I. Air Quality

This Chapter of the DEIS addresses the Proposed Project's impact on air quality, both during construction and upon completion of the Project. Air quality impacts from the Proposed Project can be classified as either direct or indirect. Direct air quality impacts result from emissions generated by stationary sources at a project or potential development site such as emissions from fuel burned at a site for heating and air conditioning systems. Indirect air quality impacts result from emissions from off-site stationary sources and mobile sources generated by the Proposed Project.

1. Existing Conditions

   a. Ambient Air Quality Standards

   The U.S. Environmental Protection Agency (USEPA) has promulgated National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The NAAQS includes primary standards that are designed to be protective of human health including the health of sensitive subpopulations such as children or those with chronic respiratory diseases. Secondary standards are set to protect welfare values such as vegetation, visibility, property values, and other non-health related concerns.

   NAAQS have been established for each of the following six major criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), respirable particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). Individual states are free to adopt standards more stringent than the federal NAAQS. NYSDEC has established Ambient Air Quality Standards (AAQS) for New York that are listed in Part 257, *Air Quality Standards*, of the NYSDEC regulations. In some cases, the New York AAQS are more stringent than the NAAQS. The NAAQS and New York AAQS criteria are presented in ***Table III. I-1, National and New York Ambient Air Quality Standards (AAQS).***

Table III. I-1
National and New York Ambient Air Quality Standards (AAQS)

Pollutant	Averaging Period	New York AAQS (ug/m^3)		National AAQS (ug/m^3)	
		Primary	Secondary	Primary	Secondary
Sulfur Dioxide (SO_2)	3-Hour	1,300	750	n/a	1,300
	24-Hour	365	260	365	n/a
	Annual	80	n/a	80	n/a
Particulate Matter (PM_{10})	24-Hour	150	150	150	150
	Annual	50	50	50	50
Particulate Matter ($PM_{2.5}$)	24-Hour	35	35	35	35
	Annual	15	15	15	15
Carbon Monoxide (CO)	1-Hour	40,000	40,000	40,000	40,000
	8-Hour	10,000	10,000	10,000	10,000
Ozone (O_3)	1-Hour	120	120	n/a	n/a
	8-Hour	n/a	n/a	120	120
Nitrogen Dioxide (NO_2)	Annual	100	100	100	100
Lead (Pb)	Quarterly	n/a	n/a	1.5	1.5

b. Background Air Quality

The Federal Clean Air Act (CAA) of 1990 requires that each state develop a State Implementation Plan (SIP) to provide the regulatory framework to implement the Clean Air Act. The New York State SIP adopted the National and New York AAQS listed in ***Table III.I-1, National and New York Ambient Air Quality Standards***. Attainment of the AAQS is required under the CAA and each state has a prescribed amount of time in which to bring non-compliant areas into compliance. New York State is divided into nine Air Quality Control Regions (AQCRs) based on geographic location. The NYSDEC operates a network of ambient air quality monitoring stations located throughout the state in each of the AQCRs in order to evaluate the attainment status of each region with respect to the respective AAQS. The Village of Mount Kisco is located in Westchester County, which lies within the NYSDEC AQC Region 3. The pollutants currently monitored in or near this region include sulfur dioxide, respirable particulate matter, carbon monoxide, ozone, nitrogen oxides and lead. A summary of the characteristics of these pollutants follows.

c. Sulfur Dioxide (SO2)

SO_2 emissions are primarily associated with the combustion of sulfur containing fuels, such as oil and coal. Source no significant quantities are emitted from mobile sources and the Proposed Project will not include the combustion of fuels, SO_2 was not analyzed.

d. Respirable Particulate Matter – PM10 and PM2.5

Particulate Matter (PM) is a class of air pollutants that includes airborne particles of a wide range of sizes and chemical composition and can exist as either a liquid droplet (aerosols) or solids suspended in the atmosphere. PM is emitted into the atmosphere from a wide variety of sources including both natural and anthropogenic. Natural sources include such things as salt particles resulting from evaporation of sea spray, wind borne pollen, molds, bacteria, particles eroded from beaches, soil and rock; and particles from forest fires. Major anthropogenic sources include combustion of fossil fuels (e.g., power generation, vehicular exhaust, boilers, engines and home heating), construction activities, agricultural activities and wood-burning fireplaces.

Respirable particulate matter includes both particles that are less than 10 microns in diameter (PM_{10}) and "fine" particles less than 2.5 microns in diameter ($PM_{2.5}$). Both PM_{10} and $PM_{2.5}$ can affect human respiratory functions and are a cause of concern. $PM_{2.5}$ is of particular concern in that these smaller particles have the ability to penetrate and remain in the deepest passages of the lungs. Gasoline-powered vehicles (such as passenger automobiles and Sports Utility Vehicles) produce relatively small quantities of respirable particulate, but diesel-powered vehicles, especially heavy trucks and buses, emit significant amounts of respirable particulates. The Proposed Project, over the long term, is not anticipated to induce any significant amount of bus or heavy truck trips. As a result, a PM mobile source analysis is not required.

e. Carbon Monoxide (CO)

Carbon monoxide is colorless, odorless gas that is produced primarily from the incomplete combustion of gasoline and other fossil fuels. In NYSDEC AQC Region 3 the vast majority of CO emissions come from motor vehicles. CO concentrations can vary greatly over relatively short distances and elevated concentrations are usually limited to locations near crowded intersections and along heavily traveled and congested roadways. CO is the principal pollutant of concern for the Proposed Project.

f. Nitrogen Oxides and Ozone

Nitrogen oxides (NO_x) are produced when fuels are burned at high temperatures. Although there are a number of individual compounds that are considered to be nitrogen oxides, only the compounds nitric oxide (NO) and nitrogen dioxide (NO_2) are released by motor vehicles into the atmosphere in significant quantities. Nitrogen oxides are of concern due to their role in the formation of photochemical oxidants, commonly referred to as ozone. Ozone is formed through a series of chemical reactions, which occur in the presence of sunlight. Because these chemical reactions are slow and occur as the pollutant is diffusing downwind the resulting elevated ozone levels are often found many miles from the sources of the precursor pollutants. The effects of NO_x emissions from sources are, therefore, generally examined on a regional basis. The change in regional mobile source emissions of NO_x is directly related to the type of vehicles, the total number of vehicle trips and the vehicle miles traveled through the local metropolitan area. The Proposed Project will have a nearly undetectable impact on overall traffic in the metropolitan area and, as a result, will not have an impact on regional NO_x or ozone levels. Therefore an analysis of project-related NO_x impacts from mobile sources is not warranted.

In addition to the motor vehicle-related indirect NO_x emissions from the Proposed Project, the use of gas-fired boilers for the 129 dwelling units will result in some direct emissions of NO_x. However these 129 residences would be considered representative of small, insignificant stationary sources. Emissions from them are not considered sufficient to require an analysis.

g. Lead (Pb)

Lead emissions are associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles available since 1975 and all vehicles available after 1980 are designed to use unleaded fuel. As these newer vehicles replaced the older ones, motor vehicle-related lead emissions have decreased and, as a result, ambient concentrations of lead have declined significantly. Therefore, an analysis of project-related emissions is not warranted.

Ambient air quality monitoring data collected by the NYSDEC was reviewed in an effort to characterize the existing air quality at the Project Site. The NYSDEC operates a network of monitoring stations throughout the State to measure ambient air quality and the results are published on an annual basis. For the Proposed Project, existing background concentrations of criteria pollutants were determined based on

data from monitoring stations nearest the Proposed Project. ***Table III. I-2, Existing Ambient Air Quality Monitoring Data Representative of the Project Area,*** summarizes the measured ambient concentrations that are most representative of the Project Area. The table lists the maximum annual concentration and second-highest short-term concentration (except for ozone, for which the fourth-highest 8-hour concentration is listed) in each of the last three years.

The data in ***Table III. I-2, Existing Ambient Air Quality Monitoring Data Representative of the Project Area*** indicates that existing air quality levels in the vicinity of the Project Site are well below the NAAQS and the New York AAQS.

Table III. I-2
Existing Ambient Air Quality Monitoring Data Representative of the Project Area

Pollutant	Location	Period	Units	Monitored Concentrations				AAQS
				2003	2004	2005	2006	
NO_2	Bronx Botanical Gardens	Annual	ppm	0.027	0.024	0.027		0.05
CO	Bronx Botanical Gardens	1-Hour	ppm	3.4	2.8	3.5	.025	35.0
		8-Hour	ppm	2.2	2.0	2.2		9.0
SO_2	Mt. Ninham (Carmel, NY)	3-Hour	ppb	26.9	38.9	21.8	2.2	500
		24-Hour	ppb	16.5	13.6	9.9	1.7	140
		Annual	ppb	2.4	2.2	2.2		30
PM_{10}	IS52 (Bronx, NY)	24-Hour	ug/m^3	46	40	-	18.5	150
		Annual	ug/m^3	22	18	-	10.8	50
$PM_{2.5}$	White Plains	24-Hour	ug/m^3	29.9	26.7	27.6	1.7	35
		Annual	ug/m^3	11.9	10.8	11.0		15
O_3	White Plains	8-Hour	ppm	0.091	0.078	0.095	-	0.08

Note: PM_{10} data was not available for 2005 for the IS52 monitor. 2007 information not available

As shown in ***Table III. I-2, Existing Ambient Air Quality Monitoring Data Representative of the Project Area,*** ambient air quality complies with the New York and Federal AAQS, with the exception of ozone, which is regional problem through the entire northeastern United States.

The existing air quality in the vicinity of the Proposed Project is acceptable for the proposed residential development and poses no known threat to either the health or welfare of the general population. With regard to elevated ozone levels, the NYSDEC has established an air pollution episode-monitoring plan to issue health warnings to the general public to caution those prone to health problems to remain indoors and restrain themselves from strenuous activities on days where ozone levels are predicted to be elevated. It should also be noted that high ozone levels are found throughout the northeastern United States and non-attainment of the ozone standard is more of a regional problem than a local problem and cannot be resolved without coordinated regional air pollution programs. The Proposed Project is consistent with all New York State Department of Transportation (NYSDOT) regional transportation programs, and thus, is in conformance with the portions of the SIP designed to bring the region into compliance with the ozone AAQS.

2. Potential Impacts

a. Short-Term

Construction activities related to the Proposed Project would result in limited short-term air quality impacts.

(1) Emissions of Carbon Dioxide

It is very difficult to project the number of vehicles to be used on the Site during construction that would produce carbon dioxide (CO_2) emissions. However, for the purpose of measuring the sensitivity of this potential construction-related impact, the CO_2 emissions from the Site during construction have been calculated to be approximately 21,099 tons of CO_2. This is a relatively small amount of CO_2, equivalent to approximately 0.009 percent of the total CO_2 (239.04 million tons) emitted by combustion sources in New York State in 2004, as reported by the United States Environmental Protection Agency (US EPA).

The potential CO_2 emissions associated with construction equipment for the Proposed Project would not be expected to have any measurable impact on global warming. In addition, it is unlikely that there would be a significant number of new emissions generators as a result of the Proposed Project. In other words, most of the vehicles and equipment used on the Site would be in use and generating CO_2 emissions throughout New York State and therefore the actual emissions associated with the Proposed Project would be significantly less than has been projected.

The estimated CO_2 emissions indicated above were based on the following assumptions and calculations:

Project Construction Activity Assumptions:

- 72 trucks each would be utilized each day during construction;
- The 72 trucks would be on-site and operating for six hours day for six days a week;
- The construction phase would last 88 weeks;
- Each truck would consume 50 gallons of diesel fuel per six hour day.

Calculating CO2 emissions

One of the primary determinants of CO_2 emission from mobile sources is the amount of carbon in the fuel. Carbon content varies, but typically average carbon content values are used to estimate CO_2 emissions.

The Code of Federal Regulations (40 CFR 600.113) provides a value for carbon content per gallon of diesel fuel of 2,778 grams which the US EPA uses in calculating the fuel economy of vehicles.

The Intergovernmental Panel on Climate Change (IPCC) guidelines for calculating emissions inventories require that an oxidation factor be applied to the carbon content to account for a small portion of the fuel that is not oxidized into CO_2. For all oil and oil products, the oxidation factor used is 0.99 (99 percent of the carbon in the fuel is eventually oxidized, while one percent remains un-oxidized.)

Therefore, to calculate the CO_2 emissions from a gallon of diesel fuel, the carbon emissions are multiplied by the ratio of the molecular weight of CO_2 (m.w. 44) to the molecular weight of carbon (m.w.12): 44/12.

CO_2 emissions from a gallon of diesel = 2,778 grams x 0.99 x (44/12) = 10,084 grams = 10.1 kg/gallon = 22.2 pounds/gallon.

Based on this CO_2 emission factor for diesel fuel the CO_2 emissions from construction operations associated with the Proposed Project are calculated as follows:

72 trucks x 50 gal. diesel/day x 6 day/week x 88 weeks = 1,900,800 gal. diesel
1,900,800 gal. diesel x 22.2 lbs. CO_2/gal. x 1 ton/2,000lbs = 21,099 tons CO_2

(2) Fugitive Dust Emissions

There would be fugitive dust generated during the Site preparation and construction phases of the Proposed Project.

The potential impact from these fugitive dust emissions would be minimized by following the established Westchester County Best Management Practices guidance.

The construction of the Proposed Project would result in carbon dioxide emissions from the following sources:

- Exhaust from the diesel construction equipment used for project site preparation, clearing, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from diesel trucks used to deliver equipment, concrete, fuel, and construction supplies to the construction site;
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site and from vehicles used by workers to commute to the construction site;
- Exhaust from diesel-powered welding machines, electric generators, air compressors, etc.

These emissions would be similar in nature to those produced by any large construction project that involves heavy equipment and transportation of materials to a project site. The carbon dioxide emissions from on-site construction equipment would be expected to be inconsequential compared to the carbon dioxide emissions associated with traffic in the general vicinity of the project.

Neither of the two above-described short-term construction-related impacts are expected to cause any violations of the State or Federal Ambient Air Quality Standards.

b. Long-Term

The only long term air quality impact that may be created by the Proposed Project results from the potential increase in project-related vehicular exhaust emissions. The primary pollutants associated with vehicular exhaust emissions are NO_x and CO.

The concern with NO_x emissions is their role in the photochemical reactions that lead to the formation of ozone. However, the chemical reaction to produce ozone is a slow process the effects of NO_x emissions from a source are only reviewed on a regional (mesoscale) and not a local (microscale) basis.

The principal pollutant of concern associated with vehicular emissions is CO. Vehicular CO emissions tend to increase as vehicle speeds decrease and are maximized during periods of vehicle idling and acceleration. CO emissions also increase as ambient temperatures decrease. Therefore, roadway intersections characterized by vehicular deceleration, queuing at idle and acceleration during winter temperature regimes represent the area where vehicular CO emissions (and potential impacts) are highest. Based on the traffic analysis was prepared by John Collins Engineers, P.C. the air quality impacts resulting from increased traffic were evaluated. The analysis is presented below.

(1) Carbon Dioxide from Tree Removal

The Proposed Project has identified 1,926 trees that would be removed during the construction phase of the Proposed Project. The Site can be characterized as a Maple-Birch-Ash Mixed Hardwood Upland Forest that is dominated by Red Maples, Sweet Birch, White Ash and Sugar Maples, which comprise over 80 percent of the tree species identified on site. An assessment of the potential amount of carbon dioxide that might be emitted as the result of removing these trees from the Site was conducted utilizing the *Method for Calculating Carbon Sequestration by Trees in Urban and Suburban Settings* developed by the U.S Department of Energy for Greenhouse Gas Reporting. This methodology utilizes the tree species and estimated age to estimate the total amount of carbon sequestered in a tree which, when multiplied by 3.67, yields the total potential carbon dioxide contained in the tree. The average age for each species of tree was obtained from the Proposed Project's analysis of the onsite forest as contained in Section III. C, Natural Resources of the DEIS. The following

Table III.I-3, Estimated Carbon Dioxide in Trees to be Removed summarizes the amount of potential carbon dioxide sequestered in the trees proposed to be removed:

Table III.I-3
Estimated Carbon Dioxide in Trees to be Removed

Common Name	To be Removed		Avg. Tree Age	Estimated Sequestered CO_2 (tons)
	#	% of total		
Red Maple	967	50.4%	32	1,116
Sweet Birch	235	12.2%	42	212
White Ash	223	11.6%	66	2,080
Sugar Maple	136	7.1%	31	69
Misc. Hardwoods	365	19.0%	55	1,288
Total	**1,926**	**100%**	**-**	**4,765.5**

The CO_2 sequestered in the trees to be removed would be emitted to the atmosphere when the wood is either combusted or during the natural decomposition process of the wood. The estimated 4,741 tons of CO_2 is a relatively small amount of carbon dioxide equivalent to approximately 0.002 percent of the total carbon dioxide (239.04 million tons) emitted by combustion sources in New York State in 2004 as reported by the US EPA. The potential CO_2 emissions associated with the Proposed Project's tree removal would not be expected to have any measurable impact on global warming. In addition the removal of these trees would be partially offset by the replanting of trees as part of the Proposed Project's tree mitigation plan for reestablishing a healthy forest community.

(2) Indirect Carbon Dioxide Emissions from Electricity Use after Project Completion

Electric service to the Site would be provided by the local utility supplier, Con Edison. The annual electric consumption for the project is estimated to be 2,828,887 kilowatt-hours per year. The U.S. EPA's Power Profiler website: (http://www.epa.gov/cleanenergy/powerprofiler.htm) was utilized to obtain the fuel mix and associated carbon dioxide emissions specific to Con Edison and the Proposed Project's location. EPA's Power Profiler utilizes the most recent version of the Emissions & Generation Resource Integrated Database (eGRID) which contains a comprehensive inventory of air emissions sources of electric power systems.

The carbon dioxide emission rate associated with electric generation for the project area is estimated by EPA to be 922 lbs/MWh which yields an annual project related carbon dioxide emission of 1,304 tons/yr (2828.9 MWh x 922 lbs/MWh x 1 ton/2000 lbs).

The following ***Table III.I-4, Electric Generation Fuel Mix for Project Region vs. National Fuel Mix*** provides the EPA estimated fuel mix to generate

electricity in the region of the Proposed Project as compared to the national fuel mix and the resulting carbon dioxide emission rate:

Table III.I-4
Electric Generation Fuel Mix for Project Region vs. National Fuel Mix

Fuel	Fuel Mix (%)	
	Project Area	National
Nuclear	49	20
Coal	0	50
Natural Gas	30	17
Oil	20	3
Hydro	0	7
Non-Hydro Renewables	1	2
Carbon Dioxide Emissions	**922 lbs/MWh**	**1363 lbs/MWh**

The lower carbon dioxide emissions in the Proposed Project's area is due to the higher overall percentage of electricity generation from non-fossil fuel related power (i.e. nuclear, renewables) as compared to the national average.

c. Screening Analysis

In September of 1998, the NYSDOT Environmental Analysis Bureau (EAB), in conjunction with the NYSDEC, released a revised version of their Environmental Procedures Manual (EPM) for Air Quality Analysis. For air quality issues, the revised EPM addressed changes in mobile source emission factors, analysis screening criteria and conformity to the SIP.

Chapter 1.A, Section 9 of the NYSDOT EPM provides criteria for screening free-flowing roadways and intersections to determine the need for a microscale air quality analysis. The guidelines in the EPM for an air quality modeling analysis provide the following criteria for determining when a microscale air quality modeling analysis may be needed for new developments:

For intersections with a LOS of A, B or C, no air quality analysis is required. For intersections with a LOS of D, E or F, the following criteria are applied to make the determination for the necessity of a microscale air quality analysis:

- 10 percent or greater reduction in the source-receptor distance;
- 10 percent or greater increase in traffic volume;
- 10 percent or greater increase in vehicle emissions;
- Any increase in the amount of queued lanes; and
- A 20 percent reduction in speed, when build-estimated average speed is at 30 mph or less.

If none of the criteria are met, then there is no need to conduct a microscale air quality analysis for a project. The traffic study for the Proposed Project identified the following intersections as having a projected LOS of D, E or F at the build year (2010):

- Kisco Avenue and Saw Mill River Parkway North Bound Ramps

- Kisco Avenue and Hubbell's Drive; and
- Kisco Avenue and Preston Way.

The results of the traffic study concluded that none of these intersections will experience: an increase in traffic greater than 10 percent; a reduction in source-receptor distances; an increase in vehicle emissions; addition of new queue lanes; or, a reduction in existing speeds to such a degree as to require a microscale modeling analysis.

3. Proposed Mitigation

Stationary source impacts from the Proposed Project are limited to the natural gas-fired boilers used to meet the Proposed Project's resident heating and hot-water needs. The air quality impacts from these sources are negligible and would have no perceptible affect on local air quality. The conclusion of the air quality screening analysis of potential long-term traffic impacts on local air quality is that the project-related traffic would not adversely affect long-term air quality and would not result in any new violations of AAQS. As a result, no mitigation measures are necessary in addressing long-term air quality impacts from the Proposed Project.

Short-term air quality impacts associated with construction of the Proposed Project would be mitigated by following the Westchester County Best Management Practices guidance and by maintaining all construction equipment in good working condition.

In addition, all other air pollutant emissions associated with construction equipment for the Proposed Project would be mitigated by the following actions:

- Ensure all equipment and vehicles used during construction would comply with applicable Federal and state air quality regulations;
- Implement operational measures such as limiting engine idling time and shutting down equipment when not in use;
- Active dust suppression would be implemented on unpaved construction access roads, parking areas and staging areas, using water-based dust suppression materials in compliance with state and local regulations; and
- Encourage carpooling among construction workers would be encouraged to minimize construction-related traffic and associated emissions;

a. Green Technologies to be utilized to Reduce Greenhouse Gas Emissions

The Proposed Project is proposing to design the building to achieve a silver rating according to the Leadership in Energy and Environmental Design (LEED) green building rating system. The Proposed Project would mitigate the production of greenhouse gas emissions through the following strategies:

- Selection of refrigerants that minimize or eliminate the emission compounds that contribute to ozone depletion;
- Mitigation of refrigerant leakage;
- Selection of equipment with efficient refrigerant charge;
- Reduction of "indirect" energy consumption which in turn reduces power plant emissions of greenhouse gases; and

- Fundamental and enhanced commissioning to verify that all of the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents.