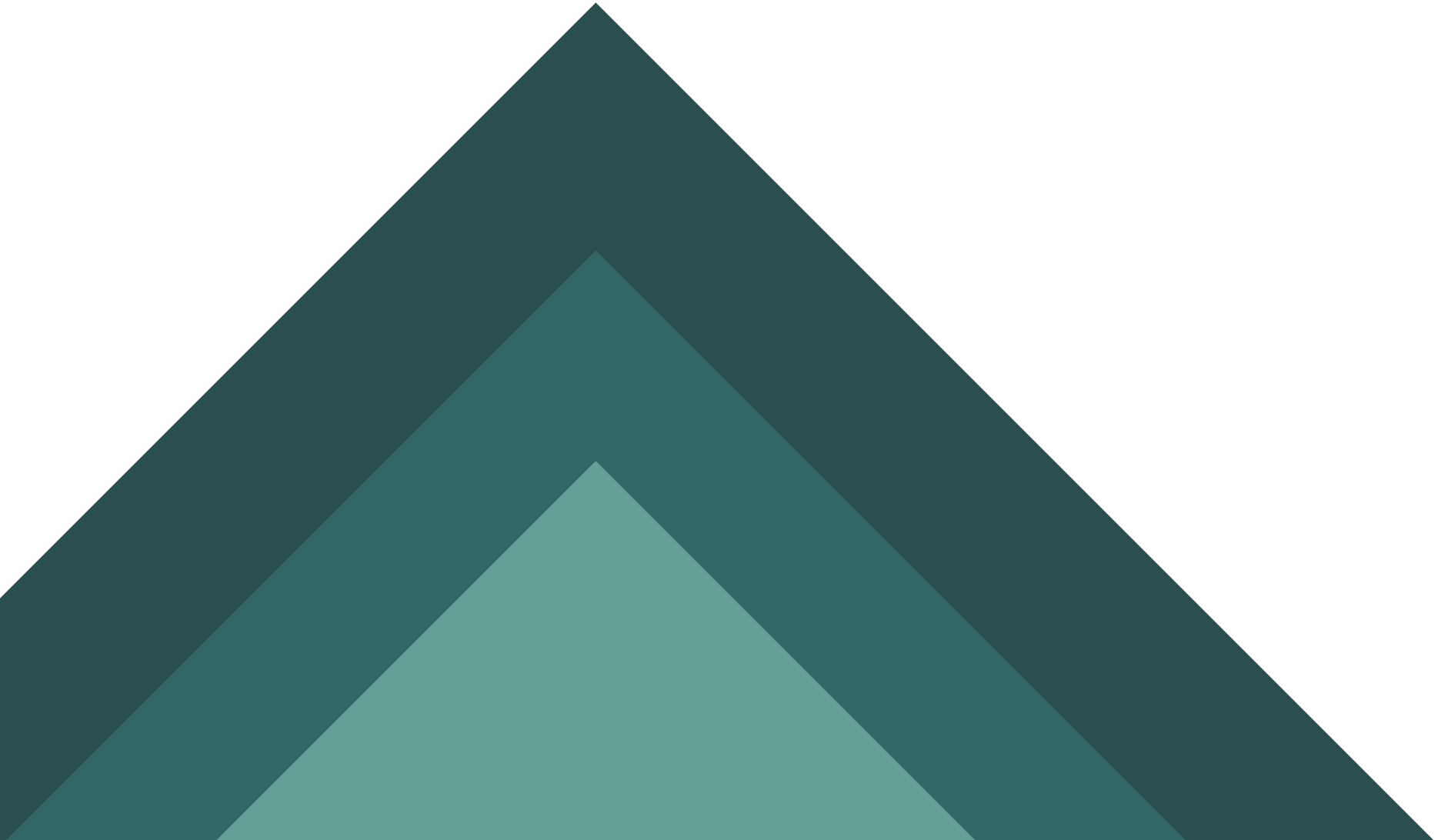
ENVIRONMENTAL CONSIDERATIONS



4. ENVIRONMENTAL CONSIDERATIONS

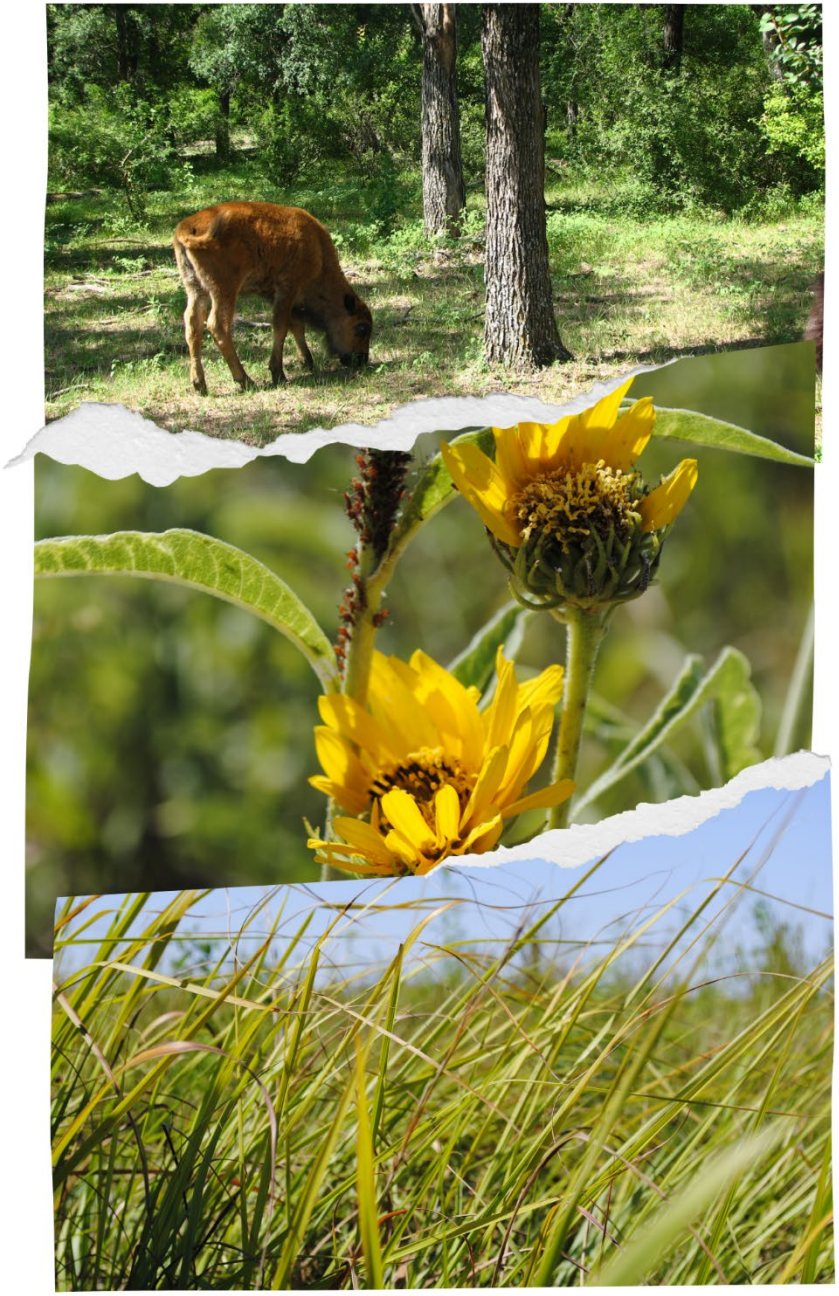
INTRODUCTION

North Central Texas is a diverse and growing region, rich in natural ecosystems ranging from prairies to wetlands. These environments provide essential benefits like clean air, water, and recreational opportunities. As the region expands, its transportation system must support economic and population growth while balancing environmental considerations. This chapter outlines the North Central Texas Council of Governments' approach to integrating environmental stewardship into transportation planning, ensuring compliance with federal regulations and the National Environmental Policy Act.

From project conception to implementation, the plan considers air quality, habitat preservation, historic resources, and water impacts, recognizing the deep connection between transportation and environmental health. Infrastructure projects, particularly highways, can contribute to soil erosion, runoff, and habitat disruption. Through collaborative planning and mitigation strategies, we work to minimize these impacts and promote sustainable solutions. Mobility 2050 advances this effort by streamlining project approvals while upholding environmental protections, public engagement, and safety.

IN THIS CHAPTER

- Air Quality
- Environmental Effects, Mitigation, and Stewardship
- Hazard Vulnerability and Resilience



Images: NCTCOG Staff

DID YOU KNOW?

AIR QUALITY: The Dallas-Fort Worth region has one of the highest numbers of electric vehicle registrations in Texas, with more than 132,000 electric vehicles on the road today.

NATURAL ENVIRONMENT: Highway projects must follow strict environmental review processes, which can take several years to ensure impacts to wildlife, water, and air are minimized.

RESILIENCY: Stronger storms and weather events are increasingly factored into transportation planning to build roads, bridges, and transit systems that can withstand future conditions.

4-1. AIR QUALITY AND CLEAN FUELS

OVERVIEW

The negative impacts of poor air quality on health are of great concern in North Central Texas. Air quality is vital to a community's overall quality of life, but the negative impacts of polluted air can more adversely affect sensitive populations such as children and the elderly. For example, a 2021 update from the Center for Children's Health found 1 in 10 children aged 0 to 14 in the eight-county area of Collin, Denton, Grayson, Hood, Johnson, Parker, Tarrant, and Wise were reported to have an asthma diagnosis at some point in their lifetime.[1]

Beyond health effects, air pollution can have negative economic impacts. North Central Texas is a leader in global and domestic trade (for further discussion, see the **Freight** section of the **Mobility Options** appendix). Generally, the trucks used in goods movement are fueled by diesel and, therefore, are major contributors to air pollution. Heavy-duty on-road diesel vehicles (buses and trucks) account for approximately 70 percent of the total 2026 on-road mobile source nitrogen oxide emissions in the region, as illustrated in the **Air Quality** section of the **Environmental Considerations** appendix. Failure to meet federal air quality standards could result in additional emission control requirements negatively impacting local businesses. It may also result in a freeze on all federally funded transportation projects, costing the region millions of dollars in federal transportation funding and ultimately affecting jobs in the region.

Regional air quality has emerged as a growing concern for North Central Texas residents, who recognize that our current reliance on personal vehicles contributes to poor air quality. Public input gathered during the development of Mobility 2050 indicates that residents across the region want to reduce car dependency by investing in alternative modes of transportation and expanding electric vehicle infrastructure. It is a collective priority to develop a regional transportation system that moves people and goods more efficiently while also protecting regional air quality and environmental health.

To address these concerns and to meet state and federal air quality standards, the North Central Texas Council of Governments (NCTCOG) monitors air quality impacts attributable to transportation and administers various programs to improve air quality in the region. These efforts, which target both regulated and nonregulated pollutants, result in significant reductions. Detailed descriptions of regulated pollutants and required technical analyses are provided in the Required Technical Analysis section of this chapter, while the Vehicle Air Quality Strategies and Voluntary Initiatives section discusses NCTCOG's proactive measures and numerous projects aimed at enhancing air quality in North Central Texas.

[1] The Center for Children's Health, 2021-chna_final_board-approved-04-26-2022.pdf (cookchildrens.org)

MOBILITY 2050 SUPPORTED GOALS

Improve the availability of transportation options for people and goods.

Support travel efficiency measures and system enhancements targeted at congestion reduction and management.

Ensure all communities are provided access to the regional transportation system and planning process.

Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.

Encourage livable communities which support sustainability and economic vitality.

Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system.

Pursue long-term sustainable revenue sources to address regional transportation system needs.

Provide for timely project planning and implementation.

Develop cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system.

MOBILITY 2050 POLICIES AND PROGRAMS

Mobility 2050 includes policies and programs that address regional priorities and public needs. Policies guide decision-making and set the framework for long-term goals, while programs provide the funding and resources to turn plans into action across the transportation system.

Policies

AQ3-001: Pursue successful Transportation Conformity determinations of the Metropolitan Transportation Plan and Transportation Improvement Program consistent with federal and state guidelines.

AQ3-002: Provide technical assistance and analysis to attain and maintain National Ambient Air Quality Standards and reduce negative impacts of other air pollutants.

AQ3-003: Support and implement educational, operational, technological, and other innovative strategies that improve air quality in North Central Texas, including participation in collaborative efforts with local, regional, state, federal, and private sector stakeholders.

AQ3-004: Adopt and implement an idling restriction ordinance, or any other idling restriction measure, to reduce idling within local government jurisdictions as consistent with Regional Transportation Council Resolution R21-06.

AQ3-005: Promote adoption and implementation of an ordinance or guidelines similar to an ordinance that promote sustainable tire disposal practices, including recycling.

AQ3-006 Revise the Dallas-Fort Worth Air Quality Improvement Plan and implement measures to support the attainment and maintenance of the National Ambient Air Quality Standards and reduce carbon dioxide equivalent emissions. Includes pursuing funding for implementation as needed.

AQ3-007: Adopt and implement various measures in the Dallas-Fort Worth Air Quality Improvement Plan to reduce carbon dioxide equivalent emissions and attain and maintain the National Ambient Air Quality Standards.

AQ3-008: Pursue and partner with local governments and other stakeholders to secure funding for the purchase and installation of additional non-regulatory monitors. The focus is on addressing air quality community impacts and public health and providing information about the current air quality status in each monitor's respective area.

CF3-001: Participate in initiatives to support improved energy integration and resiliency, and increased energy efficiency.

CF3-002: Required for clean fleet funding as contained in Regional Transportation Council Resolution R14-10 or subsequent updated resolution. Establish a framework for reducing emissions, transitioning to alternative fuel and lower-emitting vehicles, reducing fuel consumption, participating as a stakeholder in Dallas-Fort Worth Clean Cities, and training staff.

CF3-003: Support and implement strategies that promote alternative fuel infrastructure development, including adoption of best practices in regulatory approaches (e.g., codes and ordinances) and participation in collaborative efforts with local and regional stakeholders.

CF3-004: Participate in initiatives to support community readiness for the safe deployment of zero-emission and advanced transportation technologies.

Programs

For more information on program funding and implementation, see the **Environmental** appendix.

AQ2-001: Air Quality Initiatives: Conventional Vehicle and Equipment Emissions Reduction

AQ2-002: Air Quality Initiatives: Grants Program

AQ2-003: Air Quality Technical Planning and Analysis

AQ2-004: Performance Measurement Frameworks Program

AQ2-005: Regional Air Quality Monitoring Program

AQ2-006: Regional Scrap Tire Abatement Program

CF2-001: Alternative Fuel Infrastructure Development Program

CF2-002: Dallas-Fort Worth Clean Cities Coalition

CF2-003: Technology Demonstration and Deployment

CF2-004: Energy Efficiency and Resilience Planning

CF2-005: Community-Readiness for Clean Transportation Technologies

REQUIRED TECHNICAL ANALYSIS

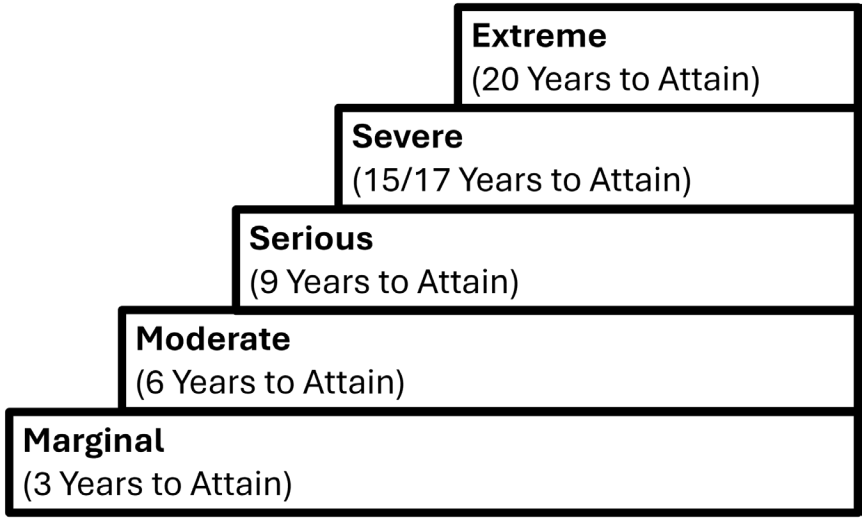
National Ambient Air Quality Standards and Ozone Nonattainment Status

The federal Clean Air Act requires the United States Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for outdoor air pollutants considered harmful to public health and the environment. These pollutants, called criteria pollutants, include carbon monoxide, nitrogen dioxide, ground-level ozone, sulfur dioxide, particulate matter, and lead. Each county in the nation is assessed according to the standards for each criteria pollutant. Counties that meet these standards are classified as "attainment," meaning pollutant concentrations are within the safe limits set by the EPA. Counties that exceed these limits are classified as "nonattainment." For the areas that are in nonattainment, based on the magnitude of a pollutant, the EPA initially classifies counties into the categories listed in **Figure 4-1**. If an area fails to meet the standards within the specified timeframe, it may be reclassified to a higher nonattainment status.

When the amended Clean Air Act set NAAQS designations in 1990, four counties in the NCTCOG region were initially classified as nonattainment. Most of the air quality efforts focus on reducing ozone precursor pollutants from the transportation sector, the largest contributor to ozone formation. Ground-level ozone pollution is caused by a photochemical reaction of volatile organic compounds and nitrogen oxides, which are known as ozone precursors, in the presence of sunlight and heat.

The Clean Air Act requires the EPA to periodically reevaluate criteria pollutant standards. This reevaluation can result in changes to the ozone NAAQS. Consequently, the number of counties designated as nonattainment and the region's classification status may change. Over time, as the standards have become more stringent, six additional counties were added to the region's nonattainment area. The "Environmental Protection Agency Historical Ozone Standard Timeline," in the **Air Quality** section of the **Environmental Considerations** appendix, presents the timeline of changes to the EPA's ozone standard and the implications for the North Central Texas region.

Figure 4-1: Nonattainment Classifications



The 2008 and 2015 ozone standards classify counties based on their air quality status.

2008 8-Hour Ozone Standard:

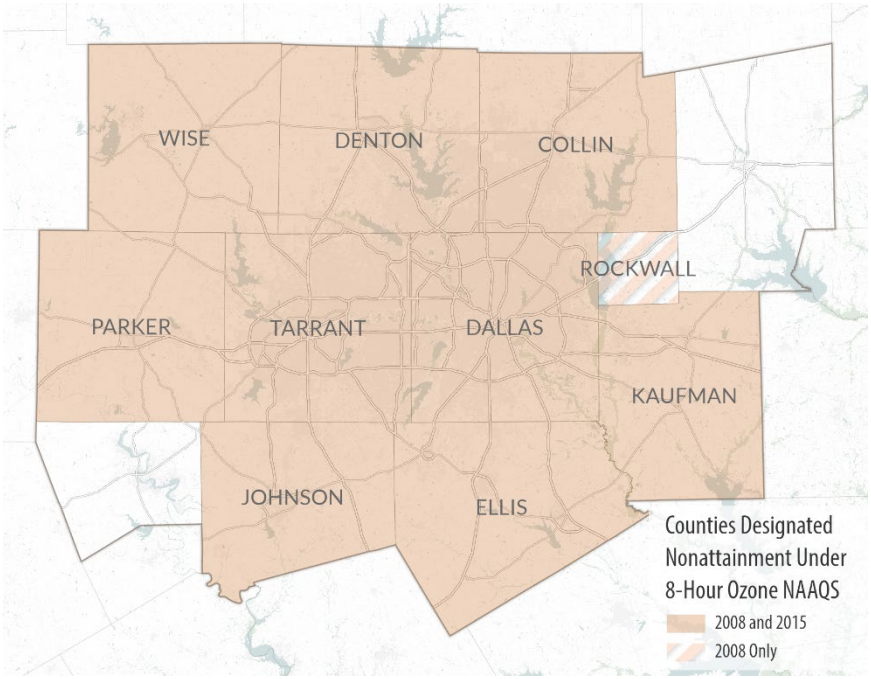
- 10 counties are classified as severe nonattainment (see **Figure 4-2**)
- Attainment deadline: July 20, 2027 (based on 2024-2026 data)

2015 8-Hour Ozone Standard:

- 9 counties (excluding Rockwall County) are classified as serious nonattainment

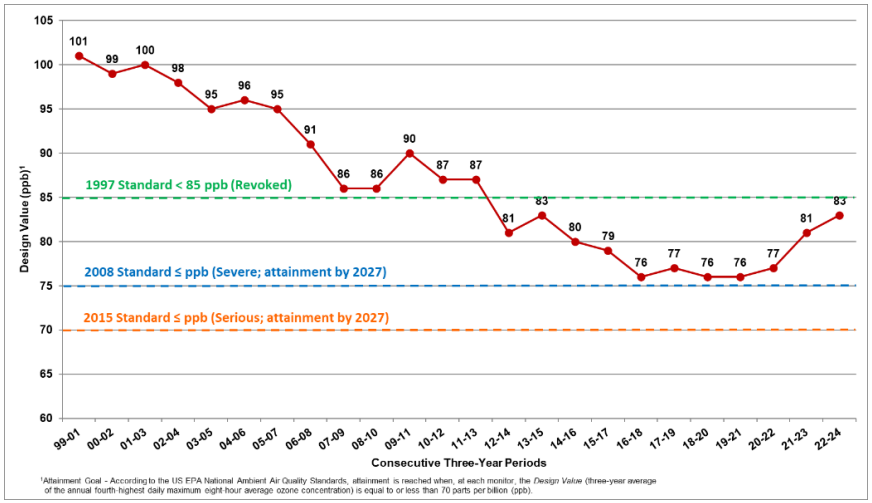
- This standard is more stringent, with a limit of 70 ppb
- Attainment deadline: August 03, 2027

Figure 4-2: 8-Hour Ozone NAAQS Nonattainment Area



The region is facing significant challenges in meeting the revised air quality standards. **Figure 4-3** provides a detailed look at the historical ambient ozone concentrations, highlighting the changes over time.

Figure 4-3: 8-Hour Ozone NAAQS Trend Line



Air Quality Conformity

NCTCOG participates in a cooperative, collaborative process with local, state, and federal agencies to improve air quality across the region. This partnership includes close coordination as the Texas Commission on Environmental Quality (TCEQ) develops the State Implementation Plan (SIP). The SIP, a regional air quality plan required by the Clean Air Act, outlines how ozone concentrations will be reduced in the nonattainment area to a level that complies with the federal standard.

In North Central Texas, the Regional Transportation Council has taken a proactive role in helping TCEQ revise the SIP for the region. NCTCOG assists with air quality technical planning and implements emission reduction control strategies at the local level to enhance federal and state efforts. Numerous other stakeholders throughout the region, including local governments and business coalitions, also support this process and facilitate local implementation.

The federal government requires projects and programs in nonattainment areas, including the 10 counties in North Central Texas, to be analyzed for Transportation Conformity to be approved and implemented. Transportation Conformity air quality analysis must be conducted on federally funded projects; projects requiring federal approval; transportation improvement programs; or projects, programs, and policies identified in long-range transportation plans. The conformity analysis does not measure ozone directly but instead measures ozone precursors: volatile organic compounds (VOC) and nitrogen oxides (NOx). Motor Vehicle Emissions Budgets (MVEB) for NO_X and VOC are established in the regional SIP. Under the MVEB test, vehicle emissions for each analysis year must be less than the applicable air quality budgets.

DID YOU KNOW?

THE GOAL of the North Central Texas Council of Governments air quality programs is to achieve healthy air quality for North Central Texas residents and the environment by meeting and maintaining federally mandated standards for all criteria air pollutants.

Conformity determination is a two-step process in metropolitan areas. First, the Regional Transportation Council (RTC), as the policy body of the region's Metropolitan Planning Organization, is responsible for conducting the local-level transportation conformity determination for the North Central Texas counties designated as nonattainment. Second, the Federal Highway Administration and Federal Transit Administration make a federal-level transportation conformity determination. Only after receiving this federal determination can the Metropolitan Transportation Plan and Transportation Improvement Program be implemented.

Vehicle emission results documented below demonstrate the 10-county Dallas-Fort Worth ozone nonattainment area meets the regional air quality conformity requirements of the budget test. Conformity analysis results are shown in **Figure 4-4** and **Figure 4-5.**

RTC initiatives, such as bicycle and pedestrian facilities, traffic signal improvements, high-occupancy vehicle/managed lanes, and park-and-ride facilities, are important to ensure a successful conformity determination and to assist in regional attainment for the EPA's criteria pollutants.

Figure 4-4: Emissions of Nitrogen Oxides

Dallas-Fort Worth Ozone Nonattainment Area
Air Quality Conformity Analysis Results

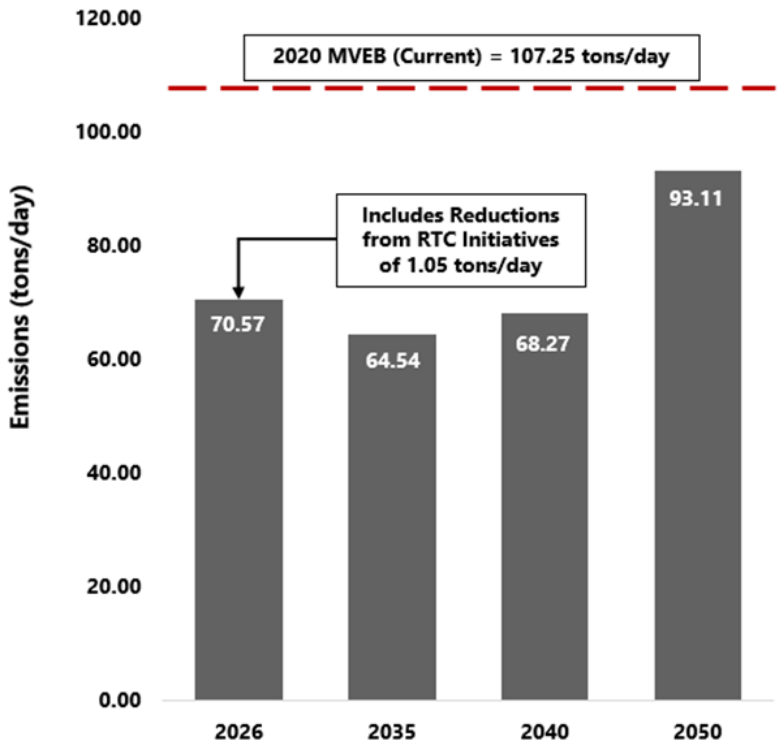
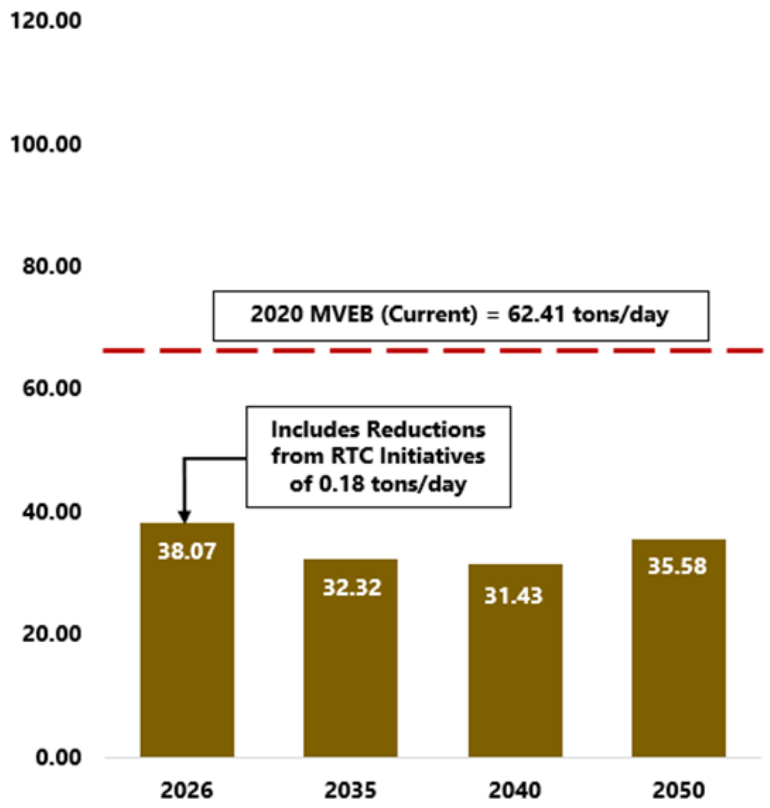


Figure 4-5: Emissions of Volatile Organic Compounds

Dallas-Fort Worth Ozone Nonattainment Area
Air Quality Conformity Analysis Results



The results of the conformity determination demonstrate Mobility 2050 meets the specific transportation air quality conformity requirements of the Clean Air Act (42 USC 7504, 7506(c) and (d)) and amendments, the applicable revision to the air quality plan (2017 Attainment Demonstration SIP, including the approved 2017 MVEBs[2]), and the Transportation Conformity rule (40 CFR Parts 51 and 93). This conformity determination was approved by the RTC, along with Mobility 2050, in June 2025. For additional Transportation Conformity information, refer to the 2025 Transportation Conformity document.[3]

OTHER AIR QUALITY PLANNING

Mobile Source Air Toxics

The EPA regulates Mobile Source Air Toxics (MSAT) in addition to the criteria air pollutants under the NAAQS. MSAT includes 7 of the 187 air toxics defined by the Clean Air Act Amendments of 1990. All refineries or importers of gasoline for passenger vehicles must meet specific compliance baselines established by the EPA for conventional and reformulated gasoline. The remaining air toxics come from point and area sources.

Among the seven MSAT, some are present in fuel and are emitted into the air when fuel evaporates or passes through an engine unburned. Others are produced from the incomplete combustion of fuels or as secondary combustion products. MSAT also results from engine wear or from impurities in oil or gasoline. MSAT emissions are expected to decline significantly over time, despite a significant increase in vehicle miles traveled, which can be attributed to the use of cleaner fuels and more efficient engines.

Particulate Matter

Particulate Matter (PM), in general, are small solid or liquid particles suspended in the air ranging from less than 0.01 to 10 micrometers in diameter. The NAAQS identifies two groups of Particulate Matter: PM_{10} are larger particles of 10 micrometers or less, about 1/6 of the diameter of a human hair, and $PM_{2.5}$ are fine solid or liquid inhalable

[2] *Adequacy Status of the Dallas-Fort Worth, Texas Attainment Demonstration 8-Hour Ozone Motor Vehicle Emission Budgets for Transportation Conformity Purposes*, 81 FR 78591

[3] North Central Texas Council of Governments, 2025, Transportation Conformity, http://www.nctcog.org/trans/air/conformity/.

particles approximately 2.5 micrograms per cubic meter (µg/m3) or less in size.

In March 2024, the EPA updated the NAAQS annual standard for $PM_{2.5}$ from 12.0 µg/m3 to 9.0 µg/m3 effective on May 6, 2024. However, starting in March 2025, this updated standard is currently under review, (Revisiting the "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter" 89 FR 16202.[4])

Carbon Dioxide Equivalent Emissions

Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) delay heat loss from the atmosphere to space which creates a naturally occurring warming phenomenon; the higher the concentration of these gases in the atmosphere, the stronger the warming effect becomes. Changes in temperature may affect the built and natural environment in ways that are broad reaching and sometimes unpredictable at a regional level. The North Central Texas region could experience changes in precipitation levels, more high temperature days, and impacts on human health and natural ecosystems.

Atmospheric gases can occur naturally or result from human activities. Natural atmospheric gases include CO_2, CH_4, and N_2O.

Manmade atmospheric gases encompass chlorofluorocarbons and hydrofluorocarbons, which are by-products of foam production, refrigeration, and air conditioning; and perfluorocarbons and are generated by industrial processes.

NCTCOG has completed the region's first Emissions Inventory for analysis year 2019 and is working on an updated Emissions Inventory as part of its work on the Dallas-Fort Worth Air Quality Improvement Plan, detailed below.

In the 2019 Emissions Inventory, the 12-county Metropolitan Planning Area's largest contributor to regional CO_2, CH_4, and N_2O emissions was the Energy sector, accounting for 53 percent. Transportation and Mobile Sources followed with 43 percent, while the Solid Waste sector contributed 4 percent.

The programs and policies supported by Mobility 2050 not only seek to improve the efficiency of the transportation system, which in turn improves air quality by reducing regulated pollutants, but also serve to reduce other pollutants (e.g., CO_2, CH_4, and N_2O emissions) and fuel consumption.

Air Quality Improvement Plan

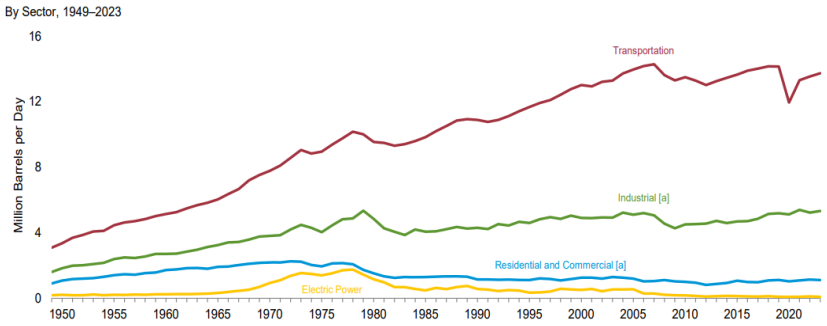
Local governments across the region are working with NCTCOG to develop the Dallas-Fort Worth Air Quality Improvement Plan, a roadmap to improve air quality, protect public health, provide community benefits, and reduce impacts of extreme weather events. This initiative is funded through the EPA's Climate Pollution Reduction Grants: Planning Grants (CPRG) Program, which provides funds to develop plans for comprehensively reducing air pollution. NCTCOG was awarded $1 million from the CPRG planning grants on behalf of the region. In March 2024, NCTCOG submitted a Priority Climate Action Plan, as required by the EPA grant, which outlines work that is ongoing or will be done through 2030 to achieve comprehensive air quality improvement. The next step is the development of a more comprehensive plan that will encompass work through 2050. For more information, visit www.publicinput.com/dfwAQIP.

[4] pm-naaqs_powering-the-great-american-comeback_fact-sheet.pdf

STRATEGIES TO IMPROVE AIR QUALITY

Aside from monitoring the status of air quality, the RTC has taken a proactive stance in supporting implementation of various strategies, including technologies, projects, and programs to improve air quality by reducing emissions and energy impacts from the transportation sector. The transportation sector not only directly emits air pollutants at vehicle tailpipes but also contributes to upstream emissions associated with energy consumed in the process of producing fuels. According to the US Energy Information Administration, in 2023, 69 percent of total US petroleum consumption was from the transportation sector.[5] **Figure 4-6** depicts the increase in petroleum consumption of transportation compared to other sectors.

Figure 4-6: Petroleum Consumed by the Transportation Sector in the US[6]



Transportation strategies that improve air quality can fall into two major categories: transportation-focused strategies that have air quality improvements as a co-benefit, and strategies that are designed specifically to achieve air quality improvements. Transportation-focused strategies with air quality co-benefits include initiatives such as:

- Mitigating congestion
- Reducing the number of vehicles driven by individual commuters using alternative transportation options or technology advancements (e.g., remote work or virtual meetings enabled by stable broadband connection and access)
- Improving roadway design to facilitate traffic flow
- Using connected and autonomous vehicles and infrastructure that enable optimization of system efficiencies

These strategies are discussed in the **Operational Efficiency** chapter. Many of these programs and projects are included as voluntary control strategies in the region's SIP because of the positive air quality impacts.

Strategies that are designed specifically to improve air quality generally do so by reducing vehicular emissions, particularly tailpipe emissions, by targeting improvements in individual vehicle emission rates. Air quality strategies include projects that seek to facilitate the use of the cleanest available technologies either directly (e.g., providing incentives to scrap and replace high-polluting vehicles, to purchase zero-emission vehicles, or to implement alternative fuel infrastructure) or indirectly (e.g., providing education on features and benefits of cleaner transportation technologies to encourage adoption).

Finally, numerous communication strategies help explain the importance of these measures to stakeholders and the public, including

[5] US Energy Information Administration, September 2024 Monthly Energy Review, https://www.eia.gov/totalenergy/data/monthly/, US Energy Information Administration, September 2024 Petroleum Consumption by Sector

[6] *US Energy Information Administration Petroleum Consumption by Sector, September 2024* https://www.eia.gov/totalenergy/data/monthly/

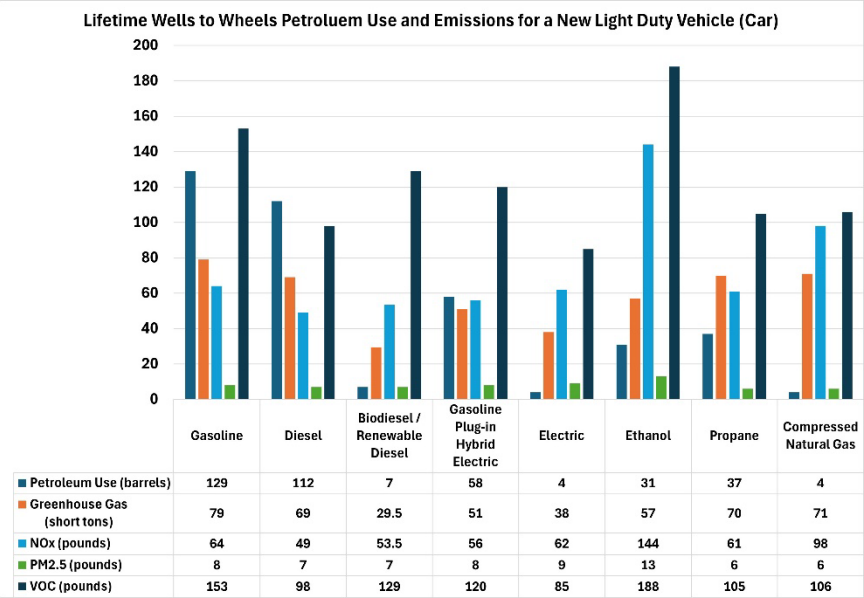
Air North Texas, education campaigns, newsletters, and social media. This comprehensive approach to reducing emissions will become increasingly important as the region balances population and economic growth with the need to continue to improve air quality.

Clean Fuels and Energy

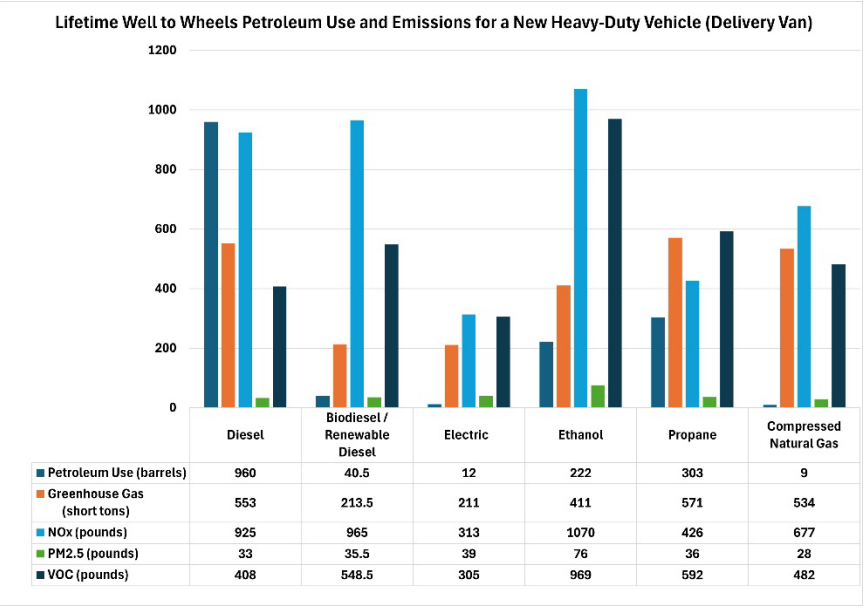
Adoption of alternative fuel vehicles (e.g., natural gas, propane, electric, hydrogen, or biofuels) and advanced technology vehicles (e.g., hybrids) can increase fuel efficiency through idle reduction or fuel economy improvements. In addition, these vehicles help reduce air pollutants, especially criteria pollutants that contribute to local nonattainment concerns, as alternative fuels are generally cleaner-burning. While the impacts vary depending on fuel type and vehicle type (i.e., light-duty and heavy-duty), alternative fuel vehicles typically have fewer emissions, even when accounting for upstream fuel production, material processing, vehicle assembly, disposal, and recycling, as shown in **Figure 4-7**.

The increased adoption of alternative fuel vehicles is accomplished through educating stakeholders on supporting adoption of clean transportation technologies, including zero-emission and other alternative fuels, reducing energy impacts, minimizing negative grid impacts due to the electrification of transportation, and planning and supporting workforce development to support clean transportation technologies and the grid.

Figure 4-7: Lifetime Well to Wheels[7]



	Gasoline	Diesel	Biodiesel / Renewable Diesel	Gasoline Plug-in Hybrid Electric	Electric	Ethanol	Propane	Compressed Natural Gas
Petroleum Use (barrels)	129	112	7	58	4	31	37	4
Greenhouse Gas (short tons)	79	69	29.5	51	38	57	70	71
NOx (pounds)	64	49	53.5	56	62	144	61	98
PM2.5 (pounds)	8	7	7	8	9	13	6	6
VOC (pounds)	153	98	129	120	85	188	105	106



	Diesel	Biodiesel / Renewable Diesel	Electric	Ethanol	Propane	Compressed Natural Gas
Petroleum Use (barrels)	960	40.5	12	222	303	9
Greenhouse Gas (short tons)	553	213.5	211	411	571	534
NOx (pounds)	925	965	313	1070	426	677
PM2.5 (pounds)	33	35.5	39	76	36	28
VOC (pounds)	408	548.5	305	969	592	482

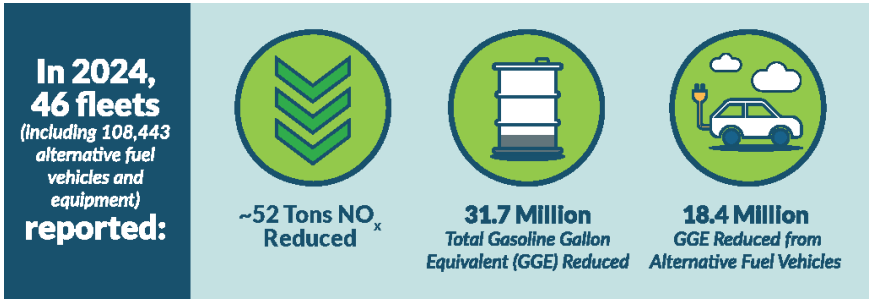
[7] Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool 2023

Dallas-Fort Worth Clean Cities Coalition

One of the primary ways NCTCOG works to implement cleaner vehicles technologies is through the Dallas-Fort Worth Clean Cities Coalition (DFWCC). NCTCOG was designated by the Department of Energy as the host agency for DFWCC in 1995; DFWCC participates in the national Clean Cities and Communities partnership. In this role, DFWCC works to reduce transportation energy use and improve air quality by providing support, education, and training to fleets, education and awareness-building for consumers, supporting workforce development activities, and planning support and sharing of best practices among the cities and other organizations that have a role to play in creating regulations and policies that can help or hinder alternative fuel and electric vehicle adoption.

As a designated Clean Cities and Communities Coalition, DFWCC is committed to improving air quality by promoting clean, reliable, accessible, and sustainable transportation technologies. As such, DFWCC has a target of increasing energy use impacts each year, as described in **Appendix C**. Most of these impacts are realized through the use of alternative fuel vehicles, fuel economy gains from using more efficient vehicles, and idle reduction strategies. Progress is documented in the DFWCC Annual Report, available at www.dfwcleancities.org/annualreport. Based on data submitted by local fleets for the DFWCC Annual Report, the Coalition administers the DFWCC Fleet Recognition Program, which recognizes fleets for their efforts and showcases success stories. Information is available at dfwcleancities.org/fleetrecognition. **Figure 4-8** represents an overview of DFWCC energy use impacts summarized from the 2024 Annual Survey of local fleet activities.

Figure 4-8: Annual Survey of Local Fleet Activities, 2024



Electric Vehicles

Electric vehicles, which include battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hydrogen fuel cell electric vehicles (FCEVs), have seen significant adoption and investment recently. **Figure 4-9** shows electric vehicle registrations by zip code across the region. These vehicle technologies are a focus of DFWCC activities as they produce zero tailpipe emissions and are of substantial interest of local stakeholders. Use of BEVs and PHEVs in North Central Texas has increased by 76,924 from September 2021 to September 2024, representing a total increase of 225 percent.[8] NCTCOG also facilitates consumer outreach and education through efforts like the Dallas-Fort Worth National Drive Electric Week (www.driveelectricdfw.org).

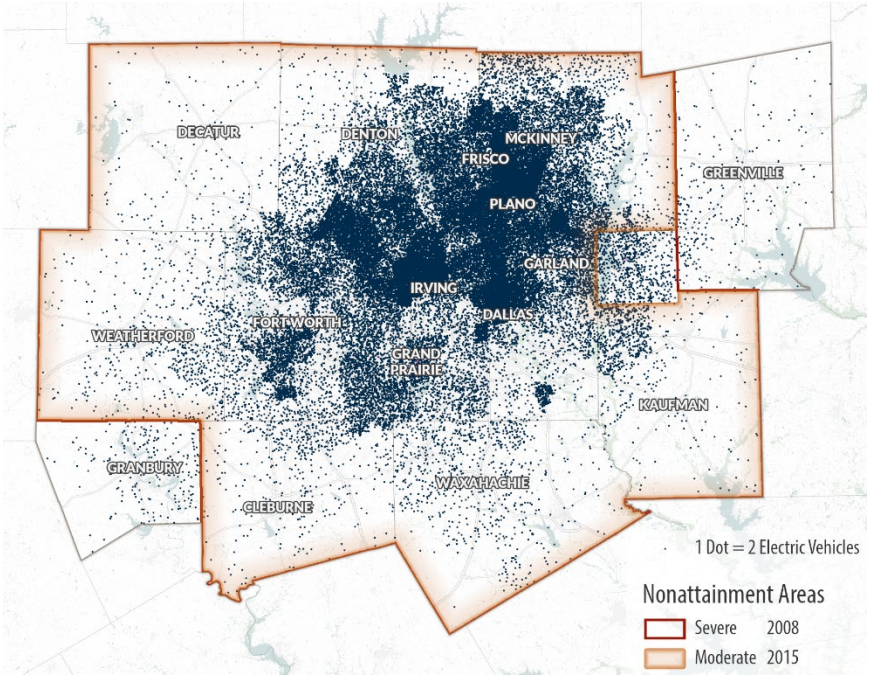
To date, hydrogen fuel cell adoption in North Central Texas has been minimal, as there are no hydrogen refueling stations in the region, but there is growing momentum for use of FCEVs as a viable diesel alternative in heavy-duty freight transportation. The first heavy-duty FCEV and hydrogen fueling projects in Texas have recently been funded.

Substantial funding is coming to the North Texas region for the adoption of alternative fuel vehicles, including $19.7 million awarded

[8] DFW Clean Cities 2024, https://www.dfwcleancities.org/evnt

to school districts through the Environmental Protection Agency's Clean School Bus Program, and $60 million to NCTCOG through EPA's Clean Heavy-Duty Vehicles (CHDV) Program. NCTCOG will award the CDHV funds to public and private entities to replace existing heavy-duty non-zero emission vehicles (gasoline, diesel, propane, or compressed natural gas) with zero-emission versions as part of the North Texas Zero-Emission Vehicle Project.

Figure 4-9: Electric Vehicle Registration by Zip Code



Alternative Fuel Corridors

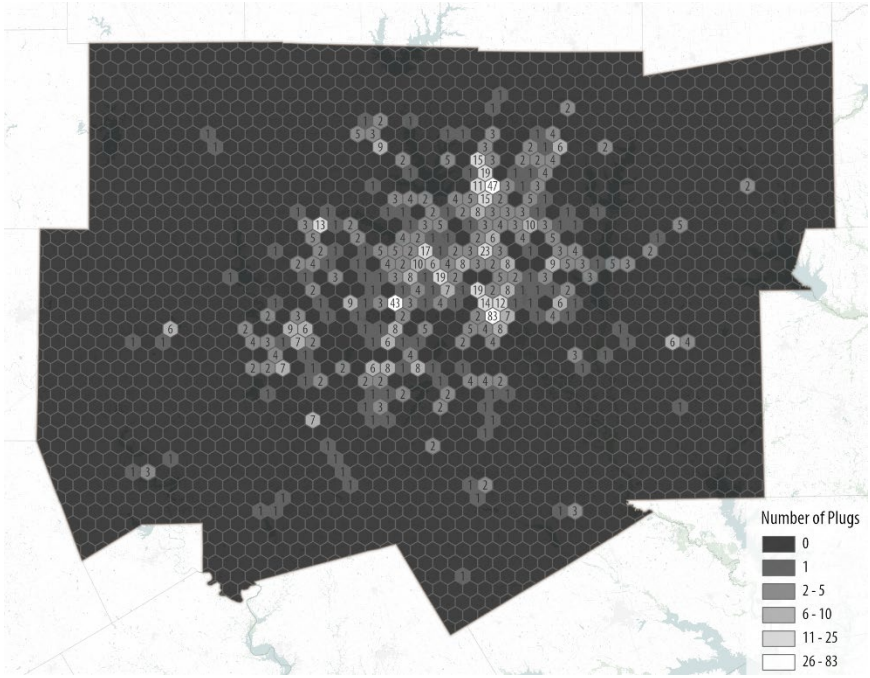
Use of alternative fuel vehicles is only possible if alternative fuel infrastructure exists to support their operation. Beginning in 2016, the Federal Highway Administration (FHWA) was required to designate Alternative Fuel Corridors as either "ready" or "pending" based on availability of infrastructure for electric vehicle (EV) charging and hydrogen, propane, and natural gas fueling. NCTCOG was heavily engaged in this initiative. Building on corridor designations toward deployment, NCTCOG drafted the Interstate Highway (IH) 45 Corridor Zero Emission Vehicle (ZEV) Plan. This plan outlined recommendations for build-out of new charging or fueling infrastructure to support ZEV project deployment along IH 45 from Houston to Dallas, with an emphasis on the freight sector. This is particularly meaningful for the NCTCOG region as medium- and heavy-duty diesel vehicles have a disproportionate impact on air quality—they produce 48 percent of the ozone-forming pollution but only travel 6 percent of total miles. To advance the recommendations in the IH 45 ZEV Plan, NCTCOG worked with the Houston-Galveston Area Council and a variety of stakeholders, including original equipment manufacturers, station providers, and utilities, and successfully competed for an award through the FHWA Charging and Fueling Infrastructure: Corridor Program to build five publicly accessible medium- and heavy-duty hydrogen refueling stations throughout the Texas Triangle, bounded by Dallas-Fort Worth, San Antonio, and Houston. Two of these planned stations are in the NCTCOG 12-county Metropolitan Planning Area.

In March 2024, the Joint Office of Energy and Transportation released the National Zero-Emission Freight Corridor Strategy identifying areas with the greatest potential to support early adoption of zero-emission medium- and heavy-duty vehicles. Several freight corridors in the North Central Texas region are identified in the plan. A map of the currently designated Alternative Fuel Corridors and Zero-Emission Freight Corridor Strategy in the North Central Texas region can be found in the **Air Quality** section of the **Environmental Considerations** appendix. Corridor designations and inclusion in the plan provide opportunities to prioritize federal funding for development of alternative fueling and will be a key focus of NCTCOG efforts.

Charging Infrastructure

Light-duty BEVs are now widely marketed to everyday consumers. Even though EV charging infrastructure is available in the region, it will need to continue to expand to support EV adoption. There are over 3,000 publicly available EV charging plugs dispersed over 1,000 charging stations within North Central Texas as of January 2024. However, in a mid-level adoption forecast for PHEVs and BEVs in Texas, the National Renewable Energy Laboratory (NREL) forecasts there will be over 2.2 million PHEVs and BEVs statewide by 2030, necessitating 13,300 Direct Current Fast Charge (DCFC) and 63,400 Level 2 (L2) publicly available charging ports. Dallas-Fort Worth-Arlington was included as a Top 10 core-based statistical area in NREL's 2030 projections and was forecasted to see the adoption of 651,000 PHEVs and BEVs, necessitating 19,000 L2 and 2,500 DCFC publicly available charging infrastructure.[9] **Figure 4-10** shows the dispersion of publicly accessible charging infrastructure across the region, to indicate where new investments may be needed to improve access to everyone across the region.

Figure 4-10: Publicly Accessible and Planned EV Charging Infrastructure Access in the 12-County North Texas Metropolitan Planning Area

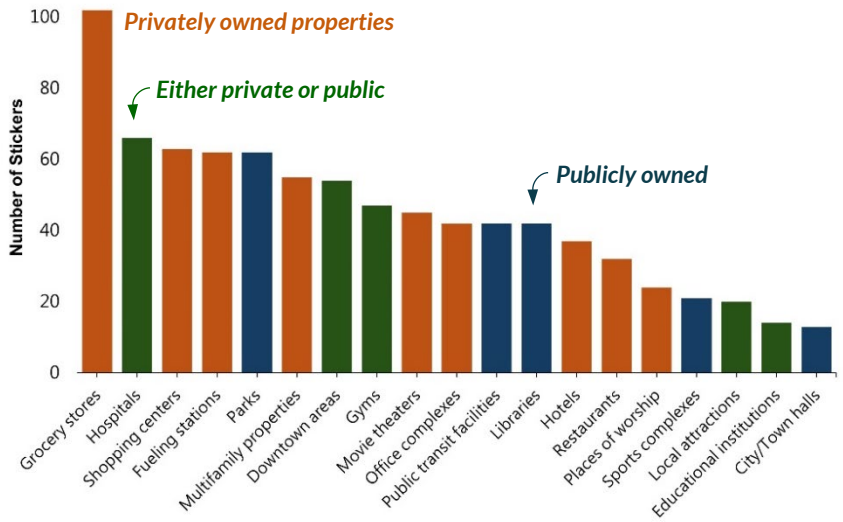


To support the expansion of EV charging infrastructure, approximately $407 million has been allocated to the Texas Department of Transportation through the National Electric Vehicle Infrastructure Formula Program, which is designed to help build a nationwide network of charging stations along highways. A portion of this funding will be used to support charging site development in the 12-county Metropolitan Planning Area boundary. NCTCOG successfully competed for additional funding from the FHWA Charging and Fueling Infrastructure: Community Program for funding to build EV charging stations that fill gaps in charging access in the 16-county NCTCOG region. NCTCOG will continue to lead or support more competitive applications for alternative fuel infrastructure in our region. These initiatives are referenced in the Clean Fuels & Energy: Alternative Fuel Infrastructure Development Program in the **Air Quality** section of the **Environmental Considerations** appendix. These dollars will provide critical investments needed to increase EV charging accessibility across the region and enable more seamless EV travel without range limitations. Currently, most registered electric vehicles and their corresponding charging infrastructure have been concentrated in a small geographic area, and NCTCOG seeks to achieve a more even distribution of charging infrastructure within the North Central Texas region. NCTCOG is also conducting public engagement efforts across the region to collect feedback that will inform the locations and types of chargers funded by NCTCOG grants and the National Electric

[9] NREL The 2030 National Charging Network, June 2023, 85654.pdf (nrel.gov)

Vehicle Infrastructure Formula Program. Preliminary public engagement results around the types of locations desired by residents, shown in **Figure 4-11**, will guide investments through these existing deployment projects, and also identify types of locations to be prioritized in future work.

Figure 4-11: Desired Types of Charging Station Location Identified Through Preliminary Public Engagement, Conducted Fall 2024 to Spring 2025



To prepare for the strong EV adoption forecasted above and needed build-out of EV infrastructure, NCTCOG implements initiatives that support communities in setting and achieving EV readiness goals and promoting broad access to electric mobility, encouraging workplace charging through education and connecting workplaces with local EV charging coaches, and supporting workforce development to support clean transportation technologies and the electric grid. These initiatives are referenced in the Clean Fuels & Energy: Community Readiness for Clean Transportataion Technologies Program in the **Air Quality** section of the **Environmental Considerations** appendix.

Electric Vehicles and the Future of Grid Management

EVs represent a new load on the electrical grid when charging and the air quality benefits provided by EVs depends somewhat on when and how EVs charge. Outreach and education about the "best" time to charge will be essential, along with "smart" charging and managed charging strategies that shift the load from charging EVs to optimum times to lessen the need for additional electricity generation and to avoid the prolonged use of higher emitting electric generating units. This will be increasingly important as more high-power charging infrastructure and expansion of the power grid is needed in the coming decades to meet the growing demand of electric medium- and heavy-duty vehicles, as discussed in a 2024 Texas Department of Transportation report.[10] Technologies such as off-grid or solar-integrated EV charging and bi-directional vehicle-to-grid capabilities provide an opportunity for EVs to help increase resilience and efficiency of the electrical grid and provide power during emergencies. Through the Clean Fuels & Energy: Energy Efficiency and Resilience Planning Program, referenced in the **Air Quality** section of the **Environmental Considerations** appendix, NCTCOG collaborates with a variety of stakeholders to plan and support policies and initiatives for the integration of transportation with the electrical grid in a way that not only serves transportation needs but also accounts for grid resource constraints.

[10] TxDOT Evaluation of Medium-Duty and Heavy-Duty Vehicle Charging Infrastructure and Capacity, September 2024, rider-48-report.pdf (txdot.gov)

Vehicle Emissions Enforcement Initiatives

Vehicle emissions enforcement initiatives focus on reducing emissions from on-road mobile sources. These initiatives promote public awareness, behavior changes, education, and collaboration with federal, state, and regional stakeholders, including law enforcement officials for enforcement of vehicle emissions standards. Vehicle tailpipe emissions are a major cause of ozone-forming pollutants and have contributed to the North Central Texas region not meeting EPA ground level ozone standards. Identifying vehicle emission problems like fraudulent emissions inspections or emissions control component tampering activities that may occur between annual emissions inspections or circumvention of the inspection process helps get the highest polluting vehicles back into compliance.

One priority for light-duty high-emitting vehicles is to identify and reduce fraudulent or improper emissions inspections, as well as counterfeit or improperly issued registrations and license plates. Emissions enforcement activities include educating and providing tools to local law enforcement personnel to utilize the NCTCOG Emissions Database to identify vehicle emissions inspection stations performing improper inspections and identifying those engaged in actions to circumvent the annual emissions inspection. NCTCOG facilitates working groups to encourage collaboration between local governments to increase enforcement efforts. Other light-duty initiatives involve promoting public awareness and behavior changes about excessive tailpipe emissions and educating the benefits of repairing and maintaining vehicles.

In the Dallas-Fort Worth region, a sizable portion of on-road emissions are attributed to heavy-duty diesel vehicles, yet they are excluded from the state inspection and maintenance emissions program. A priority for heavy-duty high-emitting vehicles is to identify and reduce diesel engine idling and tampering. Tampering on a diesel-powered vehicle can either occur via removal of emissions-related components or done almost entirely through software programs aimed at disabling aftertreatment systems such as the diesel particulate filter, exhaust gas recirculation, and the selective catalyst reduction system. These vehicles are difficult to detect due to not only a lack of an emissions inspection for diesel-powered on-road vehicles but also because they look almost visually identical to those vehicles operating within compliance. According to the EPA, a tampered diesel-powered vehicle can produce hundreds of times more NOx than its non-tampered counterpart. By repairing tampered diesel vehicles, reducing engine idling, and replacing high-emitting diesel vehicles, harmful tailpipe pollutants will be reduced and be compliant with federal, state, and local laws.

SUMMARY

Air quality is vital to a community's overall quality of life. The Clean Air Act requires the United States to set NAAQS for outdoor air pollutants considered harmful to public health and the environment. NCTCOG participates in a cooperative, collaborative process with local, state, and federal agencies to improve air quality across the region.

By implementing air quality policies and programs and monitoring advancements in technology and related factors, NCTCOG takes a proactive stance in supporting regional efforts to improve air quality for North Texans.

All air quality policies, programs, projects, and maps are included in the **Air Quality** section of the **Environmental Considerations** appendix.

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4-2. ENVIRONMENTAL EFFECTS, MITIGATION, AND STEWARDSHIP

OVERVIEW

Transportation rules and regulations[11] require the long-range transportation planning process to:

- Take place in consultation with environmental resource and regulatory agencies
- Consider and implement programs and projects that protect and enhance the environment and improve quality of life
- Improve the resiliency and reliability of the transportation system
- Reduce or mitigate stormwater impacts
- Discuss potential mitigation activities and locations

MOBILITY 2050 POLICIES

Mobility 2050 includes policies and programs that address regional priorities and public needs. Policies guide decision-making and set the framework for long-term goals, while programs provide the funding and resources to turn plans into action across the transportation system.

ER3-001: Enhance quality of life by protecting, retaining, restoring/mitigating, or enhancing the region's environmental quality during planning and implementation of transportation programs and projects.

ER3-002: Work cooperatively with regulatory and conservation partners to develop innovative approaches that meet their conservation priorities and facilitate the delivery of transportation projects.

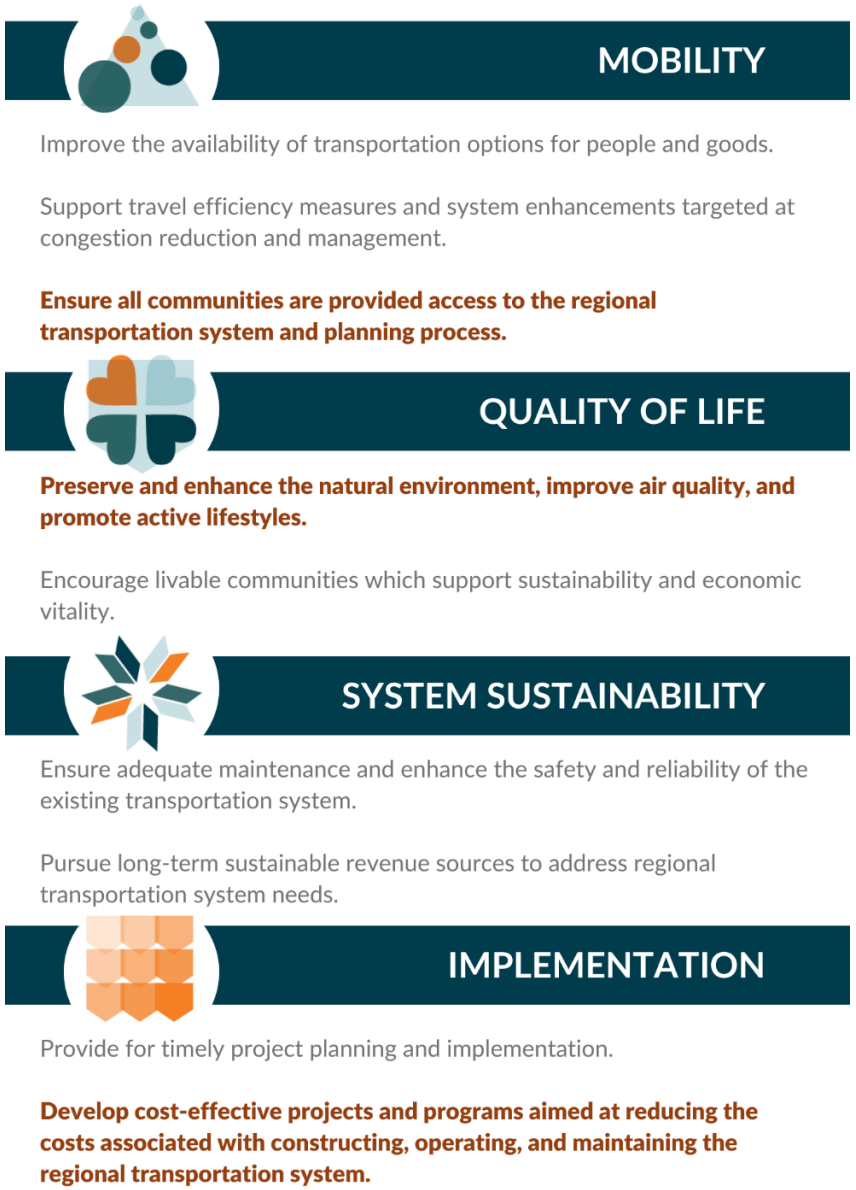
ER3-003: Promote transportation programs and projects that encourage healthy lifestyles, including, but not limited to, providing appropriate access to the natural environment.

ER3-004: Facilitate federally recognized Tribal Nations' meaningful participation through Regional Transportation Council Policy P19-01, Policy Position to Support Communication with Tribal Nations.

F3-002: Incorporate sustainability and livability options during the project selection process. Include additional weighting or emphasis as appropriate and consistent with Regional Transportation Council policy objectives, including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of transportation options and accessibility to other modes (such as freight, aviation, bicycle, and pedestrian).

[11] 23 CFR 450.306(b)(5), 23 CFR 450.306(b)(9), 23 CFR 450.316(b), and 23 CFR 450.324(f)(10)

MOBILITY 2050 SUPPORTED GOALS



[12] National Cooperative Highway Research Program Synthesis 305, Interaction between Roadways and Wildlife Ecology, https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_305.pdf

PROGRAMS AND PROJECTS

The North Central Texas Council of Governments (NCTCOG) acknowledges the inextricable links between transportation, the natural environment, and the well-being of the region. NCTCOG conducts environmental assessments and utilizes tools to foster a planning process that helps reduce and minimize impacts, avoid duplication of effort, promote environmental stewardship, and reduce delays in project implementation.

Infrastructure Voluntary Evaluation Sustainability Tool

Transportation infrastructure reduces and fragments wildlife habitat. On roadways crossed by wildlife, the safety of motorists and animals is at stake. Addressing these issues early in the transportation planning process can reduce the impacts projects have on the environment.[12]

A planned roadway in Denton County will cross a conserved greenbelt that serves as a wildlife corridor between Lewisville Lake and Ray Roberts Lake and protects the water quality in the Elm Fork of the Trinity River. The greenbelt is located in one of the most frequently visited state parks in Texas.

NCTCOG engaged stakeholders from Tribal Nations, nonprofit groups, environmental resource agencies, and municipalities to integrate their feedback into a study of transportation needs and potential alignments, or routes, for the roadway. An online tool,[13] created by the Federal Highway Administration (FHWA), was used by planners to identify sustainability and environmental stewardship best practices that can be incorporated into planning for the roadway. The project

[13] Federal Highway Administration, INVEST, https://www.sustainablehighways.org/

was funded by a grant from FHWA. The feasibility study and grant report can be found at https://www.nctcog.org/trans/quality/environmental-coordination/planning-and-environmental-linkages.

The Infrastructure Voluntary Evaluation Sustainability Tool (INVEST) has been used previously by NCTCOG to identify sustainability focus areas to add to the long-range planning process. This resulted in new programs and projects on infrastructure resiliency and the link between asset management and planning. Following completion of the INVEST study, the Texas Department of Transportation (TxDOT) and Denton County proceeded into the next stage of the project by starting an Environmental Impact Statement. NCTCOG staff continue to remain engaged in this project, named the Denton County Outer Loop, by participating in meetings and working with TxDOT and Denton County on their environmental and schematic efforts to identify alignments that promote sustainability and minimize environmental impacts in the corridor.

Section 214 Program

Section 214 of the Water Resources Development Act of 2000 allows entities to expend funds to expedite the review of permits from the US Army Corps of Engineers (USACE). NCTCOG has participated in the program since 2008 to expedite permits for regionally significant transportation projects.

This program has allowed NCTCOG to advance critical infrastructure projects while preserving the environment and waters of the US. Through this program, USACE can increase their participation in the transportation project throughout the National Environmental Policy Act (NEPA) phase. The increased involvement and communication resulting from this program has reduced the impact of transportation projects on the aquatic environment, reduced the type of permitting required, and reduced the time and cost for mitigation efforts. The program has also allowed USACE to create a new Regional General Permit for expediting permitting under Section 404(b)(1)[14] of the Clean Water Act on projects requiring permit under Section 408[15] of the Clean Water Act. In addition to permits, the program has allowed USACE to participate in and engage local governments on training and learning seminars for impacts to waters of the US and to assist in mitigation efforts by the region.

Wetland and Stream Mitigation Assessment

Federal laws require agencies that construct transportation projects to mitigate for unavoidable impacts those projects have on wetlands and streams that are Waters of the United States. Under Section 404(b)(1)[14] of the Clean Water Act, the preferred form of mitigation to compensate for unavoidable impacts is the purchase of mitigation bank credits. If appropriate mitigation bank credits are not available, agencies building transportation projects may create their own mitigation sites; this can be financially risky and delay construction. Assessment results can be found in the *Potential Mitigation Activities and Locations* section of this chapter.

[14] 40 CFR 230 Subpart J

[15] US Army Corps of Engineers, 33 USC 408, https://www.spl.usace.army.mil/Missions/Section-408-Permits/

Stormwater Management

The Transportation *Integrated* Stormwater Management[16] (TriSWM) framework was created to address regional issues with stormwater management by creating common stormwater criteria to address runoff from the region's roadway system.

TriSWM provides planning, design guidance, and frameworks for incorporating environmentally sensitive designs into standard stormwater management for roadway systems. The program was developed for cities, counties, and the private sector.

The goals of TriSWM:

- Provide safe driving conditions
- Minimize downstream flood risk to people and properties
- Minimize downstream bank and channel erosion
- Reduce pollutants in stormwater runoff to protect water quality

The primary pollutants from roadway runoff include:

- Particulates: pavement wear, sediment disturbance
- Nitrogen and phosphorus: roadside fertilizer
- Metals: gasoline and diesel, rusting automotive metals, engine wear, oil
- Sodium and calcium: de-icing salts, grease
- Chloride: de-icing salts
- Sulfate: roadway beds, fuel, de-icing salts
- Petroleum: spills and leaks, antifreeze, hydraulic fluids, asphalt surface
- Pathogenic bacteria: soil litter, bird droppings, livestock from hauling

To reduce the pollution entering the water system and address excessive stormwater runoff, TriSWM provides three levels of stormwater practices based upon traffic volumes on a roadway facility and the sensitivity of the receiving water system. These practices include grass channels, filter strips, bioretention areas, enhanced swales, stormwater wetlands, and infiltration trenches.

POTENTIAL MITIGATION ACTIVITIES AND LOCATIONS

Major transportation infrastructure enables residents to travel, conduct business, transport goods, and engage in daily activities. As the population grows, new infrastructure must be built, which can negatively affect the environment. Efforts must be made to avoid these impacts. However, some impacts are unavoidable, and laws and rules can require mitigation for those impacts on some resources.

The **Environmental Considerations** appendix includes a summary of regional mitigation strategies that transportation agencies can employ to minimize, rectify, reduce, or compensate for transportation project impacts that cannot be avoided. These strategies are intended to be regional in scope; however, mitigation may address and be applied to project-level impacts. NCTCOG coordinates with federal, state, and local resource agencies to develop a regional, ecosystem-based mitigation approach that expedites the delivery of transportation projects while encouraging preservation and restoration of high-priority ecosystems. Programs such as the Section 214 Program, Environmental Stewardship Program, Transportation and Stormwater

[16] NCTCOG, iSWM™ Criteria Manual TriSWM Appendix, https://www.nctcog.org/getmedia/daa4b50e-0b23-4718-b445-33dc3a96ff95/GreenInfrastructure_TriSWM_Appendix.pdf

Infrastructure, and TriSWM provide examples of NCTCOG's efforts to integrate conservation priorities early in the planning process.

As individual transportation projects advance toward further planning and development, the federal government requires a detailed environmental analysis consistent with NEPA. During this analysis, project features may be narrowed and refined, and environmental impacts and mitigation strategies will be appropriately ascertained for individual projects.

Potential Mitigation Locations

The Wetland and Stream Mitigation Assessment identified potential locations for mitigation activities, such as restoration or enhancement, to compensate for unavoidable impacts to wetlands or streams. These locations, displayed in the **Environmental Considerations** appendix, were identified as providing the greatest ecological benefit to the region. Ecological factors were identified with feedback from federal, state, and local resource agencies.

Mitigation Assessment of Mobility 2050

Potential credit demand and availability were analyzed for roadway projects in Mobility 2050 that are expected to be constructed by 2035. This first interim year was chosen because it reflects the time scale on which mitigation banks operate better than the plan's horizon year of 2050. **Table 4-1** estimates which subbasin-level watersheds in the region may face the greatest demand for mitigation credits. It also identifies the number of wetland and stream credits available in each subbasin at the time the data was downloaded from the Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS), which was developed by USACE. The number of available credits can change daily as credits are purchased from or made available for sale by mitigation banks. RIBITS also does not reflect credits that have been purchased but are not yet associated with a permit.

NCTCOG will analyze potential credit demand and availability with each Metropolitan Transportation Plan. This will identify a potential lack of credits early in the planning process and allow NCTCOG to coordinate with mitigation bankers, transportation partners, and the US Army Corps of Engineers as necessary.

Table 4-1: Mitigation Assessment

Subbasin (HUC-8)	Ecoregion	Wetlands		Streams						Species/Habitat
		Available Credits	Potential Demand	Perennial		Intermittent		Ephemeral**	General Legacy***	Available Credits
				Available Credits	Potential Demand	Available Credits	Potential Demand	Available Credits	Available Credits	
12010001	Blackland Prairie	8,536.97	High	21,629.27	None	16,506.50	High	7,565.47	111.25	
12010001	East Central Texas Plains	14,861.52	Low	28,377.40	Low	13,165.84	Low	6,095.02	111.25	
12010003	Blackland Prairie	9,394.36	Low	19,941.20	None	2,368.30	Low	0.00	1.00	
12030101	Cross Timbers	290.46	Low	0.00	Low	0.00	Low	0.00	110.25	1,289.20
12030102	Blackland Prairie	495.33	Medium	2,240.19	Medium	9,916.65	Medium	11,039.71	110.25	286.00
12030102	Cross Timbers	548.43	Low	49,509.19	Medium	234,849.05	Low	64,448.71	110.25	286.00
12030103	Blackland Prairie	500.30	Medium	1,688.07	High	14,138.20	Medium	7,565.47	110.25	286.00
12030103	Cross Timbers	1,222.76	Medium	0.00	Low	0.00	High	0.00	110.25	1,289.20
12030104	Cross Timbers	500.30	Low	1,688.07	Low	14,138.20	Low	7,565.47	110.25	286.00
12030105	Blackland Prairie	822.39	High	2,240.19	High	15,628.93	Medium	13,438.71	110.25	286.00
12030106	Blackland Prairie	7,547.92	High	3,879.97	High	14,138.20	High	7,565.47	111.25	286.00
12030107	Blackland Prairie	7,512.69	High	3,879.97	Low	11,182.29	High	7,565.47	111.25	
12030109	Blackland Prairie	866.95	Medium	2,240.19	Medium	10,726.25	Medium	11,039.71	110.25	286.00
12030109	Cross Timbers	548.43	None	2,240.19	None	7,770.34	Low	11,039.71	110.25	286.00
12060201	Cross Timbers	454.26	Low	47,269.00	Low	224,932.40	Low	53,409.00	110.25	1,289.20
12060202	Cross Timbers	772.78	Low	0.00	None	809.60	Low	0.00	110.25	1,289.20

* Data on available credits was downloaded from the US Army Corps of Engineers Regulatory In-Lieu Fee and Bank Information Tracking System on January 14, 2025.
** Potential demand for ephemeral credits cannot be estimated because data on the location of these streams is not available.
*** General legacy stream credits can be used to mitigate impacts to any kind of stream. The watersheds in which these credits are available are approximated.

COORDINATION WITH ENVIRONMENTAL RESOURCE AND REGULATORY AGENCIES

Federal, state, regional, and local agencies are tasked with regulating and ensuring the health of both human and natural environments. For example, the Clean Water Act and its regulations are monitored and regulated by agencies, including the Environmental Protection Agency, US Army Corps of Engineers, and the Texas Commission on Environmental Quality. Agencies such as the Texas Parks & Wildlife Department and the US Fish and Wildlife Service regulate other state and federal laws such as the Texas Parks & Wildlife Code and the Endangered Species Act.

Long-range transportation plans are developed in coordination[17] with agencies such as these, in addition to local municipalities, special districts, and non-governmental organizations. The **Environmental Considerations** appendix provides a summary of federal and state resource agencies that are stakeholders in the transportation planning process.

NCTCOG uses the Planning and Environment Linkages (PEL) process to engage stakeholders in the planning process. PEL seeks to include environmental, community, and economic priorities early in transportation planning.[18] Environmental coordination for Mobility 2050 was conducted in spring 2025. Coordination with relevant resource agencies and consultation on specific projects will continue to occur during individual project development phases after the plan is adopted.

Federal regulations state that consultation for Metropolitan Transportation Plans should include comparison with state conservation plans or maps, and inventories of natural or historic resources. Comparisons to this information, where available, are included in the **Environmental Considerations** appendix.

Regional Ecosystem Framework

The Regional Ecosystem Framework (REF), developed by NCTCOG in 2011, is a geographic information systems-based tool designed to integrate conservation and ecosystem priorities into infrastructure project planning using a watershed approach. The REF includes 10 ecological layers such as flood zones, impaired water segments, agricultural lands, wildlife habitat, and wetlands. It assigns scores to grid cells within subwatersheds to indicate areas of ecological importance, aiding in the assessment of potential environmental impacts for corridor-specific projects. This tool supports the linkage between planning and environmental processes, facilitating informed decision-making and promoting environmental stewardship. REF data sources, definitions, and maps are included in the **Environmental Considerations** appendix.

Interactive Website

NCTCOG has developed an interactive mapping website to share the REF layers and other pertinent environmental data with transportation and resource agency partners. The interactive tool allows users to overlay REF ecological data with additional spatial data relevant to conserving natural areas or mitigating the environmental impacts of infrastructure projects. The interactive mapping website can be accessed at:

[17] While federal regulations call for consultation, in Texas, that word is generally reserved for the National Environmental Policy Act process. Mobility 2050 uses the term coordination instead of consultation.

[18] Federal Highway Administration, Environmental Review Toolkit Planning and Environment Linkages Program Overview, https://www.environment.fhwa.dot.gov/integ/index.asp

https://nctcoggis.maps.arcgis.com/apps/webappviewer/index.html?d=629ea7bf1f5e4d93a38f857ebb1f2f1f.

Natural Environment Screening

Roadway and public transportation recommendations from Mobility 2050 were screened to identify potential future needs for environmental coordination. The Natural Environment Screening can assist in achieving federal goals to sustain and restore the health of ecosystems and to promote environmental stewardship in the transportation system. The Natural Environment Screening provides a preliminary tool to identify potential impacts to natural environment resources that may result from the roadway and transit recommendations made in Mobility 2050. Early consideration of environmental effects may assist in identifying resource agencies that may be of interest for ongoing environmental coordination and collaboration throughout the planning and project development process. Potential opportunities for mitigation activities may also be identified through preliminary screening. The methodology and results of the Natural Environment Screening are included in the **Environmental Considerations** appendix.

Coordination with Federally Recognized Tribal Nations

NCTCOG recognizes that some federally recognized Tribal Nations have historical and current interests in the region. NCTCOG endeavors to understand and address those interests through distinct processes that respect Tribal Nations' sovereignty and the government-to-government relationship. More information on NCTCOG's coordination with Federally Recognized Tribal Nations can be found in the **Social Considerations** chapter under Public Involvement.

SUMMARY

The analysis of environmental effects and the processes of environmental mitigation and stewardship are integral components of long-range transportation planning. Emphasizing the importance of collaboration with environmental resource and regulatory agencies, these efforts aim to protect and enhance the environment, improve quality of life, and ensure the resilience and reliability of the transportation system. Key initiatives at NCTCOG include the use of Natural Environment Screening for identifying transportation projects' environmental impacts, the Mitigation Assessment to determine mitigation demand, and the TriSWM framework for managing stormwater impacts.

4-3. HAZARD VULNERABILITY AND RESILIENCE

OVERVIEW

Transportation systems, defined as extensive physical infrastructure and/or arrays of multimodal services, are desired to have longevity, durability, and meet the evolving needs of modern society. These systems have always been exposed to a wide range of hazards, with extremes in frequency, duration, and intensity. However, natural and human-induced environmental factors, particularly through weather pattern changes, are compounding the extent, intensity, and sensitivity of those hazards, increasing risks for cascading events and creating new stressors on transportation assets. Meanwhile, the daily demands for safe and efficient transportation resources persist or grow in scale and complexity. Numerous transportation assets across the country have long outlasted their planned service lives, yet continue to be critical for economic vitality, essential mobility/service needs, and emergency responses, while accommodating traffic levels and other burdens beyond anticipation during their original planning and design. Under these circumstances, capabilities for the transportation system to withstand, recover from, or adapt to adverse conditions and events have become more important, yet more challenging, than ever before.

According to the National Oceanic and Atmospheric Administration, in 2024, the United States experienced a record-breaking 27 natural disaster events, exceeding $182 billion in damages and economic losses (trailing the record-setting 28 events in 2023).[19] Twenty of the disasters in 2024 occurred in the State of Texas. Texas' affliction with such events has surpassed any other state since statistics began in 1980, both in terms of numbers (190 out of 403 nationwide) and total inflation-adjusted costs ($440 billion out of $2.92 trillion nationwide). Additionally, the trend for those events has dramatically increased within that 44-year span, with 68 events occurring in the opening years of this decade (2020 to 2024) compared to 14 events across the entirety of the 1980s.[20] In the North Central Texas region, these events cover nearly the full spectrum of recorded types, including drought, heat waves, wildfires, severe storms, flooding, winter precipitation, and freezes.

To varying degrees, each of these disasters damaged and/or disrupted transportation infrastructure vital for emergency services, evacuations, and key supplies. Costly repairs strained budgets at all government levels, and disruptions adversely affected economies. Furthermore, the events highlighted disparities in impacts and recovery rates among economically disadvantaged and minority populations. Such outcomes underscore the necessity for integrating resilience considerations within transportation and land use planning, asset management, hazard mitigation efforts, and sustainability initiatives. Prioritizing resiliency ensures major transportation investments are optimized for lifecycle benefits.

[19] National Oceanic and Atmospheric Administration National Centers for Environmental Information US Billion-Dollar Weather and Climate Disasters, 2024, https://www.ncdc.noaa.gov/billions

[20] National Oceanic and Atmospheric Administration National Centers for Environmental Information Texas Billion-Dollar Weather and Climate Disasters, 2024, Billion-Dollar Weather and Climate Disasters | Texas Summary | National Centers for Environmental Information (NCEI)

MOBILITY 2050 SUPPORTED GOALS

Improve the availability of transportation options for people and goods.

Support travel efficiency measures and system enhancements targeted at congestion reduction and management.

Ensure all communities are provided access to the regional transportation system and planning process.

Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.

Encourage livable communities which support sustainability and economic vitality.

Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system.

Pursue long-term sustainable revenue sources to address regional transportation system needs.

Provide for timely project planning and implementation.

Develop cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system.

[21] See Chapter 5, Operational Efficiency

MOBILITY 2050 POLICIES AND PROGRAMS

Mobility 2050 includes policies and programs that address regional priorities and public needs. Policies guide decision-making and set the framework for long-term goals, while programs provide the funding and resources to turn plans into action across the transportation system.

Policies

SPD3-001: Increase resiliency of ancillary infrastructure included within or immediately adjacent to the transportation system's right-of-way or easement, including improving stormwater management.

Supporting Policies from Other Sections

TSSC3-002: Transportation System Security and Resilience should be considered, and mitigation strategies put in place, during planning, engineering, construction, and operation stages of corridor implementation for roadway and transit operations, with emphasis on identified critical infrastructure or key resources affected by human-made or natural disasters.

TSSC3-003:[21] Identify regional transportation components of key resources and critical infrastructure and develop protective methodologies to reduce risk to assets from damage due to natural or human-implemented attacks.

RD3-015:[22] Support the asset management objectives in the Texas Transportation Plan to maintain and preserve multimodal facilities using cost-beneficial treatments and to achieve a state of good repair for pavement, bridge, and transit assets.

[22] See Chapter 6, Mobility Options

F3-005:[23] Ensure that adequate funding is given to maintenance and operations of the existing multimodal transportation system consistent with federal and/or state guidelines and recommendations.

Programs

For more information on program funding and implementation, see the **Environmental Considerations** appendix.

SPD2-001: Hazard Vulnerability and Resilience Strategies

Federal Guidance

Existing federal statutes and regulations provide ample guidance and justification for the incorporation of resiliency in the metropolitan transportation planning process, as well as a framework for assessing transportation system vulnerability and identifying critical infrastructure. Through various administrative orders, surface transportation legislation, and executive orders, the federal government has outlined the expectations and ways in which Metropolitan Planning Organizations (MPOs) can incorporate resiliency into their planning programs. Additional details on specific orders and legislation pertaining to resiliency can be found in the **Environmental Considerations** appendix.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS RESILIENCE EFFORTS

North Central Texas Council of Governments (NCTCOG) staff have incorporated resilience into its transportation planning and asset management processes in the following ways:

Initial Resilience Studies

Since 2010, the Federal Highway Administration (FHWA) has partnered with state Departments of Transportation, Metropolitan Planning Organizations, and other planning agencies on multiple rounds of pilot programs aimed at the continued refinement and deployment of an infrastructure vulnerability assessment and adaptation framework for transportation planning, asset management, and sustainability purposes. NCTCOG was one of 19 pilot teams who participated in the second program round during 2013 to 2015, and the collective efforts and outcomes generated a community of practice for transportation agencies seeking to increase resilience to extreme weather events, a community that continues to grow in familiarity, resources, and applications upon completion of each program round.

Published in March 2015 and titled "Climate Change/Extreme Weather Vulnerability and Risk Assessment for Transportation Infrastructure in Dallas and Tarrant Counties," NCTCOG's pilot study was conducted through collaboration with the University of Texas at Arlington, the city of Dallas, and Trinity Metro to assess current and future flooding and extreme heat vulnerability of roads, passenger rail, and airports in Dallas and Tarrant counties. The study concluded that increasingly severe precipitation and heat events, combined with continued urbanization and congestion near floodplains, will place a greater number of transportation assets at risk. By correlation, potential changes to the region's urban heat island effect and plasticity (shrinking/swelling) of area soil would only exacerbate infrastructure damage or disruption.

This study spurred subsequent local, regional, and state initiatives, all while benefiting from the pilot program community's ongoing expansion in data, tools, lessons learned, and best practices. The

[23] See Chapter 7, Financial Reality

collective experiences and contributions from the community culminated in FHWA's publishing of a third edition to the Vulnerability Assessment and Adaptation Framework Manual in 2017, an in-depth practitioner's guide for resilience incorporation and decision-making that continues to be of significant use and benefit.

NCTCOG staff continue to perform multiple studies and exchange information about extreme weather vulnerability/criticality assessments, adaptability strategies, data sources, evaluation tools, and various resilience strategies with FHWA, the Texas Department of Transportation (TxDOT), and other state and metropolitan planning agencies. Examples of resilience studies with regional implications include the city of Fort Worth's Environmental Master Plan (2019), Dallas Area Rapid Transit's Climate Action Plan (2020), and the city of Dallas' Comprehensive Environmental and Climate Action Plan (2020), among many others. Below are additional details regarding several of the most recent substantive efforts involving NCTCOG staff.

State Flood Plan

In 2019, the Texas Legislature passed Senate Bill 8 directing the creation of the first statewide flood plan for Texas. It brought together the findings of the 15 river-basin-based regional flood plans and made legislative and floodplain management recommendations to guide state, regional, and local flood control policy. NCTCOG was among more than 350 planning group members who coordinated with the Texas Water Development Board (TWDB) on plan development, to ensure the cumulative effects of and impacts to transportation, urban development, and other infrastructure are fully integrated. The transparent, bottom-up process aimed to identify the comprehensive exposure to flooding, identify the state's major flood risk reduction infrastructure, consider existing floodplain management practices or lack thereof, and identify and recommend flood risk reduction solutions across the state. TWDB adopted Texas' inaugural State Flood Plan in August 2024 for delivery to the Texas Legislature, with subsequent regional and state flood planning processes expected to recur in five-year cycles.[24]

TxDOT Statewide Resiliency Plan

In late 2022, TxDOT initiated development of a Statewide Resiliency Plan (SRP) to strengthen resilience of the state's multimodal transportation system to a range of potential hazards that can damage infrastructure and disrupt operations, with cascading effects for safety, public health, freight supply chains, and the Texas economy. The SRP will evaluate transportation system vulnerabilities, identify critical infrastructure, and develop solutions and strategies to increase their durability and/or adaptability to those hazards. Additionally, the SRP will evaluate the resulting economic costs, such as infrastructure damage, emergency response costs, market losses, and recovery costs, if no actions are taken to address system vulnerabilities.

Incorporating the perspectives and experiences of transportation stakeholders from across Texas will be critical to the success of the SRP, and NCTCOG has participated as a primary stakeholder. The findings and recommendations of the SRP will serve as a resource to TxDOT divisions, districts, and various partners for incorporating transportation resilience into statewide, regional, and local transportation planning efforts and project development. A science-based approach, informed by stakeholder input, will generate strategies and solutions that anticipate and act against current and future hazards, including reciprocal exchanges of information and

[24] Texas Water Development Board (TWDB) 2024, State Flood Plan, https://www.twdb.texas.gov/flood/planning/sfp/index.asp

recommendations between the SRP and other TxDOT planning processes. The SRP will be both informed by and incorporated into future iterations of the Statewide Long-Range Transportation Plan, Texas Freight Mobility Plan, Texas Transportation Asset Management Plan, and numerous other efforts. TxDOT expects to complete and execute this initial SRP in early 2025.[25]

Integrated Planning for Regional Transportation, Development, and Stormwater Management Project

Recent major flooding events in Texas have highlighted the need for more comprehensive stormwater planning, particularly in the upstream portions of the Trinity River watershed, where population and urbanization are expected to grow significantly. Beginning in 2023, NCTCOG embarked on a $10 million multi-year silo-busting effort in areas north and west of the Dallas and Fort Worth urban cores to identify tools, policies, and projects that 1) address vulnerable and critical infrastructure assets; 2) reduce flood risk according to changes in storm frequency, duration , and intensities over time; 3) minimize overall lifecycle costs; and 4) provide measurable environmental, ecosystem, and economic benefits to accommodate future population growth. Completion of the study is expected by mid-2026, employing experience and expertise from multiple financial and technical partners as shown in the following graphic.

The scope of the study is comprised of four key components. First, the partners will perform an exhaustive literature review of similar studies and study elements across the nation, acknowledging best practices and lessons learned, in the creation of a comprehensive project data inventory. Second, the partners will conduct an extensive

Source: NCTCOG Environment and Development Department

public/stakeholder engagement campaign through various training and scenario planning workshops, surveys, project updates, education/outreach materials, and creation of a Technical Advisory Group to document needs, deficiencies, and ensure greater ownership of final outcomes and implementation actions. Third, the partners will prepare an integrated apparatus of mapping, modeling, and policy recommendations for stormwater, transportation, urban development, and environmental planning. It will include 1) scenario options, strategies, and predictable return on investment parameters to adopt for higher flood protection levels for existing and proposed transportation projects; 2) lists of performance measures, evaluation criteria, and benefit-cost ratio methodologies to inform transportation project selection/prioritization processes for future local/regional transportation plans; and 3) a report of delivery, management, and maintenance strategies aimed at improving operational capabilities

[25] TxDOT (2024), Statewide Resiliency Plan, https://www.txdot.gov/projects/planning/statewide-resiliency-plan.html

and reducing risks from flooding. Finally, the study will document the roles of data, tools, analyses, and practices in establishing integrated standard operating procedures and/or planning model templates. This will allow for easy incorporation, replication, and amplification of project outcomes in other portions of the state and nation by any entity type and at varying geographic scales.

Advocacy Committees

As a participant in FHWA's Transportation Asset Management Expert Task Group, NCTCOG staff coordinate with other Metropolitan Planning Organizations, state Departments of Transportation, other transportation providers, and resource agencies to integrate extreme weather vulnerabilities and resilience into asset management practices and performance measurement processes. NCTCOG plays a similar role with advocacy committees associated with the Transportation Research Board, Association of Metropolitan Planning Organizations, and the American Association of State Highway Transportation Officials.

North Central Texas Emergency Management Working Group

NCTCOG hosts this group of local stakeholders.

Suggested resilience strategies are listed in the **Environmental Considerations** appendix. These strategies were derived from NCTCOG's associated research and participation in the resilience activities described above.

Additional information about emergency preparedness and response to natural disasters is included in the **Transportation System Security** section of the **Operational Efficiency** chapter.

SUMMARY

Mobility 2050 supports policies and programs that adhere to federal resiliency requirements and will improve the region's transportation system resilience through comprehensive strategies and partnerships. In addition, Mobility 2050 supports and presents initiatives to facilitate project delivery while enhancing resiliency for key environmental resources adjacent to transportation facilities in North Central Texas. This process will support resilient, adaptable transportation assets and services for all residents. NCTCOG will continue to coordinate with resource and regulatory partner agencies to develop innovative infrastructure development approaches demonstrating resiliency against natural hazards. In addition, NCTCOG will continue to collaborate with other public agencies and private entities to share data and strategies for encouraging transportation infrastructure resiliency.

All resilience policies, programs, projects, and maps are included in the **Environmental Considerations** appendix.