispersion modeling stack options and assumptions are applied per the guidance of the *CEQR Technical Manual.* It is assumed that exhaust stacks are located three feet above roof height, and are assumed to be located 10 feet from the wall of any adjacent taller building. Where exceedances of thresholds are predicted to occur with this scenario, additional iterations of the analysis are conducted utilizing subsequent setback distances from the wall of the adjacent building. If the maximum distance is reached (i.e., the edge of the subject rooftop directly opposite the adjacent building property line), then the analysis is run assuming interval increases in stack height. Building receptor locations are located on every floor and spaced 25 feet (horizontally).

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analyses of potential impacts from exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length, and elimination of calms. AERMOD can be run with and without building downwash (the downwash option accounts for the effects on plume dispersion created by the structure the stack is located on, and other nearby structures). In general, modeling "without" building downwash produces higher estimates of pollutant concentrations when assessing the impact of elevated sources on elevated receptor locations. Therefore, the analysis was performed using the AERMOD model with the no downwash option only.[4] The largest site (Potential development site 90) was analyzed for both downwash and no downwash to determine potential worst-case impacts.

The refined dispersion modeling analysis was performed for 1-hour SO_2, 24-hour and annual $PM_{2.5}$ when fuel oil was assumed for the HVAC systems, and 1-hour NO_2, 24-hour and annual $PM_{2.5}$ when natural gas was assumed for the HVAC systems.

Receptor Placement

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed building façades to represent potentially sensitive locations such as operable windows and intake vents. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations.

Emission Estimates and Stack Parameters

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[5] EPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air, July 2010

Fuel consumption was estimated based on procedures outlined in the *CEQR Technical Manual* as discussed above. Using worst−case assumptions, fuel was assumed to be No. 2 fuel oil for SO2 and $PM_{2.5}$, and natural gas for NO2 and $PM_{2.5}$. Emission factors from the fuel oil and natural gas combustion sections of EPA's AP−42 were used to calculate emission rates for the Projected and Potential development site's HVAC systems.

EPA's preferred regulatory stationary source model, AERMOD, is capable of producing detailed output data that can be analyzed at the hourly level required for the form of the 1-hour standard. EPA has also developed guidance to estimate the transformation ratio of NO2 to NOx, applicable to heating and hot water systems, as discussed further below.

1-hour average NO_2 concentration increments associated with the Projected and Potential development sites' hot water systems were estimated using AERMOD model's Ozone Limiting Method (OLM) module to analyze chemical transformation within the model. The OLM module incorporates hourly background ozone concentrations to estimate NOx transformation within the source plume. Ozone concentrations were taken from the NYSDEC Queens College monitoring station that is the nearest ozone monitoring station and had complete five years of hourly data available. An initial NO_2 to NOx ratio of 0.1 at the source exhaust stack was assumed, which is considered representative for boilers.

The methodology used to determine the compliance of total 1-hour NO_2 concentrations from the Proposed Action's HVAC systems with the 1-hour NO_2 NAAQS was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each receptor location and the 98th percentile daily 1-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally the maximum of the 98th percentile concentrations over the latest five years was selected as the total 1-hour NO_2 concentration.

Cumulative Impacts from Heat and Hot Water Systems

A cumulative HVAC impact analysis is performed for projected and/or potential development sites with buildings that would have a similar stack height and were located in close proximity to one another (i.e., site clusters). Development cluster sites are grouped based on the following criteria:

- Density and scale of development;
- Similarity of building stack height; and
- Proximity to other nearby buildings of a similar height.

The HVAC cluster analysis was performed to identify potential impacts of SO_2, NO_2, and $PM_{2.5}$ emissions using the most recent version of the AERMOD refined model. An estimate of the emissions from the HVAC systems is made based on the proposed development size per the RWCDS, type of fuel used, and type of construction with fuel consumption rates shown below:

- For residential developments, 60.3 ft^3/ft^2-year and 0.43 gal/ft^2-year are used for natural gas and fuel oil, respectively; and
- For commercial developments, 45.2 ft^3/ft^2-year and 0.21 gal/ft^2-year are used for natural gas and fuel oil, respectively.

Short-term factors are determined by using peak hourly fuel consumption estimates for heating, hot water, and cooling systems.

Emission factors for each fuel are obtained from the EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. The SO_2 emissions rates are calculated based on a maximum fuel oil sulfur content of 0.0015 percent (based on use of ultra-low sulfur No. 2 oil) using the appropriate AP-42 formula.

The average minimum distance from the source clusters to the nearest buildings is used in the modeling analysis. The analysis examines existing buildings or other projected or potential development sites which are of a similar or greater height than the source cluster.

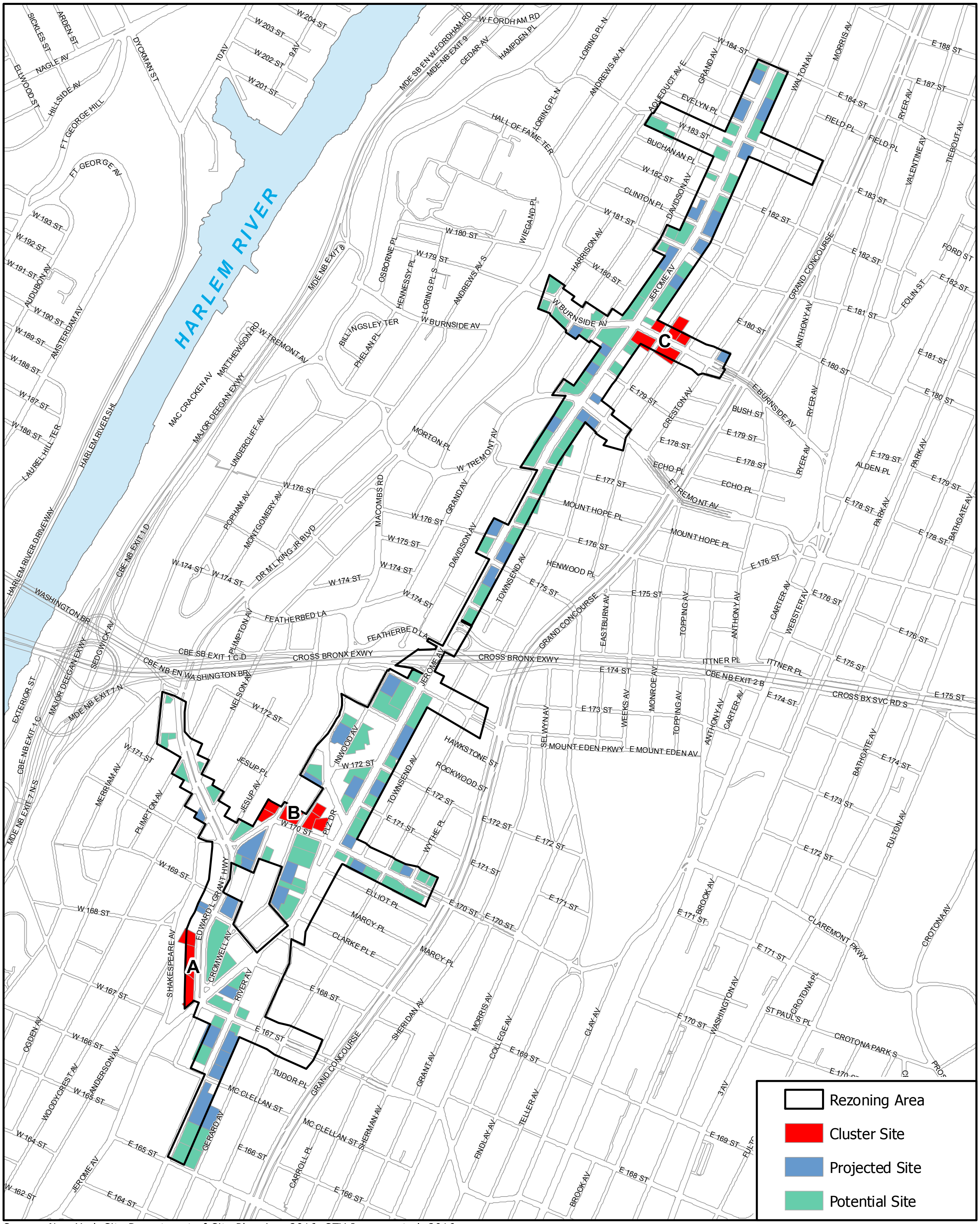
The results of the analysis are added to background concentrations to determine whether impacts are below ambient air quality standards. The maximum concentrations from a cluster is predicted for both fuel oil and national gas types. In the event that an exceedance of a standard for a specific pollutant is predicted with either No. 2 fuel oil or natural gas, an air quality E-designation is proposed for the site, describing the fuel and/or HVAC exhaust stack restrictions that would be required to avoid a significant adverse air quality impact.

A total of three clusters have been selected for analysis. The projected and potential development sites associated with each cluster and their location are presented in Table 14-4, “Cluster Analysis Sites,” and on 14-1, “HVAC Cluster Locations.”

Table 14-4: Cluster Analysis Sites

Cluster	Projected and Potential Development Sites
1	Projected Development Sites 39
	Potential Development Sites 92, 93
2	Projected Development Sites 30
	Potential Development Sites 71, 72, 73, 74 , 75
3	Potential Development Sites 27, 28, 29, 30, 31

Source: STV Incorporated, 2017.



Source: New York City Department of City Planning, 2016; STV Incorporated, 2016.

N

0 1,000 2,000 Feet

Figure 14-1

HVAC CLUSTER LOCATIONS

Industrial Sources

Based on a review of the PLUTO database and site visit conducted by STV, potential manufacturing or industrial sources were identified. A request was made to DEP's Bureau of Environmental Compliance (BEC) and NYSDEC for information regarding the release of air pollutants from these potential sources within the entire study area. The DEP and NYSDEC air permit data provided was compiled into a database of source locations, air emission rates, and other data pertinent to determining source impacts. A comprehensive search was also performed to identify NYSDEC Title V permits and permits listed in the EPA Envirofacts database.[5]

For industrial sources, a review of land use mapping and a visual inspection of the rezoning area are conducted to determine whether any industrial emissions sources could be found within 400 feet of a projected or potential development site. Existing processing and manufacturing sources that are located within a radius of 400 feet of a projected or potential development site are identified. Any industrial sources beyond 400 feet of a projected or potential development site are excluded from the analysis. In addition, the analysis excludes industrial sources located at projected development sites because the Proposed Actions assume that all such sites would be redeveloped. However, for potential development sites, the industrial analysis is performed for both of two conditions, as follows:

1. Assuming the site is developed, in which case the industrial source is not assumed to be operating in the With-Action condition. In this case, potential air quality impacts from other industrial sources in the rezoning area are analyzed to evaluate their potential effects on the potential development site.
2. Assuming the site is not developed, in which case the industrial source is assumed to be operating in the With-Action condition, its potential effects on other potential development sites is determined.

For industrial source locations confirmed to be within 400 feet of the rezoning area, a field survey was performed to confirm the operational status of the sites identified in the permit search, and to identify if any additional sites have sources of emissions that would warrant an analysis. Of the site identified, 12 have been determined to be active and not located on a projected development site.

A cumulative analysis for each toxic pollutant is conducted from multiple sources. NYSDEC Annual Guideline Concentration (AGC) and Short-term Guideline Concentration (SGC) are used as the thresholds to determine impact significance. If an initial screening assessment predicts exceedances of an AGC or SGC, a refined modeling analysis using the AERMOD model is performed in association with the five-year meteorological data to determine if significant air quality impacts on projected and potential development sites would result from existing toxic emissions sources.

[5] EPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air, July 2010.

For some autobody shops that perform paint spraying, in some cases the pollutant emissions were not listed on the permit. To estimate the individual air toxic emissions in these cases, generic emissions of several pollutants are utilized based on material safety data sheet information from representative sources. Emissions were calculated based on maximum percentage by weight for individual air toxics that are commonly found in coatings used in paint spraying operations. A generic solvent usage was multiplied by the weight percentage for each air toxic to estimate the maximum emission rate for the air toxics, by source.

Refined Dispersion Analysis

After compiling the information on facilities with manufacturing or process operations in the study area, maximum potential pollutant concentrations from different sources, at various distances from the projected and potential development sites, are evaluated with a refined modeling analysis using the EPA/AMS AERMOD dispersion model. The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on emission rates, source parameters and hourly meteorological data, stack tip downwash, urban dispersion, and surface roughness length, and elimination of calms. Because the highest concentrations are predicted to occur at nearby elevated locations, the AERMOD model was run without downwash — a procedure which produces the highest concentrations at elevated locations. The meteorological data set consisted of five years of meteorological data: surface data collected at La Guardia Airport (2011−2015) and concurrent upper air data collected at Brookhaven, Suffolk County, New York.

Predicted worst−case impacts on the projected and potential development sites are compared with the short−term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) recommended in *NYSDEC's DAR−1 AGC/SGC Tables*. These guidelines present the airborne concentrations which are applied as a screening threshold to determine if the future residents of the projected and potential development sites could be significantly impacted by nearby sources of air pollution.

To assess the effects of multiple sources emitting the same pollutants, cumulative source impacts were determined. Concentrations of the same pollutant from industrial sources that were within 400 feet of an individual development site are combined and compared to the guideline concentrations discussed above.

Discrete receptors (i.e., locations at which concentrations were calculated) are placed on the potentially affected projected and potential development sites. The receptor network consisted of receptors located at spaced intervals along the sides of the development site from the ground floor to the upper level.

Emission rates and stack parameters, obtained from the DEP permits, are input into the AERMOD dispersion model.

Health Risk Assessment

Potential cumulative impacts are evaluated based on EPA's Hazard Index Approach for non−carcinogenic compounds and EPA's Unit Risk Factors for carcinogenic compounds. Both methods are based on equations that use EPA health risk information at referenced concentrations for individual compounds to determine the level of health risk posed by an expected ambient concentration of these compounds at a sensitive receptor.

For non−carcinogenic compounds, EPA considers a concentration−to−reference dose level ratio of less than 1.0 to be acceptable. For carcinogenic compounds, the EPA unit risk factors represent the concentration at which an excess cancer risk of one− in−one million is predicted. In cases where an EPA reference dose or unit risk factor did not exist, the NYSDEC AGC was used.

Additional Sources

The *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a "large" or "major" emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the projected and potential development sites, a review of existing permitted facilities was conducted. Sources of information reviewed included the USEPA's Envirofacts database,[6] the NYSDEC Title V and State Facility Permit websites,[7] the New York City Department of Buildings website,[8] and DEP permit data.

Two facilities with state facility permits have been identified within 1,000 feet of a development site:

- Executive Towers at 1020 Grand Concourse and Bronx Lebanon Hospital. The Executive Towers are within 1,000 feet of Projected Development Site 45 and Potential Development Sites 100 and 101.
- Bronx Lebanon Hospital at 1650 Grand Concourse is within 1,000 feet of Potential Development Site 51.

Pollutant concentrations are estimated from these facilities to evaluate their potential impact on the Proposed Actions. The AERMOD dispersion model is used in the analysis, with the same set of meteorological data and the same background concentration values.

The Executive Tower facility has two dual use (oil and natural gas) 16.8 mmBtu/hr boilers. Each boiler vents through the same exhaust stack. The Mount Lebanon Hospital facility has two dual use (oil and natural gas) 25.1 mmBtu/hr boilers. Each boiler vents through the same exhaust stack.

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[6] EPA, Envirofacts Data Warehouse, https://www3.epa.gov/enviro/.

[7] NYSDEC Title V and State Facility permit websites:

Title V- http://www.dec.ny.gov/dardata/boss/afs/issued_atv.html;

State Permit- http://www.dec.ny.gov/dardata/boss/afs/issued_asf.html.

[8] http://www1.nyc.gov/site/buildings/index.page.

The facility emissions are estimated using the information developed for the State Facility Permit application, and applying the EPA's *Compilations of Air Pollutant Emission Factors* (*AP−42*)[9] emission factors for natural gas−fired boilers. Table 14−5, "Stack Parameters and Emission Rates (Executive Tower)," and 14-6, "Stack Parameters and Emission Rates (Mount Lebanon Hospital)," present the emission rates and stack parameters used in the major source AERMOD analyses.

Table 14-5: Stack Parameters and Emission Rates (Executive Tower)

Parameter	Value	
Stack height (m)	70.1	
Stack Diameter (m)	1.5	
Exhaust Velocity (m/s)	6.4 [1]	
Exhaust Temperature (˚K)	426 [1]	
Fuel Type	**Oil (g/s)**	**Natural Gas (g/s)**
1-hr NO_2	0.6048	0.4150
Annual NO_2	0.6472	0.6472
24-hr $PM_{2.5}$	0.0644	0.0315
Annual $PM_{2.5}$	0.0689	0.0492
24-hr PM_{10}	0.0720	0.0315
1-hr SO_2	0.0064	N/A
Notes: [1] Based on DEP boiler database		

Source: STV Incorporated, 2017.

[9] EPA, Compilations of Air Pollutant Emission Factors AP−42, Fifth Edition, Volume I: Stationary Point and Area Sources, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

Table 14-6: Stack Parameters and Emission Rates (Mount Lebanon Hospital)

Parameter	Value	
Stack height (m)	57.91	
Stack Diameter (m)	1.06	
Exhaust Velocity (m/s)	6.4 [1]	
Exhaust Temperature (˚K)	426 [1]	
Fuel Type	**Oil (g/s)**	**Natural Gas (g/s)**
1-hr NO_2	0.9036	0.6201
Annual NO_2	0.7163	0.7163
24-hr $PM_{2.5}$	0.0962	0.0471
Annual $PM_{2.5}$	0.0763	0.0544
24-hr PM_{10}	0.1075	0.0471
1-hr SO_2	0.0096	N/A
Notes: [1] Based on DEP boiler database		

Source: STV Incorporated, 2017.

14.7 The Future without the Proposed Actions (No-Action Condition)

MOBILE SOURCES

Some development within the study area will occur in the future without the Proposed Actions by 2026. As a result, traffic volumes would increase at locations near these developments. However, it is not anticipated that the anticipated increase in traffic volumes would result in significant increases in localized pollutant emissions.

STATIONARY SOURCES

Some development within the study area will occur in the future without the Proposed Actions by 2026. However, while the resulting increase in stationary source stack emissions from heat and hot water systems could affect some sensitive building receptors, these affects would dispersed throughout the project area at locations nearby the future development sites.

14.8 The Future with the Proposed Actions (With-Action Condition)

MOBILE SOURCES

As described in the *CEQR Technical Manual,* a screening of the studied traffic intersections is conducted to determine whether any would require detailed analysis. The proposed project is not expected to generate more than 170 vehicles at any intersection in the study area during peak traffic hours in the future analysis year (2026). In addition, the $PM_{2.5}$ CEQR screening criteria would not be exceeded at any of the studied locations. As a result, a detailed assessment of mobile source air quality was not required as impacts related to mobile sources are not anticipated.

STATIONARY SOURCES

Individual HVAC Systems

Screening Analysis

The screening analysis was performed to evaluate whether potential air quality impacts from the HVAC systems associated with the Projected and Potential development sites could potentially impact other Projected and Potential development sites, or existing buildings.

A total of 40 Projected and 87 Potential development sites failed the CEQR Manual nomographic screening analysis using No. 2 fuel oil as the fuel source. Therefore, each of these proposed development sites required a refined modeling analysis for the use of No. 2 fuel oil. Of the sites that failed the screening analysis using No.2 fuel oil analysis, a total of 33 Projected and 73 Potential development sites failed the refined modeling analysis using No. 2 fuel oil as the fuel source. Therefore, a screening analysis using natural gas was conducted for each of these development sites. A total of 31 Projected and 72 Potential development sites failed the screening analysis using natural gas as the fuel source, therefore, each of these development site required a further refined modeling analysis.

Refined Dispersion Analysis

As indicated above, a total of 127 Projected and Potential development sites (40 Projected and 87 Potential development sites) required a refined modeling analysis to determine the potential for air quality impacts. The results of the refined modeling analysis determined the following:

- 21 (seven projected and 14 potential development sites) of the 127 sites analyzed using the refined dispersion model passed the analysis for # 2 fuel oil; therefore, no restrictions are required for these sites.
- If the fuel type is restricted to natural gas, no significant adverse impacts are predicted at 15 of the sites (three projected and 12 potential development sites).
- If the fuel type is restricted to natural gas only, and heating and hot water system stacks are set back from the building edge to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at 67 of the sites (24 projected and 43 potential development sites).
- If the fuel type is restricted to natural gas only, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at 17 of the sites (four projected and 13 potential development sites).
- If the fuel type is restricted to natural gas only, heating and hot water system stacks are set back from the building edge, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at seven of the sites (two projected and five potential sites).

Table 14-7 presents a summary of the analysis results and proposed restrictions, with additional detail provided in Tables 14-8 (projected development sites) and 14-9 (potential development sites).

Table 14-7: Individual HVAC Analysis Summary

Analysis	Projected Development Sites		Potential Development Sites	
No.2 Oil	**Pass**	**Fail**	**Pass**	**Fail**
No.2 Oil Screening	5	40	14	87
No.2 Oil Detailed Analysis	7	33	14	73
Total	***12***	***33***	***28***	***73***
Sites with Requirements	**Pass**	**Fail**	**Pass**	**Fail**
Natural Gas Screening	2	31	1	72
Natural Gas Refined Analysis	1	30	11	61
Natural Gas and Stack Setback Requirement	24	6	43	18
Natural Gas and Stack Height Requirement	4	2	13	5
Natural Gas, Stack Setback and Stack Height Requirement	2	0	5	0

Source: STV Incorporated, 2017.

Overall, to preclude the potential for significant adverse air quality impacts on other Projected and Potential development sites, or existing buildings, from the HVAC emissions, an (E) designation (E−442) would be assigned as part of the Proposed Actions for 106 projected and potential development sites (including 33 projected and 73 potential development sites). These designations would specify the various restrictions, such as type of fuel to be used, the distance that the vent stack on the building roof must be from its lot line(s), and/or the above-grade stack height. A summary of the proposed E designations for each of the projected and potential development sites is presented in Appendix F, "Air Quality".

Table 14-8: Individual HVAC Analysis – Results for Projected Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
1	115	104	219	>5.5	>0.3	36.6	5.5/0.3/196	Fail	2.5	0.12	163.7	5.5/0.3/188	Pass	Yes
2	115	104	219	>5.5	>0.3	33.7	5.5/0.3/196	Fail	4.5	0.19	179.4	5.5/0.3/188	Pass	Yes
3	115	105	220	4.9	0.19	29.5	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
4	115	104	219	4	0.18	29.6	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
5	115	97	212	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
6	115	95	210	>5.5	>0.3	90	5.5/0.3/196	Fail	3.7	0.15	187.4	5.5/0.3/188	Pass	Yes
7	115	88	203	5.2	0.25	30.3	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
8	115	79	194	>5.5	>0.3	75.1	5.5/0.3/196	Fail	3.3	0.15	186.4	5.5/0.3/188	Pass	Yes
9	115	75	190	>5.5	>0.3	87.4	5.5/0.3/196	Fail	2.8	0.13	180.8	5.5/0.3/188	Pass	Yes
10	145	80	225	>5.5	>0.3	33.6	5.5/0.3/196	Fail	4	0.18	174.4	5.5/0.3/188	Pass	Yes
11	165	55	220	>5.5	>0.3	69	5.5/0.3/196	Fail	1.4	0.05	155.6	5.5/0.3/188	Pass	Yes
12	145	88	195	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
13	165	50	213	>5.5	>0.3	83.3	5.5/0.3/196	Fail	0.8	0.03	126.6	5.5/0.3/188	Pass	Yes
14	165	48	213	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
15	165	47	212	>5.5	>0.3	52.6	5.5/0.3/196	Fail	4.8	0.19	181.5	5.5/0.3/188	Pass	Yes
16	165	48	213	>5.5	>0.3	41	5.5/0.3/196	Fail	4.9	0.19	184.4	5.5/0.3/188	Pass	Yes

Table 14-8 (continued): Individual HVAC Analysis – Results for Projected Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
17	145	54	199	>5.5	≥0.3	57.3	5.5/0.3/196	Fail	2.1	0.08	184.9	5.5/0.3/188	Pass	Yes
18	165	44	209	>5.5	0.23	29.6	5.5/0.3/196	Fail	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	Yes
19	165	43	208	2.6	0.12	29.4	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
20	115	43	158	>5.5	≥0.3	48.6	5.5/0.3/196	Fail	4.3	0.17	173.9	5.5/0.3/188	Pass	Yes
21	95	44	139	>5.5	≥0.3	93.5	5.5/0.3/196	Fail	176.1	1.38	0.1	5.5/0.3/188	Pass	Yes
22	115	54	169	>5.5	≥0.3	41	5.5/0.3/196	Fail	4.8	0.19	178.4	5.5/0.3/188	Pass	Yes
23	95	48	143	>5.5	≥0.3	164.4	5.5/0.3/196	Fail	2.7	0.12	186.6	5.5/0.3/188	Pass	Yes
24	165	46	211	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
25	165	53	218	>5.5	≥0.3	31.6	5.5/0.3/196	Fail	2.6	0.12	173.4	5.5/0.3/188	Pass	Yes
26	115	54	169	>5.5	≥0.3	59.2	5.5/0.3/196	Fail	4.5	0.18	184	5.5/0.3/188	Pass	Yes
27	165	59	224	4.1	0.16	29.4	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
28	145	72	217	>5.5	≥0.3	33.8	5.5/0.3/196	Fail	4.1	0.18	178.7	5.5/0.3/188	Pass	Yes
29	145	85	230	>5.5	≥0.3	30.9	5.5/0.3/196	Fail	2.6	0.12	177.4	5.5/0.3/188	Pass	Yes
30	145	46	191	4.2	0.15	30.3	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
31	145	93	238	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
32	225	57	282	3.5	0.17	29.7	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
33	175	34	209	>5.5	≥0.3	69.2	5.5/0.3/196	Fail	2.8	0.13	185.8	5.5/0.3/188	Pass	Yes
34	145	40	185	>5.5	≥0.3	111.5	5.5/0.3/196	Fail	4.1	0.18	187.1	5.5/0.3/188	Pass	Yes
35	145	34	179	>5.5	≥0.3	120.9	5.5/0.3/196	Fail	3.8	0.16	183.3	5.5/0.3/188	Pass	Yes

Table 14-8 (continued): Individual HVAC Analysis – Results for Projected Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
36	175	47	222	>5.5	0.25	31	5.5/0.3/196	Fail	1.9	0.08	180	5.5/0.3/188	Pass	Yes
37	175	42	217	>5.5	>0.3	31.2	5.5/0.3/196	Fail	5.1	0.23	185.1	5.5/0.3/188	Pass	Yes
38	175	39	214	>5.5	>0.3	42.4	5.5/0.3/196	Fail	0.3	0.01	107.6	5.5/0.3/188	Pass	Yes
39	175	28	203	>5.5	>0.3	32.7	5.5/0.3/196	Fail	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	Yes
40	225	29	254	>5.5	>0.3	116	5.5/0.3/196	Fail	2.2	0.14	185.1	5.5/0.3/188	Pass	Yes
41	195	43	238	>5.5	>0.3	149.3	5.5/0.3/196	Fail	5.4	0.20	184.9	5.5/0.3/188	Pass	Yes
42	195	47	242	>5.5	>0.3	32.4	5.5/0.3/196	Fail	3.3	0.13	183.1	5.5/0.3/188	Pass	Yes
43	15	46	61	>5.5	>0.3	36.9	5.5/0.3/196	Fail	2.3	0.12	180.7	5.5/0.3/188	Pass	Yes
44	195	42	237	>5.5	>0.3	32.4	5.5/0.3/196	Fail	3.5	0.14	185.1	5.5/0.3/188	Pass	Yes
45	205	37	242	>5.5	>0.3	>196	5.5/0.3/196	Fail	1.6	0.05	155	5.5/0.3/188	Pass	Yes

Note: The 1-hour SO_2 and 1-hour NO_2 concentrations presented in this table include the respective background concentrations.

Source: STV Incorporated, 2017.

Table 14-9: Individual HVAC Analysis – Results for Potential Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
1	115	104	219	>5.5	>0.3	38.5	5.5/0.3/196	Fail	0.4	0.02	107.8	5.5/0.3/188	Pass	Yes
2	115	104	219	>5.5	>0.3	33	5.5/0.3/196	Fail	4.5	0.19	184.2	5.5/0.3/188	Pass	Yes
3	115	104	219	>5.5	>0.3	34.3	5.5/0.3/196	Fail	2.8	0.13	174.4	5.5/0.3/188	Pass	Yes
4	115	104	219	>5.5	>0.3	30	5.5/0.3/196	Fail	2.5	0.10	151.5	5.5/0.3/188	Pass	Yes
5	115	104	219	>5.5	0.25	30	5.5/0.3/196	Fail	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	Yes
6	115	104	219	4.3	0.21	29.7	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
7	95	131	226	>5.5	>0.3	41.4	5.5/0.3/196	Fail	4.7	0.19	176.4	5.5/0.3/188	Pass	Yes
8	95	132	227	>5.5	>0.3	34.1	5.5/0.3/196	Fail	2.3	0.10	169.5	5.5/0.3/188	Pass	Yes
9	115	101	216	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
10	115	101	216	4.3	0.17	29.5	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
11	115	99	214	>5.5	0.26	30	5.5/0.3/196	Fail	1.9	0.09	165.1	5.5/0.3/188	Pass	Yes
12	95	105	200	>5.5	>0.3	51.3	5.5/0.3/196	Fail	1.7	0.08	187.6	5.5/0.3/188	Pass	Yes
13	115	90	205	>5.5	>0.3	30.9	5.5/0.3/196	Fail	2.7	0.12	180	5.5/0.3/188	Pass	Yes
14	95	108	203	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
15	115	77	192	>5.5	>0.3	32.7	5.5/0.3/196	Fail	3.1	0.14	162.2	5.5/0.3/188	Pass	Yes
16	165	73	238	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
17	115	67	182	>5.5	>0.3	78.9	5.5/0.3/196	Fail	3.5	0.15	185.8	5.5/0.3/188	Pass	Yes
18	165	61	226	>5.5	>0.3	71.9	5.5/0.3/196	Fail	3.2	0.15	187.7	5.5/0.3/188	Pass	Yes
19	165	59	224	>5.5	>0.3	96.7	5.5/0.3/196	Fail	0.8	0.03	129.5	5.5/0.3/188	Pass	Yes

Table 14-9 (continued): Individual HVAC Analysis – Results for Potential Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
20	145	97	242	3.7	0.15	29.7	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
21	145	97	242	3.7	0.17	29.7	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
22	145	87	232	3.5	0.12	30.5	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
23	145	69	214	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
24	145	78	223	>5.5	>0.3	52.4	5.5/0.3/196	Fail	0.7	0.04	122.2	5.5/0.3/188	Pass	Yes
25	165	61	226	>5.5	>0.3	30.4	5.5/0.3/196	Fail	3.6	0.15	165.9	5.5/0.3/188	Pass	Yes
26	165	58	223	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
27	145	63	208	>5.5	>0.3	53.1	5.5/0.3/196	Fail	2.3	0.07	182.9	5.5/0.3/188	Pass	Yes
28	145	68	213	>5.5	>0.3	96.5	5.5/0.3/196	Fail	1	0.04	136.4	5.5/0.3/188	Pass	Yes
29	145	72	217	>5.5	>0.3	32.2	5.5/0.3/196	Fail	4.5	0.19	187.3	5.5/0.3/188	Pass	Yes
30	145	58	203	>5.5	>0.3	194.6	5.5/0.3/196	Fail	0.9	0.04	123.9	5.5/0.3/188	Pass	Yes
31	145	70	215	4.2	0.16	29.8	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
32	165	58	223	>5.5	>0.3	39.6	5.5/0.3/196	Fail	4	0.17	181	5.5/0.3/188	Pass	Yes
33	165	58	223	>5.5	>0.3	37.3	5.5/0.3/196	Fail	3.1	0.13	180.6	5.5/0.3/188	Pass	Yes
34	165	53	218	>5.5	>0.3	70.7	5.5/0.3/196	Fail	3.1	0.12	180	5.5/0.3/188	Pass	Yes
35	165	53	218	4.3	0.19	30.1	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
36	165	48	213	>5.5	>0.3	71.8	5.5/0.3/196	Fail	0.6	0.02	122.1	5.5/0.3/188	Pass	Yes
37	165	50	215	>5.5	>0.3	31.7	5.5/0.3/196	Fail	3.1	0.12	173.4	5.5/0.3/188	Pass	Yes
38	165	47	212	>5.5	>0.3	33.7	5.5/0.3/196	Fail	4	0.17	171.6	5.5/0.3/188	Pass	Yes

Table 14-9 (continued): Individual HVAC Analysis – Results for Potential Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
39	165	48	213	>5.5	>0.3	37	5.5/0.3/196	Fail	4.8	0.19	183.2	5.5/0.3/188	Pass	Yes
40	165	48	213	>5.5	>0.3	41.6	5.5/0.3/196	Fail	3	0.12	173.7	5.5/0.3/188	Pass	Yes
41	165	48	213	>5.5	>0.3	32.9	5.5/0.3/196	Fail	3.3	0.14	187.8	5.5/0.3/188	Pass	Yes
42	165	48	213	>5.5	>0.3	34.3	5.5/0.3/196	Fail	2.6	0.12	176.5	5.5/0.3/188	Pass	Yes
43	145	47	192	>5.5	>0.3	33.2	5.5/0.3/196	Fail	3	0.13	184.7	5.5/0.3/188	Pass	Yes
44	145	45	190	5.4	0.28	29.9	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
45	145	43	188	>5.5	>0.3	151.4	5.5/0.3/196	Fail	5.4	0.19	183.7	5.5/0.3/188	Pass	Yes
46	125	43	168	>5.5	>0.3	34.6	5.5/0.3/196	Fail	3.2	0.14	184.2	5.5/0.3/188	Pass	Yes
47	115	44	159	>5.5	>0.3	32.1	5.5/0.3/196	Fail	3.3	0.12	180.1	5.5/0.3/188	Pass	Yes
48	115	44	159	4.3	0.19	29.6	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
49	114	44	158	>5.5	0.3	30.6	5.5/0.3/196	Fail	2.3	0.10	176.6	5.5/0.3/188	Pass	Yes
50	115	46	161	>5.5	>0.3	53.2	5.5/0.3/196	Fail	5	0.20	178.9	5.5/0.3/188	Pass	Yes
51	165	49	214	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
52	115	48	163	>5.5	>0.3	33.1	5.5/0.3/196	Fail	4.3	0.18	189.7	5.5/0.3/188	Pass	Yes
53	145	47	192	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
54	95	48	143	>5.5	0.21	33.1	5.5/0.3/196	Fail	2.4	0.07	186.9	5.5/0.3/188	Pass	Yes
55	115	55	170	>5.5	>0.3	33.7	5.5/0.3/196	Fail	3.4	0.17	186.2	5.5/0.3/188	Pass	Yes
56	165	51	216	>5.5	>0.3	92.2	5.5/0.3/196	Fail	4.5	0.16	177.6	5.5/0.3/188	Pass	Yes
57	115	55	170	>5.5	>0.3	34.3	5.5/0.3/196	Fail	3.1	0.13	165.1	5.5/0.3/188	Pass	Yes
58	145	46	191	>5.5	>0.3	117.1	5.5/0.3/196	Fail	4.3	0.17	178.5	5.5/0.3/188	Pass	Yes
59	165	51	216	>5.5	>0.3	80.8	5.5/0.3/196	Fail	4.5	0.14	183.5	5.5/0.3/188	Pass	Yes

Table 14-9 (continued): Individual HVAC Analysis – Results for Potential Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
60	115	55	170	>5.5	>0.3	33.8	5.5/0.3/196	Fail	2.5	0.11	159.4	5.5/0.3/188	Pass	Yes
61	115	55	170	>5.5	>0.3	44	5.5/0.3/196	Fail	5.2	0.20	182.1	5.5/0.3/188	Pass	Yes
62	115	56	171	>5.5	>0.3	76.5	5.5/0.3/196	Fail	3.4	0.14	185.9	5.5/0.3/188	Pass	Yes
63	165	56	221	4.8	0.22	30.3	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
64	145	62	207	>5.5	>0.3	46	5.5/0.3/196	Fail	3.3	0.16	187.1	5.5/0.3/188	Pass	Yes
65	145	71	216	>5.5	>0.3	41.5	5.5/0.3/196	Fail	1.9	0.07	174.4	5.5/0.3/188	Pass	Yes
66	145	78	223	>5.5	>0.3	84.9	5.5/0.3/196	Fail	0.9	0.05	130.8	5.5/0.3/188	Pass	Yes
67	145	81	226	>5.5	>0.3	113	5.5/0.3/196	Fail	1.2	0.05	152.3	5.5/0.3/188	Pass	Yes
68	145	90	235	4.5	0.19	29.8	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
69	145	90	235	>5.5	>0.3	51.5	5.5/0.3/196	Fail	2.6	0.12	167.5	5.5/0.3/188	Pass	Yes
70	145	94	239	>5.5	>0.3	31	5.5/0.3/196	Fail	3.1	0.12	175.4	5.5/0.3/188	Pass	Yes
71	145	48	193	>5.5	>0.3	33.8	5.5/0.3/196	Fail	4.1	0.17	179.2	5.5/0.3/188	Pass	Yes
72	145	52	197	>5.5	>0.3	31.8	5.5/0.3/196	Fail	4.6	0.19	188.1	5.5/0.3/188	Pass	Yes
73	145	47	192	>5.5	>0.3	78.8	5.5/0.3/196	Fail	3.5	0.16	181.9	5.5/0.3/188	Pass	Yes
74	145	51	196	>5.5	>0.3	32.1	5.5/0.3/196	Fail	4	0.18	196	5.5/0.3/188	Pass	Yes
75	145	48	193	>5.5	>0.3	94.9	5.5/0.3/196	Fail	0.7	0.03	124.2	5.5/0.3/188	Pass	Yes
76	225	73	298	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
77	175	66	241	>5.5	>0.3	30.7	5.5/0.3/196	Fail	2.8	0.12	182.7	5.5/0.3/188	Pass	Yes
78	145	95	240	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
79	145	104	249	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No

Table 14-9 (continued): Individual HVAC Analysis – Results for Potential Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (µg/m³)					Natural Gas Modeled Concentrations (µg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
80	145	104	249	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
81	145	130	275	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
82	145	123	268	>5.5	0.26	31.2	5.5/0.3/196	Fail	1.8	0.08	180	5.5/0.3/188	Pass	Yes
83	145	138	283	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
84	145	53	198	>5.5	>0.3	32.2	5.5/0.3/196	Fail	4.2	0.19	182.2	5.5/0.3/188	Pass	Yes
85	145	53	198	>5.5	>0.3	71.8	5.5/0.3/196	Fail	2.8	0.13	183.8	5.5/0.3/188	Pass	Yes
86	145	37	182	3.5	0.15	30.3	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
87	165	51	216	>5.5	>0.3	35.9	5.5/0.3/196	Fail	4.4	0.18	182.5	5.5/0.3/188	Pass	Yes
88	165	50	215	>5.5	>0.3	44.2	5.5/0.3/196	Fail	0.6	0.03	117.4	5.5/0.3/188	Pass	Yes
89	165	49	214	>5.5	>0.3	30.8	5.5/0.3/196	Fail	3.1	0.14	180.5	5.5/0.3/188	Pass	Yes
90	225	33	258	>5.5	>0.3	32.5	5.5/0.3/196	Fail	3.4	0.12	177.4	5.5/0.3/188	Pass	Yes
91	225	30	255	4.4	0.17	29.9	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
92	175	27	202	>5.5	>0.3	85.8	5.5/0.3/196	Fail	3.8	0.13	187.7	5.5/0.3/188	Pass	Yes
93	175	25	200	>5.5	>0.3	115.5	5.5/0.3/196	Fail	2.4	0.12	178.5	5.5/0.3/188	Pass	Yes
94	225	33	258	>5.5	>0.3	32.5	5.5/0.3/196	Fail	3.9	0.18	179.1	5.5/0.3/188	Pass	Yes
95	225	44	269	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
96	195	44	239	5.4	0.2	30	5.5/0.3/196	Pass	Passes Screening	Passes Screening	Passes Screening	5.5/0.3/188	Pass	No
97	195	46	241	>5.5	>0.3	32.6	5.5/0.3/196	Fail	4.4	0.18	179.7	5.5/0.3/188	Pass	Yes
98	195	46	241	>5.5	>0.3	64.1	5.5/0.3/196	Fail	0.6	0.03	124.6	5.5/0.3/188	Pass	Yes

Table 14-9 (continued): Individual HVAC Analysis – Results for Potential Development Sites

Site No.	Building Height (ft)	Ground Elevation (ft)	Absolute Height (ft)	No.2 Oil Modeled Concentrations (μg/m³)					Natural Gas Modeled Concentrations (μg/m³)					Requires (E) Designation (Yes/No)
				24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr SO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr SO_2 Standard	Pass/Fail	24-hr $PM_{2.5}$	Annual $PM_{2.5}$	1-hr NO_2	24-hr $PM_{2.5}$/Annual $PM_{2.5}$/1-hr NO_2 Standard	Pass/Fail	
99	195	43	238	>5.5	>0.3	83.8	5.5/0.3/196	Fail	3.2	0.14	181.9	5.5/0.3/188	Pass	Yes
100	205	28	233	>5.5	>0.3	159.8	5.5/0.3/196	Fail	3.0	0.13	179.5	5.5/0.3/188	Pass	Yes
101	205	22	227	>5.5	>0.3	131.6	5.5/0.3/196	Fail	2.7	0.12	183.7	5.5/0.3/188	Pass	Yes

Note: The 1-hour SO_2 and 1-hour NO_2 concentrations presented in this table include the respective background concentrations.
Note: The refined HVAC analysis for potential development site 90 was performed for both with and without building downwash options, and the higher concentration is presented in this table.
Source: STV Incorporated, 2017

Cumulative Impacts from Heat and Hot Water Systems (Cluster Analysis)

An analysis is conducted to evaluate potential air quality impacts from groups or "clusters" of heat and hot water systems in close proximity with similar stack heights. Three clusters have been identified as presented in Table 14-4.

The analysis is performed using the EPA AERMOD model using the general assumptions and procedures outlined earlier for individual development sites. The same restrictions on fuel type and stack parameters (i.e., stack height and stack location) as determined from the individual HVAC analysis were assumed for cluster analysis. The maximum pollutant concentrations for NO_2 annual, NO_2 1-hour, SO_2 1-hour, PM_{10} 24-hour, $PM_{2.5}$ Annual and $PM_{2.5}$ 24-hour concentrations are presented in Table 14-10, "Maximum Pollutant Concentrations (ug/m3)."

Table 14-10: Maximum Pollutant Concentrations (ug/m^3)

Pollutant	Averaging Period	Maximum Concentration			Background Concentration	Total Concentration			NAAQS /De Minimus
		Cluster 1	Cluster 2	Cluster 3		Cluster 1	Cluster 2	Cluster 3	
NO_2	Annual	2.2	1.8	1.1	37.5	39.7	39.3	38.6	100
	1-Hour[1]	187.8	177.3	166.4	N/A	187.8	177.3	166.4	188
SO_2	1–Hour	1.2	0.8	1.2	28.8	88.7	38.3	38.7	196
PM_{10}	24–Hour	3.7	5.9	4.8	32.0	41.2	43.4	42.3	150
$PM_{2.5}$	24-Hour	3.2	3.9	3.0	N/A	3.2	3.9	3.0	5.5
	Annual	0.23	0.27	0.18	N/A	0.23	0.27	0.18	0.3

Notes: N/A – Not Applicable

[1] Seasonal-hourly background concentration was added to the modeled 1-hour NO_2 concentrations to predict the maximum total concentration.
[2] The 24-hour $PM_{2.5}$ impacts are assessed on an incremental basis without considering the background. The 24-hour $PM_{2.5}$ background concentration is used to develop the De Minimis criteria.
[3] Annual $PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ de minimis criteria of 0.3 µg/m^3, without considering the annual background. Therefore, the annual $PM_{2.5}$ background is not presented in the table.

Source: STV Incorporated, 2017.

The cluster analyses demonstrated that with the same restrictions on fuel type and stack parameters (i.e., stack height and stack locations) determined from the individual HVAC analysis, the maximum pollutant concentration predicted for Clusters 1, 2, and 3 would not exceed the respective NAAQS and De Minimis criteria for NO_2 1-hour. Likewise, Cluster 3 would exceed the respective NAAQS /De Minimis criteria. Therefore, no significant adverse air quality impacts are predicted from the cumulative effects of emissions from groups or "clusters" of heat and hot water systems in close proximity with similar stack heights as a result of the Proposed Actions.

Additional Sources

Potential stationary source impacts on the projected and potential development sites from the existing boilers at the Executive Towers and the Mount Lebanon Hospital are determined using the AERMOD model. The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling are added to the background concentrations to estimate total air quality concentrations on the Proposed Actions, while PM2.5 concentrations were compared with the PM2.5 *de minimis* criteria. The results of the AERMOD analysis are presented in Tables 14-11, "Maximum Modeled Pollutant Concentrations on Projected and Potential Development Sites ($\mu g/m^3$) (Executive Towers)," and 14-12, "Maximum Pollutant Concentrations on Projected and Potential Development Sites ($\mu g/m^3$) (Mount Lebanon Hospital)."

Table 14-11: Maximum Modeled Pollutant Concentrations on Projected and Potential Development Sites ($\mu g/m^3$)
Executive Towers

Pollutant	Averaging Period	Maximum Modeled Concentration (No Downwash)		Background Concentration	Total Concentration	NAAQS / *de minimis*	Pass / Fail
		No.2 Oil**	NG				
NO_2	1-Hour	4.19	-	120.9	125.09	188	PASS
	Annual	0.10	-	38.3	38.40	100	PASS
$PM_{2.5}$	24-Hour	0.08	-	24.8	0.08	5.1	PASS
	Annual	0.01	-	--	0.01	0.3	PASS
PM_{10}	24-Hour	0.15	-	39	39.15	150	PASS
SO_2	1-Hour	0.05	-	41.4	41.45	196.5	PASS

Notes: **Since modeled results assuming 100% use of No.2 oil are well below the NAAQS thresholds and the emission rates for No.2 oil are higher than NG. No. 2 Oil was modeled as a worse case.

Source: STV Incorporated, 2017.

Table 14-12: Maximum Modeled Pollutant Concentrations on Projected and Potential Development Sites (µg/m³)
Mount Lebanon Hospital

Pollutant	Averaging Period	Maximum Modeled Concentration (No Downwash)		Background Concentration	Total Concentration	NAAQS / *de minimis*	Pass / Fail
		No.2 Oil**	NG				
NO_2	1-Hour	4.79	-	120.9	125.69	188	PASS
	Annual	0.10	-	38.3	38.40	100	PASS
$PM_{2.5}$	24-Hour	0.10	-	24.8	0.10	5.1	PASS
	Annual	0.01	-	--	0.01	0.3	PASS
PM_{10}	24-Hour	0.17	-	39	39.17	150	PASS
SO_2	1-Hour	0.06	-	41.4	41.46	196.5	PASS

Notes: **Since modeled results assuming 100% use of No.2 oil are well below the NAAQS thresholds and the emission rates for No.2 oil are higher than NG. No. 2 Oil was modeled as a worse case.

Source: STV Incorporated, 2017.

As shown in the tables, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective standards. Therefore, no significant adverse air quality impacts on the proposed and potential development sites from existing sources are predicted.

Proposed (E) Designation Requirements

At affected projected and potential development sites, the proposed (E) designation (E−442) would specify the type of fuel to be used, whether low NOx burners are required, the distance that the vent stack on the building roof must be from its lot line(s), and for the minimum stack height. A summary of the proposed (E) designations is presented in Appendix F, "Air Quality."

For each of the projected and potential development sites with a proposed (E) designation, the (E) designation process, as set forth in Zoning Resolution Section 11−15 and Chapter 24 of Title 15 of the Rules of the City of New York, allows for the modification of the measures required under an (E) designation in the event of new information or technology, additional facts or updated standards that are relevant at the time the site is ultimately developed. Because the air quality analysis is based on conservative assumptions due to the absence of information on the actual design of buildings that would be constructed, the actual design of buildings may result in modification of the (E) designation measures under these procedures. When an (E) designation is placed for more than one pollutant (e.g., for PM2.5 and NO2), any modifications must address the measures required with respect to each pollutant.

With the foregoing, the evaluation of $PM_{2.5}$, and thus the (E) designations, would be able to take into account the fact that air quality in New York City is expected to improve. As discussed in the Section

"NAAQS Attainment Status and Implementation Plan," EPA recently redesignated the New York City Metropolitan Area, which had been nonattainment with the 2006 24−hour $PM_{2.5}$ NAAQS since November 2009, as in attainment. Under the required maintenance plans, NYSDEC would continue to address the attainment of the 24−hour and annual NAAQS in the area, which would require further reductions in emissions of $PM_{2.5}$ and its precursors. In addition, New York City has prohibited the use of No. 6 and No. 4 oil in new boiler installations, and is phasing out their use at existing installations, which would result in direct reductions of $PM_{2.5}$ emissions, and reductions in SO_2 emissions, which is a $PM_{2.5}$ precursor (because chemical reactions in the atmosphere convert some SO_2 to $PM_{2.5}$). Although these measures do not address the emissions of $PM_{2.5}$ associated with Proposed Actions, taken together, they are anticipated to result in an improvement in air quality in the rezoning area, resulting in significant reductions from current levels of the ambient background $PM_{2.5}$ concentrations and, consequently, in the total $PM_{2.5}$ concentrations with the Proposed Actions.

Industrial Source Analysis

As discussed above, a study is conducted to analyze industrial uses within 400 feet of the projected and potential development sites, large sources or major sources within 1,000 feet of a projected or potential development site. DEP−BEC, NYSDEC and EPA permit databases were used to identify existing sources of emissions. A total of 12 facilities (consisting of 12 sources) were analyzed. The information from these permits (emission rates, stack parameters, etc.) is input to the AERMOD dispersion model.

Table 14−13, "Maximum Predicted Impacts on Projected and Potential Sites from Industrial Sources," presents the maximum predicted impacts at the projected and potential development sites using the AERMOD refined dispersion model. As shown in Table 14-13, "Maximum Predicted Impacts on Projected and Potential Sites from Industrial Sources," for all projected and potential development sites, the refined modeling demonstrates that there would be no predicted significant adverse air quality impacts on these development sites from existing industrial sources in the area.

Table 14-13: Maximum Predicted Impacts on Projected and Potential Sites from Industrial Sources

Modeled Pollutants	CAS#	Maximum Modeled Short Term Concentration (μg/m3)	SGC (μ/m³)	Maximum Modeled Annual Concentration (μg/m3)	AGC (μ/m³)
Aromatic Petro Dist	64742-95-6	---	---	0.17	100
V,M, & P Naptha	64742-89-8	---	---	0.26	3200
Toluene	00108-88-3	879.27	37000	1.59	5000
Ethyl Benzene	00100-41-4	791.37	54000	1.40	1000
1-Methoxy - 2 - Propyl	00108-65-6	85.24	55000	0.25	2000
Methylcyclohexane	00108-87-6	---	---	0.01	3800
N-Butyl Acetate	00123-86-4	439.64	95000	0.78	17000
Xylenes	01330-20-7	967.18	4300	1.70	100
N-Heptane	00142-82-5	4.26	210000	0.01	3900
Acetone	00067-64-1	3780.86	180000	6.65	30000
Prop. Glycol Mono. Et	00107-98-2	78.85	55000	0.22	2000
Iso Butyl Acetate	00108-88-3	63.93	37000	0.18	5000
Isopropyl Alcohol	00067-63-0	212.68	98000	0.80	7000
Isobutyl Alcohol	00078-83-1	---	---	0.09	360
Oxo-Heptyl Acetate	90438-79-2	27.70	150000	0.08	2100
2-Butoxyethyl Acetate	00112-07-2	0.00	---	0.10	310
Butoxy Ethanol	00111-76-2	34.09	14000	0.10	1600
Ester Alcohol	25265-77-4	17.05	550	0.05	300
Propylene Glycol	00057-55-6	14.90	55000	0.04	2000
Stoddard Solvent	08052-41-3	---	---	6.21	900
Aromatic Solvent	64742-95-8	---	---	0.22	100
Polyfunctional Azirid	64265-57-2	---	---	0.81	16
N,n - Dimethyl Ethanol	00108-01-0	---	---	0.00	26
Propylenenimine	00075-55-8	0.00	93	0.00	1.1
2 Ethylhexyl Acetate	00103-11-7	0.00	---	0.01	17
Methyl Isobutyl Keton	00108-10-1	55.41	31000	0.15	3000
Ethyl Acetate	00141-78-6	12.78	10000	0.04	140
Petroleum Distillates	64741-65-7	---	---	0.04	16
Naphtha	64742-48-9	---	---	0.08	900
Aromatic Naphtha	64742-95-6	---	---	0.04	100
N Butyl Alcohol	00071-36-3	---	---	0.15	1500
Naphtha	08032-32-4	---	---	0.04	900
Aliphatic Hydrocarbons	08052-41-3	---	---	1.55	900

Modeled Pollutants	CAS#	Maximum Modeled Short Term Concentration (µg/m3)	SGC (µ/m³)	Maximum Modeled Annual Concentration (µg/m3)	AGC (µ/m³)
1,2,4 - Trimethyl Benzene	00095-63-6	---	---	0.15	6
Glycol Ether	00111-46-6	12.78	440	0.04	240
Ethylene Glycol Mono	02807-30-9	70.33	430	0.20	230
1,3,5 Trimethyl Benzene	00108-67-8	---	---	0.05	290
Mica	12001-26-2	---	---	0.01	7.1
Microcrystalline Silica	14808-60-7	---	---	0.01	0.06
Aluminum Flake	07429-90-5	---	---	0.01	2.4
Carbon Black	01333-86-4	---	---	0.00	8.3
Titanium Dioxide	13463-67-7	---	---	0.03	24
Graphite	07782-42-5	---	---	0.01	4.8
Prop. Nickel Comp	Not Established	0.00	300	0.00	10
Aromatic Petroleum distillates	64742-94-5	---	---	0.78	3,800.00
Butane	00106-97-8	---	---	0.78	57,000.00
Ethanol	00064-17-5	---	---	1.70	45,000.00
Ethyl 3-Ethoxyproprioanate	00763-69-9	69.15	140	1.55	64
Methyl Ethyl Ketone	00078-93-3	439.64	13,000.00	0.78	5,000.00
Propane	00074-98-6	---	---	4.65	43,000.00
Particulates (PM2.5) [1]	NY075-02-5 [2]	35.64	88	4.64	12
1-Methoxy-2-Propyl Acetate	00108-65-6	30.23	55000	0.03	2000

Notes:
(1) Pollutant includes emissions from both Particulates (NY075-00-0) and Total Solid Particulate (NY079-00-0)
(2) Conservatively assumes all particulate emissions would be PM2.5. SGC and AGC from Particulate (PM-2.5) used.

Health Risk Assessment

Cumulative impacts are also determined for the combined effects of multiple air contaminants in accordance with the approach described above in the "Methodology for Predicting Pollutant Concentrations" section. Using the predicted concentrations of each pollutant, the maximum hazard index are calculated for each affected projected and potential development site associated with the Proposed Actions. The hazard index approach is used to determine the effects of multiple non−carcinogenic compounds. None of the pollutants studied were carcinogens so a cancer risk assessment was not required.

Table 14-14, "Estimated Maximum Hazard Index," presents the results of the assessment of cumulative Non−carcinogenic effects on the Proposed Actions.

Table 14-14: Estimated Maximum Hazard Index

Modeled Pollutants	CAS#	Maximum Modeled Annual Concentration (μ/m3)	AGC (μ/m^3)	Concentration to AGC Pollution Ratio
Aromatic Petro Dist	64742-95-6	0.17	100	1.65E-03
V,M, & P Naphtha	64742-89-8	0.26	3200	7.99E-05
Toluene	00108-88-3	1.59	5000	3.18E-04
Ethyl Benzene	00100-41-4	1.40	1000	1.40E-03
1-Methoxy - 2 - Propyl	00108-65-6	0.25	2000	1.23E-04
Methylcyclohexane	00108-87-6	0.01	3800	2.78E-06
N-Butyl Acetate	00123-86-4	0.78	17000	4.56E-05
Xylenes	01330-20-7	1.70	100	1.70E-02
N-Heptane	00142-82-5	0.01	3900	2.71E-06
Acetone	00067-64-1	6.65	30000	2.22E-04
Prop. Glycol Mono. Et	00107-98-2	0.22	2000	1.12E-04
Iso Butyl Acetate	00108-88-3	0.18	5000	3.68E-05
Isopropyl Alcohol	00067-63-0	0.80	7000	1.14E-04
Isobutyl Alcohol	00078-83-1	0.09	360	2.58E-04
Oxo-Heptyl Acetate	90438-79-2	0.08	2100	3.72E-05
2-Butoxyethyl Acetate	00112-07-2	0.10	310	3.34E-04
Butoxy Ethanol	00111-76-2	0.10	1600	6.20E-05
Ester Alcohol	25265-77-4	0.05	300	1.62E-04
Propylene Glycol	00057-55-6	0.04	2000	2.01E-05
Stoddard Solvent	08052-41-3	6.21	900	6.90E-03
Aromatic Solvent	64742-95-8	0.22	100	2.15E-03
Polyfunctional Azirid	64265-57-2	0.81	16	5.07E-02
N,n - Dimethyl Ethanol	00108-01-0	0.00	26	0.00E+00
Propylenenimine	00075-55-8	0.00	1.1	0.00E+00

Modeled Pollutants	CAS#	Maximum Modeled Annual Concentration (µ/m3)	AGC (µ/m^3)	Concentration to AGC Pollution Ratio
2 Ethylhexyl Acetate	00103-11-7	0.01	17	4.97E-04
Methyl Isobutyl Keton	00108-10-1	0.15	3000	5.14E-05
Ethyl Acetate	00141-78-6	0.04	140	2.72E-04
Petroleum Distillates	64741-65-7	0.04	16	2.38E-03
Naphtha	64742-48-9	0.08	900	8.68E-05
Aromatic Naphtha	64742-95-6	0.04	100	3.80E-04
N Butyl Alcohol	00071-36-3	0.15	1500	1.03E-04
Naphtha	08032-32-4	0.04	900	4.22E-05
Aliphatic Hydrocarbons	08052-41-3	1.55	900	1.72E-03
1,2,4 - Trimethyl Benzene	00095-63-6	0.15	6	2.43E-02
Glycol Ether	00111-46-6	0.04	240	1.58E-04
Ethylene Glycol Mono	02807-30-9	0.20	230	8.63E-04
1,3,5 Trimethyl Benzene	00108-67-8	0.05	290	1.68E-04
Mica	12001-26-2	0.01	7.1	1.19E-03
Microcrystalline Silica	14808-60-7	0.01	0.06	1.76E-01
Aluminum Flake	07429-90-5	0.01	2.4	6.16E-03
Carbon Black	01333-86-4	0.00	8.3	5.08E-04
Titanium Dioxide	13463-67-7	0.03	24	1.06E-03
Graphite	07782-42-5	0.01	4.8	1.76E-03
Prop. Nickel Comp	Not Established	0.00	10	0.00E+00
Aromatic Petroleum distillates	64742-94-5	0.78	3,800.00	2.04E-04
Butane	00106-97-8	0.78	57,000.00	1.36E-05
Ethanol	00064-17-5	1.70	45,000.00	3.79E-05
Ethyl 3-Ethoxyproprioanate	00763-69-9	1.55	64	2.43E-02
Methyl Ethyl Ketone	00078-93-3	0.78	5,000.00	1.55E-04
Propane	00074-98-6	4.65	43,000.00	1.08E-04
Particulates (PM2.5) [1]	NY075-02-5 [2]	4.64	12	3.87E-01
1-Methoxy-2-Propyl Acetate	00108-65-6	0.03	2000	1.49E-05
Total Hazard Index				**0.711**
Hazard Index Threshold Value				**1.0**

Notes:
(1) Pollutant includes emissions from both Particulates (NY075-00-0) and Total Solid Particulate (NY079-00-0)
(2) Conservatively assumes all particulate emissions would be PM2.5. SGC and AGC from Particulate (PM-2.5) used.

As shown in Table 14-14, the results of this health risk assessment indicated that there would be no significant adverse air quality impacts on the projected and potential development sites because the hazard index for any affected site would not exceed 1.0.

The procedures used to estimate maximum potential impacts from industrial sources showed that their operations would not result in any predicted violations of the NAAQS or any exceedances of the recommended SGC or AGC. Therefore, based on the data available on the surrounding industrial uses, development resulting from the Proposed Actions would not experience significant air quality impacts from these facilities.