

APPENDIX F AIR QUALITY MEMORANDUM

AIR QUALITY TECHNICAL REPORT

**University Boulevard (Route 0840) Extension
0840-076-R21**

**Between Devlin Road and Wellington Road
UPC 118313**

Northern Virginia District

Prepared for (by):



Environmental Division

Prepared by:

WSP

September 2025

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ACRONYMS

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
CAA	Clean Air Act
CF	Categorical Finding
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FY	Fiscal Year
FTA	Federal Transit Administration
HAP	Hazardous Air Pollutant
HEI	Health Effects Institute
HOT	High-Occupancy Toll
HRTPO	Hampton Roads Transportation Planning Organization
I-	Interstate-
IRIS	Integrated Risk Information System
L&D	Location & Design Division (VDOT)
LOS	Level of Service
LRTP	Long Range Transportation Plan
MOVES	Motor Vehicle Emission Simulator
MPO	Metropolitan Planning Organization
MSATs	Mobile Source Air Toxics
MTPY	Metric Tons per Year
NAAQS	National Ambient Air Quality Standards
NCHRP	National Cooperative Highway Research Program
NCRTPB	National Capital Region Transportation Planning Board
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
OIPI	Office of Intermodal Planning and Investment
O ₃	Ozone
PA	Programmatic Agreement

Pb	Lead
PM	Particulate Matter
PM _{2.5}	Fine inhalable particulate matter, with diameters that are generally 2.5 micrometers and less
PM ₁₀	Inhalable particulate matter, with diameters that are generally 10 micrometers and less
POM	Polycyclic Organic Matter
PPM	Parts per million
PPB	Parts per billion
RTP	Long-Range Transportation Plan
SIP	State Implementation Plan
SO ₂	Sulfur Dioxide
TIP	Transportation Improvement Program
TMPD	Transportation Mobility and Planning Division (VDOT)
TPY	Tons per Year
TSD	Technical Support Document
USACE	U.S. Army Corps of Engineers
USDOT	US Department of Transportation
USEPA	U.S. Environmental Protection Agency
VA	Virginia
VAC	Virginia Administrative Code
VDEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VDRPT	Virginia Department of Rail and Public Transportation
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VPHPL	Vehicles per Hour per Lane
VTRC	Virginia Transportation Research Council

Executive Summary

The Virginia Department of Transportation (VDOT), in cooperation with the Prince William County Department of Transportation, is proposing to connect two existing sections of University Boulevard (Route 840) in Prince William County, Virginia. University Boulevard would be extended for approximately 2.5 miles with 1.75 miles of new roadway and reconstruction of roughly 0.75 miles of existing road. At the northern end, the current two-lane section of University Boulevard would be expanded to four lanes between Wellington Road and the southern entrance of Gainesville High School. The proposed improvements were assessed for potential air quality impacts and compliance with all applicable air quality regulations and guidance. Based on the assessment, the proposed improvements would meet all applicable federal and state transportation conformity regulatory requirements as well as air quality guidance under the National Environmental Policy Act (NEPA). As such, the proposed improvements would not cause or contribute to a new violation of the national ambient air quality standards (NAAQS) established by the US Environmental Protection Agency (EPA).

Carbon Monoxide (CO)

EPA project-level (“hot-spot”) transportation conformity requirements for CO do not apply as the project is located in a region that is in attainment of the NAAQS. A project-specific analysis or assessment for CO is also not needed for NEPA per the programmatic approach specified in the VDOT Resource Document (Protocol 4.2.2.2). Based on the overall weight-of-evidence, it may reasonably be concluded that the CO NAAQS will be met given the following factors: 1) continued implementation of effective emission control technology that has substantially reduced CO emission rates nationwide; 2) extensive experience in project-specific modeling for CO for a wide variety of projects, in which compliance with the NAAQS established by EPA for CO is readily demonstrated; and 3) extensive experience in programmatic agreements for project-level agreements for CO that established ever-increasing thresholds for such analyses given the substantially reduced emission rates.

Mobile Source Air Toxics (MSATs)

Federal Highway Administration (FHWA) guidance (2023)¹ states that “...EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA).² These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.” Following FHWA guidance for projects with low potential impacts based on forecast traffic volumes and other technical criteria, a qualitative assessment of potential MSAT impacts was conducted for this project.

¹ FHWA, “*INFORMATION: Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*”, January 18, 2023. See: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/

² See: <https://www.epa.gov/national-air-toxics-assessment>

Based on that assessment, best available information indicates that, nationwide, regional levels of MSATs are expected to decrease in the future due to ongoing fleet turnover and the continued implementation of increasingly more stringent emission and fuel quality regulations. Nonetheless, technical shortcomings of emission and dispersion models and uncertain science with respect to health effects effectively limit meaningful or reliable estimates of MSAT emissions and effects of this project at this time. While it is possible that localized increases in MSAT emissions may occur as a result of this project, emissions would likely be lower than present levels in the design year of this project as a result of EPA's national control programs that are projected (in the FHWA 2023 Guidance) to reduce annual MSAT emissions by 76 percent between 2020 and 2060 while vehicle-miles-traveled (VMT) are expected to increase on a national level by 31 percent. Although local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Mitigation

Emissions may be produced in the construction of this project from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT *Road and Bridge Specifications*.³

The Virginia Department of Environmental Quality (VDEQ) provides general comments for projects by jurisdiction that in part address mitigation. For Prince William County, VDEQ stated that⁴ “...the project is located in a volatile organic compounds (VOC) and nitrogen oxides (NOx) Emissions Control Area. As such, all reasonable precautions should be taken to limit the emissions of VOC and NOx. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions⁵; 9 VAC 5-45, Article 7, Cutback Asphalt restrictions⁶; and 9 VAC 5-50, Article 1, Fugitive Dust precautions.”⁷

Project Status in the Regional Transportation Plan and Program

Federal conformity requirements at 40 CFR 93.114⁸ and 40 CFR 93.115⁹ (as incorporated by reference into the Virginia conformity SIP) apply as the area in which the project is located is designated as nonattainment for ozone. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program or otherwise meet the criteria specified in 40 CFR

³ <https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/technical-guidance-documents/road-and-bridge-specifications/>

⁴ Spreadsheet entitled: “DEQ SERP comments by jurisdiction_07252024”, July 25, 2024, downloaded from the online data repository for the VDOT Resource Document. The repository may be accessed via the Environmental Division webpage:
<https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/environmental/>

⁵ See: <https://law.lis.virginia.gov/admincode/title9/agency5/chapter130/>

⁶ See: <https://law.lis.virginia.gov/admincode/title9/agency5/chapter45/>

⁷ See: <https://law.lis.virginia.gov/admincode/title9/agency5/chapter50/>

⁸ See: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#93.114>

⁹ See: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#93.115>

93.109(b).¹⁰ As of the date of preparation of this analysis, the project is included in the currently conforming FY 2023-2026 Transportation Improvement Program (TIP) and Visualize 2045, the Long Range Transportation Plan (LRTP) developed by the designated metropolitan planning organization (MPO) for the region, the National Capital Region Transportation Planning Board (NCRTPB).¹¹

¹⁰ See: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#93.109>

¹¹ See: <http://www.mwcog.org/transportation/tpb/>

1.0 Project Background

This section presents background information including the project purpose and need, description, alternatives, summary traffic data and the project status in the regional transportation plan and program (for areas subject to conformity).

1.1 Purpose and Need

The purpose of the proposed project is:

- To provide additional capacity to the roadway system to alleviate traffic congestion for existing and future traffic demand on local roads and intersections;
- To be consistent with existing and planned local development and County plans and goals to support growth; and
- To safely improve multimodal connection and accessibility between the western and eastern portions of Prince William County to support existing and future vehicle, pedestrian, and bicycle mobility.

1.2 Project Description

VDOT, in cooperation with the Prince William County Department of Transportation, is proposing to connect two existing sections of University Boulevard (Route 840) in Prince William County, Virginia. University Boulevard would be extended for approximately 2.5 miles with 1.75 miles of new roadway and reconstruction of roughly 0.75 miles of existing road. At the northern end, the current two-lane section of University Boulevard would be expanded to four lanes between Wellington Road and the southern entrance of Gainesville High School. Exhibit 1.2.1 provides an overview of the study corridor for the proposed project.

Exhibit 1.2.1: Existing University Boulevard



1.3 Alternatives

Based on the project purpose and need, two alternatives have been developed: one build alternative and the No-Build alternative. The Build Alternative includes the extension and widening of University Boulevard. The No-Build Alternative assumes that no action would be taken to address the project purpose and need, other than those typically completed as part of existing system preservation (i.e., resurfacing, landscape management, sign replacement, etc.).

1.3.1 The No-Build Alternative

This alternative includes continued routine maintenance and repairs of existing transportation infrastructure within the Study Area Corridors, but there would be no major improvements. All roadway facilities would remain in their current configuration.

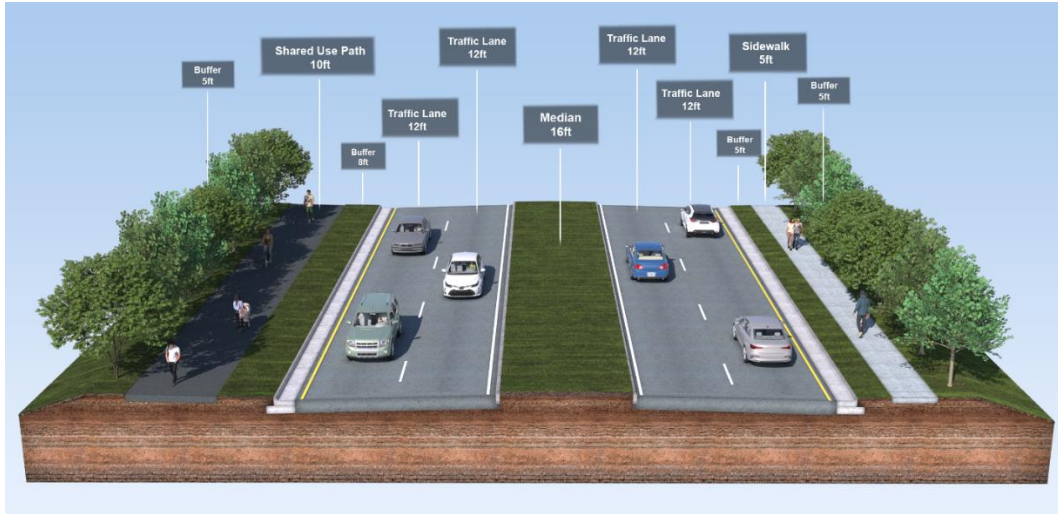
1.3.2 Build Alternative

Description. The Build Alternative would extend University Boulevard for approximately 2.5 miles, encompassing approximately 1.75 miles of new-alignment roadway and reconstruction of approximately 0.75 miles of existing roadway, as detailed below:

- At the north end of the Project, which is developed, the existing two-lane portion of University Boulevard would be widened to four lanes between Wellington Road and the Gainesville High School south entrance on existing University Boulevard.
- The new portion of the alignment, which would run across largely undeveloped/forested land, would be extended between the southern entrance of Gainesville High School and Devlin Road, with intersection improvements as needed to accommodate the extension.

Typical Section. The University Boulevard Extension roadway would be completed in accordance with Minor Arterial collector criteria with a design speed of 50 mph. The typical section is shown in Exhibit 1.3.1 below. The Build Alternative would include construction of a four-lane divided roadway, with two lanes in each direction separated by a raised grass median. The typical section would include a 10-foot-wide shared-use path for pedestrians and cyclists and a 5-foot-wide sidewalk for the full Project limits. The right-of-way width to accommodate these improvements is 128 feet along the proposed corridor. Wider portions of the roadway would be provided for turn lanes and pedestrian refuge at specific crossing locations that include Wentworth Green Drive, the northern and southern entrances to Gainesville High School, Rollins Ford Road, and Devlin Road.

Exhibit 1.3.1: Build Alternative Typical Section



Source: WSP

1.4 Summary of Traffic Data and Forecasts

Detailed traffic data and forecasts are provided in the Operational and Safety Analysis Final Report, August 2025. Exhibit 1.4.1 presents a summary of the mainline segments’ opening (2028) and design year (2048) average daily traffic (ADT) forecasts for the project. As shown in the exhibit, the peak ADT forecast for 2048 is 44,530 on the east leg of University Boulevard at Rollins Ford Road.

Exhibit 1.4.1: 2028 and 2048 Average Daily Traffic Volumes

	North Leg	South Leg	East Leg	West Leg
University Blvd at Wentworth Green Drive				
2028 Build Conditions	20,170	22,170	1,780	7,240
2048 Build Conditions	43,070	43,230	1,800	12,430
University Blvd at Gainesville High School South Entrance				
2028 Build Conditions	21,570	15,900	12,250	N/A
2048 Build Conditions	42,620	36,960	12,160	N/A
University Blvd at Rollins Ford Road				
2028 Build Conditions	N/A	N/A	N/A	N/A
2048 Build Conditions	N/A	19,020	44,530	36,960

Source: WSP, University Blvd Final Report, 27 August 2005 Table 16

2.0 Ambient Air Quality and Attainment Status

2.1 National Ambient Air Quality Standards

Exhibit 2.1.1 presents the NAAQS established by the EPA for criteria air pollutants, namely: CO, SO₂, O₃, PM, NO₂, and Pb. There are two types of NAAQS—primary and secondary: “*Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.*”¹²

As a requirement of the Clean Air Act, EPA periodically reviews the NAAQS and revises them as needed, e.g., to make them more stringent and/or, on occasion, to revoke previous standards that were less stringent.¹³ For example, EPA revoked the 1997 annual primary PM_{2.5} NAAQS effective October 24, 2016, with the implementation of the more stringent 2012 PM_{2.5} NAAQS.¹⁴ Effective May 6, 2024, EPA revised the primary annual PM_{2.5} standard by lowering the level from 12.0 µg/m³ to 9.0 µg/m³.¹⁵

Areas that have never been designated by EPA as nonattainment for one or more of the NAAQS are classified as attainment areas, while areas that do not meet one or more of the NAAQS may be designated by EPA as nonattainment areas for that or those criteria pollutants. Areas that have failed to meet the NAAQS in the past but have since re-attained them may be re-designated as attainment (maintenance) areas, which are commonly referred to as maintenance areas.

¹² From the preamble to the EPA NAAQS table: <https://www.epa.gov/criteria-air-pollutants/naaqs-table>

¹³ On January 27, 2023, EPA issued a proposed rule for “Reconsideration of the National Ambient Air Quality Standards for Particulate Matter” (18 FR 5558). At the time of preparation of this report, that rule has not been finalized. The NAAQS table presented here may be updated for PM when the rule is finalized.

¹⁴ On August 24, 2016, EPA issued a final rule (81 FR 58010), effective October 24, 2016, on “*Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements*” that stated, in part: “*Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012.*”

See: <https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf>.

Note the revocation of the 1997 annual primary NAAQS for PM_{2.5} also eliminated the associated conformity requirements. This was the case for northern Virginia, which was in attainment (maintenance) for the 1997 NAAQS at the time of its revocation.

¹⁵ On March 6, 2024, EPA issued a final rule for “Reconsideration of the National Ambient Air Quality Standards for Particulate Matter” (45 FR 16202).

Exhibit 2.1.1: National Ambient Air Quality Standards (US EPA Tabulation)

Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form	
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year	
			1 hour	35 ppm		
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m ³ ⁽¹⁾	Not to be exceeded	
Nitrogen Dioxide (NO ₂)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
		primary and secondary	1 year	53 ppb ⁽²⁾	Annual Mean	
Ozone (O ₃)		primary and secondary	8 hours	0.070 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	
Particle Pollution (PM)		PM _{2.5}	primary	1 year	9.0 µg/m ³	annual mean, averaged over 3 years
			secondary	1 year	15.0 µg/m ³	annual mean, averaged over 3 years
			primary and secondary	24 hours	35 µg/m ³	98th percentile, averaged over 3 years
		PM ₁₀	primary and secondary	24 hours	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO ₂)		primary	1 hour	75 ppb ⁽⁴⁾	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
		secondary	1 year	10 ppb	annual mean, averaged over 3 years	

- (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 ppb 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 are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O₃ standards.
- (4) The previous SO₂ standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO₂ standards or is not meeting the requirements of a SIP call under the previous SO₂ standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Source: Excerpted from: <https://www.epa.gov/criteria-air-pollutants/naaqs-table>, accessed 4/1/2025.

2.2 Air Quality Attainment Status of the Project Area

The EPA Green Book¹⁶ lists non-attainment, maintenance, and attainment areas across the nation. It lists the jurisdictions within the area in which the project is located as nonattainment for ozone and attainment for all other NAAQS.

As noted in Section 6 on consultation, the VDEQ provides general comments by jurisdiction on proposed projects. With regard to attainment status for the area in which project is located, their comment¹⁷ is: *"This project is located within a Moderate 8-hour Ozone Nonattainment area. In accordance with 40 CFR Part 93, transportation conformity requirements apply to the project since the project is located in a nonattainment or maintenance area for a transportation-related criteria pollutant (i.e., ozone). In addition, the project is located in a volatile organic compounds (VOC) and nitrogen oxides (NOx) Emissions Control Area ..."*

2.3 Ambient Air Quality Monitoring Data and Trends

VDEQ issues an annual report summarizing air quality monitoring data for the previous year, covering criteria pollutants (those for which EPA has established NAAQS) and other pollutants including air toxics.¹⁸ Excerpts of the monitoring data from the most recent version of that report (2023) are presented below.

2.3.1 Criteria Pollutants

For transportation sources, the criteria pollutants of primary interest are CO and PM.

2.3.1.1 Carbon Monoxide

EPA provides the following background information on CO:¹⁹

"CO is a colorless, odorless gas that can be harmful when inhaled in large amounts. CO is released when something is burned. The greatest sources of CO to outdoor air are cars, trucks and other vehicles or machinery that burn fossil fuels. A variety of items in your home such as unvented kerosene and gas space heaters, leaking chimneys and furnaces, and gas stoves also release CO and can affect air quality indoors."

As shown in Exhibit 2.3.1, and due primarily to the implementation of more stringent vehicle emission and fuel quality standards, the national trend in ambient concentrations of CO over the past few decades has decreased to a level substantially below the current eight-hour NAAQS of nine parts per million (ppm). The national trend is reflected in the very low ambient CO concentrations currently observed for the project area in Virginia, which are presented in Exhibits 2.3.2 (chart) and 2.3.3 (table) respectively. Exhibit 2.3.3 presents monitoring data from Fairfax County as it is the closest CO monitor to the project area. As noted above, Virginia is in attainment for both the one- and eight-hour NAAQS for CO.

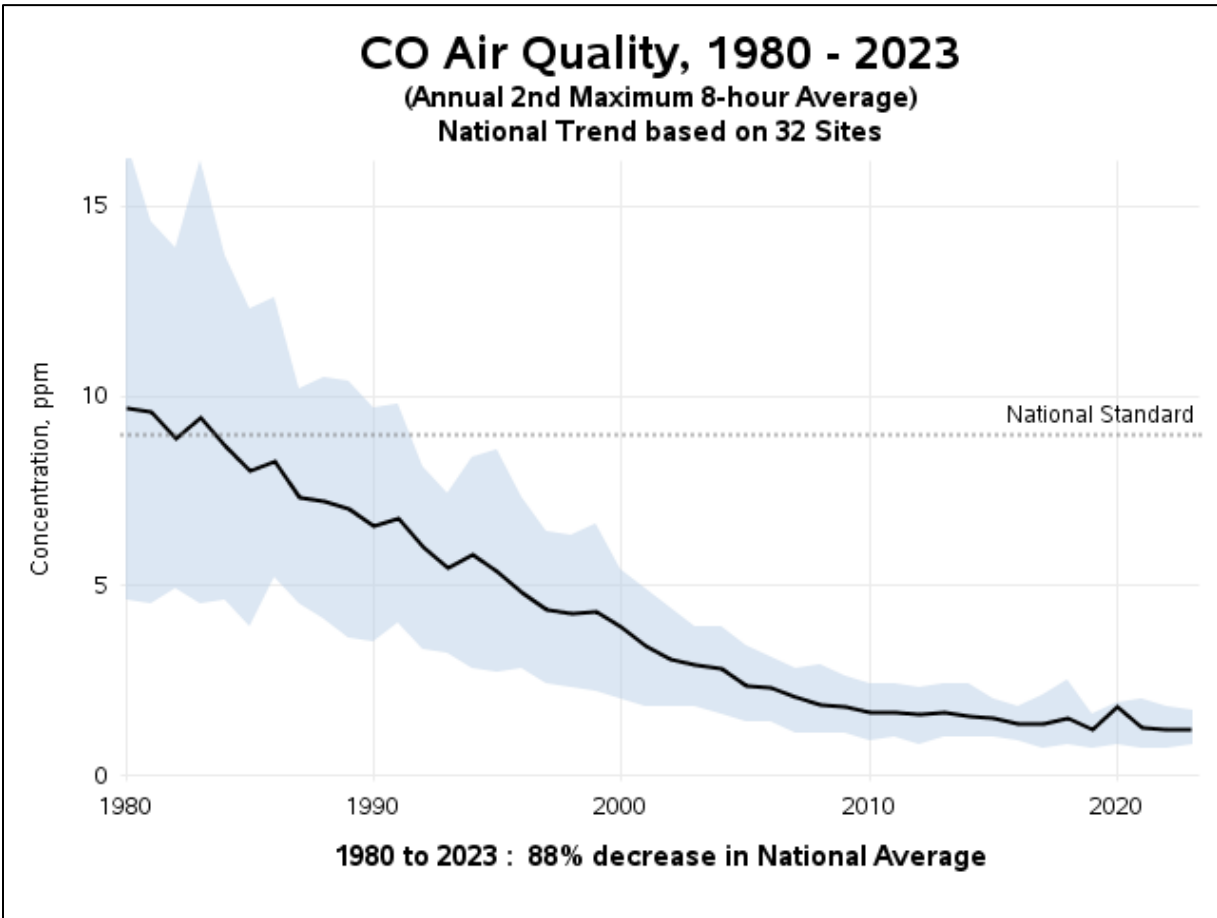
¹⁶ EPA Green Book: <https://www.epa.gov/green-book>

¹⁷ Spreadsheet entitled: "DEQ SERP comments by jurisdiction_07252024", July 25, 2024

¹⁸ <https://www.deq.virginia.gov/our-programs/air/reports>

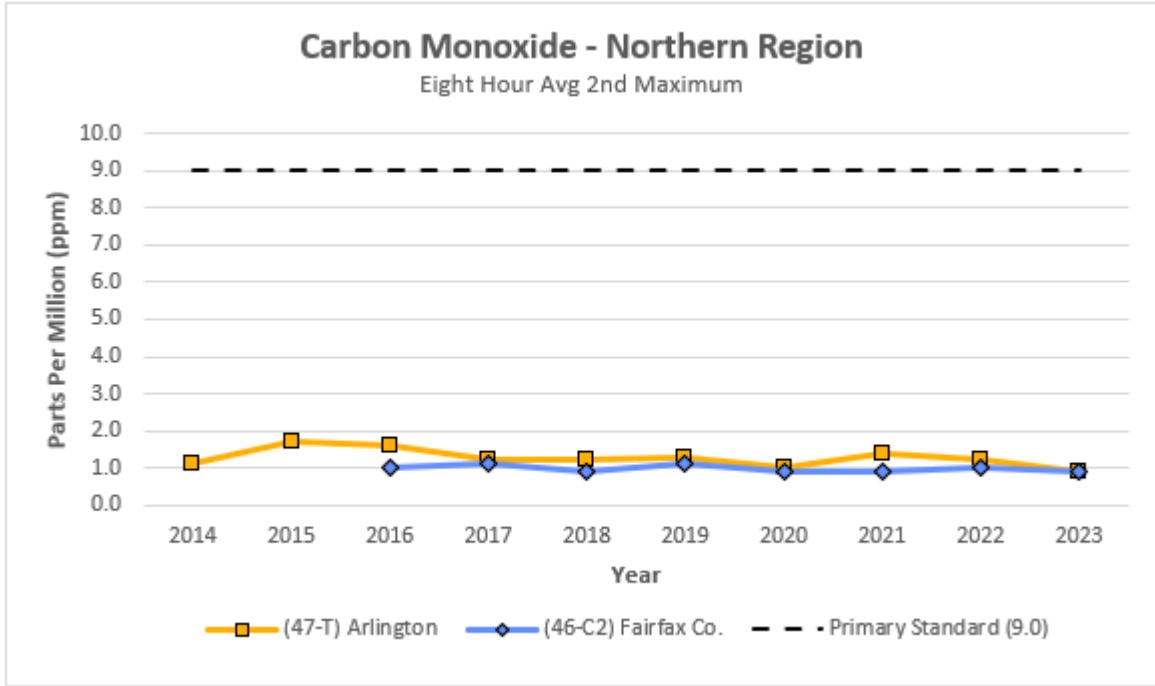
¹⁹ <https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution#What%20is%20CO>

Exhibit 2.3.1: National Trend in Ambient CO Concentrations



Source: Excerpted from USEPA, <https://www.epa.gov/air-trends/carbon-monoxide-trends>, accessed April 1, 2025

Exhibit 2.3.2: Trend in Ambient CO Concentrations in the Project Area



Source: Excerpted from Virginia Department of Environmental Quality, “Virginia Ambient Air Monitoring 2023 Annual Report”, November 2024. See: <https://www.deq.virginia.gov/our-programs/air/reports>

Exhibit 2.3.3: Ambient Concentrations of Carbon Monoxide in the Project Area

2022 parts per million. Primary NAAQS: 35 ppm (1-hour) and 9 ppm (8-hour)

Site	2023			
	1-Hour Avg. (ppm)		8-Hour Avg.* (ppm)	
	1 st Max.	2 nd Max.	1 st Max.	2 nd Max.
(46-C2) Fairfax Co.	1.2	1.1	1.0	0.9

*: Eight Hour Averages given as Ending-Hour running average

***: The Henrico County site operates a trace-level CO monitor, which reports the 1-hour average to 2 decimal places

Source: Excerpted from Virginia Department of Environmental Quality, “Virginia Ambient Air Monitoring 2023 Annual Report”, November 2024. See: <https://www.deq.virginia.gov/our-programs/air/reports>

2.3.1.2 Particulate Matter

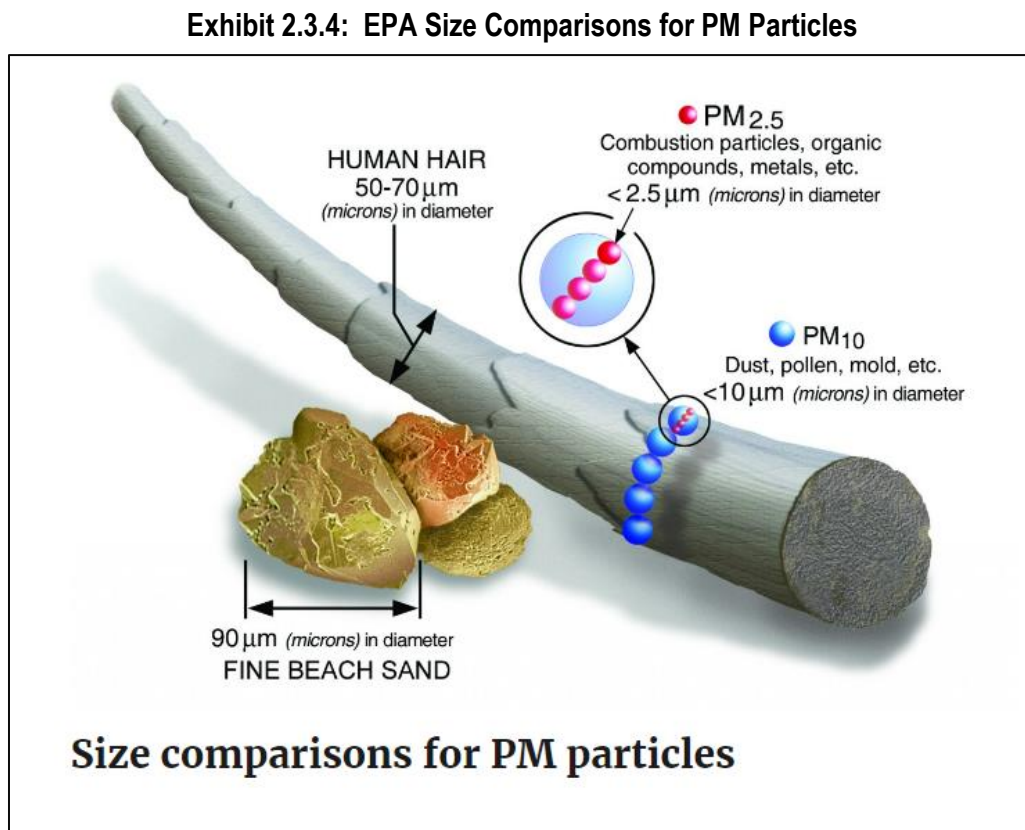
EPA provides the following background information on particulate matter (PM):²⁰

“PM stands for particulate matter (also called particle pollution): the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

Particle pollution includes:

- *PM₁₀ : inhalable particles, with diameters that are generally 10 micrometers and smaller; and*
- *PM_{2.5}: fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.”*

Exhibit 2.3.4 from EPA shows the size of PM_{2.5} and PM₁₀ particles relative to human hair and fine beach sand.

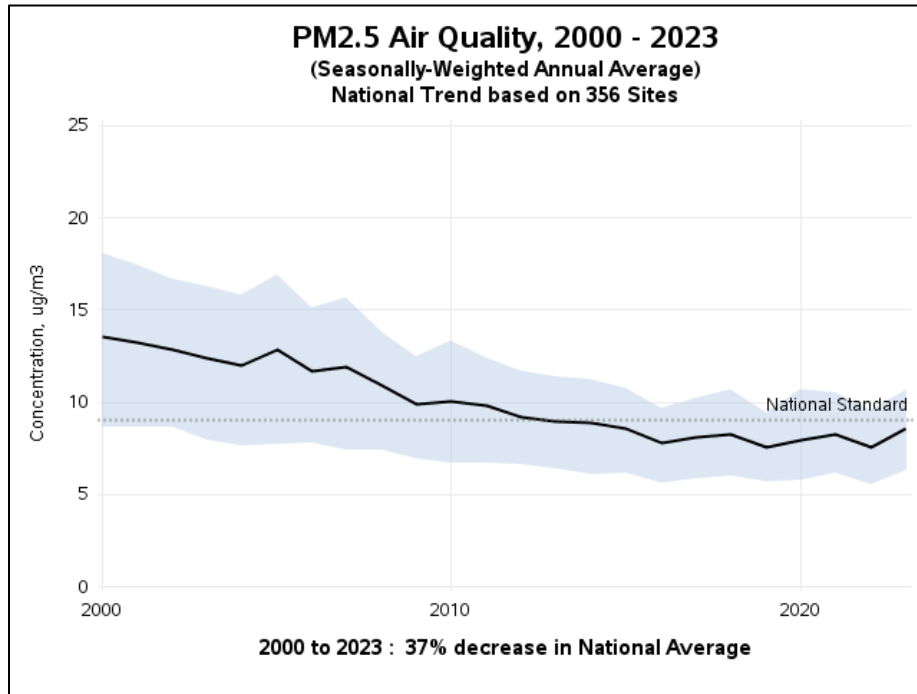


Source: Excerpted from USEPA, <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>, Last accessed April 1, 2025

Exhibits 2.3.5 and 2.3.6 present the national and local trends in PM_{2.5} (annual average) levels respectively.

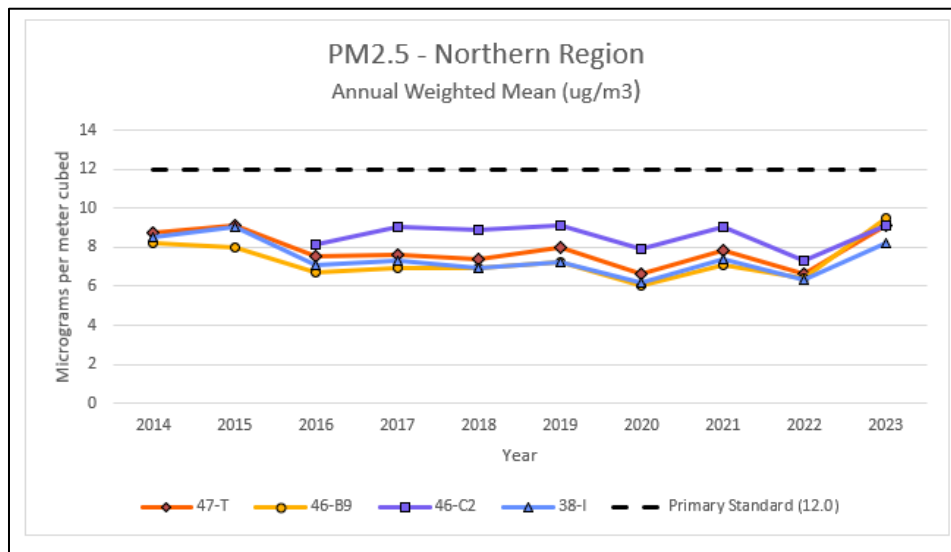
²⁰ See: <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>

Exhibit 2.3.5: National Trends in PM_{2.5} Concentrations (Annual Average)



Source: Excerpted from US EPA, <https://www.epa.gov/air-trends/particulate-matter-pm25-trends>, accessed April 1, 2025

Exhibit 2.3.6: Trends in PM_{2.5} Concentrations (Annual Average) in the Project Area



Source: Excerpted from US EPA, <https://www.epa.gov/air-trends/particulate-matter-pm25-trends>, accessed August 28, 2025

Exhibit 2.3.7 presents a tabulation of recent trends in ambient data for annual average PM_{2.5} for the monitors in adjacent Loudoun and Fairfax counties since there are no PM_{2.5} monitors located in Prince William County.

Exhibit 2.3.7: Ambient Concentrations of PM_{2.5} (Annual Average) in the Project Area

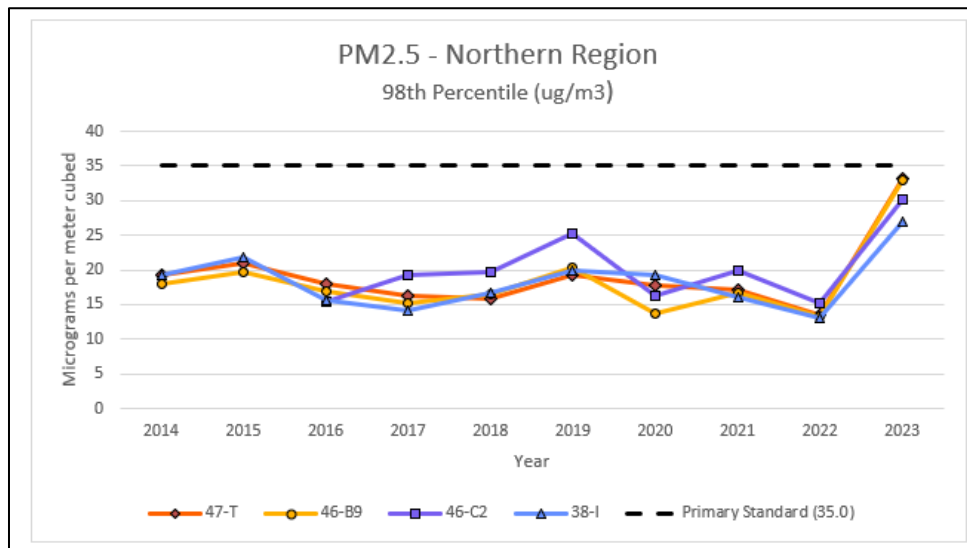
2021-2023 PM_{2.5} Weighted Annual Arithmetic Means (µg/m³, LC)				
Site	2021	2022	2023	3-Year Average
(38-I) Loudoun Co.	7.4	6.4	8.2	7.3
(46-B9) Franconia, Fairfax Co.	7.1	6.4	9.5	7.6
(46-C2) Springfield, Fairfax Co.	9.1	7.3	9.1	8.5

* Annual value did not meet completeness criteria.

Source: Excerpted from Virginia Department of Environmental Quality, "Virginia Ambient Air Monitoring 2023 Annual Report" <https://www.deq.virginia.gov/our-programs/air/reports>

Exhibits 2.3.8 (chart) and 2.3.9 (table) present respectively the recent trend in 24-hr PM_{2.5} levels in the project area for adjacent Loudoun and Fairfax Counties as there are no monitors located in Prince William County.

Exhibit 2.3.8: Ambient Concentrations of PM_{2.5} (24-Hour) in the Project Area



Source: Excerpted from US EPA, <https://www.epa.gov/air-trends/particulate-matter-pm25-trends>, accessed August 28, 2025

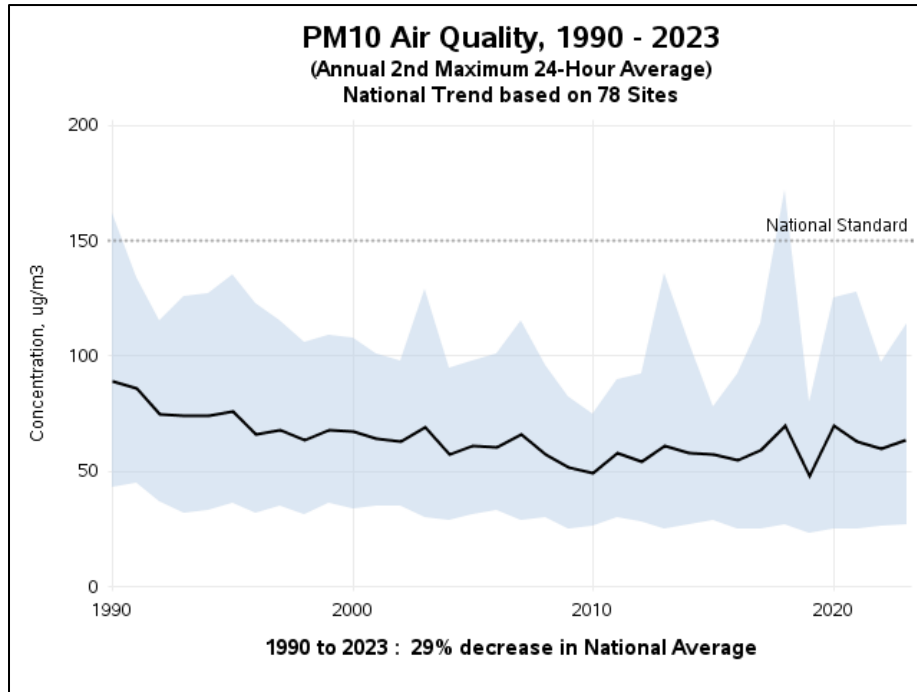
Exhibit 2.3.9: Ambient Concentrations of PM_{2.5} (24-Hour Average) in the Project Area

Site	2021	2022	2023	3-Year Average
(38-I) Loudoun Co.	16.0	13.0	27.0	19
(46-B9) Franconia, Fairfax Co.	16.7	13.2	33.0	21
(46-C2) Springfield, Fairfax Co.	19.9	15.1	30.1	22

Source: Excerpted from Virginia Department of Environmental Quality, "Virginia Ambient Air Monitoring 2023 Annual Report" <https://www.deq.virginia.gov/our-programs/air/reports>

Exhibit 2.3.10 presents a chart showing the national trend in 24-hr PM₁₀ levels. Exhibit 2.3.11 presents recent data for adjacent Stafford and Fairfax Counties since there are no monitors located in Prince William County.

Exhibit 2.3.10: National Trends in PM₁₀ Concentrations (24-Hour)



Source: Excerpted from US EPA, <https://www.epa.gov/air-trends/particulate-matter-pm10-trends>, accessed April 1, 2025

Exhibit 2.3.11: Ambient Concentrations of PM₁₀ (24-Hour Average) in the Project Area

2021-2023 PM ₁₀ 24-Hour Average Concentrations (units in µg/m ³ STD)							
Site	2021		2022		2023		>150 µg/m ³
	1 st Max	2 nd Max	1 st Max	2 nd Max	1 st Max	2 nd Max	
(44-A) Stafford Co.	34	30	18	13	69	34	0
(46-B9) Fairfax Co. **@	45	43	30	23	191	131	1

** Continuous monitoring started in 2023

@ Did not meet one quarter of data completeness criteria in either 2022 or 2023

Source: Excerpted from Virginia Department of Environmental Quality, "Virginia Ambient Air Monitoring 2023 Annual Report" <https://www.deq.virginia.gov/our-programs/air/reports>

2.3.1.3 Ozone

Exhibit 2.3.12 presents the trend in regional ozone levels for the eight-hour standard in the Northern Virginia Nonattainment Area. Data is provided for Loudoun, Prince William, Arlington and Fairfax Counties.

Exhibit 2.3.12: Trend for the Eight-Hour Ozone Standard in the Project Area
2021-2023 Fourth-Highest Daily Maximum 8-Hour Ozone Averages (units parts per million)

Areas	Monitor Location (County/City)	2021	2022	2023	3-Year Average (NAAQS = .070 ppm)
Northern Virginia Nonattainment Area	Loudoun Co.	0.066	0.061	0.067	0.065
	Prince William Co.	0.062	0.058	0.070	0.063
	Arlington Co.	0.070	0.061	0.071	0.067
	Fairfax Co. (Lee Park)	0.068	0.062	0.073	0.068

Source: Excerpted from Virginia Department of Environmental Quality, “Virginia Ambient Air Monitoring 2023 Annual Report”, November 2024. See: <http://www.deq.virginia.gov/Programs/Air/AirMonitoring/Publications.aspx><https://www.deq.virginia.gov/our-programs/air/reports>

2.3.2 Air Toxics

From the VDEQ website:²¹

“Toxic air pollutants, also called Hazardous Air Pollutants or air toxics, are known or suspected to cause adverse health or environmental effects.

DEQ maintains two air toxics monitoring sites: one in the Richmond area at the MathScience Innovation Center, and one in Hopewell. Among the princip[al] objectives of these stations are assessing trends and emission reduction program effectiveness, assessing and verifying air quality models (e.g., exposure assessments, emission control strategy development, etc.), and as direct input to source-receptor models.

At each of these sites, daily measurements are taken for dozens of pollutants, including volatile organic compounds (VOCs), carbonyls and metals, and the Richmond site also measures polyaromatic hydrocarbons (PAHs). The Hopewell site was placed in 2009 as part of a grant to study localized impacts from air toxics. The Richmond site is part of a national network to study air toxics trends...

Find more information about these monitors in DEQ's Air Monitoring Network Plan.²²”

Mobile source air toxics and trends are addressed in more detail in the next section on project assessment.

3.0 Project Assessment

3.1 Regulatory Requirements

²¹ <https://www.deq.virginia.gov/our-programs/air/monitoring-assessments/air-monitoring/pollutant-monitoring>, accessed April 1, 2025

²² Ibid

The assessments presented in this section were conducted for purposes of the National Environmental Policy Act of 1969 (NEPA) and, where applicable, to meet transportation conformity rule requirements. FHWA posts guidance for NEPA on its website for project development,²³ and provides guidance specific to air quality (focusing on carbon monoxide) in its 1987 Technical Advisory 6640.8A, “Guidance for Preparing and Processing Environmental and Section 4(f) Documents.”²⁴ FHWA posts separate guidance for mobile source air toxics (MSATs) along with responses to “Frequently Asked Questions” (FAQs) on its air quality webpage.²⁵

Conformity requirements are specified both by EPA and the Commonwealth. EPA transportation conformity rule requirements, which are specified in 40 CFR Parts 51 and 93,²⁶ were issued pursuant to requirements in the Clean Air Act (CAA) as amended.²⁷ Copies of the EPA conformity regulation and associated guidance are available on the EPA website.²⁸ In general, the rule requires conformity determinations for transportation plans, programs and projects in “non-attainment or maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan” (40 CFR 93.102(b)). However, under the implementation provisions²⁹ of the transportation conformity rule at 40 CFR 51.390(a), the federal rule establishes the “criteria and procedures” only “until such time as EPA approves the conformity implementation plan”. In other words, the federal requirements apply only in the absence of corresponding requirements in the state conformity regulation or “conformity SIP”. Accordingly, Virginia requirements for conformity were implemented in 9 VAC-5-151³⁰ that incorporate by reference most of the requirements in the July 1, 2012 federal rule from 40 CFR 923.101 to 93.129, with the notable exception of 40 CFR 93.105, which addresses consultation. For consultation, the Virginia regulation provides detailed requirements that are specific to Virginia but otherwise reflect the federal requirements at 40 CFR 93.105.

For Virginia, project-level conformity requirements do not apply as all areas of the Commonwealth are in attainment of the CO and PM NAAQS. Regional conformity requirements apply for ozone in northern Virginia and, under the 2018 South Coast II court ruling³¹ that impacted areas nationwide, Richmond/Tri-Cities, Fredericksburg, and Hampton Roads. As the project is located in Prince William County, regional conformity requirements apply.

²³ See: https://www.environment.fhwa.dot.gov/nepa/nepa_projDev.aspx

²⁴ See: <https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp>

²⁵ See: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/

²⁶ EPA Transportation Conformity Regulation and Guidance:

- <https://www.epa.gov/state-and-local-transportation/current-law-regulations-and-guidance-state-and-local-transportation>.

Direct links:

- <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-51#subpart-T>

- <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#part-93>

²⁷ See: <https://www.epa.gov/clean-air-act-overview/>

²⁸ See: <https://www.epa.gov/state-and-local-transportation/transportation-conformity>

²⁹ 40 CFR 51.390(a): “...The federal conformity rules under part 93, subpart A, of this chapter... establish the conformity criteria and procedures necessary to meet the requirements of Clean Air Act section 176(c) until such time as EPA approves the conformity implementation plan revision required by this subpart... The federal conformity regulations contained in part 93, subpart A, of this chapter would continue to apply for the portion of the requirements that the state did not include in its conformity implementation plan and the portion, if any, of the state's conformity provisions that is not approved by EPA.” <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-51#51.390>

³¹ Per a 2/16/2018 court decision (South Coast Air Quality Management District v. EPA), all areas in the country that were in nonattainment or maintenance for the 1997 eight-hour ozone NAAQS before its revocation by EPA in 2015 were again made subject to conformity for that standard. This decision in part affects “orphan areas” (as defined in the ruling), which in Virginia include Fredericksburg, Richmond/Tri-Cities, and Hampton Roads. See: <https://law.justia.com/cases/federal/appellate-courts/cadc/15-1115/15-1115-2018-02-16.html>

Note all emission and dispersion modeling for conformity and NEPA is conducted using models specified and maintained (including validation) by EPA.

3.2 Application of the VDOT Resource Document

In 2016, the Department created the “VDOT Resource Document” and associated online data repository to facilitate and streamline the preparation of project-level air quality analyses for purposes of NEPA and conformity.³² Inter-agency consultation was conducted with FHWA Division and Headquarters and other agencies (including EPA) before the Resource Document was finalized. The Resource Document was most recently updated in 2023 to address changes in applicable regulations and guidance.

With regard to this project, the models, methods/protocols and assumptions as specified or referenced in the VDOT Resource Document were applied without substantive change.

3.3 Carbon Monoxide Assessment

EPA project-level (“hot-spot”) transportation conformity requirements for CO do not apply as the project is located in a region that is in attainment of the NAAQS. A project-specific analysis or assessment for CO is also not needed for NEPA per the programmatic approach specified in the VDOT Resource Document (Protocol 4.2.2.2). Based on the overall weight-of-evidence, it may reasonably be concluded that the CO NAAQS will be met given:

- Continued implementation of effective emission control technology, increasingly more stringent motor vehicle emission and fuel quality standards implemented over the past few decades by the Environmental Protection Agency (EPA) that have had the combined effect of substantially reducing CO emission rates nationwide, resulting in long-term downward trends in emissions and near-road ambient concentrations of CO despite increasing VMT
- Extensive experience in project-specific modeling for CO for a wide variety of project types, configurations and operating conditions in which compliance with the NAAQS established by EPA for CO is readily demonstrated given the substantially reduced CO emission rates, and despite the use of multiple worst-case assumptions for emission and dispersion modeling that have a compounding effect such that emissions and near-road ambient concentrations are substantially over-estimated; and
- Extensive experience in programmatic agreements for project-level agreements for CO that established ever-increasing thresholds for such analyses given the substantially reduced emission rates.

3.4 Mobile Source Air Toxics (MSATs) Assessment

FHWA most recently updated its guidance for the assessment of MSATs in the NEPA process for highway projects in 2023.³³ It states that “...EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or

³² See: <https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/environmental/>

³³ FHWA, “*INFORMATION: Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*”, January 18, 2023. See: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/

contributors and non-cancer hazard contributors from the 2011 NATA.³⁴ These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.” It also specifies three possible categories or tiers of analysis, namely, 1) projects with no meaningful potential MSAT effects, or exempt projects (for which MSAT analyses are not required), 2) projects with low potential MSAT effects (requiring only qualitative analyses), and 3) projects with higher potential MSAT effects (requiring quantitative analyses).

3.4.1 Level of Analysis Determination

As this project involves an EA and is not exempt, it does not qualify as a Tier 1 project under FHWA MSAT Guidance. It also does not meet the criteria for a Tier 3 project in FHWA guidance, as the peak traffic is forecast to reach only 44,530 ADT for the build scenario, which is below the 140-150 thousand ADT criteria specified in FHWA guidance for Tier 3 projects (i.e., ones for which quantitative analyses for MSATs would be required). Additionally, this project does not involve the creation or alteration of a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location.

This project may therefore be categorized as a Tier 2 project, i.e., one with “Low Potential MSAT Effects.” Projects in this category are addressed with a qualitative analysis, which as FHWA guidance states provides a basis for identifying and comparing potential differences for MSAT emissions, if any, from the various alternatives.

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below follows FHWA guidance. It is derived in part from a study conducted by FHWA entitled “A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives.”³⁵

3.4.2 Background

Controlling air toxic emissions became a national priority with the passage of the CAA as amended in 1990, whereby Congress mandated that the U.S. EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA’s Integrated Risk Information System (IRIS).³⁶ In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 NATA.³⁷ These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

³⁴ See: <https://www.epa.gov/national-air-toxics-assessment>

³⁵ https://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.cfm

³⁶ <https://www.epa.gov/iris>

³⁷ <https://www.epa.gov/national-air-toxics-assessment>

3.4.3 Motor Vehicle Emissions Simulator (MOVES)

MSAT emissions were evaluated using the U.S. EPA MOVES model, which EPA maintains and validates as needed. MOVES5, which is the latest update to the EPA MOVES series of models, was released in November 2024. It reflects the effects of federal emissions standards adopted through that time.³⁸

Using a prior version of the model (MOVES3, which was then in effect), FHWA estimated that even if VMT increases by 31 percent at a national level from 2020 to 2060 as forecast, a combined reduction of 76 percent in the total annual emissions for the priority MSATs is projected for the same time period, as shown in Exhibit 3.4.1. Diesel PM is the dominant component of MSAT emissions, making up 36 to 56 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES5 will notice some differences in emissions compared with MOVES3. MOVES5 is based on updated data on emissions, pollutant processes, fuels, vehicle registrations, and VMT projections, and reflects the latest Federal emissions standards in place at the time of its release. While projections may differ between the two models, the general trends of a significant decrease in MSAT emissions over time will be similar.

3.4.4 MSAT Research

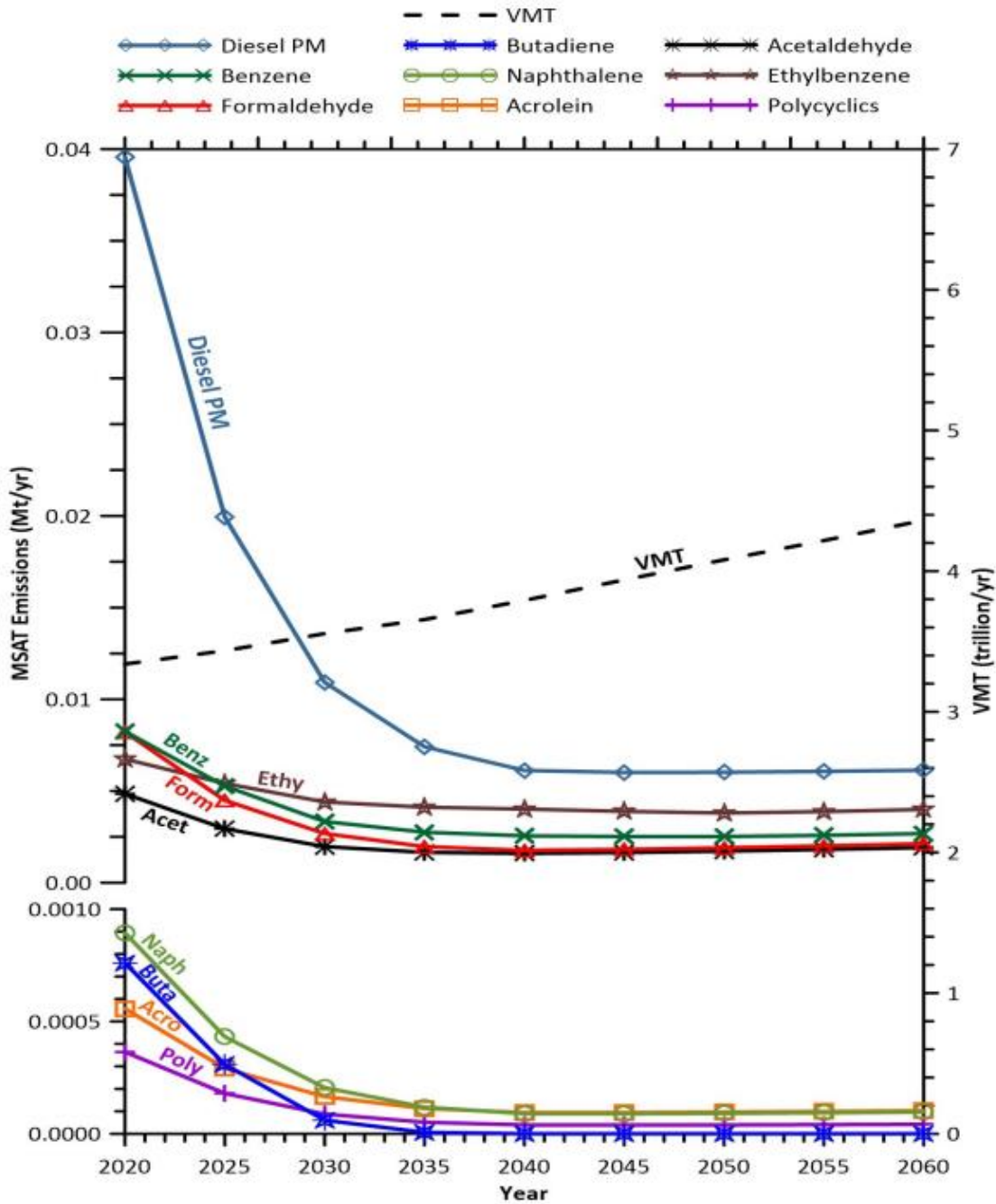
Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the NEPA process. Even as science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field. An overview of recent research is provided in Appendix D of FHWA's guidance.

³⁸ Federal regulatory requirements evolve over time so the version of the MOVES model available of the time of analysis may or may not fully reflect current regulatory requirements. For reference, MOVES5 accounts for EPA's Light- and Medium-Duty Multi-Pollutant Rule with higher projected electric vehicle (EV) fractions and more emissions stringent standards as well as for EPA's Heavy-Duty Greenhouse Gas Emissions-Phase 3 Rule with higher projected EV fractions and updated energy consumption estimates for heavy-duty EVs. See:

- U.S. EPA (2024). Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles.
- U.S. EPA (2024). Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3.

Exhibit 3.4.1: FHWA Projected National MSAT Emission Trends 2020 – 2060 for Vehicles Operating on Roadways



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Source: FHWA MOVES3 model runs conducted March 2021. Similar trends would be expected using the current version of the model.

3.4.5 Qualitative Analysis

Following FHWA guidance, this project has been determined to have low potential MSAT effects, thereby requiring a qualitative MSAT analysis. A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives*.³⁹

The amount of MSATs emitted is proportional to vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Build Alternative therefore may be slightly higher than that for the No-Build Alternative, because additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT could lead to higher MSAT emissions for the preferred alternative along a highway corridor, along with a corresponding decrease in MSAT emissions along parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to the EPA MOVES3 model, emissions of all of the priority MSAT decrease as speed increases.

Because the estimated VMT under each of the Alternatives are nearly the same, varying by less than five percent in 2028 and nine percent in 2048, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected in FHWA guidance to reduce annual MSAT emissions by over 76 percent between 2020 and 2060 even with a 31 percent increase in VMT on a national level. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases. Any additional travel lanes contemplated as part of the project may have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher for the Build Alternative than for the No-Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts.

³⁹ See: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.cfm

Exhibit 3.4.2: No Build and Build VMT

Year	No Build	Build	Percent Change
2028	227,000	237,245	4.5%
2048	328,051	356,551	8.7%

Source: WSP Traffic, 2025

In sum, when capacity is added, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). In addition, MSAT emissions would be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions that, in almost all cases, would cause region-wide MSAT levels to be significantly lower than today.

3.4.6 Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects."⁴⁰ Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT

⁴⁰ See: <https://www.epa.gov/iris/>

compounds at current environmental concentrations⁴¹ or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupported assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI.⁴² As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust: “[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk (https://iris.epa.gov/static/pdfs/0642_summary.pdf).”

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA’s approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.⁴³

⁴¹ HEI Special Report 16. See: <https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>

⁴² Ibid

⁴³ Natural Resources Defense Council v. EPA. See: <https://law.justia.com/cases/federal/appellate-courts/cadc/07-1053/07-1053-1120274-2011-03-24.html>.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities while improving access for emergency response, that are better suited for quantitative analysis.

3.4.7 Conclusions

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project at this time. While it is possible that localized increases in MSAT emissions may occur as a result of this project, emissions would likely be lower than present levels in the design year of this project as a result of EPA's national control programs that are projected in FHWA guidance (2023) to reduce annual MSAT emissions by 76 percent between 2020 and 2060 even as VMT increases nationally by 31 percent. Although local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

3.5 Project Status in the Regional Transportation Plan and Program

Federal conformity requirements at 40 CFR 93.114⁴⁴ and 40 CFR 93.115⁴⁵ (as incorporated by reference into the Virginia conformity SIP) apply as the area in which the project is located is designated as nonattainment for ozone. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program or otherwise meet the criteria specified in 40 CFR 93.109(b).⁴⁶ As of the date of preparation of this analysis, the project is included in the currently conforming FY 2023-2026 TIP and 2045 LRTP developed by the designated MPO for the region, the NCRTPB.⁴⁷

4.0 Mitigation

Historically, the continued implementation of increasingly more stringent motor vehicle emission, fuel quality and fuel economy standards has resulted in substantial reductions of emissions across the nation. These and other measures identified below serve to minimize emissions in the region. Note updates to the MOVES emission model incorporate changes as appropriate in emission and fuel quality standards that are in effect at the time of the update.

4.1 Construction

⁴⁴ See: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#93.114>

⁴⁵ See: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#93.115>

⁴⁶ See: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93#93.109>

⁴⁷ See: <https://www.mwcog.org/TPB/>

Emissions may be produced in the construction of this project from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT *Road and Bridge Specifications*.⁴⁸

4.2 VDEQ Requirements

The VDEQ provides general comments for projects by county that in part address mitigation.⁴⁹ For the region in which the proposed project is located, their comment is:

“...all reasonable precautions should be taken to limit the emissions of VOC and NOx. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions⁵⁰; 9 VAC 5-45, Article 7, Cutback Asphalt restrictions⁵¹; and 9 VAC 5-50, Article 1, Fugitive Dust precautions.⁵²”

5.0 Consultation

5.1 Public Consultation

Public consultation is generally conducted and documented within the overall NEPA process, and not separately by subject area (including air quality). Please refer to the overall NEPA documentation for a summary of public consultation activities for this project.

5.2 Inter-Agency Consultation

5.2.1 Models, Methods, Assumptions and Protocols Specified in the VDOT Resource Document

All models, methods, assumptions and protocols specified or referenced within the VDOT Resource Document⁵³ for projects in northern Virginia were subjected to inter-agency consultation for conformity (IACC) and NEPA with FHWA, EPA, DEQ and other agencies prior to originally being finalized in 2016. IACC was required at that time as it was before project-level conformity requirements in northern Virginia were eliminated for CO (with the expiry of the CO maintenance plan on March 16, 2016) and PM_{2.5} (with the revocation by EPA of the applicable annual primary NAAQS effective October 24, 2016). Appendix A of the Resource Document provides a summary of the consultation process and results. Currently, inter-agency consultation for projects is limited to that needed for purposes of NEPA.

5.2.2 Virginia Department of Environmental Quality

⁴⁸ <https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/technical-guidance-documents/road-and-bridge-specifications/>

⁴⁹ Spreadsheet entitled: “DEQ SERP comments by jurisdiction_07252024”, July 25, 2024

⁵⁰ See: <https://law.lis.virginia.gov/admincode/title9/agency5/chapter130/>

⁵¹ See: <https://law.lis.virginia.gov/admincode/title9/agency5/chapter45/>

⁵² See: <https://law.lis.virginia.gov/admincode/title9/agency5/chapter50/>

⁵³ See: <https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/environmental/>

VDEQ provided a tabulation of general comments organized by jurisdiction.⁵⁴ For Prince William County, they provided the comments above noted under “Mitigation” and under Section 2.2.

6.0 Conclusions

The proposed improvements were assessed for potential air quality impacts and compliance with applicable air quality regulations and requirements. All models, methods/protocols and assumptions applied in modeling and analyses were made consistent with those provided or specified in the VDOT Resource Document. The assessment indicates that the project would meet all applicable air quality requirements of the National Environmental Policy Act and federal and state transportation conformity regulations. As such, the project would not cause or contribute to a new violation of the NAAQS established by EPA.

⁵⁴ Spreadsheet entitled: “DEQ SERP comments by jurisdiction_07252024”, July 25, 2024, downloaded from the online data repository for the VDOT Resource Document. See: <https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/environmental/>