Chapter 13: Air Quality

13.1 INTRODUCTION

In this chapter of the Environmental Impact Statement (EIS), the Federal Railroad Administration (FRA) and the New Jersey Transit Corporation (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 provides an evaluation of 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. Also included is 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 provides an evaluation of the impacts of the Preferred Alternative once completed and operational, in comparison to the No Action Alternative. The Port Authority of New York and New Jersey (PANYNJ), in its role as Project Sponsor, has accepted and relied on the evaluations and conclusions of this chapter.

This chapter reflects the following changes made since the Draft EIS (DEIS) for the Hudson Tunnel Project:

- The discussion of applicable regulations and regulatory context is updated.
- The analysis incorporates revisions and refinements to the construction staging approach in New Jersey, including the addition of a new potential haul route for truck access to the Hoboken staging site. The analysis incorporates revisions and refinements to the construction methods in New York. For both New Jersey and New York, it includes more refined information on construction equipment that may be used at the construction sites.

This chapter contains the following sections:

13.1 Introduction
13.2 Analysis Methodology
  13.2.1 Regulatory Context
  13.2.2 Analysis Techniques
  13.2.3 Study Areas
13.3 Affected Environment: Existing Conditions
  13.3.1 New Jersey
  13.3.2 New York
13.4 Affected Environment: Future Conditions
13.5 Impacts of No Action Alternative
13.6 Construction Impacts of the Preferred Alternative
  13.6.1 Overview
  13.6.2 New Jersey
  13.6.3 Hudson River
  13.6.4 New York
13.7 Permanent Impacts of the Preferred Alternative
13.8 Conformity with State Implementation Plan
13.9 Measures to Avoid, Minimize, or Mitigate Impacts

13.2 ANALYSIS METHODOLOGY

During development of this EIS, 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.

Following completion of the DEIS, the PANYNJ became the Project Sponsor for the Hudson Tunnel Project (see Chapter 1, "Purpose and Need," Section 1.1.2, for more information). Consistent with the roles and responsibilities defined in Section 1.1.1, as the current Project Sponsor, the PANYNJ will comply with mitigation measures and commitments identified in the Record of Decision (ROD).

FRA and NJ TRANSIT prepared the detailed analyses in this chapter using an anticipated construction schedule for the Preferred Alternative that was to begin in 2019. However, FRA, NJ TRANSIT, and the PANYNJ now anticipate that construction would begin later. Construction of the new Hudson River Tunnel could begin in 2022 and be complete in 2030; rehabilitation of the North River Tunnel could begin in 2030 and be complete in 2033, an overall delay of three years. FRA and NJ TRANSIT have updated annual regional emissions to reflect the later start date, but the analysis of local air quality concentrations conservatively considers the earlier analysis years. As engine technology improves and fleets are gradually updated each year, emission factors associated with construction equipment and vehicles would decrease in later years. Therefore, the conclusions regarding air emissions in later years would be similar or lower than the conclusions of this analysis and the analysis is conservative (worst case).

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 precursors (i.e., VOCs, nitrogen oxides (NO_x), and SO_2) 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 issued final area designations for the revised standard on April 30, 2018.

EPA lowered the primary and secondary standards for lead to 0.15 μg/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		Secondary	
	ppm	μg/m^3	ppm	μg/m^3
Carbon Monoxide (CO)				
8-Hour Average	9 (1)	10,000	None	
1-Hour Average	35 (1)	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)	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 (4)	NA	12	NA	15
24-Hour Average (5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(6)	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/m^3 – 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/m^3 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.
3. 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
4. 3-year average of annual mean.
5. Not to be exceeded by the annual 98th percentile when averaged over 3 years.
6. 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. For EPA to redesignate an area as in attainment of the NAAQS, the state is required to demonstrate that air quality conditions within the area have improved such that pollutant concentrations meet the NAAQS and that the improvement is the result of permanent emission reductions as specified in the approved SIP (or Federal air pollutant control regulations). Furthermore, the SIP must include an approved 10-year maintenance plan for maintaining attainment status once the area is in attainment (followed by a second 10-year maintenance plan after the expiration of the first plan). Areas that have been redesignated as in attainment of the NAAQS and are under a maintenance plan are considered maintenance areas.

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 and July 1, 2016 for the New York and New Jersey portions, respectively.

Manhattan had been designated as a moderate nonattainment area for PM_{10} on July 29, 2015. EPA clarified on July 29, 2015 that the PM_{10} designation only applied to the revoked annual standard and not the 24-hour standard. 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 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, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ("anti-backsliding"). EPA designated the same 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. On July 19, 2017 New York State announced that the New York Metro Area (NYMA) is not projected to meet the July 20, 2018 attainment deadline and therefore requested that EPA reclassify the NYMA to "serious" nonattainment. EPA reclassified the NYMA from "moderate" to "serious" NAA, effective September 23, 2019, which imposes a new attainment deadline of July 20, 2021 (based on 2018-2020 monitored data). On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. New York State began submitting SIP documents in December 2014.

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 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 December 2017, EPA designated the entire State of New York as in attainment for this standard, with the exception of Monroe County, which was designated "unclassifiable." 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, M	A, M
Respirable Particulate Matter (PM_{10})	24-Hour	A	A
Fine Respirable Particulate Matter ($PM_{2.5}$)	Annual, 24-Hour	A, M[1]	A, M[1]
Ozone (O_2)	8-Hour	S[2]	S[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 – area under a maintenance plan
S – nonattainment (serious)
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 redesignated the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA from "moderate" to "serious" nonattainment areas for the 2008 8-hour average ozone standard, effective September 23, 2019. This includes New York, Bronx, Kings, Queens, Richmond Nassau, Suffolk, Rockland, and Westchester 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. Ultimately, an increase in service between Newark Penn Station and PSNY cannot be realized until other substantial infrastructure capacity improvements are built, such as an expansion at PSNY and a new bridge over the Hackensack River to add capacity to the Northeast Corridor (NEC) (see Chapter 4, "Analysis Framework," Section 4.2.1.2). With both the No Action Alternative and the Preferred Alternative, all train operations through the existing North River Tunnel and in the proposed new Hudson River Tunnel would be with electric-powered locomotives, which do not emit air pollutants.

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); 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. 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 and adjacent on-road sources 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. The increases in 1-hour NO_2 concentrations associated with the Project have not been analyzed explicitly due to limitations in guidance and modeling tools. However, any increase in 1-hour NO_2 associated with the Project's construction would be relatively small and would not

---

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

affect levels of NO_2 experienced near roadways. Furthermore, any such increases would be temporary in nature and would not persist at a single location.

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 2020 *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:

- 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 µg/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 for mobile sources, 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 µg/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); 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

---

[2] New York City. *CEQR Technical Manual*. Chapter 17, section 412. 2020; and New York State Environmental Quality Review regulations, 6 NYCRR § 617.7.

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 NO_x (ozone precursors, ozone non-attainment area in transport region), 100 tons of CO (CO maintenance area), and 100 tons of $PM_{2.5}$.

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 for which 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 Federal agency for the preparation of the EIS is 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 the NEPA evaluation for the Hudson Tunnel Project, 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.[3] 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**).[4] The Project's exemption from the transportation conformity requirements under the Clean Air Act means that no analysis of operational air quality impacts is required to demonstrate conformity with the SIP.

---

[3] 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.

[4] 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."

Nonetheless, FRA and NJ TRANSIT did conduct an analysis of operational air quality impacts, which is presented in Section 13.7. For actions taken by FRA, general conformity applies to the Project in accordance with 40 CFR Part 93 Subpart B. Therefore, this chapter presents a regional emissions analysis during construction in Section 13.8. In addition, this chapter presents a detailed analysis of potential localized air quality impacts related to construction of the Preferred Alternative in Section 13.6.

13.2.1.7 AIR QUALITY, CLIMATE CHANGE, AND OZONE

According to the National Climate Assessment,[5] 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.

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

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

conceptual design information,[6] 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 for both the Palisades and river tunnel segments of the new Hudson River Tunnel, 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 and/or sequential excavation method (SEM) tunnel construction at West 30th Street, and fitting out of this portion of the tunnel for the Preferred Alternative.

Data sources included the conceptual construction schedule and the construction means and methods information (e.g., construction logistics, estimated equipment type, numbers, and usage projections) presented in Chapter 3, “Construction Methods and Activities,” updated to reflect the more advanced engineering design, schedule, and sequencing assumptions developed since the release of the DEIS; 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, updated to reflect the design refinements since the release of the DEIS, that were analyzed in this chapter, with the potential locations of different kinds of construction equipment on each staging site, along with equipment engine type, estimated engine size, quantity, daily and average usage factors for each type of equipment, and emission factors.

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

---

[6] The conceptual design information that FRA and NJ TRANSIT used in the construction air quality modeling analysis for the DEIS included detailed equipment tables including engine size, quantity, type, usage factors, as well as the anticipated construction activity. FRA and NJ TRANSIT have updated this information for the FEIS to reflect advancements to the Project design and refinements to construction schedule and sequencing assumptions made since the release of the DEIS; this information is included in the FEIS as part of **Appendix 13**.

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.

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*

7 EPA, *Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*, Ch. 13.2.1, NC, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors, January 2011.

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

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.

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 and/or SEM tunnel ▪ Tenth Avenue cut-and-cover tunnel ▪ Underpinning of the building at 450 West 33rd Street
Annual analysis period	June 2021 – May 2022	▪ Ground freezing and sequential excavation method (SEM) construction ▪ Twelfth Avenue shaft ▪ West 30th Street cut-and-cover and/or SEM tunnel ▪ Tenth Avenue cut-and-cover tunnel ▪ Underpinning of the building at 450 West 33rd Street

Note: * FRA and NJ TRANSIT prepared the detailed analyses in this chapter for the DEIS using an anticipated construction schedule for the Preferred Alternative that was to begin in 2019. Now, the Project Partners anticipate that construction would occur later. The analyses conducted using earlier analysis years are conservative, since engine technology improves and fleets are gradually updated each year, emission factors associated with construction equipment and vehicles would decrease in later years.

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

[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, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors, January 2011.

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. In the model, receptors were placed at sidewalk or roadside locations at intersections near the Project site with continuous public access. 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 case of this Project, the prescribed annual rates are 50 tons of VOCs and NO_x (ozone precursors, ozone moderate 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 and the potential construction truck routes ("haul 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.

---

[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.

13.3 AFFECTED ENVIRONMENT: EXISTING CONDITIONS

13.3.1 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.[12] 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	µg/m^3	24-hour	20.9	35
			Annual	8.2	12
PM_{10}	355 Newark Avenue, Jersey City	µg/m^3	24-hour	44.0	150
NO_2	360 Clinton Avenue, Newark	µg/m^3	Annual	29.3	100
CO	2828 Kennedy Boulevard, Jersey City	µg/m^3	1-hour	5,496	40,000
			8-hour	3,321	10,000
Source: EPA, AIRS Database, http://www.epa.gov/airdata, 2015-2019.					

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.[13] 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/m^3	24-hour	23.0	35
			Annual	9.6	12
PM_{10}	Division Street, Manhattan	µg/m^3	24-hour	44.0	150
NO_2	Intermediate School (IS) 52, Manhattan	µg/m^3	Annual	37.8	100
CO	City College of New York, Manhattan	µg/m^3	1-hour	2,885	40,000
			8-hour	1,718	10,000
Source: *New York State Air Quality Report Ambient Air Monitoring System*, NYSDEC, 2015–2019.					

12 The air quality monitoring stations listed in Table 13-4 are existing air quality monitoring stations established and maintained by the NJDEP Bureau of Air Monitoring that are located nearest the Project site in New Jersey. These monitoring sites were not specifically established for the Hudson Tunnel Project, but are used by NJDEP to collect background air quality information.

13 The air quality monitoring stations listed in Table 13-5 are existing air quality monitoring stations established and maintained by NYSDEC that are located nearest the Project site in New York. These monitoring sites were not specifically established for the Hudson Tunnel Project, but are used by NYSDEC to collect background air quality information.

13.4 AFFECTED ENVIRONMENT: FUTURE CONDITIONS

Existing/background ambient pollutant concentrations are trending downwards, according to ambient air quality monitoring reports in the region, despite continuing development in the region that has the potential to add to emissions. In addition, as time passes, newer and cleaner technology became more readily available to replace older technology, which serves to partially or fully offset the population growth and development in the region, as demonstrated in the yearly NYSDEC ambient air quality monitoring reports. For these reasons, FRA and NJ TRANSIT assumed that localized air quality will remain similar to existing conditions in the Project study area in the future analysis year of 2033, absent the Preferred Alternative. In addition, for purposes of this EIS, FRA and NJ TRANSIT have assumed that that the North River Tunnel would remain functional and in operation at least through the EIS analysis year of 2033 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 passenger capacity vehicles, which will accommodate limited increases in ridership. The evaluation of the future affected environment considers air quality conditions in the study areas during the future analysis years absent the implementation of the Preferred Alternative. This condition is the baseline against which the impacts of both the No Action and Preferred Alternatives are compared.

In addition, by the 2033 analysis year, a number of projects will occur in the Project vicinity. In New Jersey, these include the Hudson County's rehabilitation of the Willow Avenue bridge over the Hudson-Bergen Light Rail (HBLR) in Hoboken and Weehawken, New Jersey; the Rebuild By Design project in Hoboken, New Jersey; a new residential development at 1300 Manhattan Avenue in Union City, New Jersey, adjacent to the proposed Hoboken staging area and shaft site; and ongoing large-scale waterfront redevelopment within the Lincoln Harbor Redevelopment Area just north of Weehawken Cove, in Weehawken, New Jersey. There will also be numerous new developments in the New York study area, including new development 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). At the east end of the block, two private developers are constructing new high-rise, predominantly residential buildings for completion in 2022. Several notable transportation and infrastructure projects will be complete by 2033 in New York in or near the Project area, including replacement of the Port Authority Bus Terminal and completion of the East Side Access Project.

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. For purposes of analysis in this EIS, FRA and NJ TRANSIT have assumed that with the No Action Alternative, the North River Tunnel would remain functional and in operation at least through the FEIS analysis year of 2033, and train service would continue operating through the North River Tunnel at similar levels to today's service. In addition, 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 NEC across the Hudson River as service disruptions would increase as a 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, FRA and NJ TRANSIT identified one worst-case short-term and one annual period of construction 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 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 updated 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	20.9	8.2	29.1	35
	Annual	8.2	2.5	10.7	12
PM_{10}	24-hour	44.0	14.5	58.5	150
NO_2	Annual	29.3	65.9	95.2	100
CO	1-hour	5,496	258	5,754	40,000
	8-hour	3,321	150	3,741	10,000

Note: Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

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	20.9	7.9	28.8	35
	Annual	8.2	0.7	8.9	12
PM_{10}	24-hour	44.0	13.4	57.4	150
NO_2	Annual	29.3	14.3	43.6	100
CO	1-hour	5,496	534	6,030	40,000
	8-hour	3,321	134	3,355	10,000

Note: Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

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, potential air quality effects associated with the traffic increase from construction-related vehicles were analyzed for the intersection of 19th Street and Park Avenue in Weehawken, based on the traffic information developed for this FEIS (and presented in Chapter 5A, "Traffic and Pedestrians"). As shown in **Table 13-8**, the maximum predicted total CO, PM_{10}, and $PM_{2.5}$ concentrations would be below the NAAQS.

For the disposal of excavated tunnel spoils or muck that cannot be beneficially reused, trucking to commercial disposal sites may be appropriate. These truck trips were accounted for at the construction staging sites, and were included in the traffic information developed for this FEIS (presented in Chapter 5A, "Traffic and Pedestrians," Section 5A.6). The commercial disposal site(s) to be used will be determined by the Project Sponsor, in cooperation with the other Project Partners, after construction contracts are awarded. Spoils will not be disposed in areas within the jurisdiction of USACE. Since specific disposal locations have not been identified at this time, quantified analyses of the air quality effects of disposal truck trips to and from these locations cannot be performed. However, since the trucking activity at each of the staging sites includes all of the trucks coming from and going to these sites, and the air quality analysis shows that the maximum predicted total CO, PM_{10}, and $PM_{2.5}$ concentrations would be below the NAAQS, it is reasonable to assume that the NAAQS would not be exceeded at any given disposal site.

Table 13-8
Pollutant Concentrations from On-Road Construction Sources (μg/m³)
Intersection of 19th Street and Park Avenue, Weehawken

Pollutant	Averaging Period	Background Concentration	Maximum Predicted Modeled Concentration due to Project	Maximum Predicted Total Concentration	NAAQS
$PM_{2.5}$	24-hour	23.0	0.29	23.29	35
	Annual	9.6	0.01	9.61	12
PM_{10}	24-hour	44.0	15.9	59.9	150
CO	1-hour	2,885	1,076	3,984	40,000
	8-hour	1,718	847	2,565	10,000

Note: Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

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 13-9 and 13-10**, 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 result in adverse air quality impacts at New Jersey locations.

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, maximum local impacts similar to or less than the modeled results may potentially occur at any stage of construction outside the worst-case construction periods. However, emission sources would not be located continuously at any single location throughout any stage of construction. Therefore, such concentrations would not persist in any single location and would not exceed the concentrations projected for the worst-case scenarios.

Table 13-9
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	20.9	8.4	29.3	35
	Annual	8.2	2.67	10.87	12
PM_{10}	24-hour	44.0	14.6	58.6	150
NO_2	Annual	29.3	66.1	95.4	100
CO	1-hour	5,496	287	5,783	40,000
	8-hour	3,321	168	3,489	10,000

Note: Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

Table 13-10
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	20.9	7.9	28.8	35
	Annual	8.2	0.7	8.9	12
PM_{10}	24-hour	44.0	13.4	57.4	150
NO_2	Annual	29.3	14.4	43.7	100
CO	1-hour	5,496	534	6,030	40,000
	8-hour	3,321	134	3,455	10,000

Note: Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

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, including the facades of the two new residential buildings currently under construction on the same block as the Twelfth Avenue staging site, which will be occupied when construction activities occur for the Project. To estimate the maximum total pollutant concentrations, they added the calculated impacts from the emission sources 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. Extensive construction may also be occurring at the Western Rail Yard site north of the Twelfth Avenue staging site at the same time. The air quality effects of simultaneous construction of the Project and other nearby projects would be minimal since 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 13-11**. 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). Exceedances of the $PM_{2.5}$ *de minimis* criteria are considered significant adverse impacts for projects subject to the CEQR impact criteria. The analysis was conducted in accordance with both Federal and CEQR criteria, with the CEQR criteria used to evaluate the potential for predicted impacts at locations in New York City, so that this analysis could meet the requirements of New York City agencies that may need to take actions related to the Preferred Alternative. Although the analysis concluded there is the potential to exceed the New York City $PM_{2.5}$ CEQR de *minimis* criteria, the total $PM_{2.5}$ concentrations are predicted to be below the NAAQS and would therefore not be considered an adverse impact using the Federal impact criteria for the NEPA analyses. In addition, 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 13-11
Pollutant Concentrations from On-Site Construction Sources (μg/m³)
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	23.0	9.7*	32.7	6.0	35
	Annual	9.6	1.3*	10.9	0.3	12
PM_{10}	24-hour	44.0	20.5	64.5	N/A	150
NO_2	Annual	37.8	34.5	72.3	N/A	100
CO	1-hour	2,885	777	3,662	N/A	40,000
	8-hour	1,718	250	1,968	N/A	10,000

Notes:
N/A – Not Applicable
[1] 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.
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 μg/m³ at discrete receptor locations.
* An asterisk indicates that New York City *de minimis* criteria are exceeded.
Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

If construction activities in this area include the use of Sequential Excavation Method (SEM) mining together with ground freezing in Hudson River Park, there would be additional truck trips and construction equipment in this area. While the additional trucks and equipment would result in increased pollutant emissions, these emissions would only occur for 18 months. Furthermore, for 10 months, equipment would be located within the temporary shaft and underground tunnels without direct pathways between equipment and nearby receptors. Therefore, such an increase in pollutant emissions would result in increased concentrations less than or similar to the concentrations projected for adjacent receptors to the Twelfth Avenue staging site, which would not exceed the corresponding NAAQS for PM_{10}, NO_2, and CO but may exceed the New York City $PM_{2.5}$ *de minimis* criteria at adjacent open space sidewalks.

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 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 13-12**, the maximum predicted total CO, PM_{10}, and $PM_{2.5}$ concentrations would be below both the NAAQS and the New York City *de minimis* criteria.

For the disposal of excavation spoils or muck from construction of the Preferred Alternative that cannot be beneficially reused, trucking to commercial disposal sites may be appropriate. These truck trips were accounted for at the construction staging sites, and were included on the traffic information developed for this EIS (presented in Chapter 5A, "Traffic and Pedestrians," Section 5A.6). The Project Sponsor (or the Project contractor it will direct) will determine the commercial disposal site(s) to be used after construction contracts are awarded. No spoils will be disposed in areas within the jurisdiction of USACE. Since specific disposal locations are unknown at this time, quantified analyses of the air quality effects of disposal truck trips to and from these locations cannot be performed. However, since the trucking activity at the Manhattan staging sites includes all of the trucks coming from and going to these sites, and the air quality analysis shows that the maximum predicted total CO, PM_{10}, and $PM_{2.5}$ concentrations would be below the NAAQS and the New York City *de minimis* criteria, it is reasonable to assume that neither the NAAQS nor the New York City *de minimis* criteria would be exceeded at any given disposal site.

Table 13-12
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	23.0	0.29	23.29	6.0	35
	Annual	9.6	0.01	9.61	0.3	12
PM_{10}	24-hour	44.0	15.9	59.9	N/A	150
CO	1-hour	2,885	1,076	3,961	N/A	40,000
	8-hour	1,718	847	2,565	N/A	10,000

Notes:
N/A – Not Applicable
1 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.
$PM_{2.5}$ *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 μg/m³ at discrete receptor locations.
* An asterisk indicates that New York City *de minimis* criteria are exceeded.
Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the EIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

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 13-13**, 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 not be permanent and would be limited only to the construction period, 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 on any given set of receptors. Consequently, the location of the maximum pollutant concentrations resulting from construction would not persist at a single location. 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 13-13
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	23.0	9.7*	32.7	6.0	35
	Annual	9.6	1.4*	11.0	0.3	12
PM_{10}	24-hour	44.0	20.6	64.6	N/A	150
NO_2	Annual	37.8	38.2	76.0	N/A	100
CO	1-hour	2,885	780	3,665	N/A	40,000
	8-hour	1,718	253	1,971	N/A	10,000

Notes:
N/A – Not Applicable
1 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.
$PM_{2.5}$ *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 µg/m³ at discrete receptor locations.
* An asterisk indicates that New York City *de minimis* criteria are exceeded.
Maximum predicted modeled concentrations and maximum predicted total concentrations in this table have been conservatively revised for the FEIS using the DEIS assumption that construction would start in 2019 rather than the current estimate of 2022. As engine technology improves and fleets are gradually updated each year, emission factors for construction equipment decrease in later years; therefore concentrations for the updated construction schedule would be similar or less than those presented.

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 3.3.7.3, it is possible that construction at the Twelfth Avenue shaft site would delay the construction of a potential Emergency Medical Services (EMS) station or one-story garage that is part of a private development project under construction at 601 West 29th Street, at the eastern end of the block. In that event, the 18-month construction of the potential EMS facility or garage would occur after completion of construction for the Hudson River Tunnel on the Twelfth Avenue shaft site (2029). This EIS analyzes the impacts associated with this potential delay in the schedule for construction and completion of the potential EMS facility that could result because of the Hudson Tunnel Project.

The delay in the construction schedule for the potential EMS facility or garage would extend the duration of construction activities occurring adjacent to the two new residential buildings that will be complete at the end of the block in 2022. These two buildings would therefore be located next to construction activities for the Preferred Alternative on the Twelfth Avenue staging site for approximately seven years. If construction of the potential EMS facility or garage 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 potential EMS station or garage 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. 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 delayed construction of the potential EMS station or garage would be less than those predicted for the worst-case scenarios and would not 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. Other than during the perturbed conditions, the fan plants would generally operate passively (fans would not run, and ventilation would occur naturally through train movement in the tunnel), and in any case would not emit significant quantities of pollutants because both the fans and trains operating in the new tunnel would be electric and would not emit pollutants. The hot air exhausted from the tunnel vents would not be a source of air pollutants. Consequently, operation of the Preferred Alternative under normal conditions, including when hot air is exhausted from the tunnel ventilation buildings, would not result in air pollutant concentrations exceeding the applicable standards and thresholds and therefore would not have the potential to result in adverse air quality impacts.

In addition to the normal operations discussed above, the Project’s ventilation system 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. As discussed in Chapter 2, “Alternatives and Description of the Preferred Alternative,” Section 2.5.2.6, the Hudson Tunnel Project’s ventilation design includes ventilation shaft and fan plant facilities on each side of the Hudson River as well as additional supply/exhaust points at each of the tunnel portals to create a total of six ventilation zones in each tube of the new Hudson River Tunnel. Ventilation zones are tunnel segments within which smoke can be contained during emergencies, based on operations at a fan plant and the supply/exhaust point at the end of the vent zone. To comply with the fire-life safety standards of National Fire Protection Association (NFPA) (specifically, NFPA 130), the Hudson River Tunnel’s signal system would be designed so that only one train would operate in each vent zone, which would allow safe evacuation of trains operating in the tunnel in the event of a fire in one train.

The emergency ventilation system would preserve safe egress routes for passengers/employees and ingress routes for emergency service personnel during tunnel fire events. 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. The ventilation system would direct smoke away from the egress and ingress routes using a “push-pull” ventilation approach in which ventilation fans on one side of the incident location supply air to the tunnel while ventilation fans on the opposite side of the incident exhaust air from the tunnel.

The operation of the ventilation fans in supply mode would establish a smoke-free zone for evacuation, rescue and firefighting activities; the ventilation fans operating in exhaust mode would purge smoke from the tunnel system, and would be operating at a high velocity, pushing the exhaust and smoke up and away from the fan plant(s) where it would then mix with the ambient air to dissipate. Release of smoke from the ventilation facilities in an emergency condition is a speculative event that cannot be reasonably analyzed, because there are too many unknown variables that would need to be assumed. For any given fire, the characteristics of the smoke and associated pollutants would be a function of the type of fire and what was burning. In addition, any fire event would likely be of short duration. In any case, smoke would be exhausted from the louvers at the ventilation facility through high-pressure ducts at high volumes and therefore would rapidly disperse from the fan plants.

Consequently, operation of the Preferred Alternative in emergency conditions would not have the potential to result in adverse air quality impacts.

13.8 CONFORMITY WITH STATE IMPLEMENTATION PLAN

As discussed in Section 13.2.1.6, for projects that are developed, funded, or approved under Title 23 USC or the Federal Transit Act, conformity of the project (in terms of the project's consistency with the Clean Air Act) must be addressed according to the requirements of 40 CFR Part 93 Subpart A (Federal transportation conformity regulations); for other Federal actions, conformity must be considered according to the requirements of Subpart B of the same section (Federal general conformity regulations). 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 an analysis of the impacts of train operations for a 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.

As required by the general conformity regulations at 40 CFR Part 93 Subpart B, FRA and NJ TRANSIT compared the estimated emissions associated with construction of the Preferred Alternative to thresholds listed in 40 CFR § 93.153 to determine whether a conformity determination is required. Those regulations require a conformity determination for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area is equal to or higher than the rates listed in the regulations. FRA and NJ TRANSIT estimated the annual on-site and off-site construction-related emissions over the scheduled construction duration (2022 through 2033), taking into account all the planned construction activities and equipment at the Project's construction sites, including the in-river construction area. The construction estimates and assumptions used in the analysis, including equipment engine type, estimated engine size, quantity, daily and average usage factors for each type of equipment, and emission factors, are presented in **Appendix 13**. These are presented in **Table 13-14**. 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 13-14
Emissions from Construction Activities (ton/yr)

Year	$PM_{2.5}$	PM_{10}	NO_x	VOC	CO	SO_2
De Minimis Criteria	100	100	50	50	100	100
2022	0.4	0.4	6.7	0.7	3.2	<0.1
2023	3.0	3.1	38.3	4.6	21.4	0.1
2024	**3.8**	**4.4**	**48.5**	5.9	**27.2**	**0.2**
2025	3.5	3.9	40.1	5.2	23.7	0.2
2026	1.8	2.0	20.6	2.7	12.3	0.1
2027	0.6	0.7	19.2	2.0	4.6	<0.1
2028	0.4	0.5	14.9	1.5	3.4	<0.1
2029	0.2	0.2	7.0	0.6	1.4	<0.1
2030	1.0	1.9	4.2	**14.8**	1.4	0.1
2031	0.6	1.2	2.4	8.5	0.8	<0.1
2032	0.7	1.4	2.7	9.9	0.7	<0.1
2033	0.1	0.2	0.3	1.2	0.1	<0.1

Notes:

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

Values have been revised for the FEIS to reflect the updated construction schedule for the Preferred Alternative.

If construction activities include the use of SEM mining together with ground freezing in Hudson River Park, there would be additional annual emissions within the first three years of construction (2022-2024). The combined annual emissions were estimated for the SEM mining activities and were combined with the construction emission estimated for the entire Project Area. These are presented in **Table 13-15**. As shown, the combined annual emissions would remain lower than the *de minimis* rates defined in the general conformity regulations. Therefore, no general conformity determination is required.

Table 13-15
Emissions from Construction Activities with SEM Mining (ton/yr)

Year	$PM_{2.5}$	PM_{10}	NO_x	VOC	CO	SO_2
De Minimis Criteria	100	100	50	50	100	100
2022	0.5	0.5	8.4	0.9	4.3	<0.1
2023	3.3	3.8	43.3	5.1	24.1	0.1
2024	**4.0**	**4.4**	**49.0**	5.9	**27.7**	**0.2**
2025	3.5	3.9	40.1	5.2	23.7	0.2
2026	1.8	2.0	20.6	2.7	12.3	0.1
2027	0.6	0.7	19.2	2.0	4.6	<0.1
2028	0.4	0.5	14.9	1.5	3.4	<0.1
2029	0.2	0.2	7.0	0.6	1.4	<0.1
2030	1.0	1.9	4.2	**14.8**	1.4	0.1
2031	0.6	1.2	2.4	8.5	0.8	<0.1
2032	0.7	1.4	2.7	9.9	0.7	<0.1
2033	0.1	0.2	0.3	1.2	0.1	<0.1

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

13.9 MEASURES TO AVOID, MINIMIZE, OR MITIGATE IMPACTS

The Project Sponsor will implement mitigation measures to avoid or reduce pollutant emissions during construction. The lead Federal agency will be responsible for ensuring that the Project Sponsor implements these measures, which will be identified in the ROD. The analysis results presented in this chapter assume that these control measures are in place to minimize the air quality effects during construction. These requirements will also apply to barge-based non-road equipment conducting the in-river construction work. Barges with emission sources moored near the construction site would be required to comply with the same standards as land-based equipment. The mitigation measures include the following:

- *Dust Control.* To minimize fugitive dust emissions from construction activities, the Project Sponsor will require a multi-approach 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 will be dampened or covered and stockpiles will be covered with a heavy duty plastic at the end of the work day and will be bermed to contain water that drains from the soil which will be collected and containerized for disposal as needed. Vehicles will be rinsed at rinsing stations before leaving construction staging areas and mud mats will be used to help protect against dirt being tracked off the sites. In addition, a continuous perimeter air monitoring program will be conducted at the staging areas to identify when additional dust management procedures are warranted. In addition, as discussed in Chapter 16, "Contaminated Materials," Section 16.8.1.2, a real-time dust monitoring program would be implemented in order to address potential exposure of the public and the environment to respirable particulates and other contaminants of concern.

- *Clean Fuel*. Project construction contracts will require that ULSD[14] 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 three minutes 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[15] 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. ✷

---

14 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.

15 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.