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Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation

Section 3.10, Air Quality

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3.10 Air Quality

A qualitative air quality assessment was conducted to identify potential changes in vehicle emissions as a result of implementing the Interstate 11 (I-11) Build Corridor Alternatives in comparison to the No Build Alternative. The following analysis is qualitative and does not include a detailed quantitative evaluation of air quality emissions, which is consistent with a Tier 1 study. Additional analysis would be required for a Tier 2 environmental review, as discussed in Section 3.10.2.

3.10.1 Regulatory Setting

3.10.1.1 Federal Regulations

Air quality is regulated at the national level by the Clean Air Act of 1970 (CAA) (42 United States Code 7401 et seq) as amended in 1977 and 1990. The United States (US) Environmental Protection Agency (USEPA) is responsible for establishing National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: carbon monoxide (CO), ground-level ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide, coarse and fine particulate matter (PM) (less than or equal to 10 microns [PM_{10}] and less than or equal to 2.5 microns [$PM_{2.5}$], respectively), and lead. Of the six NAAQS pollutants, transportation sources contribute to CO, NO_2, PM, and ozone (USEPA 2017a). USEPA works with state and local jurisdictions to monitor ambient air levels for these pollutants. The State of Arizona adopted the NAAQS for these criteria pollutants, which are summarized in **Table 3.10-1** (National Ambient Air Quality Standards for Criteria Pollutants).

Geographic areas that violate a NAAQS for a criteria pollutant are considered “nonattainment areas” (NAA) for that pollutant. Conversely, areas that are below a criteria pollutant standard are considered “attainment” areas. Maintenance areas are defined as having previously violated the NAAQS for a criteria pollutant NAA, but are currently attaining the standard and have developed a maintenance plan outlining steps for continued attainment over the maintenance period. Specific requirements are placed on the transportation planning process in air quality NAA that do not meet the NAAQS emissions limits and in areas that were reclassified from NAAs to maintenance areas.

In addition to the NAAQS for criteria air pollutants, USEPA also regulates air toxics under Section 202 of the CAA. Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics (pollutants suspected or known to cause cancer) defined by the CAA. MSATs were identified as an issue of concern related to transportation projects (USEPA 2017b). MSATs are toxic compounds emitted from on-road mobile sources (e.g., vehicles), non-road mobile sources (such as airplanes and locomotives), and stationary sources (such as factories and refineries). In 2007, USEPA issued a Final Rule on controlling emissions of hazardous air pollutants (USEPA 2007).

3.10.1.2 Clean Air Act Conformity

Implementation of any of the Build Corridor Alternatives would require approval by USEPA under the Transportation Conformity Requirements (i.e., 40 Code of Federal Regulations 51), requiring an analysis of criteria pollutant concentrations and comparison to the NAAQS.

Table 3.10-1 National Ambient Air Quality Standards for Criteria Pollutants

Pollutant/Averaging Time	Primary Standard (1)	Secondary Standard (1)
Carbon Monoxide (CO)		
8-hour	9 ppm (2)	--
1-hour	35 ppm	--
Lead (Pb)		
Rolling 3-Month Average	0.15 µg/m^3	0.15 µg/m^3
Nitrogen Dioxide (NO_2)		
1-hour	100 ppb	--
Annual Arithmetic Mean (3)	53 ppb	53 ppb
Ozone (O_3)		
8-hour (4)	0.070 ppm	0.070 ppm
Particulate matter less than 2.5 microns ($PM_{2.5}$)		
Annual	12 µg/m^3	15 µg/m^3
24-hour	35 µg/m^3	35 µg/m^3
Particulate matter less than 10 microns (PM_{10})		
24-hour	150 µg/m^3	150 µg/m^3
Sulfur Dioxide (SO_2)		
1-hour	75 ppb	--
3-hour	--	0.5 ppm

(1) Primary standards set limits to protect public health, including the health of “sensitive populations, such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment and damage to animals, crops, vegetation, and buildings.

(2) Due to mathematical rounding, a measured value of 9.5 ppm or greater is necessary to exceed the standard.

(3) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(4) Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.

NOTE: ppm= parts per million, µg/m^3= micrograms per cubic meter, ppb= parts per billion.

SOURCE: USEPA 2017a.

The Federal Highway Administration (FHWA), as the lead agency, in coordination with USEPA, must make a determination that a federal action conforms to the applicable state air quality implementation plan to achieve attainment of the NAAQS. In general, conformity rules are designed to ensure that projects using federal funds or requiring federal approval would not:

- cause or contribute to any new violation of the NAAQS,
- increase the frequency or severity of any existing violation, or
- delay timely attainment of any standard, interim emission reduction, or other milestone.

The transportation conformity process is the mechanism used by the responsible transportation planning organizations, in this case the Sun Corridor Metropolitan Planning Organization, Pima Association of Governments, and Maricopa Association of Governments, to ensure that requirements of the CAA are met for planned transportation improvements within the region. The conformity rule requires all regionally significant projects be included in the appropriate

Regional Transportation Plan (RTP) and Transportation Improvement Plan (TIP). The fiscally constrained RTP and TIP must identify all projects that are expected to receive federal funds or that will require FHWA approval. For any Build Corridor Alternative to be implemented (including the limited improvements under the No Build), it must be included in a regional emissions analysis that demonstrates conformity to the State Implementation Plans (SIPs) to comply with the CAA. To demonstrate conformity, the RTP and TIP total emissions must be consistent with the established motor vehicle emissions budget, including for the applicable transportation planning organization. Conformity would be established during Tier 2 studies.

In addition to the regional conformity determination, the project must be assessed as to whether it will cause a violation of the NAAQS for criteria pollutants in localized areas, known as hotspots. The NAAQS pollutants of concern for transportation hotspots are CO, $PM_{2.5}$, and PM_{10}. The CO hotspots would most likely be a concern where traffic is very congested and slow moving, such as high-volume intersections. The PM_{10} and $PM_{2.5}$ hotspot analyses would be required if building the project would result in a high number of heavy trucks or other large diesel vehicles in the corridor, which would make it a "project of air quality concern" in terms of federal conformity screening criteria for PM. The conformity rule spells out criteria for when CO, $PM_{2.5}$, and PM_{10} hotspot analyses are required. The O_3 level is influenced by regional pollutant emissions and is not typically a hotspot concern; therefore, a local analysis is not appropriate for O_3. NAAQS assessment also would occur during Tier 2 studies, as appropriate.

3.10.1.3 Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the CAA Amendments of 1990, whereby the US Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants. The USEPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (USEPA 2007), and identified a group of 93 compounds emitted from mobile sources that are part of USEPA's Integrated Risk Information System (USEPA 2017c). In addition, USEPA identified nine compounds with significant contributions from MSATs that are among the national- and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Ambient Air Toxics Assessment (USEPA 2011). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, 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 USEPA rules.

USEPA's 2007 Final Rule on controlling air toxics emissions mentioned above requires emissions controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to FHWA, analysis using USEPA's Motor Vehicles Emissions Simulator model indicates that even if vehicle miles traveled (VMT) increases by 45 percent by 2050, as assumed, a combined reduction of 91 percent in the total annual emissions rate for the priority MSATs is projected from 2010 to 2050 (FHWA 2016). **Figure 3.10-1** (FHWA Predicted National MSAT Trends 2010-2050 for Vehicles Operating on Roadways) illustrates the predicted trends for MSAT levels.

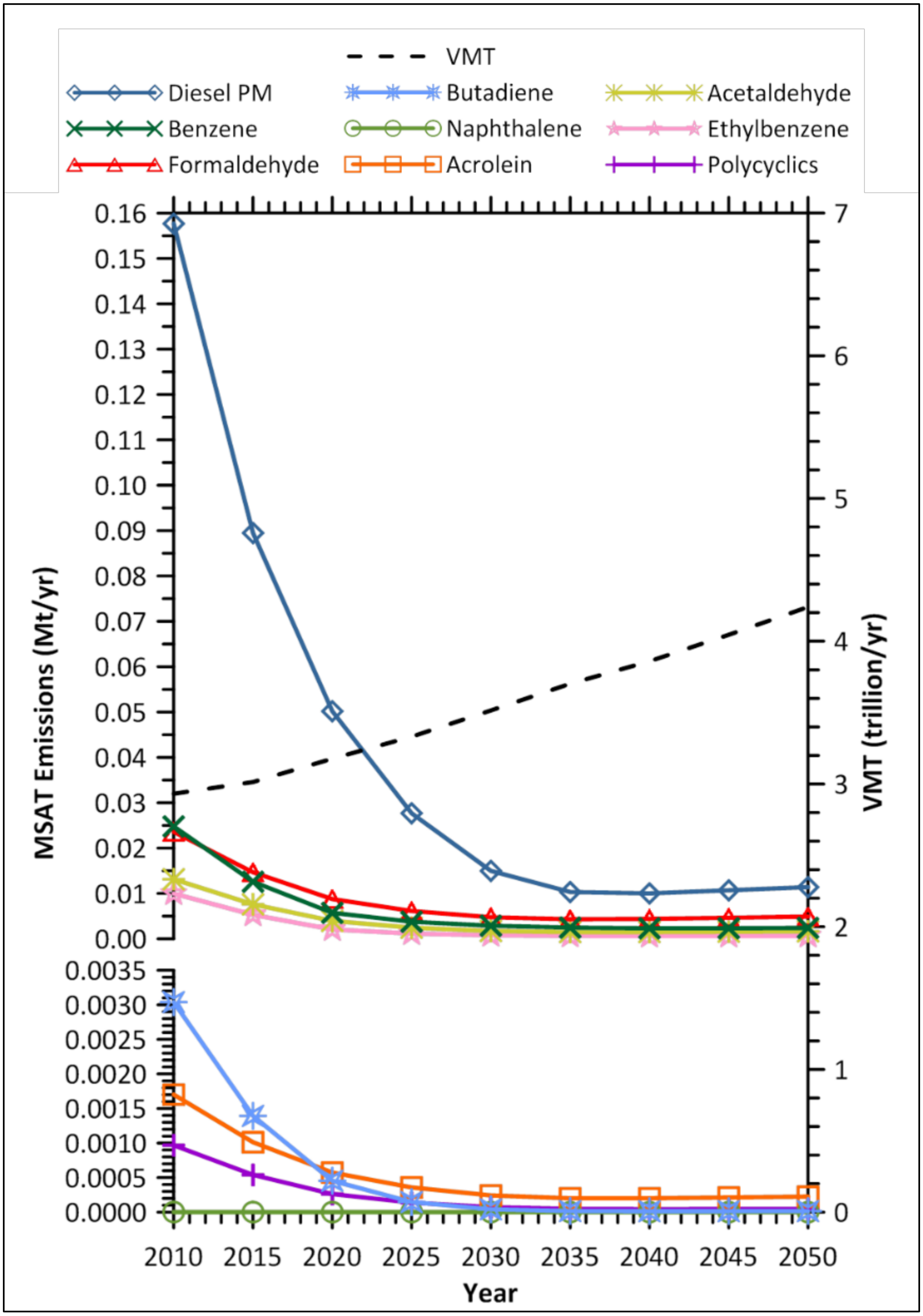

Figure 3.10-1 FHWA Predicted National MSAT Trends 2010-2050 for Vehicles Operating on Roadways

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 the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of National Environmental Policy Act (NEPA).

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect the lead agencies to address MSAT impacts in environmental documents. FHWA, USEPA, Health Effects Institute, and others have funded and conducted research studies to try to more clearly define the potential risk from MSAT emissions associated with highway projects. FHWA will continue to monitor the developing research in this emerging field.

3.10.1.4 Greenhouse Gases

Climate change is a critical national and global concern. Human activity is changing the earth's climate by causing the buildup of heat-trapping greenhouse gas (GHG) emissions through the burning of fossil fuels and other human activities. Carbon dioxide (CO_2) is the largest component of human produced emissions; other prominent emissions include methane, nitrous oxide, and hydrofluorocarbons. These emissions are different from criteria air pollutants because their effects in the atmosphere are global rather than localized and they remain in the atmosphere for decades to centuries, depending on the species.

GHG emissions have accumulated rapidly as the world has industrialized, with concentration of atmospheric CO_2 increasing form roughly 300 ppm in 1900 to more than 400 ppm today. Over this timeframe, global average temperatures have increased by roughly 1.5 degrees Fahrenheit (ºF) (1 degree Celsius [ºC]), and the most rapid increases have occurred over the past 50 years. Scientists have warned that significant and potentially dangerous shifts in climate and weather are possible without substantial reductions in GHG emissions. They commonly cite 2ºC (1ºC beyond warming that has already occurred) as the total amount of warming the earth can tolerate without serious and potentially irreversible climate effects. For warming to be limited to this level, atmospheric concentrations of CO_2 would need to stabilize at a maximum of 450 ppm, requiring annual global emissions to be reduced 40 to 70 percent below 2010 levels by 2050 (International Panel on Climate Control [IPCC] 2014). State and national governments in many developed countries set GHG emissions reduction targets of 80 percent below current levels by 2050, recognizing that post-industrial economies are primarily responsible for GHGs already in the atmosphere. As part of a 2014 bilateral agreement with China, the US pledged to reduce GHG emissions 26-28 percent below 2005 levels by 2025; this emissions reduction pathway is intended to support economy-wide reductions of 80 percent or more by 2050 (The White House 2014).

GHG emissions from vehicles using roadways are a function of distance travelled (expressed as VMT), vehicle speed, and road grade. GHG emissions also are generated during roadway construction and maintenance activities. The I-11 Corridor is projected to handle a substantial number of heavy-duty trucks. Heavy-duty trucks have a low fuel economy; therefore, decreases in travel times would lead to a GHG emissions benefit in the region.

As with GHGs, MSAT emissions also are generally a function of distance traveled, vehicle speeds, and road grades. MSAT emissions also are generated during roadway construction and maintenance activities similar to GHGs. Decreases in travel times, which are associated with improved speeds, can lead to a reduction in emissions of MSATs for all motor vehicle types despite increases in distance traveled.

As part of FHWA's *Climate Change Resilience Pilot Program*, a study was conducted to assess the vulnerability of Arizona Department of Transportation (ADOT)-managed transportation infrastructure to Arizona-specific extreme weather. Long term, ADOT seeks to develop a multi-stakeholder decision-making framework – including planning, asset management, design, construction, maintenance, and operations – to cost-effectively enhance the resilience of Arizona's transportation system to extreme weather risks.

For the study, ADOT elected to focus on the Interstate corridors connecting Nogales, Tucson, Phoenix, and Flagstaff (I-19, I-10, and I-17). This corridor includes a variety of urban areas, landscapes, biotic communities, and climate zones, which present a range of weather conditions applicable to much of Arizona. The project team examined climate-related stressors including extreme heat, freeze-thaw, extreme precipitation, and wildfire, considering the potential change in these risk factors as the century progresses.

As part of the pilot program, the study leveraged the *FHWA Vulnerability Assessment Framework*, customizing it to fit the study's needs. The project team gathered information on potential extreme weather impacts, collected datasets for transportation facilities and land cover characteristics (e.g., watersheds, vegetation), and integrated these datasets to perform a high-level assessment of potential infrastructure vulnerabilities. Each step of the process drew heavily on internal and external stakeholder input and feedback.

The assessment qualitatively addresses the complex, often uncertain interactions between climate and extreme weather, land cover types, and transportation facilities—with an ultimate focus on potential risks to infrastructure by ADOT District. Preliminary results were presented in focus groups, where ADOT regional staff provided feedback on the risk hypotheses developed through the desktop assessment. The results of the assessment were organized first by ADOT District, then by stressor, and then further delineated by land cover types (e.g., desert), which are considered qualitatively as potential factors that could either alleviate or aggravate the impacts of extreme weather phenomena. The key climate stressors and impacts assessed in the study were extreme temperature and precipitation events and wildfires.

Extreme temperatures were evaluated by assessing the potential increase in the number of days when the temperature was greater than 100ºF and the number of days when the temperature was below freezing. Extreme heat events can lead to pavement deformation due to thermal expansion, affect construction schedules and seasons, pose challenges to maintenance and operations activities, and lead to unsafe conditions for workers. The study determined that the number of extreme heat events is likely to increase in the Phoenix and Tucson districts, which could lead to negative effects on the transportation system. The study also evaluated potential changes in the number of freezing events. Freezing events can have a negative effect on the transportation system by increasing operations and maintenance costs. The number of freezing events is projected to decrease, which would have a positive effect in the Phoenix and Tucson districts.

Extreme precipitation can degrade the transportation system by causing flooding/inundation and mudslides. Extreme precipitation was analyzed by evaluating increases in 100-year rainfall events in the districts. The study concluded that extreme precipitation events are likely to have a neutral effect in the Phoenix and Tucson districts; however, it also was noted that there is a lower level of confidence in these conclusions than the extreme temperature assessment.

Wildfires can disrupt the transportation system by interrupting operations and aggravating flooding or drainage failures. In the Phoenix District, there is currently a low risk for wildfire events and the study concluded that potential increases related to climate events was likely to be negligible. In the Tucson District, there is an increased risk for wildfire events, but this increase is uncertain over the long-term.

3.10.1.5 Class 1 Areas

In 1977, Congress amended the CAA to include provisions to protect the scenic vistas of the nation's national parks and wilderness areas. In these amendments, Congress declared as a national visibility goal: *The prevention of any future, and the remedying of any existing impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution (Section 169A).* Highway transportation projects contribute to visibility concerns in NAAs and maintenance areas through primary $PM_{2.5}$ and NO_2 emissions, which contribute to the formation of secondary $PM_{2.5}$. Analysis has shown that transportation impacts to visibility are minimal. Predicted 2018 emissions of nitrogen oxide vehicles contributed 23 percent of total statewide emissions, which represents a decrease of nearly 70 percent as compared to 2002 emissions (Arizona Department of Environmental Quality [ADEQ] 2011). Tailpipe emissions of coarse particulate matter were predicted to account for less than one percent of total statewide emissions in 2018 (ADEQ 2011).

Under the provisions of the CAA, USEPA designated a number of areas in the State of Arizona, including national parks and wilderness areas, as mandatory Class 1 Areas where visibility is an important value. These mandatory Class 1 Areas are listed in 40 Code of Federal Regulations 81.403. Under the USEPA Regional Haze Rule, states must establish goals to improve visibility in Class 1 Areas and develop long-term strategies to reduce emissions of pollutants that cause visibility impairment. In addition to visibility, Class I Areas have other Air Quality Related Values (AQRVs) that are indicators of potential impairment in these areas. AQRVs are distinct from the NAAQS. Goals for emissions reductions to improve visibility and other AQRVs are outlined in the SIPs.

Of the mandatory Class 1 Areas in Arizona, Saguaro National Park (SNP) is the closest to the I-11 Corridor Study Area (Study Area). SNP is located in the South Section of the Study Area and is 0.3 mile from the Build Corridor Alterative.

3.10.1.6 Fugitive Dust

Fugitive dust is PM from unstable or disturbed soil surfaces that becomes airborne due to mechanical disturbance and has the potential to adversely affect human health or the environment. About 50 percent of fugitive dust is PM_{10} or smaller. Fugitive dust originates from agricultural, mining, construction, transportation, and manufacturing activities. This study is concerned mostly with fugitive dust generated from construction activities such as earth moving, paved-road track-out, driving on haul roads, and disturbing surface areas, since such activities would likely be required during construction of the I-11 Corridor. Re-entrained road dust also is a source of concern.

3.10.1.7 State and Local Regulations

With regard to air quality, the I-11 Corridor is under the jurisdiction of ADEQ, Sun Corridor Metropolitan Planning Organization, Pima Association of Governments, Maricopa Association of Governments, Pima County Department of Environmental Quality, Pinal County Air Quality

Control District, and Maricopa County Air Quality Control Department. These agencies regulate air pollution and operate air monitors throughout the state.

A transportation project implemented pursuant to this study would need to adhere to the following:

- ADEQ, Title 18. Environmental Quality, Chapter 2—Air Pollution Control. This rule defines ambient air quality standards, area designations and classifications, and control of hazardous air pollutants, as well as establishes controls on emissions from new and existing mobile sources and motor vehicle inspection and maintenance programs.
- Arizona Statutes, Title 49. The Environment, Chapter 3—Air Quality. This statute establishes the state air pollution control department including its powers, duties, and enforcement obligations. It also sets motor vehicle emissions standards for the state and defines the state's voluntary travel reduction program.
- Pima County, Title 17. Air Quality Control. The rules codified under Title 17 establish the county's ambient air quality standards, establish an air quality monitoring program, set limits on visible emissions, and enact a trip reduction program for major employers.
- Pinal County, Article 2. Fugitive Dust. This article enacts a variety of fugitive dust control standards including a provision that does not allow, or permit the use, repair, construction, or reconstruction of any road without taking every reasonable precaution to effectively prevent fugitive dust from becoming airborne.
- Pinal County Air Quality Control District Code of Regulations. These regulations establish ambient air quality standards and the methods and procedures for an air quality monitoring network including the methods for evaluating air quality data and interpreting the standards. It establishes attainment area designations, visibility limiting standards, controls on fugitive dust sites for construction activities, and enacts a county-level hazardous air pollutant reporting program.
- Maricopa County, Regulation III. Control of Air Contaminants. This regulation includes Rule 310 that establishes controls on fugitive dust from construction, Rule 370 on the federal hazardous air pollutants program, and Rule 372 on the Maricopa County hazardous air pollutants program.
- ADEQ and local air districts maintain a statewide network of monitoring stations that routinely measure pollutant concentrations in the ambient air. These stations provide data to assess compliance with the NAAQS and evaluate the effectiveness of pollution control strategies.

3.10.2 Methodology

The methodology for considering potential air quality impacts is focused on identifying potential NAAQS attainment implications and effects on visibility in Class 1 Areas for the Build Corridor Alternatives and the No Build Alternative in the overall Study Area. Broad comparisons are provided to address primary air quality issues in various regions. A review of Arizona SIPs was conducted to identify all NAAQS NAAs and maintenance areas in the Study Area, as well as any Build Corridor Alternatives that were located within a county that contained a Class 1 Area. The Tier 2 air quality analysis will address impacts on receptors located close to the selected improvements when Corridor Options and the associated implications of actual roadway cross sections and construction impact footprints details are available.

3.10.3 Affected Environment

The Study Area is located in portions of Santa Cruz, Pima, Pinal, Maricopa, and Yavapai counties. These counties comprise the air quality Analysis Area. The elevation of the Analysis Area ranges from approximately 4,000 feet above mean sea level near Heroica Nogales to approximately 850 feet above mean sea level near Palo Verde.

The Analysis Area is in a desert climate characterized by extremely hot summers, mild winters, and minimal precipitation. Average daily maximum temperatures in Heroica Nogales are in the low 80s (ºF) and the average daily minimum temperatures are in the mid-40s (ºF), with an annual average precipitation of 18 inches. Average daily maximum temperatures during the summer in Tucson and Phoenix are in the low 100s (ºF). In Phoenix, the average minimum daily temperature during the winter is in the mid-40s (ºF); however, Tucson experiences cooler temperatures in the winter, ranging from the high 30s to low 40s (ºF). In addition, Tucson receives more precipitation than Phoenix, with an average of 10 inches compared to 6.5 inches per year, respectively. Average daily maximum temperatures in Palo Verde during the summer are in the low 100s (ºF), the average minimum daily temperature in the winter is in the 40s (ºF), with an average annual precipitation of 8 inches. Precipitation is in the form of rain; snowfall is rare. Precipitation is associated with afternoon showers or thunderstorms during the late summer and winter storms that originate in the Pacific Ocean and move eastward through the region.

The following discussion addresses the Analysis Area in terms of attainment status and air shed class within the Analysis Area from south to north.

In Santa Cruz County, Option A traverses the Nogales PM_{10} NAA and the Nogales $PM_{2.5}$ maintenance area (**Figure 3.10-2** [South Section NAAs and Maintenance Areas]). The USEPA classified Nogales as a moderate NAA for PM_{10} on February 10, 2011, and $PM_{2.5}$ also was classified as a moderate NAA on December 14, 2009. In Pima County, the Study Area traverses the Tucson CO limited maintenance area, the West Pinal PM_{10} NAA, and the Rillito PM_{10} NAA for all Options (**Figure 3.10-2** [South Section NAAs and Maintenance Areas]). The USEPA designated the Tucson area as being in attainment with the NAAQS for CO on April 25, 2000 and no violations of the NAAQS for CO have been recorded in this area for 20 years. The USEPA classified Rillito as a moderate NAA for PM_{10} on October 6, 2006, and classified West Pinal as moderate NAA for PM_{10} on July 2, 2012.

The Analysis Area is within close proximity to the SNP Class 1 air shed located in Pima County (**Figure 3.10-2** [South Section NAAs and Maintenance Areas]). The approximate distance from the Class 1 air shed range to the Study Area is 7,900 feet for Option A; 6,800 feet for Option B; 1,700 feet for Option C; and 1,300 feet for Option D. The variation in distance between the Corridor Options in this portion of the Analysis Area is not considered to be notable as transportation sources do not significantly contribute to visibility impairment in the Class I areas (ADEQ 2011).

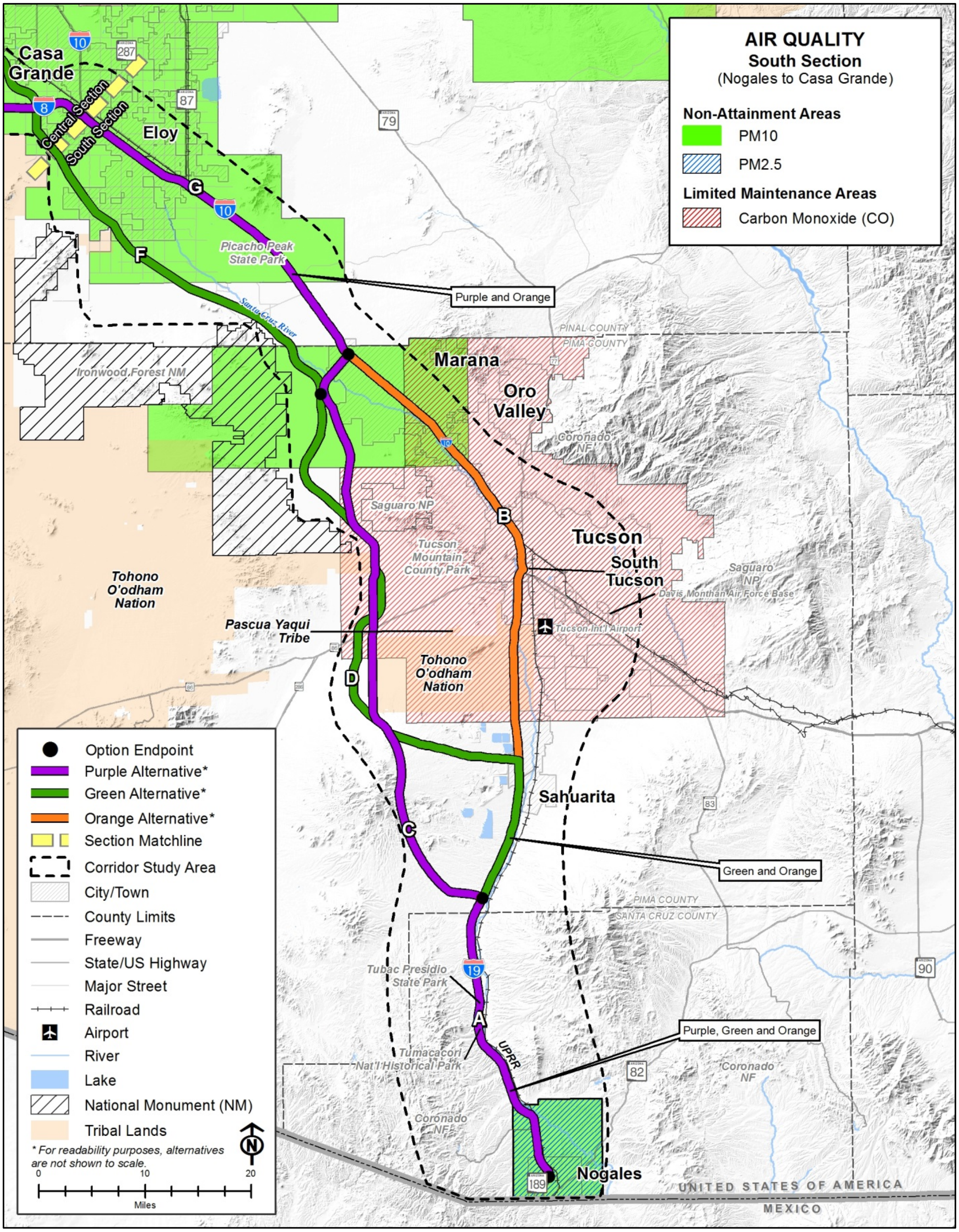

Figure 3.10-2 South Section NAAs and Maintenance Areas

The Study Area passes through Pinal and Maricopa counties in the Central Section. In Pinal County, the Analysis Area traverses the West Pinal PM_{10} NAA and the West Central Pinal $PM_{2.5}$ maintenance area for all Options (**Figure 3.10-3** [Central Section NAAs and Maintenance Areas]). USEPA designated West Pinal as a moderate NAA for PM_{10}.

USEPA made the determination that the West Central Pinal area attained the NAAQS for $PM_{2.5}$ on September 4, 2013. In Maricopa County, Option L, Option M, and Option N traverse the Phoenix-Mesa PM_{10} NAA whereas Option K is located outside of this area. The Phoenix-Mesa PM_{10} NAA was classified as serious by USEPA on November 15, 2000. The Study Area is located within the Phoenix-Mesa O_3 NAA, which was classified as marginal by USEPA on July 20, 2012.

The Analysis Area passes though Maricopa and Yavapai counties in the North Section. In Maricopa County, the North Section of the Study Area traverses the Phoenix-Mesa O_3 NAA for all Options (**Figure 3.10-4**, [North Section NAAs and Maintenance Areas]). This NAA is classified as a marginal NAA by the USEPA. Yavapai County is classified as being in attainment for all NAAQS and all Options traverse through this area.

For overall perspective, there has been a trend of decreasing total pollutant emissions in the Study Area from mobile sources for several decades, even when allowing for the growing number of VMT. These improving results are due to a series of successful emission control regulations. On-road sources account for varying amounts of the overall emissions but tend to be declining even though national VMT more than doubled over the past 30 years. Advances in vehicle technology and cleaner fuels have been major reasons for the improvements. Recent federal regulations on vehicle emissions are expected to continue the trend of improvement and further lower vehicle emissions in the future. Air quality in the Study Area has steadily been improving as demonstrated by the numerous decisions by USEPA that former nonattainment areas in the Study Area are now in attainment with the NAAQS. Emissions inventory collected by the USEPA indicates a downward trend in total statewide highway emissions of CO, nitrogen oxide, volatile organic compounds, and particulate matter over the last 20 years (**Figure 3.10-5** [South Section Class I Areas]**, Figure 3.10-6** [Annual Statewide Highway Emissions of Carbon Dioxide]**, Figure 3.10-7** [Annual Statewide Highway Emissions of Oxides of Nitrogen and Volatile Organic Compounds]), and **Figure 3.10 8** [Annual Statewide Highway Emissions of Particulate Matter]) (USEPA 2018).

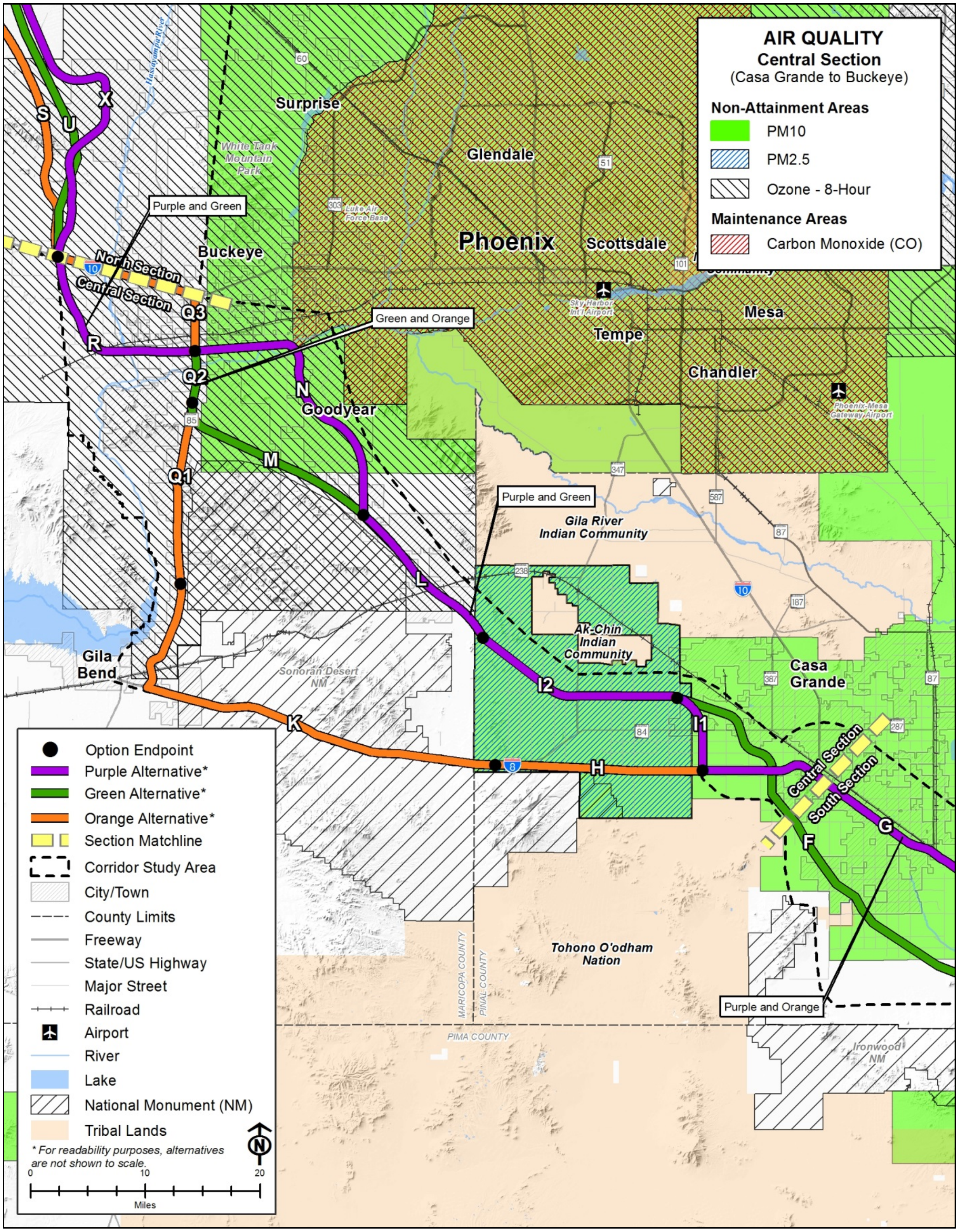

Figure 3.10-3 Central Section NAAs and Maintenance Areas

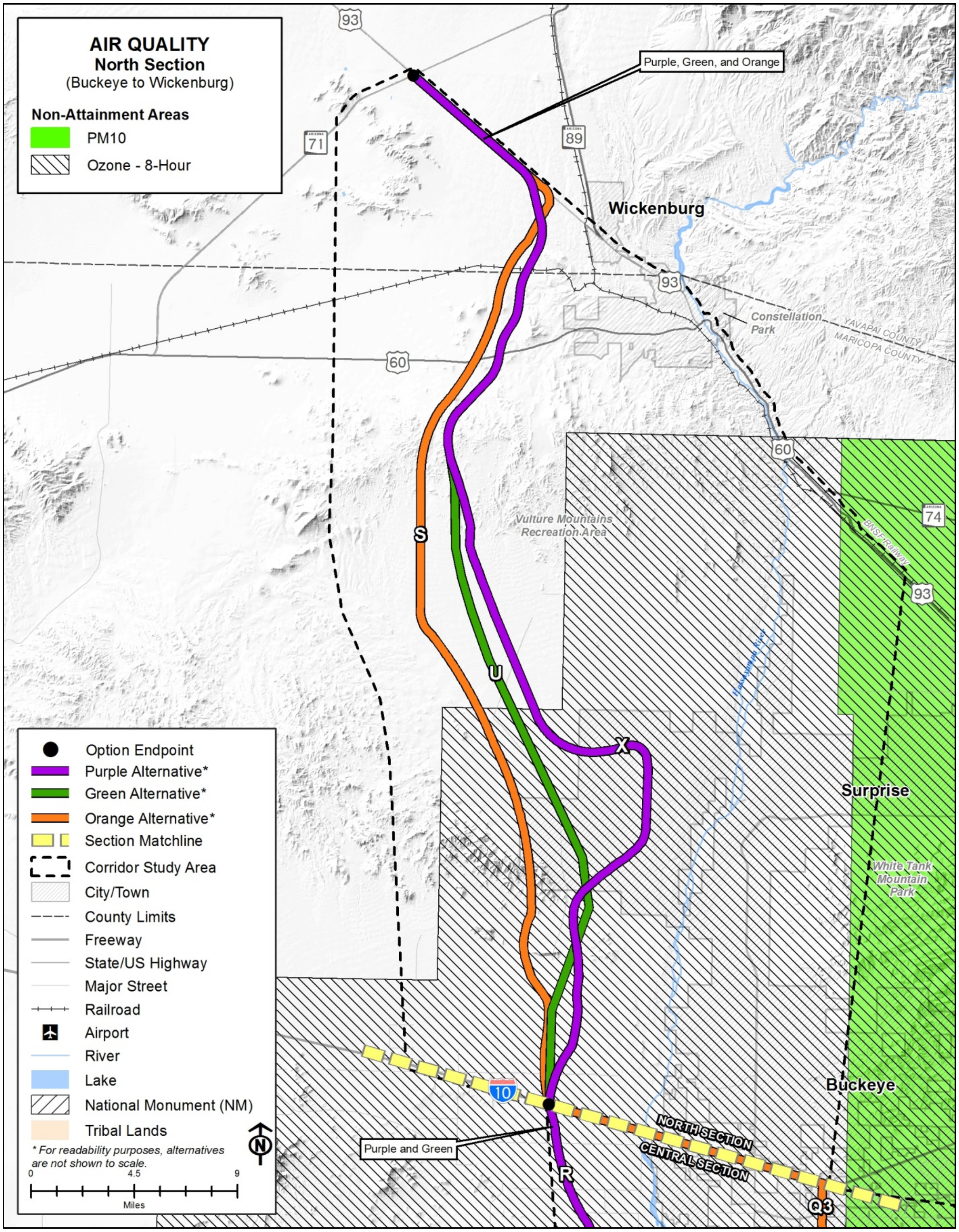

Figure 3.10-4 North Section NAAs and Maintenance Areas

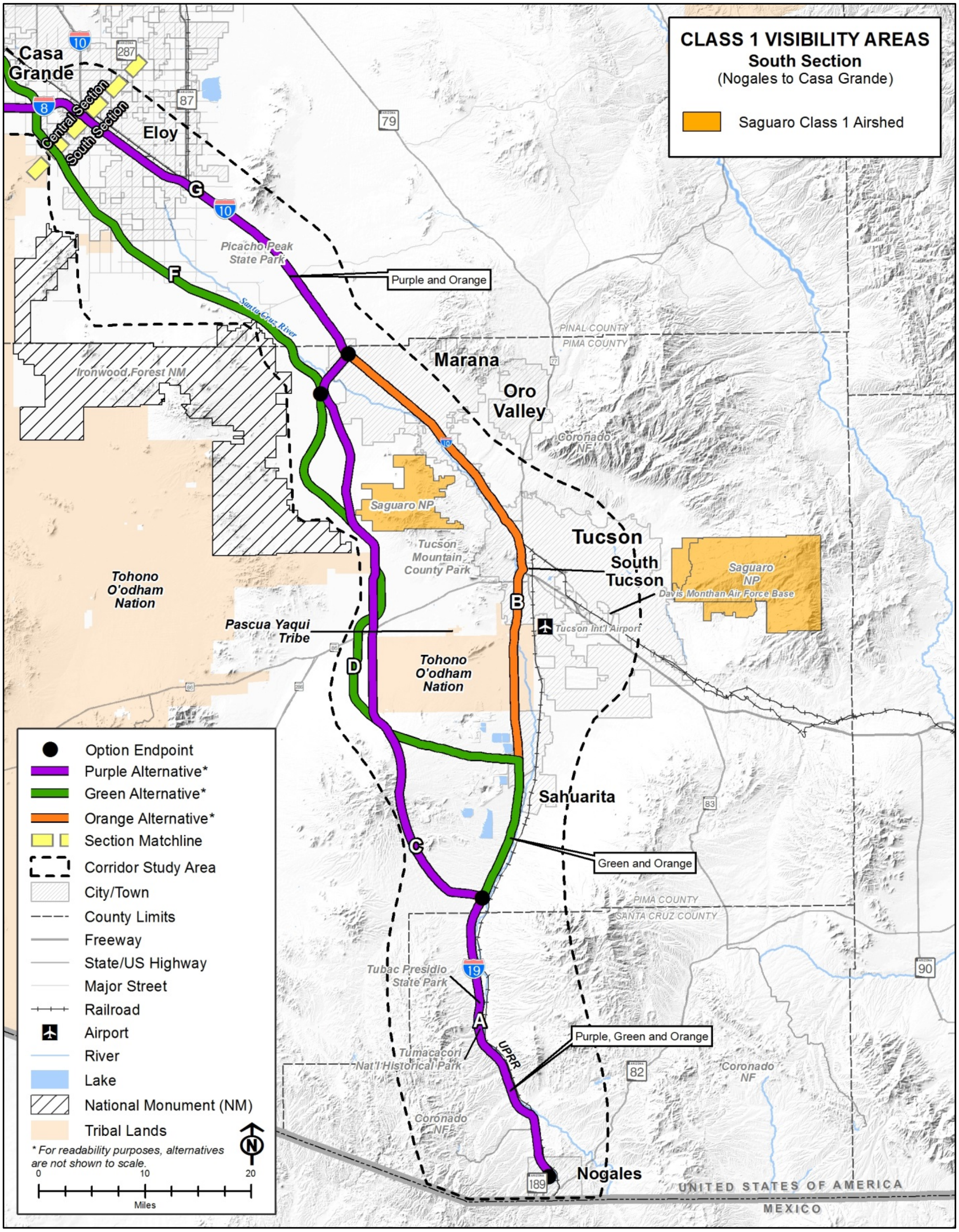

Figure 3.10-5 South Section Class I Areas

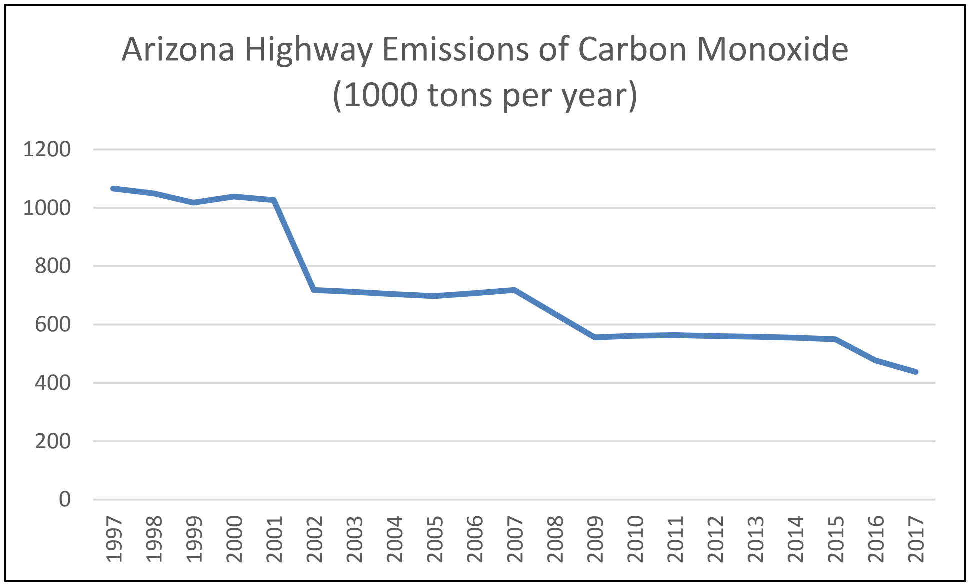

Figure 3.10-6 Annual Statewide Highway Emissions of Carbon Dioxide

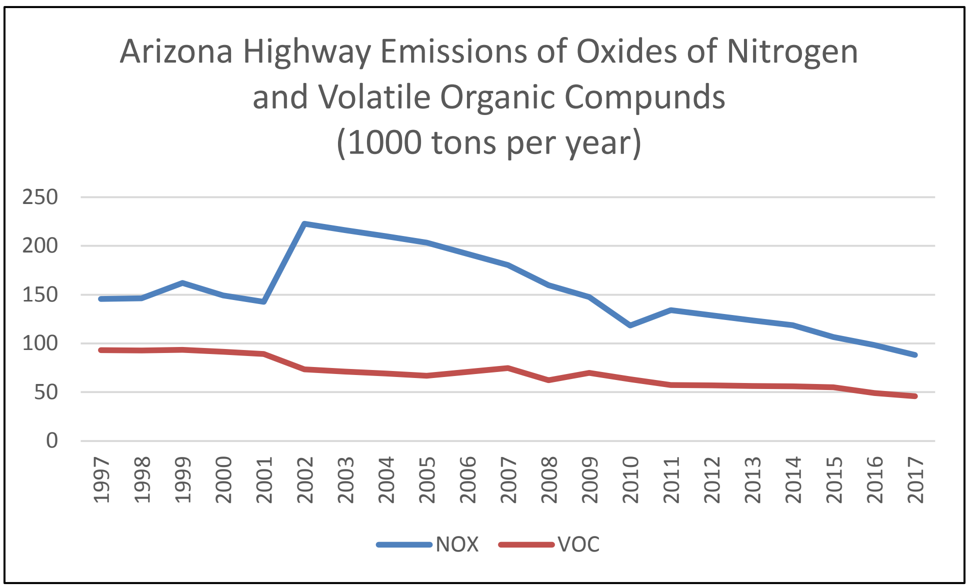

Figure 3.10-7 Annual Statewide Highway Emissions of Oxides of Nitrogen and Volatile Organic Compounds

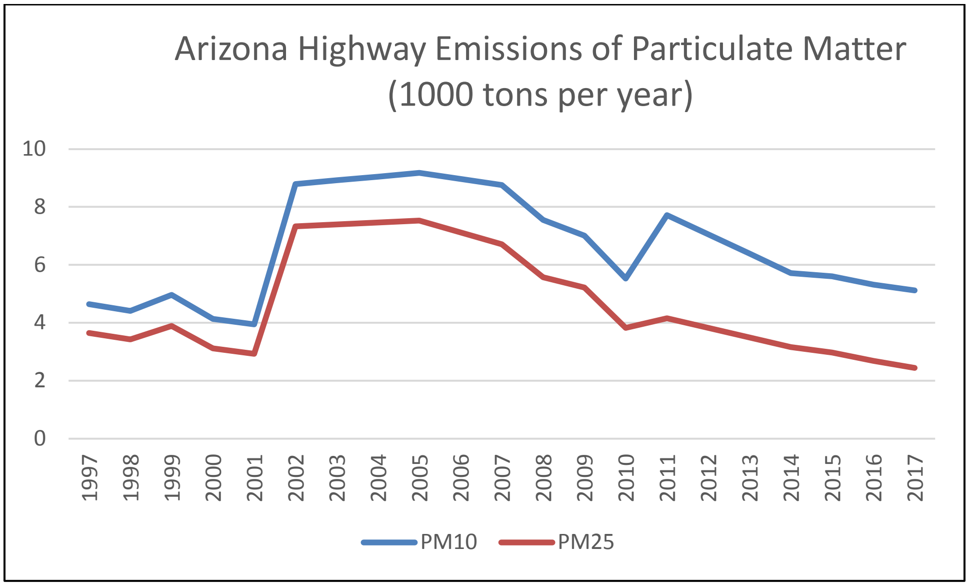

Figure 3.10-8 Annual Statewide Highway Emissions of Particulate Matter

From an air quality planning perspective, there is little potential difference in air quality within the Analysis Area because the NAAQS designations do not differ between Corridor Options with one exception. Option K is located outside of the Phoenix-Mesa PM_{10} NAA, which is classified as "serious" by USEPA. All other Corridor Options are within the Phoenix-Mesa NAA.

3.10.4 Environmental Consequences

For all Build Corridor Alternatives, air quality effects are driven by the behavior of vehicles in the transportation network. Transportation strategies that are implemented through a Build Corridor Alternative can have positive benefits on air quality by reducing emissions. Transportation strategies associated with the Build Corridor Alternatives generally affect emissions by having one or more of the following effects:

- Reducing VMT and/or vehicle trips;
- Reducing congestion and vehicle idling; or
- Improving traffic speeds or traffic flow.

The critical transportation strategies associated with the Build Corridor Alternatives are reducing congestion and improving traffic speeds. Improvements in speeds generally reduce emissions of criteria pollutants and can even offset increases in VMT (**Figure 3.10-9** [FHWA PM_{10} Emissions Factors by Speed for Light-Duty Vehicles and Trucks, 2018]). Emissions of GHGs and MSATs also are generally reduced as speeds improve.

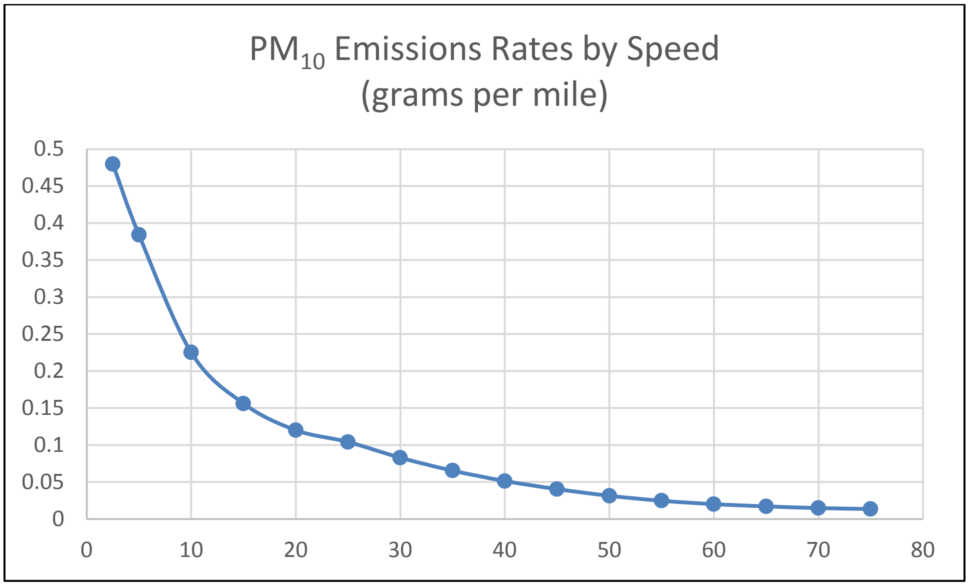

Figure 3.10-9 FHWA PM_{10} Emissions Factors by Speed for Light-Duty Vehicles and Trucks, 2018

Similarly, reducing congestion and associated vehicle idling also reduces motor vehicle emissions. Heavy-duty trucks are the dominant source of PM emissions for motor vehicles. Therefore, improvements in freight travel patterns (i.e., improved speeds and reduced travel times) can lead to a reduction in emissions of PM. In the long-term, increases in traffic and freight movement are expected under all Build Corridor Alternatives. However, the Build Corridor Alternatives are expected to generate improvements in daily freight travel patterns as compared to the No Build Corridor Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). Improvements to daily freight travel patterns are negligible in the South Section for all Build Corridor Alternatives. Improvements to daily freight travel patterns are moderate for the Orange Alternative for the Central Section because it does not divert a substantial number of vehicles between Nogales and Phoenix off I-19 and I-10. Freight patterns in the North Section are moderate in the Purple Alternative and substantial for the Green and Orange Alternatives. Therefore, collocating a Build Corridor Alternative on I-10 would have the greatest potential air quality benefit as collocation would minimize construction emissions and other environmental impacts.

Table 3.10-2 Changes in Daily Freight Travel Patterns Relative to the No Build

Section	Changes on Daily Freight Volumes		
	Purple Alternative	Green Alternative	Orange Alternative
High Percentage of Trucks			
South	Negligible	Negligible	Negligible
Central	Substantial	Substantial	Moderate
North	Moderate	Substantial	Substantial
End-to-End	Substantial	Substantial	Moderate

NOTE: Shading shown for substantial changes in travel patterns. The changes in travel patterns are beneficial effects of the project. For more information, see Section 3.2, Transportation.

Because the I-11 Corridor is expected to carry a high percentage of trucks, improvements in daily freight travel patterns could lead to a reduction in emissions of PM as compared to the No Build Corridor Alternative.

In the South Section of the Study Area there will be an increase in freight travel from vehicles originating from Mexico. Mexico has differing vehicle emissions control regulations from the US. Emissions from Mexico are outside of this action and jurisdiction of US. However, emissions from all vehicles, including those from Mexico, are included in the SIP emissions inventories used to demonstrate attainment or progress towards attainment with the NAAQS. Emissions from Mexico are partially limited by restrictions placed on freight vehicles that travel from Mexico to the US through Nogales and the Mariposa Port of Entry on State Route (SR) 189. Commercial zones for the Nogales Port of Entry limit transportation to within four miles of the City of Nogales municipal boundary (Federal Motor Carrier Safety Administration 2018). In addition, overweight trucks passing through the Nogales Port of Entry and carrying non-divisible loads must obtain a permit issued by ADOT which restricts their travel to within 25 miles of the Port of Entry.

Reductions in emissions of criteria pollutants, GHGs, and MSATs from passenger vehicles also can occur from improved speeds and reduced travel times, which, along with reductions in congestion, are anticipated from the Build Corridor Alternatives. Section 3.2, Transportation, demonstrates that the Build Corridor Alternatives are expected to operate with an improved Level of Service (LOS) as compared to the No Build Alternative. An improvement in the LOS from implementing a Build Corridor Alternative indicates a reduction in congestion that generally corresponds to a reduction in emissions, particularly for CO, as compared to the No Build Alternative.

Reductions in emissions from improved travel times and reduced congestion for the Build Corridor Alternatives may be partially offset by the increase in VMT caused by new freight travel patterns as more trucks begin to utilize the corridor. However, as noted in Section 3.10.3, there is an overall downward trend in total emissions even as VMT increases due to federal regulations on motor vehicles that have reduced tailpipe emissions.

Sections of all three Build Corridor Alternatives would be in close proximity to the SNP Class 1 air shed in Pima County. It is possible that they may adversely impact visibility and other AQRVs from the increase in traffic and emissions.

3.10.4.1 Purple Alternative

In the South Section, the Purple Alternative would pass through Santa Cruz and Pima counties. **Table 3.10-2** (Changes in Daily Freight Travel Patterns Relative to the No Build) shows the relative changes in the travel patterns for freight trucks under the Purple Alternative as compared to the No Build Alternative. The Purple Alternative passes through the Nogales PM_{10} NAA and the Nogales $PM_{2.5}$ NAA, the West Pinal PM_{10} NAA, the West Central Pinal $PM_{2.5}$ NAA, and the Rillito PM_{10} NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). Therefore, it is possible that portions of the Purple Alternative could result in new localized PM violations associated with additional freight truck flow if congestion would increase in these areas. However, these impacts are predicted to be negligible as compared to the No Build Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]).

In Pima County, Option C falls within the Tucson CO limited maintenance area. As discussed in Section 3.2, the amount of VMT predicted to operate at an improved LOS in the South Section is improved under the Purple Alternative when compared to the No Build Alternative. This is likely because a portion of the Purple Alternative between Tucson and Casa Grande would be on a new corridor, which could reduce the potential for CO violations by shifting traffic away from a currently congested section of I-10. Option C falls within close proximity to SNP and there may be potential negative impacts to visibility and other AQRVs in the park.

From an air quality planning perspective, there is little difference between the Central Arizona Project (CAP) Design Option and the Sandario Road Option. The CAP Design Option does not traverse through any new NAAs or maintenance areas for the criteria pollutants. No changes in freight travel patterns or congestion are anticipated with the CAP Design Option; therefore, the benefits to air quality for PM, CO, and GHGs are predicted to be very similar. The CAP Design Option is in closer proximity to the SNP Class I Area which could result in decreased visibility; however, the effects are not likely to be substantial as the distance from the Class I Area between the CAP Design Option and the Sandario Road Option is relatively small.

In the Central Section, the Purple Alternative would pass through Pinal and Maricopa counties including the West Pinal PM_{10} NAA, the West Central Pinal $PM_{2.5}$ NAA, the Phoenix-Mesa PM_{10} NAA, and the Phoenix-Mesa O_3 NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). Although daily freight volumes are expected to substantially increase by 2040, the amount of congestion is not expected to rise appreciably on I-10 in Pinal County compared to the No Build Alternative. LOS would not worsen under any of the alternatives.

Along I-8 and I-10 in the Central Section, it is unlikely that there is a greater potential for new localized PM violations associated with the additional daily freight truck volumes under the Purple Alternative as compared to the No Build Alternative. A portion of the Purple Alternative would be located on a new corridor in the Phoenix-Mesa PM NAA and O_3 maintenance area along Corridor Options I, L, N, and R. Therefore, it is possible that the Purple Alternative could have a small benefit with respect to regional air quality for particulates and O_3 by shifting increases in traffic away from the existing transportation network and reducing future congestion on those facilities.

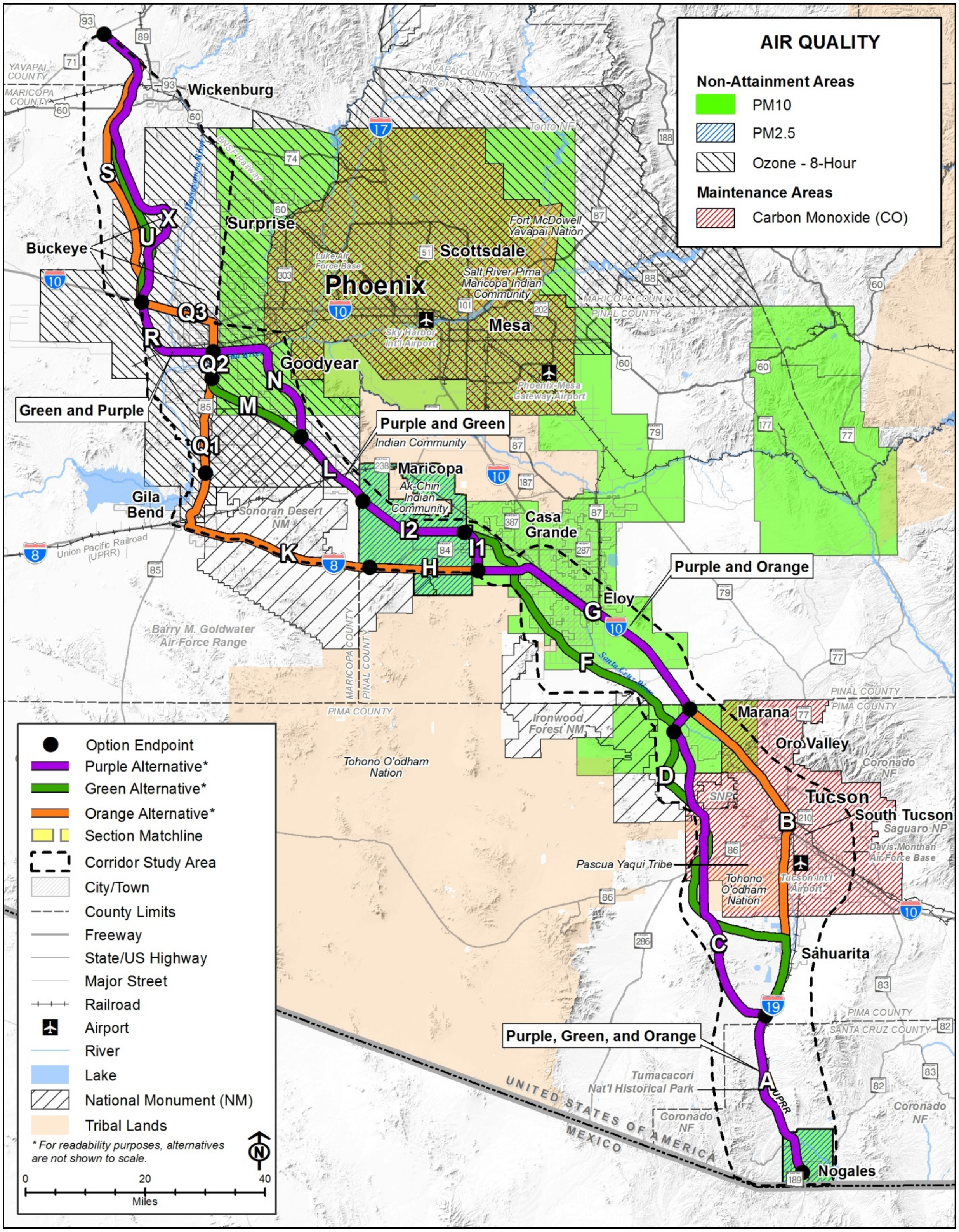

Figure 3.10-10 Corridor Alternatives and NAAs and Maintenance Areas

In the North Section, the Purple Alternative passes though Maricopa and Yavapai counties including the Phoenix-Mesa O_3 NAA (**Figure 3.10-10**). The Purple Alternative is predicted to experience moderate changes in daily freight travel patterns in the North Section as compared to the No Build Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). In the O_3 NAA, the Purple Alternative is largely on a new corridor, which could improve air quality in the region by shifting increases in traffic away from the existing transportation network and preventing increased congestion along the existing corridor that could result in increased levels of localized emissions (**Table 3.10-3**, [Summary of the Potential Impacts on Air Quality] located at the end of this section).

The Purple Alternative passes through numerous NAAQS NAA and maintenance areas. If required, quantitative modeling would occur during Tier 2 studies to evaluate whether localized violations of the NAAQS would occur. From an air quality planning perspective, the Purple Alternative may have a small benefit for regional air quality by shifting traffic away from the existing roadways and reducing congestion and delay in the portions that are not co-located on the existing transportation network. However, there also is the potential that the Purple Alternative could result in elevated localized levels of CO, PM_{10}, and $PM_{2.5}$. The potential for localized violations is greatest on Corridor Options that are co-located with an existing corridor. However, the potential for localized violations of CO and PM are likely less than those for the No Build Alternative as LOS generally improves and daily freight traffic patterns change. If the projected increases in freight truck volumes along the Purple Alternative are substantial, it could result in this Corridor Option being classified as a “project of air quality concern” under the transportation conformity rule, and hotspot analysis would be required in this event. The potential for localized violations will be assessed in a future Tier 2 analysis.

Travel times from Nogales to Wickenburg are projected to decrease by 17.3 percent compared to the No Build Alternative, which indicates that the Purple Alternative would lead to a GHG and MSAT emissions benefit as compared to the No Build Alternative once construction is complete. However, construction and subsequent maintenance of the Purple Alternative will generate GHG emissions. Preparation of the roadway corridor (e.g., earth-moving activities) involves a considerable amount of energy consumption and resulting GHG emissions, and manufacture of the materials used in construction and fuel used by construction equipment also contribute to GHG emissions. Typically, construction emissions associated with a new roadway account for approximately 5 percent of the total 20-year design lifetime emissions from the roadway, although this can vary widely with the extent of construction activity and the number of vehicles that use the roadway.

The addition of new roadway miles to the Study Area also will increase the energy and GHG emissions associated with maintaining those new roadway miles in the future. The total roadway miles in the Study Area that need to be maintained on an ongoing basis would increase relative to No Build Alternative. The increase in maintenance needs due to the addition of new roadway infrastructure will be partially offset by the reduced need for maintenance on existing routes (because of lower total traffic and truck volumes on those routes).

3.10.4.2 Green Alternative

In the South Section, the Green Alternative would pass through Santa Cruz and Pima counties. The Green Alternative falls within the Tucson CO limited maintenance area and the Nogales PM_{10} NAA, Nogales $PM_{2.5}$ NAA, West Central Pinal PM_{10} NAA, West Central Pinal $PM_{2.5}$ NAA, and the Rillito PM_{10} NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]).

The Green Alternative is predicted to have a negligible effect on daily freight travel patterns in the South Section, but it could result in new localized PM violations associated with the additional freight truck flow if congestion on I-10 and I-19 increases. The amount of VMT operating at a degraded LOS in the Tucson metropolitan area is similar to the No Build Alternative VMT because the Green Alternative is not as attractive a diversion as the Purple Alternative. Thus, most traffic is expected to behave as it would under the No Build Alternative in the South Section. On I-10 north of Tucson, VMT conditions would be similar to the No Build Alternative. Therefore, the Green Alternative is likely to have similar potential for localized PM violations as the No Build Alternative. The greatest potential for localized PM violations would be in areas where the Green Alternative is co-located with the existing roadway network as these areas would experience the greatest future demand on the existing transportation system that could result in the relatively larger increases in congestion and resultant increase in localized emissions. The Green Alternative is in the closest proximity to SNP of all the Build Corridor Alternatives and has the greatest potential to impact visibility and other AQRVs based on distance between alternatives

Like the Purple Alternative, there is little difference between the CAP Design Option and the Sandario Road Option under the Green Alternative.

In the Central Section, the Green Alternative would pass through the same counties and NAAs as the Purple Alternative. Although an increase in daily freight truck flow is anticipated, the Green Alternative is predicted to have a substantial effect on daily freight travel patterns as compared to the No Build Alternative, making it unlikely that a greater potential for new localized PM violations would arise associated with the additional daily truck volumes for this alternative as compared to the No Build Alternative.

As with the Purple Alternative, congestion is predicted to increase on SR 85 and there is an increased chance of localized PM violations in these congested areas if there also is a substantial increase in daily freight travel patterns. However, LOS would not necessarily worsen under any of the alternatives. Furthermore, the Green Alternative also is predicted to divert traffic from congested I-10 (Q3), resulting in improved LOS on I-10.

A portion of the Green Alternative would be located on a new corridor in the Phoenix-Mesa PM NAA and O_3 maintenance area, along Options F, I2, L, M, R, and U. Therefore, it is possible that the Green Alternative could have a small benefit for regional air quality for particulates and O_3 by shifting increases in traffic away from the existing transportation network and reducing congestion on those facilities.

In the North Section, the Green Alternative would pass though Maricopa and Yavapai counties including the Phoenix-Mesa O_3 NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). The Green Alternative is predicted to substantially change daily freight travel patterns, which makes the potential for localized PM violations less than the No Build Corridor Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). Therefore, the Green Alternative could improve air quality in the region as compared to the No Build Alternative by shifting increases in traffic away from the existing transportation network and preventing increased congestion along the existing corridor that could result in increased levels of localized emissions. US 93 would continue to operate acceptably under all alternatives.

From an air quality planning perspective, it is possible that the Green Alternative could have a small benefit for regional air quality by shifting traffic away from the existing roadways and reducing congestion and delay in the portions that are not co-located on the existing transportation network. From end-to-end the Green Alternative is predicted to moderately improve daily freight travel patterns, so potential for localized PM violations is likely limited to the newly congested section of SR 85 and I-10.

Overall, the potential for localized PM violations is likely less than the No Build Alternative for the Green Alternative because of the corridor-wide changes in daily freight travel patterns (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). While improvements are generally expected for the Green Alternative as compared to the No Build Corridor Alternative, projected increases in freight truck volumes along new routes in the I-11 Corridor could be substantial and may result in this Corridor Option being classified as a “project of air quality concern” under the transportation conformity rule, and hotspot analysis would be required in this event. The potential for localized violations will be assessed in a future Tier 2 analysis.

The Green Alternative has the greatest improvement in projected travel times along the I-11 Corridor of the Build Alternatives with a projected decrease in travel times of 19.4 percent compared to the No Build Corridor Alternative. Therefore, the Green Alternative likely has the greatest potential GHG and MSAT emissions benefit of all the Build Alternatives. As with the Purple Alternative, there would be increases in emissions of GHGs and MSATs during construction of the Green Alternative as well as increased GHG emissions associated with maintaining the new roadway miles in the I-11 corridor.

3.10.4.3 Orange Alternative

As with the other Build Corridor Alternatives, the Orange Alternative would serve increased freight truck flows and pass through the Tucson CO limited maintenance area, the Nogales PM_{10} and $PM_{2.5}$ NAA, the West Pinal PM_{10} NAA, and the Rillito PM_{10} NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). The Orange Alternative also is predicted to have a negligible effect on daily freight travel patterns since it largely follows existing transportation facilities, which could result in new localized PM violations associated with the additional freight truck flows if congestion in these areas increases.

As discussed in Section 3.2, Transportation, the amount of VMT predicted to operate at an improved LOS in the South Section has the greatest improvements under the Orange Alternative when compared to the other Build Corridor Alternatives. The amount of congested VMT is predicted to decrease along I-10 in Tucson due to capacity improvements, which indicates that the Orange Alternative would be preferable to the No Build Alternative and Green Alternative in this section by reducing congestion and the potential for localized CO violations. The Orange Alternative is the most co-located with the current roadway network in the South Section as compared to the other alternatives. Although both the Orange and Purple Alternatives would decrease congested VMT, and thus, reduce the potential for localized PM violations, the Orange Alternative would more effectively decrease congested VMT. Of the Build Corridor Alternatives, the Orange Alternative is the farthest distance from SNP and has the least likely negative impacts to visibility and other AQRVs as compared to these alternatives based on proximity to the Class I Area.

The Orange Alternative would pass through the same counties and NAAs as the other alternatives in the Central Section and shares the same increase in county-to-county daily freight truck flows. The Orange Alternative is predicted to have greater reductions in congested VMT on I-10 and SR 85 than the Purple and Green Alternatives because it increases the amount of capacity on I-10 between SR 85 and the new I-11 Corridor. Although the VMT on I-10 for the Orange Alternative is similar to the No Build Alternative, congestion is predicted to decrease. For the Orange Alternative, SR 85 would be improved, resulting in decreased congestion as compared to the other alternatives in this area.

The Orange Alternative would be preferable to the No Build Alternative regarding the potential to reduce localized PM violations. It is likely that the greater predicted reduction in congested VMT for the Orange Alternative offsets the lesser improvements related to a change in daily freight travel patterns as compared to the Purple Alternative and Green Alternative. Thus, the Orange Alternative is likely roughly equivalent to the other Build Corridor Alternatives regarding the decreased potential for localized PM violations as compared to the No Build Alternative.

In the North Section, the Orange Alternative also passes though Maricopa and Yavapai counties, including the Phoenix-Mesa O_3 NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). As with the other Build Corridor Alternatives, the Orange Alternative is expected to change daily freight travel patterns as compared to the No Build Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). Therefore, the Orange Alternative is similar to the Green Alternative in the reduced potential for localized PM violations as compared to the No Build Alternative.

Although the Orange Alternative relies on the existing corridor to a greater extent than the other Build Alternatives, it would reduce the amount of congested VMT to a greater extent than the other Build Corridor Alternatives. Therefore, it is possible that the Orange Alternative could have a small benefit for regional air quality to a greater extent than the other Build Corridor Alternatives. As with the other Build Corridor Alternatives, the potential for localized PM violations is likely less than the No Build Corridor Alternative because of the corridor-wide improvements.

While improvements are generally expected for the Orange Alternative, projected increases in freight truck volumes along the corridor could be substantial and may result in this Corridor Option being classified as a “project of air quality concern” under the transportation conformity rule, and hotspot analysis would be required in this event. The potential for localized violations will be assessed in a future Tier 2 analysis.

As with the other Build Alternatives, the Orange Alternative also would likely decreased travel times between Nogales to Wickenburg as compared to the No Build Alternative. The Orange Alternative is projected to decrease travel times by 9.5 percent as compared to the No Build Alternative, which is the lowest decrease in travel times among the Build Alternatives. Therefore, the Orange Alternative likely has the least potential to reduce GHG and MSAT emissions as compared to the other Build Alternatives. The Orange Alternative has the least increase in new roadway miles among the three alternatives and likely has the least GHG and MSAT emissions associated with construction and roadway maintenance.

3.10.4.4 No Build Alternative

The No Build Corridor Alternative is the “do-nothing” alternative. Under the No Build Alternative, vehicles would continue to utilize the existing transportation network in the Study Area.

The county-to-county daily freight truck flows are expected to increase by 288 percent from 2013 to 2040 in the South Section, which includes the Nogales PM_{10} and $PM_{2.5}$ NAA, the West Pinal PM_{10} NAA, and the Rillito PM_{10} NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). Even though truck emissions are improving over time due to national emissions standards, increases in truck traffic along with increased congestion lead to a heightened risk of localized violations of the NAAQS for PM along the existing corridor.

In Pima County, the No Build Alternative falls within the Tucson CO limited maintenance area. Any reduction in LOS increases the potential for localized CO violations at locations where the predicted LOS is D, E, or F. The majority of intersections predicted to perform at LOS D or worse are located in Tucson, particularly the downtown area.

The county-to-county daily freight truck flows in the Central Section are expected to increase by 244 percent between Pinal and Santa Cruz counties from 2013 to 2040. Therefore, the No Build Alternative could result in new localized PM violations along the existing I-10 corridor associated with the additional freight truck flows and increased congestion in these areas. The potential for a localized PM violation is likely greater in areas with higher freight truck flows. More congested areas would be more susceptible to potentially adverse effects in air quality as the Central Section is projected to increase in overall VMT by 239 percent by 2040, with degraded VMT occurring primarily in the SR 85/I-10 areas in Maricopa County.

In the O_3 NAA, the No Build Alternative could degrade air quality in the North Section by increasing demand on the existing transportation network and worsening congestion that would reduce speeds and increase emissions, particularly along I-10.

The No Build Alternative could have negative effects on numerous NAAQS NAAs and maintenance areas. From an air quality planning perspective, it is possible that the No Build Alternative could result in regionally adverse effects in air quality as the result of increased levels of congestion and delay that could cause elevated localized levels of CO, PM_{10}, and $PM_{2.5}$.

Under the No Build Alternative travel times from Nogales to Wickenburg are projected to increase by as much as 90 minutes and speeds would decrease by as much as 17 miles per hour due to the growing congestion along existing freeways and arterials. Therefore, the No Build Alternative is likely to increase emissions of GHGs and MSATs as compared to the Build Corridor Alternatives.

The potential for localized PM violations is greatest in NAAs and maintenance areas where high levels of daily freight volumes are predicted. The largest increases in daily freight volumes are predicted to be in the South Section between Santa Cruz and Pima counties, which includes the SNP Class 1 air shed in Pima County. This distance is not considered to be extremely significant as the Class 1 air shed covers a broad geographical area. It is possible that the No Build Alternative could adversely impact visibility from the increase in traffic and emissions, which would affect congestion and increase emissions resulting in greater potential impacts to visibility as compared to the Build Corridor Alternatives.

3.10.5 Summary

The potential impacts to regional air quality from the construction of the Build Corridor Alternatives are similar. All Build Corridor Alternatives are expected to serve as an improvement to regional air quality over the No Build Alternative. No Build Alternative could result in regionally adverse effects as the result of increased levels of congestion and delay. The Build Corridor Alternatives may impact local air quality conditions differently. The detailed quantitative analysis conducted in Tier 2 will identify localized impacts to air quality.

3.10.6 Potential Mitigation Strategies

Air quality modeling may be required for the future Tier 2 NEPA documents to quantify potential emissions for alternatives studied in detail. Mitigation measures also would be identified at that time for any potential air quality effects. All Build Corridor Alternatives are likely to result in decreased travel times as compared to the No Build Alternative. Therefore, construction of a Build Corridor Alternative could be considered a GHG mitigation measure. In addition, temporary construction effects may be quantified and temporary control measures would be recommended. Typical construction mitigation measures include:

- Minimize idling time to save fuel and reduce emissions.
- Use the cleanest fuels available for construction equipment and vehicles to reduce exhaust emissions.
- Keep construction equipment well-maintained to ensure that exhaust systems are in good working order.
- Control fugitive dust through a Fugitive Dust Control Plan, including watering disturbed areas.
- To minimize wind-blown dust from blasting, particularly near community areas, control blasting and avoid blasting on days with high winds.
- Develop a traffic plan to minimize traffic flow interference from construction equipment movement and activities.
- Space interchanges to reduce local impacts of idling on sensitive areas near the new corridor.

3.10.7 Future Tier 2 Analysis

If a Build Corridor Alternative is selected for construction, it would require a transportation conformity analysis due to the NAAs and maintenance designations of the areas surrounding the Study Area. During Tier 2 NEPA analysis, a detailed air quality analysis would be conducted once a future alignment or alternative alignments have been selected and advanced for further environmental evaluation. Individual projects on the I-11 Corridor that are in NAAs or maintenance areas would need to conform to the NAAQS, requiring an assessment of vehicle emissions within the region. Modeling of CO and particulate emissions at the project level would be conducted during Tier 2 analysis to determine potential localized air quality effects (hotspots) from future construction and operation of the I-11 Corridor. GHG emissions could be quantitatively assessed in the Tier 2 NEPA analysis using USEPA’s Motor Vehicles Emissions Simulator model. Detailed mitigation measures also would be developed and refined during Tier 2.

National Park Service (NPS) recommended analysis on local air quality impacts near the SNP. ADOT will conduct an analysis of localized air quality impacts to sensitive areas including the SNP in the Tier 2 environmental process. The analysis will assess NAAQS and criteria pollutants and will consider the spacing of interchanges and associated idling impacts on adjacent receptors. ADOT will provide the opportunity for NPS to review the air quality emission inventory and modeling protocols in the Tier 2 analysis.

Table 3.10-3 Summary of the Potential Impacts on Air Quality

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Major Resource Features	• No I-11 impacts identified. • Existing conditions and baseline trends would continue.	There is little difference in air quality between the Build Corridor Alternatives. In Corridor Option A, near Nogales, USEPA has classified the area as moderate NAA for PM_5 and PM_{10}. The Rillito and West Pinal areas have been classified as moderate NAA for PM_{10}. Phoenix Mesa PM_{10} NAA is classified as serious; this is part of the Green and Purple Alternatives. There also is marginal nonattainment in Phoenix Mesa for O_3. The South Section is in proximity to the SNP Class 1 air shed; however the air shed is regional in nature and the variance in distance to the park between alternatives is not substantial. The South Section transverses the Tucson CO limited maintenance area.		
General trends	• Could have negative effects on NAAQS, NAAs, and maintenance areas. • Could see localized violations of CO on the existing road network.	• Could benefit regional air quality by shifting traffic away from existing roadways and reducing congestion. • Could see localized violations of CO, PM_{10}, and $PM_{2.5}$ on co-located corridors. • Freight volumes could lead to the Corridor Alternative being classified as a "project of air quality concern."	• Could benefit regional air quality by shifting traffic away from existing roadways and reducing congestion. • Could see localized violations of CO, PM_{10}, and $PM_{2.5}$ on SR 85 and I-10 • Freight volumes could lead to the Corridor Alternative being classified as a "project of air quality concern."	• Could benefit regional air quality by reducing congestion more than the Green and Purple Alternatives. • Could see localized violations of CO, PM_{10}, and $PM_{2.5}$ on co-located corridors. • Freight volumes could lead to the Corridor Alternative being classified as a "project of air quality concern."
End to end changes in daily freight volumes	County-to-county daily freight truck flows are expected to increase.	• Negligible effect to freight travel in the South Section. • Substantial change in freight volumes in the Central Section. • Moderate changes in the North Section.	• Negligible effect to freight travel in the South Section. • Substantial change in freight volumes in the Central and North Sections.	• Negligible effect to freight travel in the South Section. • Moderate change in freight volumes in the Central Section. • Substantial change in freight travel in the North Section.

Table 3.10-3 Summary of the Potential Impacts on Air Quality (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
PM	• Could see localized violations of PM_{10} and $PM_{2.5}$ on the existing road network.	• Potential for new localized violations of PM in the South Section. • Potential improvements in PM levels where traffic is shifted off of the existing network in the Central and North Sections.	• Potential for new localized violations of PM in the South Section similar to the No Build Alternative. • Could see moderate improvements in PM levels where traffic is shifted off of the existing network.	• Potential for new localized violations of PM in the South Section. • Roughly equivalent to other Build Corridor Alternatives regarding decreased potential for localized violations of PM.
O_3	• Could degrade air quality in the O_3 NAA in the North Section.	• Potential to improve O_3 levels by shifting traffic from the existing road network and reducing congestion.	• Potential to improve O_3 levels by shifting traffic from the existing road network and reducing congestion.	• Potential to improve O_3 levels by reducing congestion.
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Decrease air quality due to population growth, increasing traffic and the resulting traffic congestion.	Land development induced by the project could: • Impact I-10 through a reduction in traffic volumes potentially reducing congestion. This could improve regional air quality and could reduce future delays due to congestion. • Lead to the creation of localized air pollution hotspots that exceed the NAAQS.	Similar to the Purple Alternative, except: • There is a greater potential for induced growth, which could occur at a faster pace than the Purple Alternative. It also has the second highest number (16) of new interchanges that increase automobile accessibility.	Similar to the Purple Alternative, except: • There is a greater potential for temporary increases in emissions due to dependency on the existing highway, greater traffic delays and congestion during the construction phase. • Induced growth may be lower than the other build alternatives due to co-location with existing facilities.

Table 3.10-3 Summary of the Potential Impacts on Air Quality (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	Past, present, and reasonably foreseeable projects could: • Generate minor potential incremental effects due to the combined effects of indirect effects and additional traffic volumes and congestion. Potential implementation of new air quality regulations, improving diesel and dust controls, reduced dependence on fossil fuels, and adoption of cleaner car engine technologies may offset these effects.	Past, present, and reasonably foreseeable projects could: • Not generate potential incremental effects due to reduced congestion, the potential implementation of new air quality regulations, improving diesel and dust controls, reduced dependence on fossil fuels, and adoption of cleaner car engine technologies.	Similar to the Purple Alternative.	Similar to the Purple Alternative.

NOTES: CO = carbon monoxide, I-10 = Interstate 10, NAA = nonattainment area, NAAQS = National Ambient Air Quality Standards, O_3 = ozone, PM = particulate matter, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 microns, PM_5 = fine particulate matter less than or equal to 5 microns, PM_{10} = fine particulate matter less than or equal to 10 microns, SNP = Saguaro National Park, SR = State Route, USEPA = United States Environmental Protection Agency

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