10

Air Quality

Ambient air quality, or the quality of the surrounding air, may be affected by air pollutants produced by motor vehicles, referred to as "mobile sources"; by fixed facilities, usually referenced as "stationary sources"; or by a combination of both. Under CEQR, an air quality assessment determines both a proposed project's effects on ambient air quality as well as the effects of ambient air quality on the project.

10.1 Introduction

This section examines the potential for air quality impacts from the proposed developments on Projected Development Site 1 (Norfolk Building and Suffolk Building) and Projected Development Site 2. According to the 2014 *CEQR Technical Manual*, air quality impacts can be characterized as either direct or indirect impacts. Direct impacts result from emissions generated by stationary sources, such as stack emissions from on-site fuel burned for boilers and heating, ventilation, and air conditioning (HVAC) systems. Indirect effects are caused by off-site emissions associated with a project, such as emissions from on-road motor vehicles ("mobile sources") traveling to and from a development site.

Consistent with the *CEQR Technical Manual*, air quality analyses for a proposed project focus on three main areas of potential concern:

- Potential impacts from mobile sources introduced by a project.
- Potential impacts from potential air pollutant sources introduced by a project, such as:
  - Emissions from a project's heating, ventilation, and air conditioning (HVAC) system
  - Emissions from a project's enclosed parking garage.
- Potential impacts on the proposed project from either manufacturing/processing facilities or large/major sources that are located near the project site.

The proposed project would not introduce any parking, and therefore, an assessment of emissions from such a facility is not warranted.

Therefore, this analysis focuses on the following:

- An assessment of the potential for air quality impacts from mobile sources generated by the project.
- An assessment of the project's HVAC systems to affect both the project itself ("project on project") and uses in the surrounding area ("project on existing").
- An assessment of the potential for manufacturing/processing facilities or large/major sources that are located near the project block to affect the proposed development on Projected Development Sites 1 and 2.

10.2 Principal Conclusions

The number of incremental trips generated by the proposed development on Projected Development Sites 1 and 2 would be lower than screening thresholds addressed in the *CEQR Technical Manual*, therefore, traffic from the proposed project would not result in a significant adverse impact on mobile source air quality.

The detailed HVAC analyses demonstrated that the Norfolk Building must exclusively use natural gas with low NO_x (40 ppm) burners for its HVAC systems, and ensure that the HVAC stack is located at the highest tier and at least 174.7 feet above grade, and no more than 30 feet away from the northwestern lot line facing Norfolk Street, to avoid any significant adverse air quality impacts. The Suffolk Building must exclusively use natural gas and ensure that the HVAC stack(s) is located at the highest tier and at least 310 feet above grade to avoid any significant adverse air quality impacts. For Projected Development Site 2, the additional commercial space must exclusively use natural gas and ensure that the HVAC stack(s) is located at the highest tier and at least 55 feet above grade, and no more than 60 feet from the lot line facing Grand Street and no more than 25 feet away from the lot line facing Suffolk Street, to avoid any significant adverse air quality impacts.

These commitments would be memorialized in an E-Designation for the project (E-548). With these commitments, the projected development would not result in significant adverse air quality impacts.

No significant adverse impacts are expected from existing industrial sources within a 400-foot radius of the project block, and no "large" or "major" emission sources were identified in a 1,000-foot radius of the project block. Therefore, there would be no significant adverse air quality impacts on the proposed project from either manufacturing/processed facilities or large/major sources that are located near the project site.

10.3 Pollutants of Concern

Air pollution is of concern because of its demonstrated effects on human health. Of special concern are the respiratory effects of the pollutants and their potential toxic effects, as described below.

Carbon monoxide (CO) is a colorless and odorless gas that is a product of incomplete combustion. Carbon monoxide is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches, nausea, and at sustained high concentration levels, can lead to coma and death.

Particulate matter is made up of small solid particles and liquid droplets. PM_{10} refers to particulate matter with a nominal aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 micrometers or less. Particulates can enter the body through the respiratory system. Particulates over 10 micrometers in size are generally captured in the nose and throat and are readily expelled from the body. Particulates smaller than 10 micrometers, and especially particles smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli) in the lungs. Particulates are associated with increased incidence of respiratory diseases, cardiopulmonary disease, and cancer.

Nitrogen oxides (NO_X), the most significant of which are nitric oxide (NO) and nitrogen dioxide (NO_2), can occur when combustion temperatures are extremely high (such as in engines) and atmosphere nitrogen gas combines with oxygen gas. NO is relatively harmless to humans but quickly converts to NO_2. Nitrogen dioxide has been found to be a lung irritant and can lead to respiratory illnesses. Nitrogen oxides, along with VOCs, are also precursors to ozone formation.

Sulfur Dioxide (SO_2) emissions are the main components of the "oxides of sulfur," a group of highly reactive gases from fossil fuel combustion at power plants, other industrial facilities, industrial processes, and burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. High concentrations of SO_2 will lead to formation of other sulfur oxides. By reducing the SO_2 emissions, other forms of sulfur oxides are also expected to decrease. When oxides of sulfur react with other compounds in the atmosphere, small particles that can affect the lungs

can be formed. This can lead to respiratory disease and aggravate existing heart disease.

Non-criteria pollutants may be of concern in addition to the criteria pollutants discussed above. Non-criteria pollutants are emitted by a wide range of man-made and naturally occurring sources. These pollutants are sometimes referred to as hazardous air pollutants (HAP) and when emitted from mobile sources, as Mobile Source Air Toxics (MSATs). Emissions of non-criteria pollutants from industrial sources are regulated by the United States Environmental Protection Agency (EPA).

Federal ambient air quality standards do not exist for non-criteria pollutants; however, the New York State Department of Environmental Conservation (NYSDEC) has issued standards for certain non-criteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed guidance document DAR-1 (August 2016), which contains a compilation of annual and short term (1-hour) guideline concentration thresholds for these compounds. The NYSDEC's DAR-1 guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed 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.

10.4 Impact Criteria

The predicted concentrations of pollutants of concern associated with a proposed project are compared with either the National Ambient Air Quality Standards (NAAQS) for criteria air pollutants or ambient guideline concentrations for non-criteria pollutants. In general, if a project would cause the standards for any pollutant to be exceeded, it would likely result in a significant adverse air quality impact. In addition, the City's *de minimis* criteria are also used to determine significance of impacts for CO and $PM_{2.5}$.

National Ambient Air Quality Standards

The Clean Air Act (CAA) requires the EPA to set standards on the pollutants that are considered harmful to public health and the environment. The NAAQS were implemented as a result of the CAA, amended in 1990 (see **Table 10-1**)[1] . The NAAQS applies to six principal ("criteria") pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter 10 (PM_{10}), particulate matter 2.5 ($PM_{2.5}$), sulfur dioxide (SO_2), and ozone.

[1] United States Environmental Protection Agency (October 2011). National Ambient Air Quality Standards. Retrieved from http://www.epa.gov/air/criteria.html.

Table 10-1 National and New York State Ambient Air Quality Standards

Pollutant	Averaging Time	Standard
Carbon Monoxide	1-Hour	35 ppm (40,000 µg/m^3)
	8-Hour	9 ppm (10,000 µg/m^3)
Nitrogen Dioxide	Annual	53 ppb (100 µg/m^3)
	1-Hour	100 ppb (188 µg/m^3)
Ozone	8-Hour	0.075 ppm
Particulate Matter (PM_{10})	24-Hour	150 µg/m^3
Particulate Matter ($PM_{2.5}$)	Annual	12.0 µg/m^3
	24-Hour	35.0 µg/m^3
Sulfur Dioxide	Annual	0.03 ppm (80 µg/m^3)
	24-Hour	0.14 ppm (365 µg/m^3)
	3-Hour	0.5 ppm (1,300 µg/m^3)
	1-Hour	75 ppb (196 µg/m^3)

Source: *2014 CEQR Technical Manual*

Non-criteria Pollutant Thresholds

Non-criteria, or toxic, air pollutants include a multitude of pollutants of variable toxicity. No federal ambient air quality standards have been promulgated for toxic air pollutants. However, NYSDEC has issued guideline non-criteria pollutant ambient air concentrations and acceptable risk management range to determine the potential effects to the public.

The NYSDEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter (µg/m^3) for the one-hour (SGC) and annual average time (AGC) periods for various air toxic compounds[2]. The offsite concentration should not exceed the SGC at any time.

In order to evaluate residual risk of non-carcinogenic toxic air emissions, hazard index is calculated based on annual exposure limits. If the combined ratio of pollutant concentration divided by its annual exposure threshold for each of the toxic pollutants is found to be less than 2.0, according to DAR-1, the residual risk is deemed acceptable.

In addition, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all the carcinogenic toxic pollutants combined is less than ten-in-one million, the residual risk is deemed acceptable.

[2] NYSDEC DAR-1 - http://www.dec.ny.gov/docs/air_pdf/dar1.pdf.

CO *De Minimis* Criteria

New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from the impact of project-generated mobile sources, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant adverse environmental impact. Significant increases of CO concentrations in New York City are defined as:

- An increase of 0.5 ppm or more in the maximum eight-hour average CO concentration at a location where the predicted No-Action eight-hour concentration is equal to or between 8.0 and 9.0 ppm; or
- An increase of more than half the difference between baseline (i.e., No-Action) concentrations and the eight-hour standard, when No-Action concentrations are below 8.0 ppm.

$PM_{2.5}$ *De Minimis* Criteria

New York City uses de minimis criteria to determine a project's potential to result in a significant adverse $PM_{2.5}$ impact under CEQR. The de minimis criteria are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete receptor location (elevated or ground level).

Background Concentrations

Background concentrations are ambient pollution levels associated with existing stationary, mobile, and other area emission sources. NYSDEC maintains an air quality monitoring network and produces annual air quality reports that include monitoring data for CO, NO_x, PM_{10}, $PM_{2.5}$, and SO_2. To develop background levels, the 2017 pollutant concentrations from NYSDEC monitoring sites located closest to the project block were used. If the pollutant concentration from the nearest monitoring station is not available, the next closest monitoring station is selected, and so forth. **Table 10-2** summarizes the background concentrations for each of the pollutants.

Table 10-2 Background Concentrations

Pollutant	Averaging Time	Monitoring Location	Background Concentration
Carbon Monoxide	1-Hour[1]	Queens College 2	1.36 ppm
	8-Hour[1]	Queens College 2	0.9 ppm
Nitrogen Dioxide	1-Hour[2]	IS 52	117.3 µg/m^3
	Annual[3]	IS 52	36.2 µg/m^3
Particulate Matter (PM_{10})	24-Hour[4]	Division St	28 µg/m^3
Particulate Matter ($PM_{2.5}$)	24-Hour[5]	Division St	20.7 µg/m^3
Sulfur Dioxide	1-Hour[6]	IS 52	20.8 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 (2013-2017)

2 1-hour NO_2 background concentration is based on three-year average (2015-2017) 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 (2013-2017).

4 24-hour PM_{10} is based on the highest second max value from the latest three years of available monitoring data from NYSDEC (2015-2017).

5 The 24-hour $PM_{2.5}$ background concentration is based on maximum 98th percentile concentration averaged over three years of data from NYSDEC (2015-2017).

6 1-hour SO_2 background concentration is based on maximum 99th percentile concentration averaged over the latest three years of available monitoring data from NYSDEC (2015-2017).

Source: NYSDEC Ambient Air Quality Report, 2017, http://www.dec.ny.gov/chemical/8536.html, https://www.dec.ny.gov/docs/air_pdf/2017airqualreport.pdf.

$PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria, without considering the annual background. Therefore, the annual $PM_{2.5}$ background is not presented in the table.

10.5 Methodology and Screening Analyses

Mobile Source Screening Analysis

A screening analysis of mobile source emissions of Carbon Monoxide (CO) and Particulate Matter (PM) on ambient pollutant levels in the study area was conducted per *CEQR Technical Manual* guidance using **Figure 10-6** and **Figure 10-8** from the transportation chapter. For the project's study area, as described in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, the threshold for conducting an analysis of CO emissions corresponds to 170 project-generated vehicles at a given intersection in the peak hour. The need for conducting an analysis of PM emissions is based on road type and the number of project-generated peak hour heavy-duty diesel vehicles (or its equivalency in vehicular $PM_{2.5}$ emissions) as determined using the worksheet provided on page 17-12 of the *CEQR Technical Manual* (Autos are assumed to be LDGT1 and trucks, such as pick-up trucks or vans, are assumed to be HDGV2B in the worksheet).

For the proposed development on Projected Development Sites 1 and 2, screening analyses were conducted for the Grand and Clinton Street intersection and the Norfolk and Broome Street intersection. The analyses accounted for the weekday AM and PM peak hours, as they exceeded the Level 1 screening thresholds from the transportation chapter. The Grand and Clinton Street intersection is representative of the worst-case intersection with the highest increment of project-generated vehicle trips for arterial roads, while the Norfolk and Broome Street intersection is representative of the worst-case intersection with the highest increment of project-generated vehicle trips for local roads. The number of incremental vehicular trips for both intersections would be lower than the *CEQR Technical Manual* CO-based screening threshold of 170 vehicles per hour, and the $PM_{2.5}$-based screening threshold of 23 truck equivalents (for arterial roads) and 13 truck equivalents (on local low volume roads) per hour. Therefore, a quantified assessment of on-street mobile source emissions is not warranted, and the proposed project would not result in significant adverse air quality impacts from mobile sources.

HVAC Analysis

As described in **Chapter 1**, "**Project Description**," the proposed development on Projected Development Site 1 would result in two new buildings—the Norfolk Building and the Suffolk Building. It is assumed that each of the buildings would have a boiler stack used for its own HVAC system. Thus, an air quality analysis is warranted to assess the potential for emissions from each of the HVAC systems to significantly impact each other (project-on-project impact) and existing buildings (project-on-existing impacts).

The proposed development on Projected Development Site 2 would be a 4,760-square-foot retail building adjacent to the existing mixed-use building at 384 Grand (Block 346, Lot 95). The retail building's HVAC system and boiler stack characteristics are unknown at this time. Under the With-Action condition it is assumed that the retail building would be serviced by the existing 384 Grand Building's HVAC system and stack. Thus, an air quality analysis is warranted to assess the potential for emissions from the With-Action condition HVAC systems to significantly impact other project buildings (project-on-project impact) and existing buildings.

CEQR Graphical Screening (HVAC Screening Analysis)

As described in Section 220 and Section 321 in Chapter 17 of the *CEQR Technical Manual*, for single-building projects that would use fossil fuels (i.e., No. 2 fuel oil or natural gas) for HVAC systems, a preliminary stationary source screening analysis is typically warranted to evaluate the potential for impacts on existing buildings from HVAC systems emissions for the proposed project. The *CEQR Technical Manual* provides screening nomographs based on fuel type, stack height, minimum distance from the source to the nearest receptor buildings with similar or greater heights, and floor area of development resulting from the proposed project. There are three different curves representing three different stack heights (30 feet, 100 feet and 165 feet) on the figures, and the height closest to but not higher than the proposed

stack height should be selected. Based on the development sizes, if the distances from Projected Development Sites 1 and 2 to the nearest buildings of similar or greater height are less than the minimum required distances determined, there is the potential for a significant air quality impact from the project's boilers, and further analysis needs to be conducted using the USEPA's AERMOD model.

Refined Dispersion Modeling

For projects where the CEQR graphical screening indicates the need for further analysis, a detailed air quality analysis is performed using EPA's AERMOD model (version 18081), to evaluate the potential for emissions from the proposed HVAC systems to result in a significant adverse impact. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. 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. 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).

As mentioned above and detailed below, a refined HVAC analysis was warranted for the Norfolk Building. The following summarizes the methodology used for this analysis.

Emission Rates and Stack Parameters

It is assumed that the proposed development on Projected Development Site 1 will use natural gas. NO_2 and $PM_{2.5}$ are the critical pollutants of concern from natural gas combustion, and thus were analyzed for the detailed HVAC analysis. For the Norfolk Building, emission rates of the pollutants were calculated using the maximum development size, energy consumption data from the *CEQR Technical Manual*, and emission factors from EPA's AP-42. Stack parameters, such as stack diameter, stack exhaust temperature, and exhaust velocity, were estimated based on the New York City Department of Environmental Protection (DEP) boiler database.

The analysis assumed stack tip downwash, urban dispersion and surface roughness length, and elimination of calms, using AERMOD with and without building downwash option to assess the worse cast impact from these sources.

Short-term emission rates were estimated based on an assumption that all fuel will be consumed in 100 days (3 coldest months of the year) of winter heating season, with no emissions for the rest of the year. Annual emission rates were calculated

assuming that the total emissions will be averaged out over 24 hours per day and 365 days per year.

For the refined analysis, the exhaust boiler stack was assumed to be located 3 feet above the bulkhead for the Norfolk Building's HVAC system. The stack was initially assumed to be located 10 feet away from the edge of roof closest to the receptor per New York City Fuel Gas Code § 503.5.4. If the predicted concentrations of NO_2 and $PM_{2.5}$ could not meet the NAAQS or *de minimis* requirements, the stacks would then be set back in 5-foot increments until the sources met the respective criteria. Additionally, if the use of uncontrolled NO_x boilers results in predicted concentrations of NO_2 that exceed the NAAQS requirement, controlled NO_x boilers would be considered for the HVAC system.

Methodology Utilized for Estimating NO_2 Concentrations

EPA's preferred regulatory stationary source model, AERMOD, produces detailed output data that can be analyzed at the hourly level required for the form of the 1-hour standards. EPA has also developed guidance to estimate the NO_2/NO_x conversion ratio, applicable to HVAC systems, as discussed further below.

The 1-hour NO_2 concentration associated with the project's hot water systems were estimated using AERMOD model's Tier 3 option—Plume Volume Molar Ratio Method (PVMRM). The PVMRM module limits the NO_x to NO_2 formation by estimating maximum NO_x concentration based on the amount of ozone (O_3) concentration within the plume volume.[3] Hourly background ozone concentrations from the ambient monitoring station - Queens College were incorporated into AERMOD to estimate the conversion from NO_x to NO_2. Ozone concentrations were taken from the nearest ozone monitoring station that has complete latest five years of hourly data available.

An in-stack ratio of 0.1 was assumed based on EPA's "alpha" version of the in-stack ratio database, which indicates that the in-stack ratio for boilers and combustion turbines is approximately 0.1.[4] The NO_2/NO_x equilibrium ratio was set to 0.9 (the recommended default value).[5]

The methodology used to determine the compliance of total 1-hour NO_2 concentrations from the proposed development'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 seasonal hourly background monitored concentrations; then

3 Review and Evaluation of the PVMRM and OLM for Short-Term (1-hour average) NO_2 Impacts (API, 2012).

4 http://www.epa.gov/ttn/scram/no2_isr_database.htm.

5 EPA. Technical Support Document (TSD) for NO_2-related AERMOD modifications (July 2015).

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 98th percentile concentrations were averaged over the latest five years. This methodology is recognized by EPA and the City and is referenced in EPA modeling guidance.[6]

Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2/NO_x conversion ratio of 0.75, as described in EPA's Guideline on Air Quality Models at 40 CFR part 51 Appendix W, Section 5.2.4.10.[7]

Meteorological Data

All analyses were conducted using five consecutive years of meteorological data (2012-2016). Surface data were obtained from La Guardia Airport and upper air data were obtained from Brookhaven station, New York. Data were processed using the current EPA AERMET and the EPA procedure. These meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevations over the 5-year period.

Receptor Locations

Sensitive receptor buildings were identified with heights similar or greater than the source. Receptors were also added to the Hong Ning Senior Housing Building (Block 346, Lot 1), as it is a sensitive receptor less than 30 feet away from the southern façade of the Norfolk Building. Discrete receptors (i.e., locations at which concentrations are calculated) were placed on each floor of the receptor building along each building façade where operable windows and air intakes could be located.

Industrial Source Analysis

As described in Section 220 and Section 321 in Chapter 17 of the *CEQR Technical* Manual, an air quality assessment is required to evaluate the potential impacts of air toxics emissions from ventilation exhaust systems of manufacturing or processing facilities within a 400-foot radius of a project site when a project would result in new sensitive uses (particularly residences, schools, hospitals, or parks). If any sources are identified, a screening analysis is performed based on Table 17-3 in Chapter 17 of the *CEQR Technical Manual*. The screening table provides the maximum 1-hour, 8-hour, 24-hour and annual average modeled values based on a generic emission rate of 1 gram per second of a pollutant from a 20-foot tall point source for the distances between 30 feet and 400 feet from the receptor of same height. Potential impacts predicted from the industrial source of concern based on the screen table are compared with the short-term guideline concentrations (SGCs) and annual guideline concentration (AGCs) recommended in NYSDEC's DAR-1 AGC/SGC Tables. If a proposed project fails the above screening analysis, or the screening analysis

6 http://www.epa.gov/ttn/scram/guidance/clarification/NO2_Clarification_Memo-20140930.pdf

7 http://www.epa.gov/scram001/guidance/guide/appw_05.pdf

methodology is not applicable to the project, further refined analysis using EPA's AERSCREEN and/or AERMOD model is warranted to determine any potential for significant adverse impacts.

"Large" or "Major" Source Analysis

As described in Section 220 and Section 321 in Chapter 17 of the *CEQR Technical Manual*, an air quality assessment is required to evaluate the potential impacts of emissions from a "large" or "major" emission source within a 1,000-foot radius of a project site. "Major" sources are identified as those sources located at Title V facilities that require Prevention of Significant Deterioration permits. "Large" sources are identified as sources located at facilities that require a State Facility Permit. A detailed analysis is usually performed for such sources, if any are identified, to determine any potential for significant adverse impact.

10.6 Assessment

HVAC Analysis

HVAC Screening Analysis

The proposed development on Projected Development Site 1 would consist of two buildings: the Suffolk Building, which would be a 30-story, 310-foot-tall mixed-use building totaling approximately 375,431 gsf, and the Norfolk Building, which would be a 16-story, approximately 174-foot-tall building totaling approximately 86,711 gsf. Both would use natural gas as a fuel source for their boilers and HVAC systems. Additionally, the proposed development on Projected Development Site 2 would consist of a retail building adjacent to the existing 384 Grand building.

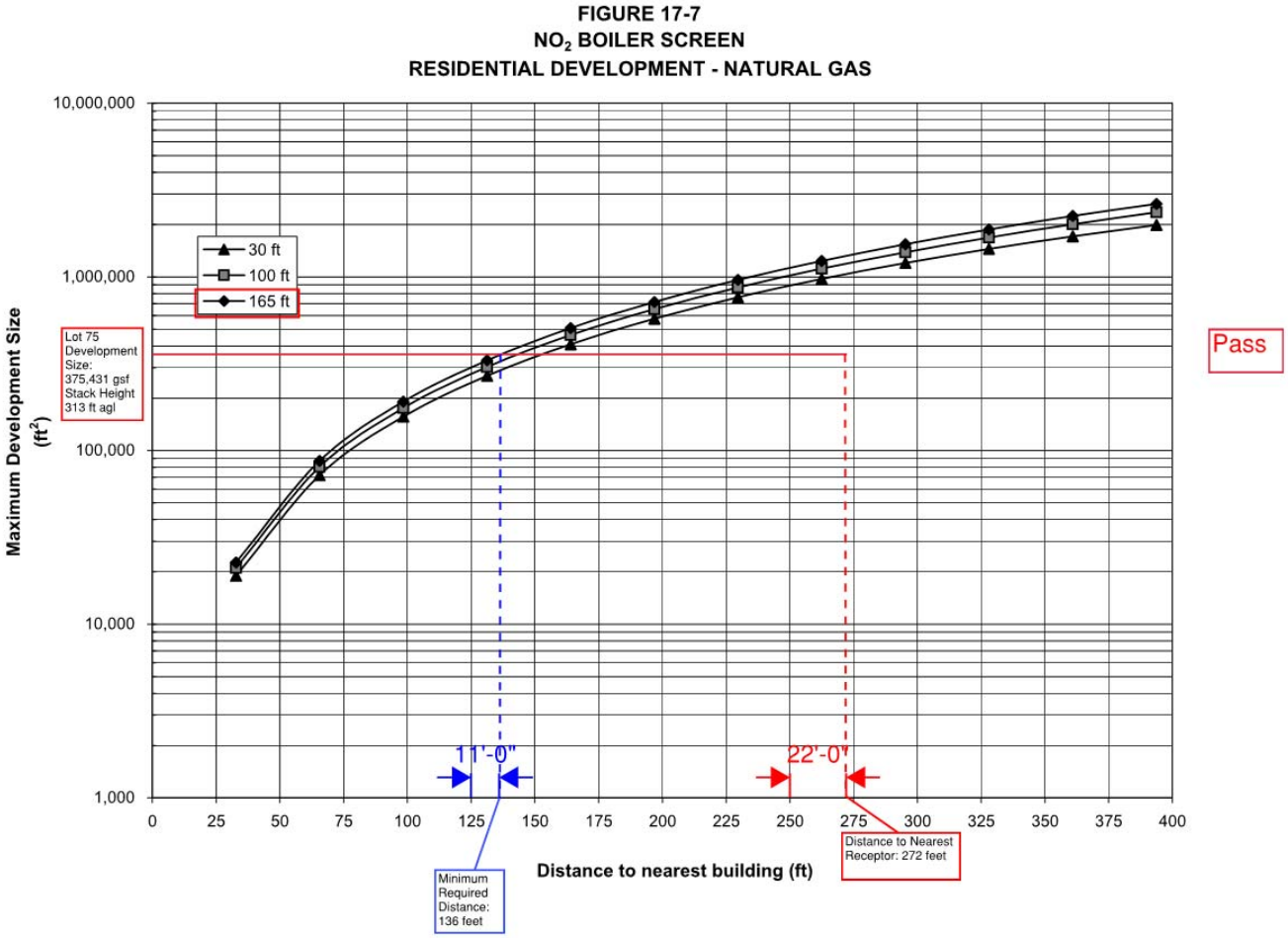
The buildings on Projected Development Site 1 would have heights of approximately 310 and 165 feet above grade level, respectively. The retail building and existing 384 Grand building on Projected Development Site 2 would have heights of approximately 30 and 55 feet above grade level, respectively. It is assumed that the stacks would rise three feet above roof of the Suffolk Building, for a total height of 313 feet, and three feet above the Norfolk Building bulkhead for a total height of 177.7 feet above grade, and three feet above the 384 Grand building for a total height of 58 feet above grade.

A survey of existing residential land uses and other sensitive receptor sites within a 400-foot radius of Projected Development Site 1 and Projected Development Site 2 was conducted. The survey indicated that the tallest building within 400 feet of Projected Development Site 1 is a No-Action building on the block bounded by Broome Street, Essex Street, Delancey Street, and Norfolk Street (Block 352, Lot 7501/115 Delancey Street/Essex Crossing Site 2); this building is currently under construction.

A screening analysis was performed for the Suffolk Building since the No-Action

building on the block bounded by Broome Street, Essex Street, Delancey Street, and Norfolk Street would be of greater height; specifically, the distance from the northern façade of the Suffolk Building to the southern façade at the setback of the No-Action building is 272 feet. The screening analysis was performed assuming a distance of 272 feet between the source to the receptor and a total development size of 375,431 square feet. Based upon the proposed height and square footage, the minimum screening distance necessary to avoid potential adverse air quality impacts was determined to be approximately 136 feet assuming natural gas is used for the HVAC systems (see **Figure 10-1**). Therefore, the screening distance requirement for natural gas is met and there would be no significant adverse stationary source impacts related to the proposed building's HVAC system, and no further analysis is necessary for the Suffolk Building.

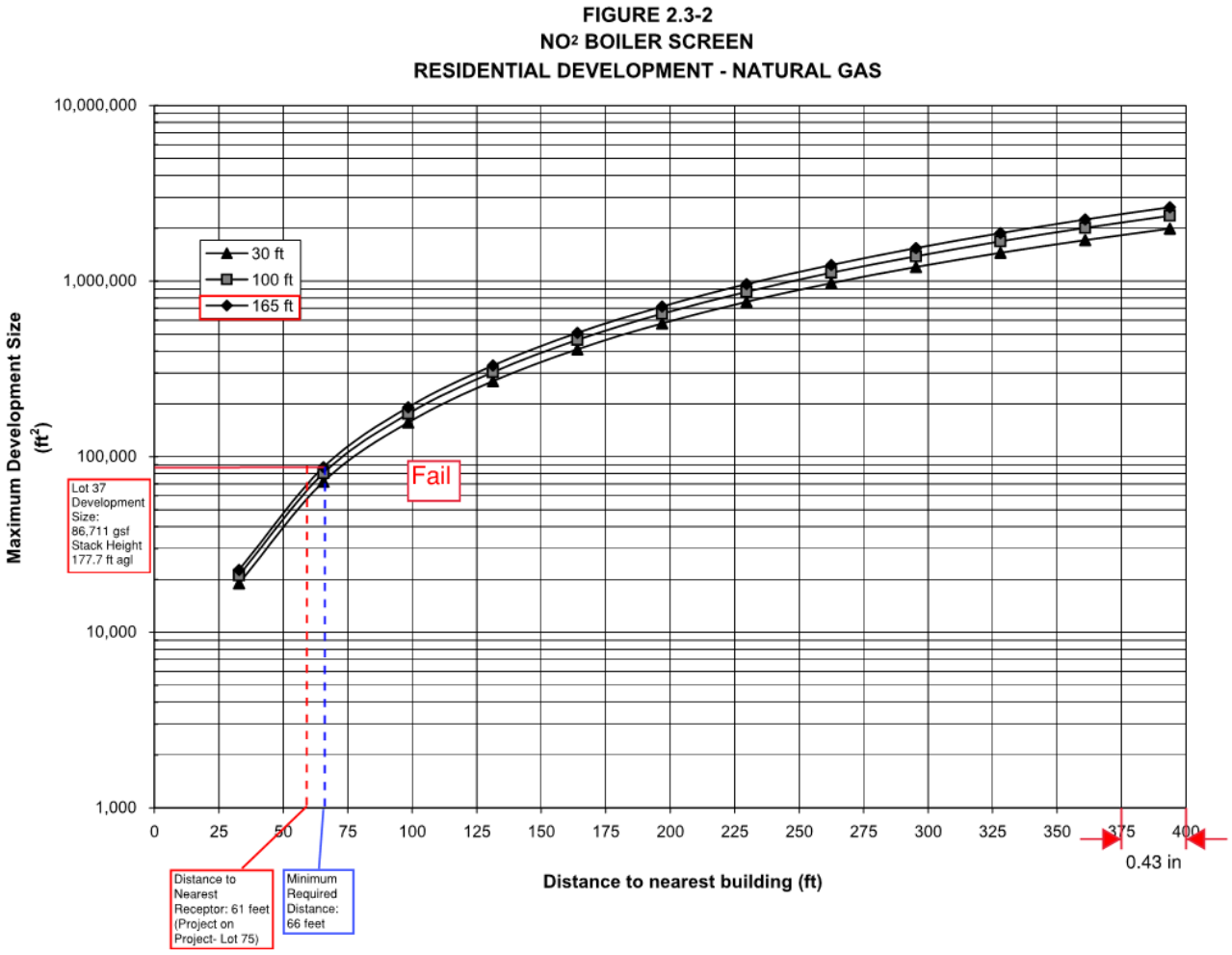
Figure 10-1 Suffolk Building Natural Gas Screening



A screening analysis was performed for the Norfolk Building since the Suffolk Building would be of greater height and located in close proximity; specifically, the distance from the western façade of the Suffolk Building to the eastern façade of the Norfolk Building is 61 feet. The screening analysis was performed assuming a

distance of 61 feet between the source to the receptor and a total development size of 86,711 square feet. Based upon the proposed height and square footage, the minimum screening distance necessary to avoid potential adverse air quality impacts was determined to be approximately 66 feet assuming natural gas is used for the HVAC systems (see **Figure 10-2**). Therefore, a refined HVAC analysis for the Norfolk Building is warranted.

Figure 10-2 Norfolk Building Natural Gas Screening

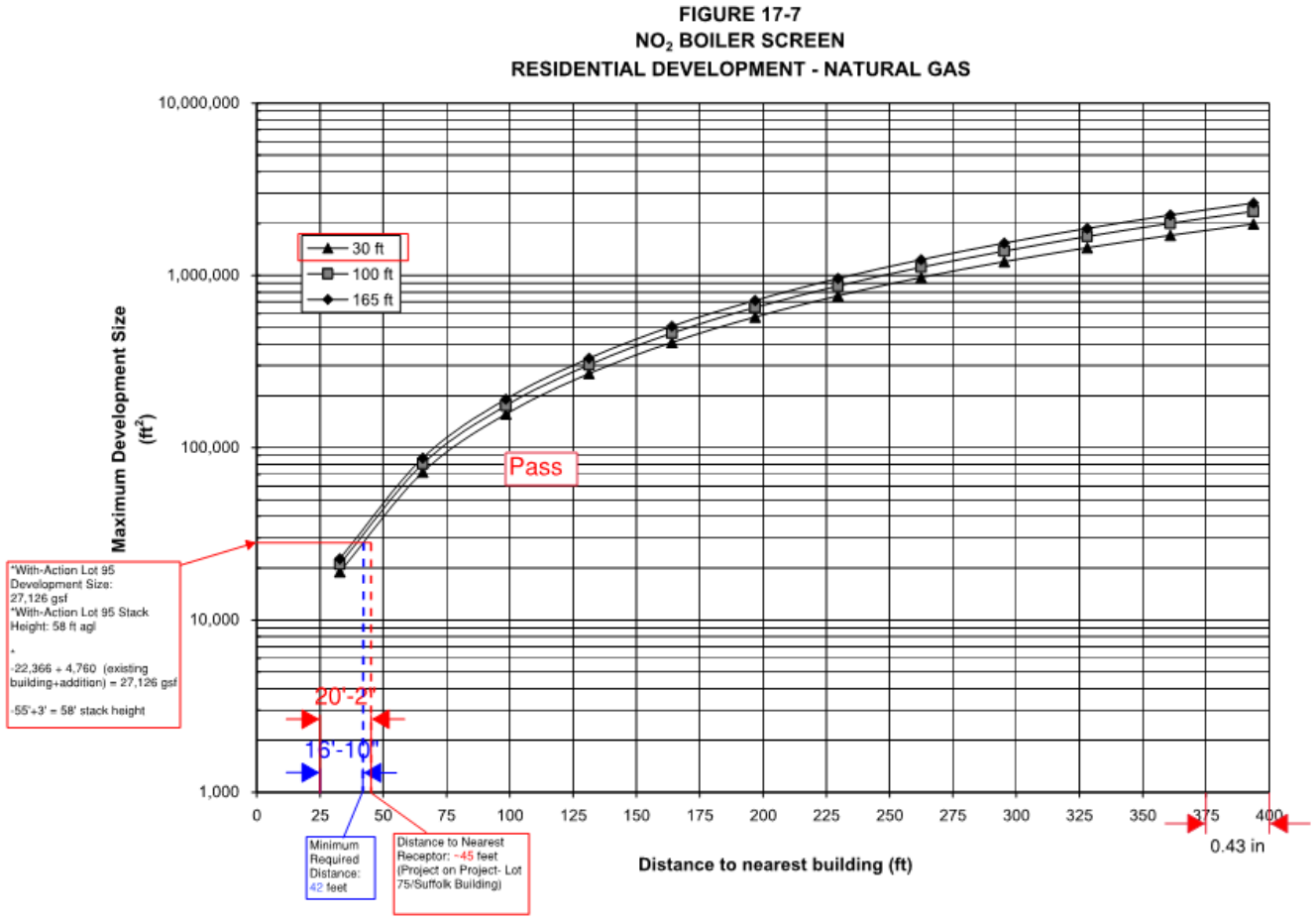


A screening analysis was performed for Projected Development Site 2 (lot 95) since the Suffolk Building from Projected Development Site 1 would be of greater height; specifically, the distance from the northern façade of the 384 Grand Building to the southern façade of the Suffolk building is approximately 45 feet. The screening analysis was performed assuming a distance of 45 feet between the source to the receptor and a total development size of 27,126 square feet.[8] Based upon the proposed height and square footage, the minimum screening distance necessary to avoid potential adverse air quality impacts was determined to be approximately 42

[8] The development size of Projected Development Site 2 is a sum of the sizes of the 384 Grand building (22,366 gsf) and the retail building (4,760 gsf).

feet assuming natural gas is used for the HVAC systems (see **Figure 10-3**). Therefore, the screening distance requirement for natural gas is met and there would be no significant adverse stationary source impacts related to the proposed building's HVAC system, and no further analysis is necessary for Projected Development Site 2.

Figure 10-3 Projected Development Site 2 Natural Gas Screening



Refined HVAC Analysis

A refined HVAC analysis for the Norfolk Building was performed to assess the potential project-on-project and project-on-existing impacts using EPA AERMOD dispersion model following the methodologies described previously. **Table 10-4** presents the stack parameters and emission rates used in the analysis. As the use of uncontrolled NO_x boilers resulted in exceedances of the NAAQS criteria, the analysis was revised to consider controlled NO_x boilers.

Modeled results for emissions from the HVAC system are presented in **Table 10-5**. As the criteria for a stack located 10 feet from the eastern façade were not met, the concentrations shown in this table represent a stack location at least 30 feet from

the eastern façade of the Norfolk Building. As shown in **Table 10-5**, the maximum 1-hour and annual NO_2 are below their respective NAAQS. The maximum 24-hour $PM_{2.5}$ concentration is below the *de minimis* criteria threshold of 7.2 µg/m^3, and the annual $PM_{2.5}$ concentration is below the *de minimis* criteria threshold of 0.3 µg/m^3. Therefore, there would be no significant adverse impacts from the HVAC system. However, some restrictions on boiler type, fuel, and stack location are necessary, as follows:

Table 10-4 HVAC Emission Rates & Stack Parameters

Project Development Site	Ground Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	1-hr NO_2 Emission Rate (g/s) [1]	Annual NO_2 Emission Rate (g/s) [1]	24-hr $PM_{2.5}$ Emission Rate (g/s)	Annual $PM_{2.5}$ Emission Rate (g/s)
Norfolk Building	9.75	54.15	426	3.47	0.305	1.35E-02	3.69E-03	2.05E-03	5.60E-04

Notes:
1 The HVAC analysis was performed assuming low NO_x boilers are used for the Norfolk Building and the Block 346, Lot 95 commercial space HVAC systems. The Norfolk Building emission rates reflect an emission factor of 50 lb/MMscf (~40 ppm) for NO_x from Table 1.4-1 of EPA's AP-42. Additionally, per boiler information provided by the MEP, the Block 346, Lot 95 commercial space emission rates reflect an emission factor of 9 ppm for NO_x.

Table 10-5 Norfolk Building Maximum Modeled Pollutant Concentration (µg/m^3)

	1-hr NO_2 Concentration[1,2]	Annual NO_2 Concentration[1,3]	24-hr $PM_{2.5}$ Concentration[1,4]	Annual $PM_{2.5}$ Concentration[1,4]
Modeled Result – Norfolk Building	176.3	36.9	4.6	0.13
Standard	188	100	7.2	0.3

Notes:
1 The refined HVAC analysis was performed in AERMOD for with and without building downwash options, and the higher concentration is presented in this table.
2 Seasonal-hourly background concentration were added to the modeled 1-hour NO_2 concentration to predict the maximum total concentration.
3 Annual NO_2 concentration was estimated using a NO_2/NO_x conversion ratio of 0.75 per EPA guidance. The annual NO_2 concentration presented in this table includes a background concentration of 36.2 µg/m^3.
4 The predicted 24-hour and annual $PM_{2.5}$ concentrations are directly compared to the de minimis thresholds of 7.2 µg/m^3 and 0.3 µg/m^3, respectively, without considering background concentrations.

The text of the (E) designation (E-548) for Projected Development Site 1 and 2 would be as follows:

Block 346, Lot 37 – (Projected Development Site 1- Norfolk Building)

Any new residential or commercial development or enlargement on the above-referenced property must exclusively use natural gas in any fossil fuel-fired heating, ventilating and air conditioning (HVAC) equipment, be fitted with low NO_x (40 ppm) burners, and ensure that the HVAC stack is located at the highest tier and at least 174.7 feet above grade, and no more than 30 feet away from the northwestern lot line facing Norfolk Street, to avoid any significant adverse air quality impacts.

Block 346, Lot 75 – (Projected Development Site 1- Suffolk Building)

Any new residential and/or community facility development or on the above-referenced property must exclusively use natural gas as the type of fuel for the heating, ventilating, and air conditioning (HVAC) systems, and ensure that the HVAC stack(s) is located at the highest tier and at least 310 feet above grade to avoid any significant adverse air quality impacts.

Block 346, Lot 95 – (Projected Development Site 2- New Commercial Space)

Any ~~development or~~new enlargement on the above-referenced property must exclusively use natural gas as the type of fuel for the heating, ventilating and air conditioning (HVAC) systems, and ensure that the HVAC stack(s) is located ~~at the highest tier and~~ at least 55 feet above grade~~, and no more than 60 feet from the lot line facing Grand Street and no more than 25 feet away from the lot line facing Suffolk Street,~~ to avoid any significant adverse air quality impacts.

Industrial Source Analysis

To assess potential air quality impacts on the proposed development from existing industrial sources that emit toxic air contaminants, an investigation of existing land uses within a 400-foot radius of the project block was conducted to identify potential sources and determine if there are active permits associated with those sources.

As a first step, land use maps were reviewed to identify surrounding land uses that could have NYCDEP-issued industrial permits (i.e., sites classified as Industrial/Manufacturing, Transportation/Utility, or Public Facilities/Institutions). **Table 10-6** lists these potential land uses.

Table 10-6 Industrial Sources within 400 Feet of the Project Block

Address	Block	Lot	Land Use*	Lot Owner Name*	DEP CATS
349 Grand Street	310	17	Industrial/Manufacturing	TAI CHEUNG REALTY INC	No permit record
115 Delancey Street	352	7501	Commercial/Office Buildings	DEPT OF SMALL BUSINES	PB033415, registration - engines/generators; PB033515, registration - engines/generators;
350 Grand Street	408	30	Public Facilities/Institutions	NYC DEPARTMENT OF EDU	No permit record
90 Ludlow Street	409	39	Commercial/Office Buildings	VIVIAN LAU	No industrial permit
109 Delancey Street	409	53	Commercial/Office Buildings	85 ESSEX RLTY CO	No industrial permit

*As per MapPLUTO
Source: NYCDEP's Clean Air Tracking System (NYCDEP CATS). https://a826-web01.nyc.gov/DEP.BoilerInformationExt/

Once the potential facilities were identified, an additional review was undertaken to assess whether the potential facilities have associated permits; the following sources were reviewed: NYCDEP's Clean Air Tracking System (NYCDEP CATS), New York City's Open Accessible Space Information System Cooperative (OASIS) database, telephone directory listings, available aerial photos provided by Google and Bing, and internet websites.

A total of two industrial permit records (PB033415 and PB033515) were identified from the NYCDEP CATS online database as emergency generators (see **Table 10-6**). However, the two businesses associated with these permits (United Rentals and Earth Construction Services) have closed as 115 Delancey Street is now a new residential development currently under construction.

A field survey of uses within a 400-foot radius of the project block was also undertaken; based on field observations, there are no non-permitted industrial sources (e.g., auto spray booth).

Therefore, no significant adverse impact associated with emissions of air toxics are expected, and no further analysis is warranted.

"Large "or "Major" Source Analysis

To assess the potential impacts of any "large" or "major" sources on the proposed development, the NYSDEC Title V and State Facility Permit website were reviewed along with aerial photos provided by Google and Bing.[9,10] Based on this review, there are no existing "large" or "major" emission sources within a 1,000-foot radius of the project block. Therefore, no significant adverse impacts from existing "large" or "major" emission sources on the proposed development are anticipated, and no further analysis is warranted.

[9] NYSDEC Title V- http://www.dec.ny.gov/dardata/boss/afs/issued_atv.html

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