



# Chapter 5: Resiliency and Reliability

## 5.1. Introduction

The El Paso region’s transportation system faces increasing risks from both extreme weather events and long-term climatic stressors. Heat waves, drought, intense storms, flash flooding in arroyos, dust storms, and occasional freeze events have the potential to disrupt operations, degrade infrastructure, and threaten public safety. In addition, the region’s unique binational context, particularly activity at the IBCs, introduces additional reliability challenges for the movement of people and freight.

## 5.2. Resiliency and Reliability

Federal transportation planning regulations require MTPs to assess capital investments and strategies that reduce the vulnerability of transportation infrastructure to both human-made and natural disasters. In response, this MTP evaluates the region’s vulnerabilities and outlines approaches to enhance the resiliency and reliability of key corridors and facilities.

Local efforts to build resilience are reflected in the City of El Paso’s “Resilient El Paso” framework, which was developed through extensive engagement, research, and planning. This document identifies priority areas for action, including poverty, transportation networks, extreme heat, flash flooding, drought, and the challenges of operating as a border metroplex. The plan emphasizes infrastructure projects that maximize co-benefits – addressing climatic and social stressors such as flooding, heat, energy, and citizen mobility. One specific initiative is the formation of an interagency working group, co-chaired by the City and the MPO, to develop regional performance metrics for large-scale infrastructure projects. This group leverages planning efforts from Southern New Mexico through West Texas and into Northern Chihuahua, aligning regional priorities to maximize the impact of major investments.

Observed and anticipated climate changes in El Paso include higher average temperatures and longer heat waves, variable precipitation with more intense, short-duration storms, and wind-driven dust that worsens visibility and air quality. These stressors can accelerate pavement and bridge deterioration, reduce asset life, and trigger non-recurring delays. Risks are concentrated along major corridors, IBC approaches, and low-lying areas subject



to rapid runoff. Reliability is also sensitive to energy and water system interdependence, as well as IBC operations during disruptions.

Key stressors relevant to the El Paso region include:

- Extreme heat and drought that reduce asset lifespan, heighten roadside fire risk, and increase worker safety constraints.
- Monsoon-driven flash flooding/arroyo flooding that intermittently closes segments and underpasses.
- Dust storms/blowing dust impairing visibility and increasing crash risk on open corridors.
- Freeze/cold events that stress pavements, signals, and the energy grid.
- Wildfire risk at the wildland–urban interface near the Franklin Mountains.
- Hazardous materials incidents and cross-border operational disruptions near IBCs and industrial corridors.

By proactively addressing these risks through coordinated planning, targeted investments, and ongoing collaboration among regional partners, EPMPO aims to ensure a resilient and reliable transportation system that supports the region’s mobility, safety, and economic vitality, now and into the future.

### **5.2.1. Comprehensive Resiliency Network**

To effectively map out the resilience of the El Paso MPO region, three themes were examined and mapped: Connectivity, Criticality, and Vulnerability.

The Connectivity Theme examined how a roadway serves the region and identifies sections that serve increased locations that are particularly important during emergency response and recovery. The data includes the following:

- Colleges and Universities (Resilience Analysis and Planning Tool (RAPT)- tool developed by FEMA)
- Colonias (RAPT)
- Fire Stations (RAPT)
- Hospitals (RAPT)
- Law Enforcement Offices (RAPT)
- Local Emergency Operations Center (RAPT)
- Mobile Home Parks (RAPT)
- Power Plants (RAPT)
- Private and Public Schools (RAPT)
- SNAP-Authorized Retailers (RAPT)



- Solid Waste Landfill Facilities (RAPT)
- Ports of Entry (Bureau of Transportation Statistics)

The Criticality Theme examined which routes have the highest regional importance based on who they serve, such as active transportation and transit routes, inclusion in the national freight network, and/or a high-level functional classification roadway. The data includes the following:

- Active Transportation Routes (trails, bikeways, etc.) (City of El Paso)
- National Freight Routes (USDOT)
- Transit Routes (Sun Metro)
- Functional Classification 1 or 2 (NMDOT, TxDOT)
- STRAHNET (Strategic Highway Network) (STRAHNET) (USDOT)

Vulnerability examined at regional environmental factors that increase risk for essential infrastructure as well as users. The data includes the following:

- Extreme Heat and Cold (FEMA)
- High Growth Areas (TTI Validated Transportation Demand Model for EPMPO)
- Riverine Flooding (FEMA)
- Wildfire Risk (FEMA)
- Drought (FEMA)

Roadway segments were scored across the three themes to identify high-scoring segments. Roadway segments were scored as follows:

- **Connectivity:** A roadway gained points based on the overlap or adjacency with a block group that contains a regional asset. 1 point was given per asset in the block group.
- **Criticality:** A roadway gained points based on inclusion in previously identified networks, 1 point for each network.
- **Vulnerability:** A roadway gained points based on overlap with increased environmental risk, 1 point for each risk level.

After initial scoring, scores within each theme were summed and converted into normalized ranks to allow for equal weight of each of the three main categories. Scores for each theme were converted to be out of 5, for a maximum of 15 for all three themes. **Figure 5-1** shows the cumulative scores in the region. This includes all three themes. The higher the score, the more essential the roadway is to emergency response and recovery. The roadways with the highest cumulative scores are along IH-10, US 54, US 62, Alameda Avenue, SH 20, and



Loop 375. Maps for individual themes can be found in **Appendix C: Comprehensive Access Need Areas and Comprehensive Resiliency Network**, along with the complete analysis.

### 5.2.2. Strategies to Improve Resiliency and Reliability

The strategies outlined below were developed through a comprehensive assessment of the El Paso region’s climate risks, infrastructure vulnerabilities, and operational challenges. Drawing on federal guidance, local planning initiatives such as Resilient El Paso, and input from regional stakeholders, the MPO identified priority corridors, assets, and communities most susceptible to disruption from extreme weather, climate change, and other hazards. The strategies are designed to address both acute events, such as flash flooding, dust storms, and hazardous materials incidents, and chronic stressors like extreme heat and drought. Each approach reflects best practices in asset management, emergency preparedness, and interagency coordination, with a focus on protecting critical infrastructure, maintaining reliable mobility, and ensuring equitable access to essential services. By targeting investments and operational improvements where they are needed most, these strategies aim to build a more resilient and adaptable transportation system for the El Paso region.

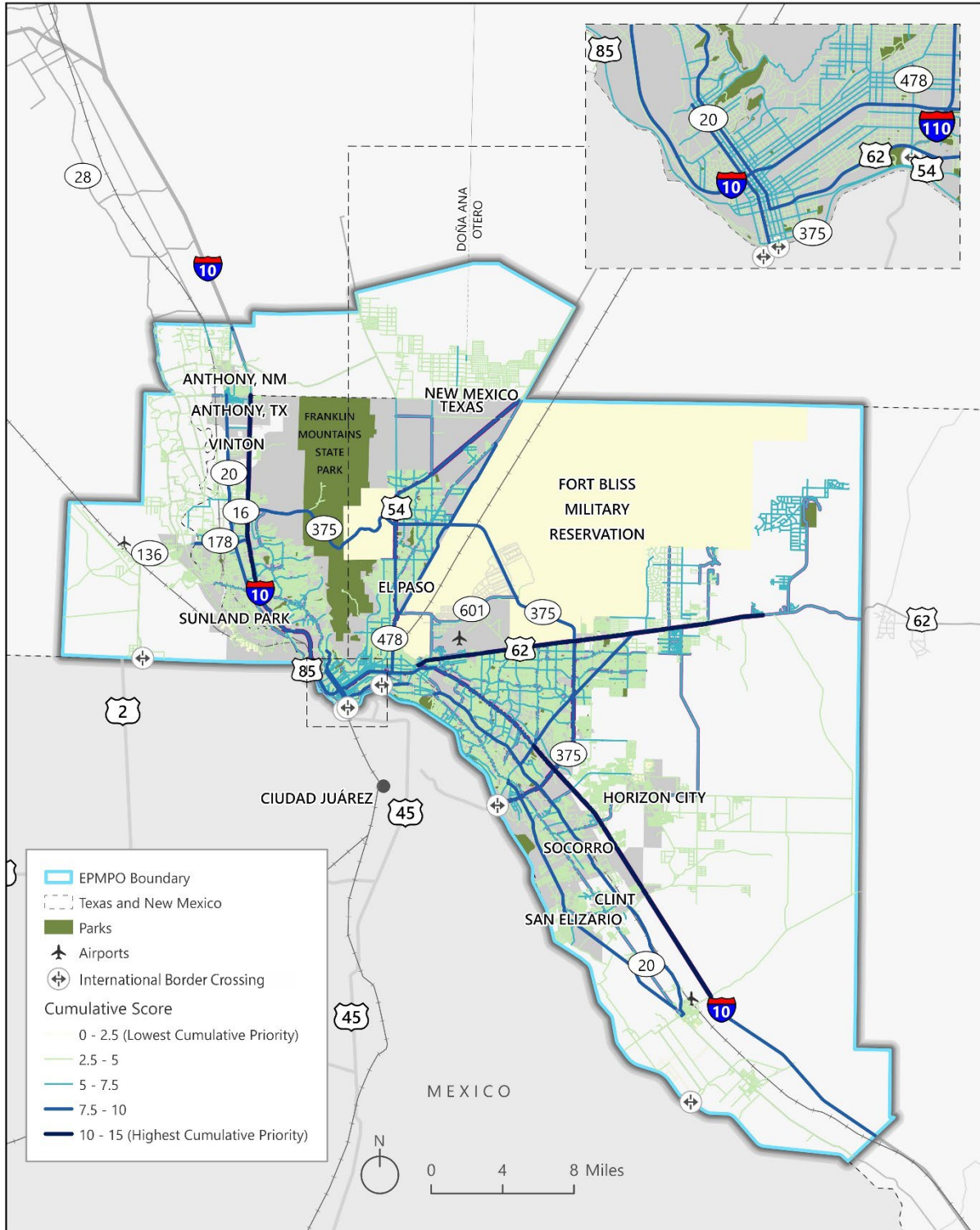
- **Asset hardening & design standards**
  - Apply temperature-resilient materials and joint details; elevate/retrofit at chronic ponding locations; protect signal/power cabinets against heat/water intrusion.
  - Incorporate low-water crossings retrofits, larger inlet capacity, debris control, and targeted green infrastructure to attenuate runoff near known flood nodes.
- **Operations & incident management**
  - Expand ITS (flood/dust warning, CCTV, weather stations) and work zone/incident response protocols on high-risk segments; integrate dust-related visibility sensors on IH-10 and other open corridors.
  - Pre-plan detours and shoulder uses for IBC approaches; coordinate multi-agency playbooks for closures near downtown bridges and Santa Teresa.



- **Redundancy & network planning**
  - Identify redundant east–west and north–south pathways linking hospitals, emergency services, and IBCs; protect/upgrade those alternatives in TIP programming.
  - Advance grade separations or bottleneck fixes on routes that provide the most reliable diversions during incidents.
- **Binational & interagency coordination**
  - Maintain joint protocols with the International Boundary and Water Commission, Customs and Border Protection, and Mexican counterparts for flood releases, bridge closures, and staffing; share data and decision thresholds to reduce delay and improve recovery time at IBCs.
- **Community**
  - Prioritize resiliency upgrades in areas with high concentrations of Comprehensive Access Need Areas, ensuring reliable access to essential services during extreme events (e.g., shaded bus stops, safer crossings, and heat-resilient walking/biking links).
- **Funding & delivery**
  - Package corridor-specific resiliency improvements to leverage federal funding, CMAQ (for dust/air-quality co-benefits), and state programs; align with TxDOT/NMDOT asset management and emergency relief processes.



Figure 5-1: Comprehensive Resiliency Network, Cumulative Scores Map



Source: WSP Analysis



## 5.3. Environmental Considerations

Projects considered in RMS 2052 may have impacts on the natural and human environment, some positive, such as reducing greenhouse gas emissions through improved active transportation systems, and some negative, such as converting existing land uses to transportation facilities. As the El Paso region continues to grow, the challenge will be to strike an acceptable balance between urban development, mobility, and economic development, while maintaining a high quality of life that includes clean air and water, environmental preservation, and opportunities for recreation and tourism.

To reduce the impacts of transportation improvements, potential environmental mitigation activities must be developed in consultation with federal, state, tribal, wildlife, land management, and regulatory agencies. EPMPO is committed to minimizing and mitigating the negative effects of transportation projects on both the natural and built environment, in order to preserve the region's environmental assets and quality of life. Not every project will require the same type or level of mitigation. Major projects, such as new roadways or interchanges, may involve considerable disturbance, while intersection improvements, street lighting, or resurfacing typically result in minimal impacts. The mitigation efforts used for a project should be proportional to the expected impact on environmentally sensitive areas.

The National Environmental Policy Act (NEPA) recommends a five-step approach to mitigation:

- 1** Avoiding the impact altogether
- 2** Minimizing impacts by limiting the degree or magnitude of the action and its implementation
- 3** Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- 4** Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- 5** Compensating for the impact by replacing or providing substitute resources

The following analysis documents existing land use patterns, environmental hazards, and environmental and cultural resources in the EPMPO region, assesses potential impacts on these assets and resources from development patterns and improvement projects identified in this MTP, and examines possible strategies to prevent or mitigate these impacts.



### 5.3.1. Existing Land Cover

Land use and development are major factors influencing environmental health in the El Paso region. As the region grows, additional land development may be required to support new housing, employment centers, and infrastructure. Land use patterns directly shape the transportation system: the location, density, and design of activities carried out by residents affect travel demand and mode choice across highways, roads, and other pathways. It is therefore essential to consider land use and transportation together to ensure the region's environmental health.

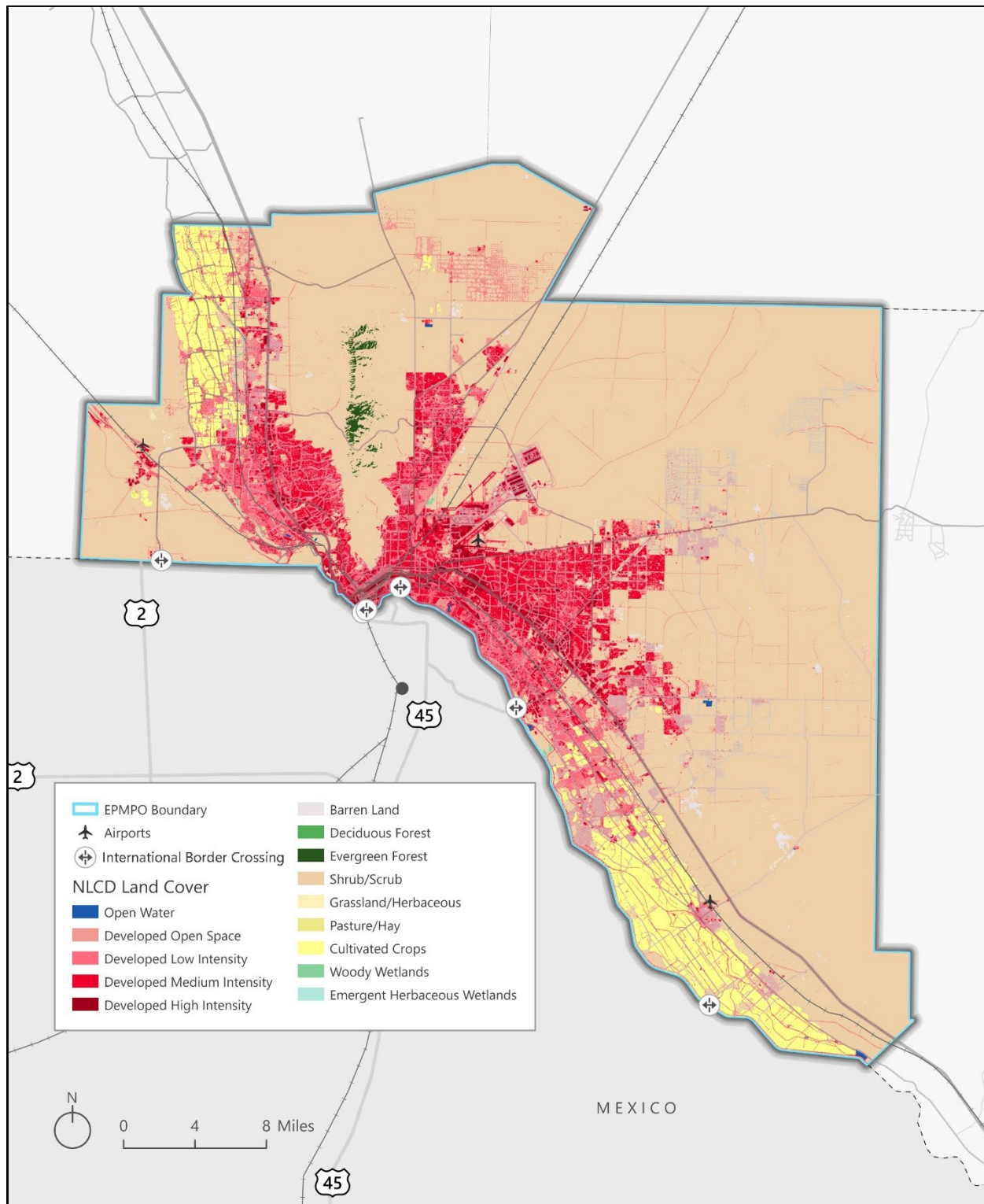
As shown in **Figure 5-3**, the EPMPO region is comprised of a large developed inner core encompassing the City of El Paso, which houses the majority of residents. Land use in the central area is predominantly residential, with some commercial use. Commercial land use in the city center is mostly service-oriented businesses and small retail shops. The surrounding areas include long stretches of farmland, shrubs, and grassland.

*Figure 5-2. Franklin Mountains State Park Lower Sunset Hike & Bike Trail*





Figure 5-3: Existing Land Cover



Source: U.S. Geological Survey



### 5.3.2. Natural, Cultural, and Historic Assets, Environmental Hazards, and Tribal Populations

Natural assets in the region include rivers, lakes, reservoirs, ponds, parks, and critical habitat areas. These features are critical to the regional ecosystem and contribute to the attractiveness and resilience of the region. Transportation projects may pose risks to these resources, making it important to develop in harmony with natural and geographic features. Environmental hazards identified in the region include municipal solid waste sites, Toxics Release Inventory (TRI) sites, and brownfield locations.

Cultural and community resources are significant assets that serve the needs of residents and enrich the region's identity. These include schools, libraries, parks, airports, courthouses, museums, and cemeteries. Such resources should be preserved and protected, as they are important destinations for recreation, tourism, and community services. Careful planning and consideration are needed to avoid negative impacts on these assets.

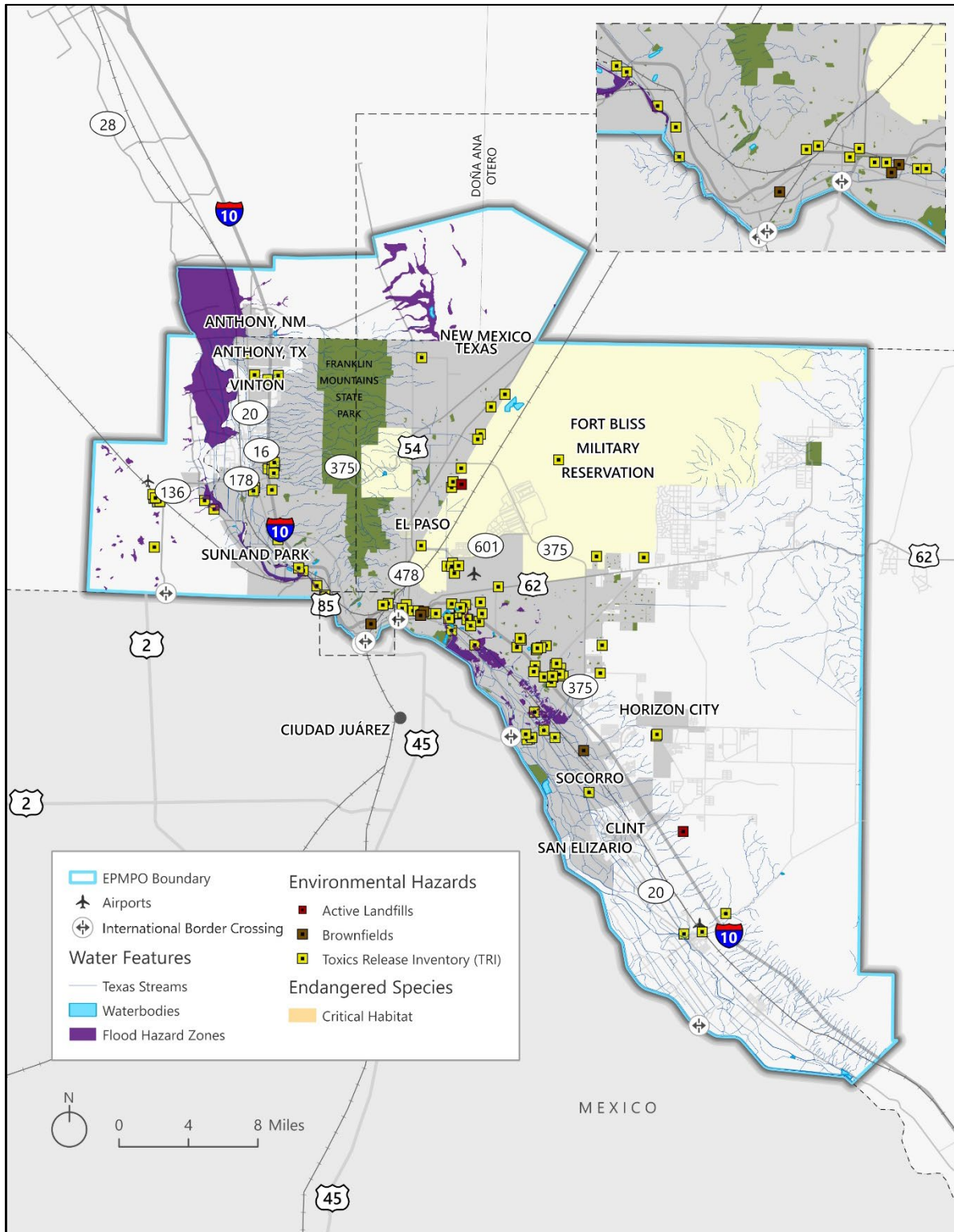
Historic sites in the El Paso region include properties, districts, and highway routes deemed significant at the local, state, or national level. Under Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the Department of Transportation Act, the Federal Highway Administration (FHWA) is required to identify, evaluate, and protect properties of historical significance. The National Register of Historic Places (NRHP) is the official list of the nation's historic landmarks and sites considered worthy of preservation. Transportation planning should consider and avoid impacts on these sites.

Tribal census tracts are also considered, including communities such as Ysleta del Sur Pueblo (Tigua Pueblo), which have unique cultural and environmental considerations.

An inventory of natural, cultural, tribal, and historic assets, as well as environmental hazards in the EPMPO region, is provided in **Figure 5-4**. This inventory is based on available GIS data and does not replace the need for project-level environmental assessments.



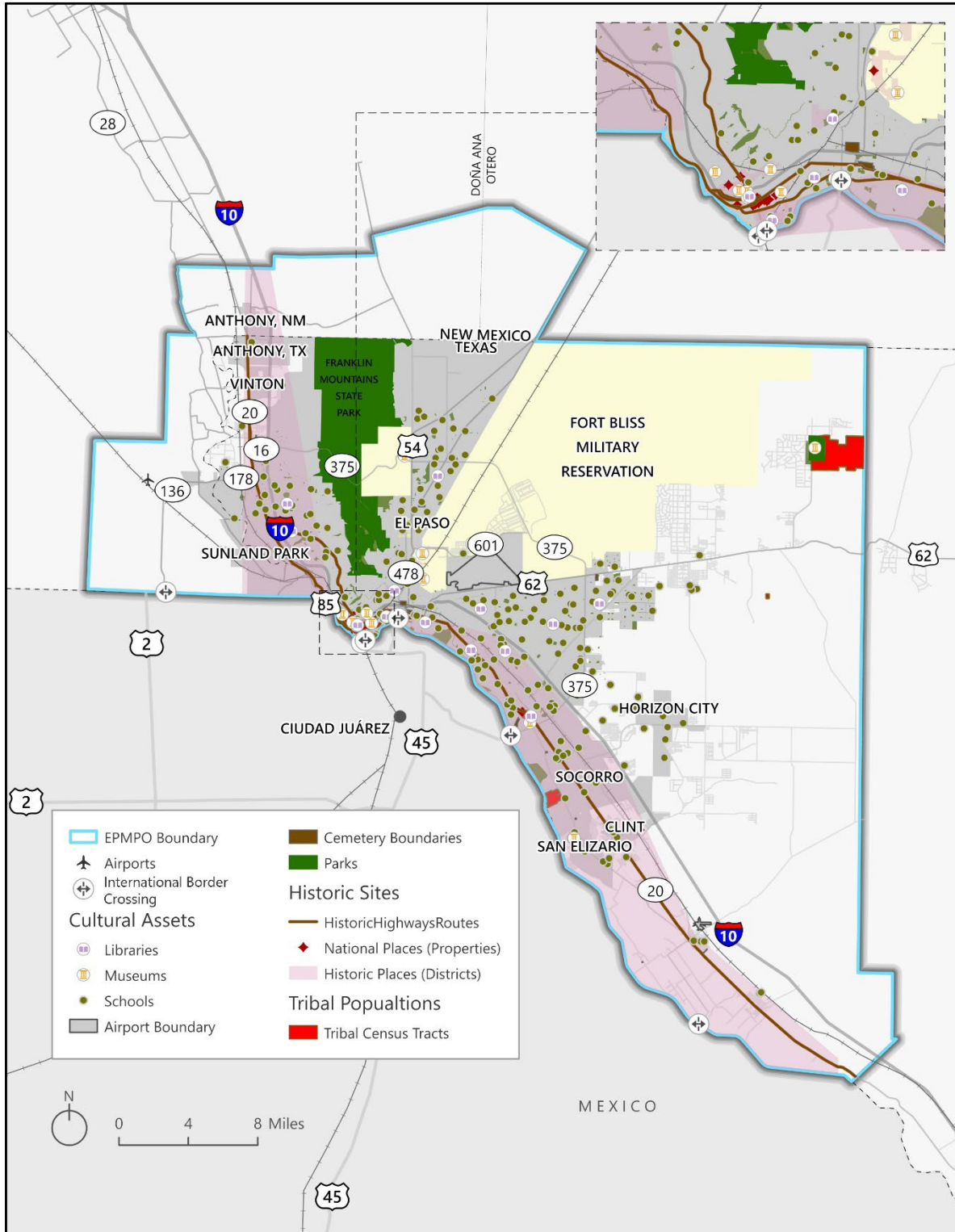
Figure 5-4: Inventory of Environmental Features



Source: Texas Commission on Environmental Quality, U.S. Fish & Wildlife, Texas Historical Commission, Texas State Library and Archives Commission, Texas Education Agency, U.S. Census Bureau



Figure 5-5: Inventory of Human, Cultural and Historical Assets



Source: Texas Commission on Environmental Quality, U.S. Fish & Wildlife, Texas Historical Commission, Texas State Library and Archives Commission, Texas Education Agency, U.S. Census Bureau



### 5.3.3. Mitigation Measures

Effective mitigation starts at the beginning of the environmental process, not at the end. Mitigation must be included as an integral part of the alternative development and analysis process. **Table 5-1** details possible strategies that may be considered for addressing environmental impacts. Many of these measures are applied by EPMPO and project partners during project development. As projects are selected and programmed, additional project-level evaluations are required, and impacts should be minimized through the alternatives analysis process.

*Table 5-1: Environmental Impact Mitigation Measures*

Resource	Mitigation Measures
<b>Agricultural Areas</b>	Avoidance, minimization, compensation (preservation, creation, restoration, in-lieu fees); design exceptions and variances; environmental compliance monitoring.
<b>Ambient Air Quality</b>	Transportation control measures, emission reduction measures, adoption of local air quality mitigation fee programs, energy efficient incentive programs, air quality enhancing design guidelines.
<b>Cultural Resources</b>	Avoidance, minimization; landscaping for historic properties; preservation in place or excavation for archeological sites; Memoranda of Agreement with the Texas Historical Commission and TxDOT Environmental Division; design exceptions and variances; environmental compliance monitoring.
<b>Endangered and Threatened Species</b>	Avoidance, minimization; time-of-year restrictions; construction sequencing; design exceptions and variances; species research/fact sheets; Memoranda of Agreement for species management; environmental compliance monitoring.
<b>Forested and Other Natural Areas</b>	Avoidance, minimization; replacement property for open space easements; design exceptions and variances; environmental compliance monitoring.
<b>Neighborhoods, Communities, Homes, Businesses</b>	Impact avoidance or minimization; context-sensitive solutions for communities (appropriate functional and/or aesthetic design features).
<b>Parks and Recreation Areas</b>	Avoidance, minimization, mitigation; design exceptions and variances; environmental compliance monitoring.
<b>Wetlands or Water Resources</b>	Avoidance, minimization; design exceptions and variances; environmental compliance monitoring.

Source: Federal Regulation 40 CFR 1508.20



### **5.3.4. Stormwater Mitigation**

Stormwater management is a critical consideration for transportation projects in the El Paso region. Urbanization and transportation infrastructure increase impervious surfaces, leading to higher volumes and velocities of stormwater runoff. This can result in flooding, soil erosion, sedimentation, stream bank erosion, and waterway pollution. The TxDOT Hydraulic Design Manual: Storm Water Management provides guidelines for mitigating stormwater impacts, including both structural and nonstructural measures such as erosion control, detention and retention systems, sedimentation and filtration systems, and vegetation buffers. The NACTO Urban Street Stormwater Guide offers supplementary best practices for urban environments.

As the EPMPO area continues to urbanize and experience development pressures, stormwater impacts must be addressed through policies, design standards, and project-level mitigation to protect transportation assets and environmental resources.

### **5.3.5. Air Quality**

Air quality is an important factor in long-range transportation planning. The National Ambient Air Quality Standards (NAAQS) are federal standards that set allowable concentrations and exposure limits for six pollutants: ozone, carbon monoxide, particulate matter, nitrogen dioxide, lead, and sulfur dioxide. If monitored levels of any of these pollutants violate the NAAQS, the Environmental Protection Agency (EPA), in cooperation with the State of Texas, will designate the contributing area as “nonattainment.”

In 2016, New Mexico Environment Department (NMED) recommended that EPA designate a portion of Doña Ana County near Sunland Park, NM as nonattainment. Based on 2014-2016 ozone monitoring data, EPA designated the area as a marginal nonattainment area on June 4, 2018 (Effective August 3, 2018) (83 FR 25776).

El Paso MPO is responsible for conducting the air quality conformity analysis to address the 2015 Ozone NAAQS for the portion of Doña Ana County near Sunland Park, NM non-attainment area.

A portion of the City of El Paso is designated as a limited maintenance area for Carbon Monoxide (CO), meaning that the area has successfully achieved and is maintaining air quality standards. EPMPO is required to establish targets and report progress for performance measures to ensure that air quality in these areas is not negatively impacted by federally funded transportation projects. The MPO works in consultation with TxDOT, TCEQ, EPA, FTA, FHWA, Sun Metro, SCRTD, and local air quality offices.

EPMPO recognizes the importance of air quality standards and is committed to meeting the region’s performance targets.