

A. INTRODUCTION

This chapter examines the potential for significant adverse air quality impacts from the proposed community of homes and associated amenities and facilities within the Town of Hamptonburgh, Orange County, New York. Air quality impacts can be either direct or indirect. Direct impacts stem from emissions generated by stationary sources at a projected or potential development site, such as emissions from fuel burned on site for heating, ventilation, and air conditioning (HVAC) systems. As discussed below, the proposed project would not result in any significant adverse air quality impacts from stationary sources.

Indirect impacts are caused by potential emissions due to mobile sources/vehicles generated by the development. This section presents the results of the air quality screening analysis that was performed for the proposed project.

B. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS**NATIONAL AND STATE AIR QUALITY STANDARDS**

As required by the Clean Air Act, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established by the US EPA for six major air pollutants: CO, NO₂, ozone, respirable PM, SO₂, and lead. The primary standards protect public health and represent levels at which there are no known significant effects on human health. 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. For NO₂, ozone, lead and PM, the primary and secondary standards are the same; there is no secondary standard for CO. EPA promulgated additional NAAQS which became effective September 16, 1997: a new 8-hour standard for ozone, which will replace the existing 1-hour standard, and in addition to retaining the PM₁₀ standards, EPA adopted 24-hour and annual standards for PM_{2.5}. The standards for these pollutants are presented in Table 3.11-1. These standards have also been adopted as the ambient air quality standards for New York State.

**Table 3.11-1
Ambient Air Quality Standards**

Pollutant	Primary		Secondary	
	ppm	µg/m ³	ppm	µg/m ³
Carbon Monoxide (CO)				
Maximum 8–Hour Concentration ¹	9	10,000	None	
Maximum 1–Hour Concentration ¹	35	40,000		
Lead				
Maximum Arithmetic Mean Averaged Over 3 Consecutive Months	NA	1.5	NA	1.5
Nitrogen Dioxide (NO₂)				
Annual Arithmetic Average	0.053	100	0.053	100
Ozone (O₃)				
1–Hour Average ²	0.12	235	0.12	235
8–Hour Average ³	0.08	157	0.08	157
Total Suspended Particles (TSP)				
Annual Mean	NA	45	None	
Rural Open Space		55		
Urban Residential		65		
Urban Industrial		75		
Maximum 24–Hour Concentration	NA	250		
Respirable Particulate Matter (PM₁₀)				
Average of 3 Annual Arithmetic Means	NA	50	NA	50
24–Hour Concentration ¹	NA	150	NA	150
Fine Respirable Particulate Matter (PM_{2.5})				
Average of 3 Annual Arithmetic Means	NA	15	NA	15
24–Hour Concentration ⁴	NA	65	NA	65
Sulfur Dioxide (SO₂)				
Annual Arithmetic Mean	0.03	80	NA	NA
Maximum 24–Hour Concentration ¹	0.14	365	NA	NA
Maximum 3–Hour Concentration ¹	NA	NA	0.50	1,300
<p>Notes: ppm – parts per million µg/m³ – micrograms per cubic meter NA – not applicable</p> <p>Particulate matter concentrations are in µg/m³. Concentrations of all gaseous pollutants are defined in ppm — approximately equivalent concentrations in µg/m³ are presented. TSP levels are regulated by a New York State Standard only. All other standards are National Ambient Air Quality Standards (NAAQS).</p> <p>¹ Not to be exceeded more than once a year. ² Applies only to areas designated as Non Attainment. ³ Three–year average of the annual fourth highest daily maximum 8–hr average concentration. ⁴ Not to be exceeded by the 98th percentile averaged over 3 years.</p> <p>Sources: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards; 6 NYCRR Part 257: Air Quality Standards.</p>				

STATE IMPLEMENTATION PLAN (SIP)

The Clean Air Act, as amended in 1990 (CAA) 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 a non-attainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which is a state's plan on how it will meet the NAAQS under the deadlines established by the CAA.

On December 17, 2004, EPA took final action designating the five boroughs of New York City, as well as Nassau, Rockland, Suffolk, Westchester and Orange counties, as non-attainment under the NAAQS for PM_{2.5}.

Orange County has also been designated as moderate non-attainment for the ozone 1-hour standard. In November 1998, New York State submitted its *Phase II Alternative Attainment Demonstration for Ozone*, which addressed attainment of the one-hour ozone NAAQS by 2007, and has recently submitted revisions to the SIP. These SIP revisions included additional emission reductions that EPA requested to demonstrate attainment of the standard and to update the SIP estimates using a new EPA model to predict mobile source emissions—MOBILE6. On April 15, 2004, EPA designated Orange County as moderate non-attainment for the new 8-hour ozone standard which became effective as of June 15, 2004. EPA will revoke the 1-hour standard in June, 2005; however, the very specific control measures for the 1-hour standard included in the SIP will be required to stay in place until the 8-hour standard is attained. The discretionary emissions reductions in the SIP would also remain but could be revised or dropped based on modeling. A new SIP for ozone will be adopted by the state no later than June 15, 2007, with a target attainment deadline of June 15, 2010.

Orange County is in attainment with respect to all other criteria pollutants.

C. POLLUTANTS FOR ANALYSIS

Ambient 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. Typically, ambient concentrations of carbon monoxide (CO) and lead are predominantly influenced by mobile source emissions. Emissions of nitrogen oxides (NO and NO₂, collectively referred to as NO_x) come from both mobile and stationary sources. Emissions of sulfur dioxide (SO₂) are associated mainly with stationary sources, but diesel-powered vehicles, primarily heavy duty trucks and buses, also contribute these emissions. Particulate matter (PM) is emitted from both stationary and mobile sources. Fine particulate matter is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react in the atmosphere. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and volatile organic compounds (VOCs), emitted mainly from industrial processes and mobile sources.

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 vary greatly 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 predicted on a local, or microscale, basis.

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The proposed actions would increase traffic volumes on streets near the project site and could result in localized increases in CO levels. Therefore, a mobile source screening analysis was performed to determine the locations where a more detailed mobile source analysis may be required.

NITROGEN OXIDES, VOCS, AND OZONE

Nitrogen oxides (nitrogen oxide [NO] and nitrogen dioxide [NO₂])—together NO_x) are of principal concern because of their role, together with volatile organic compounds (VOC), 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 diffusing downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from mobile sources are therefore generally examined on a regional basis, together with the emission of these pollutants from stationary sources. The change in regional mobile source emissions of these pollutants is related to the total number of vehicle trips and the vehicle miles traveled throughout the New York area. The proposed project would not have a significant adverse effect on the overall volume of vehicular travel in the region. It would not, therefore, have any measurable impact on regional NO_x emissions or on ozone levels. An analysis of project-related impacts from mobile sources for these pollutants was therefore not warranted.

LEAD

Lead emissions in air are principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles produced since 1975, and all produced after 1980, are designed to use unleaded fuel. As these newer vehicles have replaced the older ones, motor vehicle related lead emissions have decreased. As a result, ambient concentrations of lead have declined significantly. Nationally, the average measured atmospheric lead level in 1985 was only about one-quarter the level in 1975.

In 1985, EPA announced new rules drastically reducing the amount of lead permitted in leaded gasoline. The maximum allowable lead level in leaded gasoline was reduced from the previous limit of 1.1 to 0.5 grams per gallon effective July 1, 1985, and to 0.1 grams per gallon effective January 1, 1986. Monitoring results indicate that this action has been effective in significantly reducing atmospheric lead levels. Even at locations in the New York City area where traffic volumes are very high, atmospheric lead concentrations are far below the national standard of 1.5 micrograms per cubic meter (3-month average).

No significant sources of lead are associated with the proposed project, and, therefore, analysis was not warranted.

RESPIRABLE PARTICULATE MATTER—PM₁₀ AND PM_{2.5}

Particulate matter (PM) is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of natural organic vapors: 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. 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. Particulate matter also acts as a substrate for the adsorption of other pollutants, often toxic and some likely carcinogenic compounds.

Fine particulate matter, or PM_{2.5}, are fine particles with an aerodynamic diameter of less than or equal to 2.5 micrometers. This smaller fraction of the particle size range has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorbed 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 particulate matter (often soon after the release from an exhaust pipe or stack) or from precursor gases reacting in the atmosphere to form secondary particulate matter. Diesel-powered vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM; PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel-powered vehicles.

The proposed project would not result in any significant adverse increases in truck traffic near the project site or in the region, and therefore, an analysis of potential impacts from respirable particulates is not warranted.

SULFUR DIOXIDE

Sulfur dioxide (SO₂) emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal.

Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO₂ are not significant and therefore, an analysis of this pollutant from mobile sources was not warranted.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

An assessment of the potential air quality effects of the proposed project on CO concentrations that would result from vehicles coming to and departing from the proposed project site was performed following the procedures outlined in the New York State Department of Transportation (NYSDOT) *Environmental Procedures Manual (EPM)*, January 2001. The study area corresponds to that of the traffic analysis, described in Chapter 3.9, including 12 intersections for the CO microscale analysis (note: due to the planned redesign of Interchange 5 on Interstate 84, the intersection of NYS Route 208 and the Interstate 84 Eastbound ramps would be eliminated by 2008 as described in Chapter 3.9, resulting in 11 intersections, plus the intersection of Eager Road and the Project Site Driveway, for a total of 12 intersections that would be examined for the 2008 analysis year). The screening criteria described below were applied to the traffic analysis results for the 2008 analysis year.

CO SCREENING CRITERIA

Screening criteria described in the *EPM* were employed to determine whether the proposed project requires a detailed air quality analysis at the intersections in the study area. Before undertaking a detailed microscale modeling analysis of CO concentrations at the study area intersections, the screening criteria first determines whether the information from the traffic

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capacity analysis demonstrates that there is the potential for either significant adverse impacts from incremental traffic or from elevated air quality concentrations. The following multi-step procedure is suggested in the *EPM* to determine if there is the potential for CO impacts from the proposed project:

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

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

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

E. EXISTING CONDITIONS

Monitored ambient concentrations of SO₂, particulate matter (PM₁₀ and PM_{2.5}), ozone, and lead for the area are shown in Table 3.11-2. These values represent the most recent monitored data available that have been published by New York State Department of Environmental Conservation (NYSDEC) for these locations. Values of SO₂, were recorded at the monitoring station in Putnam County, PM₁₀ values were monitored in Ulster County, PM_{2.5}, ozone, and lead values were recorded at monitoring stations in Orange County. No CO and NO₂ monitoring is performed in the area; the nearest monitoring station is the Botanical Gardens, located in the Bronx.

There were no monitored violations of the NAAQS for the pollutants at these sites or any other in the region (with the exception of ozone, which is a regional pollutant) in 2003.

**Table 3.11-2
Representative Monitored Ambient Air Quality Data**

Pollutants	Location	Units	Period	Concentrations			Number of Exceedances of Federal Standard	
				Mean	Highest	Second Highest	Primary	Secondary
CO	Botanical Gardens, Bronx	ppm	8-hour	-	2.2	2.2	0	-
			1-hour	-	4.1	3.4	0	-
SO ₂	Mount Ninham, Putnam County	ppb	Annual	2.4	-	-	0	-
			24-hour	-	25.0	16.5	0	-
			3-hour	-	45.8	26.9	-	0
Respirable Particulates (PM ₁₀)	Belleayre Mountain, Ulster County	µg/m ³	Annual	13	-	-	0	0
			24-hour	-	49	34	0	0
Respirable Particulates (PM _{2.5})	Newburgh, Orange County	µg/m ³	Annual	11.8	-	-	-	-
			24-hour	-	44.3	39.5	-	-
NO ₂	Botanical Gardens, Bronx	ppm	Annual	0.027	-	-	0	0
Lead	Walkill, Orange County	µg/m ³	3-month	-	0.24	0.11	0	-
O ₃	Valley Central, Orange County	ppm	1-hour	-	0.109	0.107	-	-

Source: 2003 Annual New York State Air Quality Report, NYSDEC 2004

F. THE FUTURE WITHOUT THE PROPOSED PROJECT

In the future without the proposed project, no significant adverse changes in air quality are expected to occur in Orange County, as pollutant concentrations are expected to remain in compliance with the NAAQS (except for PM₂₅ and Ozone). The project site would remain undeveloped and there would be no significant adverse changes in air quality conditions at or near the project site.

G. POTENTIAL IMPACTS OF THE PROPOSED PROJECT

MOBILE SOURCE AIR QUALITY SCREENING RESULTS

The area roadway intersections were reviewed based on NYSDOT's *EPM* criteria for determining locations that may warrant a CO microscale air quality analysis. The screening analysis examined the LOS and projected volume increases by intersection approach. As described below, the results of the screening analysis show that none of the 12 project-affected intersections would require a detailed microscale air quality analysis.

LOS SCREENING ANALYSIS

Results of the traffic capacity analysis performed for the 2008 Build year condition, for the AM, PM and Saturday peak periods were reviewed at each of the study area intersections to determine the potential need for a microscale air quality analysis. As discussed in Chapter 3.9, “Traffic and Transportation”, the trip generation analysis used ITE trip generation rates for “Single Family Housing” and “Residential Condo/Townhouse” development categories. Since the proposed project is an active-adult age-restricted community, the actual rates of trip generation are expected to be lower than those used for the analysis.

The LOS screening criteria were first applied to identify those intersections with approach LOS D or worse. Based on the review of the 12 intersections analyzed, the following intersections were projected to operate at a LOS D or worse on approaches during any of the peak traffic periods analyzed:

- NYS Route 208 (N-S) @ I-84 WB Ramps
- Neelytown Road (E-W) @ Beaver Dam Road
- NYS Route 416 (N-S) @ County Route 99
- NYS Route 416 (N-S) @ NYS Route 211 (Southern leg)
- NYS Route 207 (E-W) @ NYS Route 416

CAPTURE CRITERIA SCREENING ANALYSIS

Further screening on the intersections identified in the LOS Screening Analysis was conducted using the Capture Criteria outlined above. This screening indicated that for two of the above five intersections, one of the listed Capture Criteria would be met; a 10 percent or more increase in traffic volume on affected roadways for the Build year. Therefore, a volume threshold screening analysis was conducted for the following two intersections:

- Neelytown Road (E-W) @ Beaver Dam Road
- NYS Route 416 (N-S) @ NYS Route 211 (Southern leg)

VOLUME THRESHOLD SCREENING

Since one of the capture criteria listed above was triggered, a volume threshold screening analysis was conducted to further determine the need for a microscale air quality analysis. The volume thresholds (provided in the *EPM*) establish traffic volumes below which a violation of the NAAQs for CO is extremely unlikely. This approach uses project area specific emissions data to determine corresponding vehicle thresholds. For intersections where approach volumes are equal to or less than the applicable thresholds, microscale air quality analysis is not required. Based on the volume threshold screening, the project-related traffic volumes at each of the intersections would be below the volume threshold criteria. Therefore, a detailed CO microscale air quality analysis was not warranted at these intersections.

As discussed above, the results of screening analysis based on NYSDOT’s EPM employed to determine whether the proposed project requires an air quality analysis, none of the 12 project-affected intersections would require detailed microscale air quality analysis. Therefore, no significant adverse air quality impacts would be expected to occur as a result of the proposed project.

STATIONARY SOURCES

The only stationary source of air pollutants associated with the proposed project would be the individual fossil fuel-fired heating and hot water systems. Due to their small size, residential heating systems are exempt from state and local permitting regulations for their emissions. The primary pollutants of concern when burning oil are SO₂ and particulate matter, and NO₂ when burning natural gas. Since monitored concentrations of these pollutants indicate that levels are well below the standards in the study area, it is not expected that the proposed project would result in significant adverse air quality impacts due to stationary sources.

CONSISTENCY WITH THE NEW YORK STATE AIR QUALITY IMPLEMENTATION PLAN

The proposed project is not expected to cause any new violations of air quality standards or exacerbate any existing violations with implementation of the proposed roadway improvements for the projected 2008 Build conditions. Therefore, the proposed project would not have a significant adverse impact on local air quality and would be considered consistent with the requirements of the New York SIP. As a result, no mitigation measures are warranted.