Chapter 13: Air Quality

13.1 INTRODUCTION

In this chapter, the Federal Railroad Administration (FRA) and NJ TRANSIT have analyzed the potential impacts of the Hudson Tunnel Project (the Project) on air quality in New Jersey and New York. This chapter evaluates the potential for air quality impacts associated with construction of the Preferred Alternative related to emissions from on-site construction equipment, on-road construction vehicles, and dust-generating construction activities. This analysis includes an analysis of the Preferred Alternative for both on-site and on-road sources of air emissions, and the combined impacts of both sources, where applicable, and addresses both local (microscale) and regional (mesoscale) construction period emissions. The chapter also evaluates the impacts of the Preferred Alternative once completed and operational, in comparison to the No Action Alternative.

This chapter contains the following sections:

13.2 ANALYSIS METHODOLOGY

During development of this Environmental Impact Statement (EIS), the Federal Railroad Administration (FRA) and NJ TRANSIT developed methodologies for evaluating the potential effects of the Hudson Tunnel Project in coordination with the Project's Cooperating and Participating Agencies (i.e., agencies with a permitting or review role for the Project). The methodologies used for analysis of air quality are summarized in this chapter.

13.2.1 REGULATORY CONTEXT

13.2.1.1 NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act (CAA, 42 USC § 7401 et seq.), National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: carbon monoxide (CO); nitrogen dioxide (NO_2); ozone; respirable particulate matter (PM), including particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}) and particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$); sulfur dioxide (SO_2); and lead. These are regulated by the U.S. Environmental Protection Agency (EPA) and are referred to as "criteria pollutants."

Ozone is formed in the atmosphere by complex photochemical processes that include nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Emissions of VOCs, nitrogen oxides (NO_x), and other precursors to criteria pollutants are also regulated by EPA.

The NAAQS includes primary and secondary standards for the criteria pollutants. The primary standards represent levels that are requisite 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 primary and secondary standards are the same for NO_2 (annual), ozone, lead, and PM, and there is no secondary standard for CO and the 1-hour NO_2 standard. The NAAQS are presented in **Table 13-1**. The NAAQS for CO, annual NO_2, and SO_2 have also been adopted as the ambient air quality standards for both the states of New York and New Jersey, but are defined on a running 12-month basis rather than for calendar years only.

EPA lowered the primary annual average $PM_{2.5}$ standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$, effective March 2013.

The current 8-hour ozone standard of 0.075 parts per million (ppm) is effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December 2015, EPA further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070 ppm. EPA expects to issue final area designations by October 1, 2017; those designations likely would be based on 2014-2016 air quality data.

EPA lowered the primary and secondary standards for lead to 0.15 $\mu g/m^3$, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

EPA established a new 1-hour average NO_2 standard of 0.100 ppm, effective April 10, 2010, in addition to the current annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA also established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of the daily maximum 1-hour concentrations.

Table 13-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary ppm	Primary µg/m³	Secondary Ppm	Secondary µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	40,000		
Lead				
Rolling 3-Month Average (2)	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average (3)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average (4,5)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average (1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean (6)	NA	12	NA	15
24-Hour Average (7)	NA	35	NA	35
Sulfur Dioxide (SO_2) (8)				
1-Hour Average(9)	0.075	196	NA	NA
Maximum 3-Hour Average (1)	NA	NA	0.50	1,300

Notes: ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
1. Not to be exceeded more than once a year.
2. EPA has lowered the NAAQS down from 1.5 µg/m³, effective January 12, 2009.
3. 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
4. 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
5. EPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
6. 3-year average of annual mean. EPA has lowered the primary standard from 15 µg/m³, effective March 2013.
7. Not to be exceeded by the annual 98th percentile when averaged over 3 years.
8. EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
9. 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.

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

13.2.1.2 NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines nonattainment areas as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as nonattainment by EPA, 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.

In 2002, EPA redesignated the New York–Northern New Jersey–Long Island area as in attainment for CO. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

Manhattan, which had been designated as a moderate nonattainment area for PM_{10}, was reclassified by EPA as in attainment on July 29, 2015. New Jersey is in attainment of the PM_{10} NAAQS.

The New York–Northern New Jersey–Long Island area had been designated as a $PM_{2.5}$ nonattainment area since 2004 under the CAA due to exceedance of the 1997 annual average standard, and was also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. EPA redesignated the New Jersey portion as in attainment for the 1997 annual and 24-hour NAAQS effective September 4, 2013, and the New York area effective April 18, 2014. The area is now under maintenance plans within each state. As stated above, EPA lowered the annual average primary standard to 12 $\mu g/m^3$, effective March 2013. EPA designated the area as in attainment for the new 12 $\mu g/m^3$ NAAQS, effective April 15, 2015.

Effective June 15, 2004, EPA designated the area for the Proposed Action (as part of the New York–Northern New Jersey–Long Island, NY-NJ-CT, nonattainment area) as being in moderate nonattainment for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8–hour ozone standards. EPA designated the New York–Northern New Jersey–Long Island, NY-NJ-CT nonattainment area as a marginal nonattainment area for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016 EPA reclassified the area as a moderate nonattainment area. New York State began submitting SIP documents in December 2014. New York State is expected to be able to meet its SIP obligations for both the 1997 and 2008 standards by satisfying the requirements for a moderate attainment plan for the 2008 ozone NAAQS.

New York City and New Jersey are currently in attainment of the annual average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" for the new 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available.

EPA has established a new 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State and New Jersey counties currently meet the 1-hour standard. In January 2017, New York State recommended that EPA designate the entire State of New York, with the exception of Seneca, St. Lawrence, and Tompkins Counties, as in attainment for this standard; the remaining counties will be designated upon the completion of required monitoring by December 31, 2020. On June 23, 2011, New Jersey recommended the entire state to be designated unclassifiable for the 1-hour SO_2 standard, except for the areas identified in New Jersey's Section 126 petition to the EPA as being impacted by the emissions from the Portland Power Plant located in Pennsylvania.

Table 13-2 summarizes the NAAQS attainment status in the area where the Project site is located.

Table 13-2
NAAQS Attainment Status in the Project Area

Pollutant	Averaging Period	New York	New Jersey
Carbon Monoxide (CO)	1-Hour, 8-Hour	A	A
Respirable Particulate Matter (PM_{10})	24-Hour	A	A
Fine Respirable Particulate Matter ($PM_{2.5}$)	Annual, 24-Hour	A[1]	A[1]
Ozone (O_2)	8-Hour	M[2]	M[2]
Nitrogen Dioxide (NO_2)	Annual, 1-Hour	A, U/A	A, U/A
Sulfur Dioxide (SO_2)	1-Hour	R[3]	U[4]

Notes:
A – attainment
M – nonattainment (moderate)
R – recommended as in attainment
U – unclassifiable
U/A – unclassifiable/attainment

1. EPA redesignated the New Jersey portion as in attainment for the 1997 annual and 24-hour NAAQS effective September 4, 2013, and the New York area effective April 18, 2014. The area is now under maintenance plans within each state.
2. EPA designated the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA as moderate nonattainment areas for the 2008 8-hour average ozone standard. This includes New York, Bronx, Kings, Queens, and Richmond counties in New York State as well as Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, and Warren Counties in New Jersey.
3. In January 2017, New York State recommended that EPA designate the entire State of New York, with the exception of Seneca, St. Lawrence, and Tompkins Counties, as in attainment for this standard; the remaining counties will be designated upon the completion of required monitoring by December 31, 2020.
4. On June 23, 2011, New Jersey recommended the entire state to be designated unclassifiable for the 1-hour SO_2 standard, except for the areas identified in New Jersey's Section 126 petition to the USEPA as being impacted by the emissions from the Portland Power Plant located in Pennsylvania.

13.2.1.3 POLLUTANTS FOR ANALYSIS

For the Preferred Alternative, pollutants of concern are those that would be emitted during construction activities. Once the construction is complete, train operations would not differ notably from the No Action Alternative; therefore, no change to emissions related to rail operations or commuter patterns would occur.

In general, much of the heavy equipment used in construction is powered by diesel engines that have the potential to produce relatively high levels of NO_x and PM emissions. Fugitive dust generated by construction activities is also a source of PM. Gasoline engines produce relatively high levels of CO. Since the EPA mandates the use of ultra-low sulfur diesel (ULSD) fuel for all highway and non-road diesel engines, sulfur oxides (SO_x) emitted from the Project's construction activities would be negligible. Therefore, the pollutants analyzed for the Preferred Alternative are NO_2, a component of NO_x, which is a regulated pollutant; PM_{10}; $PM_{2.5}$; and CO.

13.2.1.3.1 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.[1] CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages.

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1 Sher, Eran. *Handbook of Air Pollution from Internal Combustion Engines – Pollutant Formation and Control,* 1998.

Consequently, CO concentrations must be predicted on a local, or microscale, basis in order to assess potential impacts.

Construction under the Preferred Alternative would result in a temporary increase in traffic volumes near the Project site—defined as all areas where the Preferred Alternative would have construction activities or permanent Project features (see Chapter 4, "Analysis Framework," Section 4.2.3). Therefore, FRA and NJ TRANSIT conducted on-road source analyses at critical intersections in New Jersey and New York to evaluate future CO concentrations under the No Action and Preferred Alternatives. CO concentrations were also determined for on-site construction activities, and where applicable, cumulative impacts from on-site and on-road sources were assessed. In addition, FRA and NJ TRANSIT evaluated regional (mesoscale) CO emissions relative to the construction of the Preferred Alternative.

13.2.1.3.2 Nitrogen Oxides, VOCS, And Ozone

NO_x are of principal concern because of their role, together with VOCs, 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 advected (transported horizontally) downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions. FRA and NJ TRANSIT analyzed the change in regional NO_x and VOC emissions during construction of the Preferred Alternative. In addition, potential impacts on annual local NO_2 concentrations from on-site construction activities were determined.

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 not 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.) 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. Any increase in NO_2 associated with the Project's construction would be relatively small and would not be affect levels of NO_2 experienced near roadways. Furthermore, any such increases would be temporary in nature.

13.2.1.4 Respirable Particulate Matter—PM_{10} AND $PM_{2.5}$

Respirable 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 both natural and anthropogenic (man-made) sources. Natural sources include the condensed and reacted forms of naturally occurring VOCs; 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. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. 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. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: $PM_{2.5}$ (particles 2.5 micrometers in diameter or smaller) and PM_{10}, (particles 10 micrometers in diameter or smaller, 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 vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles. FRA and NJ TRANSIT conducted an analysis to assess the reasonable worst-case PM impacts due to on-site and on-road construction sources associated with construction under the Preferred Alternative. In addition, regional PM emissions predicted to result from the construction of the Preferred Alternative were evaluated.

13.2.1.5 IMPACT CRITERIA

13.2.1.5.1 Federal Impact Criteria

Any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 13-1**) would be deemed to have an adverse impact. This chapter conservatively uses both Federal and New York City impact criteria in identifying air quality impacts. The New York City criteria are used for purposes of satisfying the review requirements of local New York City agencies, which must comply with the requirements of New York's *City Environmental Quality Review* procedures. These criteria were developed by the City of New York specifically for local conditions in New York.

13.2.1.5.2 New York City Impact Criteria

New York City's Department of Environmental Protection (NYCDEP) has developed *de minimis* criteria for use in analysis of the air quality effects of projects that are subject to review under New York's City Environmental Quality Review (CEQR) procedures. Since the analysis of the Preferred Alternative was conducted in accordance with both Federal criteria and CEQR criteria, the *de minimis* criteria were also used to evaluate the potential for predicted impacts at locations in New York City.

13.2.1.5.2.1 CO De Minimis Criteria

As set forth in New York City's 2014 *CEQR Technical Manual*,[2] New York City *de minimis* criteria for CO set the minimum change in CO concentration that defines a "significant" environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8 ppm.

13.2.1.5.2.2 $PM_{2.5}$ De Minimis Criteria

The *de minimis* criteria for determination of potential significant adverse $PM_{2.5}$ impacts per CEQR criteria are as follows:

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[2] New York City. *CEQR Technical Manual*. Chapter 1, section 222. March 2014; and New York State Environmental Quality Review Regulations, 6 NYCRR § 617.7.

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard; or
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete or ground level receptor location.

13.2.1.6 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 transportation projects in non-attainment areas that do not conform to the applicable SIP.

Conformity of Federal actions related to transportation plans, programs, and projects that are developed, funded, or approved under Title 23 USC or the Federal Transit Act (49 USC § 1601 et seq.) must be addressed according to the requirements of 40 CFR Part 93 Subpart A (Federal transportation conformity regulations); all other Federal actions are regulated under Subpart B of the same section (Federal general conformity regulations).

An area's Metropolitan Planning Organization (MPO), together with the state, are responsible for demonstrating conformity with respect to the SIP on metropolitan long-range transportation plans and Transportation Improvement Programs (TIPs). Transportation conformity requirements mandate that MPOs produce three products: a Regional Transportation Plan with a long-term plan for the region's transportation system; a TIP, which outlines all of the Federally funded transportation projects proposed for the region over a five-year period; and an annual Unified Planning Work Program that describes transportation-related planning for the program year. For areas where NAAQS are not being met (non-attainment areas), the MPO must quantitatively evaluate the projects included in the TIP to demonstrate how the TIP projects affect the region's plan to attain compliance with the regulations. The analysis of transportation conformity for projects listed in the TIP includes the entire transportation network and all projects that are classified as regionally significant. EPA must then concur with the MPO's conformity determination for its TIP. The U.S. Department of Transportation (USDOT) has final approval of conforming plans and TIPs. Transportation projects included in the TIP, by definition, conform to the SIP. According to the EPA's transportation conformity requirements (40 CFR Part 93), certain types of projects are exempt from the requirement to determine conformity. Such projects, listed in 40 CFR § 93.126, may proceed toward implementation even in the absence of a conforming transportation plan and TIP.

The general conformity requirements apply to those Federal actions in nonattainment or maintenance areas where the action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants or their precursor pollutants at rates equal to or exceeding the prescribed rates. In the case of the Project study area, the prescribed annual rates are 50 tons of VOCs and 100 tons of NO_x (ozone precursors, ozone non-attainment area in transport region), 100 tons of CO (CO maintenance area), and 100 tons of $PM_{2.5}$[3].

[3] Direct emissions, SO_2, NO_x (unless determined not to be a significant precursor), VOC or ammonia (if determined to be significant precursor).

Federal regulations at 40 CFR § 93.150 require Federal agencies to ensure that proposed actions conform to the SIPs and do not adversely impact air quality. The regulation assumes that a proposed Federal action whose criteria pollutant emissions have already been included in the local SIP's attainment or maintenance demonstrations conforms to the SIP.

In addition to region-wide (mesoscale) emissions, conformity regulations also include provisions to ensure that local impacts do not cause or exacerbate exceedances of the NAAQS.

Each Federal agency taking action is responsible, separately, for assessing and determining, if required, conformity of its action with the SIP.

For the Preferred Alternative, the lead agency is the FRA. Actions taken by FRA, including a decision to fund or approve the Preferred Alternative, are subject to general conformity; therefore, general conformity would apply to the Preferred Alternative. Section 13.8 presents the general conformity analysis.

It should also be noted that if the Federal Transit Administration (FTA), a Cooperating Agency in this NEPA process, provides funding for implementation of the Preferred Alternative, the Project would also be subject to transportation conformity.

With respect to transportation conformity, the MPOs with jurisdiction over the Project area are the North Jersey Transportation Planning Authority (NJTPA) and the New York Metropolitan Transportation Council (NYMTC). Both New Jersey and New York have established Interagency Consultation Groups (ICGs) of agencies with responsibility for transportation and air quality to coordinate the transportation conformity process statewide.[4] The ICGs for New Jersey and New York have reviewed the Preferred Alternative and determined that according to the transportation conformity regulations (40 CFR § 93.126), the Preferred Alternative is an exempt project and therefore does not require transportation conformity analysis (see **Appendix 13**).[5]

13.2.1.7 AIR QUALITY, CLIMATE CHANGE, AND OZONE

According to the National Climate Assessment,[6] air pollution can affect changes in climate, and climate change can affect air quality. The effect of pollutant emissions on greenhouse gas emissions is discussed in detail in Chapter 14, "Greenhouse Gas Emissions and Resilience." Changes in climate measures such as temperature and wind can affect dispersion of pollutants, and increases in temperature are likely to increase ozone concentrations in many areas in the United States. Increasing temperature could lead to increased electricity use for cooling in warmer months, resulting in increased emissions from power plants, but may also reduce fuel consumption for heating in the winter. Conversely, measures aimed at reducing greenhouse gas emissions that cause climate change, such as the use of renewable energy in lieu of fossil fuels and energy efficiency, can reduce emissions from power plants, industry, buildings, and vehicles, resulting in improved air quality.

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[4] In New Jersey, the ICG includes members from EPA, the Federal Highway Administration (FHWA), FTA, the New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Transportation (NJDOT), and NJ TRANSIT. In New York, the ICG includes representatives from EPA, FHWA, FTA, the New York State Department of Transportation (NYSDOT), the New York State Department of Environmental Conservation (NYSDEC), and affected MPOs.

[5] The ICGs classified the Project as exempt for transportation conformity purposes according to the regulations (40 CFR § 93.126), which list as an exemption the "repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, location or capacity changes."

[6] USGCRP. *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. 2016.

While these changes in background conditions are likely to continue in the long term and affect future air quality, they do not substantially affect the near-future background conditions expected during construction of the Preferred Alternative and the period of approximately the next five years which is accounted for in most state level air quality planning such as state implementation plans. Longer term air quality would not be affected by the Preferred Alternative since the Project's operations would not substantially affect air quality. Therefore, the effects of climate change on air quality in the context of this air quality analysis is not considered further in this chapter, and would not otherwise affect the results of the analyses presented.

13.2.2 ANALYSIS TECHNIQUES

Emissions from on-site construction equipment and on-road construction vehicles, as well as dust-generating construction activities, have the potential to affect air quality. The analysis of potential construction air quality impacts included an analysis of the Preferred Alternative for both on-site and on-road sources of air emissions, and the combined impact of both sources, where applicable. Both local (microscale) and regional (mesoscale) construction period emissions were addressed in the analysis.

The following section outlines the general methodology for the air quality analysis that was undertaken. The construction periods with activities closest to sensitive receptors and with the most intensive activities and highest emissions were selected as the worst-case periods for analysis. Concentrations were then predicted using dispersion models to determine the potential for air quality impacts at sensitive receptor locations near the construction areas. Based on conceptual design information, detailed construction air quality modeling analysis was conducted for the following locations:

- *Tonnelle Avenue Staging Area:* Proposed Tonnelle Avenue staging area where the new Hudson River Tunnel portal would be located, tunnel boring machines (TBMs) for the tunnel segment between Tonnelle Avenue and the Hoboken shaft (i.e., the Palisades tunnel) would be launched, excavated soils would be removed from new tunnel construction, materials would be delivered, and demolition debris would be removed from the rehabilitation of the existing North River Tunnel;
- *Hoboken Staging Area:* Proposed Hoboken staging area, the site of the New Jersey ventilation shaft and fan plant for the new Hudson River Tunnel, where the shaft and adjacent site would be used for the removal of the rock TBMs used for the Palisades tunnel, and as the staging site to support tunneling operations for the excavation of the tunnel beneath the Hudson River to New York (including as the launch site for the soft-ground TBMs); and
- *Twelfth Avenue Staging Area:* Proposed Twelfth Avenue staging area in Manhattan, the site of the Manhattan ventilation shaft and fan plant for the new Hudson River Tunnel, which would be used as a tunnel access point for retrieval of the river tunnel TBMs as well as a staging site during construction of the Manhattan waterfront tunnel, the cut-and-cover tunnel construction at West 30th Street, and fitting out of this portion of the tunnel for the Preferred Alternative.

Data sources included the preliminary construction schedule and the construction means and methods information (e.g., construction logistics, equipment projection) presented in Chapter 3, "Construction Methods and Activities;" background pollutant concentrations from the New York State Department of Environmental Conservation (NYSDEC) and/or New Jersey Department of Environmental Protection (NJDEP) Bureau of Air Monitoring ambient air monitoring stations; and local meteorological data from nearby National Weather Service stations (La Guardia Airport for Manhattan sites and Newark Liberty International Airport for New Jersey sites). **Appendix 13** includes an illustration of the conceptual staging site layouts that were analyzed in this chapter, with the potential locations of different kinds of construction equipment on each staging site.

13.2.2.1 ON-SITE CONSTRUCTION SOURCE ASSESSMENT

For the on-site construction analysis, concentrations were predicted using the EPA and American Meteorological Society (AMS) AERMOD dispersion model to determine the potential for air quality impacts during construction under the Preferred Alternative. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). The meteorological data set for the AERMOD model consists of five consecutive years of latest available meteorological data: surface data collected at the nearest representative National Weather Service Station (La Guardia Airport for Manhattan sites, or Newark Liberty International Airport for New Jersey sites) and concurrent upper air data collected at Brookhaven, New York.

For short-term model scenarios (predicting concentration averages for periods of 24 hours or less), all stationary sources, such as compressors, pumps, or concrete trucks, which idle in a single location while unloading, were simulated as point sources. Other engines, which would move around the construction sites on any given day, were simulated as area sources. For periods of 8 hours or less (less than the length of a construction worker's shift), it was assumed that all engines would be active simultaneously. All sources would move around the construction sites throughout the year and were therefore be simulated as area sources in the annual analyses.

Emission factors for on-site construction engines were developed using EPA's NONROAD2008 emission model (NONROAD). With respect to trucks, emission were developed using the EPA Motor Vehicle Emission Simulator (MOVES2014a) emission model. Fugitive dust emissions from construction activities (e.g., excavation, grading, and transferring of excavated materials into dump trucks) were calculated based on EPA procedures delineated in AP-42 Table 13.2.3-1.[7] Concentrations for each pollutant of concern due to construction activities at each sensitive receptor were predicted during the most representative worst-case time period(s). The potential for adverse air quality impacts was determined by comparing modeled concentrations to the applicable Federal and New York City criteria.

As discussed above, the construction periods with activities closest to sensitive receptors and with the most intense activities and highest emissions were selected as the worst-case periods for analysis. Based on conceptual design information, the preliminary construction schedule, and the construction means and methods information presented in Chapter 3, "Construction Methods and Activities," the worst-case short-term (i.e., 24-hour, 8-hour, and 1-hour) and annual periods of construction listed in **Table 13-3** were used for the dispersion air quality modeling.

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7 EPA, *Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, January 2011.

Table 13-3
Analysis Periods for Dispersion Modeling

Analysis Type	Analysis Period	Project Construction Elements Analyzed
Tonnelle Avenue Staging Area		
Short-term analysis period	June 2020	▪ Palisades tunnel: utility relocation at Tonnelle Avenue; cut-and-cover support for Tonnelle Avenue portal ▪ New Jersey surface alignment: embankments (retained and sloped); viaducts and bridges; Tonnelle Avenue bridge
Annual analysis period	October 2020 – September 2021	▪ Palisades tunnel: TBM mining of Palisades tunnel ▪ New Jersey surface alignment: embankments (retained and sloped); viaducts and bridges; Tonnelle Avenue bridge
Hoboken Staging Area		
Short-term analysis period	June 2020	▪ Hoboken shaft and starter tunnel ▪ Underpinning and ground improvement
Annual analysis period	June 2019 – May 2020	▪ Hoboken shaft and starter tunnel ▪ Underpinning and ground improvement
Twelfth Avenue Staging Area		
Short-term analysis period	June 2021	▪ Ground freezing and sequential excavation method (SEM) construction ▪ Twelfth Avenue shaft ▪ West 30th Street cut-and-cover tunnel ▪ Tenth Avenue cut-and-cover tunnel ▪ Underpinning of Lerner Building
Annual analysis period	June 2021 – May 2022	▪ Ground freezing and sequential excavation method (SEM) construction ▪ Twelfth Avenue shaft ▪ West 30th Street cut-and-cover tunnel ▪ Tenth Avenue cut-and-cover tunnel ▪ Underpinning of Lerner Building

Broader conclusions regarding potential concentrations during other periods (i.e., North River Tunnel rehabilitation) that were not modeled are qualitatively discussed as well, based on the reasonable worst-case period results.

13.2.2.2 ON-ROAD CONSTRUCTION SOURCE ASSESSMENT

The on-road construction analysis assesses the potential for air quality impacts due to construction-generated traffic on local roadways. The analysis employed EPA-approved models that have been widely used for evaluating air quality impacts of projects in New York City, State, and nationally. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels, resulting in a conservatively high estimate of expected pollutant concentrations that could ensue from the construction under the Preferred Alternative.

NJDEP and the New Jersey Department of Transportation (NJDOT) do not have any guidance specific to the analysis of projects affecting on-road sources. Therefore, the New York State

Department of Transportation (NYSDOT) guidance document *The Environmental Manual (TEM)*[8] was used as a guidance document for the on-road sources assessment, along with the *CEQR Technical Manual*, which also provides a screening procedure that is similar in its outcome as that achieved if the TEM approach is employed, but less detailed.

Vehicular CO and PM engine emission factors were computed using the EPA on-road sources emissions model, MOVES2014a.[9] Road dust emission factors were calculated according to the latest EPA procedures delineated in AP-42 Table 13.2.3-1.[10] Maximum CO concentrations adjacent to streets within the surrounding area, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0.[11] The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model, CAL3QHCR, was employed for predicting PM concentrations. Receptors were placed at sidewalk or roadside locations at intersections near the Project site with continuous public access. In the analysis, sidewalk receptors were modeled 7 feet from the pavement edge, spaced at 25-foot intervals from the intersection analyzed, and were analyzed with a height of 6 feet. Additionally, neighborhood receptors were modeled at locations 50 feet from the pavement edge, spaced at 25-foot intervals, and with a height of 6 feet.

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the construction traffic analysis for the Project (see Chapter 5A, "Traffic and Pedestrians"). Based on these factors and the projected increase in traffic volumes due to traffic diversions in addition to construction-related vehicles, the intersection of West 33rd Street and Eleventh Avenue was selected for on-road construction source modeling.

13.2.2.3 COMBINED IMPACT ASSESSMENT

Given emissions from on-site construction equipment and on-road sources may contribute to concentration increments concurrently at the same location, the combined effect was also assessed. On-road sources adjacent to the construction sites were included with the on-site AERMOD dispersion analysis (in addition to on-site truck and engine activities) to address all local Project-related emissions cumulatively.

13.2.2.4 CONSTRUCTION MESOSCALE ANALYSIS

The pollutants of concern on a regional basis are CO, PM_{10}, $PM_{2.5}$, NO_x, and VOCs. Emissions from on-road construction trucks and worker vehicles and from non-road construction equipment were calculated on an annual basis based on the emissions modeling procedures described above for the microscale analysis.

Under the general conformity regulations, a general conformity determination for Federal actions is required for each criteria pollutant or precursor in nonattainment or maintenance areas where the action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at rates equal to or exceeding the prescribed *de minimis* rates for that pollutant. In the

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8 NYSDOT, *The Environmental Manual*, https://www.dot.ny.gov/divisions/engineering/environmental-analysis/manuals-and-guidance/epm, accessed March 2012.

9 EPA, *Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014a*, November 2015.

10 EPA, *Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, January 2011.

11 EPA, *User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections*, Office of Air Quality, Planning Standards, Research Triangle Park, North Carolina, EPA-454/R-92-006.

case of this Project, the prescribed annual rates are 50 tons of VOCs and 100 tons of NO_x (ozone precursors, ozone non-attainment area in transport region), 100 tons of CO (CO maintenance area), and 100 tons of $PM_{2.5}$, SO_2, or NO_x ($PM_{2.5}$ and precursors in $PM_{2.5}$ non-attainment area).

13.2.3 STUDY AREAS

The size of the study area is based on a consideration of potential impacts of the Preferred Alternative during construction, including the location of active construction in combination with the potential construction access routes. In general, the study area for microscale air quality analysis is the area within 500 feet from the Project site (defined as the area that would be affected by construction activities associated with the Preferred Alternative as well as the permanent elements of the Preferred Alternative—see Chapter 4, "Analysis Framework"). The mesoscale analysis examines the emissions from construction sources on a regional basis in New York and New Jersey.

13.3 AFFECTED ENVIRONMENT: EXISTING CONDITIONS

13.3.1.1 NEW JERSEY

Recent concentrations of all criteria pollutants of concern for the construction air quality analysis for New Jersey study area locations are presented in **Table 13-4**. The concentrations are collected at the NJDEP Bureau of Air Monitoring air quality monitoring stations nearest the Project site in New Jersey. All data statistical forms and averaging periods are consistent with the definitions of the NAAQS. As shown in the table, the monitored levels in New Jersey do not exceed the NAAQS.

Table 13-4
Representative Monitored Ambient Air Quality Data - New Jersey

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
$PM_{2.5}$	355 Newark Avenue, Jersey City	$\mu g/m^3$	24-hour	25.0	35
			Annual	9.3	12
PM_{10}	355 Newark Avenue, Jersey City	$\mu g/m^3$	24-hour	44.0	150
NO_2	360 Clinton Avenue, Newark	$\mu g/m^3$	Annual	17.9	100
CO	2828 Kennedy Boulevard, Jersey City	$\mu g/m^3$	1-hour	4,580	40,000
			8-hour	2,863	10,000

Source: EPA, AIRS Database, http://www.epa.gov/airdata, 2011-2015

13.3.2 NEW YORK

Recent concentrations of all criteria pollutants of concern for the construction air quality analysis for New York study area locations are presented in **Table 13-5**. The concentrations are collected at NYSDEC air quality monitoring stations nearest the Project site in New York. All data statistical forms and averaging periods are consistent with the definitions of the NAAQS. As shown in the table, the monitored levels in New York do not exceed the NAAQS.

Table 13-5
Representative Monitored Ambient Air Quality Data - New York

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
$PM_{2.5}$	Public School (PS) 19, Manhattan	µg/m³	24-hour	23.7	35
			Annual	8.8	12
PM_{10}	Division Street, Manhattan	µg/m³	24-hour	44.0	150
NO_2	Intermediate School (IS) 52, Manhattan	µg/m³	Annual	39.1	100
CO	City College of New York, Manhattan	µg/m³	1-hour	3,092	40,000
			8-hour	1,947	10,000

Source: *New York State Air Quality Report Ambient Air Monitoring System*, DEC, 2011–2015.

13.4 AFFECTED ENVIRONMENT: FUTURE CONDITIONS

Localized air quality will remain similar to existing conditions in the Project study area in the future analysis year of 2030. This EIS assumes that that the North River Tunnel would remain functional and in operation at least through the EIS analysis year of 2030 and that train service will continue operating through the North River Tunnel at similar levels to today's service. Although the number of peak hour trains would not increase, the National Railroad Passenger Corporation (Amtrak) and NJ TRANSIT will be replacing rail passenger equipment with higher capacity vehicles, which will accommodate limited increases in ridership. This condition is the baseline against which the impacts of both the No Action and Preferred Alternatives are compared.

In addition, by the 2030 analysis year, a number of development projects will occur in the Project vicinity in New Jersey and New York. As detailed in Chapter 6, "Land Use, Zoning, and Public Policy," Section 6A.4, these include the Rebuild By Design project in Hoboken, New Jersey, and numerous new developments in the New York study area, new development will occur on the same block as the proposed Twelfth Avenue staging area—the block between West 29th and West 30th Streets, Eleventh and Twelfth Avenues (Manhattan Block 675). The New York City Department of City Planning (NYDCDP) is currently evaluating a possible rezoning of the eastern end of the block. The rezoning, referred to as the Block 675 East project, would permit a range of commercial uses, as well as residential and community facility uses on the east end of the block. As a result of the rezoning, two new high-rise buildings are anticipated on the east end of the block near Eleventh Avenue. NYCDCP issued a Draft Scope of Work for an EIS for Block 675 East on April 14, 2017.[12]

13.5 IMPACTS OF NO ACTION ALTERNATIVE

In the No Action Alternative, the existing North River Tunnel will remain in service, with continued maintenance as necessary to address ongoing deterioration to the extent possible. No new passenger rail tunnel across the Hudson River is included in the No Action Alternative. With the No Action Alternative, this EIS assumes that train service will continue operating through the North River Tunnel at similar levels to today's service. In the No Action Alternative, late night and weekend service would continue to be limited to allow for the ongoing maintenance of the tunnel.

The No Action Alternative would result in negative impacts to passenger rail services on the Northeast Corridor (NEC) across the Hudson River as service disruptions would increase as a

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[12] https://www1.nyc.gov/site/planning/applicants/scoping-documents.page.

result of the continuing deterioration of the North River Tunnel. With the No Action Alternative, as the reliability of the trans-Hudson rail system worsens because of ongoing deterioration in the North River Tunnel, and congestion on each trans-Hudson mode continues to increase to keep pace with future demand, the frequency and severity of each service disruption will be magnified compared to what is experienced today. As NEC North River Tunnel passenger rail service is disrupted for emergency repairs, passengers would divert to trans-Hudson bus services, as well as to ferries, automobiles, and PATH rail service, as occurs today when there is a disruption to NJ TRANSIT service between New Jersey and New York. Moreover, if Amtrak and NJ TRANSIT operations become less reliable, reduced customer satisfaction may reduce ridership. This mode shift could result in regional increases in mesoscale (regional) air pollutants, if passengers shift from trains to automobiles (thereby increasing the vehicles miles traveled, or VMT, by passenger vehicle).

13.6 CONSTRUCTION IMPACTS OF THE PREFERRED ALTERNATIVE

13.6.1 OVERVIEW

Emissions from on-site construction equipment and on-road construction vehicles, as well as dust-generating construction activities, all have the potential to affect air quality. For the Preferred Alternative, the majority of the construction activities would be staged from three main construction staging areas—the Tonnelle Avenue staging area; Hoboken staging area; and Twelfth Avenue staging area. As discussed above, for on-site construction sources, one worst-case short-term and one annual period of construction were identified for the dispersion air quality modeling at each of these three construction staging areas and the results of the analysis are presented below. Since emissions from on-site construction equipment and on-road sources may contribute to concentration increments concurrently at the same location, the combined effects were also assessed. In addition, FRA and NJ TRANSIT conducted an on-road construction air quality analysis at the intersection of West 33rd Street and Eleventh Avenue in New York to assess the effects of traffic diversions and construction-related vehicles. The temporary effects of construction activities for the Preferred Alternative on air quality are described below.

13.6.2 NEW JERSEY

13.6.2.1 ON-SITE CONSTRUCTION SOURCE ASSESSMENT

The on-site construction source assessment considers the potential temporary air pollutant emissions associated with construction activities on the Project's construction sites that would result from the equipment operating on the sites. Based on the construction schedule and equipment likely to be used at each construction sites, FRA and NJ TRANSIT predicted pollutant concentrations using dispersion models to determine the potential for air quality impacts at sensitive receptor locations near the construction areas. To estimate the maximum total pollutant concentrations, the calculated impacts from the emission sources were added to a background value that accounts for existing pollutant concentrations from other sources. The background levels are based on concentrations monitored at the nearest NJDEP Bureau of Air Monitoring ambient air monitoring stations as presented above in Section 13.3.

Maximum predicted concentration increments and overall concentrations including background concentrations from on-site construction sources at the Tonnelle Avenue staging area and the Hoboken staging area are presented in **Tables 13-6** and **13-7**, respectively. As shown, total maximum concentrations from the on-site sources are predicted to be lower than the corresponding NAAQS for $PM_{2.5}$, PM_{10}, NO_2, and CO.

Table 13-6
Pollutant Concentrations from On-Site Construction Sources (µg/m³)
Tonnelle Avenue Staging Area

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Concentration	Maximum Predicted Total Concentration	NAAQS
$PM_{2.5}$	24-hour	25.0	6.3	31.3	35
	Annual	9.3	1.6	10.9	12
PM_{10}	24-hour	44.0	8.3	52.3	150
NO_2	Annual	17.9	51.0	68.9	100
CO	1-hour	4,580	248	4,828	40,000
	8-hour	2,863	115	2,978	10,000

Table 13-7
Pollutant Concentrations from On-Site Construction Sources (µg/m³)
Hoboken Staging Area

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Concentration	Maximum Predicted Total Concentration	NAAQS
$PM_{2.5}$	24-hour	25.0	7.9	32.9	35
	Annual	9.3	0.7	10.0	12
PM_{10}	24-hour	44.0	13.4	57.4	150
NO_2	Annual	17.9	14.3	32.2	100
CO	1-hour	4,580	534	5,114	40,000
	8-hour	2,863	134	2,996	10,000

13.6.2.2 ON-ROAD CONSTRUCTION SOURCE ASSESSMENT

The on-road construction analysis assesses the potential for air quality impacts due to construction-generated traffic on local roadways. Based on the traffic information developed for this EIS (and presented in Chapter 5A, "Traffic and Pedestrians"), using the projected increase in traffic volumes due to diversions, existing conditions, and proximity to sensitive receptors, the intersection of West 33rd Street and Eleventh Avenue in New York represents the reasonable worst-case analysis location for potential mobile source air quality pollutants and was selected for the on-road construction sources analysis. As presented below in Section 13.6.4.2, the analysis results of the on-road construction sources at that location in New York indicate that the total maximum concentrations from the on-road sources related to construction of the Preferred Alternative would be lower than the corresponding NAAQS. Therefore, during the 11-year construction period for the Preferred Alternative, other intersection locations in New Jersey would not exceed the concentrations projected for the worst-case location.

13.6.2.3 COMBINED IMPACT ASSESSMENT

Given that emissions from both on-site and on-road construction may contribute to concentrations concurrently at the same location, the combined effect was assessed. As presented in **Tables 13-8 and 13-9**, total maximum concentrations from the on-site and on-road sources including background concentrations at the Tonnelle Avenue staging area and the Hoboken staging area would be lower than the corresponding NAAQS, respectively. Therefore, construction of the Preferred Alternative would not have the potential to result in adverse air quality impacts at New Jersey location.

Table 13-8
Maximum Combined Concentrations from On-Site and On-Road Construction Sources (μg/m³)
Tonnelle Avenue Staging Area

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Combined Concentration	Maximum Predicted Total Concentration	NAAQS
$PM_{2.5}$	24-hour	25.0	9.2	34.2	35
	Annual	9.3	2.5	11.8	12
PM_{10}	24-hour	44.0	11.5	55.5	150
NO_2	Annual	17.9	64.9	82.8	100
CO	1-hour	4,828	1,761	6,341	40,000
	8-hour	2,978	1,130	3,992	10,000

Table 13-9
Maximum Combined Concentrations from On-Site and On-Road Construction Sources (μg/m³)
Hoboken Staging Area

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Combined Concentration	Maximum Predicted Total Concentration	NAAQS
$PM_{2.5}$	24-hour	25.0	7.9	32.9	35
	Annual	9.3	0.7	10.0	12
PM_{10}	24-hour	44.0	13.4	57.4	150
NO_2	Annual	17.9	14.4	32.3	100
CO	1-hour	4,828	534	5,114	40,000
	8-hour	2,978	134	2,996	10,000

13.6.2.4 OTHER CONSTRUCTION PERIODS

The modeled results are based on scenarios representative of the worst-case construction periods. Based on a review of the anticipated construction activities, other stages of construction in New Jersey, such as the North River Tunnel rehabilitation, would generally have lower construction emissions. Since worst-case short-term results may often be indicative of very local impacts, similar maximum local impacts may potentially occur at any stage of construction but would not persist in any single location, since emission sources would not be located continuously at any single location throughout construction, and would not exceed the concentrations projected for the worst-case scenarios.

13.6.3 HUDSON RIVER

Given the short duration and limited area of in-water construction activity, the construction activities in the Hudson River related to ground improvement in the low cover area would not result in an adverse construction air quality impact to nearby onshore land uses, such as Hudson River Park.

13.6.4 NEW YORK

13.6.4.1 ON-SITE CONSTRUCTION SOURCE ASSESSMENT

The on-site construction source assessment for New York considers the potential temporary air pollutant emissions associated with construction activities on the Project's Twelfth Avenue staging site that would result from the equipment operating on the sites. Based on the construction schedule and equipment likely to be used at the construction site, FRA and NJ TRANSIT predicted pollutant concentrations using dispersion models to determine the potential for air quality impacts at sensitive receptor locations near the construction areas. To estimate the maximum total pollutant concentrations, the calculated impacts from the emission sources were added to a background value that accounts for existing pollutant concentrations from other sources. The background levels are based on concentrations monitored at the nearest NYSDEC Bureau of Air Monitoring ambient air monitoring stations and are presented above in Section 13.3. Although extensive construction would also be occurring at other sites near the Twelfth Avenue staging site while construction of the Preferred Alternative is under way, the cumulative air quality effects of simultaneous construction of the Project and other nearby projects would be minimal because stationary source air quality effects are generally localized.

Maximum predicted concentration increments and overall concentrations including background concentrations from construction activity at the Twelfth Avenue staging site are presented in **Table 13-10**. As shown, total maximum concentrations from the on-site sources associated with the Preferred Alternative would be lower than the corresponding NAAQS for PM_{10}, NO_2, and CO. Incremental $PM_{2.5}$ concentrations from construction activities associated with the Preferred Alternative are predicted to exceed the New York City $PM_{2.5}$ *de minimis* criteria along adjacent sidewalks and nearby ground-level building receptors for the duration of the construction period (seven years). However, the total $PM_{2.5}$ concentrations are predicted to be below the NAAQS. Construction activities are temporary and the location of the maximum average increments would vary based on the location of the construction sources. Construction sources would move throughout the staging site over the construction period, which would minimize the impact to any one set of receptors.

Table 13-10
Pollutant Concentrations from On-Site Construction Sources ($\mu g/m^3$)
Twelfth Avenue Staging Area

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Concentration	Maximum Predicted Total Concentration	*De Minimis* Criteria (1)	NAAQS
$PM_{2.5}$	24-hour	23.7	10.5*	34.2	5.6	35
	Annual	8.8	1.5*	10.3	0.3	12
PM_{10}	24-hour	44.0	25.5	69.5	N/A	150
NO_2	Annual	39.1	39.8	78.9	N/A	100
CO	1-hour	3,092	572	3,663	N/A	40,000
	8-hour	1,947	244	2,190	N/A	10,000

Notes:

N/A – Not Applicable

In accordance with the *CEQR Technical Manual*, for locations in New York City undergoing CEQR review, $PM_{2.5}$ concentration increments are compared to the *de minimis* criteria. Increments of all other pollutants are compared with the NAAQS to evaluate the magnitude of the increments. Comparison to the NAAQS is based on total concentrations.

(1) In accordance with the *CEQR Technical Manual*, the $PM_{2.5}$ *de minimis* criteria are defined as: 24-hour average not to exceed more than half the difference between the background concentration and the 24-hour NAAQS; annual average not to exceed more than 0.3 $\mu g/m^3$ at discrete receptor locations.

* An asterisk indicates that NYC *de minimis* criteria are exceeded.

13.6.4.2 ON-ROAD CONSTRUCTION SOURCE ASSESSMENT

The on-road construction analysis assesses the potential for air quality impacts due to construction-generated traffic on local roadways. Potential air quality effects associated with the traffic diversions and the traffic increase from construction-related vehicles were analyzed for the intersection of West 33rd Street and Eleventh Avenue, based on the traffic information developed for this EIS (and presented in Chapter 5A, “Traffic and Pedestrians”). As shown in **Table 13-11**, the maximum predicted total CO, PM_{10}, and $PM_{2.5}$ concentrations would be below the NAAQS. However, incremental $PM_{2.5}$ concentrations would exceed the New York City *de minimis* criteria.

Table 13-11
Pollutant Concentrations from On-Road Construction Sources (µg/m³)
Intersection of West 33rd Street and Eleventh Avenue

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Concentration	Maximum Predicted Total Concentration	*De Minimis* Criteria [(1)]	NAAQS
$PM_{2.5}$	24-hour	23.7	9.6*	33.3	5.6	35
	Annual	8.8	1.3*	10.1	0.3	12
PM_{10}	24-hour	44.0	18.6	56.6	N/A	150
CO	1-hour	3,092	1,259	4,351	N/A	40,000
	8-hour	1,947	991	2,938	N/A	10,000

Notes:

N/A – Not Applicable

In accordance with the *CEQR Technical Manual*, for locations in New York City undergoing CEQR review, $PM_{2.5}$ concentration increments are compared to the *de minimis* criteria. Increments of all other pollutants are compared with the NAAQS to evaluate the magnitude of the increments. Comparison to the NAAQS is based on total concentrations.

[(1)] In accordance with the *CEQR Technical Manual* $PM_{2.5}$ *de minimis* criteria is defined as: 24-hour average not to exceed more than half the difference between the background concentration and the 24-hour NAAQS; annual average not to exceed more than 0.3 µg/m³ at discrete receptor locations.

* An asterisk indicates that NYC *de minimis* criteria are exceeded.

13.6.4.3 COMBINED IMPACT ASSESSMENT

Since emissions from both on-site and on-road construction may contribute to pollutant concentrations concurrently at the same location, the combined effect was assessed for the Twelfth Avenue staging area. As presented in **Table 13-12**, the maximum predicted total CO, PM_{10}, and $PM_{2.5}$ concentrations would be below the Federal impact criteria (the applicable NAAQS).

Incremental $PM_{2.5}$ concentrations are predicted to exceed the New York City impact criteria ($PM_{2.5}$ *de minimis* criteria) along adjacent sidewalks and nearby ground-level building receptors for the duration of the construction period at the Twelfth Avenue staging area. Although there is the potential for significant adverse air quality impacts in accordance with the New York City impact criteria, the construction activities associated with the Preferred Alternative would be temporary, although relatively long term, with a construction period of seven years at the Twelfth Avenue staging area. In addition, construction sources would move throughout the staging area over the construction period, which would minimize the impact any given set of receptors. Consequently, the location of the maximum pollutant concentrations resulting from construction would vary based on the location of the construction sources. In addition, as discussed below in Section 13.9, an emissions reduction program would be implemented to minimize the air quality effects from construction associated with the Preferred Alternative. Furthermore, the maximum predicted total concentrations (from the on-site and on-road sources, added to background concentrations) at the Twelfth Avenue staging area are projected to be lower than the corresponding NAAQS and therefore, construction under the Preferred Alternative would not result in any significant adverse air quality impacts under the Federal impact criteria.

Table 13-12
Maximum Combined Concentrations from On-Site and On-Road Construction Sources (μg/m³)
Twelfth Avenue Staging Area

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Combined Concentration	Maximum Predicted Total Concentration	*De Minimis* Criteria (1)	NAAQS
$PM_{2.5}$	24-hour	23.7	10.7*	34.4	5.6	35
	Annual	8.8	1.5*	10.3	0.3	12
PM_{10}	24-hour	44.0	25.7	69.7	N/A	150
NO_2	Annual	39.1	40.9	80.0	N/A	100
CO	1-hour	3,092	1,831	4,082	N/A	40,000
	8-hour	1,947	1,235	3,182	N/A	10,000

Notes:

N/A – Not Applicable

In accordance with the *CEQR Technical Manual*, for locations in New York City undergoing CEQR review, $PM_{2.5}$ concentration increments are compared to the *de minimis* criteria. Increments of all other pollutants are compared with the NAAQS to evaluate the magnitude of the increments. Comparison to the NAAQS is based on total concentrations.

(1) In accordance with the *CEQR Technical Manual* $PM_{2.5}$ *de minimis* criteria is defined as: 24-hour average not to exceed more than half the difference between the background concentration and the 24-hour NAAQS; annual average not to exceed more than 0.3 μg/m³ at discrete receptor locations.

* An asterisk indicates that NYC *de minimis* criteria are exceeded.

13.6.4.3.1 Other Construction Periods

The modeled results are based on scenarios representative of the worst-case construction periods. Based on a review of the anticipated construction activities, other stages of construction, such as the North River Tunnel rehabilitation, would generally have lower construction emissions. Given worst-case short-term results may often be indicative of very local impacts, similar maximum local impacts may potentially occur at any stage of construction but would not persist in any single location. In addition, emission sources would not be located continuously at any single location throughout construction. Therefore, air pollutant concentrations during other stages of construction would be less than those predicted for the worst-case scenarios.

As described in Chapter 3, "Construction Methods and Activities," Section 3.3.7.2, it is possible that construction at the Twelfth Avenue shaft site would delay the construction of a one-story accessory parking garage and potential Emergency Medical Services (EMS) station that are part of a private development project being planned at 601 West 29th Street, at the eastern end of the block. In that event, construction of the garage and potential EMS facility would occur after completion of construction for the Hudson River Tunnel on the Twelfth Avenue shaft site (2026). This EIS analyzes the impacts associated with this potential delay in the schedule for construction and completion of the one-story parking garage and potential EMS facility that could result because of the Hudson Tunnel Project.

The delay in the construction schedule for the garage and potential EMS facility would extend the duration of construction activities occurring adjacent to the two new residential buildings at the east end of Block 675 that would result from the Block 675 East rezoning. With the Block 675 rezoning, the two new residential buildings are anticipated for completion in 2021. These two buildings would therefore be located next to construction activities for the Preferred Alternative on the Twelfth Avenue staging site for five years. If construction of the parking lot and potential

EMS facility on Block 675 Lot 12 is delayed, this would add another 18 months of construction activity adjacent to these two new residential buildings.

Construction of the parking garage and potential EMS station is anticipated to take approximately 18 months, 12 months of which would include excavation and concrete operations. These activities would occur adjacent to occupied residential buildings—the new building proposed as part of the private development and another new building on West 30th Street. Construction emissions during these activities would be much less than those for the Twelfth Avenue shaft site, and would be located at similar locations relative to adjacent sensitive locations. Truck trips would peak at 94 per month, or 5 per day (month 8, during construction of the foundation, when concrete trucks would arrive and depart the site). This level of construction activity would be substantially lower than that associated with the Preferred Alternative. Therefore, air pollutant concentrations in the event of construction of the parking garage and potential EMS station would be less than those predicted for the worst-case scenarios and would not be expected to result in adverse air quality impacts.

13.7 PERMANENT IMPACTS OF THE PREFERRED ALTERNATIVE

The Preferred Alternative would increase operational reliability on the NEC between Newark and Penn Station New York (PSNY). With two tunnels and four tracks, the Preferred Alternative would reduce the likelihood of service disruptions resulting from repair work and night and weekend outages, as compared to the No Action Alternative, and would increase the resiliency and reliability of the NEC under the Hudson River. In addition, the addition of two new tracks would provide redundancy, allowing Amtrak and NJ TRANSIT operational flexibility when trains are delayed on the tunnel tracks or when emergency repairs are needed. This service flexibility would improve the resilience and reliability of NEC train operations for Amtrak and NJ TRANSIT between Frank R. Lautenberg Secaucus Junction Station and PSNY. In addition, by enabling Amtrak and NJ TRANSIT trains to more closely adhere to the defined train schedules, the overall reliability of operations in PSNY would be improved. Therefore, the Preferred Alternative would support continued robust use of the region’s commuter rail network, reducing the potential for commuters to shift to automobiles.

Neither the new rail tunnel nor the rehabilitated existing tunnel would result in any significant new or additional sources of air emissions relative to those associated with the No Action Alternative. Without additional capacity at PSNY, the proposed Hudson River Tunnel would not enable Amtrak and NJ TRANSIT to expand peak-hour service between New Jersey and PSNY. As a result, the four tracks between Secaucus Junction Station and PSNY would continue to provide a capacity of 24 trains per hour in the peak hours in the peak direction. There would be no change in peak hour rail service and therefore no change in commuter patterns as a result of the Preferred Alternative.

In addition, trains operating through the new tunnel would be electric, and therefore diesel emissions would not be a concern at the tunnel portals or fan plants. As discussed in Chapter 2, “Project Alternatives and Description of the Preferred Alternative,” Section 2.5.2.6, the new Hudson River Tunnel would have a ventilation system designed to bring fresh air into the tunnel passively, through normal train movement. It would also have an active component, driven by fans, to remove hot air from the tunnel during congested (perturbed) conditions when trains are stopped or moving slowly for extended periods, particularly during the summer. The active component would also be used to control and exhaust hot air and smoke during emergency conditions, such as a fire on a train in the tunnel. The fans would be used to move smoke so that smoke-free emergency routes are available for safe evacuation of passengers and fire-fighting operations. Smoke would be pulled away from the train to allow passengers to exit to the nearest cross passage upstream of the fire. Other than emergency conditions, the fan plants would generally operate passively, and in any case would not emit pollutants.

13.8 CONFORMITY WITH STATE IMPLEMENTATION PLAN

As discussed in Section 13.2.1.6, the ICGs for New Jersey and New York have reviewed the Preferred Alternative and determined that according to the transportation conformity regulations (40 CFR § 93.126), the Preferred Alternative is an exempt project and therefore does not require transportation conformity analysis (this determination is provided in **Appendix 13**). However, for actions taken by FRA, general conformity would apply to the Project in accordance with 40 CFR Part 93 Subpart B. FRA and NJ TRANSIT estimated the annual on-site and off-site construction-related emissions over the scheduled construction duration (2019 through 2029), taking into account all the planned construction activities and equipment at the Project's construction sites, including the in-river construction area. These are presented in **Table 13-13**. The annual emissions were conservatively estimated for the entire Project area instead of individual nonattainment areas. As shown, the annual emissions would be lower than the *de minimis* rates defined in the general conformity regulations. Therefore, no general conformity determination is required.

Table 13-13
Emissions from Construction Activities (ton/yr)

Year	$PM_{2.5}$	PM_{10}	NO_x	VOC	CO	SO_2
De Minimis Criteria	100	100	100	50	100	100
2019	0.8	0.8	15.4	1.6	6.0	1.2
2020	3.9	4.3	56.5	5.5	26.2	3.0
2021	**4.7**	**5.2**	**70.3**	**6.9**	**34.1**	**3.4**
2022	4.2	4.7	59.3	6.2	30.3	3.0
2023	2.5	2.8	34.9	3.7	17.3	1.8
2024	2.6	2.9	26.7	3.6	16.8	1.6
2025	1.9	2.0	18.6	2.6	11.9	1.2
2026	1.1	1.4	9.2	4.8	5.6	0.6
2027	0.8	1.7	3.9	13.2	1.3	0.1
2028	0.7	1.4	2.7	9.8	0.7	<0.1
2029	0.5	1.1	2.2	7.8	0.6	<0.1

Note:
Emissions presented in **bold** represent the highest annual emissions.

13.9 MEASURES TO AVOID, MINIMIZE, OR MITIGATE IMPACTS

The Project Sponsor and Project construction contractors will implement the following mitigation measures to avoid or reduce pollutant emissions during construction:

- *Dust Control.* To minimize fugitive dust emissions from construction activities, the Project Sponsor will require a fugitive dust control plan including a robust watering program as part of contract specifications. For example, all trucks hauling loose material will be equipped with tight-fitting tailgates and their loads securely covered prior to leaving the Project construction sites; and water sprays will be used for all excavation and transfer of soils to ensure that materials would be dampened as necessary to avoid the suspension of dust into the air. Loose materials would be dampened or covered.

- *Clean Fuel*. Project construction contracts will require that ULSD[13] be used exclusively for all diesel engines throughout the Project sites.
- *Idling Restriction.* In addition to adhering to the local law restricting unnecessary idling on roadways, Project construction contracts will specify that on-site vehicle idle time will be restricted to five (5) minutes in New Jersey and three (3) minutes in Manhattan, for all equipment and vehicles that are not using their engines to operate a loading, unloading, or processing device (e.g., concrete mixing trucks) or are otherwise required for the proper operation of the engine.
- *Best Available Tailpipe Reduction Technologies*. Project construction contracts will specify that non-road diesel engines with a power rating of 50 horsepower (hp) or greater and controlled truck fleets (i.e., truck fleets under long-term contract with the Project), including but not limited to concrete mixing and pumping trucks, will use the best available tailpipe (BAT) technology for reducing diesel PM emissions. Diesel particulate filters (DPFs) are the tailpipe technology currently proven to have the highest reduction capability. Construction contracts will specify that all diesel non-road engines rated at 50 hp or greater will use DPFs, either installed by the original equipment manufacturer (OEM) or retrofitted. Retrofitted DPFs must be verified by EPA or the California Air Resources Board (CARB). Active DPFs or other technologies proven to achieve an equivalent reduction may also be used.
- *Utilization of Newer Equipment.* EPA's Tier 1 through 4 standards for nonroad diesel engines regulate the emission of criteria pollutants from new engines, including PM, CO, NO_x, and hydrocarbons. Project construction contracts will specify that all diesel-powered non-road construction equipment with a power rating of 50 hp or greater shall meet at least the Tier 3[14] emissions standard. All diesel-powered engines used in the construction of the Project rated less than 50 hp shall meet at least the Tier 2 emissions standard as Tier 3 emissions standard do not apply to these engines.
- *Diesel Equipment Reduction*. Project construction contracts will specify that electrically powered equipment will be used rather than diesel-powered and gasoline-powered versions of that equipment, to the extent practicable.

The Preferred Alternative would not have the potential for air quality impacts once the Project is completed and operational; therefore, no mitigation measures for operational conditions are required. ✷

[13] EPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and non-road engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD fuel; sulfur levels in non-road diesel fuel are limited to a maximum of 15 ppm.

[14] The first Federal regulations for new non-road diesel engines were adopted in 1994, and signed by EPA into regulation in a 1998 Final Rulemaking. The 1998 regulation introduces Tier 1 emissions standards for all equipment 50 hp and greater and phases in the increasingly stringent Tier 2 and Tier 3 standards for equipment manufactured in 2000 through 2008. In 2004, the EPA introduced Tier 4 emissions standards with a phased-in period of 2008 to 2015. The Tier 1 through 4 standards regulate the EPA criteria pollutants, including PM, hydrocarbons (HC), NO_x and CO. Prior to 1998, emissions from non-road diesel engines were unregulated. These engines are typically referred to as Tier 0.