C. Environmental Considerations: Healthy Communities

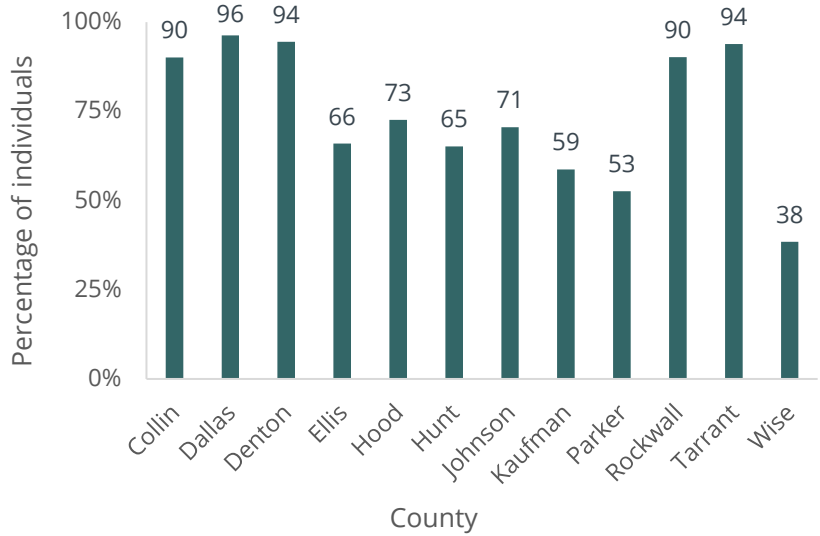
County Health Rankings & Roadmaps

The County Health Rankings & Roadmaps[1] is a collaboration between the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute. The County Health Rankings identify vital measures that have an influence on and are important to understanding the health of a community. A county's performance for each of these measures provides a starting point for communities, while the roadmaps provide tools, policies, and programs that may encourage change in community health.

The following graphs illustrate county-level performance for seven health measures that are relevant to transportation.

Access to Exercise Opportunities: The ease of participating in physical activity increases as one's ability to access facilities such as parks, gyms, and sidewalks also increases. An increase in physical activity participation can be partially associated with a lower risk in premature death from several medical conditions, including diabetes, stroke, and cardiovascular disease. This health factor measures the percentage of individuals who live in a Census block reasonably close to a park (within one-half mile) or recreational facilities (within one mile for urban areas and three miles for rural areas). Recreational facilities include gyms, community centers, YMCAs, dance studios, and pools, while parks include those that are local, state, and national. Collin, Dallas, Denton, Rockwall, and Tarrant counties score higher than the overall Texas score of 81 percent of individuals; the more rural counties in the region score below the overall Texas score (see **Exhibit C-1**).

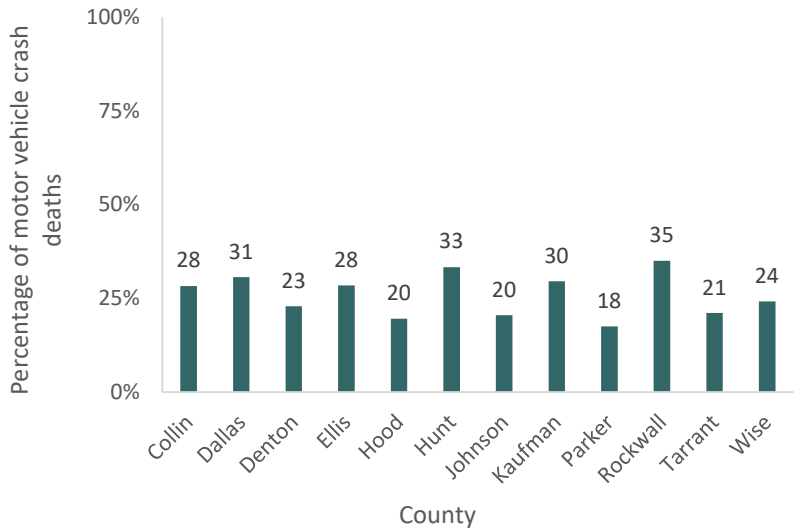
Exhibit C-1: Access to Exercise Opportunities



[1] County Health Rankings & Roadmaps website: http://www.countyhealthrankings.org/

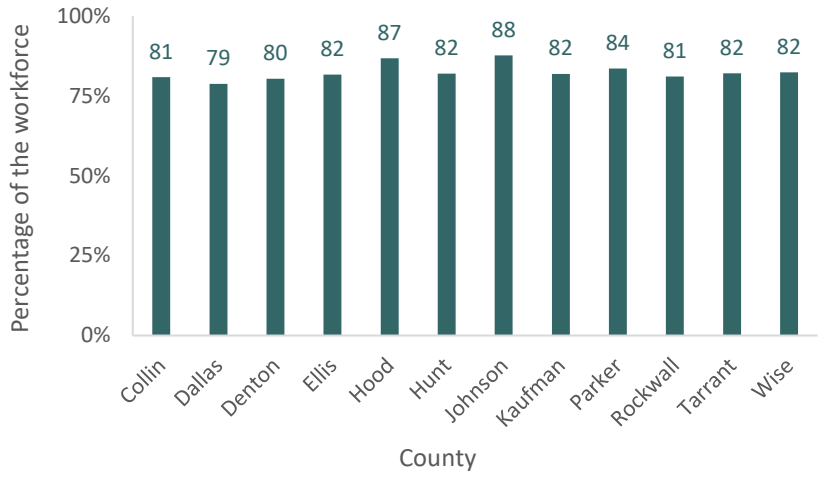
Alcohol-Impaired Driving Deaths: Annually, motor vehicle crashes involving impairment from alcohol kill about 17,000 Americans. This health factor measures the percentage of motor vehicle crash deaths related to alcohol-impaired driving. The percentage of deaths from motor vehicle crashes in the MPA (Metropolitan Planning Area) that involve alcohol ranges from 18 percent to 35 percent (as shown in **Exhibit C-2**).

Exhibit C-2: Driving Deaths Related to Alcohol Impairment



Driving Alone to Work: Over 10 million Texans drive alone to work, their primary form of transportation. Driving alone to work can negatively impact the social, mental, and active health of individuals. Driving alone contributes to the dependence Americans have on driving, which may lead to an increase in motor vehicle collisions, air pollution, and physical inactivity, and a decrease in the health of communities. This health factor measures the percentage of the work force that typically drives alone to work. Across the region, 79 percent to 88 percent of the work force drives alone to work (see **Exhibit C-3**).

Exhibit C-3: Driving Alone to Work



Income Inequality: Income inequality is a measure of the disparity between households of higher and lower incomes. Individuals in households with lower incomes can be negatively impacted by income inequality because of increased health risks such as cardiovascular disease. Income inequality can also impact communities and contribute to social stress, including lack of connectedness, trust, support, and sense of community. This health factor measures the ratio of household income at the 80th percentile to that at the 20th percentile, with a higher ratio indicating a larger division. Counties in the MPA have an average income inequality of 4.6, lower than the overall state ratio of 4.8 (as shown in **Exhibit C-4**).

Exhibit C-4: Income Inequality

Injury Deaths: Injury deaths are comprised of unintentional and intentional deaths and are the 4th and 10th leading cause of death, respectively, in the United States. Unintentional deaths include those resulting from motor vehicle traffic. Intentional deaths include homicide and suicide. This health factor is a rate and measures the number of deaths due to injury per 100,000 population. Injury deaths in the MPA range from 38 to 83 per 100,000 population (see **Exhibit C-5**).

Exhibit C-5: Deaths Caused by Intentional and Unintentional Injury (Including Motor Vehicle)

Long Commute – Driving Alone: Increasing the distance an individual commutes to work can have a negative impact on their health. As commute distance and time increases, some health risks may also negatively change, including an increase in blood pressure, obesity, and body mass index, and a decrease in physical activity participation. This health factor measures the percentage of workers who commute alone for longer than 30 minutes. In the MPA, commuters who drive alone for more than 30 minutes averages 45 percent (as shown in **Exhibit C-6**).

Exhibit C-6: Long Commute – Driving Alone

Unemployment: Individuals who are unemployed have a greater risk of having poorer health. Unemployment may result in an individual participating in high-risk consumption and behaviors, including alcohol, tobacco, drugs, poor diet, and low levels of physical activity. High-risk behaviors may lead to an increase in health risks, which may be compounded by limited access to health care and insurance due to unemployment. This health factor measures the percentage of the civilian labor force, 16 years of age and older, who are unemployed but seeking work. The percentage of unemployment in the MPA averages 3.3 percent (see **Exhibit C-7**).

Exhibit C-7: Unemployment

Supporting and Promoting Healthy Communities

Mobility 2045 Update programs and projects support transportation-related strategies for healthy communities. These programs and projects are identified in **Exhibit C-8**.

Exhibit C-8: Mobility 2045 Update Policies and Programs that Support and Promote Healthy Communities

Strategies to Improve Health	Mobility 2045 Update Policies and Programs
Reduce Vehicle Miles Traveled	**TDM3-001**: Support the Congestion Management Process, which includes explicit consideration and appropriate implementation of Travel Demand Management, Transportation System Management, and Intelligent Transportation Systems strategies during all stages of corridor development and operations.
	TDM3-002: Support an integrated planning process that maximizes existing transportation system capacity before considering major capital infrastructure investment in the multimodal system.
	TDM2-100: Regional Trip Reduction Program
	TDM2-200: Regional Vanpool Program
	TDM2-300: Park-and-Ride Facilities
	TDM2-400: Transportation Management Associations
	TSMO2-003: Bottleneck Improvement Program
	TSMO2-004: Special Events Management Program
	TSMO2-005: Bottleneck Program for Regional Corridors
	TSMO2-006: Intelligent Transportation Systems Implementation Program
	TSMO2-007: Regional Intelligent Transportation Systems Architecture Program
	TSMO2-008: Advanced Traveler Information System Implementation Program
	TSMO2-009: Advanced Traffic Management System Implementation Program
	TSMO2-010: Advanced Public Transportation System Implementation Program
	TSMO2-011: Intelligent Transportation Systems Interoperability Program
	FT3-007: Additional and improved interchanges, collector-distributor roads, frontage roads, and auxiliary lanes should be considered and implemented, as appropriate, on all freeway/tollway facilities in order to accommodate a balance between mobility, access, operational, and safety needs.
	SD3-001: Support mixed-use and infill that utilize system capacity, reduce vehicle miles traveled, and improve air quality through improved rail mobility and access management.
Expand Public Transportation	**TR3-001**: Public transportation needs should be met by existing transportation authorities and providers through a comprehensive, coordinated, and cooperative approach to maximize existing transportation resources. Alternative implementation approaches may be necessary if existing transportation authorities and providers are unable to provide needed services in a timely manner (consistent with Regional Transportation Council Policy P09-03).

Strategies to Improve Health	Mobility 2045 Update Policies and Programs
	TR3-002: Work with the region's existing public transit providers to ensure a seamless multimodal transit system through: • Seamless connections • Coordinated fare structure • One-stop access to services • Standardization of assets, technologies, and service characteristics that promote interoperability • Improved interaction between public, private-for-profit, and private-nonprofit transit providers (consistent with Regional Transportation Council Policy P09-03) • Elimination of gaps in service to establish a minimum level-of-service • Service expansion
	TR3-003: Existing and future public use rights-of-way should be monitored for appropriate public transportation service.
	TR3-005: Support the planning and development of high-speed rail to, through, and within the North Central Texas region by leading project development efforts and coordinating with federal and state initiatives as appropriate.
	TR3-006: Maximize the efficient use of public transportation resources in North Central Texas, including public, private-nonprofit, and private-for-profit providers of services.
	TR3-007 Implement safety, management and operations, and multimodal system integration projects and programs as appropriate.
	TR3-009: Support efforts to make accommodations for rail and other public transportation services to major events centers during special events.
	TR3-010: Support efforts by transit authorities to secure funding through local, state, federal, and other sources for the development and implementation of public transportation, including the Federal Transit Administration's Capital Investment Grant Program.
	TR3-011: Establish policies fostering high-speed rail system interoperability resulting in a "one-seat" ride system operation to, through, and within the North Central Texas region.
	TR2-001: Community Access Transit Program
	TR2-002: Last-Mile Transit Connections Program
	TR2-003: Regional Connections: Next Generation Transit Program
	TR2-004: State and National Transit Connections Program
	TR2-005: Transit Enhancements and Mobility Improvements Program
Promote Active Transportation	**TSMO3-001**: Installation of pedestrian facilities by local agencies as part of intersection improvement and traffic signal improvement programs shall provide access to usable walkways or sidewalks.
	BP3-001: Support the planning and design of a multimodal transportation network with seamless interconnected active transportation facilities that promotes walking and bicycling as equals with other transportation modes.
	BP3-002: Implement pedestrian and bicycle facilities that meet accessibility requirements and provide safe, convenient, and interconnected transportation for people of all ages and abilities.
	BP3-003: Support programs and activities that promote pedestrian and bicycle safety, health, and education.

Strategies to Improve Health	Mobility 2045 Update Policies and Programs
	BP2-001: Active Transportation Planning and Design
	BP2-002: Active Transportation Network Implementation
	BP2-003: Active Transportation Education and Outreach
Incorporate Healthy Community Design Features	**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 (freight, aviation, bicycle, and pedestrian). *(While this is listed as a financial policy, it has specific implications for the air quality portion of the plan.)*
	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: Support and implement strategies that promote energy conservation, address public health concerns, reduce demand for energy needs, reduce petroleum consumption, and/or decrease greenhouse gas emissions.
	AQ3-008: Adopt and implement a comprehensive air quality action plan or various strategies provided in the North Central Texas Council of Governments Comprehensive Air Quality Action toolkit.
	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.
	SD3-001: Support mixed-use and infill developments that utilize system capacity, reduce vehicle miles traveled, and improve air quality through improved rail mobility and access management.
	SD3-002: Promote transit-oriented development for all station types that improves the jobs/housing balance, "last-mile" connections, and appropriate land-use density to encourage diverse transportation mode choices.
	SD3-003: Plan for land use-transportation connections, including a variety of land uses from natural areas to the urban core connected by multimodal transportation options through strategies such as smart zoning codes, green infrastructure, affordable housing, preservation of agricultural land, healthy communities, economic development tools, parking, innovative financing, etc.
	SD2-001: Land Use-Transportation Connections Program
	SD2-002: Community Schools and Transportation Program
	SD2-003: Transit-Oriented Development Program
	SD2-004: Sustainable Development Funding Program
	AV3-003: Encourage compatible land-use planning surrounding airports in the region.
	AV2-009: Encroachment Prevention and Compatible Land-Use Planning

Strategies to Improve Health	Mobility 2045 Update Policies and Programs
	FP3-005: Enhance freight-oriented land-use sustainability by requiring local governments to adopt compatible zoning requirements and address environmental justice pertaining to freight-oriented development land uses.
	TR3-013: Support the planning and development of sustainable land uses near grade-separated high-speed rail locations by coordinating with the cities of Fort Worth, Arlington, and Dallas.
	TR3-014: Support the planning and development of sustainable land uses near at-grade high-speed rail station locations by coordinating with the cities' hosting stations.
Improve Safety for All Users	**MO3-001**: Ensure the efficient operation of the existing multimodal transportation system by evaluating and/or implementing maintenance, rehabilitation, enhancement, and/or operational type projects in order to maintain safe, efficient travel conditions.
	TSSF3-001: Implementation of safety strategies in work zones consistent with industry best practices.
	TSSF3-002: Development of safety information projects and partnerships with the Texas Department of Transportation, local governments, local police departments, and other organizations to encourage the sharing of regional/jurisdictional safety data (including, but not limited to, crash data, fatality data, and incident response and clearance time data).
	TSSF3-003: Implementation of programs, projects, and policies that assist in reducing crashes in general and eliminating fatalities and serious injuries across all modes of travel toward zero deaths. (Vision Zero—the goal of eliminating traffic fatalities and severe injuries among all road users.)
	TSSF3-004: Implementation of roadway improvement strategies that assist in reducing wrong-way driving incidents consistent with regional and/or industry best practices.
	TSSF3-005: Implementation of low-cost, systemic safety countermeasures and improvements that assist in reducing fatalities and serious injury crashes with strategies consistent with strategies outlined in the *Intersection Safety Implementation Plan for North Central Texas*, the *Regional Roadway Safety Plan*, the *Regional Strategic Plans for Pedestrian Safety and Bicycle Safety*, and other applicable safety-related plans that promote the implementation of safety countermeasures on the regional roadway system.
	TSSF3-006: Implementation of a multiagency Traffic Incident Management Program that establishes a common and coordinated response to traffic incidents consistent with Regional Transportation Council Resolution R08-10, which is a resolution supporting a comprehensive, coordinated, interagency approach to traffic incident management in the North Central Texas region. It includes the implementation of programs and projects that aid in quick incident clearance and roadway crash mitigation.
	TSSF2-001: Traffic Incident Management Program
	TSSF2-002: Regional Roadway Safety Assistance Patrol Program
	TSSF2-003: Regional Safety Information System
	TSSF2-004: Safety Education and Training Program
	TSSF2-005: Roadway Safety Improvement Program
	TSSC3-001: Support integration of traffic management and emergency management centers through the sharing of data and video.

Strategies to Improve Health	Mobility 2045 Update Policies and Programs
	TSSC3-002: Transportation System Security and Resiliency 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.
	FP3-001: Foster regional economic activity through safe, efficient, reliable freight movement while educating elected officials and the public regarding freight's role in the Dallas-Fort Worth region's economy.
	FP3-007: Improve efficiency by promoting safety, mobility, and accessibility on the freight networks.
	FP3-011: Improve railroad safety through public education, innovation, and partnering with local governments to address railroad crossing safety improvements.
	BP3-003: Support programs and activities that promote pedestrian and bicycle safety, health, and education.
	SPD2-001: Increase resiliency of ancillary infrastructure included within or immediately adjacent to the transportation system's right-of-way or easement, including improving stormwater management.
	SPD2-003: Pavement and Bridge Condition Improvement Program.
	SPD2-004: Increased transportation system resiliency for critical facilities and vulnerable locations.
Ensure Equitable Access to Transportation Networks	**EJ3-001**: Evaluate the benefits and burdens of transportation policies, programs, and plans to prevent disparate impacts and improve the decision-making process, resulting in a more equitable system.
	EJ3-002: Balance transportation investment across the region to provide equitable improvements.
	EJ3-003: Based on meaningful community input, plan for and invest in projects that proactively address racial equity and barriers to opportunity or redress prior inequities and barriers to opportunity.
	EJ3-004: Identify and support transportation solutions to address health disparities in underserved communities, including solutions that improve access to healthy food and medical care.
	EJ2-001: Health Accessibility Program
	PI3-001: Meet federal and state requirements to ensure all individuals have full and fair access to provide input on the transportation decision-making process.
	PI3-003: Use strategic outreach and communication efforts to seek out and consider the needs of those traditionally underserved by the transportation planning process.
	PI3-005: Provide education to the public and encourage input and engagement from all residents on the transportation system and the transportation decision-making process.

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C. Environmental Considerations: Air Quality

Policies

MTP Reference #	Air Quality
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	Support and implement strategies that promote energy conservation, address public health concerns, reduce demand for energy needs, reduce petroleum consumption, and/or decrease greenhouse gas emissions.
AQ3-005	Required for clean fleet funding as contained in Regional Transportation Council Resolution R14-10. Establish a framework for reducing fleet emissions, reducing fuel consumption, partnering with the North Central Texas Council of Governments/Dallas-Fort Worth Clean Cities, and training staff.
AQ3-006	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.
AQ3-007	Promote adoption and implementation of an ordinance or guidelines similar to an ordinance that promote sustainable tire disposal practices, including recycling.
AQ3-008	Adopt and implement a comprehensive air quality action plan or various strategies provided in the North Central Texas Council of Governments Comprehensive Air Quality Action toolkit.
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). *(While this is listed as a financial policy, it has specific implications for the air quality portion of the plan.)*

Programs

Air Quality Initiatives: Fleets	
Reference	AQ2-001
Background	Reducing emissions from public sector and private sector fleets is important to efforts to improving air quality in the region as mobile sources emit roughly two-thirds of ozone-forming nitrogen oxides emitted each day and are a major source of other air pollutants.
Related Goals	Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
Related Policies	AQ3-003; AQ3-004; AQ3-005
Implementation	Implement initiatives and strategies to increase the efficiency and reduce the emissions and energy impacts of local fleets. Efforts may target light-, medium-, and heavy-duty on-road vehicles and non-road equipment and involve multiple fuel types. Provide fleets with technical support and assistance, as well as educational webinars on advanced clean vehicle technologies. Provide financial support (e.g., grants or rebates) when resources allow, and provide application assistance to fleets seeking funding from programs offered by other agencies. Deploy publicly accessible electric charging or alternative fueling infrastructure to support adoption of alternative fuel vehicles by fleets in the region.
Performance Dimensions	• Number of fleets adopting a policy consistent with the Regional Transportation Council-recommended Clean Fleet Policy • Recognition from formal partners in the form of awards and accolades • Number of grant applications submitted to secure additional funding • Number of technical and planning assistance requests • Number of meetings and webinars hosted • Number of participants in webinars and trainings • Number of fleets participating in the Dallas-Fort Worth Clean Cities Annual Survey • Increase in gasoline gallon equivalents reductions year over year based on Dallas-Fort Worth Clean Cities Annual Survey results • Number of funding opportunities offered • Number of clean technology activities funded (e.g., diesel truck replacements) • Number of hydrogen refueling or EV charging stations funded, particularly using Charging and Fueling Infrastructure Corridor Program funds
Cost Estimate	Approximately $213 million

Air Quality Initiatives: Consumers	
Reference	AQ2-002
Background	Initiatives included in this element reduce emissions and/or improve energy efficiency through the promotion and implementation of new technologies and education to encourage consumers to adopt cleaner technologies or seek changes in consumer behavior.
Related Goals	Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
Related Policies	AQ3-003; AQ3-004
Implementation	Staff identifies and pursues opportunities to improve efficiency, reduce emissions, and increase consumer options for the cleanest available technologies, especially zero-emission vehicles. These consumer efforts are often educational in nature, either by educating consumers or educating organizations that directly interact with consumers (e.g., car dealerships, rideshares, or repair facilities). Strategies to increase enforcement of vehicle emissions-related offenses, programs, and policies to improve overall air quality. Example efforts include the North Central Texas Council of Governments Emissions Database, Regional Emissions Enforcement Program, Regional Smoking Vehicle Program, etc.
Performance Dimensions	• Number of Air North Texas Partners • Number of electric vehicle registrations in proportion to total vehicle registrations • Number of zero-emission vehicle incentive programs and projects funded in the region, as available • Number of studies conducted and/or reports written • Number of educational and awareness events attended
Cost Estimate	Approximately $37 million

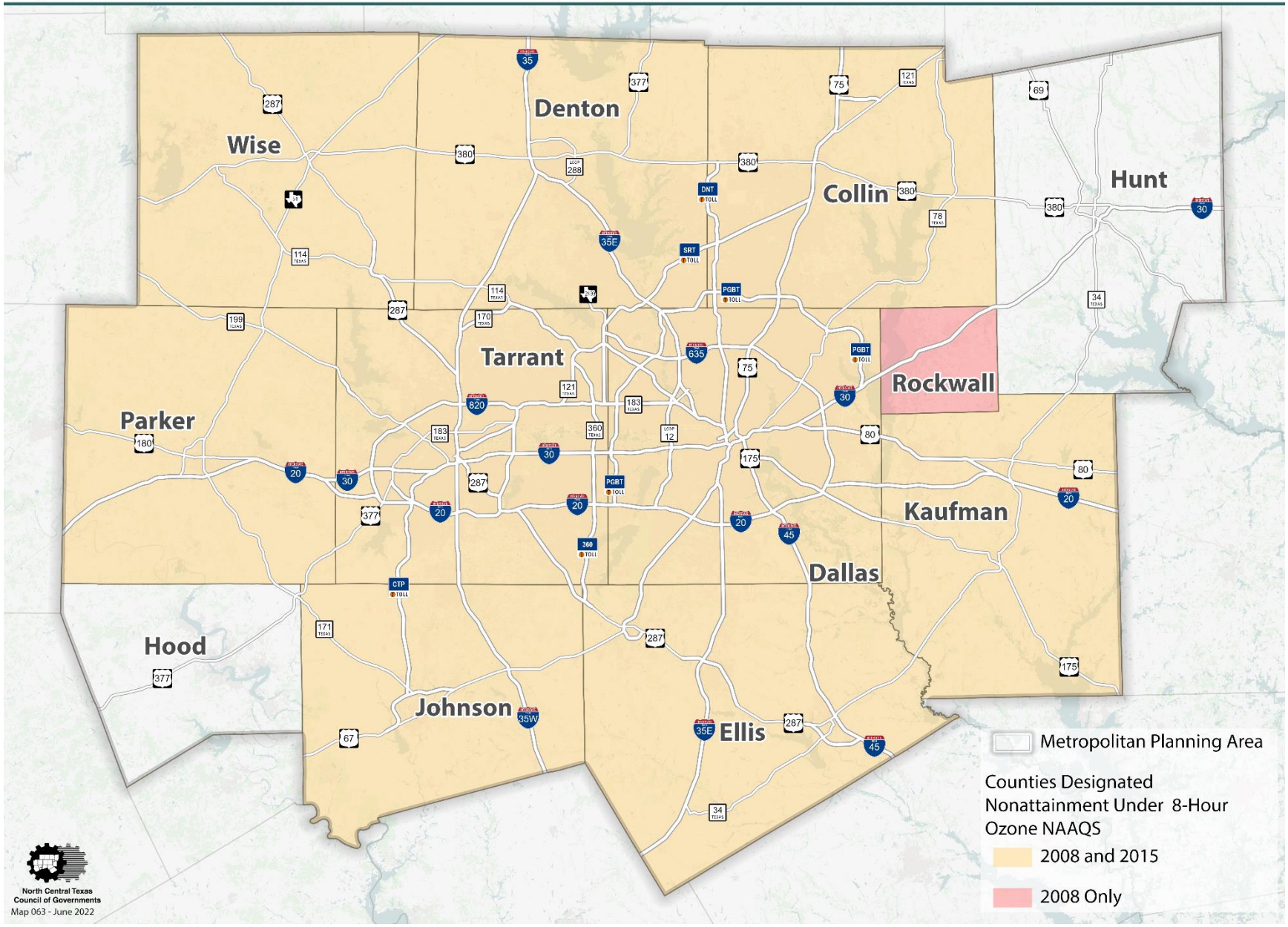
Air Quality Initiatives: Communities	
Reference	AQ2-003
Background	Initiatives in this element promote policies, contractual, infrastructure development, or regulatory measures available to local governments, utilities, and businesses that can influence deployment of and readiness for adoption of the lowest emissions and efficient technologies by consumers and fleets. Efforts also include collaborations with local governments to provide data and peer exchange related to air quality issues to help them make decisions about appropriate action steps to take within their jurisdictions.
Related Goals	Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
Related Policies	AQ3-003; AQ3-004; AQ3-006; AQ3-007; AQ3-008
Implementation	Staff works with community members, including local governments, businesses, and utilities to facilitate best practices, peer sharing, and development of initiatives that support adoption of emissions reducing technologies by consumers and fleets served by that community member. Examples include development of publicly accessible alternative fuel or electric vehicle charging infrastructure, local regulations that can facilitate build-out of infrastructure to support zero-emission vehicles (e.g., parking standards or codes related to electric vehicle-ready construction) or working with local businesses to install workplace charging. Example peer exchange efforts include the Regional Integration of Sustainability Efforts Coalition and the Air Quality Health Task Force. Example policies or ordinances include Locally Enforced Motor Vehicle Idling Restrictions. Other initiatives include construction, installation, or upgrade of publicly accessible electric vehicle charging stations throughout a community.

Air Quality Initiatives: Communities	
Performance Dimensions	• Number of technical and planning assistance requests • Number of meetings and webinars hosted • Number of communities participating in the North Central Texas Council of Governments Air Quality Health Task Force • Number of communities participating in the Regional Integration of Sustainability Efforts Coalition • Number of public and private electric vehicle charging stations, including those funded through federal programs such as the Charging and Fueling Infrastructure: Community Program, National Electric Vehicle Infrastructure Program, and Electric Vehicle Charger Reliability and Accessibility Accelerator Program • Number of persons living within a walkable distance of electric vehicle charging stations • Number of corridor nominations sent to the Texas Department of Transportation for designation under the Federal Highway Administration's Alternative Fuels Corridor Program • Number of communities adopting policies, ordinances, or other local measures recommended by the North Central Texas Council of Governments and/or the Regional Transportation Council (e.g., Locally Enforced Motor Vehicle Idling Restrictions) • Number of communities adopting a goal for long-range zero-emission vehicles and infrastructure
Cost Estimate	Approximately $51 million

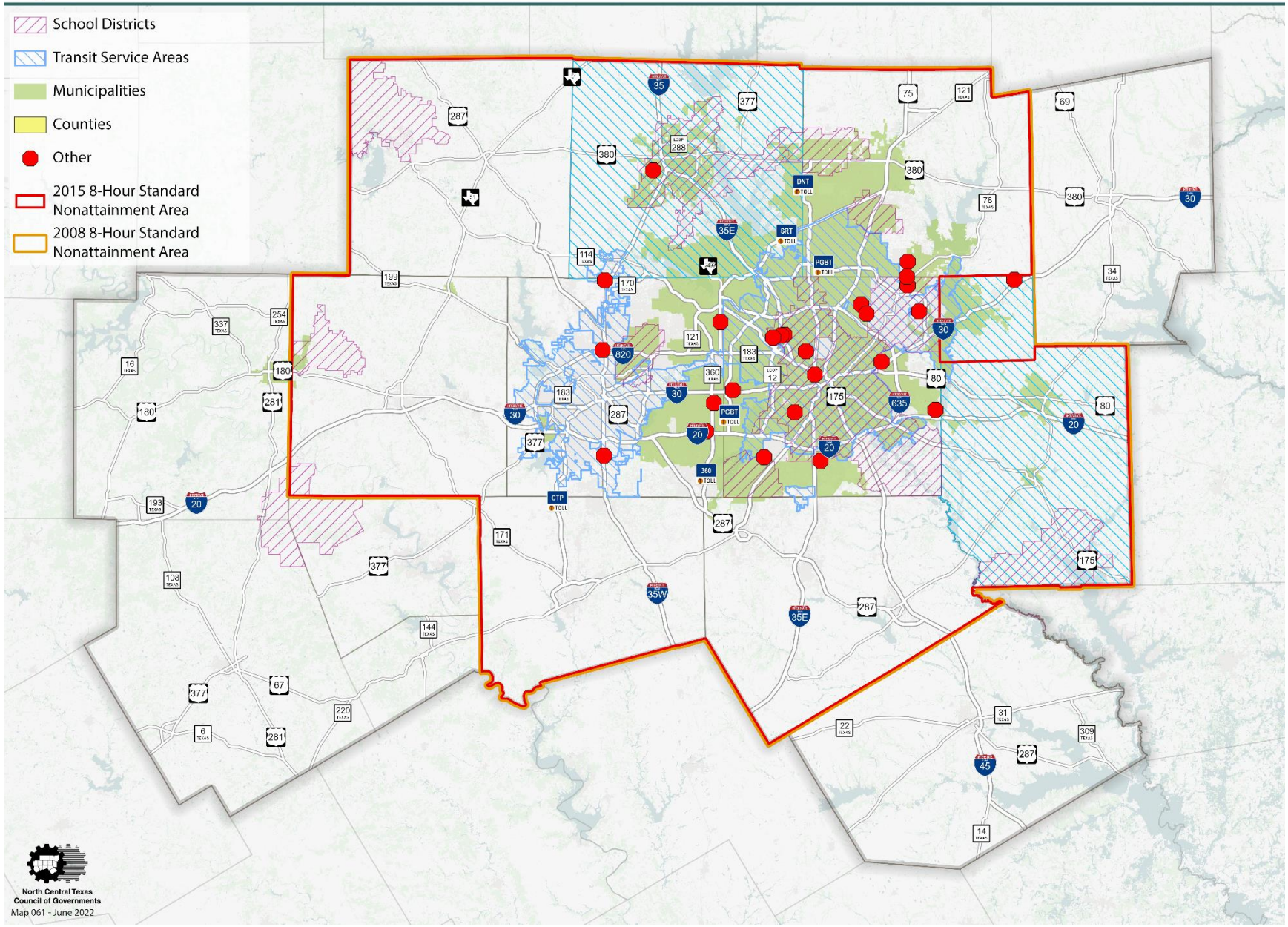
Air Quality Technical Planning and Analysis	
Reference	AQ2-004
Background	Technical analysis and planning is critical for determining progress toward improving air quality and selecting appropriate control strategies. The Metropolitan Planning Organization's role includes responsibility for air quality planning of Transportation Conformity, detailed forecasted emission inventories for inclusion into the State Implementation Plan, and technical air quality analyses to support emission reductions within the region.
Related Goals	Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
Related Policies	AQ3-001; AQ3-002; In response to applicable federal requirements, conduct necessary emissions analysis and provide technical assistance in air quality planning and control strategy evaluation.
Implementation	Provide general air quality technical assistance locally to the general public and regional governments; statewide to other nonattainment areas, the Texas Department of Transportation, and the Texas Commission on Environmental Quality; and nationally to the Federal Highway Administration, the Federal Transit Administration, and the Environmental Protection Agency. Monitor, review, and respond accordingly to federal and statewide air quality rules impacting North Central Texas. Support the state air quality planning process by developing accurate estimates of emissions through the completion of mobile emission inventories and other technical studies applicable for the region's State Implementation Plan for the 8-Hour Ozone National Ambient Air Quality Standards. Ensure, through the Transportation Conformity process, transportation plans, programs, and projects implemented in the Dallas-Fort Worth ozone nonattainment area meet federal and state air quality requirements. Ensure project and program modifications to the Transportation Improvement Program meet Transportation Conformity requirements.

Air Quality Technical Planning and Analysis	
Performance Dimensions	• Receipt of favorable conformity determinations • Environmental Protection Agency approval of State Implementation Plan revisions • Actively responding to federal and statewide proposed rules
Cost Estimate	Approximately $19 million

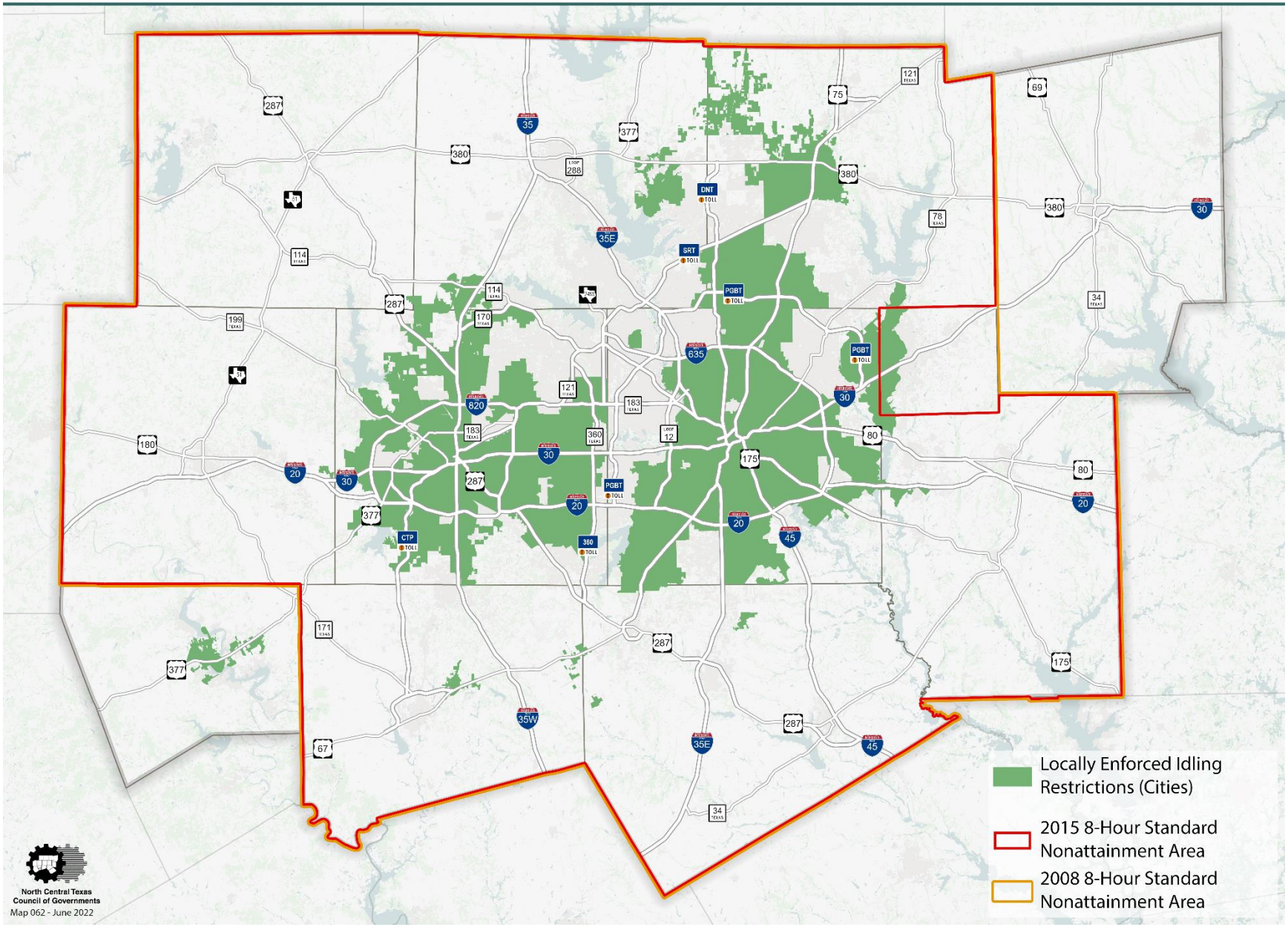
8-Hour Ozone NAAQS Nonattainment Areas



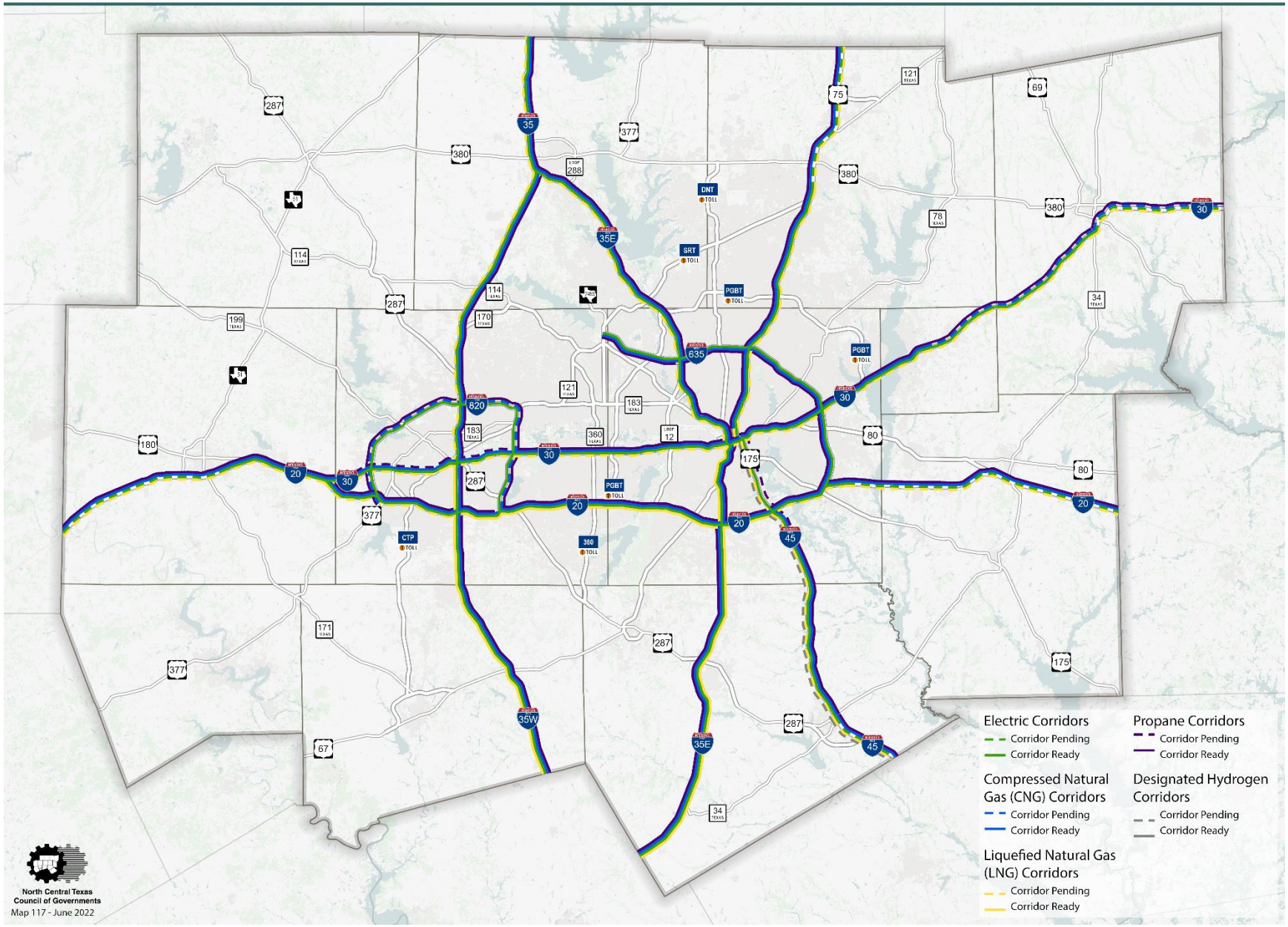
Clean Fleet Policy Adoptees



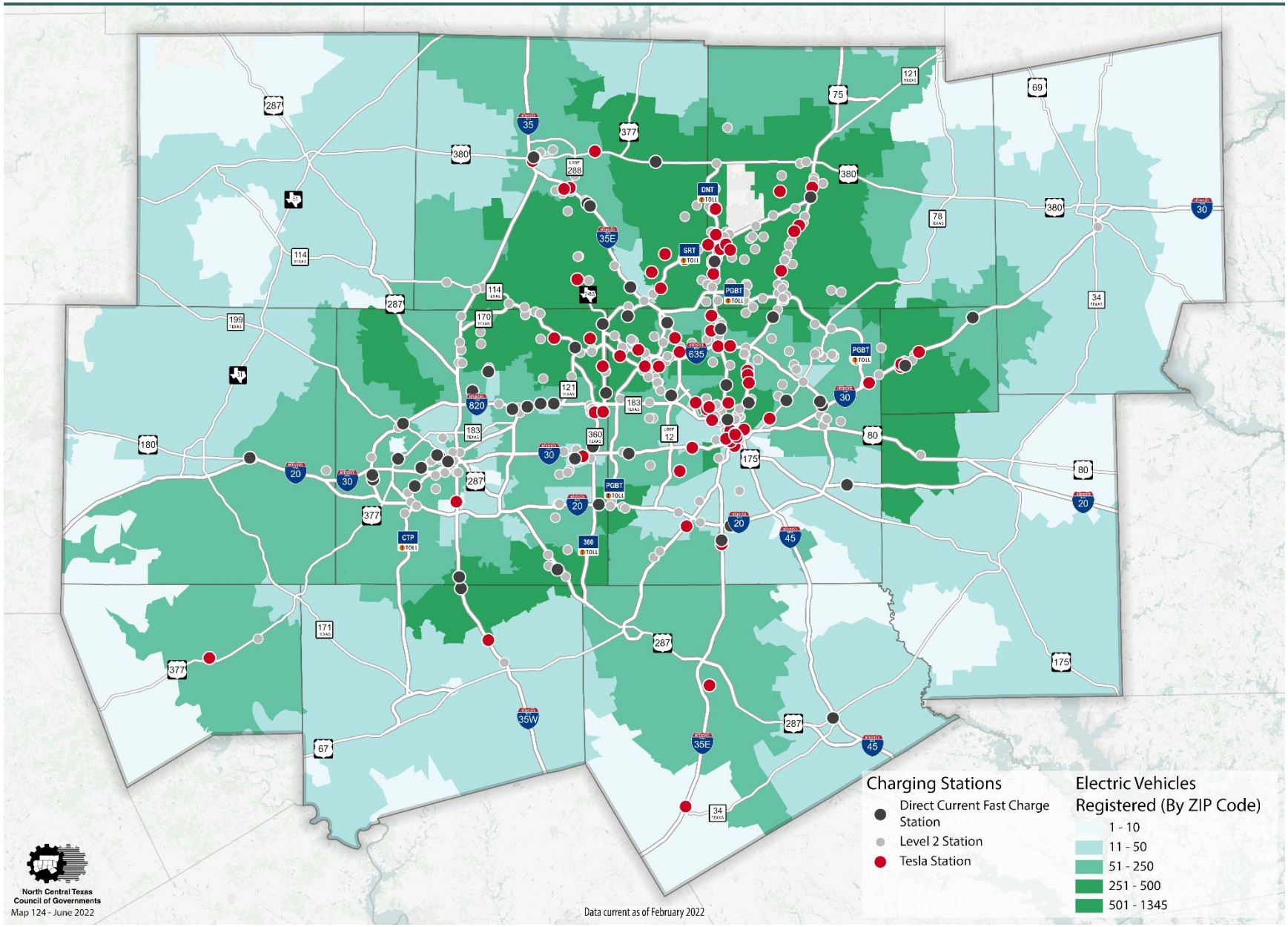
Locally Enforced Idling Restrictions



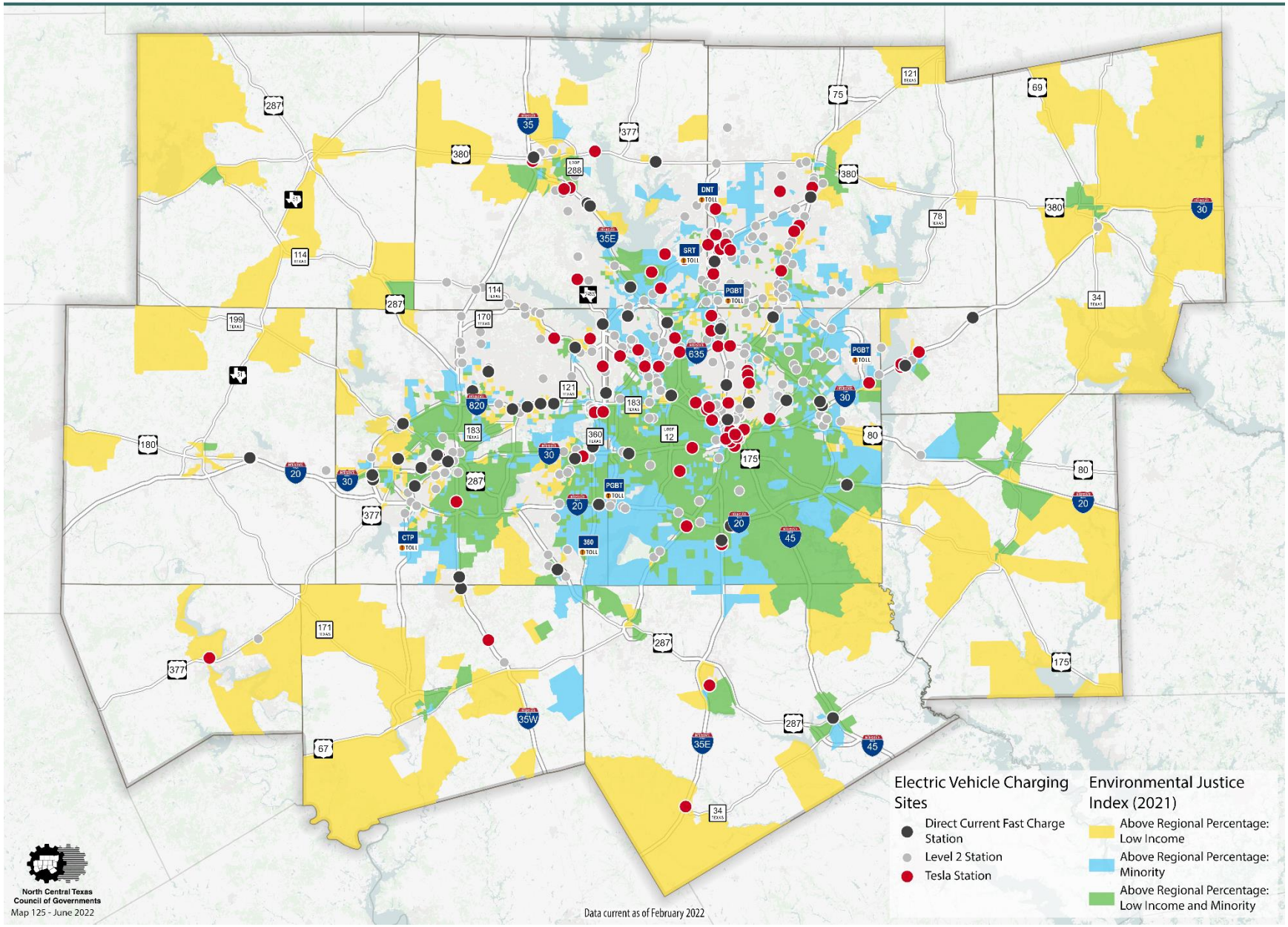
Currently Designated Alternative Fuel Corridors



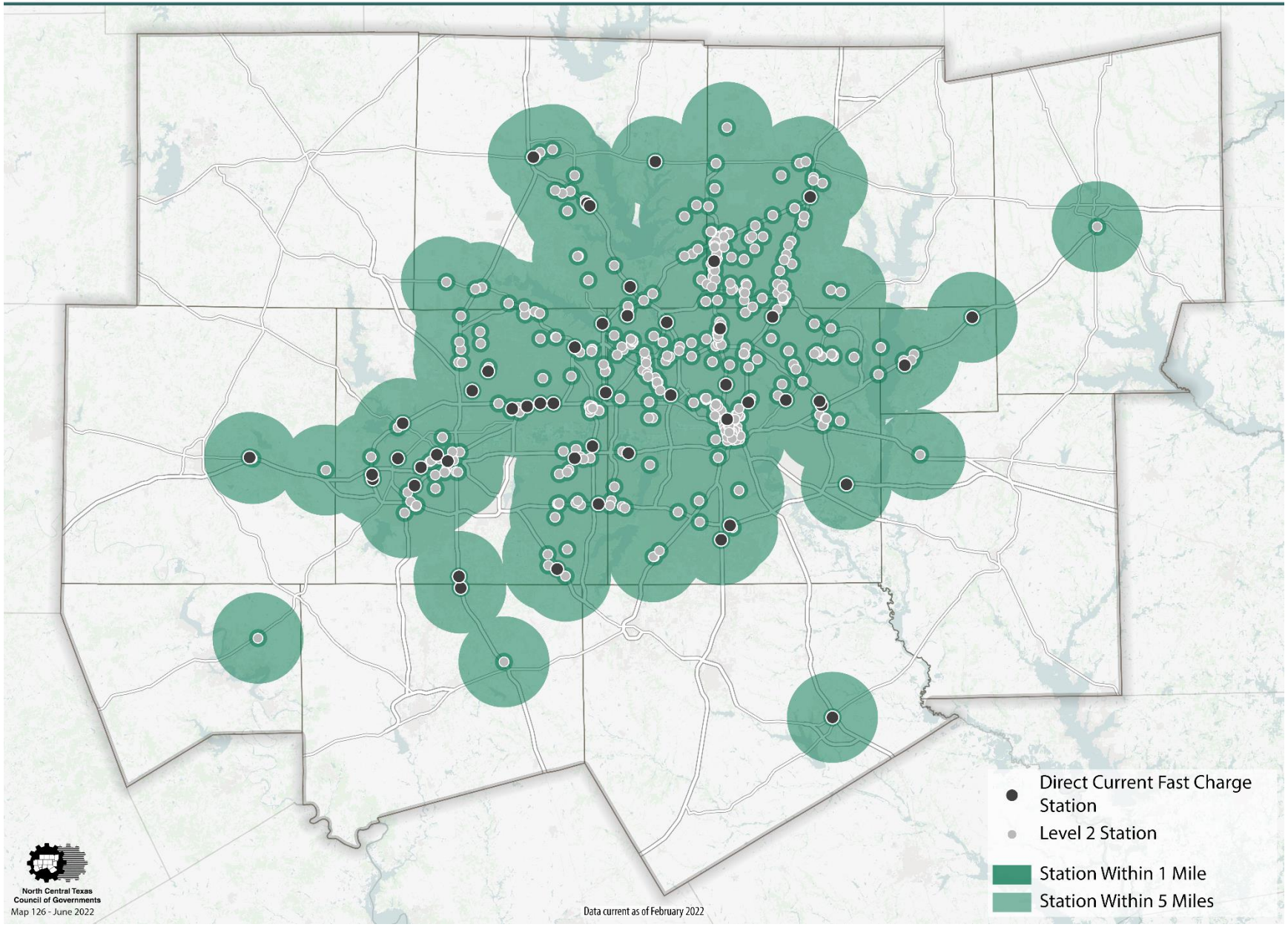
Electric Vehicle Registration by Zip Code

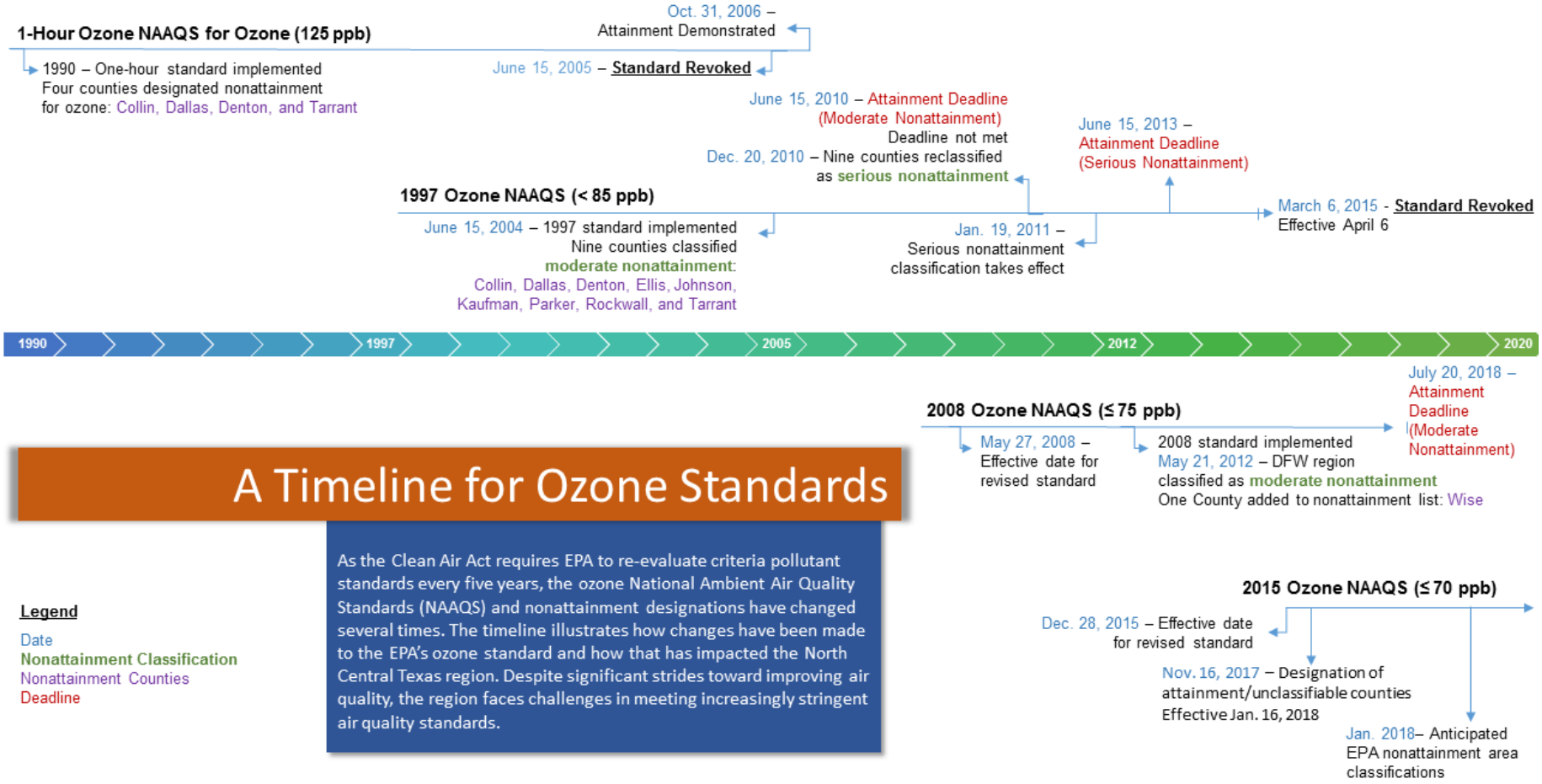


EV Charging Stations and Environmental Justice Areas



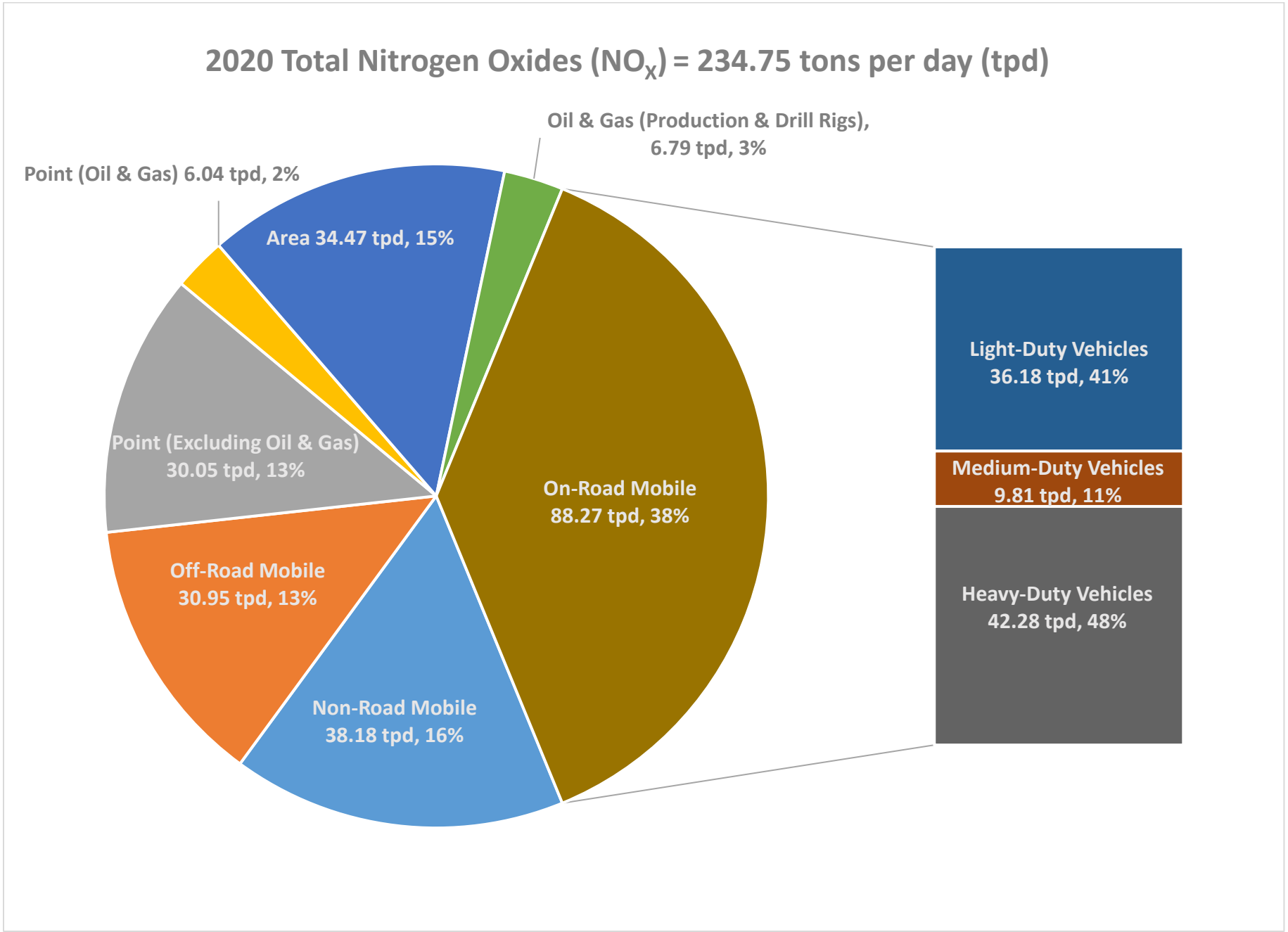
EV Charging Station Gap Analysis





A Timeline for Ozone Standards

As the Clean Air Act requires EPA to re-evaluate criteria pollutant standards every five years, the ozone National Ambient Air Quality Standards (NAAQS) and nonattainment designations have changed several times. The timeline illustrates how changes have been made to the EPA's ozone standard and how that has impacted the North Central Texas region. Despite significant strides toward improving air quality, the region faces challenges in meeting increasingly stringent air quality standards.


2020 Total Nitrogen Oxides (NO_X) = 234.75 tons per day (tpd)
Oil & Gas (Production & Drill Rigs), 6.79 tpd, 3%
Point (Oil & Gas) 6.04 tpd, 2%
Area 34.47 tpd, 15%
Point (Excluding Oil & Gas) 30.05 tpd, 13%
Off-Road Mobile 30.95 tpd, 13%
Non-Road Mobile 38.18 tpd, 16%
On-Road Mobile 88.27 tpd, 38%
Light-Duty Vehicles 36.18 tpd, 41%
Medium-Duty Vehicles 9.81 tpd, 11%
Heavy-Duty Vehicles 42.28 tpd, 48%

DFW Clean Cities Impacts – Results from 2020 Survey

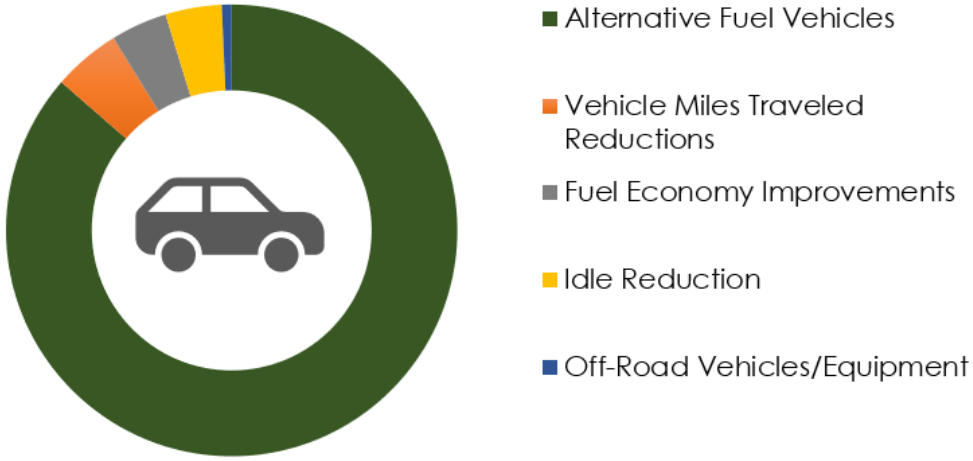
55 Fleets Reporting

10,165 Alternative Fuel Vehicles and Equipment

*Impacts Over Calendar Year 2020

dfwcleancities.org/annualreport

~23.95 Million Gasoline Gallon Equivalent (GGE) Reduced*



~367 Tons Ozone-Forming Nitrogen Oxides (NO_X) Reduced*

~1 Ton/Day

For Comparison: RTC Initiatives Credited in Conformity = ~2.12 Tons/Day

125,058 Tons Greenhouse Gas (GHG) Emissions Reduced*

Equivalent to Eliminating

5,306

Tanker Trucks of Gasoline

NCTCOG Air Quality Projects and Initiatives

The projects and initiatives listed in the table below are ongoing as of 2021. Status of these initiatives may change over time, and new efforts may develop in future years.

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Air North Texas Impacts: Consumers and Communities www.airnorthtexas.org Encourages participation and support of key elements in the State Implementation Plan and other air quality improvement strategies, as well as the reduction of energy use. Promotes simple things that people can do to help make a difference in the region's air quality.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Air Quality Funding Opportunities Impacts: Fleets, Consumers, and Communities www.nctcog.org/aqfunding Offers funding assistance periodically and promotes use of incentives available from other agencies (e.g., Environmental Protection Agency, Texas Commission on Environmental Quality).	✓				✓		✓	✓	✓	✓	✓
Clean Construction Specifications & Equipment Program Impacts: Communities and Fleets www.nctcog.org/construction Encourages use of equipment with lower emissions by encouraging use of existing incentives and promoting emissions-related contract requirements.	✓				✓		✓	✓		✓	✓
Clean Fleet Policy Impacts: Fleets www.nctcog.org/fleetpolicy Regional Transportation Council Resolution: See 'Clean Fleet Policy' map. Outlines emissions, fuel saving, and partnership goals for local fleets to help reduce environmental impact and increase collaboration and best-practice sharing.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

VMT: vehicle miles traveled; NO_X: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Dallas-Fort Worth Clean Cities Coalition Impacts: Communities, Consumers, and Fleets www.dfwcleancities.org Seeks to advance energy security, protect environmental and public health, and stimulate economic development by promoting practices and decisions to reduce fuel consumption and improve air quality, primarily in the transportation sector, and through public-private partnerships. Incorporates promotion of other clean vehicle initiatives such as Electric Vehicles North Texas and Engine Off North Texas.	✓				✓	✓	✓	✓	✓	✓	✓
Electric Vehicles North Texas Impacts: Communities, Consumers, and Fleets www.dfwcleancities.org/evnt Encourages and supports the transition to electric vehicles in North Texas through industry partnerships, fleet education, and consumer outreach; is part of the Dallas-Fort Worth Clean Cities Coalition.	✓				✓		✓	✓	✓	✓	✓
Regional Integration of Sustainability Efforts Impacts: Communities www.nctcog.org/envir/development-excellence/rise-coalition Supports collaboration among North Texas local governments on regional sustainability projects and initiatives. This coalition explores topic areas that provide participants opportunities to leverage regional resources and share best practices to achieve environmental and sustainability goals. Collaboration with the North Central Texas Council of Governments Environment & Development Department.							✓				

VMT: vehicle miles traveled; NO_x: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Regional Energy Management Impacts: Communities and Fleets https://www.nctcog.org/envir/natural-resources/energy-efficiency Provide education and resources to local stakeholders on the topic of energy management in an effort to increase efficiency and reduce energy consumption, which can reduce air pollution associated with energy generation. Acknowledge the growing connection between the transportation system and energy sectors as fuels diversify, especially with regard to electric vehicles. Work to increase use of renewable natural gas and promote electric vehicle grid integration as a grid resiliency tool. Collaboration with the North Central Texas Council of Governments Environment & Development Department.	✓				✓		✓	✓	✓	✓	✓
NCTCOG Air Quality Health Task Force Impacts: Communities https://nctcog.org/trans/about/committees/aq-health-monitoring-task-force Supports collaboration among government representatives, health officials, academic representatives, and air quality experts to evaluate data that may indicate a need for additional air quality improvement strategies to address concerns over localized air pollution, with a focus on transportation sources.							✓	✓		✓	

VMT: vehicle miles traveled; NO_x: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Engine Off North Texas (Idling) Impacts: Communities, Consumers, and Fleets www.engineoffnorthtexas.org Regional Transportation Council Resolution (Locally Enforced Motor Vehicle Idling Restrictions): See 'Locally Enforced Idling Restrictions' map. Addresses vehicle idling through a comprehensive anti-idling campaign that includes grant funding elements, promotion of idling restrictions for heavy-duty vehicles, and education on the various benefits of idle reduction.					✓		✓	✓	✓	✓	✓
Heavy-Duty Diesel Inspection and Maintenance Program Impacts: Fleets www.nctcog.org/dieselim Identifies emissions testing program for this currently exempt class of vehicles. Facilitates the Heavy-Duty Diesel Inspection and Maintenance Working Group.	✓				✓		✓	✓	✓		✓
Regional Emissions Enforcement Program Impacts: Consumers and Fleets www.nctcog.org/reep Identifies high-emitting vehicles with fictitious/counterfeit inspections and/or registrations.	✓				✓		✓	✓	✓		✓
Regional Smoking Vehicle Program Impacts: Consumers www.smokingvehicle.net Allows North Central Texas drivers to anonymously report vehicles emitting visible smoke and encourages reported drivers to voluntarily repair their vehicles by providing information and educational material.	✓				✓		✓	✓	✓	✓	✓

VMT: vehicle miles traveled; NO_X: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Car Care Awareness Impacts: Consumers http://www.ntxcarcare.org Partners with local nonprofit organizations and vehicle repair facilities to inform and educate the local community on vehicle maintenance related to emissions inspections.	✓				✓		✓	✓	✓	✓	✓
Saving Money and Reducing Truck Emissions/Freight Efficiency Outreach Program Impacts: Fleets www.nctcog.org/smarte Provides outreach and information to the trucking industry to improve awareness of strategies and technologies that help reduce fuel consumption and emissions while saving money on operating costs. This initiative incorporates elements of the Environmental Protection Agency SmartWay Transport Program, Dallas-Fort Worth Clean Cities Coalition, idling restrictions, and the Clean Fleet Policy in a way that is specifically catered to the trucking industry.	✓			✓	✓		✓	✓	✓	✓	✓
On-Road Vehicle Emissions Project Impacts: Consumers and Fleets Develop air quality planning strategies and emissions modeling comparisons through collecting on-road vehicle emissions data in the nonattainment area. Establish mobile emissions enforcement task forces.	✓				✓		✓	✓	✓	✓	✓
Alternative Fuel Corridor Study: IH 45 Corridor Communities Develops a plan for deployment of infrastructure that supports the use of zero-emission vehicles along Interstate 45 and supports an emphasis on the transition of medium- and heavy-duty vehicles in goods movement.	✓						✓	✓	✓	✓	✓

VMT: vehicle miles traveled; NO_x: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

NCTCOG Projects and Initiatives with Air Quality Benefits

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Congestion Management Process Impacts: Communities http://www.nctcog.org/trans/cmp/ Identifies and expands alternate modes of transportation available within congestion corridors before adding single-occupancy vehicle capacity. Includes, but is not limited to, the following projects: • High-Occupancy Vehicle/Managed Lanes • Intelligent Transportation Systems/Remote Sensing • Intersection Improvement Projects • Park-and-Ride Facilities • Parking Management/Way-Finding Signs • Traffic Signalization • Autonomous Vehicle Integration		✓	✓		✓	✓	✓	✓	✓	✓	✓
Employer Trip Reduction Program Impacts: Communities, Consumers http://www.nctcog.org/trans/cmp/tdm/ETR.asp Educates and encourages the use of alternative commute options such as rideshare programs (carpool and vanpool), transit, flexible work hours, telecommuting, bicycling, and walking.						✓	✓	✓	✓	✓	✓
Freeway Incident Management Training Impacts: Communities http://www.nctcog.org/trans/safety/FIM.asp Provides specific courses designed for first responders, managers, and executive-level policymakers in order to initiate a common, coordinated response to traffic incidents that will build partnerships, enhance safety for emergency personnel, reduce upstream traffic accidents, improve the efficiency of the transportation system, and improve air quality.		✓			✓	✓		✓	✓	✓	✓

VMT: vehicle miles traveled; NO_X: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Light-Emitting Diode Streetlight and Traffic Signal Replacement Program Impacts: Communities http://www.nctcog.org/trans/cmp/led/ Promotes conversion of streetlights and traffic signals to light-emitting diode lighting to save energy and reduce ozone precursor pollutants emitted from electric power generator plants within the region.							✓	✓		✓	✓
NCTCOG Try Parking It Website Impacts: Communities and Consumers https://www.tryparkingit.com/public/home.aspx Allows commuters to record information about alternative commute trips and to locate traditional carpool or vanpool matches. Offers buddy/mentor matches for transit, biking, and walking. Also includes the Regional Vanpool programs.			✓			✓	✓	✓	✓	✓	✓
Passenger Rail Transit Impacts: Consumers, Communities Coordinates with local transit authorities to identify corridors suitable for regional passenger rail transit lines.					✓	✓	✓	✓	✓	✓	✓
Sustainable Development Impacts: Communities http://www.nctcog.org/trans/sustdev/ Develops communities to be independent of vehicle travel through consideration of the interface between land use and transportation, planning for bicycle and pedestrian modes of transportation, and transit-oriented development.			✓		✓	✓	✓	✓	✓	✓	✓

VMT: vehicle miles traveled; NO_X: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

	Air Quality Emphasis Areas Addressed							Pollutants/Emissions Addressed			
Project/Initiative	**High Emitting Vehicles/ Equipment**	**Low Speeds**	**Cold Starts**	**Hard Accelerations**	**Idling**	**VMT**	**Energy/ Fuel Use**	**NO_X**	**VOC**	**$PM_{2.5}$**	**CO_2**
Truck Lane Restriction Program Impacts: Fleets, Communities http://www.nctcog.org/trans/goods/trucks/tlp.asp Improves mobility, safety, and air quality by identifying suitable transportation corridors for truck lane restrictions where trucks with three or more axles are prohibited from using the inside left lane, except when passing traffic. Works with local municipalities to implement enforcement ordinances.		✓			✓		✓	✓	✓	✓	✓

VMT: vehicle miles traveled; NO_x: nitrogen oxides; VOC: volatile organic compounds; $PM_{2.5}$: particulate matter; CO_2: carbon dioxide

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C. Environmental Considerations: Environmental Effects, Mitigation, and Stewardship

Policies

MTP Reference #	Environmental
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). *(While this is listed as a financial policy, it has specific implications for the environmental considerations portion of the plan.)*

Coordination with Environmental Resource and Regulatory Agencies – Comparison with State Plans and Maps

Metropolitan Planning Organizations must compare transportation plans to state agencies' plans, inventories, or maps of environmental resources. Some of this information, such as the locations of habitat for threatened and endangered species, is not publicly available to protect the environmental resource. In those cases, descriptions of agencies' priorities are included. The Natural Environment Screening results provided in **Exhibits C-21** to **C-24** also compare the long-range plan's projects to mapped data of environmental resources.

Texas Parks & Wildlife Department – Texas Conservation Action Plan

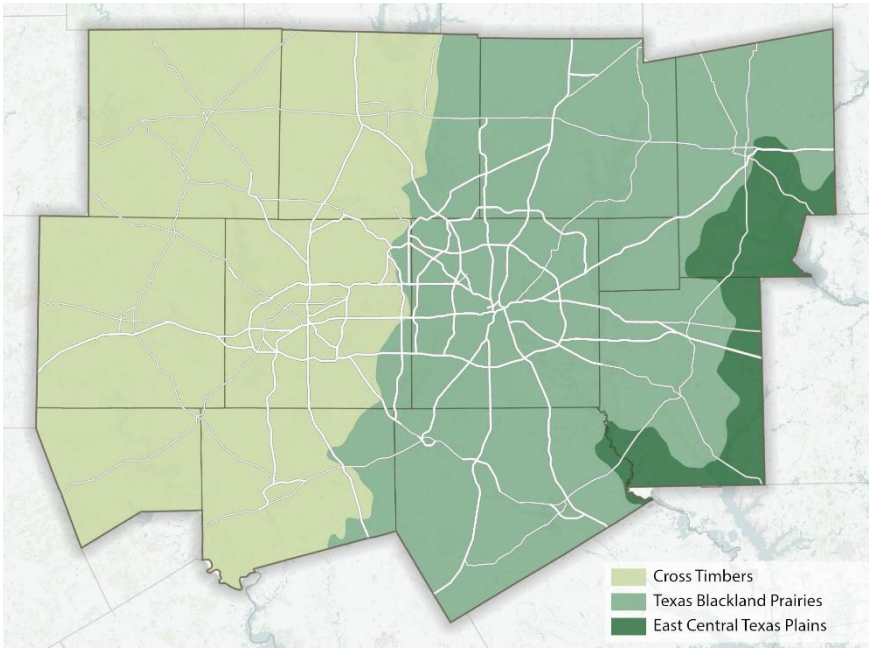
Priority Habitat Types: Ecoregions are geographic areas defined by their type, quality, and quantity of environmental resources. The North Central Texas 12-county Metropolitan Planning Area includes three ecoregions: 1) Texas Blackland Prairie, 2) Cross Timbers and Prairies, and 3) East Central Texas Plains, as shown in **Exhibit C-9**.

These ecoregions include habitats the TPWD (Texas Parks & Wildlife Department) has identified as high priorities for conservation

because they support a high number of rare species or threatened resources.[2] These habitats include:

- Native grasslands
- Surface water
- Groundwater
- Riparian areas and floodplains
- Corridors that allow animals to travel daily or seasonally
- Habitats that serve as breeding, feeding, and/or sheltering areas

Exhibit C-9: 12-County Metropolitan Planning Area Ecoregions



Native grasslands, including those found in the Texas Blackland Prairie, have been greatly diminished and fragmented as land is converted for agriculture, pasture, and urban development. The grasslands also face threats from non-native species and from native species that encroach on and degrade the grasslands.

Surface water provides drinking water and recreation for humans, but it also serves as habitat for many freshwater species, including migratory waterfowl, fish, mussels, and insects. These waters can be affected by increased urbanization; by conversion of natural areas to agricultural land; and by pollution, including runoff from roads. The mitigation assessment for the Mobility 2045 Update compares roadway projects to streams and rivers that may face transportation impacts. The results are found in **Exhibit 4-14** in the **Environmental Considerations** chapter.

Groundwater sources are replenished when precipitation infiltrates and percolates through the ground. Impervious surfaces such as roads and parking lots can prevent water from infiltrating the ground and instead create water runoff that flows into lakes, rivers, and streams.

Riparian areas and floodplains provide habitat to plants and animals that depend on streams that border these areas. The vegetation present in intact riparian areas protects water quality by preventing erosion, providing habitat for animals, and maintaining appropriate water temperature. Riparian areas can be damaged by flood management when stream banks are cleared for recreation, and when bridges and reservoirs are built.

Corridors that allow animals to travel daily or seasonally provide habitat for birds waiting out the winter months. They promote the birds' migration across the United States and between South and North America. Some of these birds are TPWD Species of Greatest Conservation Need.

[2] TPWD, Texas Conservation Action Plan State/Multi-Region Handbook, September 2012, https://tpwd.texas.gov/landwater/land/tcap/documents/tcap_statewide_multiregion_handbook.pdf

Habitat that provides areas for animals to congregate also serves as feeding and breeding grounds; however, the presence of humans can threaten these areas.

TPWD identifies priority ecosystems and species in its Texas Conservation Action Plan Ecoregion Handbooks.

Texas Blackland Prairies Ecoregion: Texas Blackland Prairies may be more endangered than any other ecoregion in the state. Agriculture and urban and suburban development have reduced the original blackland prairies to less than one-tenth of a percent of their original area. The estimated 5,000 remaining acres exist as small areas scattered across the ecoregion. This ecoregion, which earned its name because of the prairie's dark, rich soil, is far from homogenous. The ecoregion also includes woodlands, bottomland hardwoods, and isolated wetlands. TPWD considers the most threatened habitats in this ecoregion to be prairies and the wetlands that are geographically isolated from protected waterbodies.[3]

Indian grass at The Nature Conservancy's Clymer Meadow Preserve. The preserve is a remnant of native Texas Blackland Prairie in Hunt County (*Source: NCTCOG*)

The Texas Blackland Prairie, as shown in **Exhibit C-9**, covers almost half of the MPA (Metropolitan Planning Area), including large portions or all of Collin, Dallas, Ellis, Hunt, Kaufman, and Rockwall counties, and smaller portions of Denton, Tarrant, and Johnson counties. The TPWD Conservation Action Plan identifies the large transportation plans designed to serve the booming Dallas-Fort Worth region as a priority conservation issue in the Texas Blackland Prairies ecoregion.

Cross Timbers Ecoregion: The Cross Timbers includes about 890,000 acres of old-growth forest featuring post oak and blackjack oak. The ecoregion supports a high degree of biodiversity because of the great variety of habitats found in the area. Some plant species are endemic to the ecoregion, meaning they live nowhere outside of the Cross Timbers. However, this ecoregion contains little conserved land compared with other ecoregions in Texas.[4]

As shown in **Exhibit C-9**, this ecoregion covers much or all of Denton, Hood, Johnson, Parker, Tarrant, and Wise counties. TPWD identifies transportation plans as a priority conservation issue in the Cross Timbers ecoregion.

East Central Texas Plains Ecoregion: This ecoregion, also known as Post Oak Savannah, includes woodlands interspersed with small prairies, streams, and unique wetlands. The remaining prairies are remnants of what may have been the original ecosystem of this area. Development, agriculture, and wildfire suppression may have allowed trees and shrubs to overtake the prairies. The ecoregion's unique wetlands include bogs and swamps where endemic plants thrive. However, fewer than 1,000 acres of these unique wetlands are under conservation. Ecologically important streams in this ecoregion provide important habitat for rare wildlife.[5]

As shown in **Exhibit C-9**, this ecoregion includes portions of Kaufman, Hunt, and Ellis counties. The TPWD Conservation Action Plan identifies the expansion of agriculture, introduction of non-native grasses used for pasture, and development—including plans

[3] Texas Parks & Wildlife Department's Texas Conservation Action Plan 2012-2016: Texas Blackland Prairies Handbook

[4] Texas Parks & Wildlife Department's Texas Conservation Action Plan 2012-2016: Cross Timbers Handbook

[5] Texas Parks & Wildlife Department's Texas Conservation Action Plan 2012-2016: East Central Texas Plains Handbook

for new reservoirs—as the primary threats to the East Central Texas Plains.

Threatened and Endangered Species: TPWD's Rare, Threatened, and Endangered Species of Texas by County website[6] lists state- or federal-listed threatened or endangered species that may occur in Texas counties. The website also provides information on the agency's Species of Greatest Conservation Need. TPWD regulates state-listed species; the US Fish & Wildlife Service regulates federal-listed species under the Endangered Species Act of 1973, which was designed to prevent the extinction of plant and animal species and to preserve the habitat on which threatened and endangered species rely. A comparison of transportation projects to potential habitat for state- and federal-listed threatened or endangered species is incorporated into **Exhibits C-21** and **C-22** of the *Natural Environment Screening*, which is a preliminary screening tool; planners should still seek legally required biological or environmental opinions.[7]

Texas Parks & Wildlife Department – Wetlands Conservation Strategies

Less than 5 percent of Texas' total land area is wetlands, yet Texas has the fourth-greatest wetland acreage in the lower 48 states. Wetlands provide habitat and protect environmental quality. While wetlands provide many ecosystem services or benefits to society, approximately half of the historic wetland acreage in Texas has been converted to cropland or urban development.

TPWD identifies several conservation strategies. These include:

- Wetland restoration
- Wetland enhancement
- Wetland creation

The North Central Texas Council of Governments supports these conservation strategies through projects and programs, including the Section 214 Program with the US Army Corps of Engineers Regulatory Division, Quantifying the Benefits of Environmental Stewardship, the Environmental Stewardship Program, and the Wetland and Stream Mitigation Assessment.

In the mitigation assessment for the Mobility 2045 Update, planners compared roadway projects in the plan to wetlands identified by three data sources: TPWD's Ecological Mapping Systems, US Fish & Wildlife Services' National Wetlands Inventory, and the US Geological Survey-supported National Land Conservation Database.

Texas Forest Service – Texas Forest Action Plan

The Texas Forest Action Plan[8] identifies the issues that will affect Texas forests. The five issues and their priority areas within the MPA are:

1. **Wildfire and Public Safety:** The risk of wildfire is growing in Texas due to population growth, land use change, and an increase in drought frequency. What was historically an issue isolated to rural regions has become a threat statewide for both small towns and urban areas. Within the MPA, Wise, Parker, Hood, and Johnson counties are priority counties.
2. **Sustainability of Forest Resources in East Texas:** Sustainability of the forests of East Texas, which have traditionally provided important economic, social, and environmental benefits, is a growing concern due to increasing population and land use change. This issue does not apply to Metropolitan Planning Area counties.
3. **Central Texas Woodlands Conservation:** Conservation of this area is under threat, with increasing pressures from population growth, fragmentation, land use changes, wildfires, oak wilt, and

[6] Texas Parks & Wildlife Department's Rare, Threatened, and Endangered Species of Texas by County, http://tpwd.texas.gov/gis/rtest/

[7] US Fish Wildlife Service, *Endangered Species*, http://www.fws.gov/endangered/

[8] Texas Forest Action Plan is available at: https://tfsweb.tamu.edu/ForestActionPlan

invasive species. Within the MPA, Parker County is a high priority and Wise and Hood counties are a moderate priority.

4. **Urban Forest Sustainability:** Urban forests benefit people by removing air pollution, reducing stormwater runoff, reducing energy costs, and sequestering carbon. However, urban trees are threatened by rapid population growth, land use changes, and natural disasters. Eight of the top 10 priority areas are within the MPA: Arlington, Irving, Grand Prairie, Frisco, McKinney, Mesquite, Carrollton, and Richardson.
5. **Water Resource Protection:** Forests and woodlands are an important component to meeting the water needs in Texas. Threats to the forests' ability to contribute to clean water include an increase in population, frequency of extreme and persistent drought, and conversion of forests to impervious surfaces. Within the MPA, Wise, Parker, and Hood counties are areas of very high priority.

Texas Historical Commission – Statewide Historic Preservation Plan

The Statewide Historic Preservation Plan[9] is developed every 10 years and serves as a basis for the development of individual action plans for other agencies. The plan seeks to preserve the historic and cultural objects, places, buildings, and landscapes in Texas through a process of identification, protection, and enhancement. The Texas Historical Commission vision and values for the plan include valuing historic places, including a strategy to create economic, social, and environmentally healthy communities and enhance general well-being. The plan also emphasizes the value of working across disciplines and interests to achieve mutually beneficial goals. The environmental policies of NCTCOG (North Central Texas Council of Governments) support these visions and values.

The NCTCOG Regional Ecosystem Framework Interactive Viewer website[10] provides data relevant to cultural, historic, and archeological sites in the region. This information is available for planners during the development of transportation projects. **Exhibit C-10** displays the locations of historic sites, national register districts and properties, and historic cemeteries. **Exhibit C-11**, **Exhibit C-12**, and **Exhibit C-13** display the Texas Department of Transportation's Potential Archeological Liability maps, which model the relative likelihood of the presence of archeological sites. One map illustrates the likelihood of archeological sites near the surface and another map illustrates the likelihood at deeper levels.[11] A third map illustrates potential archeological liability in Hunt County; the Texas Department of Transportation used a different method for this county. Because roadway and transit recommendations in the Mobility 2045 Update do not include specific alignments or routes for transportation infrastructure, cultural, historic, and archeological sites must be considered in greater detail during later development phases of transportation projects.

Texas Water Development Board – Regional and State Water Plan

Regional water plans are created for each of the 16 water planning regions in Texas.[12] The goal of the plans is to ensure affordable and adequate water supplies for Texas through a 50-year planning period, even in times of severe drought. The regional plans propose

[9] Texas Historical Commission, Texas' Statewide Historic Preservation Plan 2011-2020 Updated 2016, http://www.thc.texas.gov/public/upload/publications/Texas%20Statewide%20Preservation%20Plan%202011-2020_Updated%202016.pdf

[10] NCTCOG, Regional Ecosystem Framework Interactive Viewer, www.nctcog.org/REF

[11] Texas Department of Transportation, Potential Archeological Liability Maps, https://www.txdot.gov/inside-txdot/division/environmental/compliance-toolkits/toolkit/archeological-map.html

[12] North Central Texas includes counties in Regions C, D, and G. 2021 *Regional Water Plans*, https://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp and *Water for Texas: 2022 State Water Plans*, https://www.twdb.texas.gov/waterplanning/swp/2022/index.asp

water management strategies to be considered in the state plan, which is recommended to the state legislature. Recommendations relevant to transportation include major water management strategies, recommendation of ecologically significant stream segments, and identification of areas uniquely eligible for reservoir construction. Major water management strategies that may impact transportation projects could include pipelines, new reservoirs, reservoir changes, and construction of new infrastructure. These strategies should be considered in the transportation planning process as they could become future recommendations.

Texas Commission on Environmental Quality – Strategic Plan, Texas Groundwater Protection Strategy

The TCEQ (Texas Commission on Environmental Quality) Strategic Plan[13] outlines the agency's goals and action plans for a five-year period. Each goal aims to protect public health and the environment. This aligns with NCTCOG policies to protect the region's environmental assets through the planning process. **Exhibit C-8** in the **Healthy Communities** section identifies Mobility 2045 Update policies and programs that seek to protect public health.

TCEQ's Texas Groundwater Protection Strategy[14] outlines plans for groundwater conservation and protection in the state. Groundwater can provide drinking water and is ecologically important to the flow of water bodies. TCEQ prioritizes groundwater management areas that have been designated by the Texas Water Development Board. In a 2021 report to the Texas Legislature,[15] TCEQ identified Dallas County as a priority groundwater management area. The following North Central Texas counties were identified as both priority groundwater management areas and groundwater conservation districts: Collin, Denton, Ellis, Hood, Johnson, Parker, Tarrant, and Wise. Because a majority of the counties in the MPA are designated as priority areas, the transportation planning process should consider the effects of transportation on groundwater. NCTCOG's Transportation *integrated* Stormwater Management framework, described in the **Environmental Considerations** chapter, provides strategies to protect water quality.

[13] TCEQ Strategic Plan Fiscal Years 2021-2025: https://www.tceq.texas.gov/publications/sfr/strategic-plan

[14] TCEQ, Texas Groundwater Protection Strategy, https://www.tceq.texas.gov/groundwater/groundwater-planning-assessment/prot_prog.html

[15] Priority Groundwater Management Areas and Groundwater Conservation Districts: Report to the 87th Texas Legislature: https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-20.pdf

Exhibit C-10: Historic Sites, National Register Districts and Properties, and Historic Cemeteries

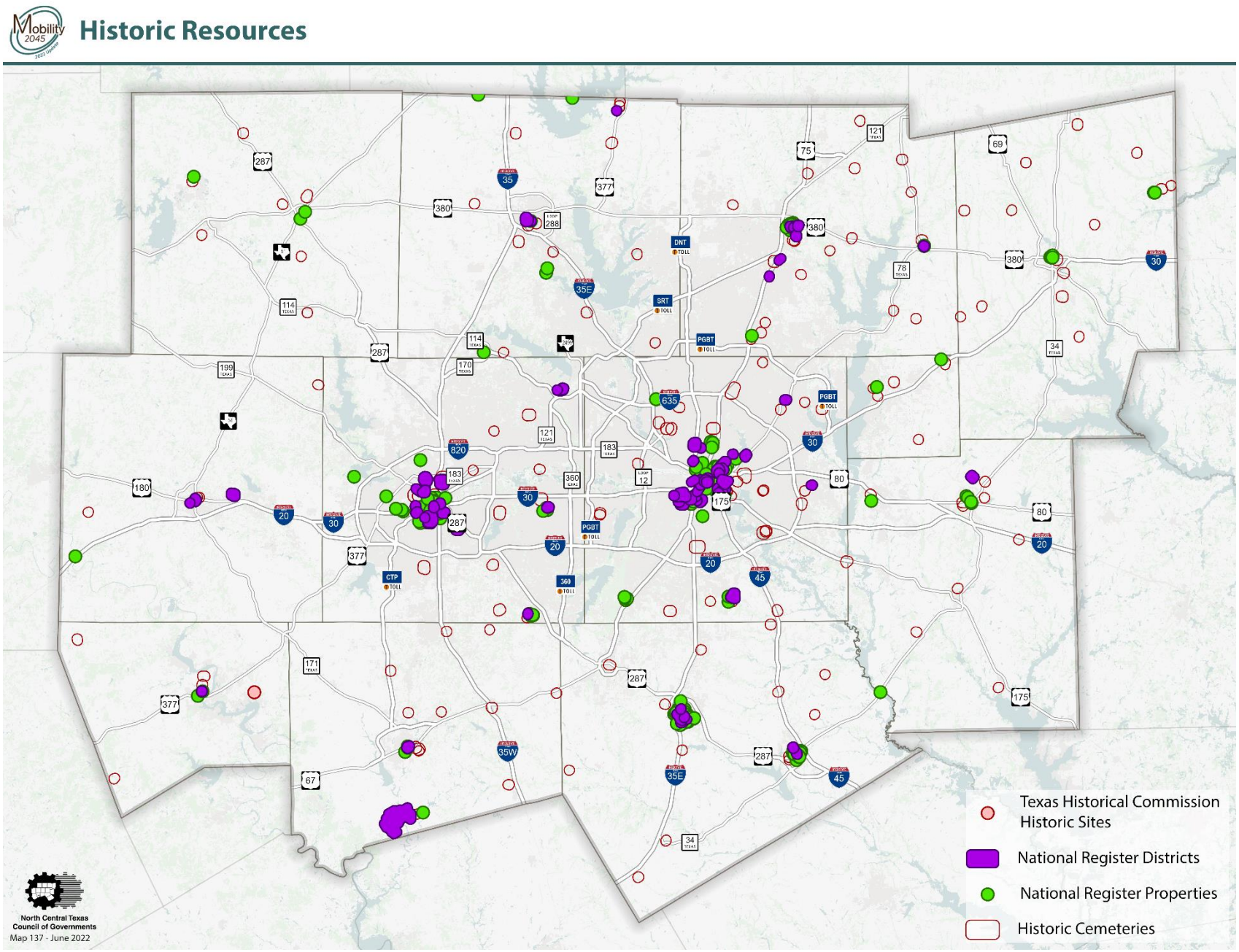


Exhibit C-11: Likelihood of Archeological Sites near the Surface

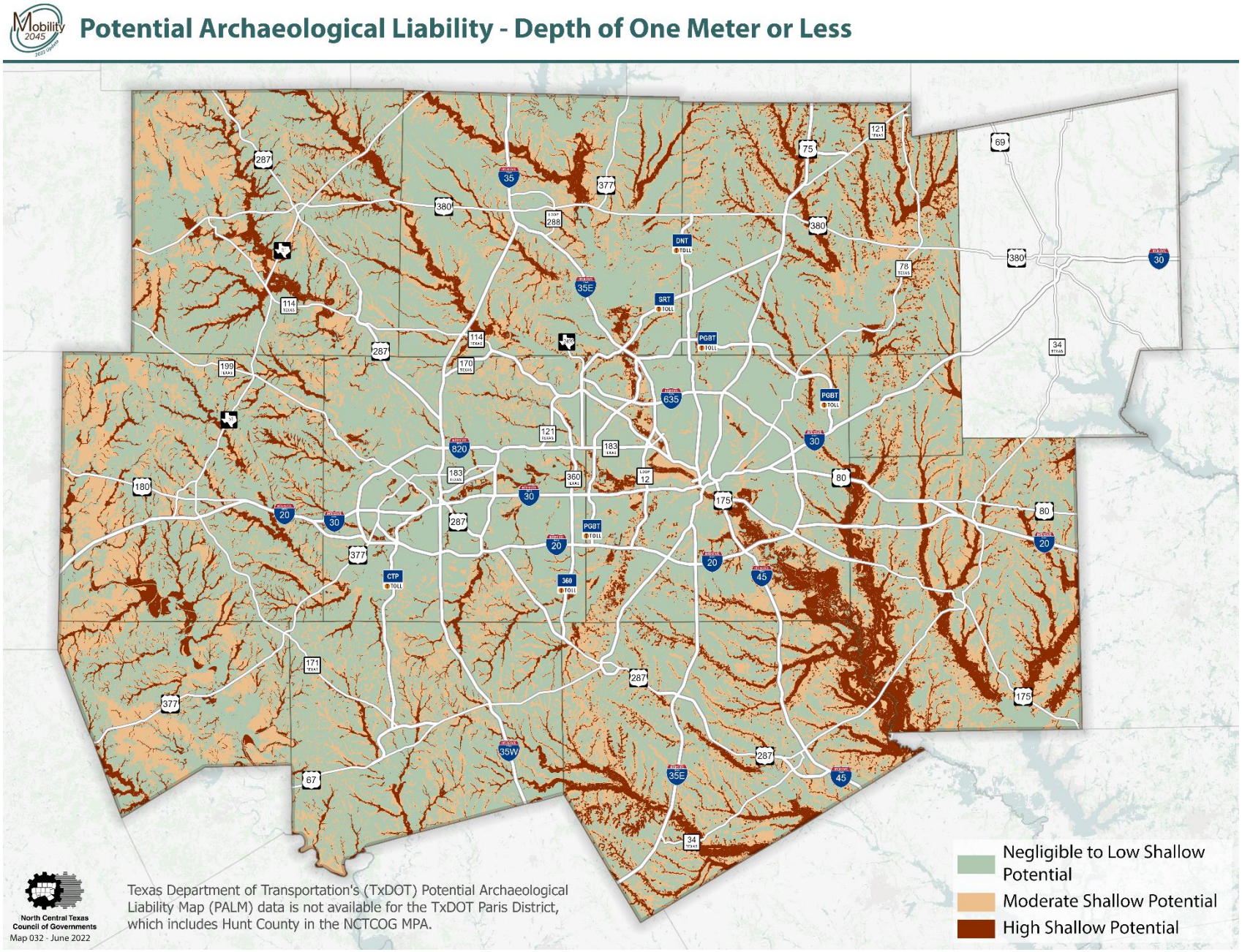


Exhibit C-12: Archeological Sites at Deep Levels

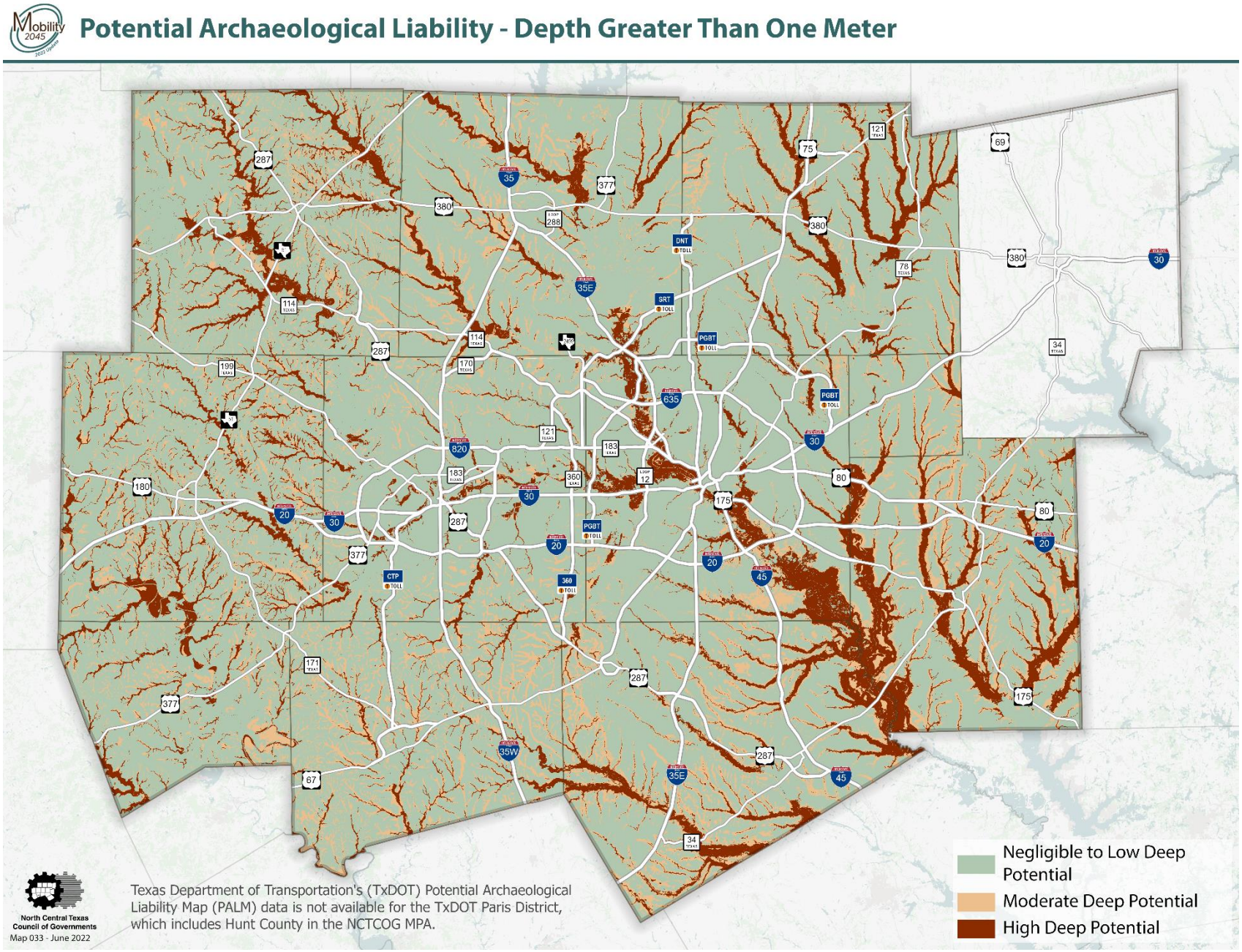
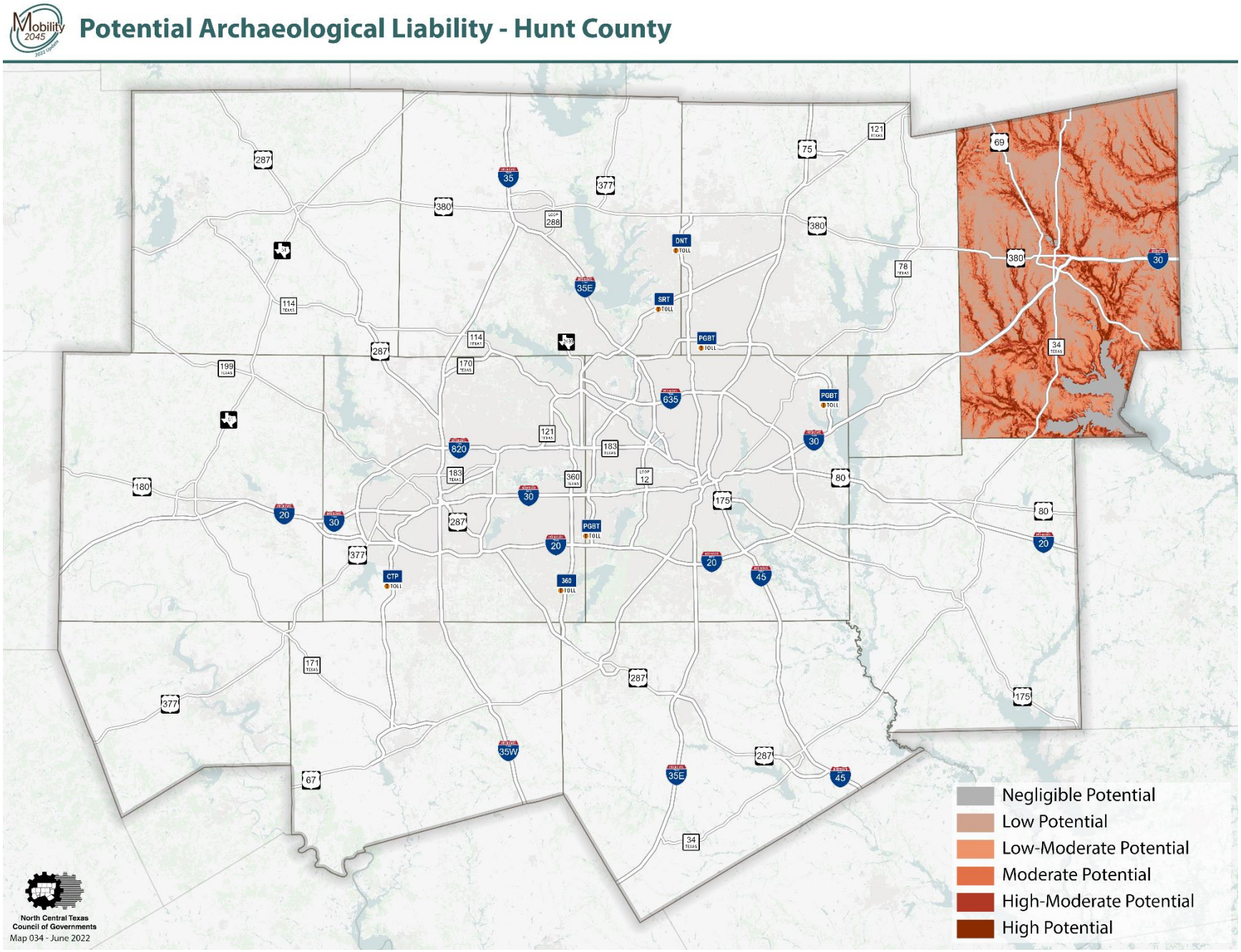


Exhibit C-13: Archeological Sites in Hunt County



TCEQ designates impaired stream segments in their Texas Integrated Report Index of Water Quality Impairments. A comparison to these segments is made in the *Natural Environment Screening* section of this appendix.

TCEQ also monitors air quality. The **Air Quality** section of the **Environmental Considerations** chapter and appendix address this topic.

Texas A&M Natural Resources Institute – Texas Land Trends

As the North Central Texas population continues to grow, more land will be developed for urbanization.[16]

Texas Land Trends: Texas Landowner Changes and Trends[17] describes Texas' growing population and its relationship with changing rural land ownership. Several changes to rural land ownership are of interest to transportation planners:

- The increase in transfer of property ownership
- Small acreage operations
- New operations near urban regions

The increasing age of current landowners could lead to a shift in property ownership to younger generations, who may lack the experience to operate businesses. An increase in smaller-acreage operations could increase land fragmentation and the risk for lower profitability and operational challenges. Lack of knowledge and small acreage size could result in financial strain for operators, which, combined with the pressure of a growing urban population, could lead to a willingness to convert land to other more profitable uses such as residential. This change in land use could reduce natural resource services and increase development and the need for transportation facilities.

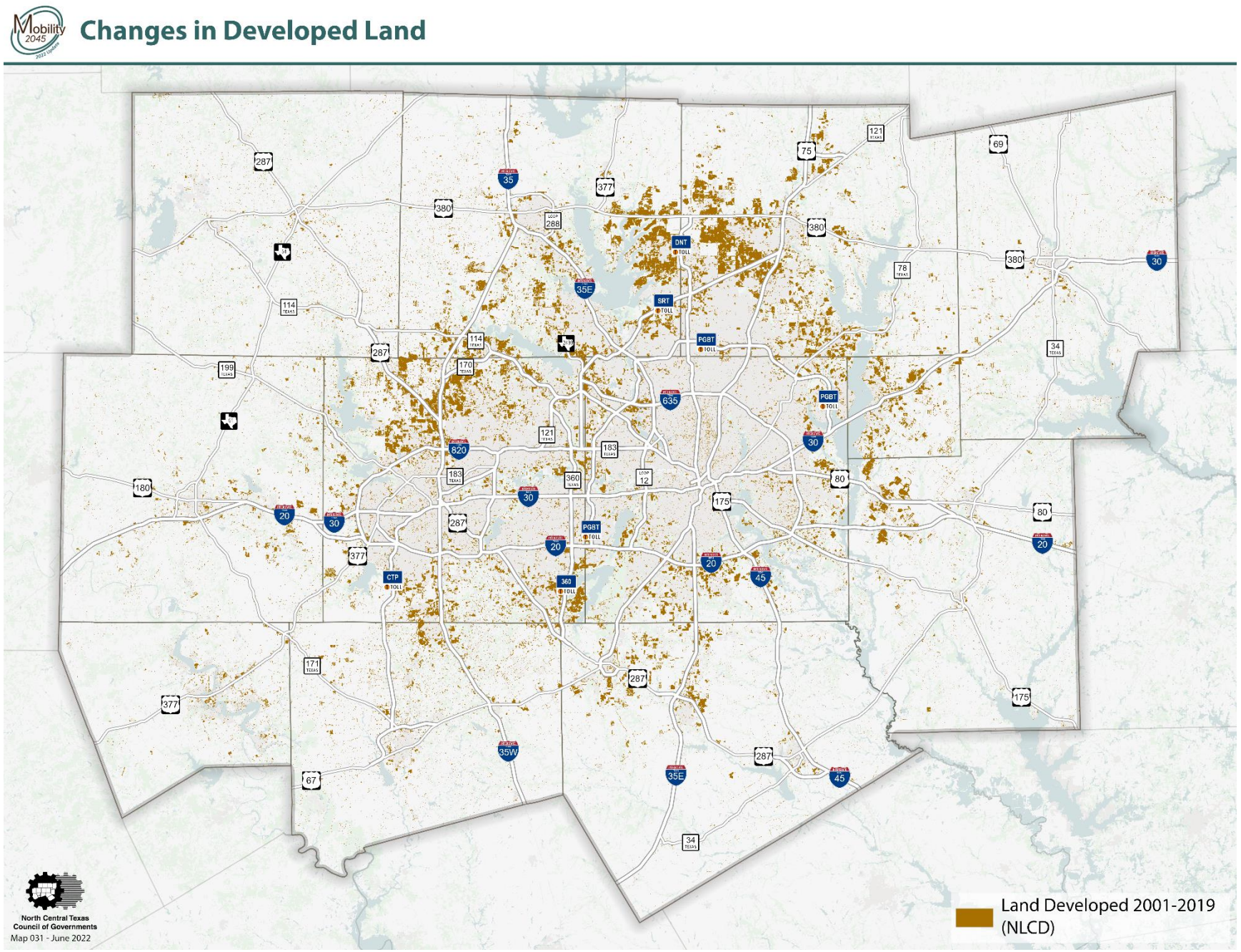
New transportation infrastructure can have a direct or indirect impact on open space and undeveloped land. NCTCOG's Environmental Stewardship Program and Quantifying the Benefits of Environmental Stewardship provide opportunities for voluntary mitigation of effects such as habitat fragmentation and the reduction of open space.

Technology also could have an impact on land-use trends. The potential widespread deployment of automated vehicles could affect the demand to expand the urbanized area in the region. To date, the region has accommodated increasing population by building transportation infrastructure to accommodate relatively low-density outward growth. It has relied upon privately owned vehicles that sit unused for over 90 percent of the time. Large amounts of land are used to provide roads and parking spaces. If automated vehicles are deployed in shared mobility fleets, especially using vehicles carrying multiple passengers (e.g., microtransit), then the region's mobility needs can be satisfied using fewer vehicles that park less than would be utilized under current approaches. This would reduce the demand for parking and allow property owners to repurpose parking facilities for high valued uses, including new residential facilities in areas that are developed already. This infill development could reduce the pressure to expand the metropolitan region outward and reduce the need to invest in new transportation infrastructure.

[16] National Land Cover Database, 2001 and 2019, https://www.mrlc.gov/

[17] Texas A&M Natural Resources Institute, Texas Land Trends: Texas Landowner Changes and Trends, September 2017, http://txlandtrends.org/media/1018/ltchanginglandownerfinal2.pdf

Exhibit C-14: Changes in Developed Land



Environmental Coordination Stakeholders

Exhibit C-15 represents a sampling of the tribal, federal, and state agencies NCTCOG seeks to coordinate with during transportation planning and the development of transportation projects.

Exhibit C-15: Environmental Coordination Stakeholders

	Description and Areas of Expertise
Federally Recognized Tribal Nations	
Federally Recognized Tribal Nations	These tribes have areas of interest located within the MPA boundary: Absentee Shawnee Tribe of Oklahoma Apache Tribe of Oklahoma Caddo Nation Cherokee Nation Comanche Nation of Oklahoma Delaware Nation Jena Band of Choctaw Indians Kialegee Tribal Town Kickapoo Traditional Tribe of Texas Kickapoo Tribe of Oklahoma Kiowa Tribe Mescalero Apache Tribe Muscogee Nation Poarch Band of Creek Indians Shawnee Tribe Thlopthlocco Tribal Town Tonkawa Tribe of Oklahoma Wichita and Affiliated Tribes Comment on transportation plans is sought from these tribes.
Federal Agencies	
EPA (US Environmental Protection Agency), www.epa.gov	The EPA is a multidisciplinary agency that offers resources, including data sets, research, and expertise in programs such as air, pesticides, pollution prevention, toxics and chemicals, water, and wastes and recycling. The EPA has expertise in the Clean Water Act, Clean Air Act, Environmental Data Registry, and Pollution Prevention Act.
DOE (US Department of Energy), www.energy.gov	The DOE addresses the nation's policies regarding energy, and its responsibilities include energy conservation and energy-related research. The DOE's area of expertise includes energy efficiency, renewable energy, sustainable transportation, and vehicle technologies.
USDOI (Department of the Interior), www.doi.gov	The USDOI manages the nation's resources, including water, wildlife, and energy, and upholds the country's relationship with tribal nations. The department is a cabinet-level agency that includes the bureaus and offices that protect the nation's natural and cultural resources.
USFWS (Department of the Interior – US Fish and Wildlife Service), www.fws.gov	USFWS administers the Endangered Species Act and provides technical assistance associated with Section 404 of the Clean Water Act as it relates to sensitive species. The National Wetlands Inventory is also maintained by USFWS. UFSWS encourages the design of transportation projects that provide the greatest value to the greatest number of people while avoiding or minimizing impacts to habitat and the disruption of the ecological processes that naturally sustain these areas.
USGS (Department of the Interior – US Geological Survey), www.usgs.gov/	The mission of the USGS is to provide reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; assist others in managing water, biological, and other natural resources; and enhance and protect quality of life. The USGS provides technical expertise and datasets in geography, geology, hydrology, and biology.

	Description and Areas of Expertise
USACE (Department of Defense – US Army Corps of Engineers), www.usace.army.mil/	The USACE Regulatory Program implements Sections 404 and 408 of the Clean Water Act and Sections 9, 10, and 14 of the Rivers and Harbors Act of 1899 through regulations that serve to protect that nation's valuable aquatic resources and civil works projects. USACE has expertise in the process for Section 401 of the Clean Water Act and Section 214 of the Water Resources Development Act. Additional programs within USACE are responsible for flood protection, lake master plan revisions, and recreation.
FEMA (Department of Homeland Security – Federal Emergency Management Agency), www.fema.gov	The mission of FEMA is to lead the effort to prepare the nation for all hazards and effectively manage federal response and recovery efforts following any national incident. FEMA administers the National Flood Insurance Program.
USCG (Department of Commerce – Coast Guard), www.uscg.mil/	The mission of USCG is to protect the public, the environment, and US economic interests in the nation's ports and waterways, along the coast, on international waters, or in any maritime region as required. USCG administers Section 9 of the Rivers and Harbors Act.
USDA-NRCS (US Department of Agriculture – Natural Resources Conservation Service), www.nrcs.usda.gov/	NRCS provides leadership in a partnership effort to help people conserve, maintain, improve, and protect natural resources and the environment. They provide technical assistance to land owners, local governments, communities, and federal agencies in planning and implementing conservation systems. NRCS also provides services related to watershed rehabilitation, watershed protection and flood prevention, and watershed surveys and planning, all within the guidance of the Watershed Protection and Flood Prevention Act of 1954. The implementation of the Farmland Protection Policy Act is also the responsibility of the NRCS. The Natural Resources Inventory, state and national soil surveys, and other farmland data are also maintained by the NRCS.
NRHP (National Park Service – National Register of Historic Places), https://www.nps.gov/subjects/nationalregister/index.htm	NRHP is the nation's official list of cultural resources and historic places worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources.
FHWA (US Department of Transportation – Federal Highway Administration), www.fhwa.dot.gov/	The core mission of FHWA is to improve mobility on the nation's highways through national leadership, innovation, and program delivery. The primary focus of FHWA strategies is improving highway system performance – particularly its safety, reliability, effectiveness, and sustainability. Initiatives such as Every Day Counts and Planning and Environment Linkages, in addition to other FHWA programs, are aimed at shortening project delivery time, enhancing the safety of roads, protecting the environment, and improving mobility and livability. FHWA provides guidance and technical expertise to state and local agencies.
FTA (US Department of Transportation – Federal Transit Administration), www.transit.dot.gov/	The FTA supports locally planned and operated public transit systems, including buses, subways, light rail, commuter rail, trolleys, and ferries, through financial and technical assistance.
FAA (US Department of Transportation – Federal Aviation Administration), www.faa.gov/	The FAA is responsible for the safety, efficiency, and environmental responsibility of civil aviation.

	Description and Areas of Expertise
State Agencies	
TCEQ (Texas Commission on Environmental Quality), www.tceq.texas.gov/	TCEQ is a regulatory agency that aims to protect public health and conserve natural resources through monitoring impacts to water, air, and regulated materials. TCEQ provides expertise on the Clean Air Act, National Flood Insurance Program, and Section 401 of the Clean Water Act. TCEQ is responsible for administering the State Superfund Program, Texas Pollutant Discharge Elimination System, Municipal Separate Storm Sewer System, and reviewing Stormwater Prevention Pollution Plans.
TxDOT (Texas Department of Transportation), www.txdot.gov	TxDOT, in cooperation with local and regional officials, is responsible for planning, designing, building, operating, and maintaining the state's transportation system. One of TxDOT's visions is to be a progressive state transportation agency recognized and respected by the citizens of Texas by providing comfortable, safe, durable, cost-effective, environmentally sensitive, and aesthetically appealing transportation systems. TxDOT provides expertise on the National Environmental Policy Act.
TFS (Texas Forest Service), https://tfsweb.tamu.ed	The mission of TFS is to provide statewide leadership to ensure the state's forests, trees, and related natural resources are wisely used, nurtured, protected, and perpetuated for the benefit of all Texans.
GLO (Texas General Land Office), www.glo.texas.gov	The core functions of the Texas GLO are tied to the protection and preservation of the natural- and human-made resources of the state. GLO manages state lands and mineral rights, including sales and leases. As it relates to transportation projects, a GLO easement may be required if the project crosses or disturbs any state-owned streambeds.
THC (Texas Historical Commission), www.thc.texas.gov/	THC is the state agency for historic preservation. Projects that include the disturbance of existing features should include a search of the THC database to screen for potential historic significance. Projects that include ground disturbance should include an assessment of the potential for disturbance of archeological or other culturally significant sites. THC oversees the State Archeological Designation and the Texas Historic Sites Atlas.
TPWD (Texas Parks & Wildlife Department), https://tpwdtexas.gov	TPWD is a state agency with a mission to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing, and outdoor recreation opportunities for the use and enjoyment of present and future generations. TPWD can offer services to local municipalities such as habitat assessments, habitat restoration assistance, erosion control techniques, and ecologically sensitive landscaping. TPWD oversees the Texas Conservation Action Plan, which focuses on habitat and Species of Greatest Conservation Need. Species listed as threatened or endangered at the state or federal level are included as Species of Greatest Conservation Need.
Texas RRC (Railroad Commission), www.rrc.state.tx.us/	Texas RRC has regulatory divisions that oversee the Texas oil and gas industry, gas utilities, pipeline safety, safety in the liquefied petroleum gas industry, and the surface mining of coal. Texas RRC has authority of pollution of surface waters associated with oil and gas exploration under Section 404 of the Clean Water Act. The Public Geographical Information System Map Viewer is also maintained by Texas RRC.
Texas SECO (State Energy Conservation Office), https://comptroller.texas.gov/programs/seco/index.php	As the state energy office, SECO assists local governments in developing energy efficiency and renewable energy programs and offers financial assistance for improving or retrofitting buildings.

	Description and Areas of Expertise
TWDB (Texas Water Development Board), www.twdb.texas.gov	The mission of TWDB is "to provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water in Texas." TWDB produces information and data on ground water, population projections, water demand, flooding, water conservation, and water-related maps. The agency provides guidance and expertise on water-related financial assistance and planning.

Programs and Projects: A Closer Look at the Regional Ecosystem Framework

In 2011, NCTCOG developed the REF (Regional Ecosystem Framework), a tool that provides a foundation for using the watershed approach when considering conservation- and ecosystem-based priorities during development of infrastructure projects.

The foundational concepts for the REF include "*Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects*."[18] Nine resource and regulatory agencies participated in preparing this Eco-Logical report in 2006.

The REF is a geographic information systems-based tool that consists of 10 layers focused on three central ecological parameters. NCTCOG coordinated with resource and regulatory agency stakeholders to determine what was included in each of the categories:

Green Infrastructure*	Water Considerations	Ecosystem Value
• Wildlife habitat • Natural areas • Agricultural land	• Impaired water segments • Flood zones • Surface water quantity • Wetlands	• Rarity • Diversity • Ecosystem sustainability

* Green Infrastructure in this context refers to open spaces, including natural and working lands. Green infrastructure is typically referenced as opposite to gray infrastructure, which refers to the urban built environment.

Regonal Ecosystem Framework Update

NCTCOG updated the REF in 2014 with funds from the Federal Highway Administration's second Strategic Highways Research Program. While data was not available to update all layers, the following were updated:

- Flood zones
- Impaired water segments
- Agricultural lands
- Wildlife habitat
- Wetlands

Scoring Methodology

For scoring purposes, the North Central Texas region was divided into ¼ km² grid cells. For each of the 10 REF layers, NCTCOG assigned a score of 1 to 5 to each grid based on the presence of the layer. For example, if more than 50 percent of the area of a grid cell contained wetlands, it received a high score of 5 for its wetlands layer. Subwatersheds were assigned a score for each of the REF layers based on the average scores of the grids that fall within the subwatershed.

The resulting subwatershed maps indicate areas of relative ecological importance in the region. However, it is important to note that the majority of the REF layers represent quantity of a resource, not quality. The following maps show the subwatershed scores for each of the 10 layers. Additional information about the underlying data sources for each of the REF layers can be found at www.nctcog.org/ref.

Corridor Application

Beyond the regional application, the REF data has been applied to corridor-specific projects to determine potential impacts to the natural environment. This application utilizes the subwatershed grid-level data and determines impacts based on a set distance from the project or potential corridors/alignments. The data gathered through this approach can provide feasibility-level information for the natural

[18] Federal Highway Administration, Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects, https://www.environment.fhwa.dot.gov/env_initiatives/eco-logical.aspx

environment and can help planners and project engineers avoid potential impacts or locate potential impacts that may require further studies or mitigation. This approach allows a greater chance to avoid potential impacts to natural resources and can provide data to compare potential alignments or corridors. The information produced in corridor applications supports the linkage between the planning and environmental process and supports pre-National Environmental Policy Act decisions.

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

REF Definitions and Data Sources

Agricultural Lands: The Agricultural Lands score represents a subwatershed's quantity of agricultural lands classified as 2011 National Land Cover Database Pasture/Hay and Cultivated Crops.

Diversity: The REF Diversity score is based on aggregate data from the Environmental Protection Agency's Region 6 REAP (Regional Ecological Assessment Protocol) database. The four sub-layers used to calculate the REAP Diversity include: 1) Appropriateness of Land Cover, 2) Contiguous Size of Undeveloped Area, 3) Shannon Land Cover Diversity, and 4) Ecologically Significant Stream Segments.

Ecosystem Sustainability: The REF Ecosystem Sustainability score is based on aggregate data from the REAP database. The Ecosystem Sustainability layer consists of 11 measures that can be loosely grouped into fragmentors and stressors. Fragmentors include contiguous land cover type, regularity of ecosystem boundary, appropriateness of land cover, waterway obstruction, and road density. Stressors include airport noise, Superfund National Priority List and State Superfund Sites, water quality, air quality, Resource Conservation and Recovery Act, Treatment-Storage-Disposal Sites, Corrective Action and State Voluntary Cleanup Program Sites, and urban/agricultural disturbance.

Flood Zones: The REF Flood Zones score is based on the percentage of a subwatershed that falls inside a 100-year or 500-year floodplain identified by the Federal Emergency Management Agency's Digital Flood Insurance Rate maps.

Impaired Water Segments: The REF Impaired Water Segment score is based on Clean Water Act 303(d) Segments State Priority Data from the Texas Commission on Environmental Quality.

Natural Areas: The REF Natural Areas score is based on areas *North Texas 2050*[19] describes that "generally reflect floodplains, major public parks and open spaces, shores along major lakes, and potential connections between these natural assets."

Rarity: The REF Rarity score is based on aggregate data from the REAP database. The four sub-layers used to calculate the REAP Rarity layer include: 1) Vegetation Rarity, 2) Natural Heritage Rank, 3) Taxonomic Richness, and 4) Rare Species Richness.

Surface Water Quantity: The REF Surface Water Quantity score is based on the quantity of surface waters present in a subwatershed.

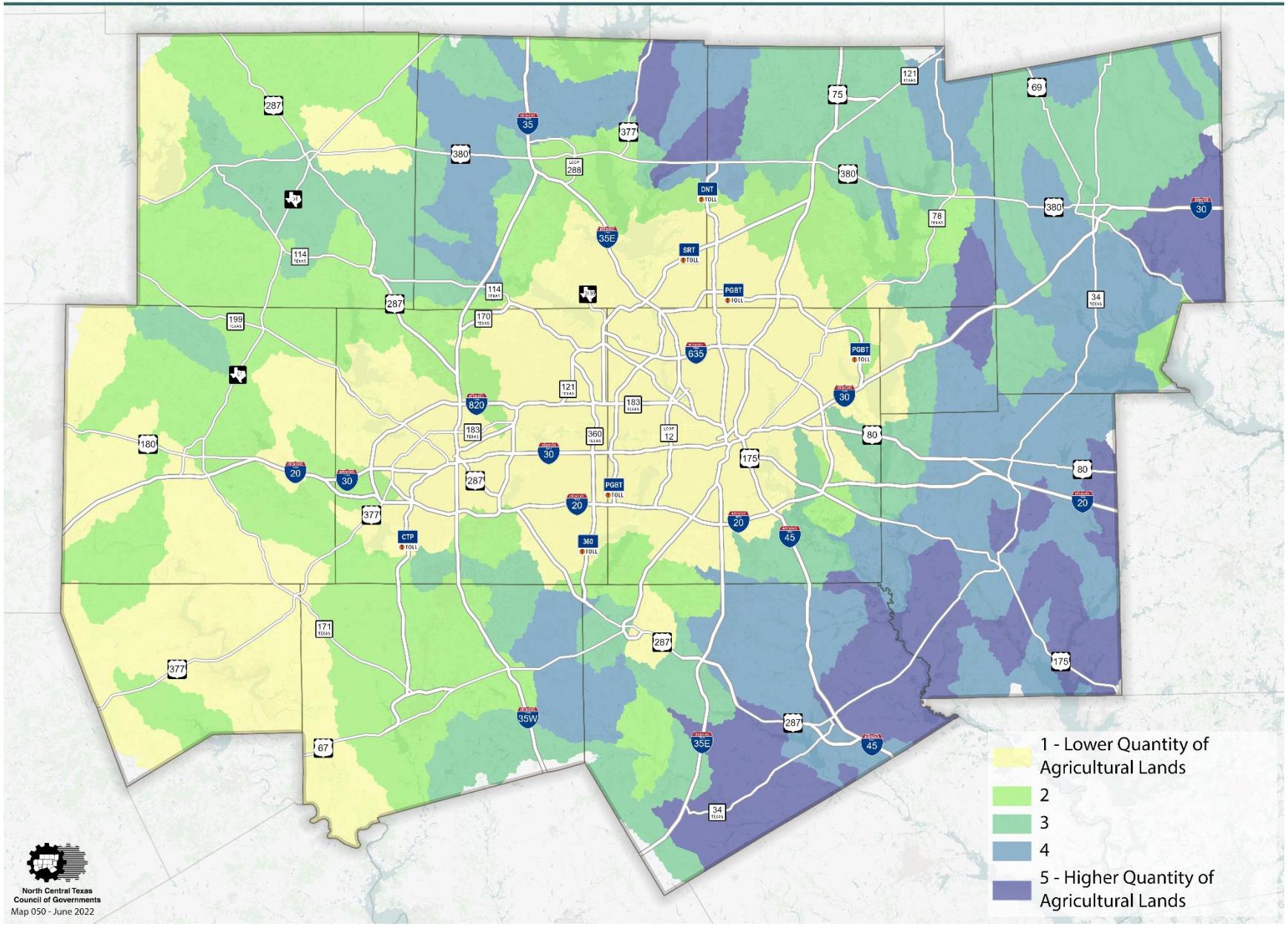
[19] Vision North Texas, 2010, *North Texas 2050*, http://www.visionnorthtexas.org/regional_summit/North_Texas_2050.pdf

The data source is the US Geological Survey National Hydrography Dataset.

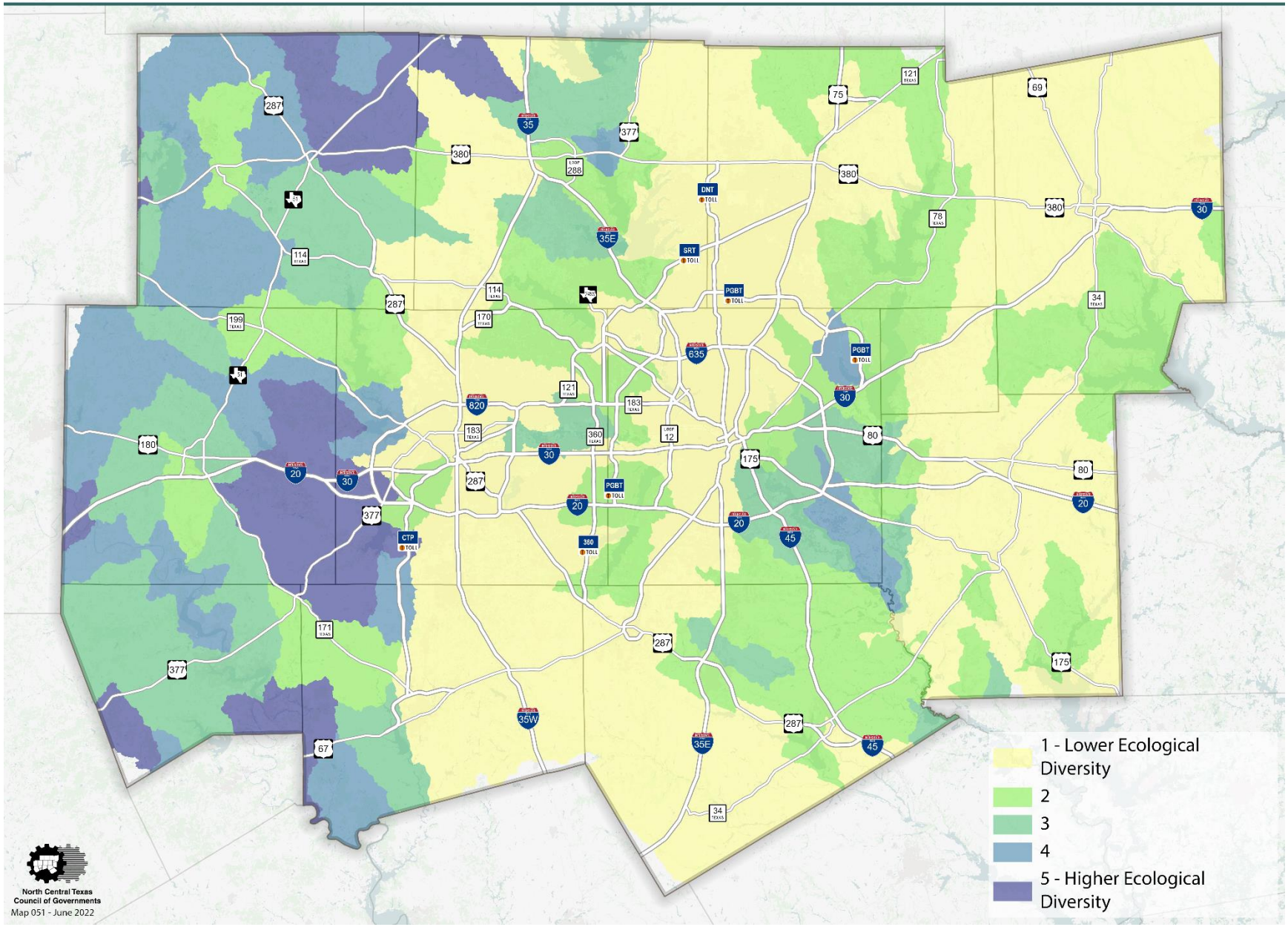
Wetlands: The REF Wetlands score represents a subwatershed's quantity of wetlands classified as 2011 National Land Cover Database Woody Wetlands or Emergent Herbaceous Wetlands.

Wildlife Habitat: The REF Wildlife Habitat score represents a subwatershed's quantity of lands classified by the 2011 National Land Cover Database as Forestlands, Shrublands, Grasslands, Wetlands, or Open Water.

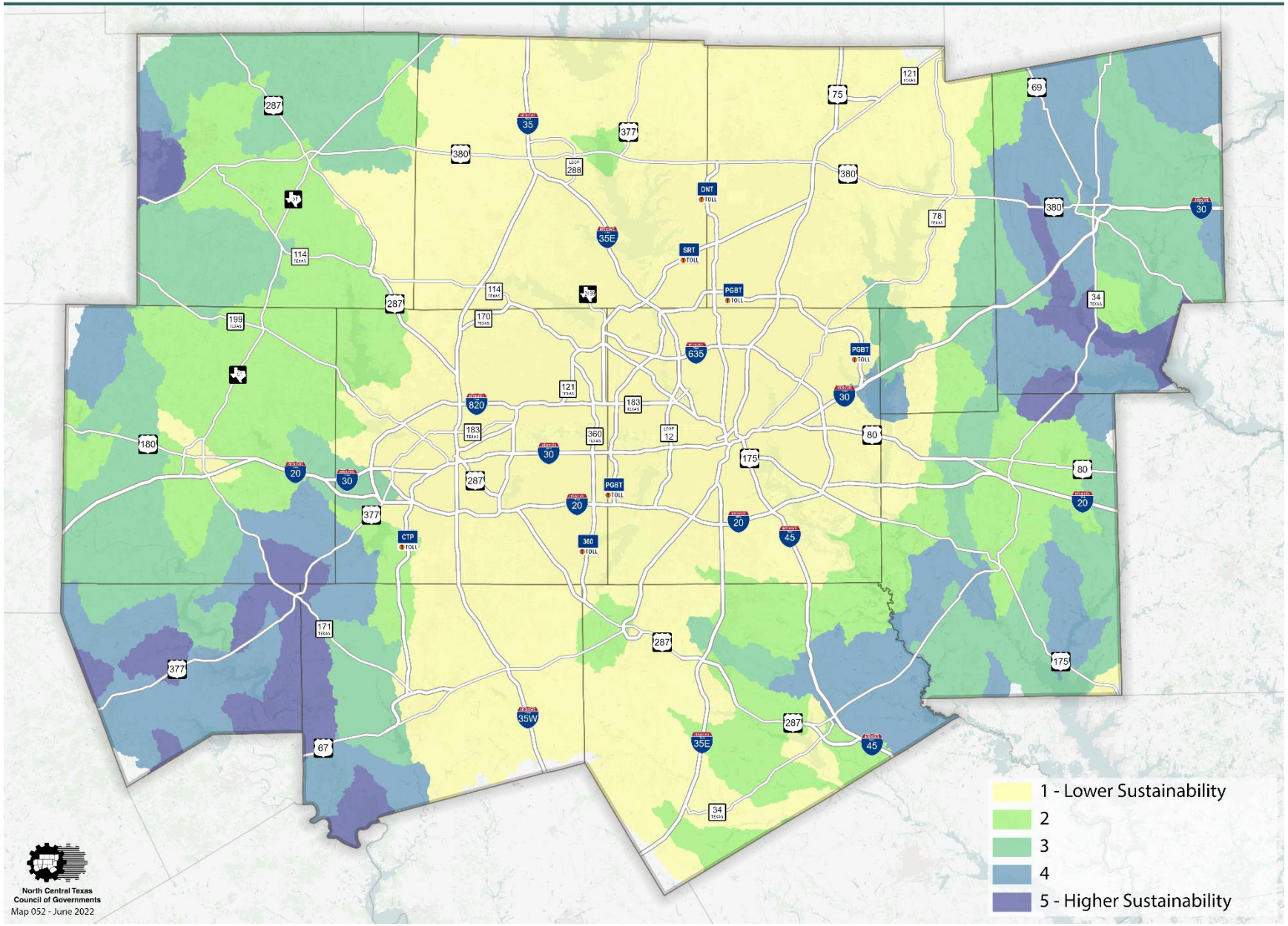
Regional Ecosystem Framework - Agricultural Lands



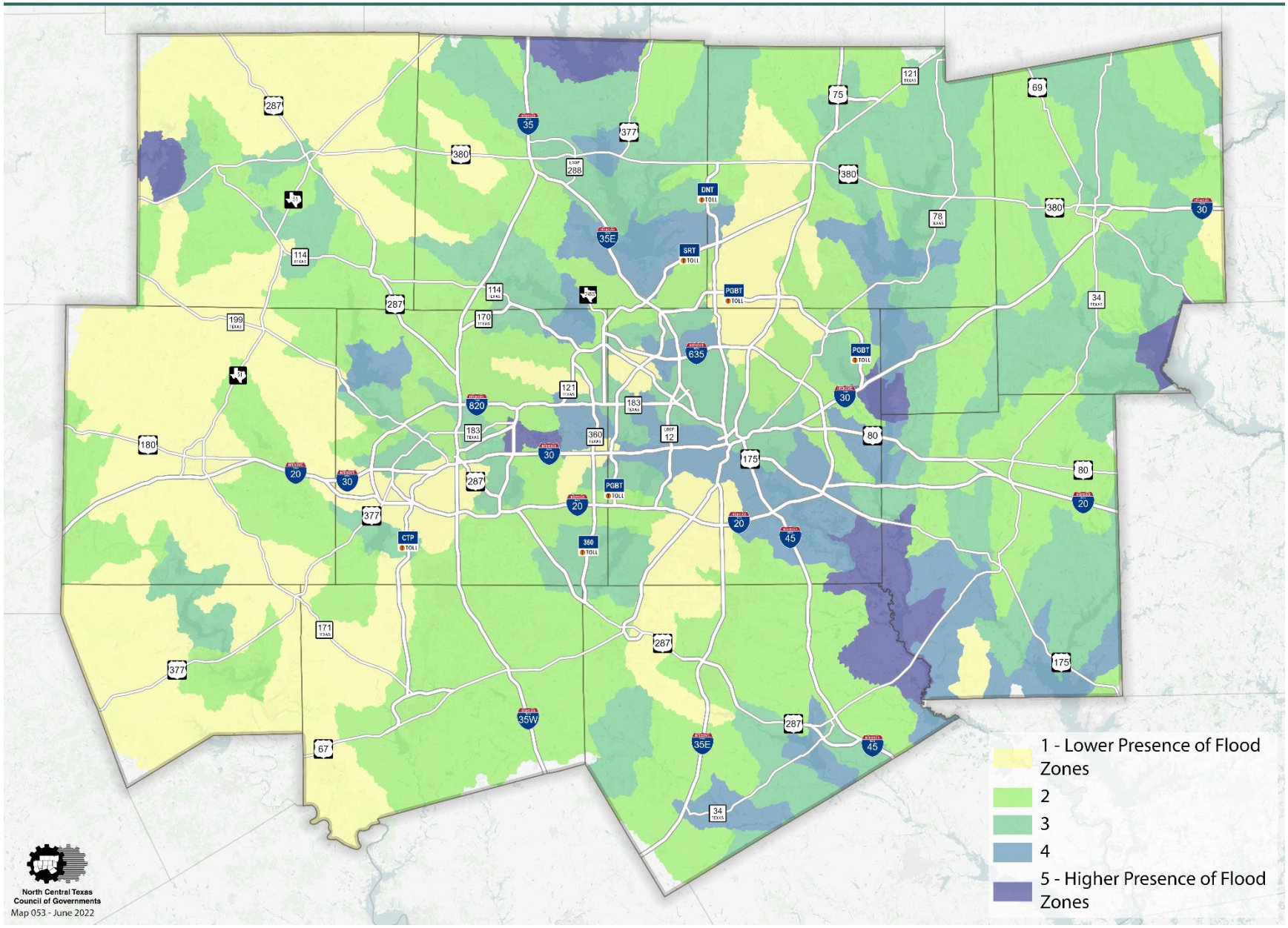
Regional Ecosystem Framework - Diversity



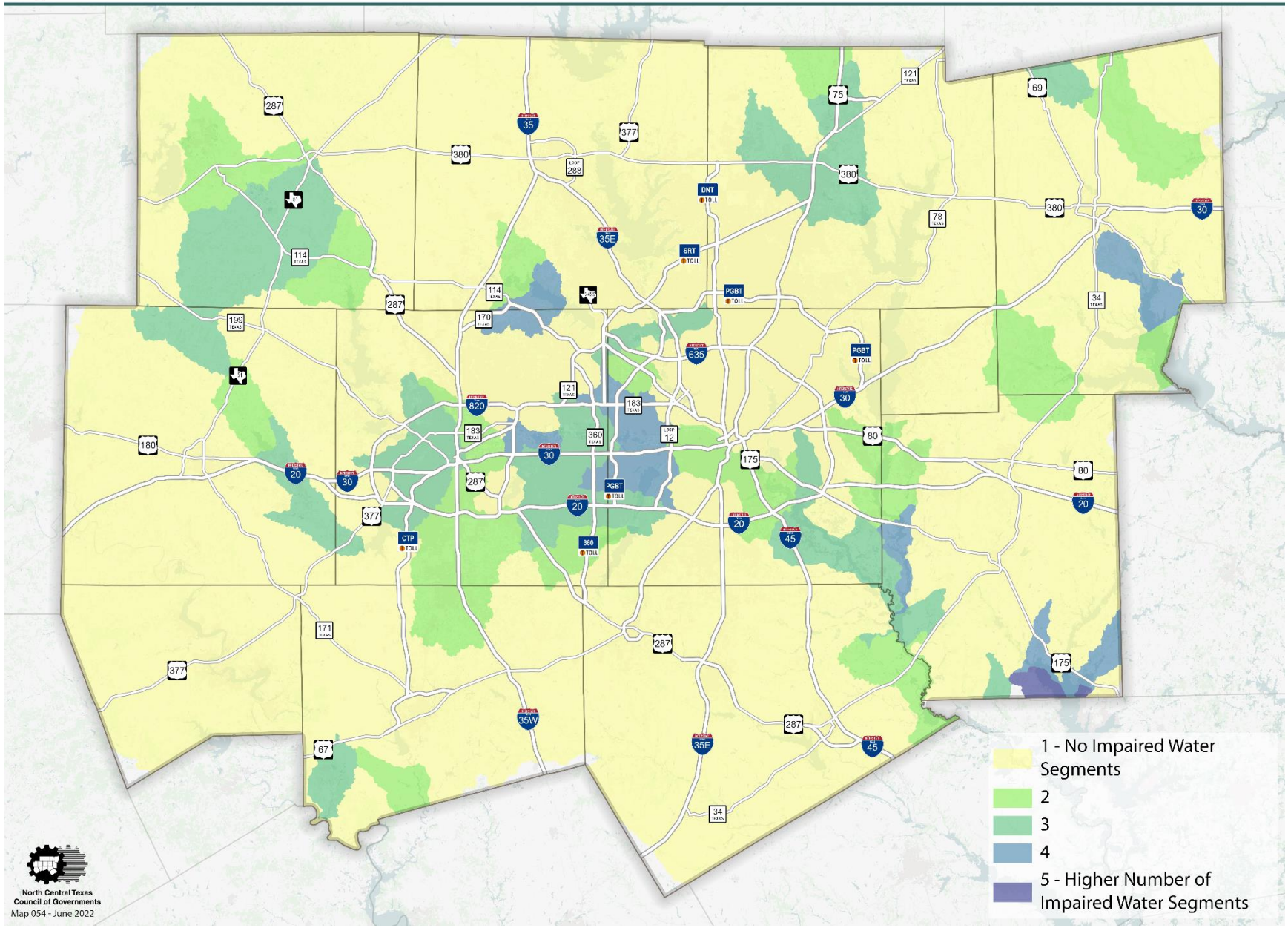
Regional Ecosystem Framework - Ecosystem Sustainability



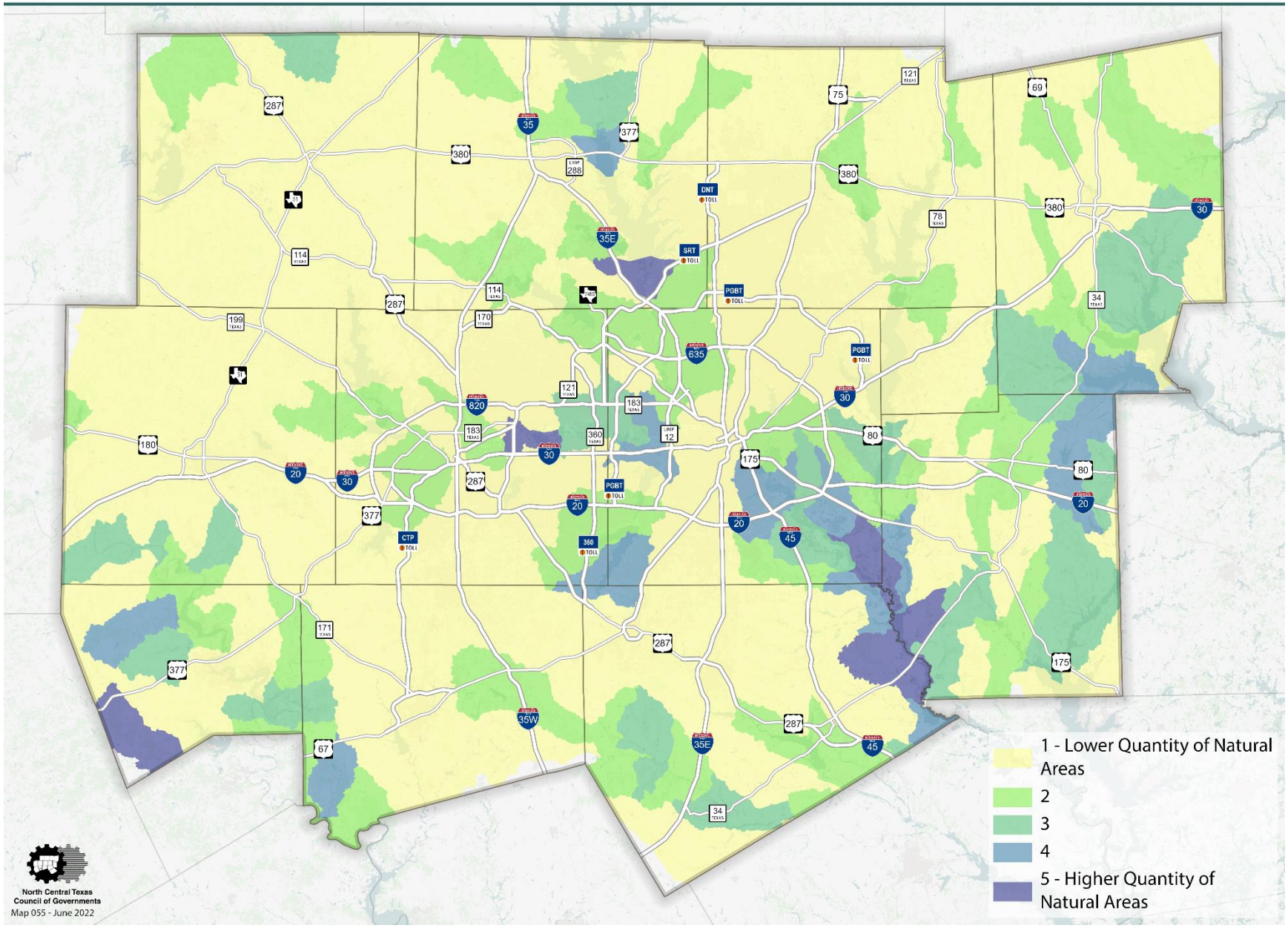
Regional Ecosystem Framework - Flood Zones



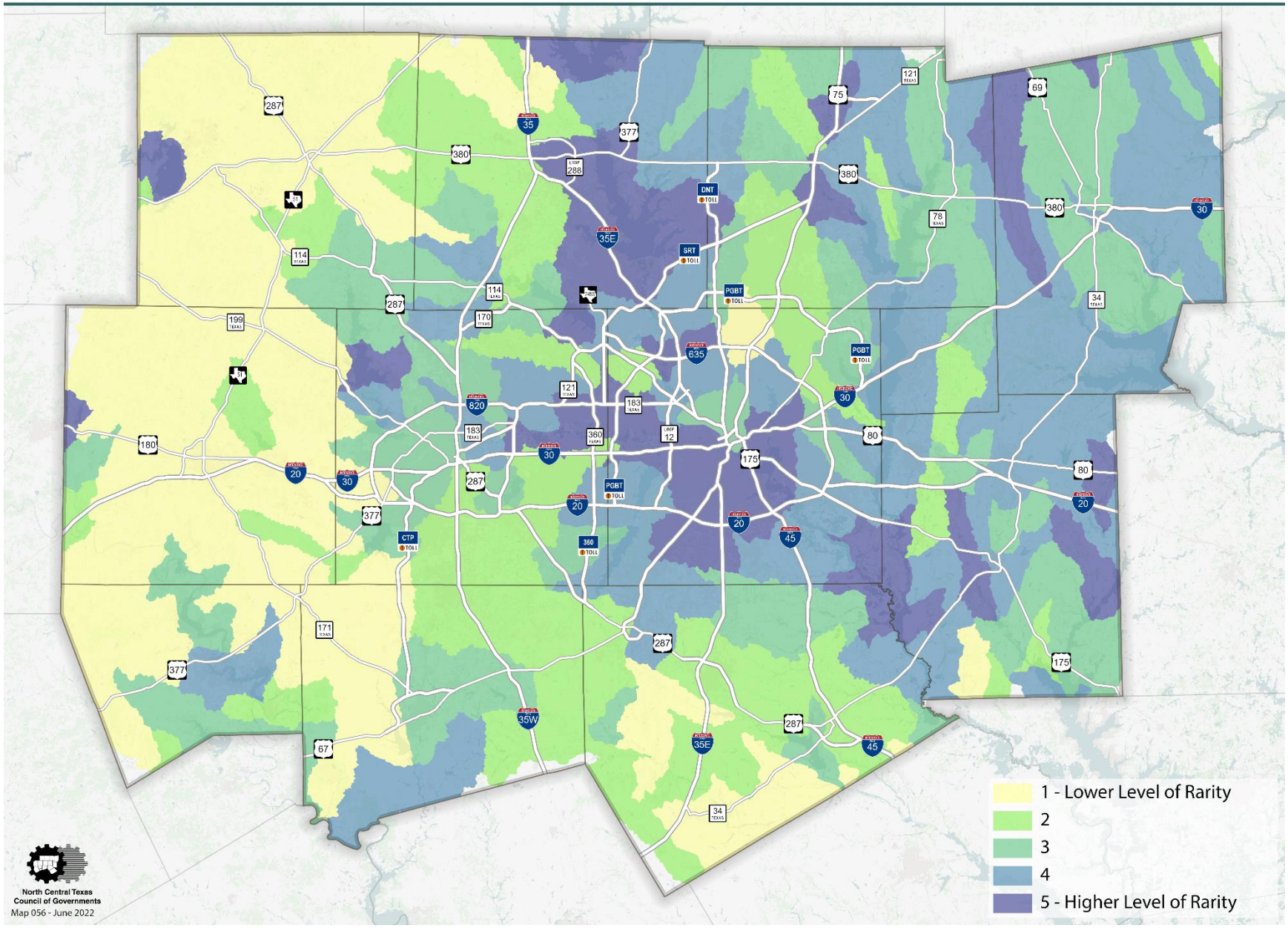
Regional Ecosystem Framework - Impaired Water Segments



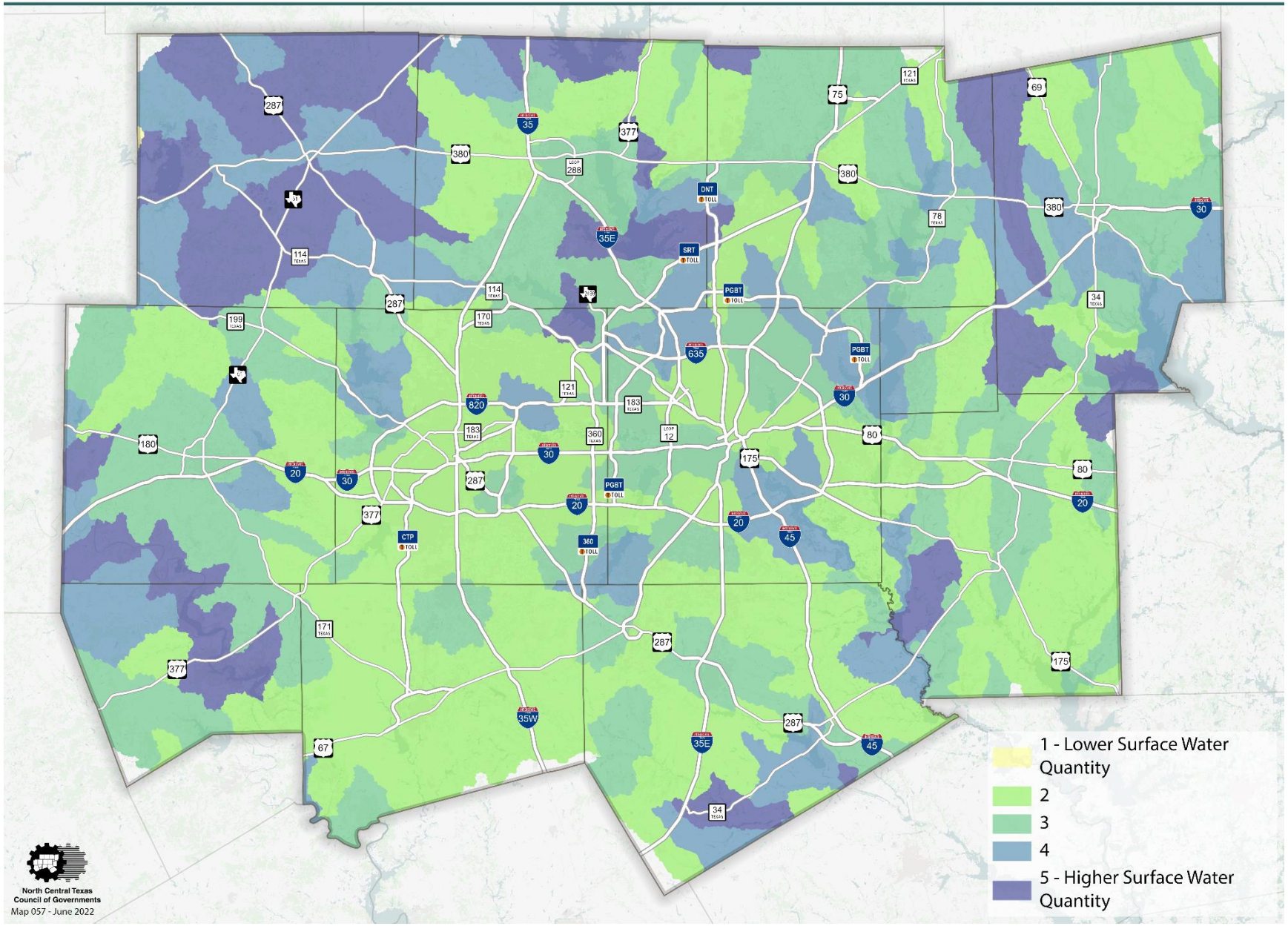
Regional Ecosystem Framework - Natural Areas



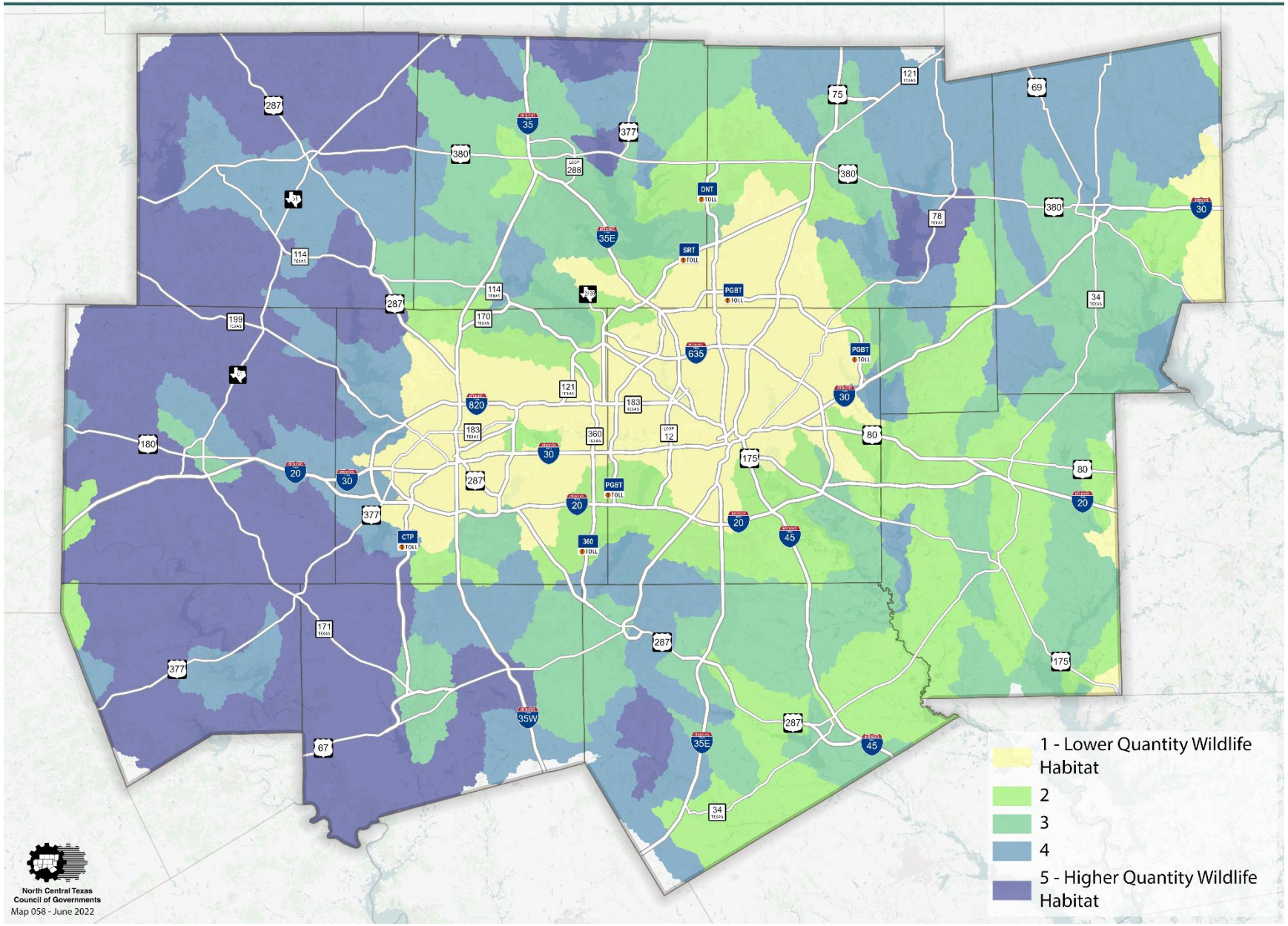
Regional Ecosystem Framework - Rarity



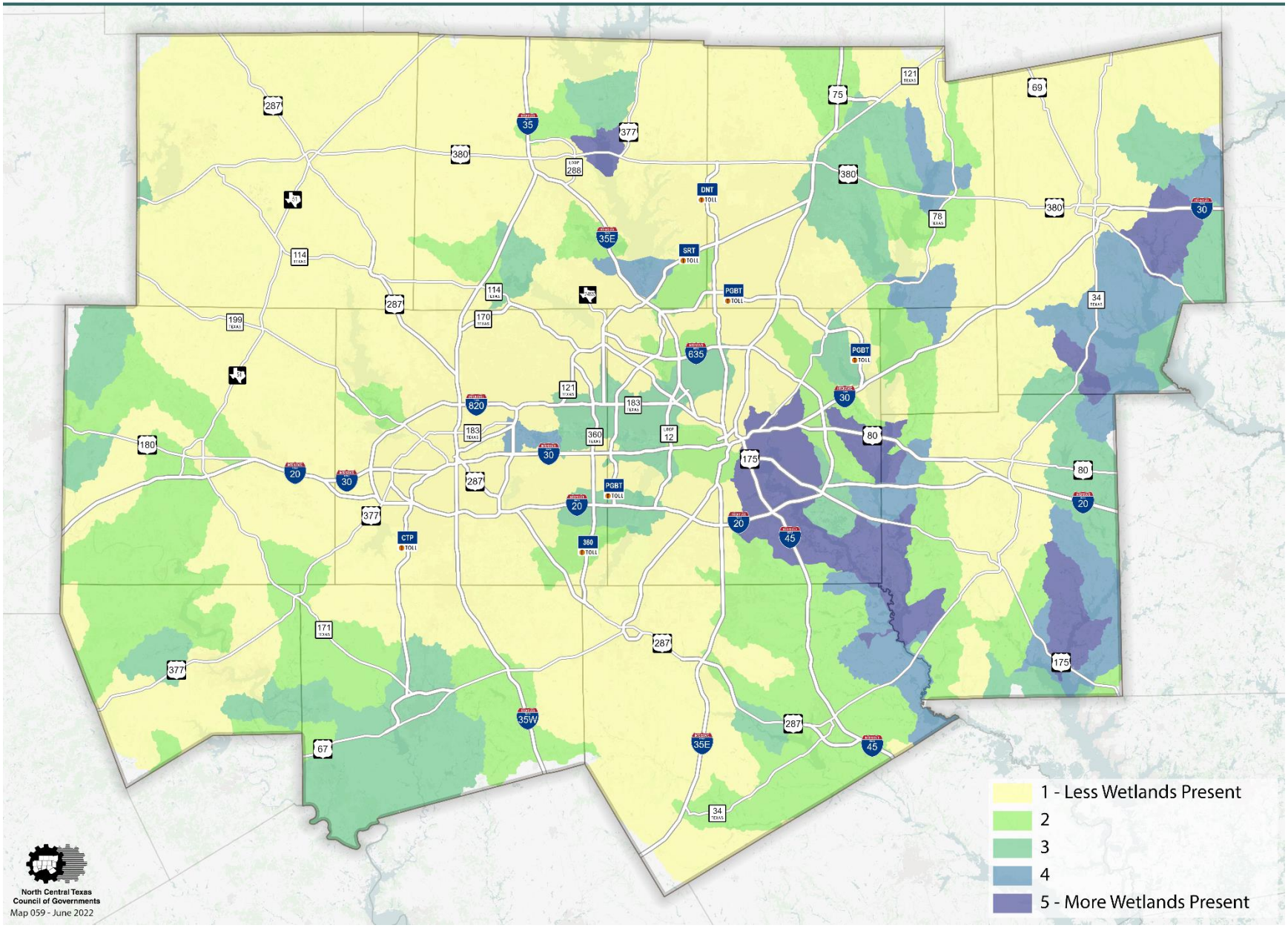
Regional Ecosystem Framework - Surface Water Quantity



Regional Ecosystem Framework - Wildlife Habitat



Regional Ecosystem Framework - Wetlands



Potential Mitigation Activities and Locations

Programs and Projects: Wetland and Stream Mitigation Assessment

NCTCOG's Mitigation Assessment identified potential locations for mitigation of impacts to wetlands and streams in accordance with the Clean Water Act. With feedback from stakeholders at federal, state, and local environmental agencies, environmental factors were used to model wetland acreage and stream segments whose protection could provide the greatest ecological benefit. Potential locations for wetland enhancement (**Exhibit C-16**), wetland restoration (**Exhibit C-17**), and stream enhancement (**Exhibit C-18**) were identified. The environmental factors considered can be found in NCTCOG's Wetland and Stream Mitigation Assessment.[20]

NCTCOG has modeled the potential demand for wetland and stream mitigation credits generated by roadway recommendations in the Mobility 2045 Update (please see results in the *Mitigation Assessment of Mobility 2045* section of the **Environmental Considerations** chapter). Demand is estimated for perennial and intermittent streams.[21]

Mitigation Strategies

Consistent with the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users; Moving Ahead for Progress in the 21st Century Act; and the Mobility 2045 Update initiatives and program goals to support the ecosystem approach, the following is a summary of mitigation strategies. The Mobility 2045 Update includes projects expected to be built by 2045, including many projects at the earliest stages of development. At these early stages, even the most fundamental details of a project, such as exact alignments and dimensions, are largely unknown. Therefore, detailed environmental review through the National Environmental Policy Act and similar state/local environmental review procedures is not required at this preliminary stage. With exceptions for regional air

The **Council on Environmental Quality** regulations define mitigation as**:**

Avoiding the impact altogether by not taking a certain action or parts of an action.

Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

Compensating for the impact by replacing or providing substitute resources or environments.

Ecosystem-Based Mitigation: The process of restoring, creating, enhancing, and preserving habitat and other ecosystem features in conjunction with or in advance of projects in areas where environmental needs and the potential environmental contributions have been determined to be greatest.

[20] NCTCOG, 2016 Banking on Credits, https://www.nctcog.org/nctcg/media/Transportation/DocsMaps/Quality/Environ/Mitigation-Assessment_combined_3-2018.pdf

[21] Perennial streams typically contain water that flows year-round and draw their flow primarily from groundwater. Intermittent streams typically contain water that flows seasonally and draw their flow from groundwater and rainfall runoff. The type of stream impacted may affect the type of mitigation options available to compensate for unavoidable impacts.

quality, offsetting environmental impacts during the long-range planning process is not required. Current environmental discussions and coordination regarding the Metropolitan Transportation Plan will include efforts to provide a forum for regional cooperation. This will allow project-level mitigation efforts to include ecosystem-based considerations, meet conservation goals, and enhance the environment. Environmental mitigation activities include strategies, policies, programs, actions, and activities that, over time, will serve to avoid, minimize, or compensate for the impacts to or disruption of elements of the human and natural environment associated with the implementation of transportation projects.

Exhibit C-16: Potential Locations for Wetland Enhancements

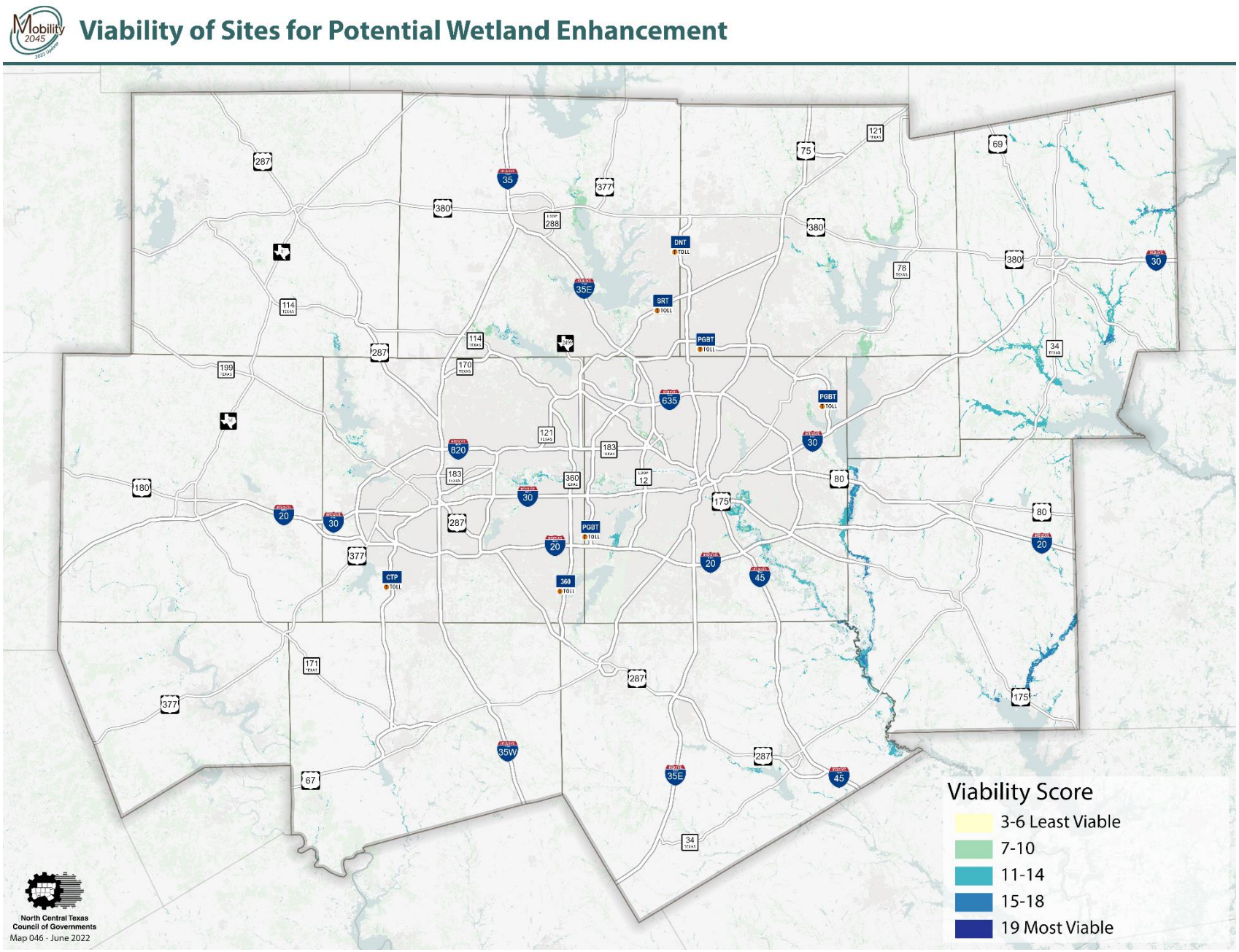


Exhibit C-17: Potential Locations for Wetland Restoration

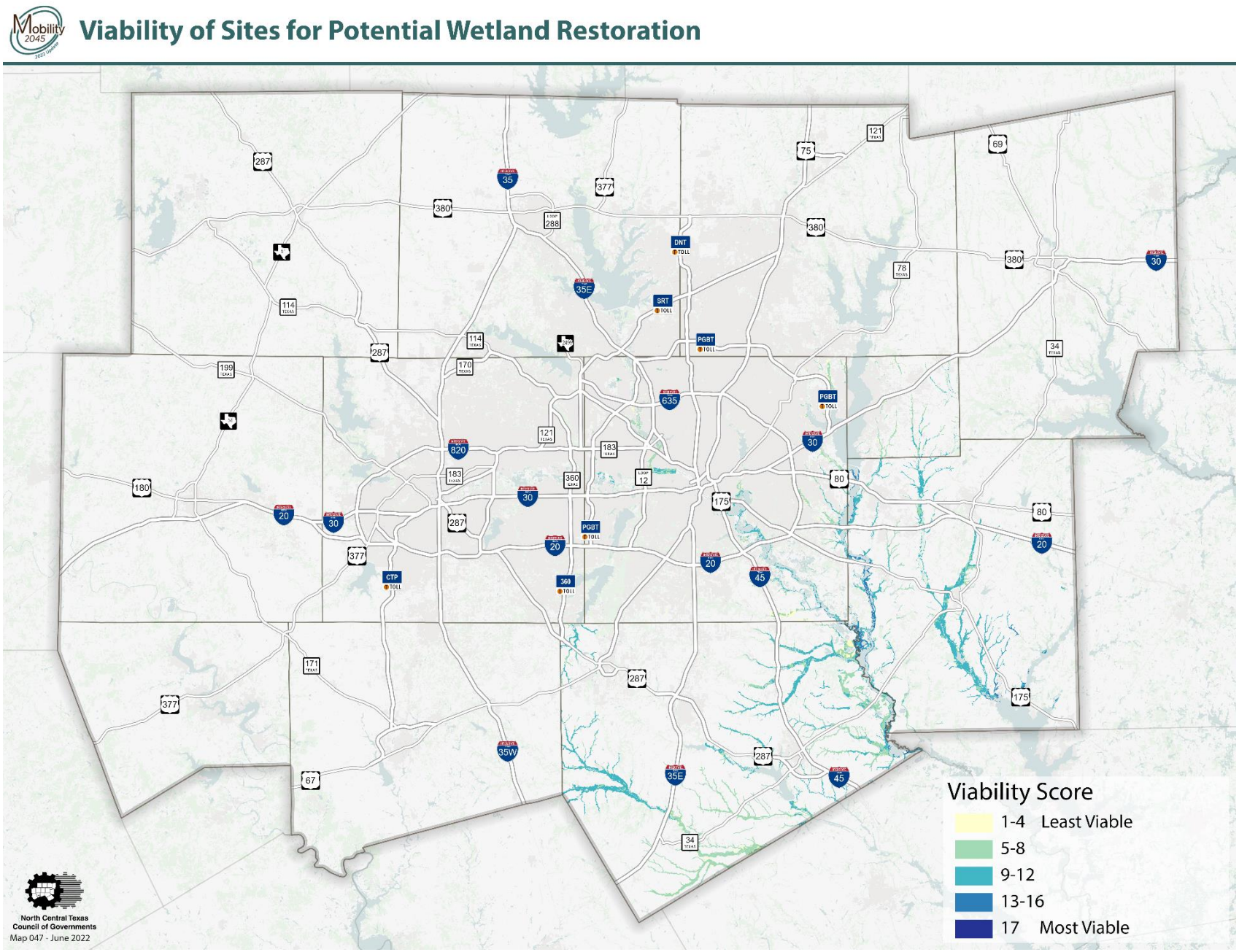
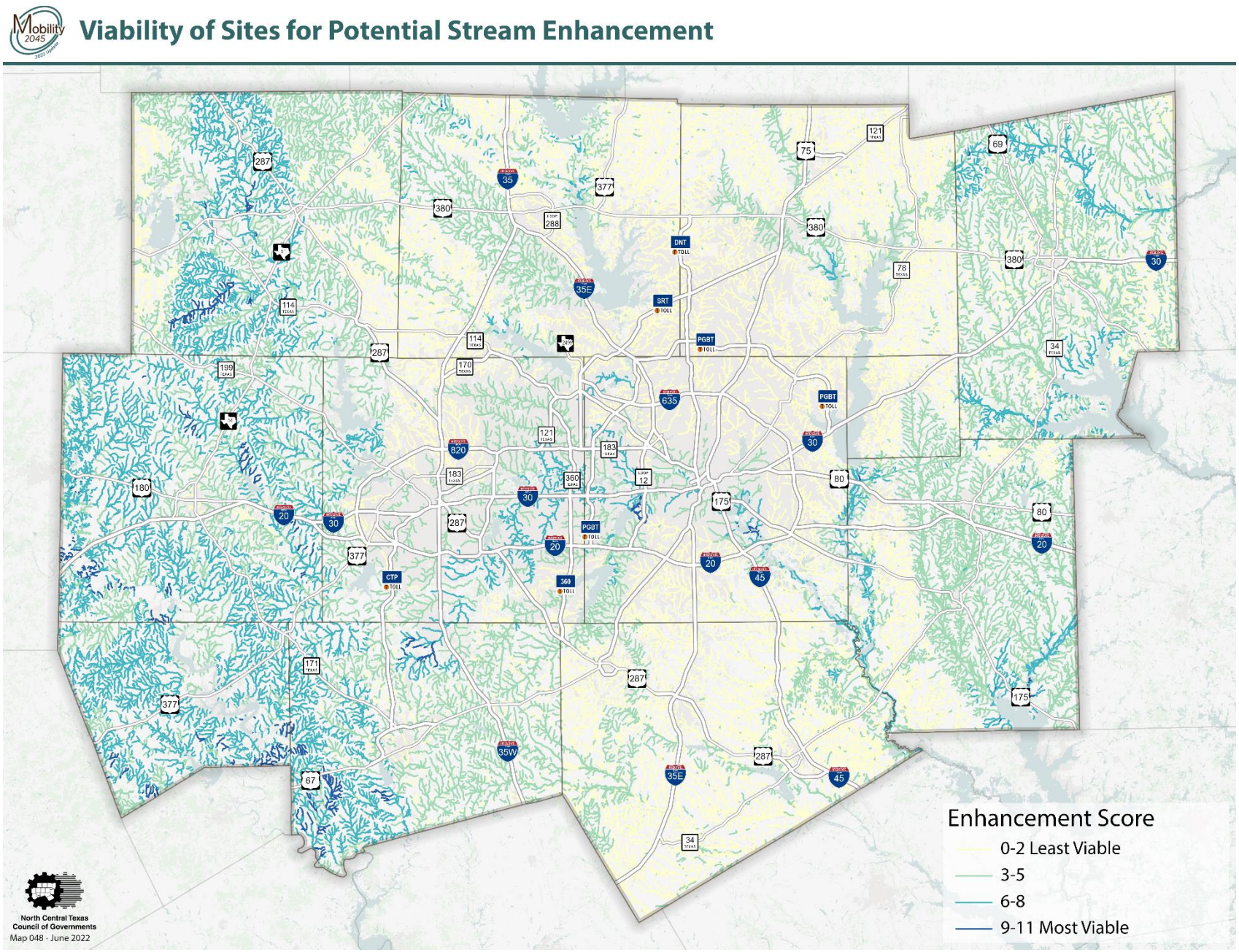


Exhibit C-18: Potential Locations for Stream Enhancement



Impact Types and Mitigation Strategies

Resources within the natural and built environments are generally impacted by transportation projects as a result of construction, increased traffic, and stormwater runoff from paved surfaces. Effects can occur directly, indirectly, or cumulatively. Mitigation for these effects can focus on the following resources and areas:

- Neighborhoods and communities, homes and businesses
- Traffic operations, traffic noise
- Cultural resources (historic properties or archaeological sites)
- Parks and recreation areas
- Wetlands and water resources
- Vegetation other natural areas
- Agricultural areas
- Endangered and threatened species
- Lighting and visual impacts
- Socio-economic impacts
- Environmental justice
- Air quality

Direct Effects: Caused by the action, occurring at the same time and place as the action.

Indirect Effects: Caused by the action, occurring later in time or farther removed in distance from the action; however, they are reasonably foreseeable.

Cumulative Effects: Effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions.

The Council on Environmental Quality's NEPA (National Environmental Policy Act) 2022 Final Rule restores direct, indirect, and cumulative effects under the definition of effects. The 2022 Final Rule modifies changes made in a 2020 rule.

The potential environmental impacts are listed in **Exhibit C-19** with corresponding mitigation activities that could be considered to have a potential to restore and maintain the environmental functions in areas affected by the projects recommended in the Mobility 2045 Update. This list should not be considered an exhaustive list of all resources, potential impacts, or potential mitigation activities that could be found or implemented in a project or regional area. Furthermore, once projects are past the preliminary planning phases, there may be additional federal, state, and/or local mitigation required as a part of the environmental review process. NCTCOG's Natural Environment Screening may help to identify potential mitigation activities that may be relevant to the roadway and public transportation recommendations in the Mobility 2045 Update and are included in **Exhibit C-19.**

Exhibit C-19: Potential Effects and Mitigation Strategies

Resource	Potential Effects	Potential Mitigation Activities	Potentially Relevant Resources from the Mobility 2045 Update Natural Environment Screening
Wetlands and Water Resources	• Loss of natural habitat • Erosion • Sedimentation • Stormwater runoff and pollutants • Nutrient loading • Alteration of hydrological flows • Loss of wetlands and impacts to streams • Floodplain impacts such as reduced flood storage capacity, increased erosive water velocities, or raised flood water levels	• Replace or restore wetlands. • Bridge sensitive areas. • Use erosion control measures. • Utilize environmentally sustainable stormwater management and Best Management Practices. Approaches may reduce the volume or pollutant load in stormwater runoff or reduce the impact to water resources. Examples may include porous pavement, bio swales, bioretention, and bottomless culverts. • Replace or restore natural areas, utilizing species native to individual ecoregions where appropriate. • Coordinate with federal, state, and private organizations to promote or incentivize preserving, restoring, or protecting wetlands and water resources by using policies such as conservation easements, conservation developments, or infill policies. • In floodplains, maintain valley storage and flood capacity, and reduce construction and development.	• Ecologically Significant Stream Segments • Impaired Water Segments • Surface Water Density • Wetlands • Flood Zones • Diversity • Rarity • Wildlife Habitat
Natural Areas such as Forests, Prairies	• Removal or fragmentation of key habitats, conservation areas, parks, and open space • Farmland • Priority prairies and habitats	• Use selective cutting and clearing. • Replace or restore natural areas, utilizing species native to individual ecoregions where appropriate. • Preserve existing vegetation and/or specialized mowing regimes. • Reduce the use of non-native species. • Coordinate with federal, state, and private organizations to promote or incentivize preserving, restoring, or protecting natural areas using policies such as conservation easements, conservation developments, or infill policies. • Address visual, light, and noise impacts using methods such as quiet zones, sound walls, and directional lighting. • Compensate for impacts through actions such as investing in a mitigation bank, defining a conservation easement, or creating a habitat conservation plan.	• Natural Areas • Wildlife Habitat • Diversity • Rarity

Resource	Potential Effects	Potential Mitigation Activities	Potentially Relevant Resources from the Mobility 2045 Update Natural Environment Screening
Endangered and Threatened Species and other Wildlife	• Removal or fragmentation of endangered species habitat • Disturbance of endangered or threatened species nesting regimes • Disturbance of habitats or nests for wildlife and migratory birds	• Use selective cutting and clearing. • Bridge sensitive areas. • Replace or restore natural areas, utilizing species native to individual ecoregions where appropriate. • Avoid nesting season or prevent nesting during construction projects when possible. • Compensate for impacts through on- and off-site mitigation such as a conservation easement, a habitat conservation plan, or wildlife bridges/crossings/culverts/tunnels, or creating habitat corridors.	Wildlife Habitat
Air Quality	• Project construction • Increased traffic and emissions • Congestion	• Control dust during construction. • Minimize idling of heavy construction vehicles. • Maintain construction equipment. • Use congestion management strategies such as Intelligent Transportation Systems, Travel Demand Management, and Transportation Systems Management strategies and programs.	
Neighborhoods and Communities	• Displacement of residents/businesses • Noise • Vibration • Visual and lighting • Increased traffic and change in travel patterns • Air quality/dust control • Historic structure removal • Archeological remains • Project construction	• Provide relocation assistance. • Minimize noise impact (sound walls, sound insulation, quiet zones). • Provide shielding/direct lighting. • Prevent the spread of hazardous materials with soil testing and treatment. • Document historic/archaeological sites. • Relocate historic buildings. • Use alternate hours for construction to minimize additional peak hour congestion.	

Coordination with Environmental Resource and Regulatory Agencies: Natural Environment Screening

The Natural Environment Screening was conducted to assist in achieving federal goals to sustain and restore the health of ecosystems through an ecosystem-based approach[22] and to promote environmental stewardship in the transportation system.[23] The Natural Environment Screening provides a preliminary tool to identify potential effects on natural environment resources that may result from the roadway and public transportation recommendations in the Mobility 2045 Update. These potential effects may warrant early coordination with resource agencies during the planning and project development process. Applicable resource agencies are identified for each recommendation. Potential opportunities for stewardship or mitigation activities may also be identified through the screening. Mitigation activities that may be relevant to the natural environment resources assessed here are found above in **Exhibit C-19**.

The screening identified the potential for effects on the natural environment on three levels:

- Roadway and public transportation recommendations
- Subwatersheds
- The North Central Texas region

The methodology and results for the three levels of screening are described below. Interpretation of the results should consider that the data used in the Natural Environment Screening represents quantity, not quality, of natural environment resources. Recommendations, subwatersheds, and resources identified as facing relatively high effects may require additional review, documentation, and coordination with the applicable regulatory or planning agencies to confirm the potential effects and stewardship or mitigation needs.

The Natural Environment Screening includes data from the Regional Ecosystem Framework and supplemental sources. Some of the REF data was updated for the Mobility 2045 Update Natural Environment Screening. Data sources are listed in **Exhibit C-20**. More information on REF data sources can be found in the REF Data Dictionary.[24]

[22] An ecosystem approach integrates social, ecological, and economic factors with the goal to "restore and sustain the health, productivity, and biological diversity of ecosystems and the overall quality of life." Federal Highway Administration, Environmental Review Toolkit, "Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects Appendix A – 1995 Memorandum of Understanding to Foster the Ecosystem Approach." https://www.environment.fhwa.dot.gov/env_initiatives/eco-logical/report/eco_app_a.aspx

[23] Federal Register Vol. 67, No. 184 Executive Order 13274: Environmental Stewardship and Transportation Infrastructure Project Reviews. Agencies "shall take appropriate actions, to the extent consistent with applicable law and available resources, to promote environmental stewardship in the Nation's transportation system and expedite environmental reviews of high-priority transportation infrastructure projects." 2002, https://www.transportation.gov/office-policy/transportation-policy/environmental-stewardship-and-transportation-infrastructure

[24] NCTCOG REF Data Dictionary: https://www.nctcog.org/nctcg/media/Environment-and-Development/Documents/Natural%20Resources/REF/REF-data-Dictionary-2020.pdf

Exhibit C-20: Natural Environment Screening Data Sources

Natural Environment Screening Resource	Data Source
REF Diversity	Environmental Protection Agency Region 6 Regional Ecosystem Assessment Protocol
Ecologically Significant Stream Segments	Texas Parks & Wildlife, 2017
REF Flood Zones	Federal Emergency Management Agency, Digital Flood Insurance Maps
Impaired Water Segments	Texas Commission on Environmental Quality Index of Water Quality Impairments, 2020, and Watershed Protection Plan, 2021
REF Rarity	Environmental Protection Agency Region 6 Regional Ecosystem Assessment Protocol
REF Surface Water Density	US Geological Survey National Hydrological Dataset
Threatened and Endangered Species	US Fish and Wildlife Service Information for Planning and Consultation and Texas Parks & Wildlife Department
Wetlands	National Land Cover Database, US Fish and Wildlife Service National Wetlands Inventory, and Texas Parks & Wildlife Department Ecological Mapping Systems of Texas
Wildlife Habitat	National Land Cover Database, Texas Parks & Wildlife Department Wildlife Management Areas, Environmental Protection Agency National Ecological Framework, and US Geological Survey Protected Area Database

Methodology: Roadway and Public Transportation Recommendations

The Natural Environment Screening assessed the potential environmental effects of each corridor recommended in the Mobility 2045 Update. For each recommendation, a half-mile buffer from the centerline was used to determine the natural environment resources that could be affected. A half mile was chosen because the majority of Mobility 2045 Update recommendations are improvements to existing facilities. For each resource, grid cells measuring 1 km^2 received a score of 1 to 5, depending on the quantity of the resource within the grid cell, with 5 indicating the highest quantity of a resource. Scores from the grid cells within the buffer were then averaged for each resource, resulting in low, medium, or high designations based on percentile groupings. Results are found in **Exhibits C-21** and **C-22**.

Exhibit C-21: Results: Natural Environment Screening for Roadway Recommendations

Project 1: Chisholm Trail Parkway	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Whooping Crane, Piping Plover, Black Rail, Golden-cheeked Warbler, Brazos Heelsplitter, Texas Fawnsfoot, Brazos Water Snake, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 2: Collin County Loop	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 3: Denton County Loop	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	High
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Sandbank Pocketbook	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 4: DFW Connector	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	Low
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Army Corps of Engineers, Texas Commission on Environmental Quality	

Project 5: DNT Extension	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 6: DNT Widening	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 7: East Branch	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Low
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 8: Horizon Gateway	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	High
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 9: IH 20 (Dallas County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 10: IH 20 (Parker County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	Low
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Whooping Crane, Piping Plover, Black Rail, Golden-cheeked Warbler, Brazos Heelsplitter, Texas Fawnsfoot, Earth Rruit, Brazos Water Snake, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 11: IH 20 East Tarrant County	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 12: IH 20 West Tarrant County	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 13: IH 30 (East)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Texas Commission on Environmental Quality	

Project 14: IH 30 (Hunt County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Texas Pigtoe, Texas Heelsplitter, Southern Hickorynut, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Northern Scarlet Snake	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 15: IH 30 (Rockwall County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	High
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: Wood Stork, White-faced Ibis, Whooping Crane, Piping Plover, Black Rail, Rufa Red Knot, Texas Fawnsfoot, Louisiana Pigtoe, Texas Heelsplitter, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 16: IH 30 (Tarrant County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 17: IH 30 Canyon	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	High
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Texas Commission on Environmental Quality	

Project 18: IH 30 West Freeway	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 19: IH 345	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
Texas Commission on Environmental Quality	

Project 20: IH 35	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	High
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	High
Wetlands	Low
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Piping Plover, Black Rail, Whooping Crane, Rufa Red Knot, Sandbank Pocketbook, Texas Heelsplitter, Louisiana Pigtoe, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 21: IH 35E (Lowest Stemmons)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 22: IH 35E (North)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 23: IH 35E Stemmons	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 24: IH 35W (North)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	High
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Piping Plover, Black Rail, Whooping Crane, Rufa Red Knot, Sandbank Pocketbook, Texas Heelsplitter, Louisiana Pigtoe, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 25: IH 35W (South)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Whooping Crane, Piping Plover, Black Rail, Golden-cheeked Warbler, Brazos Heelsplitter, Texas Fawnsfoot, Brazos Water Snake, Texas Horned Lizard, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 26: IH 45/SM Wright	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	Low
Wetlands	High
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 27: IH 635 (East)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 28: IH 820 (East)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 29: IH 820 (Northwest)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 30: IH 820 (West)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 31: Midtown Express/SH 183	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Low
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard, Wood Stork, Golden-cheeked Warbler, Trinity Pigtoe, Texas Fawnsfoot	
Resource Agencies of Greatest Interest	
US Army Corps of Engineers, Federal Emergency Management Agency	

Project 32: North Tarrant Express (1 & 2)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Army Corps of Engineers, Federal Emergency Management Agency	

Project 33: North Tarrant Express (3)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
Federal Emergency Management Agency, US Army Corps of Engineers	

Project 34: PGBT (North)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 35: Rockwall/Kaufman County Loop	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Black Bear, Texas Fawnsfoot, Trinity Pigtoe, Sandbank Pocketbook	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 36: SH 114 (Dallas County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 37: SH 114 (Denton County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	High
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Piping Plover, Black Rail, Whooping Crane, Rufa Red Knot, Sandbank Pocketbook, Texas Heelsplitter, Louisiana Pigtoe, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, US Army Corps of Engineers	

Project 38: SH 114 (Tarrant County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 39: SH 121/NTE Connection	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	High
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 40: SH 161/SH 360 Toll Connector	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Black Bear, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
Texas Commission on Environmental Quality	

Project 41: SH 170	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Piping Plover, Black Rail, Whooping Crane, Rufa Red Knot, Sandbank Pocketbook, Texas Heelsplitter, Louisiana Pigtoe, Texas Horned Lizard, Piping Plover, Black Bear, Alligator Snapping Turtle	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife	

Project 42: SH 199	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency	

Project 43: SH 360 Toll Road	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard, Golden-cheeked Warbler, Brazos Heelsplitter, Texas Fawnsfoot, Brazos Water Snake, Wood Stork, Trinity Pigtoe	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 44: SH 360 Toll Road Extension	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	Medium
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Rufa Red Knot, Black Rail, Whooping Crane, Piping Plover, Sandbank Pocketbook, Trinity Pigtoe, Louisiana Pigtoe, Texas Heelsplitter, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 45: SH 360 Widening	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	Low
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, US Army Corps of Engineers, Texas Commission on Environmental Quality	

Project 46: Southeast Connector	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 47: Southern Gateway	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	High
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 48: Spur 399	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Army Corps of Engineers, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 49: State Loop 12	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Army Corps of Engineers, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 50: State Loop 288 (East)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Piping Plover, Black Rail, Whooping Crane, Rufa Red Knot, Sandbank Pocketbook, Texas Heelsplitter, Louisiana Pigtoe, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 52: State Loop 9	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Low
Rarity	High
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 53: US 175	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 54: US 287 (Ellis County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Low
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Rufa Red Knot, Black Rail, Whooping Crane, Piping Plover, Sandbank Pocketbook, Trinity Pigtoe, Louisiana Pigtoe, Texas Heelsplitter, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 55: US 287 (North)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 56: US 287 (South)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Medium
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard, Golden-cheeked Warbler, Brazos Heelsplitter, Texas Fawnsfoot, Brazos Water Snake	
Resource Agencies of Greatest Interest	
Texas Commission on Environmental Quality, Federal Emergency Management Agency	

Project 57: US 380 Farmersville Bypass	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	Low
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 58: US 380 Freeway	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Sandbank Pocketbook	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, US Army Corps of Engineers	

Project 59: US 380 McKinney Bypass	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
Federal Emergency Management Agency, US Army Corps of Engineers, Texas Commission on Environmental Quality	

Project 60: US 380 Princeton Bypass	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Medium
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality, US Army Corps of Engineers	

Project 61: US 75 (Collin County)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Medium
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality, US Army Corps of Engineers	

Project 62: US 75 Technology Lanes	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Low
Surface Water Density	High
Wetlands	Low
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Golden-cheeked Warbler, Sandbank Pocketbook, Trinity Pigtoe, Texas Fawnsfoot	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 63: US 80	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Low
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard, Black Bear, Texas Fawnsfoot	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Exhibit C-22: Results: Natural Environment Screening for Public Transportation Recommendations

Project 5*: Spring Creek Parkway Express	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	High
Wetlands	Low
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Sandbank Pocketbook	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 6: East Lancaster Technology Corridor	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 7: Dallas Streetcar (Central Link)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

* Public Transportation recommendations 1-4 are high-intensity bus routes traveling on existing roadways. Therefore, they are excluded from this analysis because they will not require construction.

Project 7: Dallas Streetcar (Convention Center Loop)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	High
Rarity	High
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 8: M-Line Trolley Extension	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	High
Rarity	High
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 9: TEX Rail Near Southside	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	High
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 10: Silver Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	Low
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Golden-cheeked Warbler, Sandbank Pocketbook, Trinity Pigtoe, Texas Fawnsfoot, Black Bear	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 11: A-Train Extension	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Low
Rarity	High
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 12: Downtown Dallas 2nd Alignment (D2)	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Low
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Low
Wetlands	Low
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 13: Frisco Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	High
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard, Golden-cheeked Warbler, Sandbank Pocketbook, Trinity Pigtoe, Texas Fawnsfoot	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Federal Emergency Management Agency, US Army Corps of Engineers	

Project 14: McKinney Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Medium
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality, US Army Corps of Engineers	

Project 15: Silver Line East Extension	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Medium
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Whooping Crane, Black Rail, Piping Plover, Rufa Red Knot, Texas Heelsplitter, Louisiana Pigtoe, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 16: Scyene Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	Medium
Wetlands	High
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Project 17: Green Line - Southeast Extension	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Low
Rarity	Medium
Surface Water Density	High
Wetlands	Medium
Wildlife Habitat	Low
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 18: Waxahachie Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	High
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	High
Wetlands	High
Wildlife Habitat	Medium
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency	

Project 19: Midlothian Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Medium
Rarity	High
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Black Rail, Whooping Crane, Piping Plover, Rufa Red Knot, Golden-cheeked Warbler, Sandbank Pocketbook, Louisiana Pigtoe, Texas Heelsplitter, Trinity Pigtoe, Texas Fawnsfoot, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department	

Project 20: Mansfield Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	High
Rarity	Low
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Wood Stork, Rufa Red Knot, Black Rail, Whooping Crane, Piping Plover, Sandbank Pocketbook, Trinity Pigtoe, Louisiana Pigtoe, Texas Heelsplitter, Alligator Snapping Turtle, Texas Horned Lizard, Black Bear	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas Commission on Environmental Quality	

Project 21: Cleburne Line	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	Medium
Ecologically Significant Stream Segments	Low
Flood Zones	Medium
Impaired Water Segments	Medium
Rarity	Low
Surface Water Density	Medium
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Golden-cheeked Warbler, Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Whooping Crane, Piping Plover, Black Rail, Golden-cheeked Warbler, Brazos Heelsplitter, Texas Fawnsfoot, Brazos Water Snake, Texas Horned Lizard, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers, Federal Emergency Management Agency, Texas Commission on Environmental Quality	

Project 22: Southwest TEX Rail	
Natural Environment Screening Resource	**Level of Prevalence**
Diversity	High
Ecologically Significant Stream Segments	Low
Flood Zones	Low
Impaired Water Segments	Low
Rarity	Low
Surface Water Density	Low
Wetlands	Medium
Wildlife Habitat	High
Potential Threatened or Endangered Species	
Federal: Piping Plover, Red Knot, Whooping Crane **State**: White-faced Ibis, Rufa Red Knot, Black Rail, Piping Plover, Whooping Crane, Black Bear, Louisiana Pigtoe, Texas Heelsplitter, Sandbank Pocketbook, Alligator Snapping Turtle, Texas Horned Lizard	
Resource Agencies of Greatest Interest	
US Fish and Wildlife Service, Texas Parks & Wildlife Department, US Army Corps of Engineers	

Methodology: Subwatersheds

Subwatersheds are relatively small drainage basins that provide a geographic unit for environmental analysis and management. The Natural Environment Screening identified subwatersheds where the natural environment may be most affected by recommendations in the Mobility 2045 Update. The subwatershed method used the buffers and grid cell scores generated by the method for analyzing roadway and public transportation recommendations described above. For each subwatershed, a total was generated for the number of grid cells within a buffer and with a high score of 4 or 5 for any natural environment resource. Subwatersheds were then ranked based on the number of affected, high-scoring grid cells. The Natural Environment Screening identified subwatersheds with more than 400 high-scoring grid cells. This identified approximately the top 25 percent of subwatersheds that may be most affected by Mobility 2045 Update roadway recommendations. The same threshold identified approximately the top 6 percent of subwatersheds that may be most affected by public transportation recommendations. Results are found in **Exhibit C-23**.

Methodology: North Central Texas Region

Natural environment resources were analyzed at the regional scale to identify which resources may most be affected by roadway and public transportation recommendations in the Mobility 2045 Update. For each natural resource, a total was generated for the number of grid cells within a buffer and with a high score of 4 or 5. Results are found in **Exhibit C-24**.

Exhibit C-23: Results: Natural Environment Screening for Subwatersheds

Name of Watershed	Number of High-Scoring Grid Cells	Corridor Number	Corridor Name
ROADWAY			
Turtle Creek	1161	13	IH 30 (East)
		17	IH 30 Canyon
		19	IH 345
		21	IH 35E (Lowest Stemmons)
		23	IH 35E Stemmons
		26	IH 45/SM Wright
		31	Midtown Express/SH 183
City of Dallas-White Rock Creek	1127	13	IH 30 (East)
		17	IH 30 Canyon
		19	IH 345
		26	IH 45/SM Wright
		53	US 175
		63	US 80
Clemons Creek-East Fork Trinity River	1017	2	Collin County Loop
		48	Spur 399
		58	US 380 Freeway
		59	US 380 McKinney Bypass
		60	US 380 Princeton Bypass
Rush Creek-Village Creek	962	11	IH 20 East Tarrant County
		16	IH 30 (Tarrant County)
		46	Southeast Connector
		56	US 287 (South)
North Mesquite Creek-East Fork Trinity River	948	7	East Branch
		13	IH 30 (East)
		27	IH 635 (East)
		52	State Loop 9
		63	US 80
Bachman Branch-Elm Fork Trinity River	933	22	IH 35E (North)

Name of Watershed	Number of High-Scoring Grid Cells	Corridor Number	Corridor Name
ROADWAY			
		23	IH 35E Stemmons
		31	Midtown Express/SH 183
		36	SH 114 (Dallas County)
		49	State Loop 12
Delaware Creek-West Fork Trinity River	766	16	IH 30 (Tarrant County)
		31	Midtown Express/SH 183
		49	State Loop 12
Fish Creek-Mountain Creek Lake	747	9	IH 20 (Dallas County)
		11	IH 20 East Tarrant County
		40	SH 161/SH 360 Toll Connector
		43	SH 360 Toll Road
Throckmorton Creek-East Fork Trinity River	710	2	Collin County Loop
		59	US 380 McKinney Bypass
		61	US 75 (Collin County)
High Point Creek	703	35	Rockwall/Kaufman County Loop
		63	US 80
Middle Big Brushy Creek	694	35	Rockwall/Kaufman County Loop
		63	US 80
Soap Creek	683	44	SH 360 Toll Road Extension
		54	US 287 (Ellis County)
Lynn Creek-Walnut Creek	682	40	SH 161/SH 360 Toll Connector
		43	SH 360 Toll Road
		56	US 287 (South)
Upper Wilson Creek	665	2	Collin County Loop
		58	US 380 Freeway
		59	US 380 McKinney Bypass
Lower Wilson Creek	618	48	Spur 399
		62	US 75 Technology Lanes
Mustang Creek-East Fork Trinity River	615	7	East Branch

Name of Watershed	Number of High-Scoring Grid Cells	Corridor Number	Corridor Name
ROADWAY			
		52	State Loop 9
		63	US 80
Honey Creek	608	2	Collin County Loop
		59	US 380 McKinney Bypass
Wildcat Branch-Lake Arlington	563	46	Southeast Connector
Big Bear Creek	557	4	DFW Connector
		33	North Tarrant Express (3)
		38	SH 114 (Tarrant County)
		39	SH 121/NTE Connection
		45	SH 360 Widening
Stiff Creek-Sister Grove Creek	554	2	Collin County Loop
		58	US 380 Freeway
		60	US 380 Princeton Bypass
Quil Miller Creek-Village Creek	552	25	IH 35W (South)
Lower Hickory Creek	543	22	IH 35E (North)
Headwaters Waxahachie Creek	531	52	State Loop 9
		54	US 287 (Ellis County)
Culp Branch-Elm Fork Trinity River	477	3	Denton County Loop
Johnson Creek	476	11	IH 20 East Tarrant County
		16	IH 30 (Tarrant County)
		45	SH 360 Widening
Headwaters Walker Branch	457	28	IH 820 (East)
		32	North Tarrant Express (1 & 2)
Elizabeth Creek-Denton Creek	441	24	IH 35W (North)
		37	SH 114 (Denton County)
Middle Waxahachie Creek	441	54	US 287 (Ellis County)
Sycamore Creek-West Fork Trinity River	436	16	IH 30 (Tarrant County)
		18	IH 30 West Freeway
		29	IH 820 (Northwest)

Name of Watershed	Number of High-Scoring Grid Cells	Corridor Number	Corridor Name
ROADWAY			
		32	North Tarrant Express (1 & 2)
		33	North Tarrant Express (3)
		46	Southeast Connector
Village Creek-Lake Arlington	434	25	IH 35W (South)
		46	Southeast Connector
Upper Big Brushy Creek	424	15	IH 30 (Rockwall County)
		35	Rockwall/Kaufman County Loop
		63	US 80
West Fork Trinity River-Lake Worth	420	29	IH 820 (Northwest)
		30	IH 820 (West)
		42	SH 199
Hurricane Creek-West Fork Trinity River	412	16	IH 30 (Tarrant County)
		31	Midtown Express/SH 183
		32	North Tarrant Express (1 & 2)
		39	SH 121/NTE Connection

Name of Watershed	Number of High-Scoring Grid Cells	Corridor Number	Corridor Name
TRANSIT			
Fivemile Creek-Trinity River	1031	16	Scyene Line
		17	Green Line - Southeast Extension
		18	Waxahachie Line
Grapevine Creek-Elm Fork Trinity River	1017	10	Silver Line
		11	A-train Extension
		13	Frisco Line
Low Branch-Mountain Creek	919	19	Midlothian Line
		20	Mansfield Line
Headwaters Sycamore Creek	832	6	East Lancaster Technology Corridor
		9	TEX Rail Near Southside
		20	Mansfield Line
		21	Cleburne Line
		22	Southwest TEX Rail
Brown Branch-Rowlett Creek	726	5	Spring Creek Parkway Express
		10	Silver Line
		14	McKinney Line
		15	Silver Line East Extension
Turtle Creek	614	7	Dallas Streetcar (Convention Center Loop)
		7	Dallas Streetcar (Central Link)
		8	M-Line Trolley Extension
		12	Downtown Dallas 2nd Alignment (D2)
		18	Waxahachie Line
Clemons Creek-East Fork Trinity River	542	14	McKinney Line
Pittman Creek-Spring Creek	496	5	Spring Creek Parkway Express
		10	Silver Line
		14	McKinney Line

Exhibit C-24: Results: Natural Environment Screening for North Central Texas Region

Natural Environment Screening Resource (Roadway)	Number of High-Scoring Cells Affected by Mobility 2045 Update Roadway Recommendations
1 Impaired Water	15,043
2 Rarity	7,000
3 Flood Zones	6,785
4 Surface Water Density	4,833
5 Wildlife Habitat	2,584
6 Wetland	1,046
7 Diversity	389
8 Ecologically Significant Stream Segments	46

Natural Environment Screening Resource (Transit)	Number of High-Scoring Cells Affected by Mobility 2045 Update Public Transportation Recommendations
1 Impaired Water	6,039
2 Rarity	2,476
3 Flood Zones	2,070
4 Surface Water Density	1,704
5 Wildlife Habitat	487
6 Wetland	176
7 Diversity	67
8 Ecologically Significant Stream Segments	0

C. Environmental Considerations: Hazard Vulnerability and Resilience Strategies

Policies

MTP Reference #	Transportation System Security and Resiliency
TSSC3-003	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.
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.

Programs

Hazard Vulnerability and Resilience Strategies	
Reference	SPD2-004
Background	Incorporate resilience into the transportation planning and asset management processes through resilience studies, workshops, plans, and coordination.
Policy Position	SPD3-001
Implementation	Increased transportation system resiliency for critical facilities and vulnerable locations.
Performance Dimensions	• Percentage of regional land developed • National highway system lane miles in flood zones
Cost Estimate	N/A – Program costs associated with planning elements only

Strategies

Resilience strategies conducted by the North Central Texas Council of Governments are consistent with guidance from FHWA's (Federal Highway Administration) Vulnerability Assessment and Adaptation Framework (3rd Edition – December 2017),[25] as well as products and initiatives derived from participation in the following activities and groups:

- FHWA Pilot Program: Climate Change/Extreme Weather Vulnerability and Risk Assessment for Transportation Infrastructure in Dallas and Tarrant Counties (2013-2015)

[25] *Vulnerability Assessment and Adaptation Framework*, Federal Highway Administration Office of Planning, Environmental, and Realty, 3rd Edition, December 2017

- FHWA Peer Exchange: Climate Resilience and Planning (October 2016 – Atlanta, GA)
- FHWA Workshop: Resilience in the Transportation Planning Process Under the Fixing America's Surface Transportation Act (June 2017 – Austin, TX)
- Texas Association of Metropolitan Planning Organizations Summer Meeting and Transportation Asset Management Workshop (July 2017 – Harlingen, TX)
- FHWA Transportation Asset Management Expert Task Group (2018 – Present)
- Transportation Resilience Innovations Summit and Exchange (October 2018 – Denver, CO)
- American Association of State Highway and Transportation Officials Center for Environmental Excellence Technical Work Group (2019 – Present)
- Texas A&M Transportation Institute Resiliency Workshop (June 2019 – Arlington, TX)
- 2nd International Conference on Transportation Resilience to Natural Hazards and Extreme Weather (November 2019 – Washington, DC)
- Transportation Research Board Asset Management Committee – AJE30 (2020 – Present)
- Texas Association of Metropolitan Organizations Statewide Resiliency Technical Work Group (2020 – Present)

Incorporate resilience in transportation planning using the Infrastructure Voluntary Evaluation Sustainability Tool, a self-evaluation tool developed by FHWA to assist agencies in evaluating the sustainability performance of projects and programs based on sets of criteria, including infrastructure resilience.

Integrate transportation infrastructure vulnerability and criticality assessment parameters into the project development process and the prioritization for subsequent Metropolitan Transportation Plan updates.

Improve the use of forecasting tools (including climate, hydraulic, and hydrologic models) **and data collection** for the monitoring, recording, and analysis of extreme weather impacts on the region's transportation infrastructure.

Coordinate with officials responsible for disaster risk reduction, including, but not limited to, the Federal Emergency Management Agency, the Texas Division of Emergency Management, the Texas Commission on Environmental Quality, the Texas Water/Wastewater Agency Response Network, the Texas Water Development Board, municipal emergency management and response agencies, and other agencies responsible for hazard mitigation planning and implementation.

Partner with the Texas Department of Transportation municipalities, resource agencies, other Metropolitan Planning Organizations, consultants, universities, utilities, and the private sector to help identify funding resources and technical capacities for the consistent and continuous collection and evaluation of climate, watershed flooding, soil moisture retention, and other environmental data; provide expertise on vulnerabilities in the region; and strategize potential resilience options.

Use corridor studies to identify vulnerable transportation infrastructure, designate critical facilities, and develop adaptation strategies in those study areas.

Conduct evacuation route planning and develop alternative routes or capacity redundancy for identified vulnerable areas.

Utilize the results of vulnerability assessments to inform infrastructure design such as bridge or roadbed elevation, design, and the use of materials in construction that are more sustainable to natural disasters. Initiatives could also include integration of innovative stormwater management assets, as well as applications of natural infrastructure elements, where appropriate.

Federal Guidelines and Orders

Infrastructure Investment and Jobs Act (2021)

The NHPP (National Highway Performance Program) is amended to include the purpose of providing support for activities to increase the resiliency of the NHS (National Highway System) to mitigate the cost of damages from sea level rise, extreme weather events, flooding, wildfires, or other natural disasters.[26] Federal funds may, therefore, be used for "protective features" to mitigate the risk of recurring damage from extreme weather events, including Surface Transportation Block Grant Program funds, and up to 15 percent of the NHPP annual apportionment may be used for resiliency of highways and bridges that are not part of the NHS.[27] Additionally, Transportation Asset Management Plans, required by state DOTs (Departments of Transportation) and informed through the NHS pavement and bridge condition targets obtained for the NHPP, must include consideration of extreme weather and resiliency in lifecycle cost calculations and risk management analyses.

State DOTs, in consultation with designated research centers and other stakeholders (including Metropolitan Planning Organizations), are mandated through the Infrastructure Investment and Jobs Act to develop quantitative measures of resilience and annual risk affecting transportation infrastructure. Furthermore, as part of enhancing infrastructure resilience to severe weather impacts, state DOTs must assist in improving statistics to inform transportation policy and in implementing any new relevant analytical methods and capabilities.[28] Support for these initiatives will be provided through resilience research and development coordinated through establishment of the Advanced Research Projects Agency–Infrastructure within the USDOT. They will additionally be augmented through a $500 million Infrastructure Investment and Jobs Act authorization (subject to appropriation) for the creation of up to 10 regional Centers of Excellence for Resilience and Adaptation. Activities supported by such centers may include development of standards for design, operations, and maintenance of climate-resilient transportation infrastructure, as well as stakeholder engagements to increase technical capacity for risk assessments.[29] This enhancement of available data, tools, and proficiencies will be critical among all agencies to collectively improve transportation resiliency conditions and performance.

Among many other potential products/outputs, a major Infrastructure Investment and Jobs Act benefactor of those new resources will be the new PROTECT (Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation) Program.[30] With a total of $8.7 billion in Fiscal Year 2022-2026 Contract Authority from the Highway Trust Fund, $7.3 billion will be apportioned to state DOTs by formula, and $1.4 billion will be made available through competitive discretionary grants for multiple eligible entities, including Metropolitan Planning Organizations. PROTECT formula funds will be apportioned to highway, public transit facilities/services, intercity passenger rail, or port facility projects that can improve transportation system resilience, including through the use of natural infrastructure protection or ecosystem restoration elements, which may be functionally connected to transportation improvements. PROTECT competitive funds will also be applied to similar resiliency-based project types, but they will additionally be used as planning grants for the development of state/Metropolitan Planning Organizations resilience improvement plans, vulnerability

[26] 23 USC 119 (b)(4) – Infrastructure Investment and Jobs Act, Section 11105, https://www.congress.gov/117/bills/hr3684/BILLS-117hr3684enr.pdf, pgs. 29-30

[27] 23 USC 119 (k)(1) and 23 USC 133 (b)(1) – Infrastructure Investment and Jobs Act, Sections 11105 and 11109, https://www.congress.gov/117/bills/hr3684/BILLS-117hr3684enr.pdf, pgs. 29-30, 33-40

[28] Infrastructure Investment and Jobs Act (Title III – Research, Technology, and Education), Sections 13003-13006, https://www.congress.gov/117/bills/hr3684/BILLS-117hr3684enr.pdf, pgs. 200-211

[29] Infrastructure Investment and Jobs Act (Title III – Research, Technology, and Education), Section 13009, https://www.congress.gov/117/bills/hr3684/BILLS-117hr3684enr.pdf, pgs. 214-216

[30] Infrastructure Investment and Jobs Act, Section 11405, https://www.congress.gov/117/bills/hr3684/BILLS-117hr3684enr.pdf, pgs. 133-147

assessments, technical capacity building, and evacuation planning/preparation efforts. For both allotments, no more than 40 percent of funds may be used for construction of new capacity, and no more than 10 percent may be used for development phase activities. PROTECT competitive funds will have set-asides of at least 25 percent for projects in rural areas, no more than 25 percent for intercity passenger rail projects, and at least 2 percent for projects in tribal lands. The maximum federal cost share is 80 percent for construction projects and 100 percent for planning grants. Eligible entities will have abilities to increase the maximum federal cost share by 7 percent if a project is prioritized within that entity's resilience improvement plan, and by an additional 3 percent if the entity's resilience improvement plan is incorporated within a Metropolitan Planning Organization's Metropolitan Transportation Plan or a state DOT's long-range transportation plan. Any future amendments to this Metropolitan Transportation Plan Update, along with any future new Metropolitan Transportation Plans, in efforts to optimize the region's accessibility to PROTECT funds and maximize federal cost share eligibility for relevant projects, will formally address this incorporation process.

The Infrastructure Investment and Jobs Act also establishes a new Carbon Reduction Program for projects to support the lowering of transportation emissions that can exacerbate climate change and its effects on extreme weather events.[31] Eligible projects include establishment of congestion management facilities/programs, vehicle electrification infrastructure, alternate fuel or electric vehicle deployments, public transit facilities/services, on-/off-road bicycle and pedestrian (or other nonmotorized) accommodations, Intelligent Transportation System deployments, energy-efficient street lighting and traffic control device alternatives, Travel Demand or Congestion Management strategies (including pricing options), and efforts to reduce environmental and community impacts of freight movements and port facilities. Within two years of Infrastructure Investment and Jobs Act enactment, state DOTs, in consultation with all Metropolitan Planning Organizations within the state, must develop a "carbon reduction strategy" highlighting support efforts to reduce transportation emissions, identify associated projects/strategies to accomplish emission reductions, quantify the total carbon emissions derived from transportation facility construction within the state, and assess appropriateness of outcomes in relation to the context and population density of the state. The "carbon reduction strategy" must be updated at least once every four years. Sixty-five percent of apportioned funds for each state shall be obligated, in proportion of their relative population shares, across all urbanized area classifications. The remaining 35 percent of apportioned funds may be obligated in any area of the state.

Executive Order 13990 (2021)

Within renewed efforts to reduce greenhouse gas emissions and enhance resilience to climate change impacts, while simultaneously prioritizing environmental justice and job creation in achieving those ends, agencies are charged to collaborate with the federal government in accounting for the benefits of reducing climate-altering pollution as comprehensively and accurately as possible.[32] This involves estimation and comparison of monetized social costs and benefits associated with potential incremental changes in various greenhouse gas emissions, whether they result out of values in productivity, health, property, ecosystems, or other attributes. In conjunction with the reinstatement of Executive Order 13653 (2013), inclusion of these cost-benefit analyses, along with all the relevant data and tools necessary to generate the calculations, would further

[31] Infrastructure Investment and Jobs Act, Section 11403, https://www.congress.gov/117/bills/hr3684/BILLS-117hr3684enr.pdf, pgs. 127-130

[32] Executive Order 13990, https://www.federalregister.gov/documents/2021/01/25/2021-01765/protecting-public-health-and-the-environment-and-restoring-science-to-tackle-the-climate-crisis

support the targeted reforms, opportunities, and removal of barriers to better incentivize climate resilient infrastructure investments.[33]

Fixing America's Surface Transportation Act (2015)

The metropolitan planning process should consider resiliency needs as a planning factor, and its scope should provide consideration of projects and strategies that will improve the resiliency and reliability of the transportation system, as well as reduce or mitigate stormwater impacts of surface transportation.[34] Metropolitan Transportation Plans should contain capital investment and other strategies to preserve the existing and projected future metropolitan transportation infrastructure, which may be accomplished, in part, by reducing the vulnerability of current/planned assets to natural disasters.[35] Additionally, such initiatives should be included within discussions of locations and types of potential environmental mitigation activities that would have the greatest likelihood to restore, maintain, and/or enhance environmental functions affected by the Metropolitan Transportation Plan.[36]

Federal Highway Administration Order 5520 (2014)

In compliance with Federal Highway Administration policy, partnering agencies should venture together to identify climate change and extreme weather event risks to current and planned transportation systems, and integrate consideration of those risks into planning, operations, policies, and programs aimed to promote preparedness, asset protection, and ensure continued network safety, reliability, and sustainability.[37]

Moving Ahead for Progress in the 21st Century Act (2012)

This act required each state DOT to prepare and implement a risk-based asset management plan, through a development process to be reviewed and certified at least every four years, to improve or preserve asset condition and performance of NHS facilities.[38] MAP-21 (Moving Ahead for Progress in the 21st Century) also instituted the NHPP as a resource mechanism for improving NHS condition and performance, constructing new NHS facilities, and ensuring federal-aid highway construction investments are directed to support progress toward achievement of targets established in a state's required asset management plan. Most importantly, MAP-21 mandated that development of those targets be conducted to the maximum extent practicable through coordination with MPOs (Metropolitan Planning Organizations) and all non-state NHS owners, along with abilities for MPOs to set their own targets for NHS facilities within their designated planning areas. Similar planning and target-setting provisions were also authorized regarding the condition/performance of transit assets and services, and a new framework to update Metropolitan Planning Agreements enabled opportunities for MPOs, DOTs, and transit providers to formalize roles and responsibilities for developing and sharing performance data, and determining collaborative processes for the setting, reporting, and progress tracking of condition targets.[39] Though most MPOs neither own nor operate these various assets, these new regulations certainly promulgated a favorable environment for the convergence of planning, asset management, and resilience, and created an innovative, inclusive, silo-busting, and accountable formula for optimizing increasingly limited financial resources.

[33] Executive Order 13653, https://www.federalregister.gov/documents/2013/11/06/2013-26785/preparing-the-united-states-for-the-impacts-of-climate-change
[34] 23 USC 134(a)(1) and (h)(1)(I)
[35] 23 USC 134(i)(2)(G) and 23 CFR 450.324(f)(7)
[36] 23 CFR 450.324(f)(10)
[37] www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm
[38] 23 USC 119(e)(1), MAP-21 Section 1106
[39] 49 USC 5326, MAP-21 Section 20019

All the reforms above were carried forward into the Fixing America's Surface Transportation (FAST) Act and formal rulemaking was codified by 2017 for each mode concerning asset condition performance measures, target-setting processes, progress reporting, asset management plan requirements, and DOT/MPO long-range and programming plan incorporation. Essential details and exhibits regarding these characteristics, including specific regional asset condition data, proposed targets, and analyses within each mode, are described in the **Regional Performance** chapter and appendix. The FAST Act included several additional provisions to further integrate resilience and asset management. First, it enabled states to use NHPP funds for the reconstruction, resurfacing, restoration, rehabilitation, or preservation of a non-NHS bridge if the asset is located on a federal-aid eligible roadway. Second, it created an Emergency Relief Program to assist all branches of government, including those of tribal nations, with the expense of repairing serious damage to federal-aid, tribal, and federal lands roadways resulting from natural disasters or catastrophic failures. Third, it enabled new rulemaking to separate asset management plan regulations from those governing periodic evaluations of reasonable alternatives for roads, highways, and bridges requiring repeated repair and reconstruction due to emergency events. This increased availability of funds, plus a two-tiered approach to implementation giving priority for evaluations on NHS facilities, is expected to lessen the extent and severity of damage from future disasters by proactively dealing with or adapting to risks and reducing the frequency of repeated impacts.