APPENDIX H:
Air Quality

H.1. 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.

H.1.1. 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 (i.e., microscale) basis.

For the Proposed Project, CO is evaluated using the New York State Department of Transportation's (NYSDOT) The Environmental Manual (TEM) mobile source screening procedures. CO is also addressed, indirectly, in the heat and hot water screening analysis.

H.1.2. 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 Project would not have a significant effect on the overall volume of vehicular travel in the region; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of Proposed Project-related emissions of these pollutants from mobile sources is 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 farther downwind from large stationary point sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) With the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. Any increase in NO_2 as a result of project-generated traffic, however, would be relatively small due to the very small increase in the number of vehicles on area roadways as a result of the Proposed Project. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways. Due to the negligible contribution of Project-traffic to NO_2, and because of the limitations in guidance and modeling tools, the increases in NO_2 concentrations associated with project-generated traffic were not analyzed.

Potential impacts on local NO_2 concentrations from the Proposed Project's HVAC systems were assessed using the procedures described in the stationary source impact assessment.

H.1.3. LEAD

Airborne lead emissions are 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 Project. Therefore, an analysis of this pollutant was not warranted or conducted.

H.1.4. 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 (e.g., 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 VOC; 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 (e.g., 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 Project would not result in any significant increases in truck traffic near the Project Site or within the region, nor would it result in other potentially significant increases in $PM_{2.5}$ vehicle emissions. Therefore, per NYSDOT TEM guidance and consistent with EPA guidance[1] on project-level analyses, an analysis of potential mobile source impacts from PM was not warranted.

H.1.5. 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 sources was not warranted.

As part of the Proposed Project, natural gas would be burned in the proposed heat and hot water systems. The sulfur content of natural gas is negligible; therefore, an analysis of SO_2 emissions from the Proposed Project's stationary sources was not warranted.

H.2. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

H.2.1. NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary National Ambient Air Quality Standards (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 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 H-1**. The NAAQS for CO, annual NO_2, and three-hour SO_2 have also been adopted as the ambient

[1] USEPA. *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas.* EPA-420-B-15-084. November, 2015

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 H-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	$\mu g/m^3$	ppm	$\mu g/m^3$
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	40,000		
Lead				
Rolling 3-Month Average (2)	NA	0.15	NA	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)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (6)	NA	12	NA	15
24-Hour Average (7)	NA	35	NA	35
Sulfur Dioxide (SO_2) (8)				
1-Hour Average (9)	0.075	196	NA	NA
Maximum 3-Hour Average (1)	NA	NA	0.50	1,300

Notes: ppm – parts per million (unit of measure for gases only)
$\mu g/m^3$ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in $\mu g/m^3$ are presented.

1. Not to be exceeded more than once a year.
2. EPA has lowered the NAAQS down from 1.5 $\mu g/m^3$, 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. EPA has lowered the primary standard from 15 $\mu g/m^3$, 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 $\mu g/m^3$ to 35 $\mu g/m^3$ and retaining the level of the annual standard at 15 $\mu g/m^3$. 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 $\mu g/m^3$ to 12 $\mu g/m^3$, effective March 2013.

EPA has also revised the eight-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 further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 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 $\mu g/m^3$, effective January 12, 2009. EPA revised the averaging time to a rolling three-month average and the form of the standard to not-to-exceed across a three-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 three-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 three-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 the entire State of New York, with the exception of Seneca, St. Lawrence, and Tompkins Counties, as in attainment for this standard; the remaining counties will be designated upon the completion of required monitoring by December 31, 2020.

H.2.2. NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines Non-Attainment Areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment 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.

In 2002, EPA re-designated Westchester County as in attainment for CO. Under the resulting maintenance plans, New York State is committed to implementing site-specific control measures throughout the region to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

Westchester County is currently in attainment for the 24-hour average PM_{10} standard.

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 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the new 12 $\mu g/m^3$ 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 a moderate NAA for the 1997 eight-hour average ozone standard. In March 2008 EPA strengthened the eight-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 began 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.

Westchester 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 three 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. ✷