3.13 AIR QUALITY IMPACTS

Air quality is a relative measure of the amount of noxious substances that occur in the air and that are caused by natural and human processes. Certain airborne gases and particles can cause or contribute to the deterioration and/or destruction of biological life, as well as damage to property and other physical components of the environment.

Air contaminants or pollutants can be defined as solid particles, liquefied particles, and vapor or gases which are discharged into, or form in, the outdoor atmosphere. Air quality in any particular location is influenced by contaminants discharged into the atmosphere and by regional and local climatic and weather conditions.

Atmospheric conditions such as sunlight, rainfall and humidity, air turbulence, temperature differences, and wind speed and direction can disperse, intensify, or chemically change or alter the compositions of air contaminants.

3.13.1 Existing Conditions

The Project Site is located in Orange County, which is among the counties that make up Region 3 of the NYSDEC Hudson Valley Air Quality Control Region, one of nine regions in New York State monitored for compliance with Federal and State ambient air quality standards. Region 3 also includes Rockland, Ulster, Dutchess, Putnam, and Westchester Counties.

Air Quality Standards and Compliance

In conducting this analysis, the NYS EPA and NYSDEC websites were reviewed. The website for the NYSEPA is https://www.epa.gov/criteria-air-pollutants/naaqs-table and for NYSDEC is https://www.dec.ny.gov/chemical/281.html.

EPA, pursuant to the federal Clean Air Act ("CAA"), has promulgated National Ambient Air Quality Standards ("NAAQS"), which are considered the minimum levels of air quality necessary (with a margin of safety) to protect public health.

NAAQS promulgated by EPA include primary and secondary standards. Primary standards are intended to provide public health protection for the most vulnerable segments of the population, such as children, the elderly, and the infirm, who are more susceptible to respiratory infections and other air quality-related health problems. Locations or source-receptors for these populations are schools, hospitals, and convalescent homes, as well as other related facilities. Secondary standards are aimed at protecting public welfare by preventing adverse effects to animals, crops, vegetation, buildings, and visibility.

EPA has set NAAQS for six principal air contaminants (known as "criteria" air pollutants), identifying these particular pollutants as being of concern nationwide: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3) (also termed photochemical oxidants), particulate matter, sulfur dioxide (SO_2), and lead (Pb). The sources of these contaminants, their effects on human health and the nation's welfare, and their final disposition in the atmosphere vary considerably. However, for all contaminants except sulfur dioxide and suspended particulates, the primary and secondary standards are identical.

Pursuant to the CAA, each state, including New York, is responsible for development of a state implementation plan ("SIP") to provide a regulatory framework in which to implement the requirements of the CAA. The New York SIP adopted Ambient Air Quality Standards (AAIS) from a list of seven criteria pollutants established by EPA. Table 3131 lists federal and state air quality standards.

Table 3131
State and Federal Air Quality Standards

		New York State Standards			Corresponding Federal Standards (Primary Standards)		
Pollutant	**Avg Period**	**Conc.**	**Units**	**Stat**	**Conc.**	**Units**	**Stat**
Sulfur Dioxide	12 consecutive months	0.03	ppm	Arithmetic Mean ("AM")	0.03	ppm	Arithmetic Mean
	24-hour	0.14	ppm	Maximum	0.14	ppm	Maximum
	3-hour	0.5	ppm	Maximum	None		
	1-hour (max.)	None	-	Maximum	0.075	ppm	Maximum
Carbon Monoxide	8-hour	9	ppm	Maximum	9	ppm	Maximum
	1-hour	35	ppm	Maximum	35	ppm	Maximum
Ozone	8-hour	0.07	ppm	Maximum	0.07	ppm	Maximum
Nitrogen Dioxide	12 consecutive months	0.05	ppm	Arithmetic Mean ("AM")	100	µg/m³	AM
					0.53	ppm	AM
	1-hour	None	-	Maximum	0.1	ppm	Maximum
Lead [2]	3 consecutive months	None			0.15	µg/m³	3-mo. Average
Fine Particulate Matter ($PM_{2.5}$)	12 consecutive months	None			12	µg/m³	Geometric Mean ("GM")
	24-hours	None			35	µg/m³	Maximum
Inhalable Particulates (PM_{10})	24-hours	None			150	µg/m³	Maximum

[1] All maximum values are concentrations not to be exceeded more than once per calendar year. (Federal Ozone Standard not to be exceeded more than three days in three calendar years).

[2] Lead - Federal standards for lead not yet officially adopted by NYS, but is currently being applied to determine compliance status.

[3] Fine Particulate Matter – Compliance with Federal Standard is determined by using the average of the 99th percentile 24 hour value during the past 3 years, which cannot exceed 35 ug/m3.

Sources of Air Pollution

Sources of air pollution are generally characterized as mobile or non-point sources (transportation-related) or stationary sources (e.g., a smokestack). In general, the primary pollutants related to

mobile sources are carbon monoxide (CO), nitrogen oxides (NOx), and hydrocarbons. Sources of air pollutants are summarized in Table 3132.

Oxidants, primarily ozone, result from the breakdown of NOx compounds in the atmosphere by sunlight. Total suspended particulates are the result of both mobile sources, as well as industrial sources and operations.

Stationary sources, primarily manufacturing or utility operations, result in the addition of sulfur dioxides (SO_2), nitrogen oxides (NOx), hydrocarbons and particulates to the atmosphere.

NYSDEC does not regulate or model fugitive dust generated from construction operations.

Table 3132
Principal Sources of Air Pollutants

Pollutant	Principal Sources
Carbon Monoxide (CO)	Motor Vehicles (90%) Other Combustion Sources (10%)
Oxidants (primarily Ozone)	Produced by the Action of Sunlight on HC and NO_x Compounds in the Atmosphere
Nitrogen Oxides (NO_x)	Stationary Source Combustion (50%) Mobile Sources (50%)
Hydrocarbons (HC)	Motor Vehicles (60%) Industrial Process and Evaporative Losses from Storage Facilities (40%)
Particulates (part)	Many Sources (Stationary and Mobile) Including Crushing and Grinding Operations and Natural Resources
Sulfur Dioxide (SO_2)	Electric Power Generation (40%) Space Heating (30%) Other Combustion of Fuels in Industrial Processes (30%)

Source: (1) DGEIS for IBM - Proposed Re-zoning, IBM Properties, Town of Fishkill, October 3, 1983, prepared by Ronald A. Freeman Associates, P.C. Consulting Engineers; (2) NYSDEC Region 3, NYS Air Quality Report, Ambient Air Monitoring System Annual Report 1992-DAR-93-1

Note: The percentage figures represent approximate contributions for the sources identified in middle-latitude areas. For more specific information, refer to the annual reports of the Council on Environmental Quality.

Existing Air Quality: Control Region 3 (Hudson Valley)

New York State is divided into nine Air Quality Control Regions ("AQCR"), in order to evaluate air quality by geographic regions. NYSDEC has a network of ambient air monitoring stations located in each of the AQCRs, in order to evaluate the attainment status of each region with respect to the SIP. The Project Site is located in Region 3: Hudson Valley Air Quality Control Region. The Federal criteria pollutants currently monitored within Region 3 include sulfur dioxide (SO_2), ozone (O_3), total suspended particulates ($PM_{2.5}$) and lead. The remaining criteria pollutants, carbon monoxide (CO) and nitrogen dioxide (NO_2), are not monitored in the Region 3 AQCR, but are monitored in the Region 2 AQCR, which includes the five boroughs of New York City.

NYSDEC maintains a number of monitoring stations in the Hudson Valley to measure existing ambient air quality within Region 3. These stations are sometimes operated over limited periods of time, and some are utilized to sample only certain parameters. Monitoring stations are located at White Plains and Mamaroneck in Westchester County; Mt. Ninham in Putnam County; Millbrook and Poughkeepsie in Dutchess County; Belleayre Mountain, New Paltz, and Saugerties in Ulster County; and Valley Central, Newburgh (2), Wallkill (3), and Scotchtown in Orange County. Table 3133 lists stations referenced in the NYSDEC's 2016 Air Quality Report and the pollutants monitored at each.

Table 3133
NYSDEC Region 3 Air Quality Monitoring

Stations	Parameters			
	Lead	Sulfur Dioxide	Inhalable Particulates	Ozone
Mamaroneck 5956-01	✓		✓	
Wallkill 3566-02	✓			
Scotchtown 3566-11	✓			
Mt. Ninham 3951-01		✓	✓	✓
Belleayre Mtn. 5565-03		✓	✓	✓
Saugerties 5524-03			✓	
New Paltz 5522-01			✓	
Poughkeepsie 1302-06			✓	
Newburgh 3502-04			✓	
White Plains 5902-04			✓	✓
Valley Central 3527-01				✓
Millbrook 1328-01				✓

Source: Region 3 Air Quality Data, NYSDEC Division of Air Resources

Table 3134 summarizes data for Region 3. Sampling information for pollutants not included in the Table is either not collected in Region 3, or is collected at locations distant from the Project Site. Information from distant locations would not be representative of ambient air quality conditions in the Project vicinity. Based on this data, all monitored contaminants are within acceptable levels within Region 3.

Table 3134
Regional Air Quality Data Summary

Monitoring Location	Pollutant	Concentration	Air Quality Standards	Within Standard?
Valley Central	Ozone (O3)	0.072 ppm (2)	.08 ppm (2)	Yes
Mt. Ninham	Sulfur Dioxide (SO2)	0.59 ppb (1)	30 ppb (1)	Yes
Mt. Ninham	Ozone (O3)	0.072 ppm (2)	.08 ppm (2)	Yes
Newburgh	Inhalable Particulates (PM2.5)	7.4 ug/m3 (1)	12 ug/m3 (1)	Yes
Wallkill	Lead (Pb)	0.02 g/m3 (3)	0.15ug/m3	Yes

Notes: (1) Annual Arithmetic Mean in parts per billion (ppb); (2) 4th Highest Daily Maximum 8-Hour Average in parts per million (ppm); (3) Maximum Quarterly Average in grams per cubic meter (g/m3)).

Source: NYSDEC, Region 3, Air Quality Data, 2016

Existing Air Pollution Sources

Vehicle-Generated Air Quality Impacts – Existing Conditions: The primary pollutants associated with vehicular exhaust emissions are nitrogen dioxide (NO_2), hydrocarbons (HC), and carbon monoxide (CO). Since short-term exposure to elevated CO concentrations can have acute health impacts, state and federal standards have been developed for ambient CO concentrations to protect the health and welfare of the general public with an adequate margin of safety.

There are currently no enforced short-term health standards for NO_2 and HC. The primary concern pertaining to these pollutants is their role in the photochemical reactions that lead to the formation of secondary pollutants known as ozone (O_3) and "smog," known lung and eye irritants. Ozone and smog formation is a slow process that would occur outside the primary impact area of the Project; thus, these pollutants are only reviewed on a regional (mesoscale) basis for "regionally significant" projects. Because the proposed Project is not regionally significant, a mesoscale air quality analysis would not be required, and all air quality impact analyses focus on local (microscale) air quality impacts and compliance with standards for CO.

Land neighboring the Project generally supports a mixture of residential and commercial uses. There are limited industrial uses in the area. Existing sources of air pollution in the vicinity of the Project include vehicle and engine exhaust, as well as emissions from commercial and residential heating and hot water systems.

Existing Air Pollution Receptors: Potential sensitive receptors within the vicinity of the Project include residential dwellings located to the northeast (Orchard Lake Drive and Hilltop Drive) and to the southwest (Virginia Avenue and Arlington Drive). Residences fronting on or near Clove Road and NYS Route 208 southwest of the Project Site may also be considered sensitive receptors for traffic-related air quality impacts, as further described below.

3.13.2 Potential Impacts

The Project, as a residential development, would not emit greenhouse gases at the level requiring federal or state air emission permits, either during construction or after completion.

Stationary greenhouse gas (GHG) emissions for the Project are directly related to energy use and primarily related to fuel combustion for residential heating. According to NYSDEC *Guide for Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements* (July 2009), emissions of CO_2 account for an estimated 88% of total annual GHG emissions in New York. The great majority of these emissions (88.3 %) result from fuel combustion. The remaining proportion of GHG emissions come from electricity distribution, refrigerant substitutes, the

management of municipal waste, municipal wastewater, and agriculture, as well as natural gas leakage.

It is anticipated that the Project residences would be heated with a combination of natural gas, propane and electricity. The on-site combustion of natural gas and propane for heating, hot water and for cooking would result in emissions of greenhouse gases such as CO_2 from the Project Site. On-site combustion sources are considered stationary sources of emissions as opposed to the off-site generation of electricity. Fixed emergency generators, if installed by homeowners, would also be direct stationary sources of CO_2 and other greenhouse gases. The use of emergency generators is occasional and temporary and would be a minor source of overall Project emissions.

The operation of the Project's wastewater treatment plant would result in the generation of methane gas over the life cycle of the treatment plant. Wastewater treatment plants typically generate methane, CO_2, hydrogen and ammonia. The wastewater treatment plant would be constructed to current, efficient treatment standards and therefore, the generation of methane gases would be minimized.

Stationary greenhouse gas emissions from the Project can be calculated through energy use estimates. New York State households consume an average of 103 million Btu per year[1]. Natural gas is anticipated to be the primary source of heating for the Project. Utilizing a Greenhouse Gas Inventory model, potential future stationary greenhouse gas emissions from the Project can be estimated[2].

The estimates of greenhouse gas emissions provided in Table 3134 also represent relevant priority pollutants, since those priority pollutants resulting from residential uses generally consist of greenhouse gases.

The below estimates are based on typical New York households and do not account for the current energy efficient construction and heating systems found in new homes. The proposed project will include multiple energy efficiencies that will reduce greenhouse gas emissions, from the levels described below.

Air contaminants which typically are of concern with respect to projects that will generate more vehicle trips include ozone, carbon monoxide, nitrogen oxides, and lead. Air contaminants typically of concern with respect to residential projects are sulfur dioxide and inhalable particulate matter from heating and hot water systems.

[1] U.S. Energy Information Administration (www.eia.gov), 2018

[2] Local Greenhouse Gas Inventory Tool: Community Module, March 2018, U.S. EPA

Table 3134 Estimated Stationary Greenhouse Gas Emissions				
Greenhouse Gas	Gas Emission per Unit (kg)	Metric ton CO2 Equivalent per Unit	Total Project Emission (kg)	Total Metric Ton CO2 Equivalent
CO2	54.5	5.5	32,700	3,300
CH4	0.00514	0.01	3.08	6
N20	0.0001	0	0	0
Note/Source: Emissions based on annual household use of 103 million btu's, and utilizing Local Greenhouse Gas Inventory Tool: Community Module, March 2018, U.S. EPA				

The traffic volumes generated by the proposed Project are below the screening thresholds for NYSDOT regional transportation control programs, and thus conform with the SIP to bring the area into compliance with the carbon monoxide standards.

Mobile (Traffic Related) Air Quality Impacts

The primary generator of air emissions from any proposed residence is the operation of passenger vehicles. The potential impact from the project-generated traffic was evaluated using NYSDOT's "Environmental Procedures Manual," Chapter 1, Section 9, Projects Needing Air Quality Analysis (January 2001) (the "NYSDOT Procedures Manual").

Carbon monoxide (CO) is the primary pollutant of concern for traffic-generated air emissions and is used by NYSDOT as a screening tool, since CO generally has local impacts and higher concentrations of CO are limited to within a short distance of heavily traveled roadways.

According to the NYSDOT Procedures Manual, intersections with level of service ("LOS") "C" or better do not require an air quality analysis. Some six current and proposed signalized intersections were examined near the Project Site as part of the traffic analysis, as listed: NYS Route 208 and Clove Road; NYS Route 208 and Mountain Road; NYS Route 208 and Route 17 EB Ramp; NYS Route 208 and Route 17 WB Ramp; NYS Route 208 and Duelk Avenue; NYS Route 208 and Project Site Access; and NYS Route 208 and Route 94.

The future overall levels of service for the above-listed intersections are summarized in Table 3135 below. These levels of service are for the Build condition, or with the Project as proposed under Scenario No. 1 including the potential for 600 accessory apartments, and with the proposed traffic mitigation measures. Further description of levels of service, traffic volumes and intersection operation is found in Section 3.11 of the DEIS. Levels of service tables are provided in Section 3.11.4. Each of the intersections listed above may be signalized, as per NYSDOT warrants.

Table 3135 Summary of Traffic Conditions for Microscale Air Quality Screening				
Intersection	**Level of Service**	**Total Intersection Volume**	**Project Generated Traffic**	**Percent increase Between Build and No-Build Scenarios**
NYS Route 208 / Clove Road	AM - B PM - C	N/A	N/A	N/A
NYS Route 208 / Mountain Rd.	AM - A PM - B	N/A	N/A	N/A
NYS Route / US Route 6 / Route 17 Eastbound Ramp	AM - D	2222	69	3.10%
	PM - C	NA	NA	NA
NYS Route / US Route 6 /Route 17 Westbound Ramp	AM - B	NA	NA	NA
	PM - D	2954	130	4.40%
NYS Route 208 / Duelk Ave.	AM - B PM - C	NA	NA	NA
NYS Route / Project Driveway	AM - A PM - B	NA	NA	NA
NYS Route / Route 94	AM - C	NA	NA	NA
	PM - D	1971	23	1.20%
Source: Levels-of-Service from Section 3.11.4 based upon the Traffic Impact Study prepared by Maser Consulting in Appendix J-1. LOS and volumes provided are for AM and PM peak weekday traffic.				

The NYSDOT Procedures Manual indicates that intersections having a LOS "D" in the Build condition should be further evaluated to determine the need for a microscale air quality analysis. The screening criteria are: 10% or more reduction in the source-receptor distance; 10% or more increase in traffic volume on affected roadways between the No Build and Build scenarios; 10% or more increase in vehicle emissions; any increase in the number of queued lanes; and 20% reduction in speed.

Evaluation of the projected traffic indicates that, following Project development, the NYS Route 208 and Route 17 ramps and Route 94 intersections would result in LOS D conditions in the Build Condition (Scenario No. 1 with proposed improvements and with Park & Ride).

As indicated in the Table, the Project would add substantially less than 10 percent volume to those three intersections that are anticipated to have a level of service D in the Build condition. The Project would not exceed any of the criteria for further CO microscale air quality analysis. Therefore, a microscale air quality analysis is not required for the three identified signalized intersections with predicted level of service D, in the build condition. Based on the screening analysis, it is not anticipated that the ambient air quality standards would be exceeded.

All other intersections involved in the Project area would be stop sign controlled. The NYSDOT EPM states: *"It is not expected that intersections in a build alternative controlled by stop signs will require an air quality analysis*". Thus, while some non-signalized intersections may have a Build level of service lower than "C", the screening analysis concludes that traffic volumes associated with stop sign controlled intersections are not sufficiently high to warrant further CO

microscale analysis. The level of CO at a stop sign controlled intersection would not exceed ambient air quality standards. This screening methodology was also confirmed in phone conversations with Jane Lao and Dr. John Zamurs, from the NYSDOT Environmental Analysis Bureau (EAB).

The carbon monoxide screening analysis of vehicle generated emissions documents that the additional site traffic would not result in adverse air quality impacts at the primary intersections accessing the Project Site. Proposed traffic mitigation measures were included in all screening air quality impact analyses. Based on the intersection capacity analysis, the projected vehicle queues at the study intersections resulting from the Project would not be significant enough to cause air quality concerns. Given the proposed density of the project and the projected volume of traffic, no air quality impacts are expected to result from the Project.

Stationary Air Quality Impacts

The primary generators of air emissions from the proposed residences include passenger vehicles, gas-powered equipment, and heating systems. Given the proposed density of the Project, the projected volume of traffic, the installation of new and efficient heating systems, and proposed landscaping, no significant adverse long-term air quality impacts are expected to result from the Project. The WWTP would be contained in a building and therefore, mechanical equipment would be enclosed, shielding any potential odors.

3.13.3 Mitigation

The Project would not have adverse impacts on air quality. Heat and electric supply to the residential units, as well as traffic ingress and egress to and from the Project, would not produce greenhouse gas produce emissions at a greater level than those generated by any other residential activity, and would very likely be less. The Project would reduce travel by facilitating home occupations, including home professional and telework offices, which are permitted by the Village Zoning Code.

In addition, a 2001 National Household Travel Survey, conducted by the Federal Highway Administration, revealed that subdivisions with lot sizes in the range of one quarter of an acre generated an average of only 19,959 vehicle miles traveled ("VMT") per housing unit, while most lots in the two-acre range generate an average of 22,351 VMT. The larger lots generate approximately 10.6% more VMT, which, in turn, creates more air emissions, particularly CO_2.

According to the above air quality analysis, the Project would not have the potential to generate any significant adverse impacts upon air quality, including those upon local sensitive receptors; and therefore, no mitigation would be required.