ENVIRONMENTAL

MOVING PEOPLE
CONNECTING PLACES

The environment is important to everyone, especially the air we breathe and the water we drink. And not just for today, but to ensure clean air and water is available in the future. Over the years, the MPO and its partners have implemented a variety of plans, programs and projects that avoid and minimize environmental impacts to the greatest extent practicable for a more sustainable future.

Accomplishments Over the Past Five Years

Until July 18, 2018, San Antonio had been the largest city in the United States that was in compliance with federal ozone standards. On that date, the Environmental Protection Agency (EPA) designated Bexar County in marginal nonattainment for ozone. The effective date of designation was September 24, 2018. Bexar County has until September 24, 2021 to meet the ozone standard. At the same time, Comal, Guadalupe and Kendall Counties were designated attainment/unclassifiable under the October 2015 standard.

Over the years, the region has been actively implementing measures to stay in attainment. Some examples include implementing intersection improvements and improved signal re-timings, implementing vehicle idling restrictions, conducting educational and public outreach campaigns, improving transit service coverage and frequency, purchasing alternatively fueled fleets, expanding the scope of the Alamo Area Commute Solutions Program, increasing the

coverage of bicycle and pedestrian facilities and amenities, and adding vehicle travel lanes to reduce delay.

The Safe, Accountable, Flexible, Efficient, Transportation Equity Act - A Legacy for Users (SAFETEA-LU) and subsequent Moving Ahead for Progress in the 21st Century (MAP-21) acts have better defined environmental goals that include more integration of metropolitan and statewide planning with the National Environmental Policy Act (NEPA) activities. From 2013-2015, the TxDOT San Antonio District worked with regional stakeholders on two Planning and Environmental Linkages (PEL) studies. In September 2015, the MPO adopted resolutions supporting the work completed on the two PEL studies completed for sections of IH 35.

Over the past five years, the MPO staff has developed and refined its online iMap tool. iMap is a user-friendly mapping application that is available to the public on the MPO website at http://www.alamoareampo.org/imap/. iMap contains a wide variety of transportation, geographic and environmental data layers. By using iMap, users can assess traffic volumes, vehicle crashes, floodplains, Edwards Aquifer impacts, transit service, environmental justice impacts, and other important data elements for geographic areas or transportation projects.

Environmental issues in transportation planning continue to be a priority. This chapter discusses local environmental issues: Linking NEPA and Planning, environmental analyses, air quality, water availability and sustainability.

Linking Planning and NEPA

Planning and Environment Linkages or PEL is an umbrella term for the many environmental issues that should be considered and used in the planning process to improve the environment. PEL addresses many of the concerns addressed under NEPA, such as environmental effects, endangered species, wetlands, and cultural preservation. It also includes Linking Planning and NEPA activities and concepts regarding how to conduct transportation planning-level choices and analyses so they may be adopted or incorporated into the process required by NEPA. PEL pertains to a wider array of issues and topics, including planning-level interagency consultation and coordination.

The MPO utilizes PEL as an approach to transportation decision-making that considers environmental, community, and economic goals early in the planning stage, and carries them through project development, design, and construction. The MPO strives for a seamless decision-making process that minimizes duplication of effort, promotes environmental stewardship, and reduces delays in project implementation. In September 2015, the MPO adopted resolutions supporting the work completed on the two PEL studies completed for sections of IH 35.

MPO Project Assessment Tool: iMap

When considering a transportation project for funding, the MPO, agency partners, public and stakeholders, can take into general account potential impacts to the environment and community and consider, where appropriate and necessary, environmental mitigation activities. The MPO does this through its iMap online mapping application. MPO has developed iMap through publicly available datasets and geocoded data elements specific to transportation and the environment. iMap does not include an exhaustive listing of factors however, and each project sponsor is still responsible for the relevant environmental clearance documentation to comply with NEPA or appropriate state level environmental clearance, where applicable. Additionally, factors such as air quality may be a regional concern and not specifically limited to individual travel corridors.

The following are some of the environmental concerns that can be analyzed using iMap within the project development process:

- Environmental Justice
- Edwards Aquifer Impacts
- Floodplains
- Watershed areas
- Places of community interest
- Project locations and adjacent feature

As noted previously, it is still the responsibility of the sponsoring agency, in conducting the environmental analysis for proposed projects, to accurately and fully identify any impacts covering social, economic and environmental concerns, and proposed mitigation approaches, as applicable and warranted, to ensure compliance with relevant state and federal requirements.

Air Quality

The ratification of the Clean Air Act of 1970 authorized the development of comprehensive federal and state regulations to limit emissions from both stationary (industrial) sources and mobile sources. Four major regulatory programs were initiated: the National Ambient Air Quality Standards (NAAQS), State Implementation Plans (SIPs), New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAPs). The EPA was created on May 2, 1971 in order to implement the various requirements included in the Clean Air Act.

The Clean Air Act required areas to create plans to meet the air quality standards and set deadlines for achieving those standards. Using this authority, the EPA has promulgated air quality standards for six air pollutants: sulfur dioxide (SO_2), particulate matter (PM2.5 and PM10), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone, and lead. The Act required the

EPA to review the scientific data upon which the standards are based every five years. The EPA may revise the standards if necessary to protect public health with “an adequate margin of safety”.

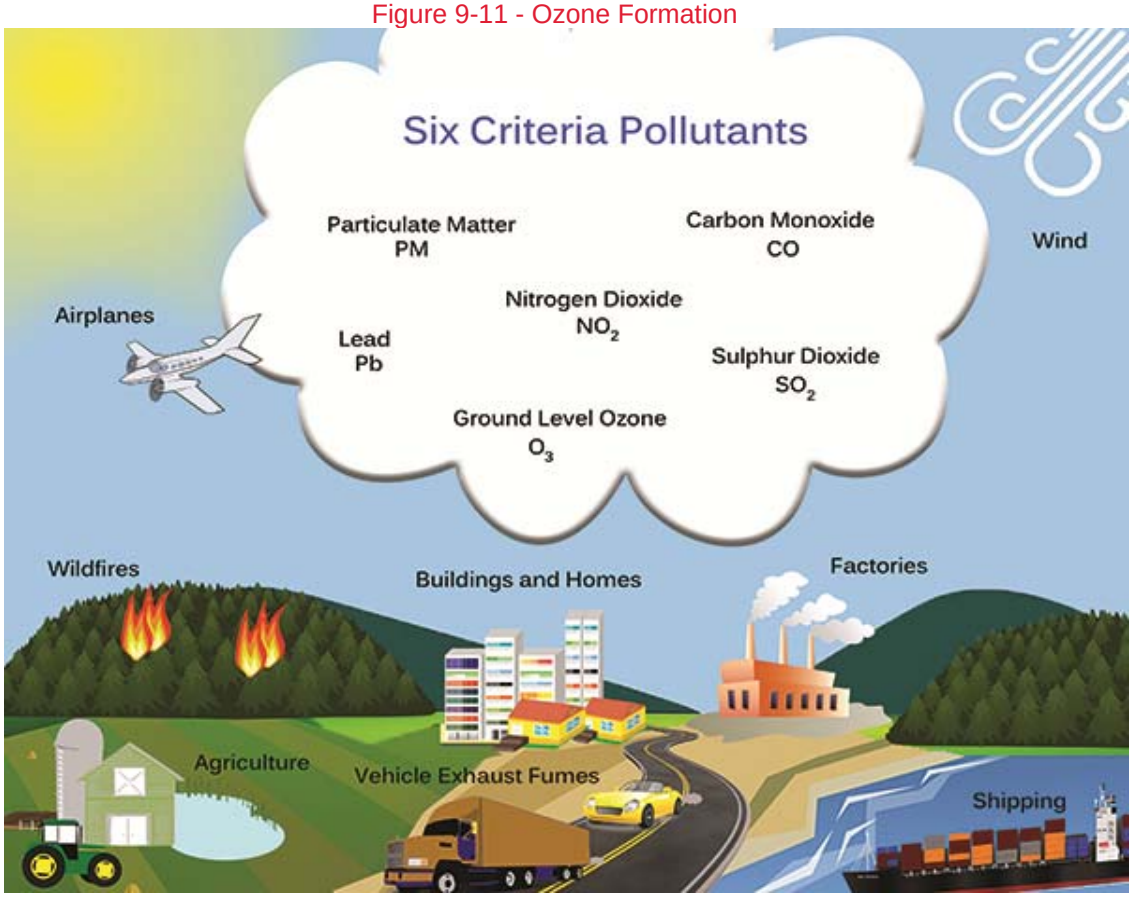
The 1990 Clean Air Act Amendments group nonattainment areas into classifications based on the severity of exceedance and establish specific pollution controls and attainment dates for each classification: Marginal, Moderate, Serious, Severe, and Extreme. Areas with more severe air pollution problems have a longer time to meet the standards, but also have more stringent control requirements placed on them.

The Ozone Standard

Unlike the other pollutants, ozone is not directly emitted from any source. Instead, it is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOx) react in the presence of sunlight. Figure 9-1 illustrates examples of on-road mobile, non-road mobile, point and area sources of VOCs and NOx. Control of ozone is based on decreasing emissions from those sources.

On October 1, 2015, the Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standards (NAAQS) for ground-level ozone by lowering the standard from 75 parts per billion (ppb) to 70 ppb, based on scientific evidence about ozone’s effects on public health and welfare. The updated standards aim to protect public health, particularly for at-risk groups including children, older adults, people of all ages who have lung diseases such as asthma, and people who are active outdoors. The San Antonio area was not able to achieve the lower standard and was designated marginal nonattainment for ozone on July 18, 2018.

Figure 9-11 - Ozone Formation

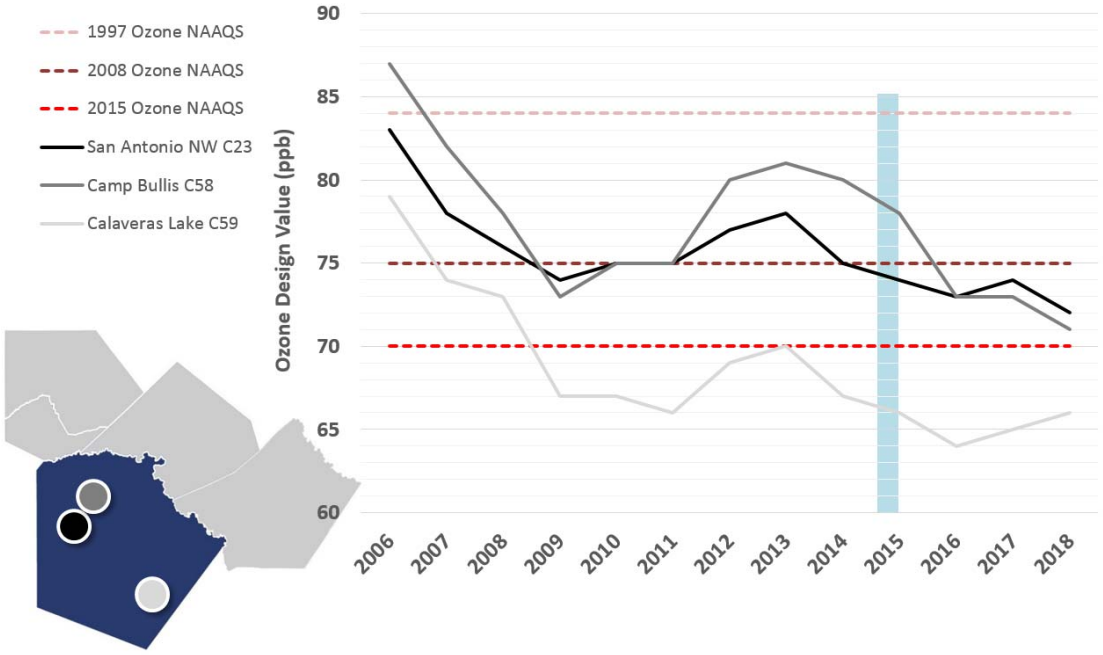


Air Quality Conditions

The MPO study area currently has several Continuous Air Quality Monitoring Systems (CAMS), which record ozone levels daily. The regulatory ozone CAMS include the San Antonio Northwest (C23), Camp Bullis (C58), and Calaveras Lake (C59). In addition, the Alamo Area Council of Governments (AACOG) operates non-regulatory ozone monitoring sites across the region during the ozone season.

illustrates that monitor readings have been trending downward over time; however, it was not sufficient to meet the new 70 ppb standard, promulgated in 2015.

Figure 9-2 -San Antonio Eight-Hour Design Value Trends by Monitor Site 2006 - 2018



(Source: MPO interpretation of data from the Texas Commission on Environmental Quality)

Transportation Conformity

Now that Bexar County has been designated nonattainment for ozone, the MPO takes on the responsibility, known as transportation conformity, of analyzing expected emissions from on-road mobile sources. The transportation conformity requirements ensure that transportation projects and plans outlined in the MPO's long- and short-range plans (currently *Mobility 2045* and the 2019-2022 Transportation Improvement Program) do not cause new air quality violations, exacerbate existing ones, or delay attainment of the air quality standards.

Transportation conformity is a two-step process that begins with a local finding of conformity by the MPO's Transportation Policy Board and a final determination of conformity made by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). The 2019 Transportation Conformity document describes the transportation conformity process in greater detail and provides local findings on VOC and NOx emissions. It can be found online at online at www.alamoareampo.org/airquality/conformity.

The MPO has one year from the effective designation date of nonattainment designation (September 24, 2018) to complete the initial transportation conformity process. A conformity determination is required, at a minimum, every time a new or amended long-range plan (MTP) or short-range plan (TIP) is adopted, unless only adding exempted projects.

Air Quality Mitigation Efforts

In the Alamo Area, on-road vehicles have historically been the most significant source of NOx and the third largest source of VOCs. Fortunately, improvements in technology have had a considerable effect on the reduction of air pollution (emissions from new vehicles have declined over time as emission controls and fuel efficiency have improved). Even though cleaner vehicles are in operation, reducing vehicle miles of travel is one way to reduce emissions and improve air quality. A downward trend in VMT brings significant benefits in reducing mobile source emissions. Reduction in the growth of vehicle miles of travel requires behavioral changes rather than solely relying on improvements in technology. The challenge is to reduce the length of most trips and to identify and implement strategies to encourage walking, bicycling and transit use. Clearing bottlenecks, and therefore reducing engine idling, is another major means of reducing vehicle emissions.

As shown in Table 9-1, vehicles are not the only source however, according to the AACOG Emissions Trend Analysis for the San Antonio-New Braunfels Metropolitan Statistical Area (MSA) of ozone forming pollutants, there are 275.36 tons of VOCs and 240.26 tons of NOx emitted daily in from all man-made sources (power generation, vehicles, aircraft, etc.) in 2012.

Table 9-1. 2017 Ozone Season Weekday Anthropogenic VOC and NOx Emissions for the San Antonio-New Braunfels MSA

Source Type	VOC (tons/weekday)		NOx (tons/weekday)	
	Tons/Weekday	Percentage	Tons/Weekday	Percentage
On-Road	24.7	13.7%	44.1	27.4%
Point	9.2	5.1%	61.1	37.9%
Area	89.0	49.3%	6.9	4.3%
Non-Road	16.9	9.3%	18.4	11.4%
Other (Oil & Gas; Off-Road)	40.8	22.6%	30.6	19.0%
Total	**180.6**	**100.0%**	**161.1**	**100.0%**

Source: AACOG, June 2018. “Regional Air Quality Plan: 2018 to 2023 San Antonio-New Braunfels Metropolitan Statistical Area (MSA)”

Water Resources

There is a continued interest in the protection of natural resources, especially water. Due to the development and expansion in the recharge zone of the Edwards Aquifer area and recent weather conditions, including drought, concerns regarding the importance of looking after and preserving the water resources in the Alamo Area continues. The Edwards Aquifer is the primary source of drinking water for the area. It is important for governmental entities, private corporations and citizens to work together to address urban development that impacts the aquifer. Plans such as the Edwards Aquifer Sustainability Initiative specify preferred restrictions on impervious cover percentages that will sustain existing water quality, as well as other measures that will assist in protecting the aquifer.

The Edwards Aquifer is one of the major groundwater systems in Texas. It has been a source of water for people in south central Texas for more than 12,000 years. Today, it is the primary source of water for approximately 1.7 million people. Geographically, the Aquifer extends through parts of Kinney, Uvalde, Zavala, Medina, Frio, Atascosa, Bexar, Comal, Guadalupe, and Hays counties and covers an area approximately 180 miles long and five to 40 miles wide. The total surface area overlying the Aquifer is approximately 3,600 square miles. The Aquifer is the primary water source for much of this area, including the City of San Antonio and its surrounding communities.

Historically, the cities of Uvalde, San Antonio, New Braunfels, and San Marcos were founded around large springs that discharged from the Aquifer. As the region grew, wells were drilled into the Aquifer in order to supplement the water supplied by those springs. The Aquifer also serves as the principal source of water for the region's agricultural and industrial activities and provides necessary spring flow for endangered species habitat, as well as recreational purposes and downstream uses in the Guadalupe, Nueces, and San Antonio river basins. During the 1970s and 1980s, residential development in the San Antonio Metropolitan Area occurred predominantly in the northern part of the region. Because of the concern of continued development over the Recharge Zone, construction in the 1990s occurred in the western and northeastern areas of the County, slightly curbing the expansion to the north.

As the metropolitan area continues to grow, the needed transportation projects will impact surface water flow and infiltration, especially during storm or flood conditions. The Aquifer is divided into three main zones: the contributing zone, the recharge zone, and the artesian zone. The contributing zone is also called the drainage area or the catchment area. Here the land surface "catches" water from rainfall that averages about 30" per year, and water runs off into streams or infiltrates into the water table aquifer of the plateau. Runoff from the land surface and water table springs then both feed streams that flow over relatively impermeable limestone until they reach the recharge zone. Because transportation facilities generally cause an increase in the impermeable surface area, roadways can result in increasing local surface runoff and reducing water infiltration into the soil. Roadway construction projects can also cause the altering of drainage patterns at stream crossings, by changing the speed, direction and amount of storm water flow.

Aquifer Mitigation Efforts

There are several mitigation strategies that could be used to reduce storm water runoff and degradation of the Edwards Aquifer by minimizing the impact of transportation improvements. Most of these can be directly incorporated into the design of the transportation facility. Engineering on new projects, and redesign and retrofit of existing facilities could include:

- erosion control measures and runoff management techniques used to prevent pollution of adjacent waterways and the Edwards Aquifer

- adjustments to the alignments of transportation facilities used to avoid flood hazards
- greater use of permeable surfaces employed to reduce impacts on ground water recharge
- cost/pricing strategies to reduce demand for paved parking or increasing fines for intentional discharge

Other mitigation strategies could include compliance with federal, state and local policies, standards and land use strategies that address water resources.

Other Environmental Considerations

Endangered Karst Invertebrates

Other environmental considerations unique to the Alamo Area include the presence of endangered Karst invertebrates. Nine Bexar County karst invertebrates were listed as endangered species on 26 December 2000 (65 FR 81419 81433). These species inhabit caves and mesocaverns (humanly impassable voids in karst limestone) in Bexar County, Texas. Five karst zones have been defined within Bexar County and are defined as follows:

- Zone 1. Areas known to contain listed karst invertebrate species.
- Zone 2. Areas having a high probability of containing habitat suitable for listed karst invertebrate species.
- Zone 3. Areas that probably do not contain listed karst invertebrate species.
- Zone 4. Areas that require further research but are generally equivalent to Zone 3, although they may include sections that could be classified as Zone 2 or Zone 5 as more information becomes available.
- Zone 5. Areas that do not contain listed karst invertebrate species

A layer containing the five karst zones can be found on our online iMap tool at http://www.alamoareampo.org/imap/.

In October 2012, TxDOT encountered an endangered karst invertebrate species while excavating for the planned construction at the interchange of Loop 1604 and SH 151. This finding caused the project to be delayed and additional costs to be incurred while the project was redesigned to minimize potential impacts.

TxDOT and engineering consultants use borehole data, trenching, electrical resistivity surveys to test for the presence and karst voids with a high likelihood of being inhabited. This is a significant construction consideration for roadway work in Bexar County but can be planned for and addressed if identified early.

Texas Hill Country

The Texas Hill Country spans a 17-county area and encompasses approximately 11.3 million acres. Each of the counties within the MPO study area contain a portion of the Hill Country. It is a geographic region located in the Edwards Plateau. Native vegetation in the region includes various yucca, prickly pear cactus, desert spoon, and wildflowers in the Llano Uplift. The predominant trees in the region are Ashe juniper and Texas live oak.

The region is also notable for its karst topography and tall rugged hills of limestone or granite. The terrain throughout the region is punctuated by a thin layer of topsoil and a large number of exposed rocks and boulders, making the region very dry and prone to flash flooding. It also features a number of caverns, three of which are within our study area – Natural Bridge Caverns, Bracken Cave, and Cascade Caverns.

The Texas Hill Country is well known for its unique ecosystems supporting several endangered species (e.g., Texas blind salamander, San Marcos salamander, black-capped vireo, golden-cheeked warbler, and Tobusch fishhook cactus).

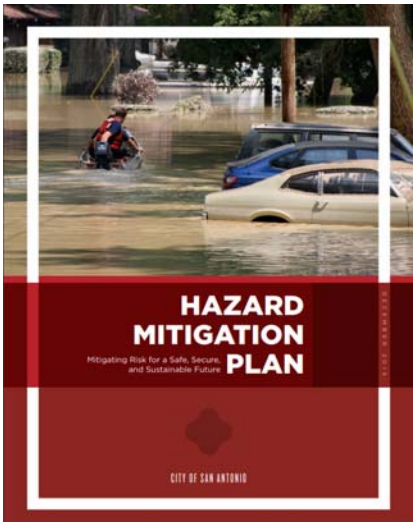
Quarry Row

The Hill Country is the source of 80% of all limestone quarried in Texas. Currently, there is a stretch of operations along the IH 35 corridor in Comal County that has approximately 40,000 acres of aggregate operations, referred to locally as “Quarry Row”.

Limestone quarrying, crushing, and cement manufacturing creates air pollution in the form of particulate matter (PM). While our region is currently in attainment for PM, health effects from exposure could include coughing, shortness of breath, tightness in the chest and irritation of the eyes from short-term exposure. Long-term exposure can result in reduced lung function, and respiratory diseases such as asthma, chronic obstructive pulmonary disease, autoimmune disease, and mortality.

Resiliency and Risk Management

According to the Texas State Collaborative, the top three hazards for south central Texas are hail, flash floods, and thunderstorm winds. Cold fronts often bring high winds, flooding and hail. Hailstorms in San Antonio throughout April 2016 topped $2 billion in losses. The entire MPO study area has seen its fair share of flash flood events with historic floods in 1998, 2002 and 2013. Finally, wind often accompanies thunderstorms, but the storms that came through in 2012 also brought with them hail and tornados injuring dozens of residents and destroying



several homes. Hazards such as these take an emotional toll on those affected, cost the region millions of dollars in repairs and lost productivity, and have the potential to interrupt operations on key corridors in the region.

The City of San Antonio's Hazard Mitigation Plan identified several additional hazards including extreme heat, tornados, winter storms, droughts, dam failures, hazardous materials, terrorism, pipeline failures, and infections diseases. Of this list, droughts, flooding, and wildfires were identified as posing the highest risk.

Bexar County has a Regional Watershed Management partnership that was created to provide improved coordination in planning and capital improvement programs for flood control, storm water management and water quality. This partnership includes the City of San Antonio, the San Antonio Authority, and the 20 suburban cities within Bexar County. Through their work, the partnership has created improved watershed models and flood maps that assess flood risk in all areas of the county.

Comal County's Hazard Mitigation Plan identifies extreme heat, hail, lightning, thunderstorm wind, tornadoes, winter storm, drought, floods, wildfires, expansive soils and dam failures as potential hazards.

Over the Next Five Years

With increased population and vehicle miles traveled projected, it is important the region be proactive on regulations concerning water quality and air quality. The area will need to be proactive in its protective measures and getting information out to the general public in order to help reduce potential negative impacts to both sensitivities and in order to:

- Reduce vehicle emissions by increasing non-single occupancy vehicle mode share.
- Increase the number of electric vehicles and electric vehicle charging stations in the Alamo Area.
- Reduce the number of vehicle miles traveled per capita.
- Continue to coordinate with partner agencies regarding air quality issues to include both ozone and particulate matter.