Chapter 11: Air Quality

A. INTRODUCTION

This chapter assesses the potential for air quality impacts from the Proposed Action. Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heat and hot water systems, or emissions from parking garage ventilation systems. Indirect impacts are caused by off-site emissions associated with a project, such as emissions from nearby existing stationary sources (i.e., impacts on the Proposed Development Blocks, as defined in Figure 2-6) or by emissions from on-road vehicle trips generated by the Proposed Action or other changes to future traffic conditions due to a project.

As described in Chapter 2, "Project Description," the Proposed Action is the adoption of a proposed Form-Based Code (FBC) that would regulate land development within the unincorporated hamlet of East Farmingdale within the Town of Babylon. The area proposed to be rezoned, the "Project Site," is approximately 109 acres and is centered on the intersection of Broadhollow Road (NYS Rt. 110) and Conklin Street (NYS Rt. 24).

The potential for mobile source air quality impacts from full buildout of the Project Site under the proposed East Farmingdale FBC (the "EF-FBC") was analyzed using the screening procedures found in the New York State Department of Transportation (NYSDOT) *The Environmental Manual (TEM)*.

It is anticipated that each of the proposed development sites would include fossil fuel-fired heat and hot water systems. Therefore, a stationary source screening analysis was conducted to evaluate potential future pollutant concentrations from full buildout with the Proposed Action.

Since the affected area is within areas zoned for manufacturing uses, potential effects of emissions from existing nearby industrial facilities on newly constructed buildings within the Project Site were evaluated. In addition, potential effects from the nearby Republic Airport on the Proposed Action were assessed.

PRINCIPAL CONCLUSIONS

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

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from fossil fuel-fired heat and hot water within the Project Site. At certain locations within the site, restrictions would be mapped in connection with the Proposed Action to ensure that future developments would not result in any significant air quality impacts from fossil fuel-fired heat and hot water systems emissions, pursuant to Section 213-566(D) of the EF-FBC.

An assessment of the cumulative impacts of industrial sources on proposed development sites was performed. Maximum concentration levels at proposed development sites were found to be below the air toxic guideline levels and health risk criteria established by regulatory agencies, and below National Ambient Air Quality Standards (NAAQS). Large and major emissions sources within 1,000 feet of a proposed development site were also analyzed. The analysis concluded that these sources would not result in significant adverse air quality impacts on any proposed development sites.

Since the Proposed Action would not exceed the thresholds referenced in the *TEM* for mobile source analyses during any traffic peak period, no further analysis is required. Based on the NYSDOT guidelines, since the relevant thresholds were not exceeded, the Proposed Action would not have any significant impact on air quality from mobile sources.

B. POLLUTANTS FOR ANALYSIS

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 carbon monoxide (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 NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), 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 NO_x 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 (CAA), and are referred to as criteria pollutants; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

The Proposed Action would include parking facilities at certain development sites. Therefore, an analysis was conducted to evaluate future CO concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Action.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x 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 advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x 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.

The Proposed Action would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of Proposed Action-related emissions of these pollutants from mobile sources was therefore not warranted.

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 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.) With the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2 associated with the Proposed Action would be relatively small due to the small increases in the number of 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 the proposed development sites' heat and hot water systems were evaluated.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of the Proposed Action. Therefore, an analysis of this pollutant was not warranted.

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical, and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways. The Proposed Action would not result in any significant increases in truck traffic near the Project Site or in the region, or other potentially significant increase in $PM_{2.5}$ vehicle emissions. Therefore, an analysis of potential impacts from PM was not warranted. However, an analysis was conducted to evaluate future PM concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Action.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and therefore, analysis of SO_2 from mobile and/or non-road sources was not warranted.

As part of the Proposed Action, No. 2 fuel could be burned in heat and hot water systems of the proposed development sites. Therefore, potential future levels of SO_2 from these sources were examined.

NON-CRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, non-criteria pollutants may be of concern. Non-criteria pollutants are emitted by a wide range of human-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 industries are regulated by 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 guideline concentrations for numerous non-criteria pollutants. The NYSDEC guidance document DAR-1[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 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 Project Site contains existing manufacturing zoned areas, which would remain in the Proposed Action. Therefore, an analysis to examine the potential for impacts to the Proposed Action from industrial emissions was performed.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate

[1] NYSDEC. DAR-1 (Air Guide-1) AGC/SGC Tables. August 2016.

margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 11-1**. The NAAQS for CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particles, settleable particles, non-methane hydrocarbons, 24-hour and annual SO_2, and ozone which correspond to federal standards that have since been revoked or replaced, and for the non-criteria pollutants beryllium, fluoride, and hydrogen sulfide.

Table 11-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9(1)	10,000	None	
1-Hour Average	35(1)	40,000		
Lead				
Rolling 3-Month Average(2)	N/A	0.15	N/A	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(3)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(4,5)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(1)	N/A	150	N/A	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(6)	N/A	12	N/A	15
24-Hour Average(7)	N/A	35	N/A	35
Sulfur Dioxide (SO_2)(8)				
1-Hour Average(9)	0.075	196	N/A	N/A
Maximum 3-Hour Average(1)	N/A	N/A	0.50	1,300

Notes:
ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
N/A – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
(1) Not to be exceeded more than once a year.
(2) EPA has lowered the NAAQS down from 1.5 µg/m3, effective January 12, 2009.
(3) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
(4) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(5) EPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
(6) 3-year average of annual mean. USEPA has lowered the primary standard from 15 µg/m3, effective March 2013.
(7) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(8) EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
(9) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

EPA has revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from 65 µg/m³ to 35 µg/m³ and retaining the

level of the annual standard at 15 µg/m^3. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked. EPA later lowered the primary annual $PM_{2.5}$ average standard from 15 µg/m^3 to 12 µg/m^3, effective March 2013.

EPA has also revised the 8-hour ozone standard, lowering it from 0.08 to 0.075 parts per million (ppm), effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December 2015, EPA lowered the 2008 primary and secondary NAAQS from 0.075 ppm to 0.070. EPA expects to issue final area designations by October 1, 2017; those designations likely would be based on 2014–2016 air quality data.

EPA lowered the primary and secondary standards for lead to 0.15 µg/m^3, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

EPA established a 1-hour average NO_2 standard of 0.100 ppm, effective April 12, 2010, in addition to the annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA also established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour concentrations. In January 2017, New York State recommended that EPA designate most of New York State, including New York City, as in attainment for this standard.

Federal ambient air quality standards do not exist for non-criteria pollutants; however, as mentioned above, NYSDEC has issued standards for three non-criteria compounds. NYSDEC has also developed a guidance document DAR-1 (August 2016), which contains a compilation of annual and short term (1-hour) guideline concentrations for numerous other non-criteria compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines nonattainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as nonattainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

Suffolk County is currently in attainment for the 24-hour average PM_{10}, 9-hour average CO, and 1-hour average CO standards.

The Nassau, Rockland, Suffolk, Westchester, and the five New York City Counties had been designated as a $PM_{2.5}$ NAA (the New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA) since 2004 under the CAA due to exceedance of the 1997 annual average standard, and were also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard effective April 18, 2014, and is now under a maintenance plan. As stated above, EPA lowered the annual average primary standard to 12 µg/m3 effective March 2013. EPA designated the area as in attainment for the new 12 µg/m3 NAAQS effective April 15, 2015.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (the New York portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as moderate non-attainment area for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8-hour ozone standards. EPA designated the New York–Northern New Jersey–Long Island, NY-NJ-CT NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, as requested by New York State, EPA reclassified the area as a moderate NAA. New York State has begun submitting SIP documents in December 2014. The state is expected to be able to meet its SIP obligations for both the 1997 and 2008 standards by satisfying the requirements for a moderate area attainment plan for the 2008 ozone NAAQS.

Suffolk County is currently in attainment of the annual-average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" of the 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once 3 years of monitoring data are available.

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties currently meet the 1-hour standard. Additional monitoring will be required. Draft attainment designations were published by EPA in February 2013, indicating that EPA is deferring action to designate areas in New York State and expects to proceed with designations once additional data are gathered.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[1] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 11-1**) would be deemed to have a potential significant adverse impact. Similarly, for non-criteria pollutants, predicted exceedance of the DAR-1 guideline concentrations would be considered a potential significant adverse impact.

NON-CRITERIA POLLUTANT THRESHOLDS

Non-criteria, or toxic, air pollutants include a multitude of pollutants of ranging toxicity. No federal ambient air quality standards have been promulgated for toxic air pollutants. However, EPA and NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure. The NYSDEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter for the 1-hour and annual average time periods for various air toxic compounds.

[1] New York City. 2014 *City Environmental Quality Review (CEQR) Technical Manual*. Chapter 1, section 222. March 2014; and SEQR Regulations. 6 NYCRR § 617.7

D. METHODOLOGY

MOBILE SOURCES

An assessment of the potential air quality effects of CO and PM emissions that would result from vehicles coming to and departing from the Project Site was performed following the procedures outlined in the NYSDOT *TEM* and NYSDOT's *Project Level Particulate Matter Analysis Policy*, September 2004. As described more fully in Chapter 10, "Traffic and Transportation," the study area includes 10 locations. The screening procedure described below used the traffic analysis results for the 2033 analysis year under both the existing zoning and the EF-FBC.

The Proposed Action is not predicted to result in changes to traffic patterns on roadway segments with high percentages of diesel vehicles, nor would the Proposed Action include facilities that are predicted to result in a significant increase of diesel vehicles, or the idling of existing diesel vehicles. Therefore, the Proposed Action will have no significant adverse air quality due to PM emissions from mobile sources.

CO SCREENING CRITERIA

Screening criteria described in the *TEM* were employed to determine whether the Proposed Action requires a detailed air quality analysis at the intersections in the study area. Before undertaking a detailed microscale modeling analysis of CO concentrations at the study area intersections, the screening criteria first determine whether the Proposed Action would increase traffic volumes or implement any other changes (e.g. changes in speed, roadway width, sidewalk locations, or traffic signals) to the extent whereby significant increases in air pollutant concentrations could be expected. The following multistep procedure outlined in the *TEM* was used to determine if there is the potential for CO impacts from the Proposed Action:

- **Level of Service (LOS) Screening:** If the Build condition LOS is A, B, or C, no air quality analysis is required. For intersections operating at LOS D or worse, proceed to Capture Criteria.
- **Capture Criteria:** If the Build condition LOS is at D, E, or F, then the following Capture Criteria should be applied at each intersection or corridor to determine if an air quality analysis may be warranted:
  - a 10 percent or more reduction in the distance between source and receptor (e.g., street or highway widening); or
  - a 10 percent or more increase in traffic volume on affected roadways for the build year; or
  - a 10 percent or more increase in vehicle emissions for the build year; or
  - any increase in the number of queued lanes for the build year (this applies to intersections); it is not expected that intersections in the build condition controlled by stop signs would require an air quality analysis; or
  - a 20 percent reduction in speed when build average speeds are below 30 miles per hour (mph).

If a project does not meet any of the above criteria, a microscale analysis is not required. If a project is located within ½-mile of any intersections evaluated in the CO SIP Attainment Demonstration, (as identified in the NYSDOT *TEM*'s Chapter 1.1, Table 2 by county), more stringent screening criteria are applied at project-affected intersections. Should any one of the above criteria be met in addition to the LOS screening, then a Volume Threshold Screening analysis is performed, using traffic volume and emission factor data to compare with specific volume thresholds established in the *TEM*.

Both the Capture Criteria and Volume Threshold Screening were developed by NYSDOT to be conservative air quality estimates based on worst-case assumptions. The *TEM* states that if the project-related traffic volumes are below the volume threshold criteria, then a microscale air quality analysis is unnecessary even if the other Capture Criteria are met for a location with LOS D or worse, since a violation of the NAAQS would be extremely unlikely.

STATIONARY SOURCES

A stationary source screening analysis was conducted to evaluate potential impacts from the proposed development sites' heat and hot water 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 HEAT AND HOT WATER SYSTEMS

A screening analysis was performed to assess air quality impacts associated with emissions from heat and hot water systems for each Proposed Development Block, as defined in Chapter 2, "Project Description." The methodology described in the *CEQR Technical Manual* was used for the analysis, and considered impacts on sensitive uses (i.e., existing residences and 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 heat and hot water systems' exhaust stack height, to evaluate whether a significant adverse impact may occur. Based on the distance from the Proposed Development Block to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size shown 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 heat and hot water systems' design was not available, each proposed development site was evaluated with the nearest existing or proposed residential development of a similar or greater height analyzed as a potential receptor. The maximum gross floor area of each proposed development site was used as input for the screening analysis.

It was assumed that No. 2 fuel oil or natural gas would be used in the proposed development sites' heat and hot water systems, and that the exhaust stack(s) would be located 3 feet above the highest portion of the roof (the default assumption in the *CEQR Technical Manual*). If the results pass the screening analysis, the proposed development site is determined to result in no potential significant adverse air quality impacts using No. 2 fuel oil or natural gas. For sources that did not pass the screening analyses using the *CEQR Technical Manual* procedures, restrictions would be put in place to avoid significant adverse air quality impacts. For fuel oil, the primary pollutants of concern are SO_2 and PM, while for natural gas, the primary pollutant of concern is NO_2.

Cumulative Impacts from Heat and Hot Water Systems

In addition to the individual source analysis, groups or "clusters" of heat and hot water sources with similar stack heights were analyzed, to address the cumulative impacts of multiple sources. The Project Site was reviewed to determine areas where clusters with high density of development sites with similar building heights would be located which could result in cumulative impacts on nearby buildings of a similar or greater height. Two clusters were selected for analysis. The development sites associated with each cluster and their location are presented in **Table 11-2**.

Table 11-2
Cluster Analysis Sites

Cluster	**Development Blocks** (see Figure 2-6)
1	A, B, D, E, F
2	K, L, M

The cluster analysis was performed using the EPA-approved AERSCREEN model (Version 16216, EPA, 2016). AERSCREEN predicts worst-case 1-hour impacts downwind from a point, area, or volume source. The model generates worst-case meteorology using representative minimum and maximum ambient air temperatures, and site-specific surface characteristics such as albedo, Bowen ratio, and surface roughness. If the worst-case concentrations predicted by AERSCREEN are above significant impact levels for each pollutant analyzed, further analysis with AERMOD is required to determine the potential for air quality impacts from the Proposed Action. However, if the worst-case concentrations predicted by the AERSCREEN model are below impact levels for an analyzed pollutant, there is no potential for impact and no further analysis is required.

The AERSCREEN model predicts impacts over a 1-hour average using default meteorology. In order to predict pollutant concentrations over longer periods of time, EPA-referenced persistence factors were used. These consist of 0.6 and 0.1 for the 24-hour and annual average periods, respectively.

The AERSCREEN model considered each cluster as a single area source. The cluster analysis was performed to identify impacts of SO_2, NO_2, PM_{10}, and $PM_{2.5}$. Estimates of the emissions from the cluster development's heat and hot water systems was made based on the square footage of the individual development sites and building energy consumption rates. Fuel consumption factors of 58.5 ft^3/ft^2-year and 0.43 gal/ft^2-year were used for natural gas and fuel oil, respectively, for residential developments. Mixed-use developments used the residential fuel consumption factors since they are more conservative. Short-term factors were determined by using peak hourly fuel consumption estimates for heating and cooling systems.

Emission factors for each fuel were 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 were calculated based on a maximum fuel oil sulfur content of 0.0015 percent (based on use of ultra-low sulfur No. 2 oil) the fuel using the appropriate AP-42 formula.

The average minimum distance from the sites within the source clusters to the nearest buildings were used in the modeling analysis. The analysis focused on existing buildings or other proposed development sites that are of a similar or greater height than the source cluster.

To estimate the maximum expected pollutant concentration at a given receptor, the calculated impact must be added to a background value that accounts for existing pollutant concentrations from other sources.

INDUSTRIAL SOURCES

Pollutants emitted from the exhaust vents of existing permitted industrial facilities were examined to identify potential adverse impacts on future residents of the proposed development sites. A comprehensive search was also performed to identify NYSDEC Title V permits, State Facility permits, and permits listed in the EPA Envirofacts database. Industrial air pollutant emission sources within a 400-foot study area of Project Site boundary were considered for the air quality impact analyses. Two facilities—Posillico Materials, LLC and Bio Systems Partners Property—were found approximately 770 feet to the east of Proposed Development Block F and

800 feet to the northeast of Block B, respectively. This is well beyond the 400-foot study area; therefore, nearby existing industrial sources are not anticipated to result in air quality impacts at the proposed development sites.

REPUBLIC AIRPORT SOURCES

Republic Airport is located directly adjacent to the Project Site. The airport is a public non-hub airport that serves general aviation of primarily single engine turboprop aircraft. Additionally, Republic Airport is designated by the Federal Aviation Administration (FAA) as a receiver airport and will serve to relieve congestion at nearby commercial airports. The airport currently is estimated by the FAA to serve an annual number of 210,000 landing and take-off operations (LTO) with less than 1 percent of operations resulting from commercial aircraft. The services located at the airport include fueling, aircraft maintenance, flight training, and charter services. In July, 2017 an environmental assessment was performed for the development of five parcels within Republic Airport and estimated a growth in the Future with the Proposed Action (the "With Action" condition) to approximately 212,000 LTOs by the 2020.[1] It is anticipated that LTOs would continue to grow by the 2033 build year in a similar growth pattern.

Aircraft emissions during an LTO are associated with fuel consumption during the approach, taxi, take-off, and climb-out modes of operation below an altitude of 3,000 feet. While taxi and take-off operations would occur at ground level locations, the majority of the approach and climb-out modes would occur above the tallest portions of the Proposed Development Blocks; and are therefore not anticipated to result in significant impacts to air quality concentrations at potential window locations or air intake locations on the façades of the Proposed Development Blocks.

Take-off operations represent the most intense mode of operation, but would have the shortest duration within a typical LTO.[2] Conversely taxi operations represent the least intense mode of operation, but would have the longest duration. In general, pollutant emissions in the take-off and taxi modes of operation represent at most approximately half of all emissions during a LTO. These emissions would occur over the two runways (with runway lengths of 6,833 and 5,516 feet for Runways 14/32 and 1/19 respectively) at Republic Airport and the rest of the taxiways for the take-off and taxi emissions, respectively. The emissions intensity at any one location in these areas are not anticipated to result in significant air quality concentrations at the nearby Proposed Development Blocks. Furthermore, the areas of the runways and taxiways within 1,000 feet from the Project Site represent a small portion of the total areas at Republic Airport.

Additional services at Republic Airport may result in air pollutant emissions (such as fuel and maintenance services). However, these services would also occur beyond 1,000 feet from the Project Site. Therefore, it is not anticipated that the emission sources at Republic Airport would result in significant air quality impacts at the Proposed Development Block, and no further analysis is required.

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[1] New York State Department of Transportation. State Environmental Quality Review Act Environmental Assessment of Long-Term Lease of Five Development Parcels at Republic Airport. July, 2017. http://www.republicairport.net/pdf/Environmental%20Assessment.pdf

[2] European Aviation Safety Agency. International Civil Aviation Organization Aircraft Engine Emissions Databank. November 2017. https://www.easa.europa.eu/easa-and-you/environment/icao-aircraft-engine-emissions-databank

E. EXISTING CONDITIONS

The representative criteria pollutant concentrations measured in recent years at NYSDEC air quality monitoring stations nearest to the Project Site are presented in **Table 11-3**. The values presented are consistent with the form of the NAAQS. As shown in the table, the recently monitored levels did not exceed the NAAQS with the exception of 8-hour average Ozone concentrations. The concentrations presented in **Table 11-3** provide a comparison of the air quality in the rezoning area with the NAAQS and represent a conservative estimate of the highest concentrations for future ambient conditions.

Table 11-3
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College, Queens	ppm	1-hour	1.59	35
	Queens College, Queens		8-hour	1.2	9
SO_2	Holtsville	µg/m^3	3-hour	20.1	1,300
			1-hour	18.3	196
PM_{10}	Queens College, Queens	µg/m^3	24-hour	44	150
$PM_{2.5}$	Babylon, Suffolk	µg/m^3	Annual	7.1	12
			24-hour	18.8	35
NO_2	Queens College, Queens	µg/m^3	Annual	32.9	100
			1-hour	120.9	188
Lead	IS 52, Bronx	µg/m^3	3-month	0.0061	0.15
Ozone	Babylon, Suffolk	ppm	8-hour	0.073*	0.070

Notes:
*Indicates an exceedance of the NAAQS
1. The CO, PM_{10}, and 3-hour SO_2 concentrations for short-term averages are the second-highest from the most recent year with available data.
2. PM2.5 annual concentrations are the average of 2014–2016 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentiles in the same period.
3. The SO2 1-hour and NO2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively, of the highest daily 1-hour maximum from 2014 to 2016.
4. The lead concentrations is based on the highest quarterly average concentration measured in 2015.
5. The ozone concentration is based on the 3-year average (2014–2016) of the 4th highest daily maximum 8-hour average concentrations.

Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2012–2016.

F. FUTURE WITHOUT THE PROPOSED ACTION

In the Future without the Proposed Action (the "No Action" condition), nearly 1 million square feet (sf) of floor area could be added to the Project Site under the existing zoning, resulting in approximately 1.6 million sf of development within the Project Site. However, as described in Chapter 3, "Land Use, Zoning, and Public Policy," under full buildout of the Proposed Action, nearly 3.14 million sf of floor area would be permitted. Therefore, the emissions from heat and hot water systems associated with the full buildout of the Proposed Action would cumulatively be greater than the emissions from heat and hot water systems under the No Action condition.

G. FUTURE WITH THE PROPOSED ACTION

MOBILE SOURCES

The area roadway intersections were reviewed based on NYSDOT's *TEM* criteria for determining locations that may warrant a CO microscale air quality analysis. The screening

analysis examined the LOS and projected volume increases by intersection approach. As described below, the results of the screening analysis show that none of the 10 intersections affected by the Proposed Action would require a detailed microscale air quality analysis.

LOS SCREENING ANALYSIS

Results of the traffic capacity analysis performed for the 2033 build year condition under either the existing zoning or the EF-FBC, and for the AM and PM peak periods were reviewed at each of the study area intersections to determine the potential need for a microscale air quality analysis. The LOS screening criteria were first applied to identify those intersections with approach LOS D or worse. Based on the review of the 10 intersections analyzed, the following intersections were projected to operate at a LOS D or worse on approaches for the AM or PM peak traffic periods:

- Broadhollow Road and Conklin Street;
- New Highway and Conklin Street;
- Wellwood Avenue and Conklin Street;
- Broadhollow Road and Price Parkway; and
- Broadhollow Road and Mellville Road.

CAPTURE CRITERIA SCREENING ANALYSIS

Further screening on the intersections identified in the LOS Screening Analysis was conducted using the Capture Criteria outlined above. This screening indicated that for three of the above six intersections, two of the listed Capture Criteria would be met; either a 10 percent or more increase in traffic volume, a 20 percent or greater reduction in speed, or both criteria. Therefore, a volume threshold screening analysis was conducted for the following three intersections:

- Broadhollow Road and Conklin Street;
- Broadhollow Road and Price Parkway; and
- Broadhollow Road and Mellville Road (under the EF-FBC only).

VOLUME THRESHOLD SCREENING

Since one or more of the capture criteria listed above were triggered, a volume threshold screening analysis was conducted to further determine the need for a microscale air quality analysis. The volume thresholds (provided in the *TEM*) establish traffic volumes below which a violation of the NAAQs for CO is extremely unlikely. This approach uses Project Site specific emissions data to determine corresponding vehicle thresholds. For intersections where approach volumes are equal to or less than the applicable thresholds, microscale air quality analysis is not required. Based on the volume threshold screening, the project-related traffic volumes at all of the intersections would be below the volume threshold criteria under either the existing zoning or the EF-FBC. Therefore, a detailed CO microscale air quality analysis was not warranted and there would be no significant adverse mobile source air quality impact.

STATIONARY SOURCES

INDIVIDUAL HEAT AND HOT WATER SYSTEMS

The screening analysis was performed to evaluate whether potential air quality impacts from the heat and hot water systems associated with the proposed development sites could potentially impact other development sites or existing buildings.

A total of 15 of the 26 future development blocks failed the screening analysis using No. 2 fuel oil as the fuel source. Therefore, each of these development sites would be required to use natural gas exclusively. Of the sites that failed the screening analysis for No. 2 oil, 8 of the 15 development sites were found to also fail using natural gas as the fuel source. Therefore, the exhaust stacks would be required to be located with setbacks from nearby sensitive receptor locations. The various restrictions to preclude the potential for significant adverse air quality impacts on other proposed development sites, or existing buildings, from the heat and hot water emissions are listed in **Table 11-4**.

Table 11-4
Heating and Hot Water System Analysis Summary

Proposed Development Site	Screening Results		HVAC System Restrictions	
	#2 Fuel Oil	Natural Gas	Fuel Restrictions	Stack Restrictions
A	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
B	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than10 feet from the western edge facing Site F of the proposed development.
C	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
D	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 30 feet from the northern edge facing Site A; and 35 feet from the western edge facing Site E of the proposed development.
E	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 20 feet from the eastern edge facing Site D; 35 feet from the northern edge facing Site B; and 35 feet from the western edge facing Site F of the proposed development.
F	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
G	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
H	Pass	Pass	None	None
J	Pass	Pass	None	None
K (1)	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 80 feet from the eastern edge facing Site L of the proposed development.
L (1)	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 55 feet from the western edge facing Site K; and 55 feet from the eastern edge facing Site M of the proposed development.
M (1)	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 65 feet from the western edge facing Site L; and 10 feet from the eastern edge facing Site N of the proposed development
N	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 10 feet from the western edge facing Site M of the proposed development.
O	Fail	Fail	The proposed development would be restricted to exclusively use natural gas.	The exhaust stack would be restricted to locations greater than 15 feet from the northern edge facing Site K; and 20 feet from the eastern edge facing Site P of the proposed development.
P	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
Q	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
R	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
S	Pass	Pass	None	None
T	Pass	Pass	None	None
U	Fail	Pass	The proposed development would be restricted to exclusively use natural gas.	None
V	Pass	Pass	None	None
W	Pass	Pass	None	None
X	Pass	Pass	None	None
Y	Pass	Pass	None	None
Z	Pass	Pass	None	None
ZZ	Pass	Pass	None	None

Notes: (1) Based on the cumulative impacts analysis, in order to avoid significant adverse air quality impacts, Proposed Development Blocks K, L, and M would be further required to use boiler units fitted with low NO_x burners.

CUMULATIVE IMPACTS FROM HEAT AND HOT WATER SYSTEMS

A screening analysis was conducted to evaluate potential air quality impacts from groups or "clusters" of heat and hot water systems in close proximity with similar stack heights. Two clusters were identified. The analysis was performed using the AERSCREEN model as described above. The maximum pollutant concentrations predicted by the AERSCREEN analysis are presented in **Table 11-5**.

Since the individual screening analysis determined that the development blocks within the clusters failed for No. 2 fuel oil, the cluster analysis was performed for natural gas only. The results of the analysis determined that that the cumulative effect of the clusters would not result in significant adverse air quality impacts when assuming natural gas as the fuel type for Cluster 1. Therefore, no additional exhaust stack restrictions would be required for the development blocks within Cluster 1. However, in order to avoid significant adverse air quality impacts for Cluster 2, the development blocks would be required to use boiler fitted with low NO_x burners. With these restrictions in place, there would be no potential for significant adverse air quality impacts.

Table 11-5
Maximum Screening Pollutant Concentrations

Pollutant	Averaging Period	Maximum Concentration		Background	Total Concentration		NAAQS
		Cluster 1	Cluster 2		Cluster 1	Cluster 2	
NO_2	1-Hour	64.5	49.9	120.9	185.4	170.9	188
	Annual	2.5	7.0	32.9	35.4	39.9	100
SO_2	1-Hour	0.7	1.1	20.1	20.8	21.2	196
	3-Hour	0.7	1.1	18.3	19.0	19.4	1,300
PM_{10}	24-Hour	5.5	8.5	44	49.5	52.5	150
$PM_{2.5}$	24-Hour	5,5	8.5	18.8	24.3	27.3	35
	Annual	0.3	0.4	7.1	7.4	7.5	12

Note: For the 1-hour SO_2 averaging period, the 3-year average of the maximum 99th percentile concentration was taken from NYSDEC's *New York State Ambient Air Quality Report for 2013*. http://www.dec.ny.gov/chemical/8536.html

H. MITIGATION

Applications for development within the Project Site would be required to either comply with the fuel source, exhaust stack, and emission level requirements described above; or, submit a detailed air quality analysis, consistent with the study described above, that demonstrates that one or more of the restrictions outlined are not necessary to avoid a significant adverse air quality impact. ✷