Chapter 11: Air Quality

11-1 INTRODUCTION

In this chapter, the effect of the project's operation on air quality is analyzed. The regulatory context, methods of analysis, existing air quality, and the future air quality with the project are described. Air quality effects during construction are analyzed in Chapter 18, "Construction Impacts."

Since the project would not increase overall traffic volumes (see Chapter 4, "Transportation"), the analysis focuses on changes in roadway and bridge configuration which may affect air quality at nearby residential locations and other land uses. However, the bridge toll rate adjustments under consideration could result in the diversion of some trips, which would otherwise use the Replacement Bridge to access alternative routes. The effect of this potential toll change on regional (i.e., mesoscale) emissions and local concentrations near diversion routes is examined. The project would not introduce any new, permanent stationary sources.

11-2 REGULATORY CONTEXT

11-2-1 POLLUTANTS FOR ANALYSIS

Emissions from motor vehicles result from combustion of fuels—predominantly gasoline and diesel.

Carbon monoxide (CO), particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide, NO, and nitrogen dioxide, NO_2, collectively referred to as NO_x) are all emitted from the combustion of both gasoline and diesel. CO emissions are predominantly from gasoline combustion. While NO_x and PM emissions are mostly from diesel combustion, substantial amounts are also emitted from gasoline vehicles.[1] Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x, which includes SO_2 and other sulfur oxides), ammonia, organic compounds, and other gases react or condense in the atmosphere. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs.

For local (i.e., microscale) on-road emissions, the pollutants of concern include CO and PM, and both are included in this analysis for the project. Overall, the efforts to reduce CO emissions from motor vehicles due to federal regulations over the past few decades have been very successful, and CO concentrations are generally not of concern in New York State, although regulations are maintained to ensure continued compliance. VOC emissions are mainly of concern as regionwide (mesoscale) ozone precursors and are, therefore, not addressed here for the microscale analysis of the project.

[1] Light-duty vehicles, which are predominantly gasoline powered, emit these pollutants at a much lower rate than heavy diesel trucks, but due to the larger number of light-duty vehicles, the total amount from light-duty vehicles is substantial.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$), and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM. Diesel-powered engines are a substantial source of respirable PM, most of which is $PM_{2.5}$.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern farther downwind from large stationary point sources, and has not been a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may become of greater concern for this pollutant, and, therefore, NO_2 from the project is discussed as well.

Emissions of sulfur dioxide (SO_2) are currently associated mainly with stationary sources and with some sources utilizing non-road diesel such as diesel trains and marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Similarly, non-road diesel federal regulations are being phased in by 2012 (with minor exceptions as late as 2015, not affecting this project) requiring the phase out of sulfur in diesel for all uses. Therefore, SO_2 is not currently of concern for on-road emissions, and will not be an issue of concern beginning in the near future from transportation sources in general. Similarly, lead in gasoline has been banned under the Clean Air Act (CAA) and is, therefore, not a pollutant of concern for the project. Therefore, SO_2 and lead have not been included in this analysis.

In addition to the criteria pollutants discussed above, non-criteria pollutants can be of concern. The Clean Air Act Amendments of 1990 listed 188 Hazardous Air Pollutants (HAPs) and addressed the need to control toxic emissions from transportation. The United States Environmental Protection Agency (USEPA) has assessed this expansive list in their latest rule: *Control of Hazardous Air Pollutants from Mobile Sources*.[2] In addition, USEPA identified seven high-priority compounds with significant contributions from mobile sources. These seven priority mobile source air toxics (MSATs) are acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM) plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. While the Federal Highway Administration (FHWA) considers these to be the priority MSATs, the list is subject to change and may be adjusted in consideration of future USEPA rules. The rule also identified several engine emission certification standards that must be implemented. Unlike criteria pollutants, HAP do not have National Ambient Air Quality Standards (NAAQS), making evaluation of their impacts more subjective.

[2] Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007.

To address stakeholders' concerns and requests for MSAT analysis during project development and alternatives analysis, FHWA developed their *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA*. This guidance was most recently updated on September 30, 2009. The guidance provides a tiered approach for analyzing MSAT in National Environmental Policy Act (NEPA) documents. Depending on the specific project circumstances, FHWA has identified three tiers of analysis: Level 1—no analysis for projects with no potential for meaningful MSAT effects; Level 2—qualitative analysis for projects with low potential for MSAT effects; or Level 3—quantitative analysis to differentiate alternatives for projects with higher potential for MSAT effects.

Since each alternative in the Final Environmental Impact Statement (FEIS) will have no impact on traffic volume or vehicle mix on the bridge and approaches, the project is classified as a "Level 1" project for the purposes of MSAT evaluation. The project would not increase overall traffic volumes, or affect vehicle mix or any other factor that would cause an increase in MSAT emissions (see Chapter 4, "Transportation"). In addition, as noted in the September 30, 2009 FHWA guidance, "EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an analysis of national trends with EPA's MOBILE6.2 model forecasts a combined reduction of 72 percent in the total annual emission rate for the priority MSAT from 1999 to 2050, while vehicle-miles of travel are projected to increase by 145 percent. This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project."

11-2-2 NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are designed to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The NAAQS are presented in **Table 11-1**. The NAAQS for CO, annual NO_2, and SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only.

11-2-3 NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment. SIPs normally include emissions budgets for all sources (motor vehicle, nonroad, point sources, and area sources) that the NAA is expected to meet. The NAAs containing the project study area or part of the study area are presented in **Table 11-2**.

Table 11-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average [(1)]	9	10,000	None	
1-Hour Average [(1)]	35	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average [(2)]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average [(3,4)]	0.075	150	0.075	150
Respirable Particulate Matter (PM_{10})				
24-Hour Average [(1)]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean [(5)]	NA	15	NA	15
24-Hour Average [(6)]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average [(7)]	0.075	196	NA	NA
Maximum 3-Hour Average [(1)]	NA	NA	0.50	1,300

Notes:
ppm – parts per million
µg/m³ – micrograms per cubic meter
NA – not applicable

All annual periods refer to calendar year.

PM concentrations (including lead) are in µg/m³ since ppm is a measure for gas concentrations. Concentrations of all gaseous pollutants are defined in ppm and approximately equivalent concentrations in µg/m³ are presented.

(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
(3) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(4) USEPA has proposed lowering the primary standard further to within the range 0.060-0.070 ppm, and adding a secondary standard measured as a cumulative concentration within the range of 7 to 15 ppm-hours aimed mainly at protecting sensitive vegetation. A final decision on this standard has been postponed but is expected to occur in 2013.
(5) USEPA has proposed lowering the primary standard to within the range 12-13 µg/m³. A final decision on this standard is expected by December 14, 2012.
(6) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(6) USEPA has lowered the NAAQS down from 65 µg/m³, effective December 18, 2006.
(7) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration. Replaced the previous annual- and 24 hour-average standards, effective August 23, 2010.

Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

Table 11-2
Non-Attainment Areas in the Project Study Area

Pollutant	NAA Name	Severity	Counties
Ozone	New York-N. New Jersey-Long Island, NY-NJ-CT	Moderate	Bronx Kings Nassau New York Queens Richmond Rockland Suffolk Westchester
CO	New York-N. New Jersey-Long Island, NY-NJ-CT	Maintenance (moderate)	Bronx Kings Nassau New York Queens Richmond Westchester
$PM_{2.5}$	New York-N. New Jersey-Long Island, NY-NJ-CT	Non-attainment	Bronx Kings Nassau New York Queens Richmond Rockland Suffolk Westchester Orange

Sources: USEPA, Greenbook, http://www.epa.gov/oar/oaqps/greenbk/, accessed 2010.

Effective June 15, 2004, USEPA designated New York City and Nassau, Rockland, Suffolk, and Westchester counties as a moderate NAA for the 1997 8-hour average ozone standard (the NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT NAA). In 2008, the New York State Department of Environmental Conservation (NYSDEC) submitted a proposed motor vehicle emissions budget (MVEB) for this NAA for public review and comment, and effective August 17, 2010, USEPA determined that said proposed MVEB was adequate for use in transportation conformity analyses. It is this MVEB to which the New York Metropolitan Transportation Council's (NYMTC) Transportation Improvement Program (TIP) and Regional Transportation Plan (Plan) have to conform. On June 18, 2012, USEPA determined that this area has attained the 1997 8-hour ozone NAAQS (0.08 ppm). Although not yet a redesignation to attainment status, this determination removes certain further requirements under the 8-hour standard.

In March 2008, USEPA strengthened the 8–hour ozone standards. USEPA designated the Counties of Suffolk, Nassau, Bronx, Kings, New York, Queens, Richmond, Rockland, and Westchester (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT NAA) as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012. A SIP will be due in 2015.

New York County is the only county in the region designated as an NAA for PM_{10} (moderate). The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties are designated as $PM_{2.5}$ NAA (the New York-Northern New Jersey-Long Island, NY-NJ-CT NAA) due to exceedance of the 1997 annual average standard. The MVEB for the 1997 annual $PM_{2.5}$ SIP was found to be adequate by USEPA on December 1, 2010. Based on 2006-2009 monitoring data, annual average concentrations of $PM_{2.5}$ in this area no longer exceed the annual standard. USEPA has determined that the area has attained the 1997 annual $PM_{2.5}$ NAAQS, effective December 15, 2010.

The New York Metropolitan Area (NYMA) is designated as nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS. The NAA includes the same 10-county area originally designated as nonattainment with the 1997 annual $PM_{2.5}$ NAAQS. Based on 2007-2009 monitoring data, 24-hour average concentrations of $PM_{2.5}$ in this area no longer exceed the 24-hour standard. New York has submitted a “Clean Data” request to the USEPA. Any requirement to submit a $PM_{2.5}$ SIP is stayed until USEPA acts on New York’s request.

Annual average NO_2 concentrations monitored at existing NO_2 monitoring stations to date have all been lower than the NAAQS. As described above, USEPA has recently promulgated a new 1-hour NO_2 standard. USEPA has designated the entire state of New York as “unclassifiable/attainment” of the new 1-hour NO_2 standard effective February 29, 2012. However, additional monitoring is required for the 1-hour standard, and therefore, areas will be reclassified once three years of monitoring data are available (2016 or 2017).

Based on the available monitoring data, all areas in New York State currently meet the new 1-hour SO_2 standard. Additional monitoring and refined modeling of large sources may be required. USEPA plans to make final attainment designations in June 2012, based on 2008 to 2010 monitoring data and refined modeling. SIPs for NAAs will be due by June 2014.

In 2002, USEPA re-designated the New York City area, including Westchester County, as in attainment for CO. Under the resulting maintenance plan, New York City is committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. There are no site-specific control measures in Westchester County. The approved maintenance plan also includes an MVEB for CO with which the seven-county area must conform.

11-2-4 CONFORMITY WITH STATE IMPLEMENTATION PLANS

The conformity requirements of the CAA and regulations promulgated thereunder (conformity requirements) limit the ability of federal agencies to assist, fund, permit, and approve projects in non-attainment or maintenance areas that do not conform to the applicable SIP. When subject to these requirements, the lead federal agency is responsible for demonstrating conformity of its proposed action. Conformity determinations for federal actions related to transportation plans, programs, and projects which are implemented, funded, or approved under title 23 U.S.C. or the Federal Transit Act (49 U.S.C. 1601 et seq.) must be made in accordance with 40 CFR § 93 Subpart A (federal transportation conformity regulations). Conformity determinations for all other federal actions must be made according to the requirements of 40 CFR § 93 Subpart B (federal general conformity regulations). As described below, FHWA, as the lead federal agency for the project, is required to make a transportation conformity determination. In addition, the United States Coast Guard (USCG) and United States Army Corps of Engineers (USACE) have determined that the general conformity requirements under 40 CFR § 93 Subpart B are also applicable to certain permits that are required for the project.

11-2-4-1 GENERAL CONFORMITY

A detailed general conformity analysis for the project construction was prepared by the New York State Department of Transportation (NYSDOT) and the New York State Thruway Authority (NYSTA) and is presented in **Appendix H** and described in Chapter 18, "Construction."

Since the annual NO_x and CO emissions from the combination of activities to be permitted by USACE and USCG would exceed the *de minimis* rates defined in the general conformity regulations, a conformity analysis was prepared. NYSDEC has documented, in a written commitment to USEPA, a specific schedule for adoption and submittal of a revision to the ozone and $PM_{2.5}$ SIP, which would achieve the needed emission reductions prior to the time emissions from the project would occur. NYSDEC has also determined that an areawide modeling analysis of CO concentrations is not required, as per 40 CFR § 93.158(a)(4)(i).

Since total direct and indirect emissions associated with the USACE permits for the project are below the general conformity applicability thresholds, USACE has concluded that a general conformity determination for its permits is not required. USCG expects to make a final conformity determination prior to or concurrent with the Record of Decision for the Tappan Zee Hudson River Crossing Project.

11-2-4-2 TRANSPORTATION CONFORMITY

The Interagency Consultation Group (ICG) in New York State includes representatives from the FHWA, Federal Transit Administration (FTA), USEPA, NYSDEC, NYSDOT, and the Metropolitan Planning Organizations. The ICG provides multi-agency concurrence on the assumptions and methodologies used in the regional emissions analyses of Transportation Improvement Programs (TIPs) and Long Range Metropolitan Transportation Plans (Plans). The modeling inputs and parameters used in the most recently amended NYMTC 2011-2015 TIP and 2035 Plan were established in consultation with NYSDEC and the New York State ICG.

As the lead federal agency, FHWA determined that the 8-lane Replacement Bridge Alternative is a non-exempt project under the conformity regulations. Thus, it must be included in the applicable regional transportation emissions analysis. The ICG concurred with FHWA's proposed non-exempt classification on November 29, 2011. Accordingly, NYMTC included the 8-lane alternative in the regional emissions analysis of the recently proposed amendment to the 2011-2015 NYMTC TIP and 2035 Plan. In effect, this means NYMTC performed the required transportation conformity analysis. The analysis revealed that the regional emissions with the 8-lane Replacement Bridge Alternative would comply with all respective SIP emissions budgets as required under the CAA. On May 16, 2012, the ICG concurred that NYMTC's regional emissions analysis appropriately considered the latest planning assumptions, which are basic inputs and current information into the model, in place at the time NYMTC's regional emissions analysis began on January 23, 2012. This meets the criteria for the use of the latest planning assumptions in 40 CFR § 93.110(a). FHWA, NYSDOT, and NYSTA continue to coordinate with NYMTC regarding the transportation conformity determination for the amended NYMTC TIP and Plan, including the Replacement Bridge Alternative. NYMTC will vote to approve the amended TIP and Plan, together with the associated Transportation Conformity analysis, in the near future. FHWA and FTA, in consultation with USEPA, will then formally concur in the Transportation Conformity Determination prior to FHWA's issuance of a Record of Decision for the Tappan Zee Bridge Hudson River Crossing Project.

The following criteria and procedures also apply for projects from a currently conforming TIP and regional transportation plan:

- The project must not cause or contribute to any new localized CO, PM_{10}, and/or $PM_{2.5}$ violations, increase the frequency or severity of any existing CO, PM_{10}, and/or $PM_{2.5}$ violations, or delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in CO, PM_{10}, and $PM_{2.5}$ nonattainment and maintenance areas.
- The project must comply with any PM_{10} and $PM_{2.5}$ control measures in the applicable implementation plan. This criterion is satisfied if the project-level conformity determination contains a written commitment from the project sponsor to include in the final plans, specifications, and estimates for the project those control measures (for the purpose of limiting PM_{10} and $PM_{2.5}$ emissions from the construction activities and/or normal use and operation associated with the project) that are contained in the applicable implementation plan.

As described in Chapter 4, "Transportation," and later in this chapter, the project is not expected to increase vehicle miles traveled or the ensuing on-road emissions during the operation of the project as compared to the future condition included in the currently conforming TIP and plan. According to the transportation conformity regulations (40 CFR § 93.116), the project will not cause or contribute to any new local CO, PM_{10}, and/or $PM_{2.5}$ violations, increase the frequency or severity of any existing violations, or delay timely attainment of any NAAQS, emissions reductions, or other milestones, if the project is not identified in the following criteria, described in 40 CFR § 93.123:

- For projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation;
- For projects affecting intersections that are at Level-of-Service D, E, or F, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes related to the project (for PM, this applies only to intersections with a significant number of diesel vehicles or significant increase in the number of diesel vehicles);
- For any project affecting one or more of the top three intersections in the nonattainment or maintenance area with highest traffic volumes or the top three

intersections in the nonattainment or maintenance area—the worst level of service, as identified in the SIP.

In addition, for PM only, procedures for "hotspot" analysis are required to be used

- For new highway projects that have a substantial number of diesel vehicles, and expanded highway projects that have a substantial increase in the number of diesel vehicles;
- New bus and rail terminals and transfer points that have a substantial number of diesel vehicles congregating at a single location; and
- Expanded bus and rail terminals and transfer points that substantially increase the number of diesel vehicles congregating at a single location.

Regarding the project-level transportation conformity requirements for localized "hotspot" emissions analyses, ICG reviewed and accepted the models, methods, and assumptions used in this environmental document. During the Draft Environmental Impact Statement (DEIS) review process, ICG concurred that since the project is non-exempt and will reduce source receptor distance by 10 percent or more, a quantitative "hotspot" emissions analyses, based on reasonable and common professional practice, is required and appropriate for CO per 40 CFR § 93.123(a)(2). ICG concurred that the project is not a project of air quality concern for PM per the criteria in 40 CFR § 93.123(b)(1).

Analyses of the effect of the change in roadway alignment on concentrations nearby were also prepared for informational purposes and to meet the requirements of NEPA and New York State Environmental Quality Review Act (SEQRA).

In addition, per the federal transportation conformity regulations and associated USEPA guidance, ICG concurred that the vehicle diversions resulting from potential toll adjustments on the Tappan Zee Bridge do not significantly increase the truck volumes on any affected roadways on the diversion routes. The estimated volume increases on the affected roadways are also below the NYSDOT thresholds for requiring a "hotspot" analysis (see more in Section 11-5-2-2). Therefore, per 40 CFR § 93.116 and § 93.123, the vehicle diversions due to potential future increased Tappan Zee Bridge tolls would not cause or contribute to any new localized CO, PM_{10}, and/or $PM_{2.5}$ violations, increase the frequency or severity of any existing CO, PM_{10}, and/or $PM_{2.5}$ violations, or delay timely attainment of any NAAQS or any required interim emissions reductions or other milestones.

11-3 METHODOLOGY

Since the project would not increase traffic volumes on the bridge or approaches and would not reduce levels of service (see Chapter 4, "Transportation"), the mobile source assessment is focused on potential air quality effects of CO and PM emissions that could result from the project roadway reconfiguration. The assessment follows the procedures outlined for CO in NYSDOT's *The Environmental Manual (TEM),* January 2001, and for PM in NYSDOT's *Project Level Particulate Matter Analysis Policy*, September 2004.

11-3-1 SCREENING ANALYSES

According to the NYSDOT *TEM* "capture criteria," CO microscale analysis is required if the Build condition level of service is at D, E, or F and the project would result in a 10 percent or more reduction in the distance between source and receptor (locations where potential air quality is analyzed, such as residential or open space locations), and if traffic volume screening thresholds would be exceeded. The slight shift in the replacement bridge's location would require an adjustment in the roadway on the bridge landing sites and connection to the existing roadway, resulting in the nearest lane being closer by more than 10 percent to some adjacent residential locations (and farther from receptors on the opposite side), and the free-flow traffic volumes on the bridge would exceed the volume screening threshold. Therefore, a detailed CO analysis was conducted in the area of both bridge landings (on the Rockland and Westchester sides). In addition, a screening analysis was prepared for locations to which traffic may be diverted as a result of the potential toll adjustments under consideration.

The toll adjustment diversion screening analysis focused on 2017. Since the 2017 emission rates are nearly identical to the highest future year emission rates (0.3 percent difference—see **Table 11-3** below), and since the growth rates in both diverted traffic increments and No Build traffic would be the same (the growth drivers for the Tappan Zee Bridge and other regional highways are the same), fractional increases due to diversions would not be different for future years.

The NYSDOT policy for PM does not require analysis for projects that would not result in increased traffic volumes, unless other factors have potential to result in increased PM emissions, but does not otherwise provide any screening procedures. Although the project would not increase emissions, and therefore PM analysis is not strictly required according to the NYSDOT policy, the project would shift the roadway source closer to some receptor locations, as described above for CO. Therefore, detailed PM analyses were prepared for the same locations described above for CO. Regarding diversions associated with potential toll adjustments, a reasonable worst-case screening model was prepared, according to the general dispersion modeling procedures (below). This model assumed a highway link with the highest predicted peak-hour traffic increment (the increments projected at the George Washington Bridge), a ground-level line source, and receptors immediately adjacent to the roadway. This screening analysis is for comparison with incremental concentrations and no intersections would be involved in which the background traffic would influence queuing time. Therefore, incremental traffic was modeled as a screen, representing the reasonable worst-case scenario for any location at which diverted traffic would result in increased traffic volume.

11-3-2 ROADWAY EMISSIONS AND DISPERSION ANALYSIS

The prediction of vehicle-generated emissions and their dispersion incorporates meteorological phenomena, traffic conditions, and physical configurations. Air pollutant dispersion models mathematically simulate the combined effect of traffic, meteorology, and geometry on pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and because it is necessary to predict the reasonable worst-case condition, most of these dispersion models predict conservatively high pollutant concentrations, particularly under adverse meteorological conditions. The mobile source analysis for the project employs a modeling approach approved by USEPA. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels which result in a conservatively high estimate of expected concentrations.

11-3-2-1 VEHICLE EMISSIONS

Vehicular exhaust emission factors, which were computed by NYSDOT using the USEPA Mobile Source Emissions Model, MOBILE6.2,[3] and presented in NYSDOT's *TEM*, were used for the CO and PM dispersion analyses. The database includes emission factors by county, vehicle class, roadway functional class, and speed. MOBILE6.2 is capable of calculating vehicle emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs.

TEM provides emission factors up to year 2035. Through the consultation with the NYSDOT Office of Environment, the analysis used year 2035 emission factors for later years, conservatively combining higher emission factors with higher traffic volumes (see more below regarding analysis years).

In addition to exhaust emissions, the PM_{10} analyses include resuspended road dust. Resuspended paved-road dust emission rates were calculated using the procedures published by USEPA (USEPA, AP-42, January 2011). According to USEPA's guidance[4] and in agreement with NYSDOT, $PM_{2.5}$ fugitive dust is considered negligible and does not need to be included in mobile source microscale modeling analysis. Therefore, $PM_{2.5}$ emissions include only engine exhaust, brake wear, and tire wear (from *TEM*).

11-3-2-2 ANALYSIS YEARS

According to the *TEM*, CO and PM impact analyses are required for the Estimated Time of Completion (ETC) and the year with highest corridor emission levels of ETC+10 and ETC+20. For this major bridge project, the year ETC+30 is also being considered in the analysis year determination so that the highest emissions for future years are being captured, and air quality conditions are adequately addressed. The ETC for the project is 2017.

In order to determine the year with the highest corridor emissions, emissions associated with the forecasted traffic volumes for each year were calculated. This calculation, presented in **Table 11-3,** incorporates the projected increase in traffic volume in future years and the decrease in vehicular emissions associated with improved vehicle technology in future years (total emissions = average emission factor x traffic volume.)

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[3] USEPA, User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model, EPA420-R-03-010, August 2003.

[4] USEPA, Transportation Conformity Guidance for Quantitative Hotspot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas, EPA-420-B-10-040, December 2010

The NYSDOT-published emission factors (available up to the year of 2035) generally decrease in earlier years, but level off starting in approximately 2027 or soon thereafter. Traffic volumes in the study area are projected to increase by about 0.3 percent and 0.2 per year in the AM and PM periods, respectively.

Table 11-3
Net Emission Rate Calculation by Analysis Year

	2017	2027	2037	2047
AM Peak Hour				
Total Bridge Traffic Volume	11,783	12,133	12,492	12,863
CO Factor (g/veh-mile at 55 mph)	3.6	3.3	3.3	3.3
CO Rate (g/mile at 55 mph)	***42,834***	*40,516*	*41,722*	***42,960***
$PM_{2.5}$ Factor (g/veh-mile at 55 mph)	0.014	0.012	0.012	0.012
$PM_{2.5}$ Rate (g/mile at 55 mph)	***169***	*152*	*150*	***155***
PM Peak Hour				
Total Bridge Traffic Volume	11,678	11,916	12,160	12,408
CO Factor (g/veh-mile at 55 mph)	3.6	3.3	3.3	3.3
CO Rate (g/mile at 55 mph)	***42,452***	*39,795*	*40,611*	***41,440***
$PM_{2.5}$ Factor (g/veh-mile at 55 mph)	0.014	0.012	0.012	0.012
$PM_{2.5}$ Rate (g/mile at 55 mph)	***168***	*149*	*146*	***149***

Notes: Idle emissions or lower speeds at the toll plaza would result in similar conclusions.
Sources: Traffic volumes from Paramix model (see Chapter 14, "Transportation")
Emission Rates from NYSDOT's *TEM*.

The projected emission factors will generally decrease more than the projected increase in traffic volumes in early years, and then level off in future years while traffic volumes continue to grow. Overall, emissions would be highest in 2017. In 2027 and 2037, emissions would be lower than in 2017 due to ongoing improvements in vehicle technology in earlier years. Emissions would begin to increase after 2037 as traffic volumes continue to grow, and would be slightly higher or slightly lower than 2017 in 2047. Therefore, detailed air quality analyses were conducted for ETC (2017) and ETC+30 (2047).

11-3-2-3 DISPERSION MODEL FOR MICROSCALE ANALYSES

Maximum CO and PM concentrations resulting from vehicle emissions at the bridge landing site in Rockland County were predicted using USEPA's CAL3QHC model version 2.0.[5] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC is used to conservatively predict the dispersion from idling and moving vehicles based on peak traffic and meteorological conditions.

A different modeling approach was used to analyze impacts around the bridge landing area in Westchester County, including the bridge's toll plaza. The toll plaza operates as a series of many line sources including queues, and is, therefore, better represented as

5 USEPA, User's guide to CAL3QHC—A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, September 1995.

an area source. Area sources are better simulated by the USEPA-approved model AERMOD. AERMOD is a steady-state plume dispersion model and simulates dispersion from multiple point, area, or volume sources. Dispersion characteristics may be selected to model rural or urban conditions, and terrain effects can be modeled to reflect simple or complex terrain. The model employs hourly sequential preprocessed meteorological data to estimate concentrations for selected averaging times from one hour to one year.

11-3-2-4 METEOROLOGY

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed from a given source, and wind speed and atmospheric stability affect the extent of mixing in the atmosphere.

Following the *TEM* and USEPA guidelines[6], CAL3QHC computations were performed using a wind speed of 1 meter per second, and the neutral stability class, D (for urban environments). The wind angle was varied to determine the maximum concentrations at each receptor under all wind conditions, regardless of frequency of occurrence. 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.70 to account for persistence of meteorological conditions; similarly, a 24-hour persistence factor of 0.4 and an annual persistence factor of 0.08 were used to obtain 24-hour and annual average PM concentrations. A surface roughness of 1.08 meters was chosen. These assumptions ensured that worst-case meteorology was used to estimate impacts.

The latest available five years of hourly meteorological data were employed in the AERMOD model: surface data collected at LaGuardia Airport and concurrent upper air data collected at Brookhaven, Suffolk County, New York from 2005 through 2009. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

11-3-2-5 TRAFFIC DATA

Traffic data for the air quality analysis were modeled based on existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the project (see Chapter 4, “Transportation”). Traffic data for the future with and without the project were employed in the respective air quality modeling scenarios. Peak hour periods were used for microscale CO and PM analysis around the bridge landing site in Rockland County (using CAL3QHC), producing the maximum anticipated project-generated traffic and the greatest potential for air pollutant emissions. This assumption results in conservatively high concentrations since the peak hour traffic is used for all hours. The modeling of bridge traffic at the landing area in Westchester County (using AERMOD) applied hourly traffic distribution.

[6] USEPA, *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, USEPA Office of Air Quality Planning and Standards, EPA-454/R-92-005, 1992.

11-3-2-6 BACKGROUND CONCENTRATIONS

Background concentrations are pollutant concentrations originating from sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions within 1,000 feet and in the line of sight of the analysis site. Background concentrations are added to modeling results to obtain total pollutant concentrations at an analysis site.

Background concentrations were conservatively assumed to be the same as those monitored in the existing condition, presented in Section 11-4, "Affected Environment." Background concentrations of PM and CO have been declining over the years and are expected to continue to decrease, as demonstrated by many monitored concentrations in the region.

11-3-2-7 RECEPTOR LOCATIONS

Concentrations were modeled at multiple receptors at both analysis sites. The receptors were placed at spaced intervals along sidewalk or roadside locations with continuous public access, and at residential locations. The receptors placed on sidewalks were located at least 3 meters from each of the traveled roadways. Concentrations were calculated at receptors placed at 25-meter intervals along the sidewalk. Ground-level receptors were placed at a height of 1.8 meters, and elevated residential windows were included as well. Receptor locations in the Rockland County and Westchester County models are presented in **Figures 11-1 and 11-2**, respectively.

11-3-3 EVALUATING AIR QUALITY IMPACTS

The relative importance of a predicted consequence of a project (i.e., whether it is material, substantial, large, or important) should be assessed in connection with its context and setting (e.g., urban or rural), and its intensity (including probability of occurrence, duration, irreversibility, geographic scope, magnitude, and number of people affected). For the purposes of this evaluation, the term 'adverse impact' is used to indicate an impact of importance based on the above criteria, and not simply an increase in pollutant concentrations.

In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the NAAQS concentrations (see **Table 11-1**) would be deemed to have a severe potential adverse impact. In addition, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be substantially increased in NAAs, threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds could be deemed to have a potential adverse impact, even in cases where violations of the NAAQS are not predicted, depending on the context, intensity, and frequency of the exceedance.

NYSDOT requires that operational PM impacts be estimated for all of their projects that exceed listed thresholds in the final interim policy (September 2004), regardless of project location or attainment status. Maximum PM_{10} and $PM_{2.5}$ incremental concentrations or emission differences found to be greater than those thresholds, listed below, will be determined to represent a potential adverse environmental impact.

11.29.11

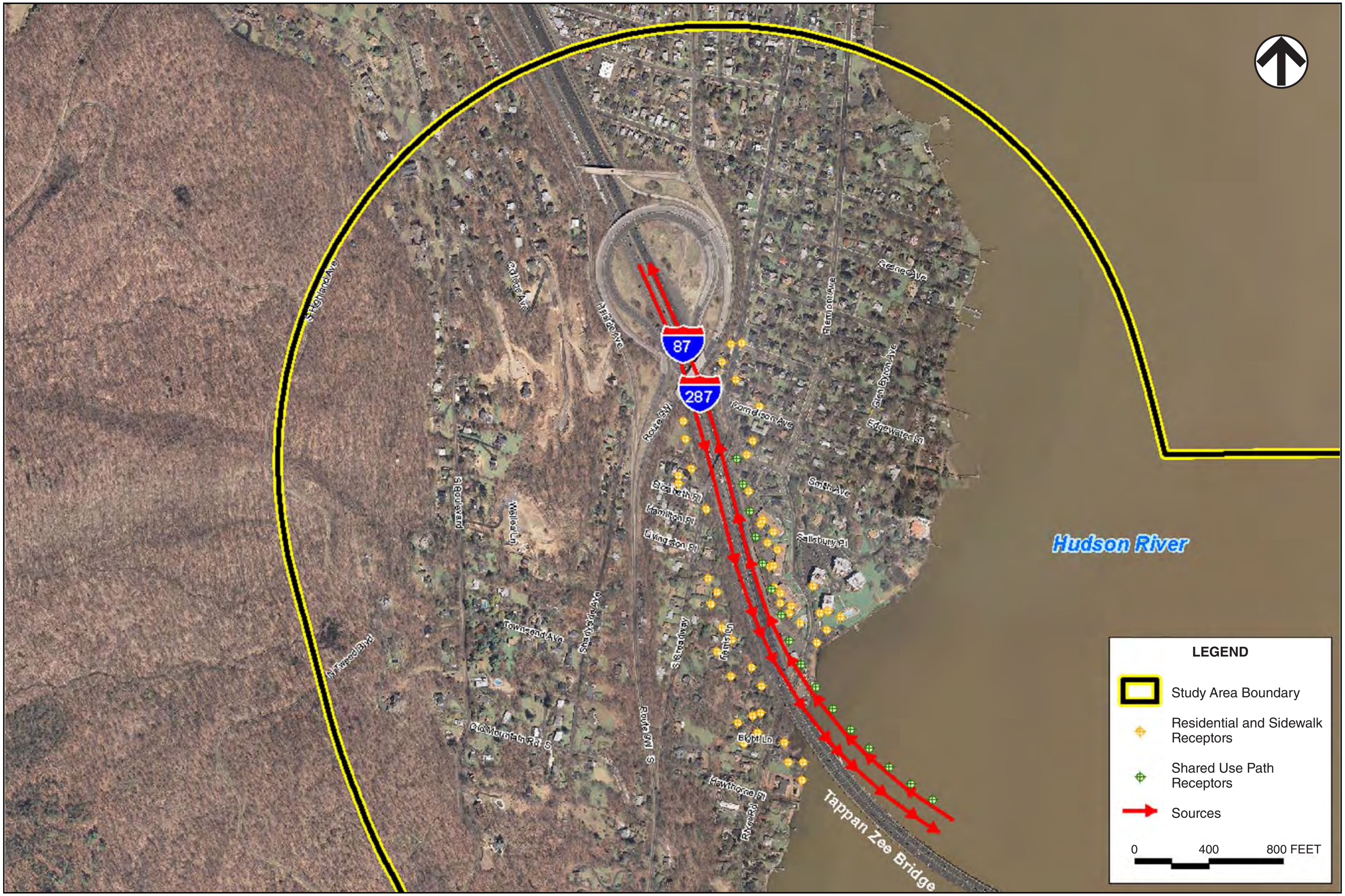

Figure 11-1
Mobile-Source Analysis Receptor Locations
Rockland County

Figure 11-2

Mobile-Source Analysis Receptor Locations
Westchester County

PM_{10} Potential Adverse Impact Thresholds—

Microscale Analysis:

- Greater than 5.0 μg/m^3 on a 24-hour basis.

Mesoscale Analysis:

- Greater than two percent increase in emission burden.

$PM_{2.5}$ Potential Adverse Impact Thresholds—

Microscale Analysis:

- Greater than two percent of NAAQS annual Standard or 0.3 μg/m^3, or
- Greater than 5.0 μg/m^3 on a 24-hour basis.

Mesoscale Analysis:

- Greater than two percent increase in emission burden.

11-4 AFFECTED ENVIRONMENT

The NYSDEC ambient air quality monitoring network was established to monitor potential statewide air quality. For areas without monitoring stations, air quality can be characterized as similar to that measured at the nearest stations that are similar in land use and air pollution sources to the area under study. The most recent concentrations of relevant criteria pollutants (2009–2011) measured at ambient air quality monitoring stations nearest to the project are presented in **Table 11-4**.

Table 11-4
Representative Monitored Ambient Air Quality Data for Criteria Pollutants, 2009 to 2011

Pollutant and Averaging Time	Monitored Data				NAAQS	Monitoring Site Location
	2009	2010	2011	3-year Average		
Carbon Monoxide (ppm)						New York City (Bronx) 200th Street and Southern Boulevard
8-hour	2.5	1.6	2.8	NR	9	
1-hour	3.4	2.1	3.2	NR	35	
Ozone (ppm)						Westchester (White Plains) Pump Station Orchard Street
8-hour 4th-highest Daily Max	0.075	0.075	0.075	0.075	0.075	
Ozone (ppm)						Orange (Montgomery) 1175 Route 17K
8-hour 4th-highest Daily Max	0.066	0.075	0.066	0.069	0.075	
Nitrogen Dioxide (ppm)						New York City (Bronx) Botanical Gardens
Annual Arithmetic Mean	0.023	0.022	0.021	0.022	0.050	
PM_{10} (μg/m^3)						New York City (Bronx) IS52
24-Hour Maximum	64	no data	no data	NR	150	
$PM_{2.5}$ (μg/m^3)						Westchester (Mamaroneck) 5th Avenue and Madison
Annual Arithmetic Mean	9.1	8.8	9.3	9.1	15	
24-Hour 98th Percentile	27.0	26.7	22.7	25.5	35	
$PM_{2.5}$ (μg/m^3)						Orange (Newburgh) 55 Broadway
Annual Arithmetic Mean	7.9	8.2	8.6	8.2	15	
24-Hour 98th Percentile	20.6	26.5	20.8	22.6	35	

Note: NR—not relevant.

The ambient air concentrations measured at all listed stations were below the corresponding NAAQS, except for exceedances of the 8-hour ozone standard recorded in both Orange and Westchester Counties within the 3-year period. The CO and PM concentrations were also applied as background levels in the microscale analysis.

11-5 ENVIRONMENTAL EFFECTS

11-5-1 NO BUILD ALTERNATIVE

In the No Build Alternative, air quality in the general area of the project would be similar to the existing condition described above, with some improvements in air quality expected to occur over the years resulting from statewide efforts to reduce pollution and improved vehicular technology as older vehicles are replaced with newer, cleaner engines. However, in the immediate vicinity of the existing bridge, concentrations higher than these background conditions would be expected (as is the case in the existing condition) due to the large volumes of traffic using the bridge, bridge approaches, and toll plaza. Future No Build concentrations were projected in the microscale model, and are presented along with the Replacement Bridge Alternative results in the following section.

Furthermore, under the No Build Alternative, heavy congestion and delays resulting from accidents and vehicle breakdowns on the bridge, where no shoulders or emergency lanes are available to clear the roadway, would persist, resulting in avoidable emissions. Additionally, maintenance operations would be more intense under the No Build Alternative than under the Replacement Bridge Alternative, resulting in some additional emissions.

11-5-2 REPLACEMENT BRIDGE ALTERNATIVE

11-5-2-1 AIR QUALITY NEAR THE REPLACEMENT BRIDGE

The air quality resulting from the Long Span and Short Span Options for the Replacement Bridge Alternative would be essentially the same; the slight differences in predicted concentrations, presented below, result from somewhat different elevations and roadway configuration at the bridge landing sites. The traffic would be the same, and the bridge alignment and receptor locations would be largely the same.

The results of the CO microscale modeling, including background levels, are presented in **Table 11-5** and are compared with the NAAQS for CO. The highest CO concentrations under the build conditions were predicted to occur along the new shared-use path since it would be the location closest to Interstate 87/287 traffic along the bridge and toll plaza. However, the predicted microscale CO levels would all be below the 1-hour CO NAAQS of 35 ppm or 8-hour CO NAAQS of 9 ppm. Consequently, the Replacement Bridge Alternative would not result in an adverse microscale CO air quality impact. (Note that the shared-use path would be located on the north side of the north span of the bridge, and would be separated from the nearest moving lane by 12-feet, the shoulder and safety barrier.)

The projected PM concentration contributions from bridge traffic in the No Build and Replacement Bridge Alternatives (excluding background levels) and the increments as compared with the No Build Alternative are presented in **Table 11-6**. The increments are all projected to be lower than the applicable NYSDOT thresholds. Note that the PM concentrations on the shared-use path cannot be compared with No Build concentrations since there is no similar path on the existing bridge (the existing bridge has no pedestrian or cyclist access).

The total predicted concentrations, including background levels (presented in **Table 11-2)**, are compared with the NAAQS. Total maximum concentrations at all locations are projected to be lower than the corresponding NAAQS, as shown in **Table 11-7**.

Overall, no exceedances of the NAAQS or applicable incremental thresholds are projected. Furthermore, a few features of the replacement bridge options would reduce pollutant emissions as compared to the No Build Alternative:

- The Replacement Bridge Alternative would replace the existing lanes (portions of which are approximately 11 feet wide) with 12-foot-wide lanes, improving safety on the bridge. The replacement bridge would also introduce shoulder areas for vehicles involved in accidents and breakdown incidents and for emergency vehicle access, thereby improving the traffic flow and reducing the substantial delays that these incidents cause (the existing bridge experiences a high accident rate, as described in Chapter 1, “Purpose and Need”).
- The introduction of three highway-speed toll lanes (replacing the two existing 35 mph lanes) would reduce congestion and idling emissions at the toll plaza.
- The replacement bridge would have four lanes in each direction, eliminating the need to move the median barriers twice daily (currently accomplished using a specialized diesel engine, taking approximately half an hour for each switch) and improving traffic flow during those times.

The bridge toll rate adjustments under consideration could result in the diversion of some trips which would otherwise use the Replacement Bridge to alternative routes. This effect was not included in the above analysis of local concentrations in the vicinity of the Replacement Bridge, and, therefore, these results would be conservatively high in the event that diversions do occur.

Table 11-5
Total Maximum Predicted CO Concentrations (ppm)

Alternative	2017		2047	
	1-hour	8- hour	1-hour	8- hour
NAAQS:	*35*	*9*	*35*	*9*
Rockland County				
Residential and Sidewalk				
No Build	6.3	4.5	6.3	4.5
Short Span	6.0	4.3	5.9	4.3
Long Span	5.8	4.2	5.9	4.3
Bridge Shared-Use Path				
Short Span	7.1	5.1	7.0	5.0
Long Span	6.3	4.4	6.4	4.5
Westchester County				
Residential				
No Build	10.4	5.1	10.7	5.4
Short Span	10.3	5.3	10.6	5.5
Long Span	9.6	5.0	9.8	5.1
Sidewalk				
No Build	10.6	6.1	10.6	6.1
Short Span	10.6	6.0	10.6	6.0
Long Span	10.6	6.1	10.6	6.1
Bridge Shared-Use Path				
Short Span	13.7	6.9	14.2	7.1
Long Span	12.5	6.3	12.9	6.5

Note: 1-hour background is 3.4 ppm; 8-hour background is 2.5 ppm.

Table 11-6
Maximum Predicted PM Concentration Increments ($\mu g/m^3$)

Alternative	2017			2047		
	$PM_{2.5}$		PM_{10}	$PM_{2.5}$		PM_{10}
	24-hour	Annual	24-hour	24-hour	Annual	24-hour
Incremental Threshold:	*5*	*0.3*	*5*	*5*	*0.3*	*5*
Rockland County						
Residential and Sidewalk						
No Build	2.4	0.5	8.8	2.0	0.4	8.8
Short Span	2.0	0.4	7.6	1.6	0.3	7.6
Long Span	2.0	0.4	7.2	1.6	0.3	7.2
Maximum Increment	-0.4	-0.1	-1.2	-0.4	-0.1	-1.2
Westchester County						
Residential						
No Build	2.7	1.0	5.5	2.6	0.9	5.7
Short Span	2.6	1.0	5.4	2.5	0.9	5.6
Long Span	2.7	1.0	5.5	2.6	0.9	5.7
Maximum Increment	0.0	0.0	0.0	0.0	0.0	0.0
Sidewalk						
No Build	3.9	1.3	8.0	3.7	1.2	8.3
Short Span	3.8	1.3	7.9	3.7	1.2	8.2
Long Span	3.9	1.3	8.0	3.7	1.2	8.3
Maximum Increment	0.0	0.0	0.0	0.0	0.0	0.0

Notes:
The projected increment from No Build to the Replacement Bridge Alternative is compared with the NYSDOT incremental thresholds.
Background concentrations are not included.
Negative numbers indicate a projected decrease in maximum concentrations.

Table 11-7
Maximum Total Predicted PM Concentrations (μg/m³)

Alternative	2017			2047		
	$PM_{2.5}$		PM_{10}	$PM_{2.5}$		PM_{10}
	24-hr	Annual	24-hr	24-hr	Annual	24-hr
NAAQS:	*35*	*15*	*150*	*35*	*15*	*150*
Rockland County						
Shared-Use Path						
Short Span	27.9	9.6	72.8	27.9	9.6	74.8
Long Span	27.1	9.4	71.2	27.5	9.5	72.4
Sidewalk and Residential						
No Build	27.9	9.6	72.8	27.5	9.5	72.8
Short Span	27.5	9.5	71.6	27.1	9.4	71.6
Long Span	27.5	9.5	71.2	27.1	9.4	71.2
-	-	-	-	-	-	-
Westchester County-Toll Plaza						
Shared-Use Path						
Short Span	28.7	10.1	70.0	28.5	10.0	70.6
Long Span	28.0	9.9	68.7	28.0	9.8	69.2
Sidewalk Receptors						
No Build	29.4	10.4	72.0	29.2	10.3	72.3
Short Span	29.3	10.4	71.9	29.2	10.3	72.2
Long Span	29.4	10.4	72.0	29.2	10.3	72.3
Residential						
No Build	28.2	10.1	69.5	28.1	10.0	69.7
Short Span	28.1	10.1	69.4	28.0	10.0	69.6
Long Span	28.2	10.1	69.5	28.1	10.0	69.7

Notes:
Pollutant concentrations include the following background levels:
$PM_{2.5}$: 24-Hrs = 28 μg/m³ ; Annual = 9.6 μg/m³
PM_{10}: 24-Hrs = 64 μg/m³

11-5-2-2 AIR QUALITY ALONG DIVERSION ROUTES

The potential effect of diversions resulting from the bridge toll rate adjustments under consideration was reviewed. The 2017 No Build traffic volumes and incremental volumes at the various crossings for peak hours and daily are presented in **Table 11-8**. The highest resulting fractional increment would be a 5.6 percent increase in daily traffic projected at the Bear Mountain Bridge.

Table 11-8
No Build and Diversion Increment Daily Traffic Volumes, 2017

Crossing	Scenario	Daily
Tappan Zee Bridge East Bound	No Build	74,520
	Increment	-11,700
		-15.7%
Lincoln Tunnel East Bound	No Build	63,530
	Increment	700
		1.1%
George Washington Bridge East Bound	No Build	162,520
	Increment	8,400
		5.2%
Holland Tunnel East Bound	No Build	47,130
	Increment	400
		0.8%
Bear Mountain Bridge East Bound	No Build	19,660
	Increment	1,100
		5.6%
Newburgh Beacon Bridge East Bound	No Build	44,590
	Increment	1,100
		2.5%

In addition to the crossings themselves, roadways leading to and from the crossings were examined to assess whether air quality analysis is warranted. Existing annual average daily traffic volumes on these routes were obtained from NYSDOT and New Jersey Department of Transportation (NJDOT) traffic counts.[7] Diversion routes were estimated with the following assumptions:

- Newburgh-Beacon Bridge (NBB) trips:
  - All of these trips would use New York Route 9D (Breakneck Road), New York Route 9 (Albany Post Road), the Taconic State Parkway, or I-84/I-684, and would continue south on these routes (merging with diversions to the BMB on Route 9A south of Peekskill and on the Taconic State Parkway south of Yorktown).
  - These diversions would be distributed as follows:
    - 5 percent on New York Route 9D (Breakneck Road);
    - 25 percent on New York Route 9 (Albany Post Road);
    - 35 percent on Taconic State Parkway; and

[7] NYSDOT, Traffic Data Viewer, http://gis.dot.ny.gov/tdv/, accessed 6/1/2012; and NJDOT, Roadway Information and Traffic Counts, http://www.state.nj.us/transportation/refdata/roadway/traffic_counts, accessed 6/5/2012.

        - 35 percent on I-84/I-684.

- Bear Mountain Bridge (BMB) trips:
    - 10 percent would head north on New York Route 9D, while 90 percent would head south;
    - Of those heading south:
        - Approximately one-third (30 percent of the total BMB traffic) would head east in Peekskill (on Bear Mountain State Parkway), with all 30 percent then heading south on the Taconic State Parkway; and
        - Two-thirds (60 percent of the diverted BMB traffic) would head south on New York Route 9 (Briarcliff-Peekskill Parkway) south of Peekskill.
- George Washington Bridge trips:
    - About one-third of the diverted traffic (about 115 vehicles per hour, or 60 vehicles per hour per lane) would likely approach the George Washington Bridge via the Palisades Interstate Parkway;
    - Less than half (about 170 vehicles per hour, or 60 vehicles per hour per lane) would approach via New Jersey Route 4 (coming from New Jersey Route 17; and
    - About one fourth (about 90 vehicles per hour, or 15 vehicles per hour per lane) would approach via I-95 (coming from the New Jersey Turnpike and Interstate 80).

The worst-case daily average existing and incremental traffic volumes along the various diversion routes are presented in **Table 11-9**.

Since the diversions would not increase traffic at any location by 10 percent or more, according to the NYSDOT guidance for CO, no significant adverse CO impact would occur due to diversions, and more detailed microscale analysis is not required.

The reasonable worst-case microscale PM screening analysis projected a maximum 24-hour average increase of 0.20 $\mu g/m^3$ 0.40 $\mu g/m^3$ for $PM_{2.5}$ and PM_{10}, respectively, and annual average increase of 0.04 $\mu g/m^3$ $PM_{2.5}$. These incremental concentrations are all lower than the applicable screening thresholds in the NYSDOT policy (5 $\mu g/m^3$ for 24-hour average $PM_{2.5}$ and PM_{10}, and 0.3 $\mu g/m^3$ for annual average $PM_{2.5}$) Therefore, no significant adverse PM impact would occur due to diversions, and more detailed microscale analysis is not required per the NYSDOT policy.

Overall, the potential diversions associated with the bridge toll rate adjustments under consideration would not cause any significant adverse impact on air quality.

Table 11-9
Summary of Diversion Distribution (Average Daily Vehicles)

Location	2017 Volume	Assigned Diversion Volume	Diverted Volume Fraction
New York Route 9 (Albany Post Road)	17,900	275	1.5%
Taconic Parkway North of Yorktown	31,500	385	1.2%
I-684 South of Brewster	67,800	385	0.6%
Bear Mountain Bridge Road	13,000	990	7.6%
New York Route 9 (Briarcliff-Peekskill Parkway)	48,200	935	1.9%
Taconic Parkway South of Yorktown	71,500	715	1.0%
I-684 near Katonah	81,100	385	0.5%
Bear Mountain State Parkway	16,500	330	2.0%
Palisades Interstate Parkway (north of 287)	41,187	339	0.8%
Palisades Interstate Parkway (south of 287)	60,574	1,139	1.9%
I-95	180,015	4,210	2.3%
NJ Turnpike	180,015	870	0.5%
I-80	149,672	4,210	2.8%
NJ-17	145,086	5,155	3.6%
NJ-4	102,371	3,072	3.0%
I-87	43,004	1,040	2.4%

11-5-2-3 REGIONAL (MESOSCALE) EMISSIONS

As described above, in the event that a modified tolling scheme for Tappan Zee Bridge users is adopted, and the potential future toll rates at the Tappan Zee Bridge are set equivalent to the tolls at the Port Authority of New York and New Jersey and the New York Metropolitan Transportation Authority facilities, some users would prefer a shorter route (where previously users may have opted for longer but cheaper routes.) As a result, there would be a reduction in vehicle use on the order of 121,000 vehicle-miles traveled daily. (See Chapter 4, “Transportation,” for details.) This represents a reduction of 0.06 percent in vehicle-miles traveled in the NYMTC region, and would result in a similar reduction in on-road emissions in the NYMTC region. Therefore, there would be no adverse impact to air quality as a result of any potential bridge toll rate adjustments.

11-6 MITIGATION

Since no exceedances of the NAAQS or applicable incremental thresholds were projected to result from the Replacement Bridge Alternative, mitigation is not required.