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3.9 AIR QUALITY

The following substantive changes have been made to this section since the DEIS.

- Impacts for Alternative R and Refined Preferred Alternative P (RPA P) have been added.
- An analysis of the Greenhouse Gas impacts of project alternatives has been added as **Appendix RR**.
- A conformity determination has been made for the RPA P in Greene County. See **Appendix SS**.

This chapter highlights existing and potential air quality impacts due to the proposed Mid-States Corridor project.

3.9.1 Introduction

The Clean Air Act of 1970 (CAA) directs the United States Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for major air pollutants. These commonly are cited as "Criteria Pollutants." At present EPA regulates six criteria pollutants: Ozone (O_3), Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), Lead (Pb) and Particulate Matter (PM). Particulate Matter (PM) is considered in two categories based on particle size. These are particles with diameters less than 10 micrometers (PM_{10}) and particles with a diameter of less than 2.5 micrometers ($PM_{2.5}$).

Section 176(c) of the CAA requires Federal agencies to demonstrate that their federal actions conform to applicable implementation plans for achieving and maintaining the NAAQS. Federal actions must not cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation or delay timely attainment of any standard.

An air quality conformity analysis for Greene County is provided in this Final Environmental Impact Statement (FEIS). The Draft Environmental Impact Statement (DEIS) identified non-conformity and maintenance areas which are impacted by the alternatives.

3.9.2 Focus of Analysis

Council of Environmental Quality (CEQ) regulation 40 C.F.R. 1502.20 (2019) provides that this Tier 1 EIS focuses on broader issues. For purposes of air quality analyses, these issues include general location, land use and areawide air quality implications. This Tier 1 EIS addresses air quality implications of the project within the 12-county Study Area. Any micro-scale analyses, such as CO hotspots, will be conducted in Tier 2 NEPA studies if necessary.

3.9.3 Regulatory Setting and Methodology

Table 3.9-1[1] shows the primary and secondary NAAQS for the criterial pollutants. The NAAQS are two-tiered. The primary tier is intended to protect public health. The secondary tier is intended to prevent further degradation of the environment.

1 Source: epa.gov/criteria-air-pollutants/naaqs-table

Pollutant	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 [2]	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[3]	Annual Mean
Ozone (O_3)	Primary and Secondary	8 hours	0.07 ppm[4]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution ($PM_{2.5}$)	Primary	1 year	12.0 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	35.0 µg/m^3	98th percentile, averaged over 3 years
Particle Pollution (PM_{10})	Primary and Secondary	24 hours	150.0 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[5]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

[2]In areas designated non-attainment for the Pb standards prior to the promulgation of 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/m^3 as a calendar quarter average) also remain in effect.

[3]The level of annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the one-hour standard level.

[4]Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligation under the prior revoked one-hour (1979) and eight-hour (1997) O_3 standards.

[5]The previous SO_2 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 one 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 non-attainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(31)). A SIP call in an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Table 3.9-1: National Ambient Air Quality Standards (NAAQS) for Criteria Pollutants

The standards identified in **Table 3.9-1** apply to the concentration of the pollutants in outdoor ambient air. For a specific geographic area, if the air quality is equal to or is better than the national standard, it is called an "attainment area". "Nonattainment areas" are locations where air quality does not meet the national standard. If the air quality of a non-attainment area improves to the level where it meets the standards and the additional redesignation requirements in the CAA [Section 107(d)(3)(E)], EPA redesignates the area as a "maintenance area". Generally, maintenance area can gain "attainment" status after 20 years in maintenance status.

Section 110 of CAA requires each state to have a State Implementation Plan (SIP). The SIP describes the steps to accomplish implementation, maintenance and enforcement of NAAQS. **Figure 3.9-1** shows "maintenance areas" within the 12-county Study Area. There are no "non-attainment" areas within the 12-county Study Area. **Figure 3.9-1** shows the following maintenance areas, as well as the Mid-States Build Alternatives:

- Greene County (O_3)
- Daviess County (Veale Township) (SO_2)
- Pike County (Washington Township) (SO_2)
- Warrick County (O_3)

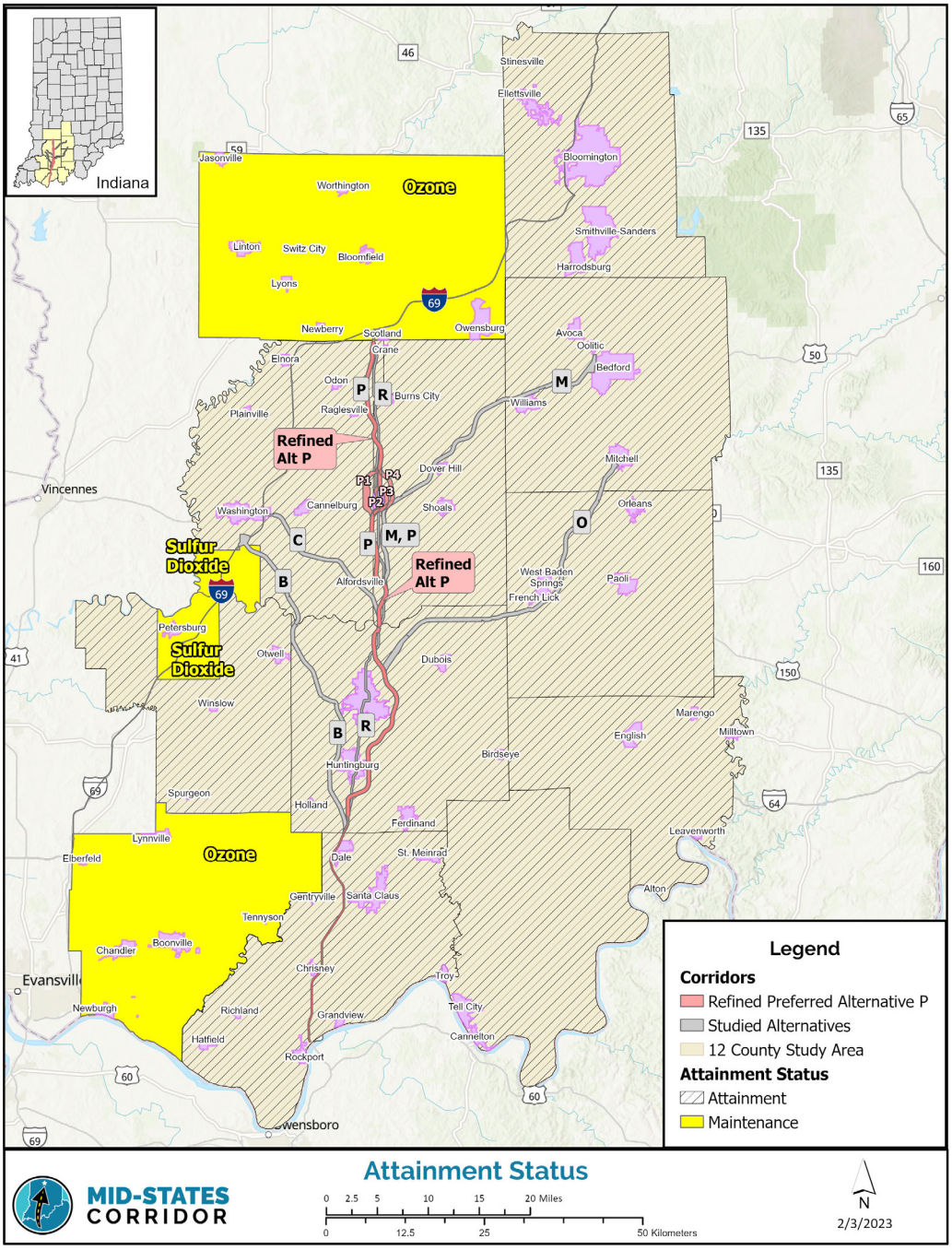

Figure 3.9-1: Air Quality "Maintenance Areas" within the 12-County Study Area

Alternative B impacts Washington Township in Pike County and Alternative P and RPA P impact Greene County. A conformity analysis determination was provided by FHWA for Greene County on August 14, 2023. See **Appendix SS** for documentation of this conformity determination.

3.9.4 Comparative Analysis of Alternatives

Table 3.9-2 shows 2045 annual Vehicle Miles Traveled (VMT) for No-Build and Build Alternatives. It shows slight VMT increases for the build alternatives due to changes in trip characteristics. These include increased numbers of trips and slightly longer trip lengths for trips to, from, and within the Study Area. In addition, added external ("through") trips are attracted to the Study Area.

Routes	Annual VMT (millions)	Total VOC (KG)	% Change in VOC Compared to No-build	Total NOx (KG)	% Change in Nox Compared to No-build
No Build	4,652	718,530	N/A	2,802,100	N/A
B Alternatives	4,681 - 4,688	723,540 - 724,450	0.76	2,828,300 - 2,829,700	0.96
C Alternatives	4,684 - 4,686	723,310 - 723,880	0.70	2,818,700 - 2,824,200	0.69
M Alternatives	4,668 - 4,671	720,920 - 721,620	0.38	2,810,400 - 2,816,100	0.40
O Alternatives	4,677 - 4,689	722,090 - 724,270	0.65	2,812,200 - 2,824,800	0.58
P & RPA P Alternatives	4,666 - 4,674	720,660 - 722,010	0.40	2,810,000 - 2,816,700	0.40
R Alternative	4,661	719,700	0	2,803,900	0.06

Table 3.9-2: 2045 Annual VMT for No-Build and Build Alternatives

Table 3.9-3 shows annual estimated emissions of Volatile Organic Compound (VOC) and Oxides of Nitrogen (NOx) for No-Build and Build Alternatives. Chemical reactions between VOC and NOx, along with heat and sunlight, form Ozone (O_3). Increases in VOC and NOx emissions are very small (one percent or lower) for the Build Alternatives.

Vehicle Type	Fuel Type	Miles per Gallon	CO_2 Emission (grams)Rate per Gallon	CO_2 Emission Rate per Mile (grams)
Auto	Gasoline	22*	8,887*	404
Multi-Unit Truck	Diesel	6.6**	10,180*	1,542
* EPA-420-F-18-008, United States Environmental Protection Agency, March 2018				
** Obtained from the TREDIS Transportation Analysis Tool				

Table 3.9-3: Annual Estimates of VOC and NOx for No-Build and Build Alternatives

Greenhouse Gases (GHG) emitted from transportation sources contribute to climate change. In 2014, transportation was responsible for 26 percent of the total U.S. GHG emission. GHGs consist of carbon dioxide, methane and nitrous oxides. Typically, more than 99 percent of carbon from fuels used for transportation (e.g., diesel, gasoline) is emitted as carbon dioxide. **Table 3.9-4** shows GHG emission rates from typical fuel used for transportation. **Table 3.9-4** shows that diesel fuel contributes 15 percent more carbon dioxide per gallon.

Alternatives	Auto		Truck	
	Annual VMT (millions)	% Change in VMT Compared to No-Build	Annual VMT (millions)	% Change in VMT Compared to No-Build
No Build	4,285	N/A	367	N/A
B Alternatives	4,310 - 4,317	0.66	371	1.10
C Alternatives	4315 - 4,316	0.71	369 - 370	0.70
M Alternatives	4,300 - 4,302	0.37	368 - 369	0.41
O Alternatives	4,309 - 4,319	0.68	368 - 370	0.54
P & RPA P Alternatives	4,298 - 4,305	0.39	368 - 369	0.41
R Alternative	4,294	0.21	367	0

Table 3.9-4: GHG Emission Rates from Different Fuel Types

Table 3.9-5 shows the annual estimated emission of GHG emission for No-Build and Build Alternatives. Increases in GHG emissions are less than one percent for the Build Alternatives. These are calculated by applying the emission rates in **Table 3.9-4** to forecasted VMT for each alternative.

Routes	Annual VMT (millions)	Total GHG (Metric Ton)	% Change in GHG Compared to No-build
No Build	4,652	2,297,054	N/A
B Alternatives	4,681 - 4,688	2,313,322 - 2,316,150	0.77
C Alternatives	4,684 - 4,686	2,312,258 - 2,314,204	0.70
M Alternatives	4,668 - 4,671	2,304,656 - 2,307,006	0.38
O Alternatives	4,677 - 4,689	2,308,292 - 2,315,416	0.64
P & RPA P Alternatives	4,666 - 4,674	2,303,848 - 2,308,218	0.39
R Alternative	4,661	2,300,690	0.16

Table 3.9-5: Annual Estimates of GHG for No-Build and Build Alternatives

Table 3.9-6 shows the net GHG emissions and associated costs for each of the Build Alternatives, for both 2.5 percent and three percent discount rates. Details of the net GHG emission estimates can be found in **Appendix RR**.

The discussion in **Appendix RR** describes that changes in vehicle emissions have a negligible role in added costs of GHG emissions. The sources of GHG emissions are similar among alternatives. As an example, for the DEIS Preferred Alternative P, which also is the FEIS RPA P1, added vehicle emissions account for approximately 0.1 percent of total increased GHG emissions. This is cited as an example of the components of GHG emissions for this project. Approximately 85 percent of GHG emissions are due to construction activities. This allocation does not consider other construction activities which INDOT could undertake if the Mid-States Corridor project did not occur. It is likely that most of these construction emissions would occur on other projects to which the Mid-States funding otherwise was directed.

Discounted GHG Costs - Millions of 2023 Dollars			
Alternative	Facility Type	Discounted Emissions Costs at:	
		2.5 percent	3.0 percent
B	Expy	$ 3.24	$ 3.10
C	Expy	$ 4.05	$ 3.87
M	Expy	$ 8.20	$ 7.87
O	Expy	$ 6.49	$ 6.23
P & RPA P1	Expy	$ 5.67	$ 5.42
RPA P2	Super-2	$ 4.74	$ 4.53
RPA P3	Expy	$ 5.64	$ 5.40
RPA P4	Expy	$ 5.76	$ 5.51
R	Super-2	$ 2.67	$ 2.55

Table 3.9-6: Discounted GHG Costs for Build Alternatives

3.9.5 Summary and Conclusions

Mid-States Build Alternatives would produce slight increases in VMT within the Study Area due to changes in trip characteristics. Increases in VMT would contribute to higher VOC, NOx and GHG emissions within the Study Area. As discussed in **Section 3.9.4**, increases in VOC, NOx and GHG would be less than one percent for Build Alternatives. Increases are highest for Alternative B and lowest for Alternative M. In the United States, Electric Vehicles (EVs) are slowly gaining market share. EVs do not emit tailpipe emissions. It is reasonable to assume that in 2045, the percentage of EVs in use will increase. See **Appendix RR** for a discussion of anticipated trends in electrical vehicle use. This will reduce emissions of criteria pollutants and GHGs from transportation sources. **Appendix RR** shows that the increases in GHG emissions due to this project are very small. Most of the increases in GHG emissions are due to construction activities and loss of carbon sequestration due to forest impacts.

Alternative P and RPA P perform lowest or next-to-lowest on emission increases of the Build Alternatives. See **Table 3.9-3** and **Table 3.9-5**. In cases where it shows the second-lowest increases in emissions, these increases differ little from Alternative M, which has the lowest increases.