

13. Air Quality

Air quality, which is a general term used to describe pollutant levels in the atmosphere, can be affected by changes in emissions as a result of transportation projects. Modification or expansion of a transit system can result in air quality impacts along roadways and near stations, and can produce changes in the amounts of emissions released into the atmosphere on a regional basis. This chapter assesses the Proposed Project’s potential beneficial and adverse impacts on ambient air quality. The chapter begins with a discussion of the methodology used in the analysis as well as background information on the regulatory context with respect to air quality. This is followed by an analysis of the Proposed Project’s effect on local as well regional air quality. Chapter 19, “Construction and Construction Impacts,” assesses the potential adverse effects during construction.

13.1 KEY CONCLUSIONS

The Proposed Project would not result in adverse impacts on the air quality. Key conclusions include the following:

- The Proposed Project would decrease regional emissions from the reduction in regionwide vehicle miles traveled, because trips would be diverted from personal vehicles to transit.
- The Proposed Project would not result in any adverse air quality impacts in station areas from new vehicular activity at these locations.
- There would be an increase in emissions from facilities that would provide Metro-North electricity for the additional traction power associated with the new service. However, the Proposed Project would result in a small net reduction in pollutant emissions when combined with the reduction in vehicle-miles traveled.

13.2 METHODOLOGY

13.2.1 Air Pollutants

The following air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide: carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂), particulate matter smaller than 10 microns (PM₁₀), particulate matter smaller than 2.5 micron (PM_{2.5}), sulfur dioxide (SO₂), and lead (Pb). In the New York City metropolitan area, as in other urban areas, motor vehicle activity predominantly influences ambient concentrations of CO, hydrocarbons, and O₃. Both mobile and stationary sources emit nitrogen oxides; sulfur oxides are associated mainly with stationary sources; and particulate matter emissions are associated with stationary sources and, to a lesser extent, with diesel-fueled mobile sources (e.g., heavy trucks and buses).

Because the Proposed Project service would operate with electrically powered trains, there would be no local rail-generated emissions. Therefore, the only potential localized air quality consideration associated with the proposed service would be related to changes in vehicular traffic volumes or patterns near PSNY and each of



the proposed stations in the eastern Bronx. Localized increases in CO and particulate matter could result from project-related traffic changes.

Because no significant change in the operation of diesel-fueled trains would be associated with the Proposed Project, analysis of localized SO₂ and NO₂ was not warranted. In addition, since Pb levels in the atmosphere have been substantially reduced due to the elimination of Pb from gasoline, a Pb analysis was also not warranted.

Therefore, the air quality analyses focused on potential project-related changes in local CO and particulate emissions and regional emissions of O₃ precursors (nitrogen oxides and hydrocarbons) and greenhouse gases (GHG) (see Chapter 15, “Greenhouse Gases”).

13.2.2 Applicable Air Quality Standards and Regulations

13.2.2.1 National Ambient Air Quality Standards

The EPA has established National Ambient Air Quality Standards (NAAQS) for the pollutants of concern—CO, NO₂, O₃, PM₁₀, PM_{2.5}, SO₂, and Pb. For the localized analysis, two primary standards for CO (1-hour and 8-hour) are of concern from the Proposed Project. Additionally, particulate matter (PM₁₀ and PM_{2.5}) is of potential concern for the Proposed Project. For PM_{2.5}, 24-hour and annual standards apply.

On a regional level, the Metropolitan Transportation Authority (MTA) estimated emissions of CO, particulate matter, and O₃ precursors—nitrogen oxides and volatile organic compounds (VOCs).

Table 13-1 summarizes these standards, as well as the ambient air quality standards established by the State of New York. The EPA established standards categorized as “primary” to protect the public health. “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 general welfare.

13.2.2.2 Local Guidelines

The New York State Department of Environmental Conservation (NYSDEC) Commissioner’s Policy (CP-33)¹ defines certain “de minimis” criteria for evaluating the potential for significant adverse impacts resulting from the emission of PM_{2.5}. The NYSDEC established threshold criteria for identifying a “significant impact” related to PM_{2.5}.² The significant threshold values defining significant adverse impacts are as follows:

- Predicted incremental impacts of PM_{2.5} greater than 5 µg/m³ on a 24-hour PM_{2.5} basis
- Predicted incremental ground-level impacts of PM_{2.5} greater than 0.3 µg/m³ on an annual basis

¹ New York State Department of Environmental Conservation. 2003. NYSDEC Division of Air Resources Commissioner’s Policy (CP-33), “Policy CP-33: Assessing and Mitigating Impacts of Fine Particulate Matter Emissions.” Accessed at: <https://www.dec.ny.gov/chemical/8912.html>.

² While PM_{2.5} is considered a health hazard, for which NYSDEC has established threshold criteria for determining a “significant impact,” PM₁₀ is considered principally a “nuisance” impact.

Table 13-1. Applicable Ambient Air Quality Standards and Guidelines

Pollutant	Averaging Period	National and New York State Standards		Form	
		Primary	Secondary		
Ozone (O ₃)	8 Hour	0.070 ppm ⁽³⁾	Same as Primary Standard	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	
Carbon Monoxide (CO)	8 Hour	9 ppm	Same as Primary Standard	Not to be exceeded more than once per year	
	1 Hour	35 ppm	Same as Primary Standard		
Nitrogen Dioxide (NO ₂)	1 year	53 ppb ⁽²⁾	Same as Primary Standard	Annual Mean	
	1 Hour	100 ppb	Not Applicable	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
Sulfur Dioxide (SO ₂)	1 Hour	75 ppb ⁽⁴⁾	Not Applicable	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
	3 Hour	Not Applicable	0.5 ppm	Not to be exceeded more than once per year	
Particulate Matter Pollution	PM ₁₀	24 Hour	150 µg/m ³	Same as Primary Standard	Not to be exceeded more than once per year on average over 3 years
	PM _{2.5}	24 Hour	35 µg/m ³	Same as Primary Standard	98th percentile, averaged over 3 years
		1 year	12.0 µg/m ³	15.0 µg/m ³	Annual mean, averaged over 3 years
Lead (Pb)	Rolling 3-Month Average	0.15 µg/m ³⁽¹⁾	Same as Primary Standard	Not to be exceeded	

 Source: [National Ambient Air Quality Standards table](#), 2020

Notes:

ppm – parts per million

ppb – parts per billion

 µg/m³ – micrograms per cubic meter

Annual periods refer to calendar year.

- (1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m³ as a calendar quarter average) also remain in effect.
- (2) The level of the annual NO₂ standard is 0.053 ppm. It is shown here in terms of parts per billion for the purposes of clearer comparison to the 1-hour standard level.
- (3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O₃ standards additionally remain in effect in some areas. Revocation of the previous (2008) O₃ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
- (4) A State Implementation Plan call is an Environmental Protection Agency action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.



In addition to State of New York thresholds, de minimis criteria have been established under New York City *Environmental Quality Review (CEQR) Technical Manual* guidelines, which were used in this analysis. According to *CEQR Technical Manual* guidelines, a project may result in significant mobile-source air quality impacts when the incremental increases in CO or PM_{2.5} concentrations, relative to those in the No Action Alternative, exceed the de minimis criteria.³ A significant CO impact is considered to occur with the following:

- A projected increase of 0.5 parts per million (ppm) or more for the 8-hour period, when background concentrations are above 8.0 ppm; or
- A projected increase of one-half the difference between the background concentration and the standard concentration (9 ppm) for the 8-hour period when background concentrations are below 8 ppm.

Thresholds for determining a significant PM_{2.5} impact per *CEQR Technical Manual* guidance are as follows:

- The 24-hour significant adverse impact threshold value for PM_{2.5} is half the difference between the 24-hour PM_{2.5} NAAQS of 35 µg/m³ and the background concentration. The 24-hour background concentration is defined as the average of the 98th percentile for the latest 3 years of available monitoring data.
- The annual PM_{2.5} significant adverse impact threshold is 0.1 µg/m³ at a ground-level on a neighborhood scale.

Localized increases in pollutant levels could result in the vicinities of the proposed new Bronx stations due to project-related increases in vehicular traffic volumes and/or changes in traffic patterns. According to *CEQR Technical Manual* screening-threshold criteria for CO, if the number of Proposed Project-generated vehicles passing through a signalized intersection in any given peak period of travel would be above a certain value, there would be a potential for significant mobile air quality impacts and a detailed analysis is required. This value is 140 vehicles for the Penn Station New York (PSNY) study area and 170 vehicles for the four new stations' study areas in the Bronx.⁴

In addition, under CEQR, the New York City Department of Environmental Protection has established screening-threshold limits for particulate matter, for which a detailed analysis is required if the Proposed Project would generate peak-hour heavy-duty diesel vehicle traffic, or its equivalent in vehicular emissions, of between 12 to 23 trips, depending on the type of affected roadways.

13.2.3 Regulatory Setting

Pursuant to the federal Clean Air Act (CAA) and its amendments, the EPA designates nonattainment areas, which are geographic regions that do not meet one or more of the NAAQS. Maintenance areas are defined as areas previously having nonattainment status and not yet re-designated to attainment status. A State

³ *CEQR Technical Manual*. (2014). Air Quality. Page 17-44. Accessed at https://www1.nyc.gov/assets/oc/technical-manual/17_Air_Quality_2014.pdf.

⁴ Projects that would generate peak-hour auto traffic or divert existing peak-hour traffic, resulting in the following:

- 160 or more auto trips in areas of concern in downtown Brooklyn or Long Island City, Queens
- 140 or more auto trips in Manhattan between 30th and 61st Streets; or
- 170 or more auto trips in all other areas of the city.

CEQR Technical Manual. (2014) Air Quality. Page 17-12. Accessed at https://www1.nyc.gov/assets/oc/technical-manual/17_Air_Quality_2014.pdf.

Implementation Plan is a state’s plan on how it will meet the NAAQS by the deadlines established by the CAA. The EPA’s Transportation Conformity Rule requires that transportation plans, programs, and projects demonstrate conformity with the State Implementation Plan before they may be approved or adopted. Therefore, federal transportation-related activities may not cause or contribute to new violations of the NAAQS, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions toward attainment of the NAAQS.

A Transportation Improvement Program is a staged, multiyear, intermodal program of transportation projects anticipated within 3 to 5 years within a metropolitan planning area, consistent with that area’s transportation plan. For the Proposed Project’s study areas, New York Metropolitan Transportation Council NYMTC is the pertinent metropolitan planning organization responsible for the Regional Transportation Plan, the Transportation Improvement Program, and the related conformity determination.

13.3 LOCALIZED AIR QUALITY ANALYSIS

13.3.1 Existing Conditions

13.3.1.1 Penn Station New York

MONITORED DATA

Table 13-2 summarizes the representative monitored ambient air quality data for Manhattan. These data, compiled by NYSDEC and the EPA AirData database, are for the year 2018, the latest full calendar year for which data are available. These data show that, with the exception of O₃ and 24-hour PM_{2.5}, the monitored pollutant levels are within (less than) the applicable NAAQS.

Table 13-2. Representative Ambient Air Quality Data Applicable to Penn Station New York Study Area (2018)^{1, 2}

Pollutant	Monitor Location	Averaging Time	Value	NAAQS
CO	160 Convent Avenue, NY, NY	8 Hours	1.7 ppm	9 ppm
		1 Hour	2.9 ppm	35 ppm
O ₃	160 Convent Avenue, NY, NY	8 Hours	0.086 ppm*	0.070 ppm
PM ₁₀	40 Division Street, NY, NY	24 Hours	40 µg/m ³	150 µg/m ³
PM _{2.5}	185 First Avenue, NY, NY	1 Year	10.4 µg/m ³	12.0 µg/m ³
		24 Hours	40.4 µg/m ³ *	35 µg/m ³
SO ₂	Queens College, Queens, NY	1 Hour	8.1 ppb	75 ppb
NO ₂	Queens College, Queens, NY	1 Hour	69 ppb	100 ppm
		1 Year	14.44 ppb	53 ppb

Source: U.S. Environmental Protection Agency AirData database, 2020

Notes:

- ¹ Where data are available from more than one representative monitor, the higher values are reported.
- ² Values correspond to the National Ambient Air Quality Standards averaging times and number of exceedances permitted.
- * Monitor value exceeds the National Ambient Air Quality Standards, but compliance is determined based on additional statistical data.

ppm = parts per million; ppb = parts per billion; µg/m³ = micrograms per cubic meter
Annual periods refer to calendar year.

ATTAINMENT STATUS

Manhattan is designated as a “nonattainment area” for O₃ and PM₁₀, and a “maintenance area” for CO and 24-hour PM_{2.5}.



13.3.1.2 Station Areas

MONITORED DATA

Table 13-3 summarizes the representative monitored ambient air quality data for the Bronx. The NYSDEC and the EPA AirData databased compiled these data for the year 2018, the most recent year for which data are available. These data show that the monitored pollutant levels are within (less than) the applicable NAAQS for all pollutants except O₃, for which the area is designated nonattainment by the EPA.

Table 13-3. Representative Ambient Air Quality Data Applicable to the New Stations' Study Areas in the Bronx (2018)^{1,2}

Pollutant	Monitor Location	Averaging Time	Value	NAAQS
CO	200th Street/Southern Blvd, Bronx, NY	8 Hours	1.5 ppm	9 ppm
		1 Hour	2.2 ppm	35 ppm
O ₃	200th Street/Southern Blvd, Bronx, NY	8 Hours	0.085 ppm*	0.070 ppm
PM ₁₀	681 Kelly Street, Bronx, NY	24 Hours	41 µg/m ³	150 µg/m ³
PM _{2.5}	200th Street/Southern Blvd, Bronx, NY	1 Year	8 µg/m ³	12.0 µg/m ³
		24 Hours	24 µg/m ³	35 µg/m ³
SO ₂	681 Kelly Street, Bronx, NY	1 Hour	12.9 ppb	75 ppb
NO ₂	681 Kelly Street, Bronx, NY	1 Hour	79 ppb	100 ppm
		1 Year	17.46 ppb	53 ppb

Source: U.S. Environmental Protection Agency AirData database, 2020

Notes: Annual periods refer to calendar year.

1. Where data are available from more than one representative monitor, the higher values are reported.

2. Values correspond to the National Ambient Air Quality Standards averaging times and number of exceedances permitted.

* Monitor value exceeds the National Ambient Air Quality Standards, but compliance is determined based on additional statistical data.

ppm = parts per million; ppb = parts per billion; µg/m³ = micrograms per cubic meter

ATTAINMENT STATUS

The Bronx is designated as a “nonattainment area” for O₃ and a “maintenance area” for CO and 24-hour PM_{2.5}.

13.3.2 No Action Alternative

13.3.2.1 Penn Station New York

MTA anticipates that future air quality levels in the PSNY study area—without implementation of the Proposed Project but with completion of the programmed and committed transportation and development projects included in the No Action Alternative inventory—will include background growth in traffic. Car emissions will change in the future as the new regulations evolve and existing regulations begin to apply. This was demonstrated in the environmental impact statements (EISs) for transportation and development projects near PSNY (e.g., Number 7 Line Extension – Hudson Yards Rezoning and Development Program FGEIS;⁵ Western Rail Yards EIS;⁶ 15 Penn Plaza EIS⁷). Those studies show that, while traffic in the study area would increase due to additional development, the resultant emissions would be offset as older, higher polluting vehicles are replaced with newer, less polluting ones. As a result, future air pollutant concentrations would be similar to current levels.

⁵ https://www1.nyc.gov/assets/planning/download/pdf/plans/hudson-yards/hy_exec_sum_t_fgeis_final.pdf

⁶ <https://www1.nyc.gov/site/planning/applicants/env-review/western-rail-yard.page>

⁷ <https://www1.nyc.gov/site/planning/applicants/env-review/15-penn-plaza.page>

13.3.2.2 Station Areas

MTA anticipates that the future air quality conditions in the four proposed station areas will approximate existing conditions. Detailed, quantitative air quality analyses conducted for EISs prepared for development projects proposed in the Bronx (e.g., Webster Avenue Rezoning EIS;⁸ Lower Concourse Rezoning EIS;⁹ Tremont and Third Avenue Rezoning EIS;¹⁰ Baychester Square EAS;¹¹ Spofford Campus Redevelopment EIS¹²) confirm that future air quality conditions will be similar to current conditions. These EISs confirm that traffic increases caused by anticipated new development near the proposed stations will be offset due to increasingly stringent federally mandated vehicle-emission controls and the replacement of older, more polluting vehicles with newer, less polluting ones.

13.3.3 Proposed Project

13.3.3.1 Penn Station New York

The traffic analysis conducted for the Proposed Project (see Chapter 12, “Transportation” and Appendix H, “Transportation”) demonstrates that the Proposed Project would result in a decrease in overall traffic volumes in the PSNY study area. The number of local project-generated vehicles would be below the *CEQR Technical Manual* screening-threshold value for CO (140 project-generated vehicles per hour at a given intersection) during both the AM and PM peak periods of travel at the potentially affected intersections. No trucks would be generated as a result of the Proposed Project. Therefore, no localized mobile-source CO or particulate air quality impacts would occur with the Proposed Project.

13.3.3.2 Station Areas

The traffic analysis conducted for the Proposed Project (see Chapter 12 and Appendix H) demonstrates that, in general, traffic volumes would decrease with the Proposed Project. The localized number of project-generated vehicles in each of the four Bronx stations’ station areas would be below the CEQR screening-threshold value for CO (170 project-generated vehicles per hour at a given intersection) during both the AM and PM peak periods of travel at the potentially affected intersections. No trucks would be generated as a result of the Proposed Project. Therefore, no localized mobile-source CO or particulate matter mobile-source air quality impacts would occur with the Proposed Project.

13.4 REGIONAL AIR QUALITY ANALYSIS

13.4.1 Methodology

The potential effects of the Proposed Project on regional hydrocarbons and NO₂ emissions (i.e., the precursors of O₃) provide an indication of the Proposed Project’s potential overall impact on areawide O₃ levels. MTA conducted a regional emissions burden (mesoscale) analysis to estimate these potential effects. The analysis used vehicle-miles travelled and vehicle hours of travel forecast for the No Action Alternative) and the Proposed Project to estimate incremental changes in pollutant burden levels that would result with the Proposed Project. Table 13-4 presents the vehicle-miles traveled under the No Action Alternative and the

⁸ <https://www1.nyc.gov/site/planning/applicants/env-review/webster-avenue.page>

⁹ <https://www1.nyc.gov/site/planning/applicants/env-review/lower-concourse.page>

¹⁰ https://www1.nyc.gov/assets/planning/download/pdf/plans/third-tremont/third_tremont.pdf

¹¹ http://www.nyc.gov/html/oec/downloads/pdf/dme_projects/14DME010X/14DME010X_EAS_07022014.pdf

¹² <https://a002-ceqraccess.nyc.gov/ceqr/ProjectInformation/ProjectDetail/12528-17DME001X#b>



Proposed Project.¹³ MTA also considered the effects of changes in passenger-rail operations (i.e., future regionwide changes in the number of miles of passenger-rail travel without and with the Proposed Project) on pollutant emissions.

Table 13-4. Daily Vehicle-Miles Travelled with No Action Alternative and Proposed Project (2025)

Regions	No Action Alternative	Proposed Project	Difference between Proposed Project and No Action Alternative
New York, NY	37,737,647	37,710,708	-26,939
Bronx, NY	9,239,343	9,229,569	-9,774
The Rest of NYC (Brooklyn, Queens, and Staten Island)	43,006,692	42,999,452	-7,240
Westchester County	21,616,543	21,607,200	-9,344
Suburban CT (Fairfield and New Haven Counties)	36,050,828	36,023,008	-27,820

Source: AECOM, 2020

MTA estimated potential Proposed Project-related effects on regional pollutant emission rates using project-specific information about auto- and train-related vehicle-miles traveled anticipated in the region for the No Action Alternative and the Proposed Project.

MTA estimated emissions generated by vehicular traffic using the latest version of the EPA-recommended emission model (MOVES) with county-specific input parameters for the boroughs of New York City, Westchester County, and Fairfield and New Haven Counties in Connecticut. The New York City Department of Environmental Protection specified the New York City metropolitan area parameters used in the estimate; Connecticut analysis used national default parameters.

MTA estimated electric-train emissions using emission factors from Argonne National Laboratory's GREET Lifecycle Model¹⁴ Urban emission factors obtained from GREET for electricity generation assuming the U.S. pathway mix. These factors can vary by year and by geography, depending on the specific mix of energy sources.

13.4.2 Analysis

Table 13-5 presents the resultant emission burdens. Emissions generated with the Proposed Project would be lower than emissions generated with the No Action Alternative.

¹³ MTA Metro-North Penn Station Access Project, 2025 Travel Demand Forecast Summary Report, version 3.0, July 14, 2020 (Appendix A)

¹⁴ Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model. <https://greet.es.anl.gov/>

**Table 13-5. Predicted Annual Regional Emissions with No Action Alternative and Proposed Project (2025)**

Pollutant	No Action Alternative (metric tons)	Proposed Project (metric tons)	Difference between Proposed Project and No Action Alternative (metric tons)
CO	111,636.04	111,576.75	-59.30
VOC	3,984.70	3,982.75	-1.95
PM ₁₀	3,657.33	3,655.69	-1.64
PM _{2.5}	822.01	821.81	-0.20
NO _x	11,757.60	11,753.96	-3.64

Source: WSP, 2020

As a non-exempt project (i.e., not exempt from the Conformity Rule, proposed within areas that have been designated as “nonattainment” for O₃ and “maintenance” for particulate matter), the Proposed Project must be included in the New York Metropolitan Transportation Council -developed, State Implementation Plan -confirming Transportation Improvement Program before the Federal Transit Administration approves it.

13.5 CONCLUSION

The analysis concluded that the Proposed Project would reduce emissions on a regional level. The emissions from power-generating facilities that provide electricity for the increased rail service would be offset by the emissions decrease due to the reduction in regionwide vehicle-miles traveled. There would be no significant impacts to localized mobile-source CO or particulate matter air quality near PSNY or the proposed stations in the Bronx.