3.10 Air Quality

3.10.1 Introduction

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.

Air Quality Standards and Compliance

The United States Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) have promulgated National Ambient Air Quality Standards (NAAQS) intended to protect the public health and welfare. These standards are designed to protect the most vulnerable segment of the population including children, the elderly and the infirm, who are more susceptible to respiratory infections and other air quality-related health problems. Locations or source-receptors that would be considered are schools, hospitals and convalescent homes and related facilities.

Several air contaminants have been identified by the EPA as being of concern nationwide. These pollutants include 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 effect on human health and the nation's welfare, and their final disposition in the atmosphere vary considerably. Particulate standards include only those particles with nominal diameters less than 10 microns which are inhalable.

NAAQS are mandated by the Federal Clean Air Act (1990). Standards promulgated by the EPA include primary and secondary standards. National Primary Standards are levels of air quality necessary, with a margin of safety, to protect the public health. National Secondary Standards are levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant, such as an adverse effect on vegetation. For all contaminants, except sulfur dioxide and suspended particulates, the primary and secondary standards are identical.

With the enactment of the Clean Air Act (the Act) and subsequent amendments, each state was required to achieve clean air through the submission of a State Implementation Plan (SIP) to the EPA for criteria pollutants which are not in attainment with the NAAQS. The SIPs describe how each state will attain and maintain air quality standards in non-attainment areas. The New York SIP adopted NAAQS from a list of seven criteria pollutants established by the EPA. These pollutants were selected by the EPA based on a list of pollutants of primary concern nationwide. Attainment of the NAAQS is required under the Act, and each State has a designated time period in which to bring nonconforming areas into compliance.

New York State drafted a SIP to achieve compliance with the ozone NAAQS by November 15, 2007. The draft SIP was prepared by the NYSDEC Air Resources Division and reviewed by the EPA for approval. The draft SIP cites strategies for reducing ozone levels including limits on gasoline volatility, lower gasoline sulfur levels, diesel fuel reformation, annual inspections for heavy-duty diesel vehicles, nitrogen oxide controls, and other measures. Table 3.10-1 provides federal and state air quality standards.

Table 3.10-1
State and Federal Air Quality Standards

		New York State Standards			Corresponding Federal Standards (Primary Standards)		
Pollutant[1]	**Avg Period**	**Conc.**	**Units**	**Stat**[2]	**Conc.**	**Units**[3]	**Stat**
Sulfur Dioxide	12 consecutive months	0.03	PPM	Arithmetic Mean (A.M)	80	µg/m³	Arithmetic Mean (A.M)
	24-hour	0.14	PPM	Maximum	365	µg/m³	Maximum
	3-hour	0.50	PPM	Maximum			
Carbon Monoxide	8-hour	9	PPM	Maximum	10	µg/m³	Maximum
	1-hour	35	PPM	Maximum	40	µg/m³	Maximum
Ozone	1-hour	0.12	PPM	Maximum	235	µg/m³	Maximum
	8-hour	0.08	PPM	Maximum	157	µg/m³	Maximum
Hydrocarbons (non-methane)	3-hour (6-9 am)	0.24	PPM	Maximum			
Nitrogen Dioxide	12 consecutive months	0.05	PPM	Maximum	100	µg/m³	AM
Lead [5]	3 consecutive months				1.5	µg/m³	Maximum
Fine Particulate Matter ($PM_{2.5}$)	12 consecutive months				15	µg/m³	Geometric Mean (G.M.)
	24-hours				65	µg/m³	Maximum
Inhalable Particulates (PM_{10}) [6]	12 consecutive months				50	µg/m³	Geometric Mean (G.M.)
	24-hours				150	µg/m³	Maximum
Total Suspended Particulates (TSP) [7]	12 consecutive months	75	µg/m³	Geometric Mean (G.M.)			
	24-hours	250	µg/m³	Maximum	260	µg/m³	Maximum

[1] New York State also has standards for beryllium, fluorides, hydrogen sulfide, and settleable particulates (dustfall). Ambient monitoring for these pollutants is not currently conducted.
[2] 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).
[3] Gaseous concentrations for Federal standards are corrected to a reference temperature of 25°C and to a reference pressure of 760 millimeters of mercury.
[4] Former NYS Standard for ozone of 0.08 PPM was not officially revised via regulatory process to coincide with the Federal standard of 0.12 PPM which is currently being applied by NYS to determine compliance status.
[5] Federal standard for lead not yet officially adopted by NYS, but is currently being applied to determine compliance status.
[6] Federal standard for PM_{10} not yet officially adopted by NYS, but is currently being applied to determine compliance status.
[7] New York State also has 30, 60, and 90-day standards as well as geometric mean standards of 45, 55, and 65 µg/m³ in Part 257 of NYCRR. While these TSP standards have been superseded by the above PM_{10} standards, TSP measurements may still serve as surrogates to PM_{10} measurements in the determination of compliance status.

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

Sources of air pollutants are summarized in Table 3.10-2, below.

Table 3.10-2
Principal Sources of Air Pollutants

Pollutant	Principal Sources
Carbon Monoxide (CO)	Motor Vehicles (78%), Fuel Combustion (6%), Industrial Processes (4%), Other Sources (12%)
Emissions leading to the creation of Ozone	Produced by the Action of Sunlight on Volatile Organic Compounds (VOC) and Nitrogen Oxindes (NO_x) Compounds in the Atmosphere
• VOC	Industrial/Commercial Processes (50%), Motor Vehicles (45%), Consumer Solvents (5%)
• NO_x	Motor Vehicles (55%), Utilities (22%), Industrial/Commercial/Residential (22%), Other Sources (1%)
Particulate Matter (PM)	Many Sources (Stationary and Mobile) Including Crushing and Grinding Operations and Natural Resources
Sulfur Dioxide (SO_2)	Electric Power Generation (67%), Fuel Combustion (18%), Non-road engines (5%), Metal Processing (3%), Other Sources (7%)
Lead	Metal Processing (52%), Waste Disposal (16%), Non-road Engines (13%), Fuel Combustion (13%), Other Sources (6%)

Source: US Environmental Protection Agency, 2007.

Sources of air pollution are generally characterized as mobile or non-point sources (transportation-related) and stationary or point sources (e.g., a smokestack). In general, the primary pollutants related to mobile sources are carbon monoxide (CO), nitrogen oxides (NOx), and Hydrocarbons. Oxidants, primarily ozone, results 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.

New York State is divided into nine Air Quality Control Regions (AQCR), in order to evaluate air quality by geographic regions. The New York State Department of Environmental Conservation

(NYSDEC) has a network of ambient air monitoring stations located throughout the State in each of the AQCR's in order to evaluate the attainment status of each region with respect to the SIP. The proposed project site is located in Region 3: Hudson Valley Air Quality Control Region. The Federal criteria pollutants currently monitored within the Region 3 include:

- sulfur dioxide (SO_2);
- ozone (O_3);
- Inhalable particulates ($PM_{2.5}$);
- inhalable particulates (PM_{10}); and,
- Lead.

The remaining criteria pollutants, carbon monoxide (CO) and nitrogen dioxide (NO_2) are not monitored in the Region 3 AQCR. The sources of these contaminants, their effect on human health and the nation's welfare, and their final disposition in the atmosphere vary considerably. Particulate standards include only those particles with diameters less than 10 microns which are inhalable.

3.10.2 Existing Conditions

The New York State Department of Envrionmental Conservation maintains a number of monitoring stations in the Hudson Valley to measure existing ambient air quality. Monitoring stations are sometimes operated over limited periods of time and certain stations are utilized to sample only certain parameters. Table 3.10-3 lists stations referenced in the NYSDEC *Air Quality Report* and the pollutants monitored at each. Monitoring stations are located at White Plains and Mamaroneck in Westchester County; Mt. Ninham in Putnam County; Valley Central, Newburgh (2), Wallkill (3), and Scotchtown in Orange County; Millbrook and Poughkeepsie in Dutchess County; and Belleayre Mountain, New Paltz and Saugerties in Ulster County. There are currently no air quality monitoring stations within Rockland County.

Table 3.10-3
NYSDEC Air Quality Monitoring

Stations	Parameters			
	Lead	Sulfur dioxide	Inhalable particulates	Ozone
NYSDEC Region 3				
Mamaroneck			**P**	
Wallkill	**P**			
Scotchtown	**P**			
Mt. Ninham		**P**		**P**
Belleayre Mtn.		**P**	**P**	**P**
Newburgh			**P**	
White Plains			**P**	**P**
Valley Central				**P**
Millbrook				**P**

P = Monitoring Location for Pollutant.
Source: *2005 Annual New York State Air Quality Report*, July 2006, NYSDEC Division of Air Resources

Table 3.10-4 summarizes 2005 data for the NYSDEC Region 3. Sampling information for pollutants not included in the table is either not collected in NYSDEC Region 3 or is collected at locations distant from the project site.

Nitrogen oxides (NO_x), a designation for nitrogen oxide (NO) and nitrogen dioxide (NO_2), are not monitored in Region 3. However, since they are precursors to the formation of ozone, they are of principal concern. The nearest monitoring station for nitrogen oxides is located in Region 2 at the Botanical Gardens in the Bronx.

Table 3.10-4
Regional Air Quality Data Summary

Monitoring Location	Pollutant	Concentration	Air Quality Standard	Within Standard?
Mt. Ninham	Ozone (O_3)	0.086 ppm (2)	.08 ppm (2)	No
Mt. Ninham	Sulfur Dioxide (SO_2)	2.2 ppb (1)	30 ppb (1)	Yes
Belleayre	Inhalable Particulates (PM_{10})	** g/m^3 (1)	50 g/m^3 (1)	**
White Plains	Inhalable Particulates ($PM_{2.5}$)	11.0 g/m^3 (1)	15 g/m^3 (1)	Yes
Wallkill	Lead (Pb)	** g/m^3 (3)	------	Yes
Mt. Ninham	PM Sulfate	** g/m^3 (1)	------	Yes
Mt. Ninham	PM Nitrate	** g/m^3 (1)	------	Yes
Botanical Gardens	Nitrogen Oxides (NO_x)	.027 ppm(1)	.05 ppm(1)	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/m^3).
**Data for 2005 is currently not available
Source: NYSDEC, Region 3, Air Quality Data 2005.

Based upon 2005 data, all monitored contaminants, except ozone, have achieved acceptable levels within the region. A geographic area that meets or exceeds the primary standard is defined as an attainment area; those that do not meet the primary standard are identified as non-attainment areas.

Ozone levels exceeding the air quality standards are found throughout the northeastern United States, and non-attainment of the standard is more of a regional than a local problem, and cannot be resolved without coordinated regional air pollution control programs. The State of New York and surrounding states have developed coordinated regulatory programs to bring the region into compliance. The proposed Stateline Retail Center development is not a large-scale regionally significant project, and therefore should not interfere with the any of the ongoing programs to bring the area into compliance with the ozone standards.

As indicated in Table 3.10-4, Putnam County is in a non-attainment area for the 8-hour standard for ozone levels. This means that the average of the highest daily 8-hour ozone levels recorded at the Mount Ninham monitoring station for the last three years exceeds the standard of 0.08 parts per million. The 1-hour ozone standard no longer applies to New York State since

it was revoked by the EPA effective June 15, 2005 for all locations with the exception of 14 metropolitan areas.

Existing Air Pollution Sources

Land in the vicinity of the project site generally supports a mixture of residential and commercial uses. Existing sources of air pollution in the vicinity include vehicle and engine exhaust and emissions from commercial and residential heating and hot water systems.

Existing Air Pollution Receptors

Potential sensitive receptors within the project vicinity include residential dwellings located within one half mile to the west, east and north of the site.

3.10.3. Future Without the Proposed Project

It is anticipated that air quality at and in the vicinity of the project site without the Stateline Retail Center project would be similar to current conditions. Minor increases in air pollutants from mobile and stationary sources would be expected due to continued local growth and development and increases in traffic volumes on Interstate 84 and US Route 6. However, compliance with the NAAQS and SIP will minimize these increases through development control and technologies employed to limit pollutant emissions for both stationary and mobile sources.

3.10.4 Potentially Significant Impacts of the Proposed Project

Air quality impacts associated with the proposed project were assessed to determine whether the proposal would have an adverse impact on the surrounding general population. Air quality impacts from construction activities and stationary sources during the operation of the development were assessed along with a determination of impacts from project-induced traffic along the primary access routes to and from the project site.

Mobile Source Analysis

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 AAQS have been developed for ambient CO concentrations requisite to protect the health and welfare of the general public with an adequate margin of safety. There are no short term health standards (currently enforced) for NO_2 and HC, since the primary concern with these pollutants is their role in the photochemical reactions that lead to the formation of secondary pollutants known as ozone and "smog" which are known lung and eye irritants. Since ozone and smog formation is a slow process, which occurs outside the primary impact area of the project, these pollutants are only reviewed on a regional (mesoscale) and not a local (microscale) basis.

Microscale Analysis

The determination for a required microscale analysis is based on the consideration of various criteria. Review of the criteria will establish the need for a microscale air quality analysis. The criteria are described below and apply to signalized intersections only:

1. Level of Service (LOS) Screening[1]

An intersection is composed of different approaches. Each approach has its own LOS. The LOS screening is performed on the entire intersection meaning all the approaches are assessed together, not separately. Under Build Conditions entire signalized intersections impacted by a project that have a LOS of D or worse need further screening and would then be considered under the Capture Criteria Screening. If there is no documented LOS information for an intersection, or it can not be calculated due to over capacity traffic volumes, the intersection will be deemed to have a LOS of D or worse.

2. Capture Criteria Screening

For Build Conditions entire intersections impacted by a project that are LOS D or worse are further screened to determine if they result in any of the following criteria:

a. A 10% or more reduction in the source-receptor distance (that is the straight-line distance between the edge of the travel lane closest to the receptor and that point of the receptor closest to the roadway);
b. A 10% or more increase compared to No-Build conditions in traffic volume on affected roadways;
c. A 10% or more increase compared to No-Build conditions in vehicle emissions;
d. Any increase in the number of queued lanes; or
e. A 20% reduction in speed, when the estimated average speed is at 30 mph or less under Build Conditions.

If any of the above criteria are met, the use of the volume and emission factor chart is needed to do volume threshold screening.

3. Volume Threshold Screening

If any of the criteria above are realized, then a traffic volume threshold should be considered to further determine the need for a microscale air quality analysis.

Review of the criteria for a microscale analysis was performed for the proposed Stateline Retail Center development and is shown in the Table 3.10-5, below. As shown in the table, the proposed Stateline Retail Center development does not meet the criteria for a microscale analysis provided in the NYSDOT EPM. Thus, no microscale analysis is required.

[1] The NYSDOT was contacted to explain the use of LOS for a microscale analysis. Per the phone conversation with Darrin Moret, NYSDOT, the entire intersection is taken into account, and not each approach involved with that intersection to come up with the LOS. See email correspondence dated, August 29 , 2007 in Appendix B.

Table 3.10-5
Stateline Retail Microscale Analysis

	YES	NO	ACTION
Does the proposed Stateline Retail Center development impact signalized intersections? These intersections are: • US Route 6/202, Argonne Road / I-684 & NYS Route 22 southbound ramps • US Route 6/202 and Starr Ridge Road/ I-684 & NYS Route 22 northbound ramps • Saw Mill Road & westbound ramps (I-84, Exit 1) • Saw Mill Road & eastbound ramps (I-84, Exit 1)	✓		If YES, continue to next question. If NO, a Microscale Analysis is not required.
If yes, is the LOS for any of the signalized intersections D, E or F?		✓	If YES, continue to next question. **If NO, a Microscale Analysis is not required.**
Do any of the intersections result in the following:	N/A	N/A	If YES, a Volume Threshold Screening is required. If NO, a Microscale Analysis is not required.
A 10% or more reduction in the source-receptor distance?	N/A	N/A	
A 10% or more increase in traffic volume on affected roadways?	N/A	N/A	
A 10% or more increase in vehicle emissions?	N/A	N/A	
Any increase in the number of queued lanes?	N/A	N/A	
A 20% reduction in speed, when the build estimated average is 30 mph or less?	N/A	N/A	

Source: Tim Miller Associates, Inc., 2006

The screening analysis of the various intersections under review revealed that traffic generated by the proposed project was insufficient to require a refined air analysis of any intersection.

Thus, significant air quality impacts resulting from vehicular air emissions are not expected.

Stationary Source Analysis

The Stateline Retail Center would not introduce major stationary sources of air pollution. The only stationary source of air pollutants associated with the proposed project would be the individual heating, ventilation and air-conditioning (HVAC) units and the hot water heating systems for the proposed retail establishment. The combustion of fuel by these systems would result in minor air pollutant emissions. The combustion of oil fuel produces SO_2 and particulate matter, while the combustion of natural gas fuel produces NO_x. Existing air quality levels for

these pollutants at the nearest monitoring stations are well within allowable standards and the proposed project would not be a major sources of stationary source emissions of these pollutants.

The operation of the facilities proposed for the project will result in minor increases in the overall atmospheric air pollutant burden. Heating and air conditioning systems may release small amounts of air pollutants that when compared to the regional burden are insignificant and should not cause an exacerbation of applicable standards or guidelines. The net difference in total air pollution burden is considered to be minimal for the Proposed Project. Thus, significant air quality impacts resulting from stationary source air emissions are not anticipated.

Construction Impacts

Potential short-term adverse air quality impacts that may result from the construction of the Proposed Project include fugitive dust and particulate matter from the clearing of the site and movement of equipment and vehicles across the site and emissions from the operation of the construction equipment and vehicles.

Fugitive and Airborne Dust

Construction activities on the project site would have a potential impact on the local air quality through generation of fugitive or airborne dust. Fugitive dust is generated during ground clearing and excavation activities, and generally when soils are exposed during dry periods. Throughout the construction period, passage of delivery trucks and other vehicles over temporary dirt roads and other exposed soil surfaces may also generate fugitive dust. Residences along NYS Route 6, closest to the proposed areas of grading and would have the greatest potential to be impacted by dust.

With proper site maintenance and careful attention to construction activities, impacts from fugitive dust can be maintained below the State or Federal NAAQS at off-site properties. Standard construction dust control methods would be employed to ensure that construction generated dust does not impact off-site residents. These methods include:

- Minimizing the area of grading at any one time and stabilizing all exposed areas, including areas where work would not occur for periods longer than two weeks, with mulch and seed immediately;
- Minimizing vehicle movement over areas of exposed soil, and covering all trucks transporting soil; and
- Unpaved areas subject to traffic would be sprayed with water to reduce dust generation.
- Truck vehicle washing pads would be constructed at all construction entrances to avoid the tracking of soil onto paved surfaces.

When conditions are favorable for dust generation, dust control can be provided through appropriate measures to reduce off-site impacts as well as improve on-site working conditions. During dry weather conditions spraying water on unpaved areas subject to heavy construction vehicle traffic will help control dust. Paved areas will also be kept clear of loose dirt that can be re-entrained into the air during vehicle passage. The use of stone tracking pads at access points to the site or washing of vehicle tires will greatly lessen the tracking of soil onto adjacent roadways.

Upon project construction, the project site will be covered with landscaping, turf, buildings, pavement, or remain in its natural state thereby reducing the potential for dust generation from the project area long-term.

Equipment and Vehicle Emissions

Construction-related air emissions will result from the use of diesel fuel as a source of energy for construction vehicles and equipment. On-site mitigation measures are proposed as a part of the project during construction to limit dispersal of particulate matter. Well maintained diesel engines are more fuel efficient than gasoline engines, however, they are a source of some air pollutants. Pollution from these engines comes from the combustion process in the form of exhaust. The major pollutants resulting from diesel fuel include the following:

- Hydrocarbons - Unburned or partially burned fuel molecules consist of hydrocarbons that can react in the atmosphere to form ground-level ozone, a major component of smog that can cause of range of respiratory health problems.
- Carbon monoxide - Emissions from diesel engines contain very low levels of carbon monoxide in comparison to gasoline engines. Carbon monoxide is a colorless, odorless gas that combines with the blood and limits its ability to transport oxygen. Carbon monoxide is the result of incomplete combustion of fuel.
- Nitrogen oxides - Because diesel engines consume fuel and air, and create heat, nitrogen from the air can be transformed into nitrogen oxides. This reddish brown gas can irritate the lungs and eyes. Nitrogen oxides react with hydrocarbons in the atmosphere to form ground-level ozone. Nitrogen oxides also contribute to acid rain.
- Particulate matter - Smoke from diesel engines contains microscopic airborne carbon particles that result from fuel combustion. The smoke from properly maintained diesel engines should not be visible. Exhaust fumes that are thick and black occur when diesel engines are poorly maintained or maintained improperly. Particulate matter can damage the respiratory system and contribute to the odor associated with diesel exhaust.

Although exhaust emissions from construction equipment is not as significant as fugitive dust generation, particulate matter from diesel exhaust emission will be controlled through proper tuning of the vehicle engines and maintenance of the air pollution controls. This will minimize additional contribution to site-generated particulate emissions during construction.

Through the incorporation of dust control measures and construction vehicle measures to control emissions, no short- or long-term significant air quality impacts as a result of construction operations are anticipated.