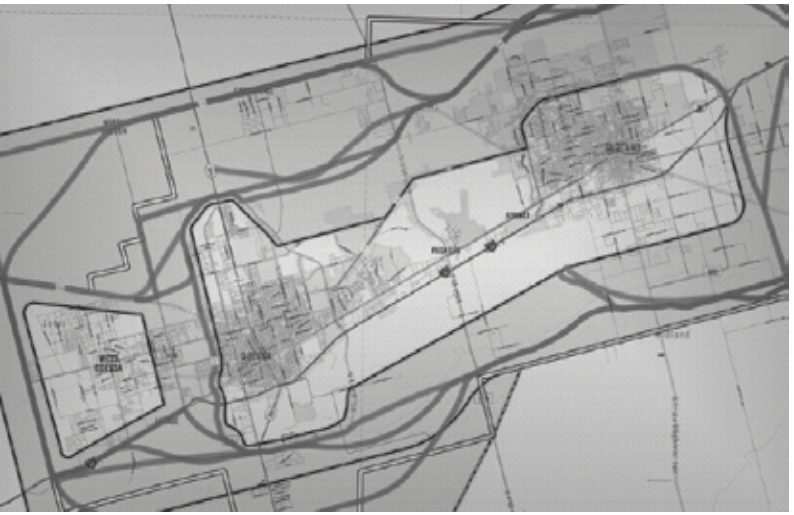

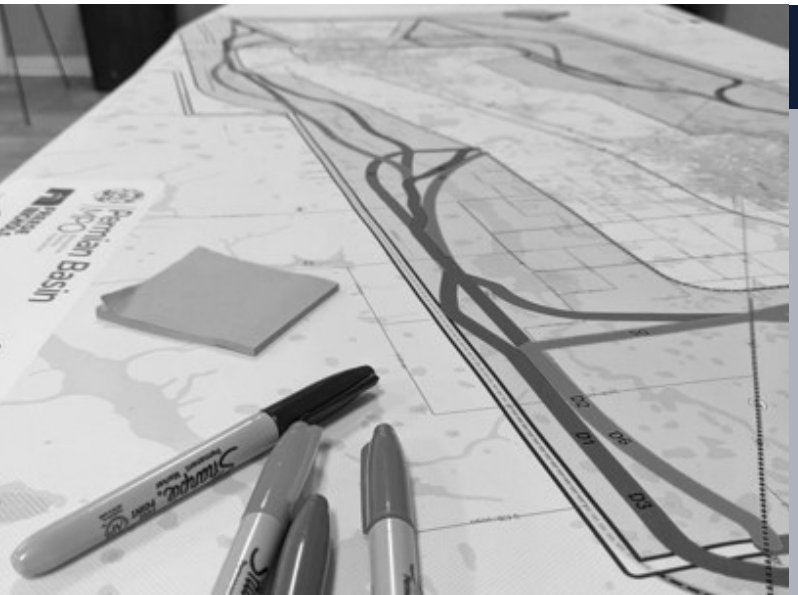

PERMIAN BASIN METROPOLITAN PLANNING ORGANIZATION

INTERREGIONAL PLANNING AND ENVIRONMENTAL LINKAGES (PEL) STUDY

SEPTEMBER 2023

Permian Basin MPO Metropolitan Planning Organization

PREPARED WITH

FREESE NICHOLS

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ACKNOWLEDGMENTS

The planning team would like to thank the many individuals who contributed to the development of the Permian Basin Interregional Corridor PEL Study. We are particularly grateful to the Study Oversight Committee, the PBMPO staff, and the stakeholders and community members who provided valuable insight and feedback about the future of the region.

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CONTENTS

I. INTRODUCTION

I. INTRODUCTION

STUDY BACKGROUND

The Permian Basin is the largest petroleum-producing region in the United States. Increased production in this and nearby areas, and consequent increased travel demands, provide an impetus to plan for more connectivity between the urbanized areas of Midland and Odessa. The Permian Basin Metropolitan Planning Organization (MPO) has realized the potential for an interregional corridor as a viable solution to not only accommodate energy and freight production and distribution, but also to enhance mobility and safety of urbanized areas between and around Midland and Odessa. Planning for a potential interregional corridor would allow Permian Basin MPO to use information about current and future growth to anticipate the best way to meet travel needs of the region, understand freight movement, and address potential safety and mobility enhancements.

PURPOSE

A Planning and Environmental Linkage (PEL) Study is a Federal Highway Administration (FHWA) process[1] meant to consider a variety of future transportation improvements in a holistic way.

Notably, this PEL is not a feasibility study for one specific roadway or facility. Rather, it began with input from stakeholders, the public, and other local voices to gradually develop concepts for potential corridors for detailed evaluation that would address the area's needs. It is an opportunity to establish a collaborative forum for the discussion of common visions, goals, and objectives. Transportation planning projects will typically engage the public to solicit input after potential solutions have already been developed by a planning team. The PEL Study process is unique in its adjustment of this traditional approach, focusing on the value of the conceptual process and recognizing the value of engagement on a variety of considerations from the very beginning.

A PEL Study:

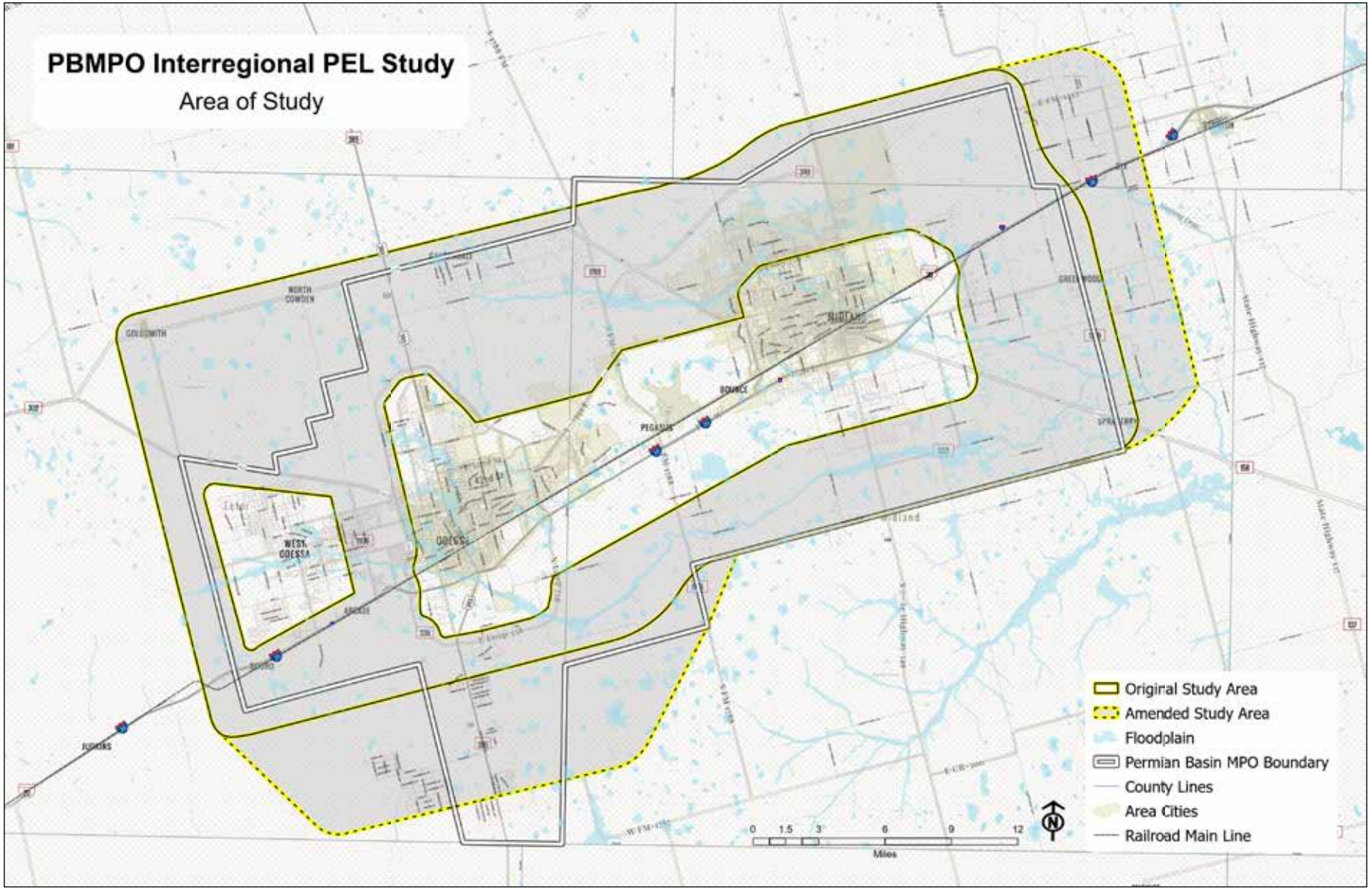
- Documents the **vision** for the proposed transportation investment along with a supporting purpose and need statement;
- Focuses on **engagement** with community members and other stakeholders;
- Is a **collaboration tool** to initiate the environmental documentation process;
- Includes a **needs assessment** to ensure the future network connects points and meets goals surrounding both communities;
- Explores potential solutions based on impacts to the **environment**, the **community**, and the **economy**;
- Addresses long-term **economic benefits**, **regional mobility**, and **safety**;
- Considers **environmental stewardship** in the context of identified needs;
- Informs next-step **environmental documentation** and conceptual design;
- May help to expedite the next steps towards **implementation** of a project; and
- Requires a **broad awareness** of the study area.

The study area (Map 1 on page 11) encircles both the Midland and Odessa metropolitan areas, but primarily encompasses areas outside of those city limits. This is because the priority for this study is mobility, safety, and connection between and around the regional communities, and a sufficiently viable solution to interregional needs will allow access from all parts of the region/MPO.

Later in the study process, additional options that were proposed by stakeholders and the public were reintroduced into the analysis process after having previously been screened out. This prompted a slight expansion of the area of focus, and this "amended study area" is shown on several maps throughout the report.

[1] This PEL Study was initiated as an independent project and did not require the use of the FHWA checklist.

Map 1: *Interregional PEL Study - Area Map*



REGULATORY REQUIREMENTS

As this PEL is pre-NEPA, the focus is to obtain relevant stakeholder and desktop data that can be used to inform follow-up detailed analyses and evaluations. Such documentation would be subject to Texas Department of Transportation (TxDOT) environmental processes as informed through the Federal Highway Administration (FHWA). Data collected for this PEL consisted of both publicly available documents as well as, a scan of numerous state databases. A detailed list of all data collected can be found in Chapter 3: Existing Conditions of this document.

Archeological and historic resource databases were also reviewed to generally assess for fatal flaws of defined conceptional corridors. Such data is protected by the Antiquities Code of Texas (ACT) and Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended.

Additional data was collected through federal and state-agency outreach efforts. A list of contacted agencies is available in Chapter 2: Public Involvement of this document.

PEL STUDY APPROACH

NEEDS AND PURPOSE

The study team began the PEL process by interviewing stakeholders and the MPO about the region's most pressing transportation issues that might be addressed by a new interregional facility. These issues were summarized into five major categories, each of which was then translated into a specific regional need. These key needs guided the development of the PEL Study purpose statements, with each need corresponding to one element of the statement.

Purpose Statements

The purpose of the PBMPO's PEL Study is to develop conceptual transportation alternatives that address the stated needs.

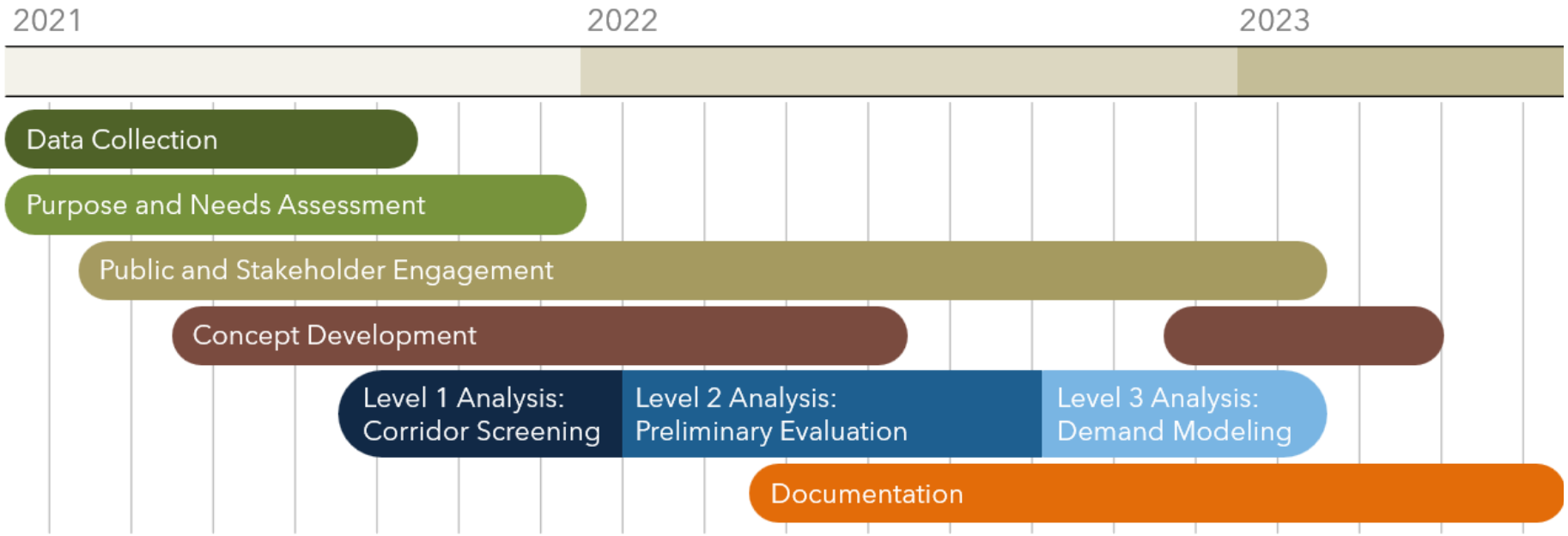
An alternative should do this by:

- Providing system relief or additional traveler choice via an alternate route for movement of goods and travelers;
- Creating safer regional movement;
- Extending or expanding the existing network;
- Providing an appropriate level of access to existing or anticipated economic and development activity;
- Providing regional connectivity and access for both the cities of Midland and Odessa; and
- Providing regional connectivity and access for Ector, Midland, and Martin Counties.

Ultimately, the needs and purpose statements provided direction for the study team and served to accurately capture local understanding of the region's transportation priorities.

More information about the derivation of the specific needs and purpose can be found in the Analysis chapter.

Figure 1: *Timeline of Major Study Elements*



PROJECT ELEMENTS

The project process included the following major milestones:

- Project Initiation and Data Collection
- Public Engagement (ongoing)
- Project Visioning / Goals & Objectives
- Needs Assessment
- Corridor Development, Analysis, and Screening
- Environmental Resource Implications
- Refined Concept Development
- Travel Demand Modeling
- Documentation

Alternative concepts were screened using a tiered analysis approach. The first level identified any “red flags” or conflicts with the PEL Study’s purpose statement. Level two employed a range of natural-and built-environmental screening criteria, and level three used additional analysis such as travel demand modeling to focus on areas of highest opportunity. These analysis steps are described in more detail in the Alternatives Analysis chapter.

REGIONAL PLANNING EFFORTS

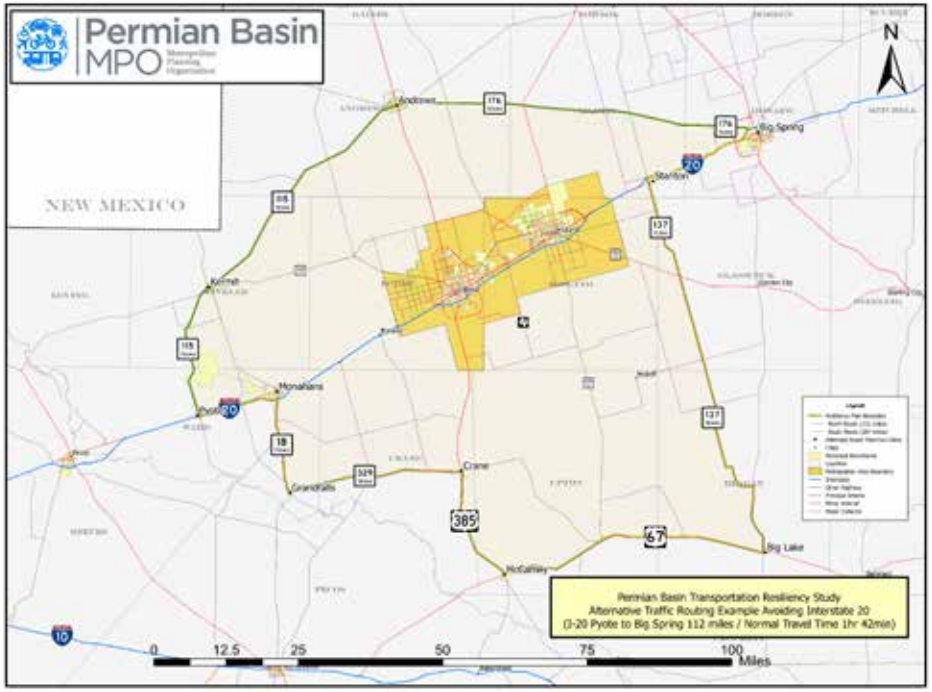
Previous and ongoing planning efforts throughout the region provide an important foundation for creating a new, cohesive plan or study. The following projects accompany the existing, adopted Thoroughfare and Transportation Plans in the development of this PEL Study.

Resilience Improvement Plan (RIP)

During the Interregional Corridor PEL development, the PBMPO was contracted with the Texas A&M Transportation Institute to create a Resilience Improvement Plan (RIP). The RIP includes comprehensive analyses of transportation corridors that are at risk for major disruptions and identifies mitigations for those risks and potential road closures. Major disruptions may be caused by extreme weather events, such as flooding, tornados, ice and snow storms, blowing sand and dust, and drought. Crashes and other human-caused events also contribute to closures on major roads. One of the key elements of the RIP is identifying roads that can be used as alternate routes when major disruptions occur.

The two project teams worked closely with each other while creating the PEL and contribution toward the RIP. This coordination resulted in both project teams and the PBMPO realizing that any additional corridors will help provide relief during disruptions on major roads. One specific example is the potential addition of future corridors that may be a combined new location and improve existing roads. Because of the high volumes of traffic on Interstate 20, east-west alternate routes are extremely important for the future of the PBMPO transportation system.

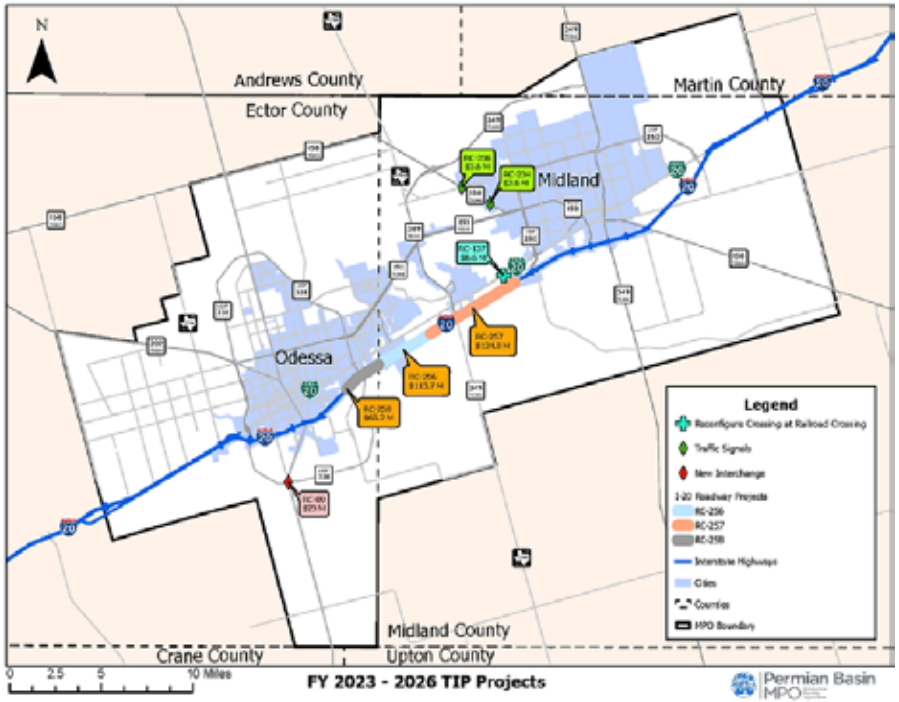
Resilience Improvement Plan Study - Area Map



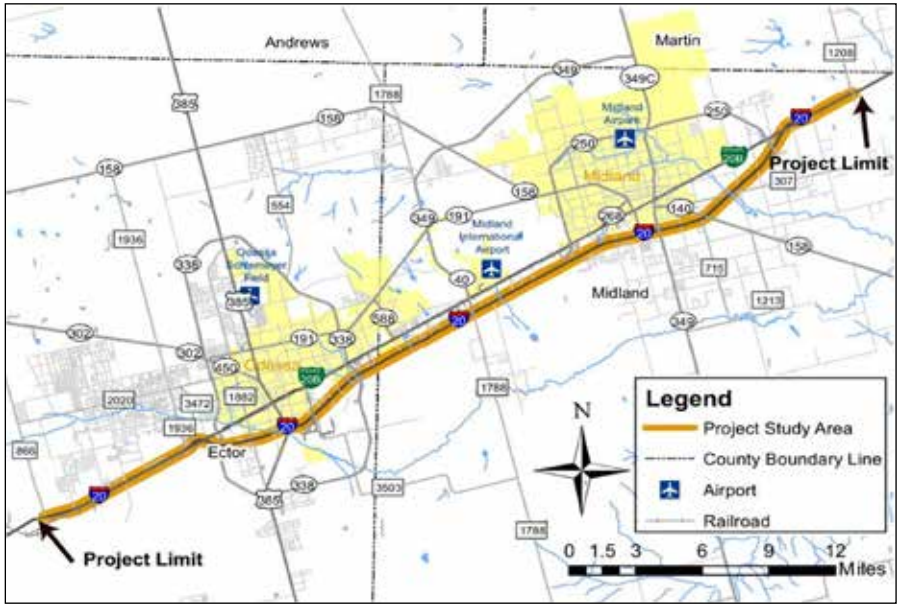
Metropolitan Transportation Plan (MTP)

In late 2019, the MPO Policy Board adopted the Forward 45 Metropolitan Transportation Plan (MTP) containing a multimodal needs plan and a financially constrained project plan for the region. The purpose of Forward 45 was to build upon the findings and initiatives identified in the previous MTP, and to detail the transportation improvements and programs to be carried out within the Permian Basin during the plan's timeframe. Keeping this plan updated is the mechanism by which the Permian Basin MPO can continue to implement and reliably fund transportation improvements and programs.

Forward 45 MTP - Transportation Improvement Projects 2023-2026



I-20 Corridor Study Limits



I-20 Corridor Study

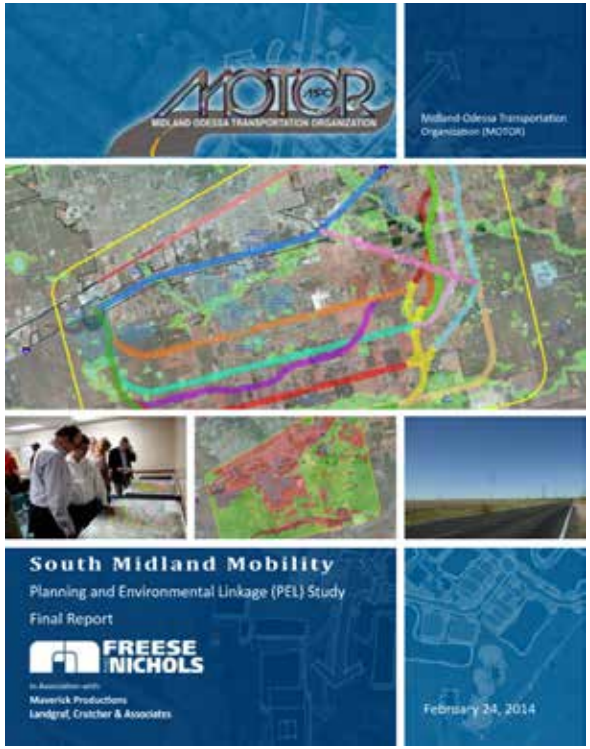
The TxDOT Odessa District, in partnership with PBMPO, initiated a corridor study in 2016 to develop a program of improvements for the I-20 Odessa-Midland corridor. The corridor study focuses on the stretch of I-20 in the Odessa-Midland area from west of FM 1936 to east of FM 1208, approximately 40 miles (see Figure 3 on page 22). Improvements will include adding main lanes, constructing new interchanges, reconfiguring ramps, and converting frontage roads from two-way operation to one-way operation, as well as capacity, operational and drainage improvements for most of the corridor. Currently, the study team is working on a cross-section schematic design for the corridor with a focus on accommodating growth, increasing safety, adding system connectivity, and addressing oversized freight.

South Midland Mobility PEL Study

This PEL Study was completed by the MPO in 2014 and focused on analyzing and identifying a potential mobility corridor south of Midland and IH 20. Much like this Interregional PEL Study, it emphasized public and stakeholder input and engagement to develop alternatives that would complete a southern mobility corridor similar to Loop 250 north of IH 20. The planning team screened potential mobility corridor concepts using environmental, social, and economic considerations, resulting in a framework that would help the MPO identify areas of high, medium, and constrained opportunity. More information about this study can be found on the MPO website.

South Midland Mobility PEL Study - Highest Opportunity Corridor Bands

South Midland Mobility PEL Study



South Midland Mobility PEL Study Public Engagement Meeting

Ports-to-Plains Corridor - I-27

Gulf Coast Strategic Highway - I-14

Ports to Plains Corridor

This corridor stretches 2,300 miles from Mexico to Canada and runs through 10 U.S. States. The primary goal of the corridor is to "advocate for a robust international transportation infrastructure to promote economic security and prosperity throughout America's Heartland." It is primarily used for the transport of agricultural sector, energy sector, and international trade goods. The Ports-to-Plains Corridor Alliance is advocating for all sections of the corridor to be upgraded to four roadway lanes or better. The section of the corridor which runs from Laredo, Texas to Raton, New Mexico (in which the Midland-Odessa region is centered), was officially announced as part of the new Interstate 27 in March 2022.

Forts-to-Ports - Interstate 14 (I-14) Gulf Coast Strategic Highway

The proposed Interstate 14 would stretch 1,300 miles across 5 U.S. States and would have its terminus in the Midland-Odessa region. The primary goal of the transportation project is to better connect military installations to Gulf Coast ports. The first section of the corridor from Killeen to I-35 was approved by Congress and officially designated in 2017. The Midland-Odessa region became included in the proposed I-14 corridor after the passage of the 2021 IIJA federal infrastructure bill.

Northeast Midland Corridor - Potential Specialty Corridors

Northeast Midland Corridor Planning

The Midland Northeast Sector Study, which is still in progress at the time of this PEL, is the second phase of the initial Northeast Corridor Plan prepared in 2018 for the City of Midland and the MPO. Planning work in this area includes evaluation of existing conditions, ten-year model forecasting, potential new corridor need, and evaluation of freight movements.

Development Initiatives

There has been a significant interest in development in the area northwest of IH 20, near FM 866. It is estimated that the proposed developments will employ thousands of construction workers and hundreds of full-time operators and maintenance personnel when fully operational. Due to their impact on both the local employment and energy production economies, large developments remain a consideration in planning for future growth. The current phase of improvements planned by TxDOT for IH-20 terminate about 10 miles west of Odessa, just outside of the PEL Study area.

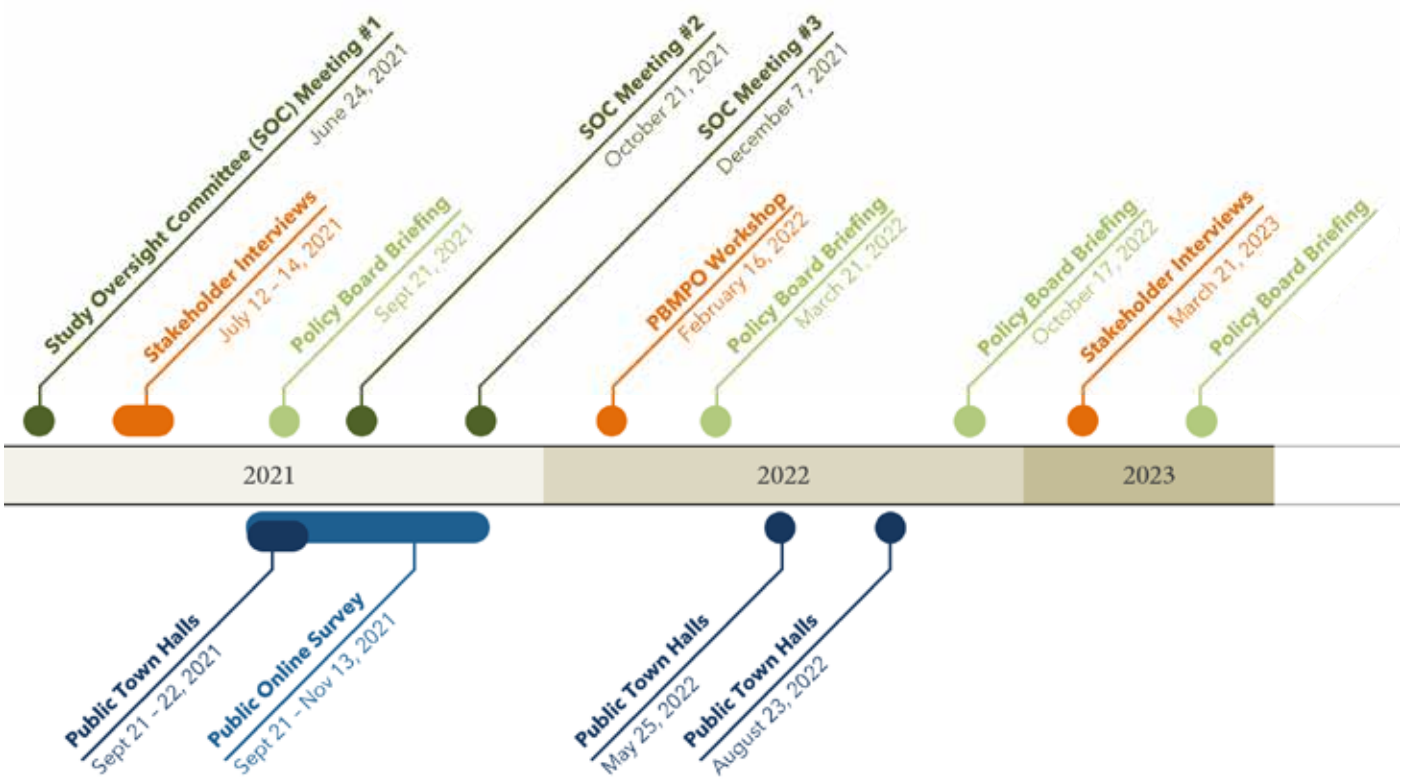
II. PUBLIC INVOLVEMENT

II. PUBLIC INVOLVEMENT

Public and stakeholder engagement is the cornerstone of a PEL study. As previously described, considerations from the public and from stakeholders are introduced from the very beginning of the study process, rather than a planning team presenting potential solutions to stakeholders after their conception.

Throughout the lifespan of the project, the planning team met with stakeholders in both group and individual settings, reached out to area resource agencies, collected information from the public in both Odessa and Midland, and engaged local leaders on a regular basis. The following is an overview of PEL study engagement activities and how they contributed to project evolution.

Figure 2: *Project Events for Stakeholder and Public Engagement*



STAKEHOLDER AND AGENCY INPUT

STAKEHOLDER INTERVIEWS

Prior to meeting with a large public audience, the planning team invited key stakeholders from throughout the community—including policymakers, elected officials, local governmental representatives, advocacy group leaders, neighborhood group leaders, and other agency officials—to provide baseline qualitative information about the state of interregional transportation in the Permian Basin. The purpose of the stakeholder interviews was to meet in a more individual, intentional setting with those who had a particularly vested interest in this project for one reason or another. They provided a more comprehensive understanding of the existing conditions of the region and their vision of potential benefits of an interregional facility. These sessions laid the foundation of key issues that were later developed in the public meeting.

The initial round of stakeholder interviews occurred on July 12th-14th at the MPO office with the following participating groups and officials:

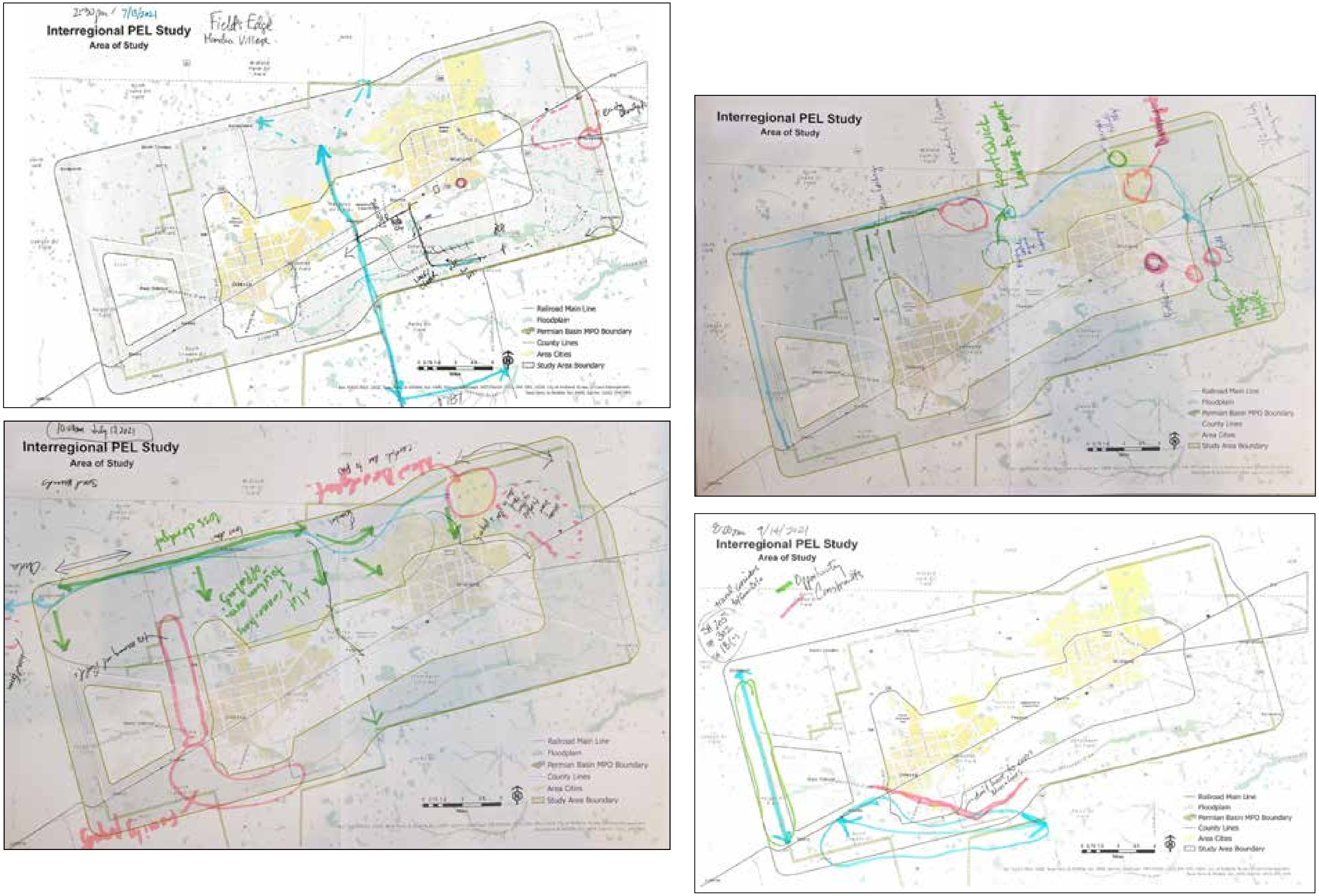
- Chambers of Commerce
- City of Midland
- City of Odessa
- County Commissioners
- Director of Airports
- Ector County Utility District
- Ector County
- Endeavor Energy
- Freight Distributors
- Judges
- Martin County
- Midland County
- Midland County Road Administrator
- Midland Economic Development Corporation
- Midland & Odessa Hispanic Chambers of Commerce
- Midland-Odessa Transportation Alliance
- Motran Alliance Inc
- Parkhill
- Permian Basin MPO
- Permian Basin Petroleum Association
- Permian Basin Safety Coalition
- Permian Strategic Partnership
- Police Officials
- Odessa Economic Development Corp
- Oil & Gas Industry Leaders
- TxDOT

Types of questions asked included:

- What benefits would you like to see an interregional corridor focus on for the Permian Basin study area?
- What interregional points should we look at connecting, that are not currently?
- What physical or environmental constraints do you see for a corridor that we should avoid or lessen within the study area?
- We want to start developing corridors for consideration within the study area. Where do you feel such corridors would be located?

The input received during the stakeholder interviews ultimately helped form the basis for 1) the focused list of issues, needs, and the purpose statements; and 2) the formation of the “universe of alternatives” mapping.

Figure 3: *Sample of Stakeholder Mapping Exercises - July 13-14th, 2021*



AGENCY COORDINATION

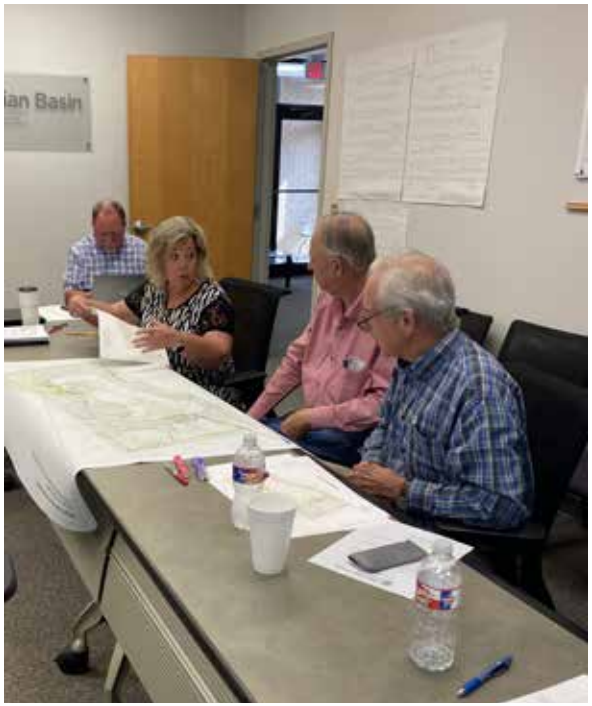
The FNI team directly engaged with TxDOT; the Cities of Odessa and Midland; Ector, Midland, and Martin Counties; and the Permian Basin MPO, as client. For this PEL study, publicly-accessible data was collected from these sources. Other resource agencies (for data purposes) included:

- Texas Railroad Commission,
- U.S. Fish and Wildlife Service,
- State Historical Preservation Office (Texas Historical Commission),
- Texas Parks and Wildlife Department,
- Texas Council on Environmental Quality,
- Natural Resources Conservation Service,
- U.S. Army Corps of Engineers, and
- FEMA.

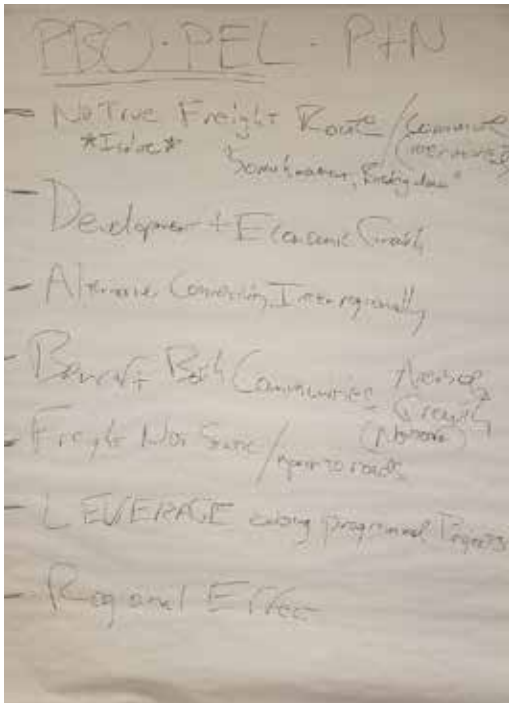
STUDY OVERSIGHT COMMITTEE (SOC)

The Study team compiled a Study Oversight Committee (SOC) to provide input and feedback throughout the course of the PEL Study and to provide a recommendation to the MPO Policy Board.

SOC Meeting #1 - June 24th, 2021



SOC Meeting #1 - Purpose & Needs Activity



SOC Meeting #1: Introduction (June 24th, 2021)

The first SOC meeting provided an overview of the study effort, established expectations for the committee members, and outlined a plan for the study's public engagement. The SOC was able to provide valuable recommendations regarding additional stakeholders and sources of information.

The study team held a mini workshop with the SOC to gather input on the biggest issues related to mobility in the region (visioning exercise), the highest priority needs for organizations in the area, and to identify potential conceptual alternatives. On maps, members drew lines indicating areas of opportunity (green), constraints (red), and possible alignments for consideration (blue). The following major themes emerged from the group's visioning process during this meeting:

- Issues of freight and commuter traffic conflicts
- Understanding potential growth as economic development opportunity

- Continuously changing “hot spots” for transportation activity due to regular shifts in energy production and freight hubs
- Lack of regional-level network redundancy
- Balance of serving the economic development priorities of both the freight/ energy sectors and the commuter realm (schools, homes, commercial, etc.)
- Ensuring the benefits of a new transportation facility extend to both major communities

SOC Meeting #2: Feedback on Level 1 Screening (Oct. 21st, 2021)

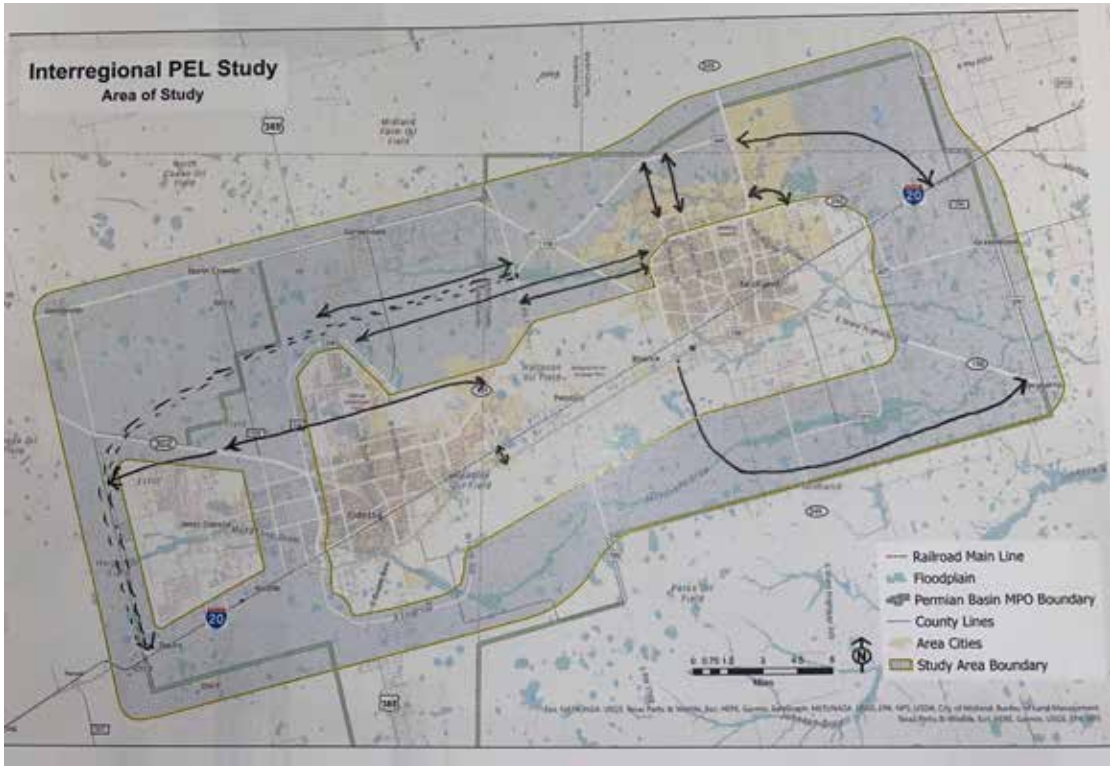
At the second SOC meeting, the study team presented an overview to the committee on project progress, which included the first level of screening for all brainstormed alternatives. The committee approved the initial process, Needs and Purpose statements, Level 1 Screening Criteria, and initial alternatives results.

A key goal of this meeting was to assess whether the trajectory of the analysis would accurately capture the wide range of variables established by stakeholders and the general public during initial outreach. SOC members provided additional feedback on the first level of screening (whether alternatives met the established needs and purpose) and helped the study team troubleshoot potential methodology flaws, such as whether each variable could stand alone as a useful indicator of a future corridor’s value.

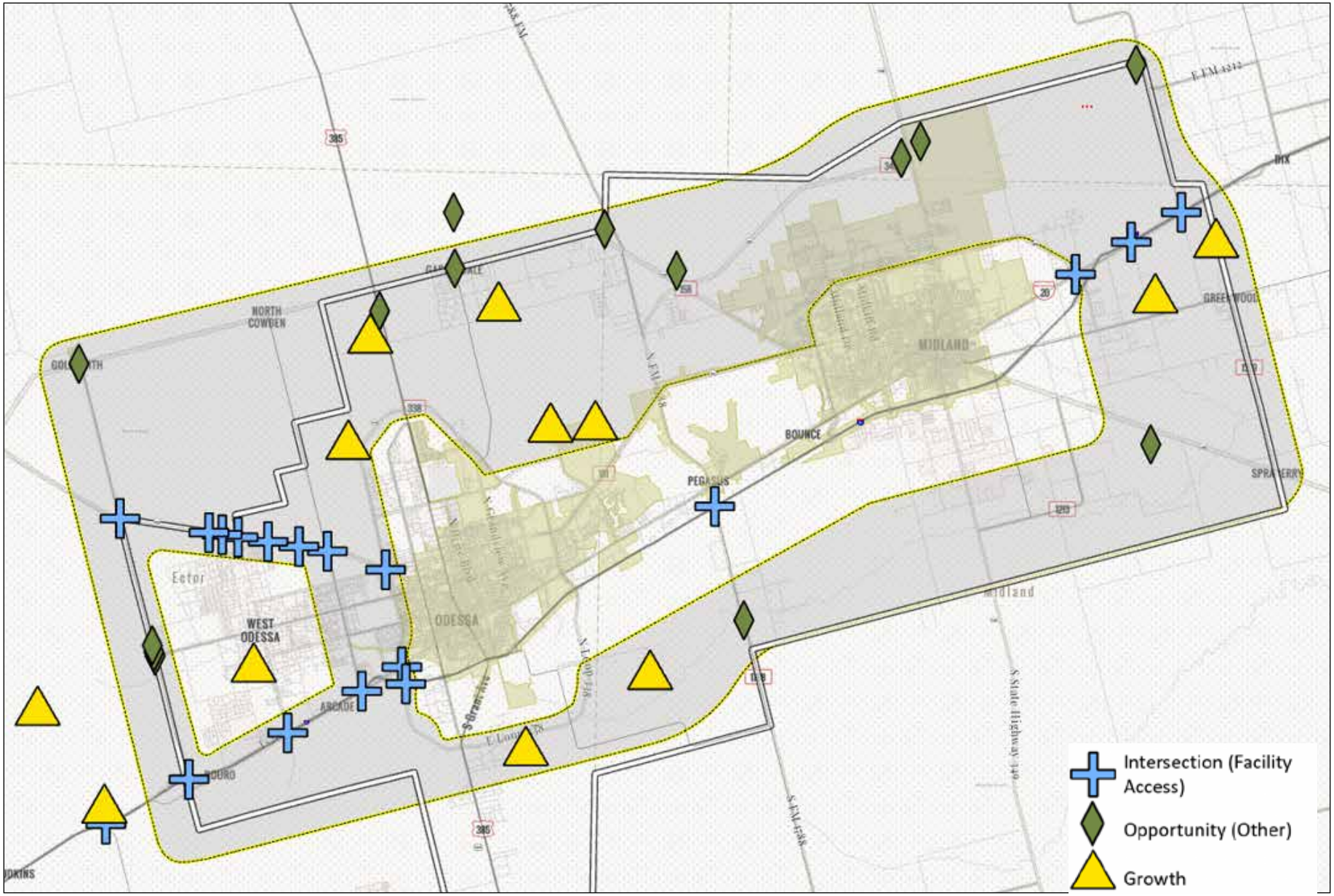
SOC Meeting #3: Conceptual Alternatives (Dec. 7th, 2021)

The final meeting of the SOC focused on common themes from all gathered feedback and on the draft results of initial corridor screening. The committee was able to help determine initial trends and calibrate the outcomes to ensure a wide enough variety of possible alternatives. This was an important foundation for future analysis to determine the areas with most transportation opportunity in the region.

Figure 4: *SOC Meeting #3 - Metroquest Online Survey Stakeholder Input Summary*



Map 2: *In-Person Engagement Feedback Mapping - Stakeholder Interviews and Study Oversight Committee Meetings*



PUBLIC INPUT

METROQUEST ONLINE SURVEY

September 21st - November 13th, 2021
223 Survey Participants I 575 Survey Visitors

A survey was launched to provide the opportunity for the greater public to provide feedback and comment on transportation connections, issues, and possible solutions in the Permian Basin region. In order to garner broad and representative feedback from the public, the survey was deployed in both English and Spanish formats.

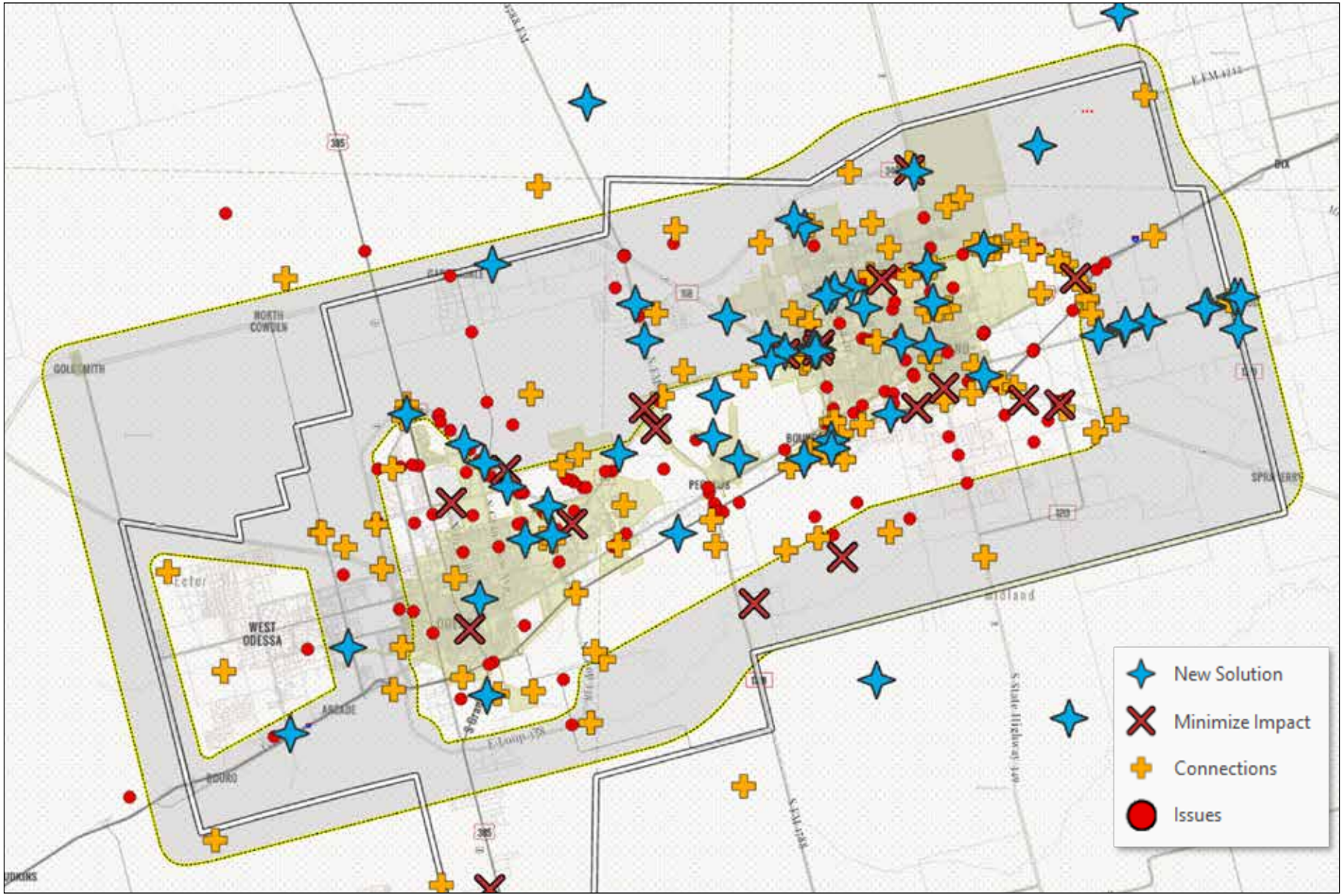
Synthesis of Feedback

Survey participants were asked to identify the top transportation needs from a future transportation corridor in the region. The areas of greatest need identified was the need for a future corridor to provide greater roadway connectivity, safety, intersection improvements, support of local development, and support of the local economy.

Survey participants were then asked to identify on a map the spatial location of transportation issues, connections needed, areas to minimize impact, and areas where new solutions were needed within the study area (see Map 2).

After identifying the greatest needs from a future corridor, participants were then asked to rank the top criteria that should be used to evaluate a future transportation corridor. The highest priorities identified were congestion reduction, overall crash reduction, pavement/bridge conditions, travel time reliability, and economic development.

Map 3: *MetroQuest Online Survey Feedback Mapping*



TOWN HALL MEETINGS

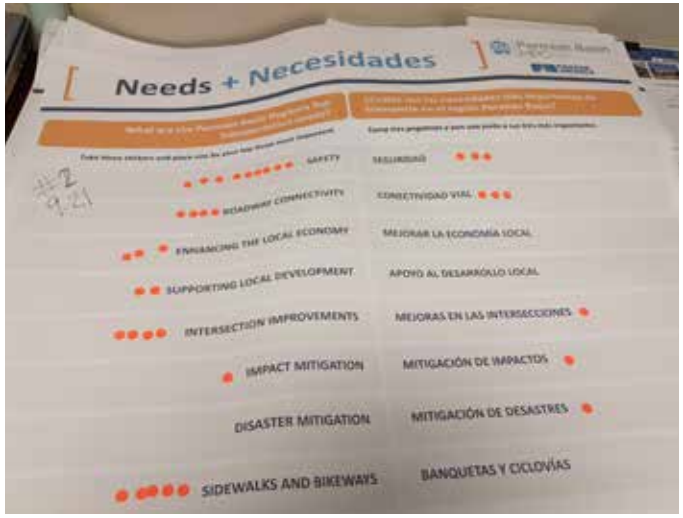
The planning team conducted three sets of public town hall meetings with the intention of creating an open space for comment and feedback throughout the progression of the PEL study process.

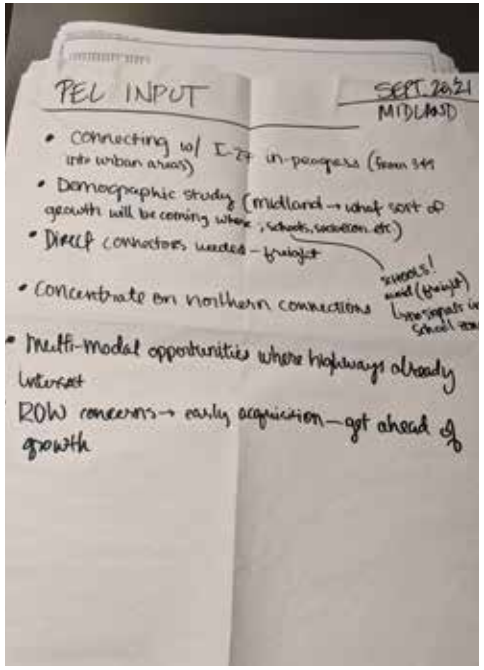
TOWN HALL #1

Monday, September 20th, 2021 @ 6 PM
Hispanic Cultural Center of Midland

Tuesday, September 21st, 2021 @ 6 PM
Odessa College Campus

The first set of town hall meetings included a presentation to introduce and explain the PEL process. After the study team provided an overview, participants broke out into small groups to discuss and identify the area's greatest transportation needs and add potential interregional corridor concepts to large maps. During the meeting, the top needs that participants identified included Safety, Roadway Connectivity, and Multimodal Routes. Additional discussion points included: What interregional points should we look at better connecting? What transportation issues and solutions do you see within the study area? What are the region's biggest transportation challenges?





TOWN HALL #2

Wednesday, May 25th, 2022
@ 12:15 PM
Hispanic Cultural Center of Midland

Wednesday, May 25th, 2022 @ 6 PM
Odessa College Campus

The second set of town hall meetings took place after the study team had compiled public and stakeholder feedback to complete the initial analysis of potential corridors. The groups were able to discuss the conceptual alternatives that had already been screened, as well as the segmentation of routes (exercise to identify logical termini).

The results of the initial screening which were presented at these meetings focused on the best possible corridor routes taking into account consistency with regional plans, natural environmental impacts, social environmental impoacts and economic development.

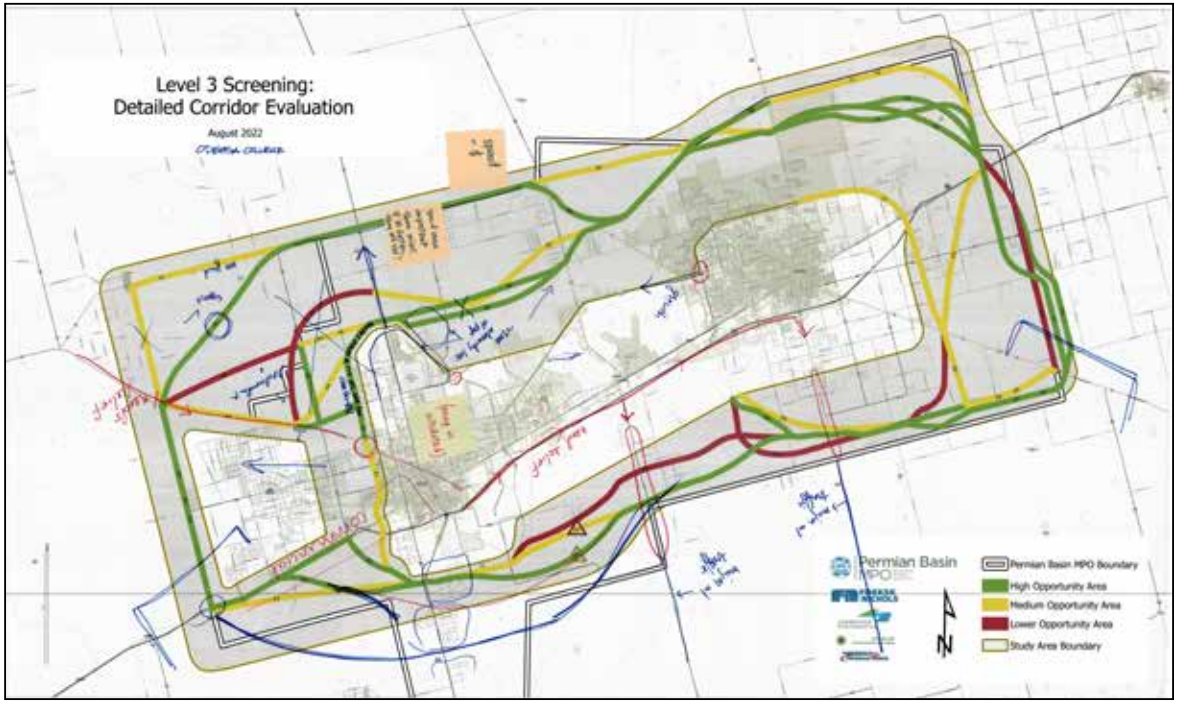
TOWN HALL #3

Wednesday, August 23rd, 2022
@ 12:15 PM
Hispanic Cultural Center of Midland

Wednesday, August 23rd, 2022 @ 6 PM
Odessa College Campus

During the final set of town hall meetings, the study team presented the results of some initial travel demand modeling to simulate how an interregional loop might affect the network. This included comparing key performance metrics for potential routes related to hours/miles traveled, and delay of automobiles vs. trucks.

Furthermore, these meetings provided an opportunity for discussion on longer-term impacts of a new facility around both communities. One key outcome of these discussions was the reintroduction of several routes from the "Universe of Alternatives" which were initially screened out because they were outside of the study area. Stakeholders and members of the public reached a consensus on these additional routes for consideration because they were slightly farther from the existing urbanized communities and would potentially allow for better long-term growth. The project team then worked to collect constraints data for these expanded study areas, which are shown as "amended areas" in this report's mapping.



III. EXISTING CONDITIONS

III. EXISTING CONDITIONS

DATA GATHERING

The environmental process is iterative, starting at a higher altitude for a PEL and becoming more specific as alternatives are eliminated and more favorable routes are revealed. Baseline environmental data was collected for display at a high-level appropriate for this scale of analysis. As corridor choices are narrowed and better defined, additional and more specific data may be collected. Working from an understanding of initial routes, environmental constraints were identified, such as whether or not there are historic districts, public parks, or critical ecological habitat that should be avoided as early as possible. These features were better defined as the PEL process proceeded as knowledge of the project study area deepened.

GIS data may be refined for Conceptual Alternatives and collected to a greater level of detail for Viable Alternatives. Typically, GIS analysis does not delve into the precise data required for the NEPA compliance phase. No field investigations have taken place during the PEL/pre-NEPA phase (as such analysis should always be conducted during the compliance phase to ensure the data is current and accurate). Specific impacts such as potential displacements of residential, commercial, or community facilities would not occur until the NEPA compliance phase although densely developed areas can be avoided during route definition during the PEL phase.

GIS data collected during this analysis is presented from a quantitative, linear, high level perspective (such as number of water features crossed rather than acreages). Other environmental considerations such as air and noise, community cohesion, socioeconomic considerations are discussed qualitatively and would be analyzed in more detail during the NEPA compliance phase. Another important consideration is consistency with local plans and policies, consideration of large planned or platted projects, consideration of existing or future sidewalks, trails, and bicycle routes.

NATURAL RESOURCE ENVIRONMENT

Water Resources

The project is located within the Colorado River Basin. Within the Colorado River Basin, the project crosses one subbasin: Johnson Draw (HUC: 12080005).

The U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system (USGS 2022). Using this data, the corridor was analyzed for the potential

presence of water features (playas, drains, etc.).

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) features are digitized from aerial photography and USGS topographical maps (USFWS 2020, USGS 2021). These datasets provide an estimation of the type and amount of various aquatic features within the corridor that may be regulated by state and/or federal agencies that would likely require coordination during project development. Additionally, the Federal Emergency Management Agency (FEMA) floodplain data was reviewed for the project.

The study area includes more than 100 stream crossings, more than 200 water bodies, and more than 1000 acres of potential wetlands overall. Therefore, based on review of these data sets, precipitation data, and ecoregion conditions, the proposed project is likely to impact various stream classifications including ephemeral, intermittent, and perennial systems, with potential impacts to wetlands and open water features.

A review of Navigable Waters of the United States in the Odessa District within the State of Texas revealed that the corridor does not contain a Traditional Navigable Water (TNW) and therefore, coordination under Section 9 and 10 of the Rivers and Harbors Act of 1899 is not anticipated.

Field investigations would be required during the NEPA phase of project development to confirm that the NHD and NWI features are present and to identify potential jurisdictional Waters of the U.S., including wetlands, not included in the NHD or NWI data.

Regulated activities may be permitted through the U.S. Coast Guard (USCG) bridge permits and/or via the U.S. Army Corps of Engineers (USACE) Individual Permits (IP), Regional General Permits (RGP), or Nationwide Permits (NWP). Regulatory compliance requirements regarding waters within the study area that would need to be addressed during the NEPA phase are described below.

Biological Resources

The United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool identified two federally endangered species including Tricolored Bat (Perimyotis subflavus), and the Piping Plover (Charadrius melodus). Two federally threatened species including the Northern Aplomado Falcon (Falco femoralis septentrrionalis) and the Red Knot (Calidris canutus rufa) were identified. One federal candidate species, the Monarch Butterfly (Danaus plexippus), was identified (USFWS 2023). There are no critical habitats within the proposed study area. The Texas Parks and Wildlife Department's (TPWD) Rare, Threatened, and Endangered Species database was reviewed for potential federal, and state listed species within Ector and Midland Counties (TPWD 2023). This database included two additional two state-listed threatened species; and 42 species of greatest conservation need (SGCN). The Texas National Diversity Database (TxNDD) was created and is managed by TPWD to manage and disseminate scientific information on rare species, native plant communities, and animal aggregations for defensible, effective conservation action. Using the TxNDD, element occurrences were discovered in and around 750-foot buffer of the PBMPO PEL corridor centerlines for a total of 58 species.

The Endangered Species Act of 1973, as amended, provides protection for federally listed species and their habitats. Texas state law includes provisions that prohibit direct harm to state-listed species. The Migratory Bird Treaty Act (MBTA) of 1918 prohibits harm to all migratory birds, their nests, eggs, and nestlings. The Bald and Golden Eagle Protection Act of 1940 further provides protection for Bald Eagles (Haliaeetus leucocephalus) and Golden Eagles (Aquila chrysaetos).

Often there is potential encroaching vegetation along fence lines and drainages for potential nesting migratory birds. To comply with the MBTA, it is recommended to implement avoidance and minimization techniques to mitigate for potential impacts to migratory birds (clearing outside of the nesting season, surveying culverts/bridges for swallow nests, and pre-vegetation nest surveys if phasing could not be accommodated).

Cultural Resources

Assuming the project involves state and federal oversight and/or funding, the proposed project would be subject to Section 106 of the NHPA of 1966, as amended, and the ACT. The ACT was enacted to protect cultural resources on state and local public property. It requires state agencies and political subdivisions of the state to notify the Texas Historical Commission (THC) prior to commencing any project on public land that may affect archeological sites or will occur in a historic district or other designated historic site. Section 106 requires federal agencies to consider the effects their undertakings have on historic properties, defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places (NRHP). Through consultation between the lead federal agency and other parties, the goal of Section 106 is to identify historic properties potentially affected by the undertaking; assess the project's effects on historic properties; and seek ways to avoid, minimize, or mitigate adverse effects on those properties. Because of these regulations, identifying known historic properties and the potential for them in or near a proposed project area is a critical step during early project planning.

Cultural resources can be designated at the local, state, or national level. None of the cities or counties in the proposed project area have a local historic designation program. State designations include commemorative subject markers, which may or may not be associated with an extant historic property; Centennial Markers, a type of marker the THC generally considers eligible for the NRHP; Recorded Texas Historic Landmarks (RTHLs), a designation the THC awards historic resources it deems worthy of preservation; State Antiquities Landmarks (SALs), which include NRHP listed historic buildings and other above ground historic resources, as well as NRHP listed or unevaluated archaeological sites, are protected under the Antiquities Code of Texas; and Historic Texas Cemeteries (HTCs), an honorary designation for cemeteries deemed worthy of recognition for their historical associations. Though RTHLs, HTCs, and properties associated with subject markers are not protected by state or federal regulations, they may be eligible for the NRHP upon evaluation and thenceforth protected by state and/or federal regulations. At the national level, historic properties may be listed in the NRHP or designated a National Historic Landmark (NHL). NHLs are the highest type of designation reserved for the country's most significant resources. All properties designated as NHLs are automatically listed in the NRHP.

The Texas Historic Sites Atlas (THSA), maintained by the THC, is a GIS database of known cultural resources that includes Historic Districts and Properties, NRHP listed and eligible bridges, historic highway routes, historical markers, including subject markers, Centennial Markers, RTHLs, SALs, HTCs, historic resource survey reports (HRSR), as well as Certified Local Government designated counties within the State of Texas. These cultural resources are compiled from various sources including the National Park Service, the THC, TxDOT, as well as contractor surveys and reports. A desktop review of this data was conducted to identify cultural resources in the proposed project area zones or their potential alignments with state or national designation or those previously determined eligible for the NRHP. The result of this analysis is presented in Chapter 4, Alternatives Analysis.

Based on current and historical aerial photographs and maps, historic-age domestic, agricultural, commercial, educational, transportation, cemetaries, light industrial, and other property types are expected to be within the potential alignments and their 750-foot buffers. Large, agricultural parcels may intersect the potential alignments or their buffers. Future study would be necessary to assess if any unevaluated cultural resources are eligible for the NRHP.

The project is expected to require cultural resources studies, including survey, because of the potential for previously unrecorded historic properties to intersect the potential alignments or their buffers. Section 106 of the NHPA would require the establishment of an area of potential effects, identification and documentation of prehistoric and historic-age resources, assessment of their potential for NRHP eligibility, and finding of effects to historic properties. Similarly, THC notification under the ACT would require historic resources studies to address the presence of historic districts. Recommendations regarding avoidance or mitigation of historic properties would be provided after field investigations are conducted and documented resources are researched.

HUMAN ENVIRONMENT

Demographics

During the NEPA phase, a detailed census data analysis using census block geographies would be conducted to present a profile of the community surrounding the proposed project area and analyze the potential effects of the proposed project on the community. The census data analysis would be used to describe the demographics of the surrounding communities, assess the neighborhoods and community resources adjacent to the project area and characterize the changes in access, travel patterns, and community cohesion (if any) due to the project. Additionally, the analysis will document the coordination efforts with Environmental Justice (EJ) communities and present the effects that would result from the proposed project to provide an assessment as to whether surrounding low-income and minority populations would experience any disproportionately high or adverse impacts due to the proposed project. This information would be used to inform public involvement efforts to ensure compliance with E.O. 12898 on Environmental Justice, E.O. 13166 on Limited English Profiency and other relevant regulations.

However, during the PEL phase, a census data analysis was completed at the Block Group level using both U.S. Census Bureau and American Community Survey data to generally caputure the demographics of the communities that surround each potential alternative concept. This analysis was used to identify all adjacent populated census Block Groups to determine census geographies that contained greater than 50 percent minority populations. Please refer to Appendix A for information about total acreage of corridors crossed with more than 50 percent minority populations. While this is an approach that is valid for a PEL to see how corridors compare with each other, more detailed analysis would be done during the NEPA compliance phase.

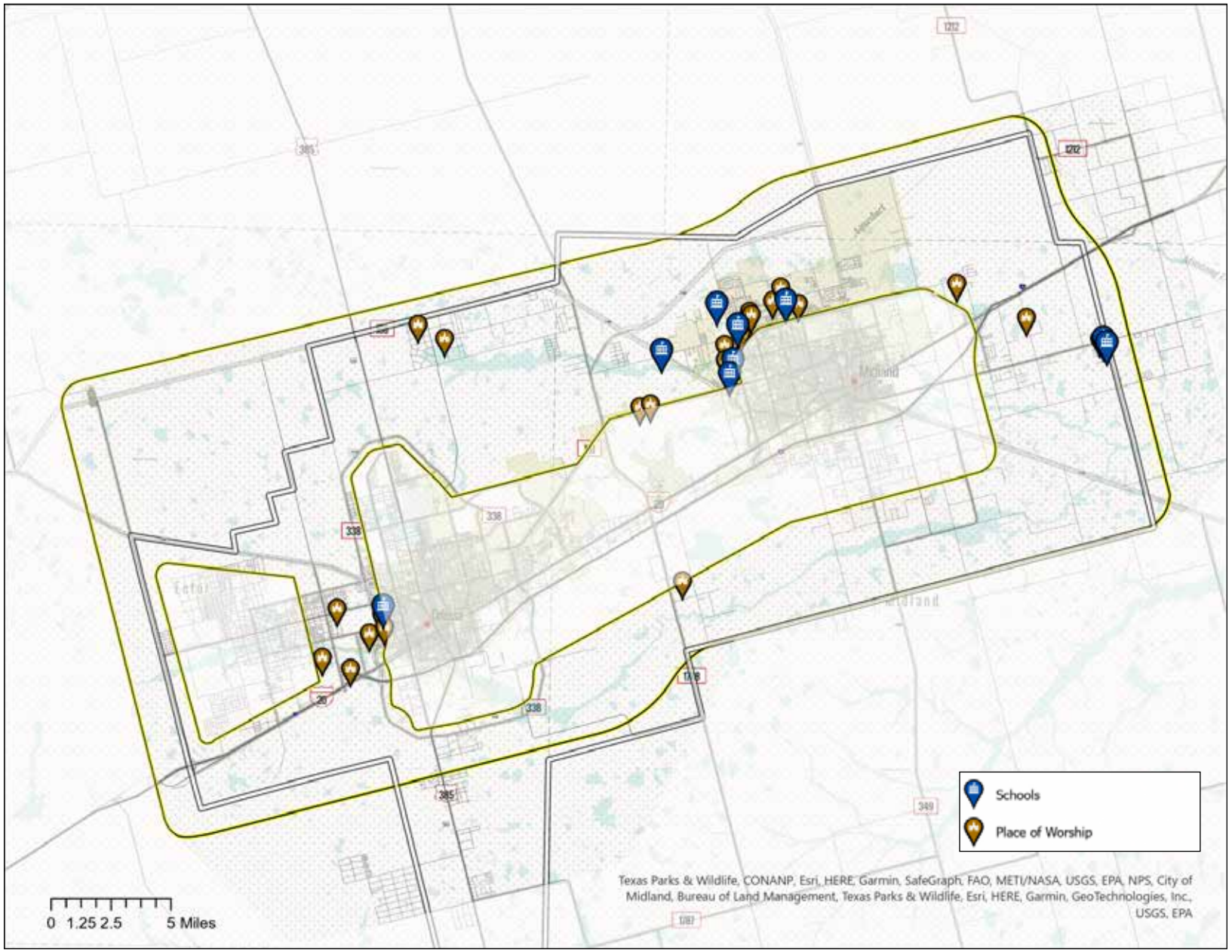
Hazardous Materials

An aspect of the Human Environment that would be considered in the NEPA phase from a due diligence perspective is hazardous materials. Various database search tools are available to assess potential impacts to recorded sites within or nearby the routes. For this PEL phase, publicly available data sources were queried to identify existing hazardous materials including Superfund sites, Petroleum Storage Tanks, Leaking Petroleum Storage Tanks, and Landfills. More detailed data would be collected in future phases; only limited databases were reviewed for this PEL.

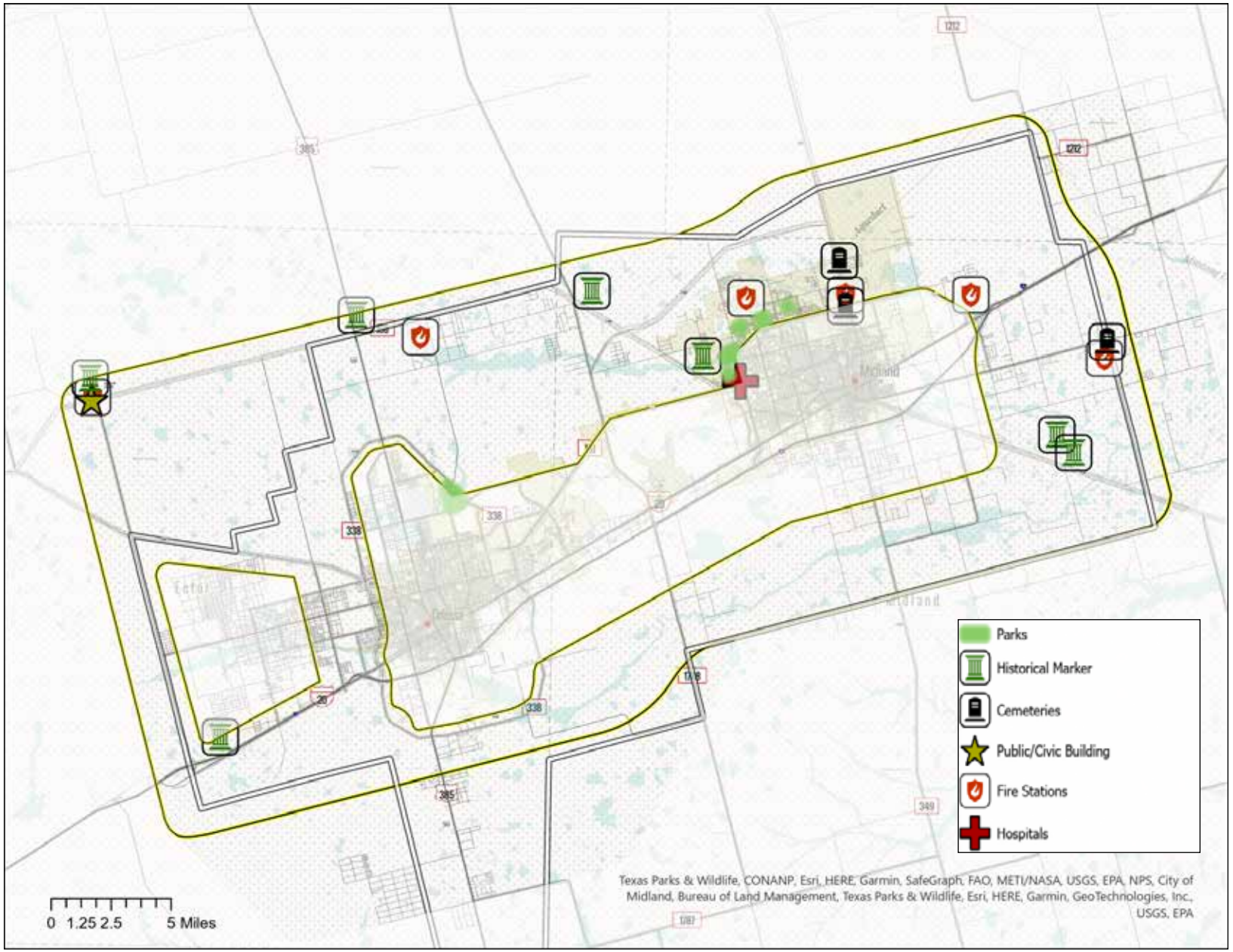
During the compliance phase, assuming that the project would be subject to oversight via TxDOT, an Initial Site Assessment (ISA) would be required. The ISA is an essential step in the process of evaluating potential environmental risks associated with hazardous materials and waste sites in the vicinity of the project area. The ISA helps developers, planners, and regulators identify any potential problems early in the development process, allowing for appropriate mitigation measures to be taken if necessary. The main objective of the ISA includes identification of known or potential hazardous materials and waste sites, and assessment and evaluation of any potential impact to the project design, contruction workers, and the general public.

To achieve these objectives, the ISA process typically involves a review of existing data from both Federal and State environmental regulatory records, historical records, previous environmental studies, and a site reconnaissance to observe current conditions and identify any visible signs of contamination or potential hazards once more detailed designs are available to review.

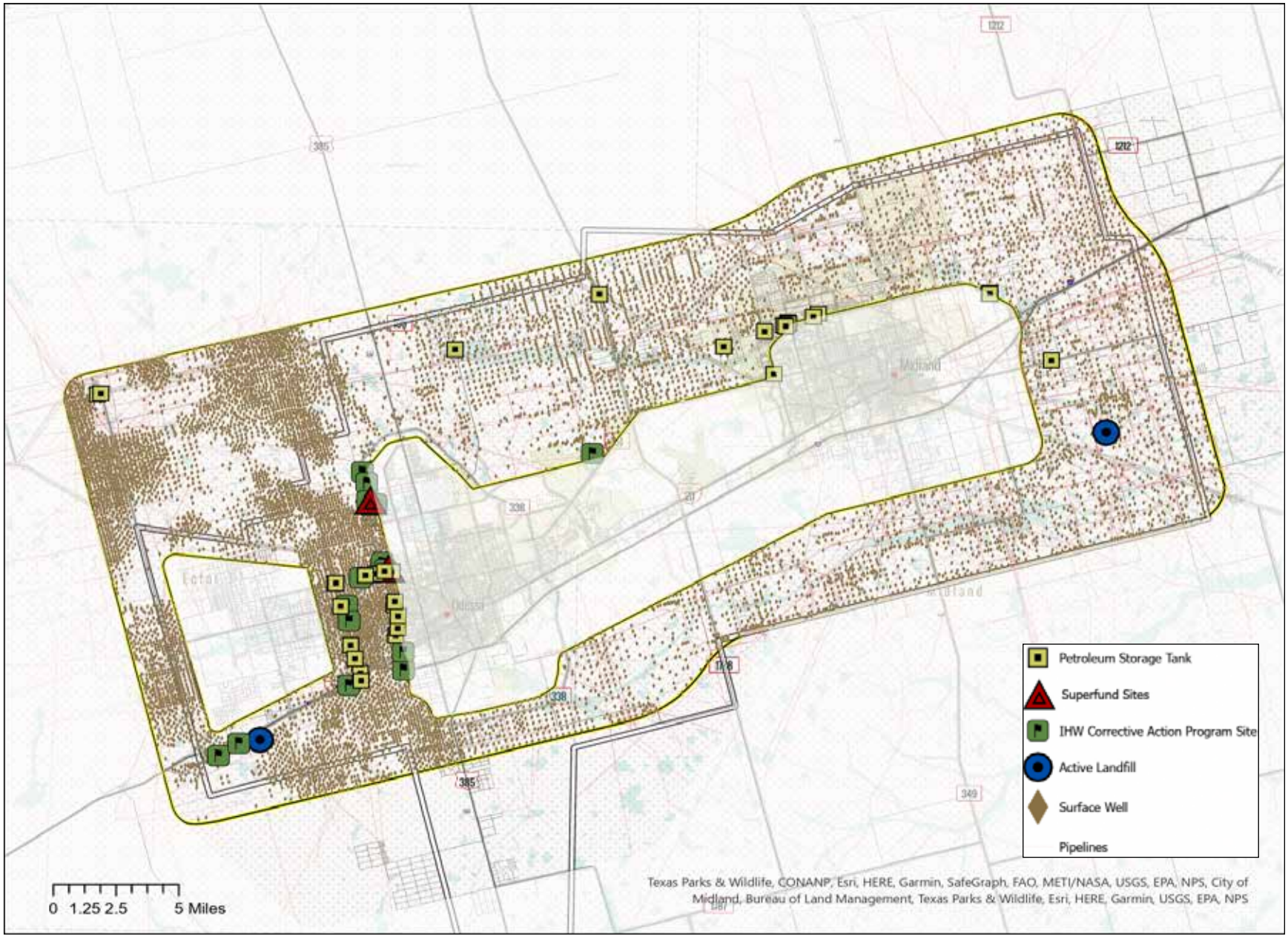
Map 4: *Human Environment - Permian Basin High-Use Facilities*



Map 5: *Human Environment - Permian Basin Public Resources*



Map 6: *Human Environment - Permian Basin Oil, Gas & Hazardous Waste*



MOBILITY DEMANDS

Existing Thoroughfares

The existing regional thoroughfare system is comprised primarily of a grid network aligned with land section lines and circumferential loops surrounding or partially surrounding both Midland (County Road 1232) and Odessa (Loop 338). A combination of grid and radial corridors extend beyond, as well as connect each city together. Regional accessibility to the metropolitan area is provided via Interstate 20, Highway 80 (Bus. 20), U.S. Highway 385, and State Highways 349, 158, 450, and Spur 302. Major connecting corridors between the two cities include SH191, IH-20, Highway 80, SH349, SH158, and FM662. Key Farm-to-Market roads serving Midland and Ector County include: FM1208, FM307, FM1788, FM1936, FM866, FM2020, FM715, and FM554. A strong arterial network in both Odessa and Midland serve the urban areas.

Proactive transportation planning at all levels of local government has consistently occurred as evidenced by functionally based thoroughfare plans in Midland, Odessa, Midland County, Martin County, the Permian Basin MPO Metropolitan Transportation Plan, and the TxDOT On-System network. Proactive capital improvement planning also exists at all local government levels, including Ector County.

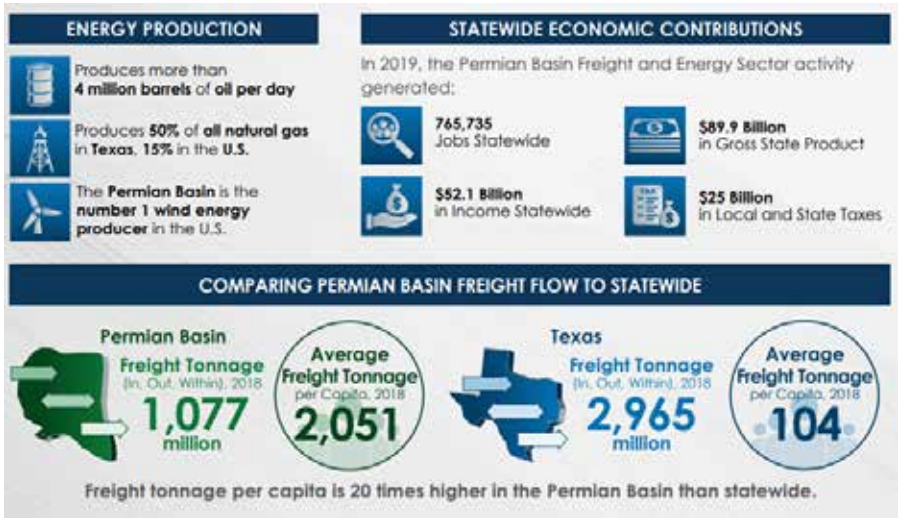
Vehicular Mobility

Vehicular miles of travel (VMT) on the regional road network continues to rise in Midland and Ector Counties. Daily VMT on roads rose by about 4% between 2020 and 2021. The total daily VMT in 2021 for Midland and Ector counties is 5,491,492 and 4,408,212, respectively, according to data from TxDOT's Transportation Planning & Programming 2021 Roadway Inventory Annual Report.

Truck travel within the counties is also increasing. Truck traffic accounts for 21-25% of total VMT on TxDOT On-System roads. In 2021, the percentage grew by about 2% overall. While a majority of truck traffic utilizes Interstate highways, the percentage of VMT of truck traffic rose from 31% to 35% on the interstates in Midland and Ector Counties. The percentage of VMT from trucks on FM and frontage roads accounts for about 15% in both counties.

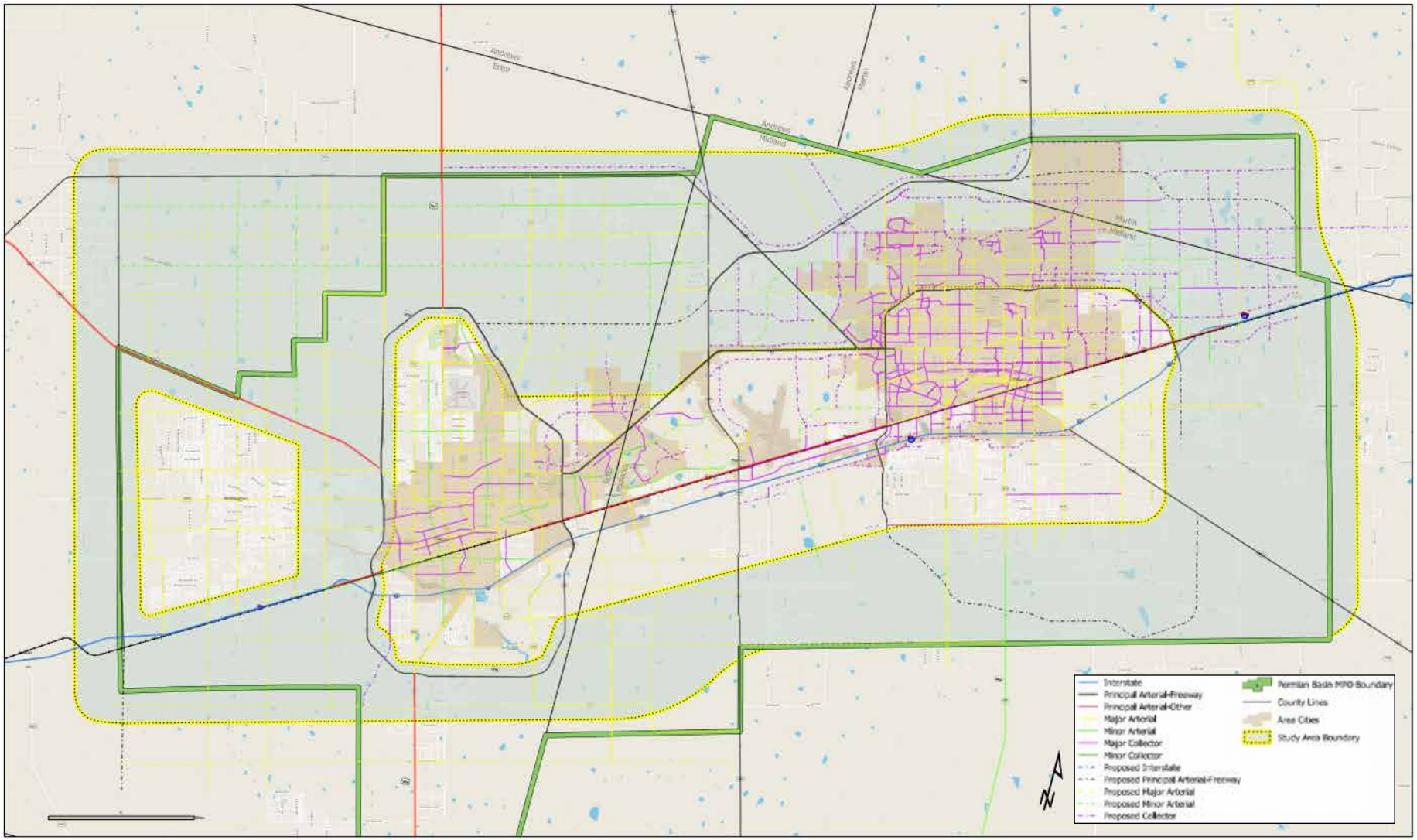
Freight Mobility

The Permian Basin is the most significant oil and gas producing region in the U.S., producing over 30% of the nation's oil and about 15% of the nation's natural gas [1]. Study data from the US Energy Administration identified that 70% of total energy and non-energy freight movements in Texas are generated from the Permian Basin and that freight tonnage per capita was 20 times higher than that statewide. In 2018, an estimated 1.1 billion tons of freight valued at $38.3 billion was transported on regional fright networks. 2050 forecasts estimate these volumes to grow by 45% to 1.6 billion tons valued at $76.9 billion.



[1] Permian Basin Freight and Energy Sector Transportation Plan, November 2020, Texas Department of Transportation.

Map 7: *Permian Basin Regional Thoroughfare Plan*



The purpose of the November 2020 Permian Basin Freight and Energy Sector Transportation Plan's purpose was to develop a multimodal regional network to improve safety, mobility, and resiliency throughout the Permian Basin by identifying local and regional freight challenges and opportunities, and identifying and prioritizing transportation improvements, including policy and program strategies. Improving safety and improving rural and urban connectivity were among key goals defined in the plan.

With the Midland-Odessa urban area situated between the Central and Delaware Basins, freight movement impacts on daily commuters have resulted in some of the highest crash rates in the state. Prevalent "high" and "medium" safety needs were identified across all roadway functional classifications in the region including notable corridors such as IH-20 throughout the Permian Basin, US385, SH158 and SH302. Key factors impacting energy sector transportation safety include, number and severity of crashes, driver behavior such as speeding, hard braking events, distracted drivers, and lack of access management. The number of miles of high and medium needs improvements in the region were 815 and 1,105 miles, respectively.

Figure 7 on page 44 shows freight-involved crashes that occurred in the region between 2017 and 2020. The prevalence of this issue in so close to the Midland and Odessa communities points to the need to address freight movements through the urban area and the potential benefits of the interregional loop. There may also be the additional potential benefit of increased capacity available to passenger vehicles within the urban area. This study adresses the areas around the cities, but benefits within the urbanized areas extend outward and should be taken into close consideration as the implementation phases move forward.

Figure 5: *Permian Basin Freight and Energy Sector Transportation Plan Study Area*

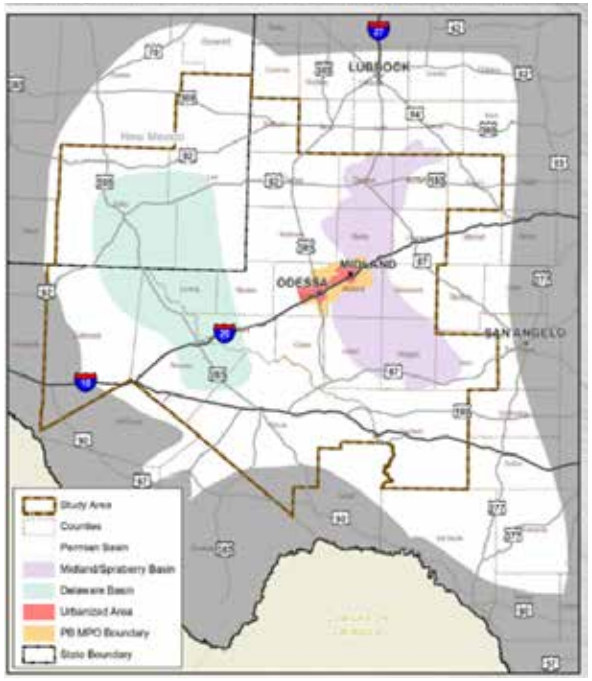
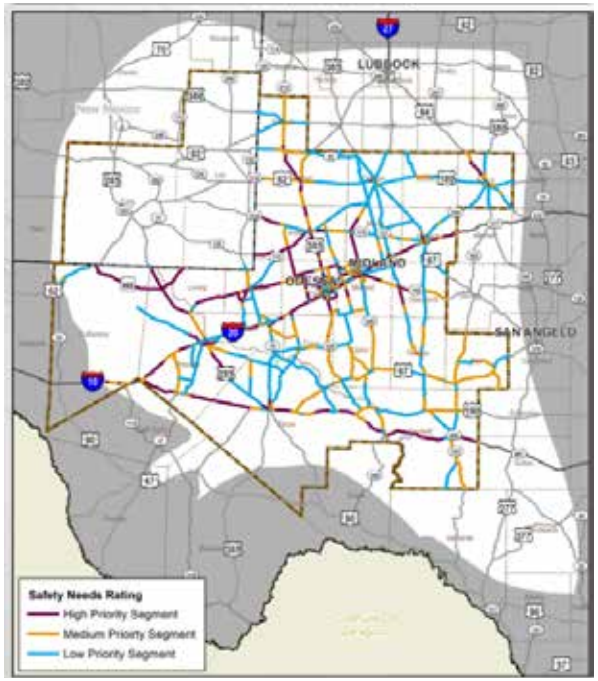
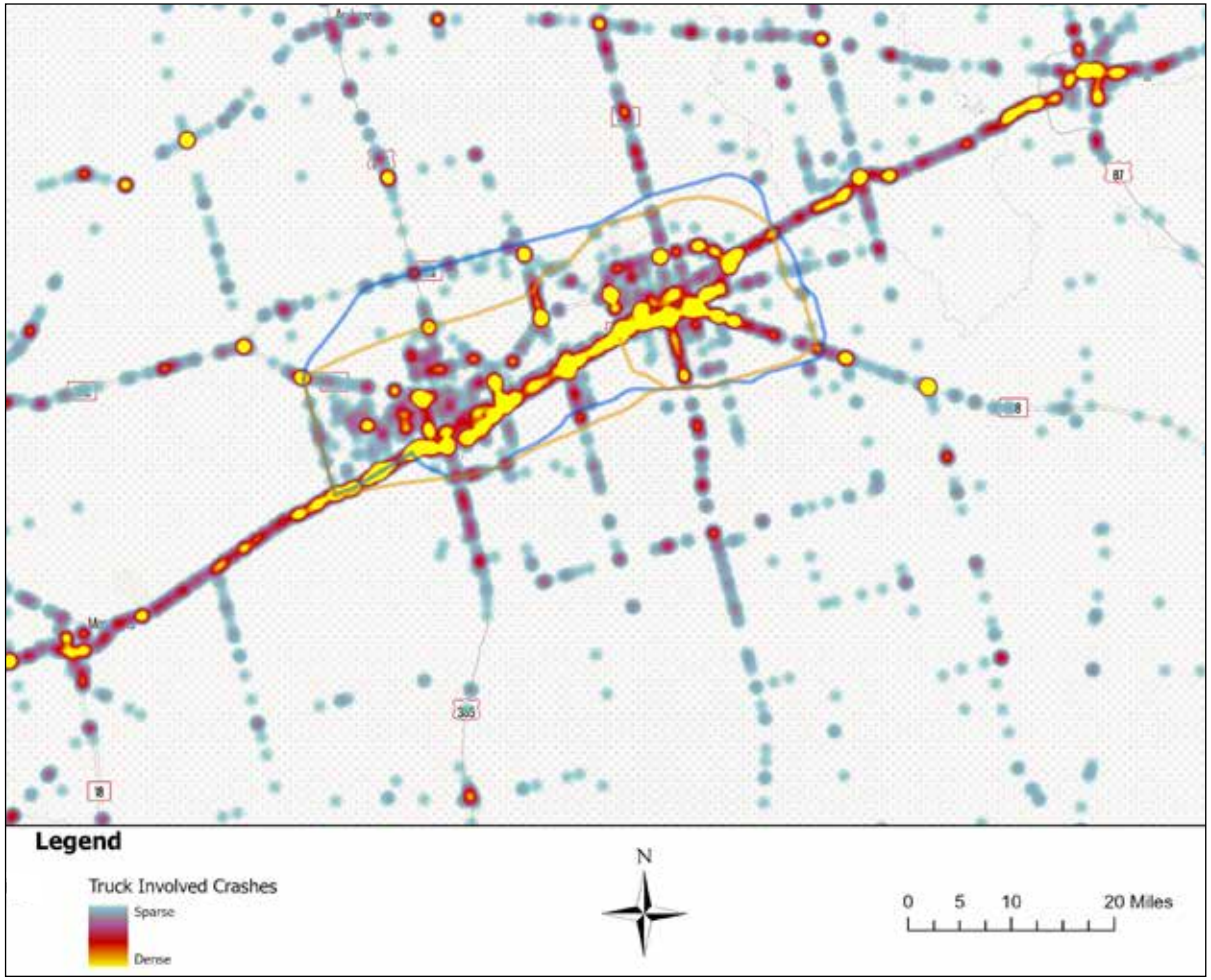


Figure 6: *Permian Basin High Frequency Network Safety Needs Ratings*



Five strategic projects impacting freight movement were identified in the study for the Permian Basin, most notably including TxDOT I-20 Corridor Improvements, the Ports to Plains Corridor (I-27), I-14 Interstate Corridor Study, and the Permian Promise Program. The TxDOT Forts-to-Ports (I-14) Strategic Corridor would also benefit freight movement through the Permian Basin MPO area. All of these studies have some connection and or touch point with the potential Interregional Loop.

Figure 7: *Permian Basin Area Truck-Involved Crashes, 2017-2020*



IV. ALTERNATIVES ANALYSIS

IV. ALTERNATIVES ANALYSIS

ISSUES, NEEDS & PURPOSE

ISSUE IDENTIFICATION & NEEDS DEVELOPMENT

Through communications with the PBMPO Staff and Policy Board, Study Oversight Committee (SOC), stakeholders, and via public input, the study team worked to identify a list of issues within the region that might be addressed by an interregional corridor. Feedback related to issue identification was extensive, but the team ultimately summarized these ideas into a condensed list containing five issues, or major problems to address in the region. These can be found in Table 1.

Each issue was formulated into a key need for the region, or a conceptual solution that would address the respective issue. Ultimately, understanding these key needs facilitated the development of the study purpose statements, with each need corresponding to one element of the statement. The needs were also formulated over time, with adjustment after any given phase of preliminary input, to accurately capture local understanding of the region's transportation priorities.

Purpose Statements

The purpose of the PBMPO PEL Study is to develop conceptual transportation alternatives that address the stated needs. An alternative should do this by:

1. Providing system relief or additional traveler choice via an alternate route for movement of goods and travelers,
2. Creating safer regional movement,
3. Extending or expanding the existing network,
4. Providing an appropriate level of access to existing or anticipated economic and development activity, and
5. Providing regional connectivity and access for both Midland, Odessa; and Ector, Midland, and Martin Counties.

The Needs & Purpose statements became the criteria for the first level of the screening. That is, the alternatives were screened based on whether they met the purpose of this PEL study, specifically. Alternatives that did not pass this level of screening were not necessarily objectively poor alternatives. They simply did not align with the specific goals of this PEL Study.

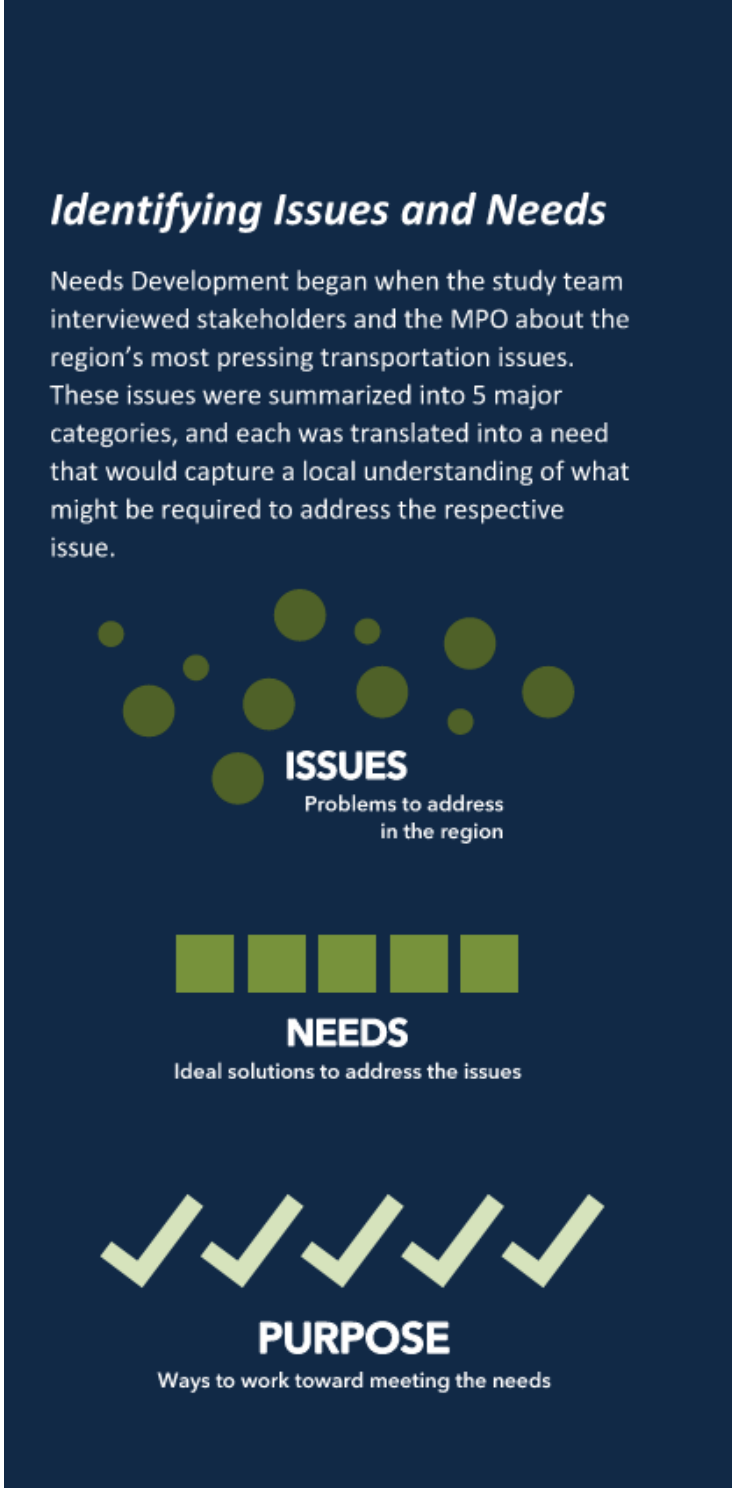


Table 1: *This PEL Study's Purpose Statements were derived from Stakeholder-Identified Issues and Needs*

ISSUE	NEED	PURPOSE *The purpose of the PBMPO PEL Study is to develop conceptual transportation alternatives that address the stated needs. An alternative may do this by:*
There is a lack of alternative routes for through-movement of goods and travelers.	**Connectivity (Nodes)**	Providing system relief or additional traveler choice via an alternate route for movement of goods and travelers
Above-average crash rates and fatal crashes	**Safety**	Creating safer regional movement
Incomplete interregional networks channel truck traffic and commuter traffic together	**Mobility (Links)**	Extending or expanding the existing network
Simultaneous increases in development and energy manufacturing have led to rapid, shifting demand growth on existing roadways, rail lines, and pipelines	**Proximity & Growth (Access)**	Providing appropriate level of access to existing or anticipated economic and development activity
Inconsistent interregional consideration for transportation solutions	**Interregional Benefits**	Providing regional connectivity and access for both Midland, Odessa; and Ector, Midland, and Martin Counties

ALTERNATIVES SCREENING

Public and stakeholder input became the basis for developing alternatives as a part of the PBMPO Interregional Corridor PEL Study. These alternatives were screened using a tiered approach. This section will describe each tier of analysis in more detail. An overview of this process is shown in Figure 4.

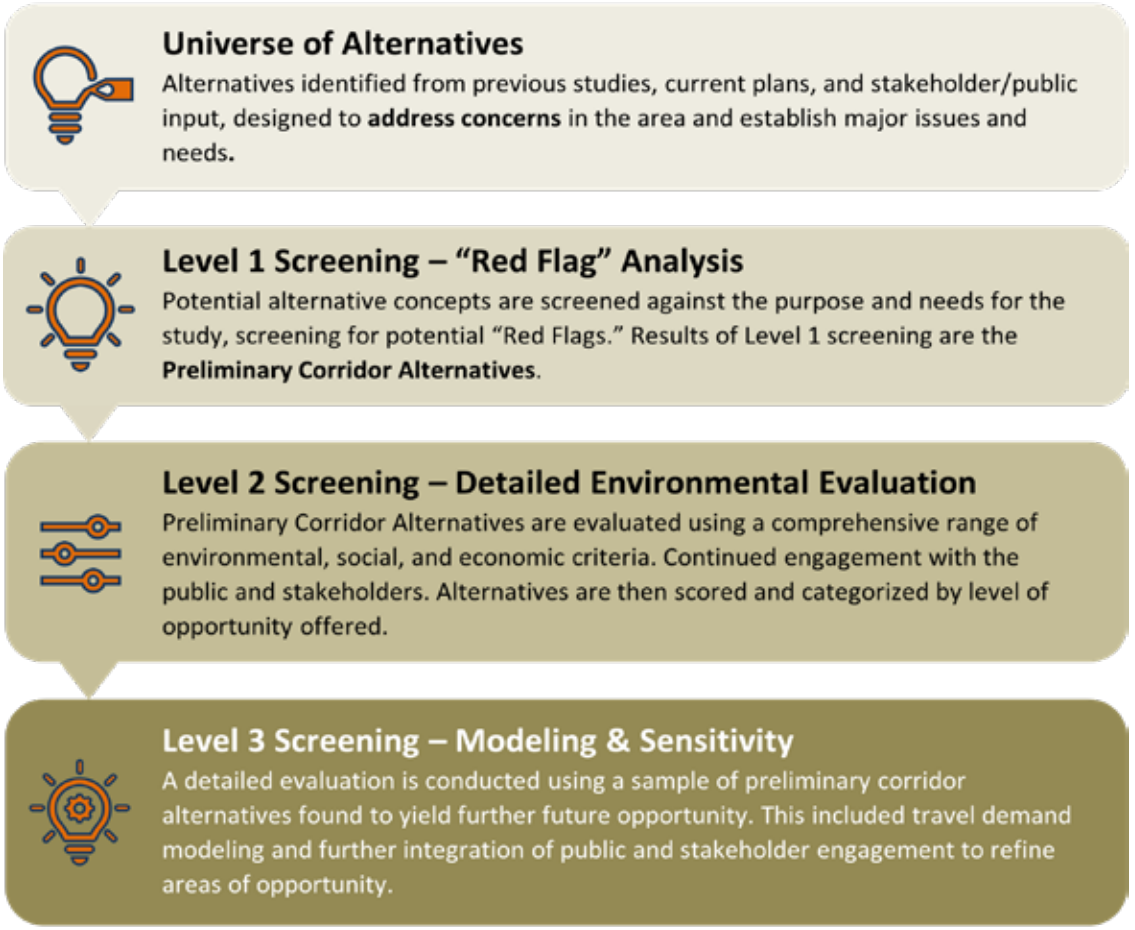
UNIVERSE OF ALTERNATIVES

The "Universe of Alternatives" was developed to encompass as many concepts as possible that emerged from stakeholder and public input. This included suggested alignments and concepts from the public online survey, public town hall meetings and workshops in Midland and Odessa, and in-depth interviews with stakeholders and agencies. It also included alternatives that had been identified from previous studies and current plans. The "Universe" map (map 16 on page 48) was designed to convey general concerns in the area and establish issues and needs.

Process & Results

The final "Universe of Alternatives" was comprised of nearly 1,200 miles of suggested concept alternatives. All suggested centerlines were mapped in GIS with an independent 750' buffer, creating a 1500' envelope for each alternative. These wide envelopes remained a part of the analysis throughout the duration of the study to indicate the focus on high-level evaluation at this phase. These allow for space to accommodate constraints during any subsequent facility planning phases.

Figure 8: *Alternatives Screening Process Overview*



The study team also completed some of the connection gaps so that alternatives represented a potential network with logical termini rather than segments with endpoints that do not connect to the existing system.

Map 8: *The PEL Study Level 0 "Universe of Alternatives" Map was developed to encompass as many reasonable concepts as possible*

LEVEL 1: RED FLAG ANALYSIS

The first level of screening for this PEL study was based on fulfilling the Purpose and Needs established early in the study process. As previously described, the issues and needs that were solicited from stakeholders and via public engagement evolved into specific purpose statements, which directly translated into the screening criteria for Level 1. By identifying those alternatives that did not align with the specific goals of this PEL Study, the study team was able to establish "red flags" for concepts moving forward. The opportunistic alignments to come out of the Level 1 screening became the Preliminary Alternatives.

Process

1. Each Purpose Statement was translated into a generally quantifiable screening criterion. Creating the screening criteria also provided the study team with a mechanism for capturing input already received from the public. Together, the criteria generally encompass the themes and priorities of the regional stakeholders.

2. Each corridor alternative was analyzed against all the Study Purpose screening criteria. Input from the Study Oversight Committee, regional experts, and existing planning documents helped to fill knowledge gaps in the simple visual analysis.

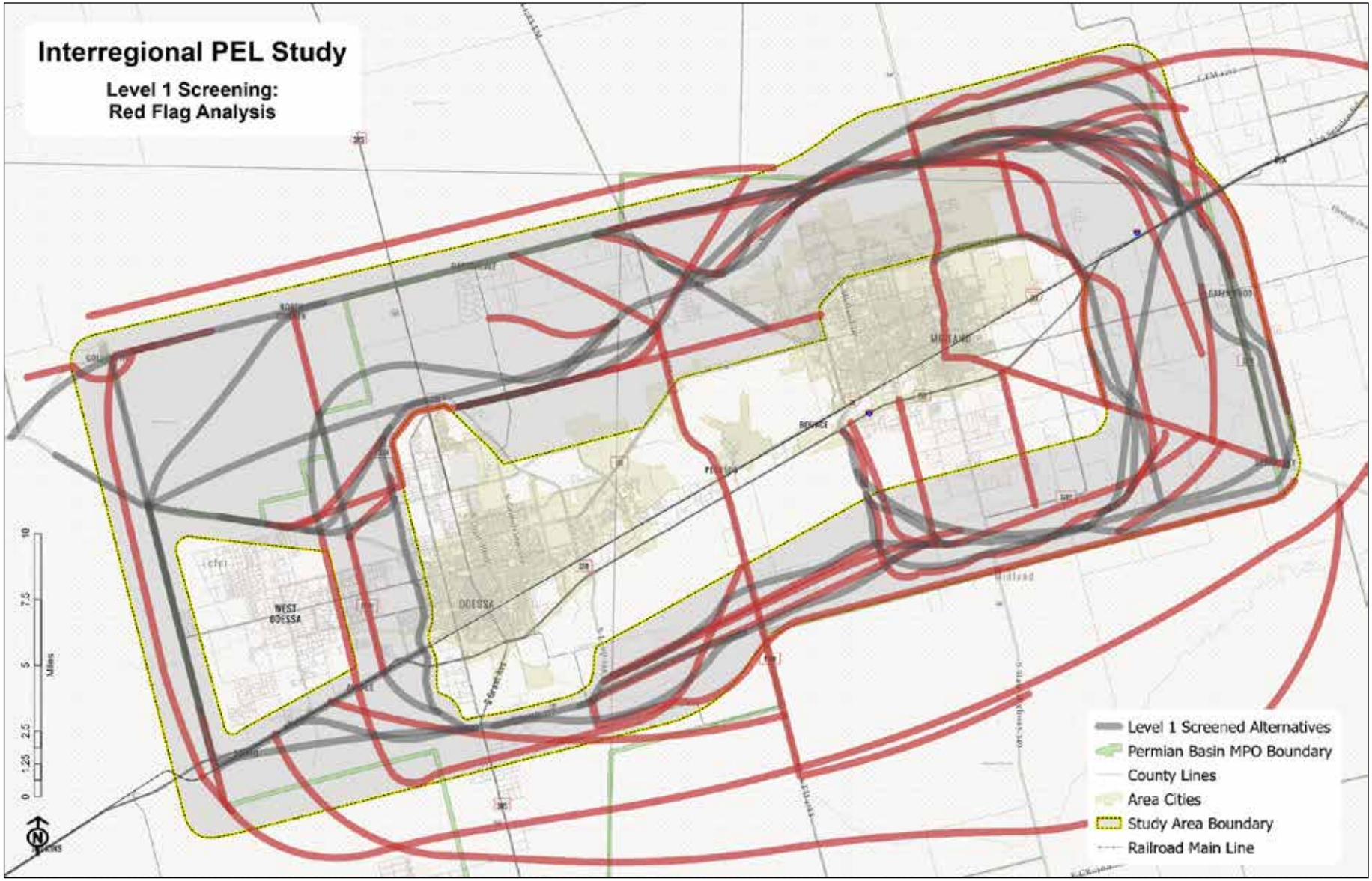
Table 2: *This PEL Study's Screening Criterion was established from Project Purpose Statements*

PURPOSE	SCREENING CRITERION
Providing system relief or additional traveler choice via an alternate route for movement of goods and travelers	Creates at least one new connection to a critical node identified by stakeholders
Creating safer regional movement	Effectively reduces crashes or crash severity
Extending or expanding the existing network	Creates at least one new link where the network is currently critically disconnected or expands existing principal arterial link
Providing appropriate level of access to existing or anticipated economic and development activity	Located within proximity to existing or anticipated economic and development activity, OR; provides a new alternative that is reasonably distanced from an existing facility
Providing regional connectivity and access for both Midland, Odessa; and Ector, Midland, and Martin Counties	Serves multiple regional communities

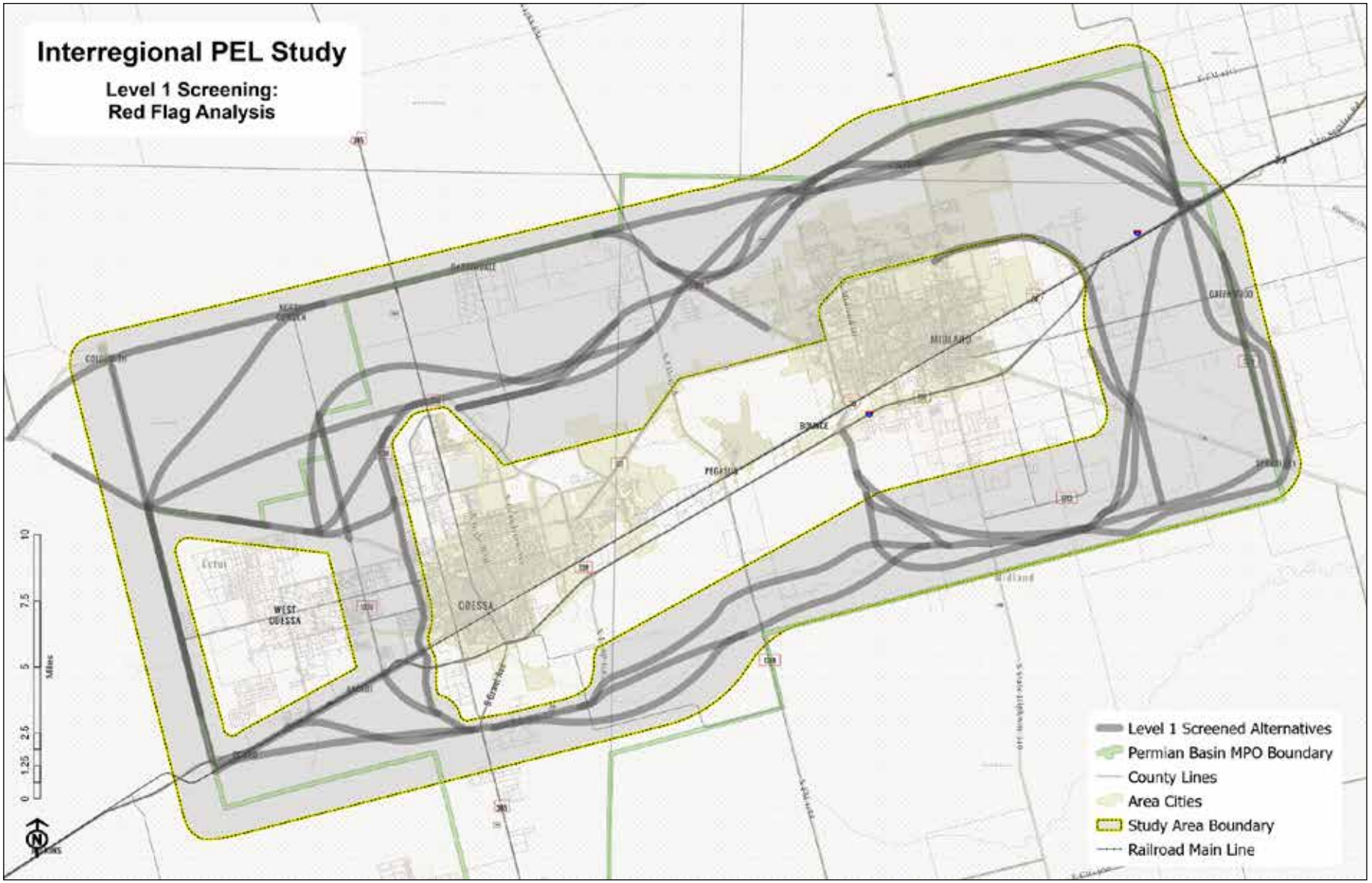
3. After convening the Study Oversight Committee and discussing the draft results, some alignments on the map were slightly adjusted to account for critical constraints such as existing facilities and bodies of water. This is an important step because the stakeholder input resulted in several lines that were extremely generalized, and the study team wanted to capture the idea behind the input. Duplicative corridor bands were also combined for simplification purposes.

4. After re-evaluating the adjusted alignments, any concepts which met at least three of the Purpose screening criteria (i.e., fewest "red flags") would move on to be screened against a range of economic, social, and environmental factors (Level 2 Screening).

Map 9: *The PEL Study Level 1 "Universe of Alternatives" Red Flag Analysis Map - Eliminated Alternatives*



Map 10: *The PEL Study Level 1 "Universe of Alternatives" Red Flag Analysis Map - Conceptual Alternatives*



Results

The Level 1 Screening resulted in over 500 total miles of Conceptual Alternatives that met the goals of this particular PEL Study while also providing representation to as much community feedback as possible.

It's important to note that alternatives eliminated from the "Universe" were not inherently poor alternatives. These concepts simply did not meet the goals of this specific PEL Study within a defined area. Later in the feedback process, several eliminated alternatives were indeed reintroduced as reasonable concepts with wide stakeholder support, prompting an amendment to the analysis and the study area. This amendment can be found in Appendix B.

LEVEL 2: DETAILED ENVIRONMENTAL EVALUATION

The "red flags" established in the first level of evaluation ensured that any conceptual alignments moving forward into the next stage were still generally representative of the themes, priorities, and feedback received from the communities at the beginning of the study. In the second level of evaluation, these preliminary alternatives were further analyzed based on more quantitative characteristics. Even so, the evaluation remained at a high level. Results of the Level 2 screening are the Reasonable Alternatives.

Process and Results

Many of the Conceptual Alternatives from the Level 1 Screening results overlapped one another, so the study team began the Level 2 screening process by combining segments with significant overlap. Duplicative alternatives were eliminated to target one generalized concept.

To ensure accurate comparison of concepts, the team then established a scheme for segmenting the study area into "zones" (see Map 12 on page 54). These zones were mostly divided using large existing transportation facilities as the break points, so that any segment of an interregional facility that might be implemented in phases would have the opportunity to take advantage of existing network connections, or "logical termini." This served to ensure an "apples-to-apples" evaluation to understand how various alternatives might compare in terms of their ability to serve a certain part of the region. In total, there were five analysis zones, labeled A through E, each containing five to eight segments for evaluation, labeled with numbers. Six additional alignments were added for evaluation later in the study after more stakeholder feedback. These segments are indicated with "EXT" in the narrative that follows and in Table 5 on page 72.

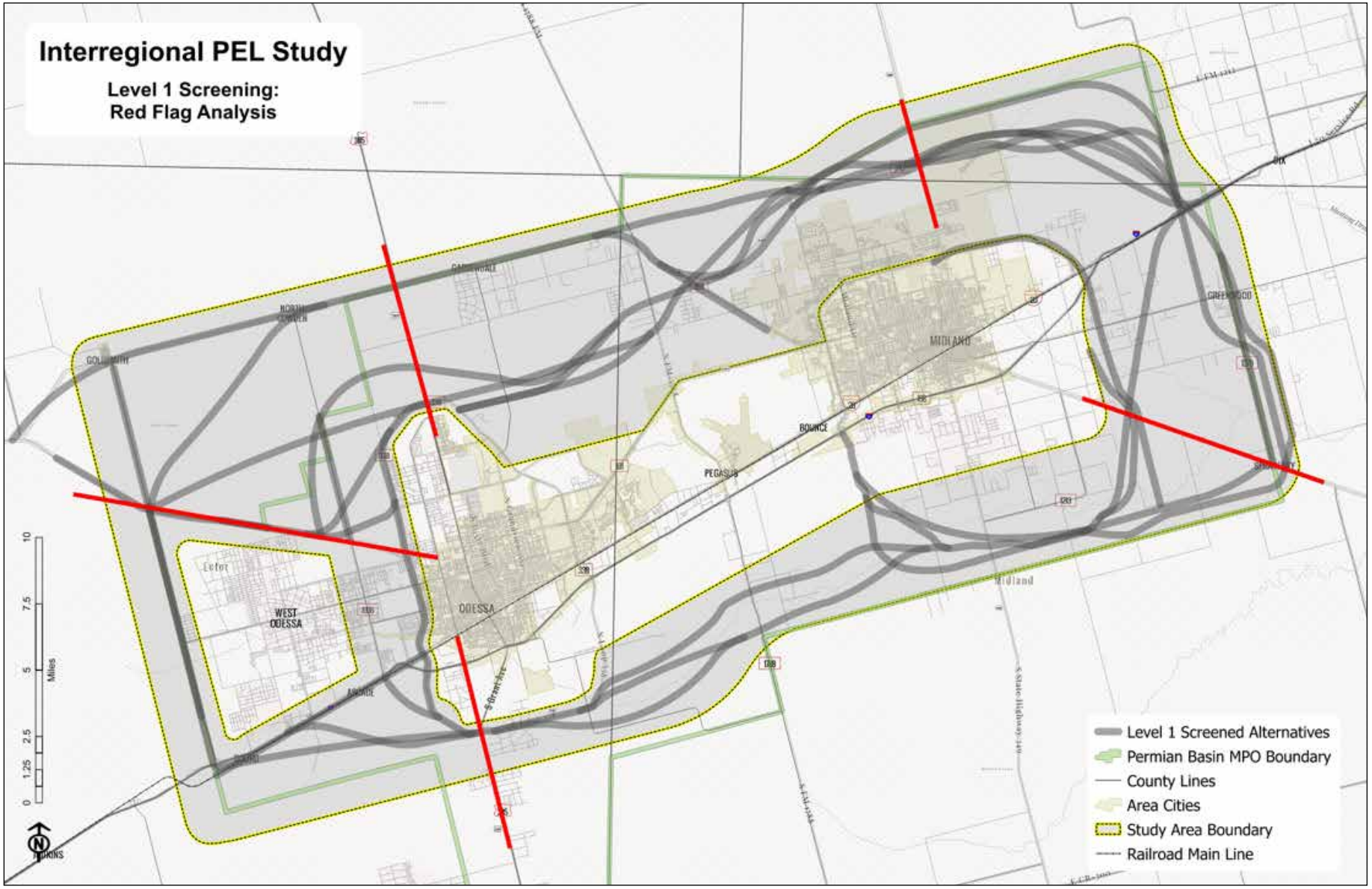
Conceptual alternative segments were evaluated individually by zone using the criteria shown in Table 3 on page 53. The project team developed thresholds for differentiating between what would be considered highly opportunistic, neutral, and least opportunistic within each variable, which were color-coded as green, yellow, and red, respectively. This was informally referred to as the "stoplight" analysis.

After a designation was assigned to each variable, the constraints were weighted, combined with initial community feedback, and each segment received an overall assignment of red, green, or yellow on the map of reasonable alternatives.

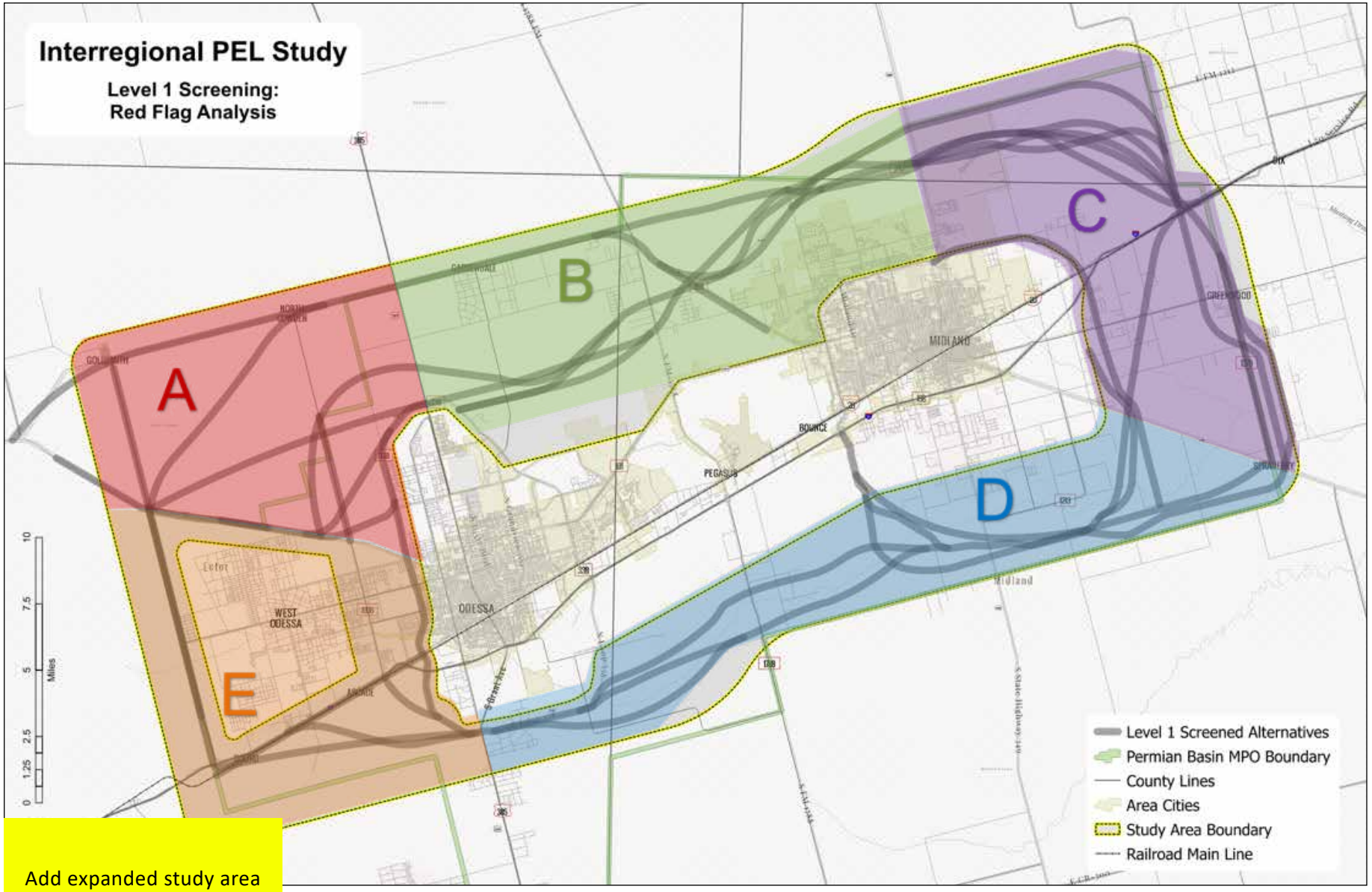
Table 3: *Level 2 Screening Criteria*

	More Opportunity	Neutral/Needs More Info	Less Opportunity
Need and Purpose	Assessed during Level 1 Analysis		
Consistency with Regional Plans			
Travel Demand Modeling	Level 3 Detailed Evaluation		
Natural Environmental Impacts			
Social Environmental Impacts			
Economic Development			

Map 11: *The PEL Study Level 1 "Universe of Alternatives" Red Flag Analysis Map - Analysis Segments*



Map 12: *The PEL Study Level 1 "Universe of Alternatives" Red Flag Analysis Map - Analysis Segments Detailed*



Add expanded study area

1. Consistency with Planned and Existing Systems

State, Regional, and Local Thoroughfare Plans	More than half of the corridor band overlaps with planned project or existing facility (y = "0")	N/A (binary variable)	Less than half of the corridor band overlaps with planned project or existing facility (n="2")
UTP/TIP Projects			
Existing Facilities			

Existing and Planned Systems

Data was collected from state, regional, and local thoroughfare plans, the TxDOT Unified Transportation Program (UTP), which is a 10-year plan that guides the development of statewide transportation work, and the Statewide Transportation Improvement Program (STIP) to determine which corridor concepts were most consistent with existing facilities and ones planned for the future. "Consistency" included overlap, support, compliance, or general lack of conflict. This captures potential opportunities for collaborating with future and ongoing transportation efforts throughout the region.

2. Historical & Cultural Resources

NRHP Property	none identified; not a differentiator at this scale		
NRHP District	none identified; not a differentiator at this scale		
TXDOT Historic Properties (Point)	none identified; not a differentiator at this scale		
TXDOT Historic Properties (Polygon)	none identified; not a differentiator at this scale		
TXDOT Historic Bridges	none identified; not a differentiator at this scale		
Historical Markers	none identified; not a differentiator at this scale		
DOE Eligible Points	none identified; not a differentiator at this scale		
DOE Eligible Polygons	none identified; not a differentiator at this scale		
Archaeological Site	0-2 markers, <4 historic highway routes, 0 arch sites	>2 markers, =>4 historic highway routes, 1 arch site <5 ac	>4 historic highway, >1 arch site >5 ac
Historic Highway Routes			

Historic and Cultural Resource Analysis Results can be found on Map 13 on page 58.

Above-Ground Historical Resources

A desktop review of data maintained by the THC and TxDOT was conducted to identify properties in the proposed project area with state or national designation or those previously determined eligible for the NRHP. This analysis was based on 2021 data. General findings are presented next, followed by a zone and segment analysis.

Historical markers, properties associated with historical markers, and historic highway routes are the only known historical resources that intersect the proposed alignment buffers (Figure X). Multiple subject

markers are within proposed alignments or their 750-foot buffers. Field investigations would be necessary to determine if any are associated with extant historic properties. An RTHL marker is mapped to a location just outside one of the zones; however, the parcel associated with the marker extends into the zone and the buffer of a potential alignment. No Centennial Markers, SALs, HTCs, NRHP-listed, NRHP-eligible, or NHL properties or districts are within proposed alignments or their buffers, though NRHP-eligible properties are in or near some of the proposed zones. Historic highway routes are within proposed alignments or their 750-foot buffers.

Zone A has two subject markers within the 750-foot buffers of alignments 1 and 2. Subject markers are commemorative and may or may not be associated with an extant built resource. The LeGrande Survey of 1833 marker commemorates early exploration in West Texas; it is not expected to be associated with built resources. The Baker Ranch School marker commemorates a 1906 schoolhouse on Teague Baker's land. If extant, the school could potentially be eligible for the NRHP. A marker for the Barrow Ranch House RTHL is mapped just outside Zone A; however, historical aerials indicate that land historically associated with the ranch extends into Zone A where alignments 3, 4, 6, 7, and 8 intersect. The ranch has potential for eligibility for the NRHP.

Three subject markers intersect the alignment buffers in Zone B. The two subject markers intersecting the 750-foot buffers of Zone A, alignments 1 and 2 also intersect the buffers of Zone B, alignments 1 and 2. The Midland & Northwestern Railroad marker also intersects alignment 2. This subject marker commemorates the 66-mile railroad line in operation from 1916 to 1920 between the town of Seminole and Midland. Only the railroad bed is extant. No other above-ground resource types are in Zone B.

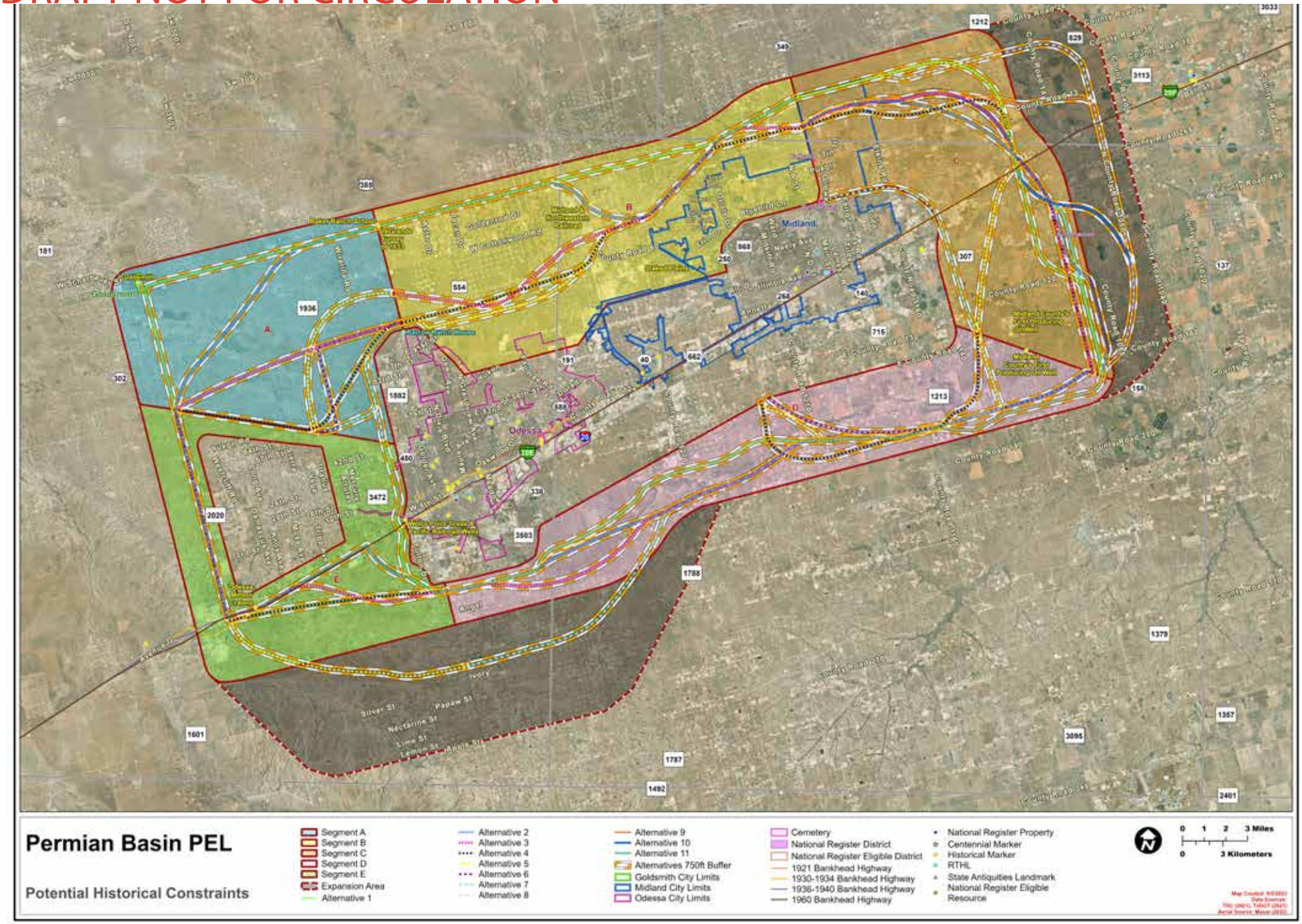
Historic highway routes intersect all proposed alignments in Zone C. No other above-ground designated or NRHP-eligible cultural resource types are in this zone. The 1921, 1930–1934, 1936–1940, and 1960 alignments of the Bankhead Highway pass diagonally through Zone C along approximately the same southwest to northeast alignment. These highway segments were not recommended eligible for the NRHP in the 2014 *Bankhead Highway Survey* and no built resources along these segments were recommended eligible as part of the survey (Hardy, Heck, Moore, Inc. 2014).

No listed or NRHP-eligible above-ground cultural resources intersect alignments in Zone D. A subject marker for Midland's first producing oil well is in Zone D; however, the marker is distant from all potential alignments and any extant built resources, presuming they are near the marker location, would not intersect alignments.

Zone E has historic highway alignments and a subject marker. The same four alignments of the Bankhead Highway that pass through Zone C intersect all alternatives in Zone E. Neither these segments nor built resources along these segments were recommended eligible for the NRHP in the 2014 Bankhead Highway Survey (Hardy Heck Moore 2014). The Odessa Meteor Craters subject marker in Zone E intersects the 750-foot buffers for alignments 2 and 3. The marker indicates the location where prehistoric meteorites hit the earth's surface and formed large funnel-shaped depressions, a rare land feature. The largest of Odessa's craters may still be visible whereas smaller craters have been covered by sediment. Zone E's alignment 4 is just south of where the Odessa Meteor Craters marker is mapped and it or its 750-foot buffer may intersect the cratered land.

THC subject markers, an RHTL, and historic highway routes are the only known above-ground cultural resource types in the study area. Though the subject markers and RTHL marker are not historic themselves, built resources associated with them may be eligible for the NRHP. The RTHL-listed Barrow Ranch House and Baker Ranch School are the markers most likely to have associated extant built resources. A cultural resources study would be necessary to determine if the Odessa Meteor Craters are a historic site. The historic highway routes intersecting Zones C and E were previously evaluated for the NRHP and were determined not eligible; therefore, they are not a constraint.

Map 13: Potential Historical and Cultural Constraints identified during detailed environmental analysis



Archaeology

A desktop review of data maintained by the THC was conducted to identify archaeological sites in the proposed project area with state or national designation or those previously determined eligible for the NRHP. This analysis was based on 2021 data. General findings are presented next, followed by a zone and segment analysis. Unlike above-ground historical resources, archaeological sites can be listed as SALs without meeting the threshold for the NRHP.

According to the THSA, a total of eight prehistoric or historic-age archaeological sites with an area of approximately 83.75 acres intersect portions of five proposed segments or their 750 ft. buffers. Field investigations would be necessary to confirm site boundaries, integrity, and NRHP eligibility status.

Zone A contains no previously identified prehistoric or historic-age sites. The risk of impacts to recorded archaeological sites for all routes in Zone A is low.

Zone B, Alternative Route 1 contains one archaeological site encompassing 0.70 acres. The risk of impacts to recorded archaeological sites for Zone B, Alternative Route 1 is considered medium, as there is one archaeological site less than five acres in size. All other routes within Zone B (2-5) are considered low risk for impacts to recorded archaeological sites.

Zone C, Alternative Route 7 contains one archaeological site encompassing 0.66 acres. The risk of impact for Zone C, Alternative Route 7 is considered medium, due to the presence of one archaeological site encompassing less than five acres. Alternative Routes 1-5 contain no previously recorded archaeological sites and are therefore considered low risk for impacts to recorded archaeological sites.

Zone D Alternative Routes 1 and 2 contain three archaeological sites encompassing 69.24 acres and two archaeological sites encompassing 11.15 acres, respectively. The risk of impacts to recorded archaeological sites for Alternative Routes 1 and 2 is considered high, as the presence of archaeological sites are in direct proximity, number greater than one, and encompass more than five acres. Alternative Route 4 contains one archaeological site encompassing two acres and is considered a medium risk to impact archaeological sites as only one site with less than five acres has been recorded. The risk of impacts to recorded archaeological sites for Alternative Routes 3, 5, and 6 is considered low.

Zone E contains no previously identified prehistoric or historic-age sites. The risk of impacts to recorded archaeological sites for all routes in Zone E is low.

In summary, relatively few archaeological sites have been recorded within the APE. Of the 29 Alternative Routes and their 750 ft. buffers, only five routes (~6%) contain previously recorded archaeological sites. Nevertheless, there are also few previously conducted cultural resource studies that incorporate portions of the APE; thus, an under-coverage bias may be represented. It is recommended that field investigations be carried out to confirm the site boundaries, integrity, and NRHP eligibility status of known sites as well as to identify previously unidentified cultural resources that may be affected by the project.

3. Natural Environment: Oil & Gas Infrastructure

Surface Wells Gas Pipelines Storage Tanks	Up to 100 total conflicts	101 - 200 total conflicts	201+ total conflicts

Conflicts with oil and gas infrastructure in the Permian Basin at this level on analysis were unavoidable; as such, the study team attempted to capture the potential magnitude of total conflicts, while remaining aware that the future implementation of an interregional facility would still require comprehensive environmental clearance and benefit-cost evaluation. This metric reflects total number of oil- and gas- related conflicts within the corridor band (1,500 feet), including surface wells, pipelines, and storage tanks at the time of data collection (2021). No one constraint was weighted greater than the other two.

All five zones have significant conflicts with suface wells and pipelines. Alignments in zones C, D, and E conflict with the greatest number, on average. However, oil and gas infrastructure conflicts occur more densely in zones A and E, the western portions of the study area. As this is a consistent conflict, wells and pipelines should not be considered a differentiator at this stage or scale of analysis. When an alignment concept is initially finalized for the interregional facility, a more detailed analysis can determine what infrastructure should be moved or avoided.

4. Natural Environment: Water Features and Wetlands

NHD Flowline NHD Waterbody NWI	< 50 ac NWI and <1000 l.f. flowline	51 - 100 ac NWI, 1000-1999 l.f. flowline	>100 ac NWI and/or >2,000 l.f. flowline

Project alignments were evaluated with thresholds and standards to the Needs & Purpose statements that served as the criteria for the first level of the screening. That is, the alternatives were screened based on whether they met the purpose of this PEL study, specifically. Impacts of less than 50 acres or less than 1,000 linear feet of water features and wetlands are expected to have a positive impact on the need and purpose, impacts of 51-100 acres or 1,000-1,999 linear feet of water features and wetlands are expected to have a neutral impact on the need and purpose, and impacts of greater than 100 acres or greater than 2,000 linear feet of water features and wetlands are expected to have a negative impact on the need and purpose of the PEL.

Zone A crosses nine NHD identified streams totaling approximatley 15,429 linear feet. The NHD database also identified 32 waterbodies, totaling approximately 40 acres within the proposed project segment alignments. The NWI database identified 50 features, totaling approximately 138 acres of wetlands within the corridor. Zone A would be considered a negative impact for the project based on the Need and Purpose.

Zone B crosses 42 NHD identified streams totaling approximatley 46,302 linear feet. The NHD database also identified 37 waterbodies, totaling approximately 59 acres within the proposed project segment alignments. The NWI database identified 107 features, totaling approximately 328 acres of wetlands within the corridor. Zone B would be considered a negative impact for the project based on the Need and Purpose.

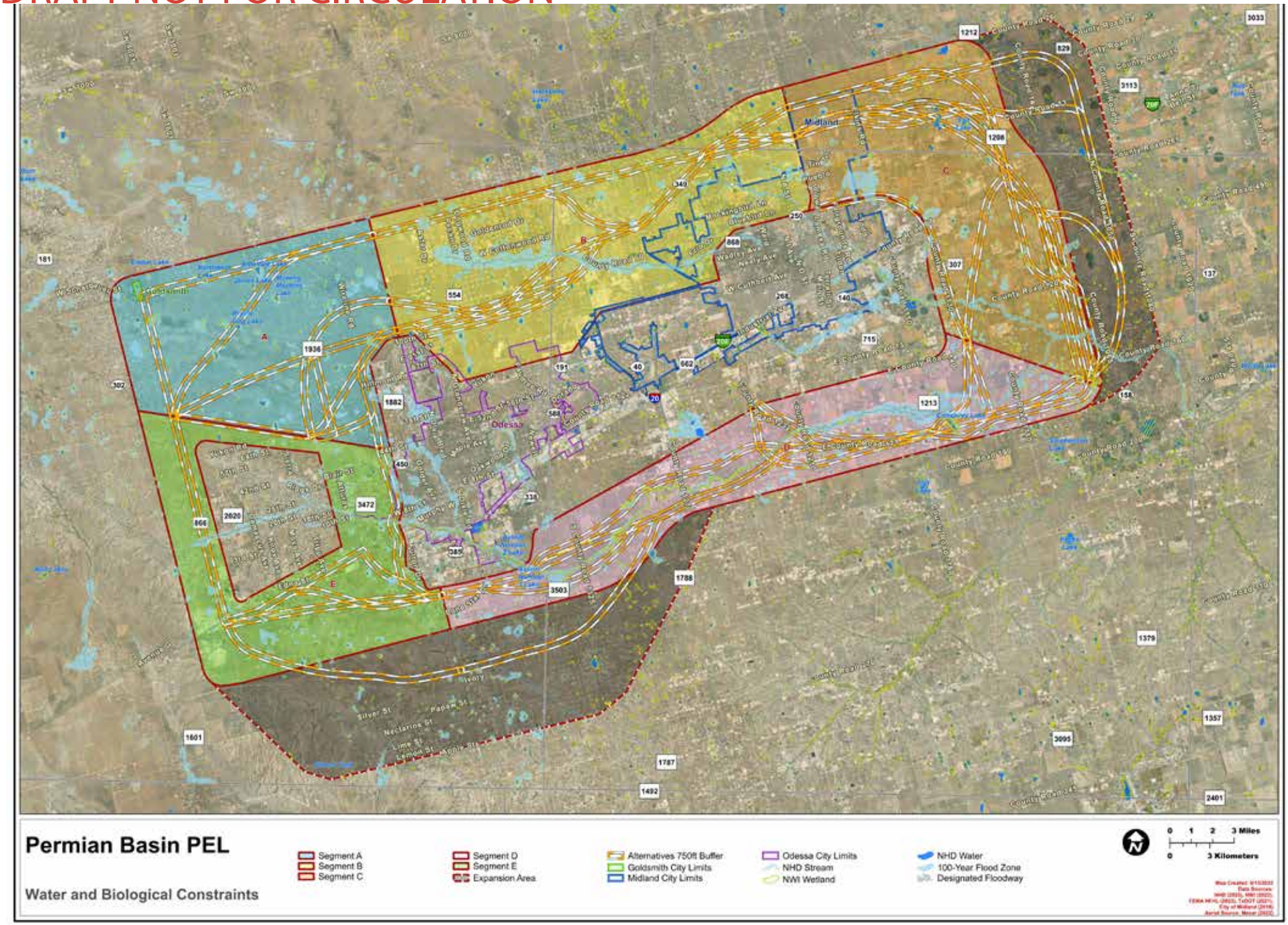
Zone C crosses 23 NHD identified streams totaling approximatley 37,261 linear feet. The NHD database also identified 67 waterbodies, totaling approximately 209 acres within the proposed project segment alignments. The NWI database identified 137 features, totaling approximately 466 acres of wetlands within the corridor. Zone C would be considered a negative impact for the project based on the Need and Purpose.

Zone D crosses 45 NHD identified streams totaling approximatley 42,423 linear feet. The NHD database also identified 37 waterbodies, totaling approximately 131 acres within the proposed project segment alignments. The NWI database identified 172 features, totaling approximately 738 acres of wetlands within the corridor. Zone D would be considered a negative impact for the project based on the Need and Purpose.

Zone E crosses 31 NHD identified streams totaling approximatley 30,465 linear feet. The NHD database also identified seven waterbodies, totaling approximately 31 acres within the proposed project segment alignments. The NWI database identified 80 features, totaling approximately 61 acres of wetlands within the corridor. Zone E would be considered a negative impact for the project based on the Need and Purpose.

Based on review of these data sets, precipitation data, and ecoregion conditions, the proposed project is likely to impact various stream classifications including ephemeral, intermittent, and perennial systems, with potential impacts to wetlands and open water features.

Map 14: *Potential Water-Related and Biological Constraints Identified during detailed environmental analysis*



5. Natural Environment: Threatened and Endangered Species

TXNDD	0 ac	1 ac - 100 ac to be confirmed in future phases	=> 100 ac

The Texas National Diversity Database (TxNDD) was created and is managed by TPWD to manage and disseminate scientific information on rare species, native plant communities, and animal aggregations for defensible, effective conservation action. Using the TxNDD, element occurrences were discovered within the 100-foot buffer of the PBMPO PEL corridor centerline for a total of 73 species for the proposed alignments with a total of approximately 13,660 acres of habitat. Impacts of zero acres or less to threatened and endangered species habitat are expected to have a positive impact on the need and purpose, impacts of one to one-hundred acres to threatened and endangered species habitat are expected to have a neutral impact on the need and purpose, and impacts of greater than 100 acres to threatened and endangered species habitat are expected to have a negative impact to the need and purpose of the PEL.

A review of the TxNDD identified 49 species within Zone A, totaling approximately 6,408 acres of habitat. Zone A would be considered a negative impact for the project based on the Need and Purpose.

A review of the TxNDD identified 10 species within Zone B, totaling approximately 3,067 acres of habitat. Zone B would be considered a negative impact for the project based on the Need and Purpose.

A review of the TxNDD identified 2 species within Zone C, totaling approximately 41 acres of habitat. Zone D would be considered a neutral impact for the project based on the Need and Purpose.

A review of the TxNDD identified 11 species within Zone D, totaling approximately 4,033 acres of habitat. Zone D would be considered a negative impact for the project based on the Need and Purpose.

A review of the TxNDD identified 1 species within Zone E, totaling approximately 112 acres of habitat. Zone E would be considered a negative impact for the project based on the Need and Purpose.

6. Natural Environment: Parklands and Conservation Areas

Cemeteries	0 - 100 ac floodplain, 0 cemeteries, 0 parks	101-199 ac floodplain, 0 cemeteries, 0 parks	>= 200 ac floodplain, >= 1 cemetery, >= 1 park
100-Year Floodplain			
Park Areas			

This factor assesses the presence of publicly owned parks, greenbelts, nature preserves, floodplains, cemeteries, or 4(f) areas in the vicinity of the corridor. An environmental database review will locate these areas in within the study area so that each corridor's impact could be assessed. Zero to one-hundred acres of floodplain, zero cemeteries, and zero parks indicates that the alternative would have a positive impact on the project based on the Need and Purpose, 101 to 199 acres of floodplain, zero cemeteries, and zero parks indicates that the alternative would have a neutral impact on the project based on the Need and Purpose, and more than 200 acres of floodplain, more than one cemetery, and more than one park indicates that the alternative would have a negative impact on the project based on the Need and Purpose.

Zone A contains no cemeteries or park areas, but did contain approximately 617 acres of floodplain. Zone A would be considered a negative impact for the project based on the Need and Purpose.

Zone B contains no cemeteries or park areas, but did contain approximately 1,108 acres of floodplain. Zone B would be considered a negative impact for the project based on the Need and Purpose.

Zone C contains two cemeteries as well as one park area that is approximately 0.70 acres. Zone C also contains approximately 1,116 acres of floodplain. Zone C would be considered a negative impact for the project based on the Need and Purpose.

Zone D contains no cemeteries or park areas, but did contain approximately 2,044 acres of floodplain. Zone D would be considered a negative impact for the project based on the Need and Purpose.

Zone E contains no cemeteries or park areas, but did contain approximately 720 acres of floodplain. Zone E would be considered a negative impact for the project based on the Need and Purpose.

7. Natural Environment: Hazardous Waste

Petroleum Storage Tank	0 - 5 PSTs, 0 other sites	1-5 LPSTs, > 5 PSTs	>5 LPSTs
Leaking Petroleum Storage Tank			
Industrial and Hazardous Waste Corrective Action (IHWCA)			
Superfund Site	none identified, not a differentiator at this stage/scale		
Landfill	none identified, not a differentiator at this stage/scale		

This factor assesses whether a corridor is within proximity to any recorded hazardous materials or landfill sites obtained from limited database searches. These sites will be located through a limited database review and public input on the area. Zero to five petroleum storage tanks (PSTs), and zero other sites indicates that the alternative would have a positive impact on the project based on the Need and Purpose, one to five leaking petroleum storage tanks (LPSTs), and less than five other sites indicates that the alternative would have a neutral impact on the project based on the Need and Purpose, and more than five LPSTs indicates that the alternative would have a negative impact on the project based on the Need and Purpose.

The proposed alignments cross 41 counts of PSTs, LPSTs, or other hazardous waste materials.

Zone A contains one PST, nine LPSTs, and one Industrial and Hazardous Waste Corrective Action (IHWCA) site. Zone A would be considered a negative impact for the project based on the Need and Purpose.

Zone B contains one PST, and no LPSTs or (IHWCA) sites. Zone B would be considered a positive impact for the project based on the Need and Purpose.

Zone C contains four PSTs, and no LPSTs or IHWCA sites. Zone C would be considered a positive impact for the project based on the Need and Purpose.

Zone D contains no PSTs, LPSTs, or IHWCA sites. Zone D would be considered a positive impact for the project based on the Need and Purpose.

Zone E contains eight PSTs, 11 LPSTs, and six Industrial and Hazardous Waste Corrective Action (IHWCA) sites. Zone E would be considered a negative impact for the project based on the Need and Purpose.

8. Natural Environment: Agriculture

Center Pivot	0 - 999 ac land, 0 center pivot	1000 - 1999 ac and/or 1 - 2 center pivots	>2,000 ac and >2 center pivots
Prime Farmland/ Farmland of Statewide Importance			

This factor assesses the impacts to agricultural areas for each corridor concept. Crop circles as well as other farm or ranch land should be visually identified on a map and each corridor's impact to this land assessed. Zero center pivots, and zero to 999 acres of farm or ranch land indicates that the alternative would have a positive impact on the project based on the Need and Purpose, one to two center pivots, and 1,000 to 1,999 acres of farm or ranch land indicates that the alternative would have a neutral impact on the project based on the Need and Purpose, and more than two center pivots, and more than 2,000 acres of farm or ranch land indicates that the alternative would have a negative impact on the project based on the Need and Purpose.

Zone A contains no center pivots or Prime Farmland/Farmland of Statewide Importance. Zone A would be considered a positive impact for the project based on the Need and Purpose.

Zone B contains five center pivot farms, totaling approximately 86 acres. Zone B also contains approximately 7,065 acres of Prime Farmland/Farmland of Statewide Importance. Zone B would be considered a negative impact for the project based on the Need and Purpose.

Zone C contains 17 center pivot farms, totaling approximately 344 acres. Zone C also contains approximately 11,095 acres of Prime Farmland/Farmland of Statewide Importance. Zone C would be considered a negative impact for the project based on the Need and Purpose.

Zone D contains 10 center pivot farms, totaling approximately 40 acres. Zone D also contains approximately 12,483 acres of Prime Farmland/ Farmland of Statewide Importance. Zone D would be considered a negative impact for the project based on the Need and Purpose.

Zone E contains no center pivots or Prime Farmland/Farmland of Statewide Importance. Zone E would be considered a positive impact for the project based on the Need and Purpose.

9. Social Environment: Potential Displacements and Area Development

Projected 2045 Population/ Households (TDM TOTPOP_45)	<100 total population-related conflicts in intersecting TAZs	100-9,999 total population-related conflicts in intersecting TAZs	10,000+ total population-related conflicts in intersecting TAZs
Surrounding City Limits (CL)	No CL intersection	N/A (binary variable)	Minimal CL intersection

This constraint was assessed for a better understanding of potential conflicts with residential development and neighborhoods. Corridors that have dense development within the corridor band are considered to have a higher likelihood of a large number of residential displacments than the corridors with large expanses of vacant or underdeveloped land. No individual structures or parcels were evaluated at this phase.

Population-related conflicts were evaluated using projected 2045 person and household data from the Permain Basin MPO's Travel Demand Model (TDM) Demographics. Since location-based demographic data was available at the Transportation Analysis Zone (TAZ) level, the study team combined values in any TAZ intersecting a corridor band to determine a residential value. The classification process then included grouping corridors in relation to one another, but actual household and population values are not reflected in the analysis output. This method resulted in rankings that favored corridors in zones A and D. Zone A is not completely within the PBMPO boundary, within which the population data was only available, and Zone D was less densly populated due to a comparative lack of surrounding community development.

Population-related conflicts were also evaluated based on a corridor's intersection with nearby City limits. These areas were generally assumed to have higher development densities, and therefore contained higher potential for residential disruption. Overall, this varibale has less of an impact, and corridor bands passing across area city limits all only cross for a small portion. While undoubtedly incomplete, these two metrics were simple ways to capture general reisdential growth patterns for the future of the region. In-depth environmental documentation will take place at later phases of an interregional corridor project to ensure appropriate protection of existing facilities and residents.

10. Social Environment: Community Facilities & Sensitive Receptors

Public Buildings	none identified; not a differentiator at this stage/scale		
Fire Stations	none identified; not a differentiator at this stage/scale		
Hospitals	none identified; not a differentiator at this stage/scale		
Places of Worship	none identified; not a differentiator at this stage/scale		
Schools	0 conflicts	N/A (binary variable)	At least 1 school-related conflict

A desktop review was completed in 2021 to identify both community facilities and sensitive receptors that are located within the study area. General findings are presented next, followed by a zone and alternative route analysis. It must be noted that the statements below indicate a review of known community facilities, but during the NEPA phase, additional research and field investigations would be needed to verify that community facilities would not be affected by these alternatives.

Only one community facility/sensitive receptor was identified within the study area. No places of worship, hospitals, fire stations, or other public buildings were identified under each alternative.

Zone A contains no identified community facilities or sensitive receptors. There is no risk of impacts to community facilities or sensitive receptors for all routes in Zone A.

Zone B contains no identified community facilities or sensitive receptors. There is no risk of impacts to community facilities or sensitive receptors for all routes in Zone B.

Zone C contains one school-related conflict. The Greenwood ISD is located near FM 1379 and FM 307. There are no other risks of impacts to community facilities or sensitive receptors for all routes in Zone C.

Zone D contains no identified community facilities or sensitive receptors. There is no risk of impacts to community facilities or sensitive receptors for all routes in Zone D.

Zone E contains no identified community facilities or sensitive receptors. There is no risk of impacts to community facilities or sensitive receptors for all routes in Zone E.

In summary, only one community facility exists within the study area. It is recommended that a site visit be conducted to confirm the location of the identified facility as well as to identify any previously unidentified facilities or sensitive receptors that may be affected by the project.

11. Social Environment: EJ, Vulnerable Populations, and Effects Across Income Levels

Block Groups w/ Minority Population < 50%	0 - 500 acres of >50% minority (assumes avoidance efforts in future phases)	501 - 1000 acres >50% minority	1001 >acres >50% minority
Low Income Block Groups	none identified; not a differentiator at this stage/scale		

A desktop review of existing Environmental Justice (EJ), low-income, and vulnerable populations within the study area was completed in 2021. The USDOT Order 5610.2(C) defines minority persons as Black, Hispanic or Latino, Asian American, American Indian and Alaskan Native, and Native Hawaiian, Other Pacific Islander, and persons who identify with two or more races. Low-income population means any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/ transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed USDOT program, policy, or activity. This report uses block level data from the 2010 U.S. Census Bureau and 2015-2019 U.S. Census Bureau's American Community Survey (ACS) to determine the presence of EJ populations within the study area. General findings are presented next, followed by a zone and segment analysis.

According to the 2010 U.S. Census Bureau and the 2015-2019 ACS data, the highest concentrations of block groups with 50 percent or more minority populations exist primarily within Zone A, followed by Zone E, Zone D, Zone C, and Zone B. No low-income populations were identified within the study area at this high level of analysis.

Zone A would potentially impact 193 block groups with 50 percent

or more minority populations. Of the 193 block groups, 42 would be located under Alternative 4, 41 under Alternative 6, 40 under Alternative 7, 27 under Alternative 3, 23 under Alternative 2, 17 under Alternative 1 and three under Alternative 8. Zone A would result in the greatest potential impact to EJ and vulnerable populations.

Zone B would potentially impact five block groups with 50 percent or more minority populations. Of the five block groups, three would be located under Alternative 3 and two would be located under Alternative 2. Zone B would result in the least potential impacts to EJ and vulnerable populations.

Zone C would potentially impact 48 block groups with 50 percent or more minority populations. Of the 48 block groups, nine would be located under Alternatives 2 and 5, eight would be located under Alternatives 1 and 3, and six would be located under Alternative 4.

Zone D would potentially impact 93 block groups with 50 percent or more minority populations. Of the 93 block groups 19 would be located under Alternative 2, 17 would be located under Alternatives 1 and 3, 15 would be located under Alternative 5, 14 would be located under Alternative 4, and 11 would be located under Alternative 6.

Zone E would potentially impact 122 block groups with 50 percent or more minority populations. Of the 122 block groups, 40 would be located under Alternative 2, 33 under Alternative 3, 31 under Alternative 4, and 18 under Alternative 1.

In summary, Zone B would impact the least amount of block groups with 50 percent or more minority populations while zone A would have the greatest impact. It is recommended that the census data be reanalyzed using the most recent 2020 U.S. Census Bureau data to accurately capture the potential changes in demographics for the proposed study area, at the time any alternative routes advance to the NEPA compliance phase. See Appendix X for demographic information for the study area.

12. Economic Development

Projected 2045 Jobs/ Employment (TDM TOTEMP_45)	>1000 total employment conflicts in intersecting TAZs	1000-4999 total employment conflicts in intersecting TAZs	5000+ total employment conflicts in intersecting TAZs

This factor was assessed for a better understanding of potential viability of future economic development around each corridor based on employment rates. The presence of businesses is assumed to promote futher economic development along a corridor. No individual structures or parcels were evaluated at this phase.

Employment-related conflicts were evaluated using projected 2045 employment data from the Permain Basin MPO's Travel Demand Model (TDM) Demographics. Since location-based demographic data was available at the Transportation Analysis Zone (TAZ) level, the study team combined values in any TAZ intersecting a corridor band to determine an employment value. The classification process then included grouping corridors in relation to one another, but actual job density values are not reflected in the analysis output. This method resulted in rankings that favored corridors in zones A and D. Zone A is not completely within the PBMPO boundary, within which the population data was only available, and Zone D was less densley populated due to a comparative lack of surrounding community development.

In-depth environmental documentation will take place at later phases of an interregional corridor project to ensure appropriate protection of existing facilities and employment centers.

Map 15: *Potential Demographic Constraints Identified during detailed environmental analysis*

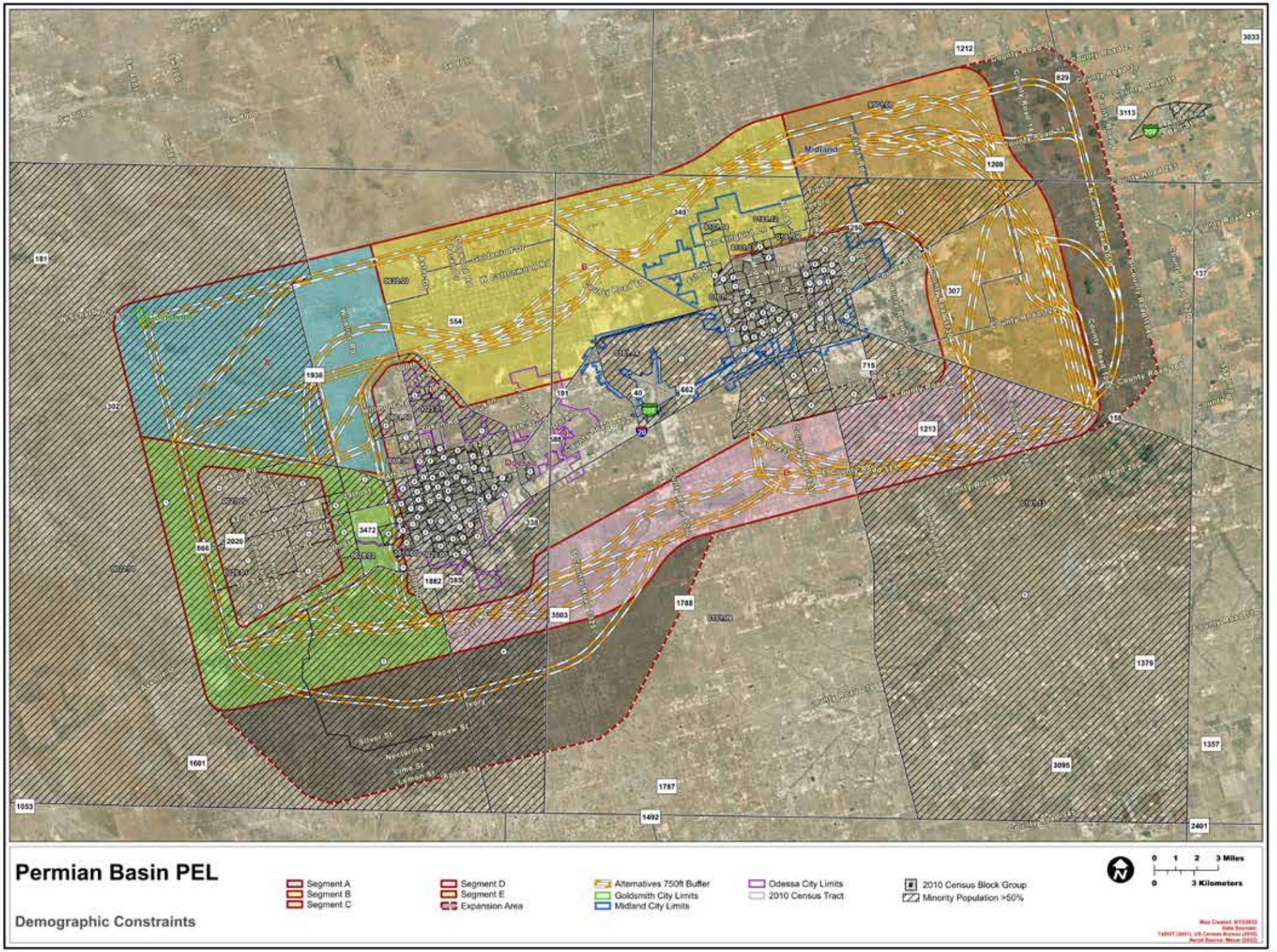


Table 4: *Analysis Thresholds for Level 2 Preliminary Evaluation Screening Criteria*

			Few Constraints	Medium Constraints	High Constraints
1.	Consistency with Regional Plans and Existing Infrastructure	State, Regional, Local Thoroughfare Plans, UTP/TIP Projects	More than half of the corridor band overlaps with planned project or existing facility	N/A (binary variable)	Less than half of the corridor band overlaps with planned project or existing facility
		Existing Facilities			
2.	Historic and Cultural Resources	NRHP Property, NRHP District	none identified; not a differentiator at this stage/scale		
		TXDOT Historic Properties, Bridges	none identified; not a differentiator at this stage/scale		
		Historical Markers	none identified; not a differentiator at this stage/scale		
		DOE Eligible Points/Polygons	none identified; not a differentiator at this stage/scale		
		Archaeological Site	0 -2 markers, <4 historic highway routes, 0 arch sites	>2 markers, =>4 historic highway routes, 1 arch site <5 ac	>4 historic highway, >1 arch site>5 ac
		Historic Highway Routes			
3.	Oil and Gas Infrastructure	Surface Wells	<=100 total conflicts	101-200 total conflicts	>200 total conflicts
		Pipeline Conflicts			
		Storage Tanks			
4.	Wetlands and Major Water Features	NHD Flowline	< 50 ac NWI and <1000 l.f. flowline	51 - 100 ac NWI, 1000-1999 l.f. flowline	>100 ac NWI and/or >2,000 l.f. flowline
		NHD Waterbody			
		NWI			
5.	Threatened and Endangered Species	TXNDD	0 acres	1 acre - 100 acres to be confirmed in future phases	=>100 acres
6.	Parklands and Conservation Areas	Cemeteries	0-100 ac floodplain, 0 cemeteries, 0 park	101-199 ac floodplain, 0 cemeteries, 0 parks	>= 200 ac floodplain, >=1 cemetery, >=1 parks
		100-year Floodplain			
		Park Areas			
7.	Hazardous Site/Landfills	Petroleum Storage Tank (PST)	0-5 PSTs, 0 other sites	1-5 LPSTs, >5 PSTs	>5 LPSTs
		Leaking Petroleum Storage Tank (LPST)			
		Industrial and Hazardous Waste Corrective Action (IHWCA)			
		Superfund Site	none identified; not a differentiator at this stage/scale		
		Landfill	none identified; not a differentiator at this stage/scale		

8.	Agricultural Areas	Center Pivot	0 center pivot, 0-999 ac land	1000 - 1,999 ac and/ or 1-2 center pivots	>2000 ac and >2 center pivots
		Prime Farm Land/Farmland of Statewide Importance			
9.	Potential Displacements and Area Development	Population + HHs in 2045	<100 total population-related conflicts in intersecting TAZs	100-9,999 total population-related conflicts in intersecting TAZs	10,000+ total population-related conflicts in intersecting TAZs
		City Limits (CL)	No CL intersection	N/A (binary variable)	Minimal CL intersection
10.	Community Facilities and Sensitive Receptors	Public Buildings	none identified; not a differentiator at this stage/scale		
		Hospitals	none identified; not a differentiator at this stage/scale		
		Fire Stations	none identified; not a differentiator at this stage/scale		
		Places of Worship	none identified; not a differentiator at this stage/scale		
		Schools	0 conflicts	N/A (binary variable)	=> 1 conflict
11.	Environmental Justice, Vulnerable Populations, and Effects Across Income Levels	Block Groups w/ Minority Pop <50%	0-500 acres of >50% minority (assumes avoidance efforts in future phases)	501 - 1000 acres >50% minority	1001> acres >50% minority
		Low Income Block Groups	none identified; not a differentiator at this stage/scale		
12.	Economic Development and Future Job Growth	Jobs in 2045	<1000 total employment conflicts in intersecting TAZs	1000-4999 total employment conflicts in intersecting TAZs	5000+ total employment conflicts in intersecting TAZs

Table 5: *Level 2 Preliminary Evaluation Screening Analysis Results by Corridor Concept. m*

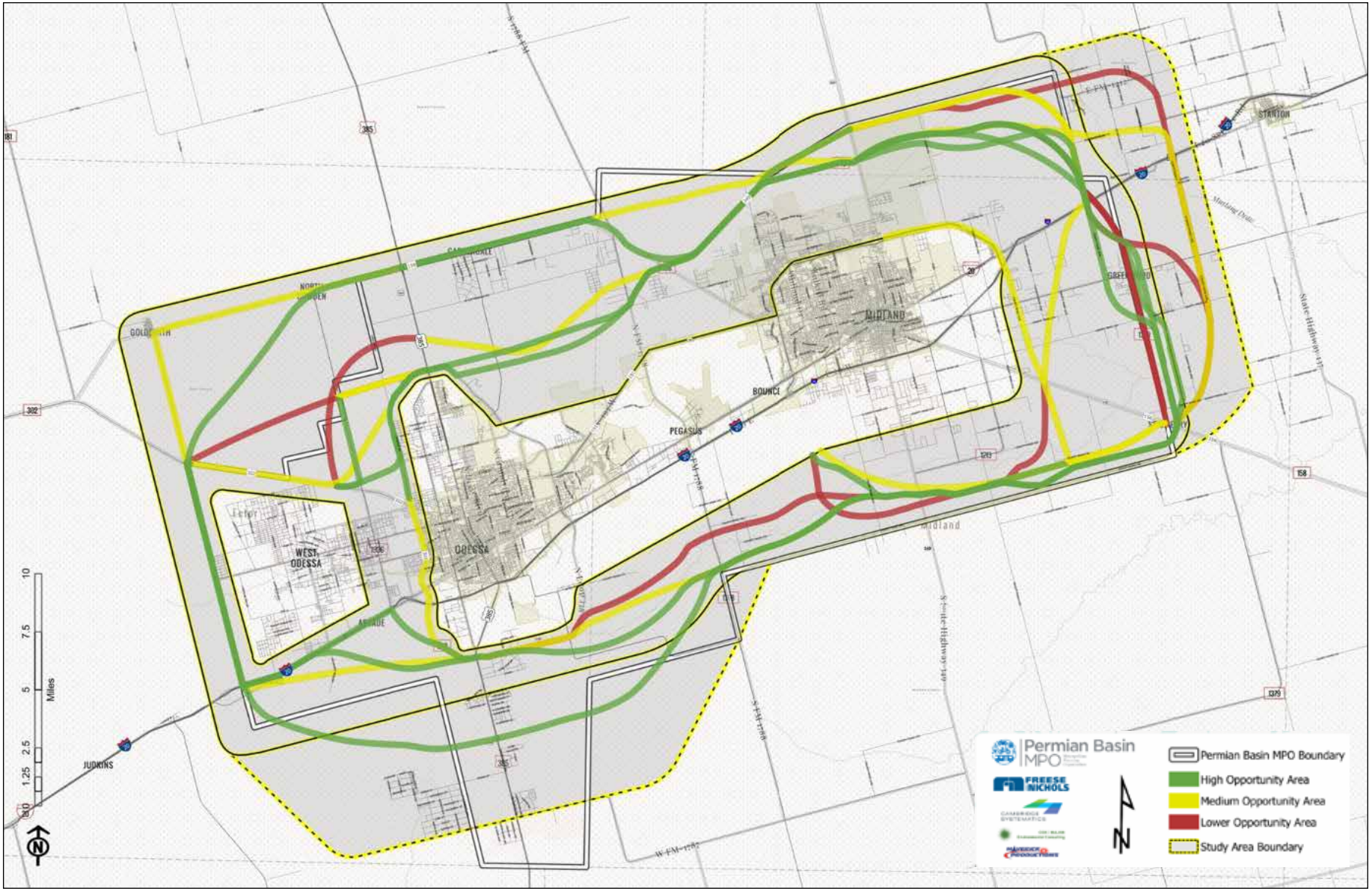
● = *Constraint is present*

			A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5
1.	Consistency with Regional Plans and Existing Infrastructure	State, Regional, Local Thoroughfare Plans, UTP/TIP Projects													
		Existing Facilities													
2.	Historic and Cultural Resources	NRHP Property, NRHP District													
		TXDOT Historic Properties, Bridges													
		Historical Markers	●	●	●	●		●	●	●	●	●			
		DOE Eligible Points/Polygons													
		Archaeological Site									●				
		Historic Highway Routes													
3.	Oil and Gas Infrastructure	Surface Wells	●	●	●	●	●	●	●	●	●	●	●	●	●
		Pipeline Conflicts	●	●	●	●	●	●	●	●	●	●	●	●	●
		Storage Tanks	●									●			
4.	Wetlands and Major Water Features	NHD Flowline	●	●	●	●	●	●	●		●	●	●	●	●
		NHD Waterbody	●	●	●	●	●	●	●	●	●	●	●	●	●
		NWI	●	●	●	●	●	●	●	●	●	●	●	●	●
5.	Threatened and Endangered Species	TXNDD			●	●	●	●	●	●			●	●	●
6.	Parklands and Conservation Areas	Cemeteries													
		100-year Floodplain	●	●	●	●	●	●	●	●	●	●	●	●	●
		Park Areas													
7.	Hazardous Site/Landfills	Petroleum Storage Tank	●									●			
		Leaking Petroleum Storage Tank	●			●			●	●					
		Industrial and Hazardous Waste Corrective Action (IHWCA)								●					
		Superfund Site													
		Landfill													
8.	Agricultural Areas	Center Pivot									●	●			
		Prime Farm Land/Farmland of Statewide Importance											●	●	●
9.	Potential Displacements and Area Development	Population + HHs in 2045													
		City Limits	●								●	●	●	●	●
10.	Community Facilities and Sensitive Receptors	Public Buildings													
		Hospitals													
		Fire Stations													
		Schools													
11.	Environmental Justice, Vulnerable Populations, and Effects Across Income Levels	Block Groups w/ Minority Pop <50%	●	●	●	●	●	●	●	●		●	●		
		Low Income Block Groups													
12.	Economic Development and Future Job Growth	Jobs in 2045													

			C1	C2	C3	C4	C5	C7	C8EXT	C9EXT	C10EXT	C11EXT
1.	Consistency with Regional Plans and Existing Infrastructure	State, Regional, Local Thoroughfare Plans, UTP/TIP Projects										
		Existing Facilities										
2.	Historic and Cultural Resources	NRHP Property, NRHP District										
		TXDOT Historic Properties, Bridges										
		Historical Markers										
		DOE Eligible Points/Polygons										
		Archaeological Site						●	●	●	●	
		Historic Highway Routes	●	●	●	●	●	●	●	●	●	
3.	Oil and Gas Infrastructure	Surface Wells	●	●	●	●	●	●	●	●	●	●
		Pipeline Conflicts	●	●	●	●	●	●	●	●	●	●
		Storage Tanks					●					
4.	Wetlands and Major Water Features	NHD Flowline	●	●	●	●	●	●	●	●	●	●
		NHD Waterbody	●	●	●	●	●	●	●	●	●	●
		NWI	●	●	●	●	●	●	●	●	●	●
5.	Threatened and Endangered Species	TXNDD			●	●			●	●		
6.	Parklands and Conservation Areas	Cemeteries			●	●						
		100-year Floodplain	●	●	●	●	●	●	●	●	●	●
		Park Areas						●				
7.	Hazardous Site/Landfills	Petroleum Storage Tank			●	●		●				
		Leaking Petroleum Storage Tank										
		Industrial and Hazardous Waste Corrective Action (IHWCA)										
		Superfund Site										
		Landfill										
8.	Agricultural Areas	Center Pivot	●	●	●	●		●	●	●	●	●
		Prime Farm Land/Farmland of Statewide Importance	●	●	●	●	●	●	●	●	●	●
9.	Potential Displacements and Area Development	Population + HHs in 2045										
		City Limits	●	●	●	●	●	●	●	●	●	●
10.	Community Facilities and Sensitive Receptors	Public Buildings										
		Hospitals										
		Fire Stations										
		Schools			●	●						●
11.	Environmental Justice, Vulnerable Populations, and Effects Across Income Levels	Block Groups w/ Minority Pop <50%	●	●	●	●	●	●	●	●	●	●
		Low Income Block Groups									●	●
12.	Economic Development and Future Job Growth	Jobs in 2045										

			D1	D2	D3	D4	D5	D6	D7EXT	E1	E2	E3	E4	E5EXT
1.	Consistency with Regional Plans and Existing Infrastructure	State, Regional, Local Thoroughfare Plans, UTP/TIP Projects												
		Existing Facilities												
2.	Historic and Cultural Resources	NRHP Property, NRHP District												
		TXDOT Historic Properties, Bridges												
		Historical Markers									●	●		
		DOE Eligible Points/Polygons												
		Archaeological Site	●	●		●								●
		Historic Highway Routes								●	●	●	●	●
3.	Oil and Gas Infrastructure	Surface Wells	●	●	●	●	●	●	●	●	●	●	●	●
		Pipeline Conflicts	●	●	●	●	●	●	●	●	●	●	●	●
		Storage Tanks								●	●	●		
4.	Wetlands and Major Water Features	NHD Flowline	●	●	●	●	●	●	●	●	●	●	●	●
		NHD Waterbody	●	●	●	●	●	●	●	●	●	●	●	●
		NWI	●	●	●	●	●	●	●	●	●	●	●	●
5.	Threatened and Endangered Species	TXNDD	●	●	●				●	●				
6.	Parklands and Conservation Areas	Cemeteries												
		100-year Floodplain	●	●	●	●	●	●	●	●	●	●	●	●
		Park Areas												
7.	Hazardous Site/Landfills	Petroleum Storage Tank								●	●			
		Leaking Petroleum Storage Tank								●	●	●	●	●
		Industrial and Hazardous Waste Corrective Action (IHWCA)								●	●	●	●	
		Superfund Site												
		Landfill												
8.	Agricultural Areas	Center Pivot	●	●					●					
		Prime Farm Land/Farmland of Statewide Importance	●	●	●	●	●	●	●					
9.	Potential Displacements and Area Development	Population + HHs in 2045												
		City Limits								●				
10.	Community Facilities and Sensitive Receptors	Public Buildings												
		Hospitals												
		Fire Stations												
		Schools												
11.	Environmental Justice, Vulnerable Populations, and Effects Across Income Levels	Block Groups w/ Minority Pop <50%	●	●	●	●	●	●	●	●	●	●	●	●
		Low Income Block Groups												
12.	Economic Development and Future Job Growth	Jobs in 2045												

Map 16: *The PEL Study Level 2 "Universe of Alternatives" - Corridors of Opportunity Map*



LEVEL 3: MODELING AND SENSITIVITY ANALYSIS

From the Reasonable Alternatives derived in the Level 2 screening process, the PEL Study team used Travel Demand Modeling to draw preliminary conclusions about how an interregional facility would affect the network at a regional scale. Any new roadway that serves both Odessa and Midland will have compounding effects on not only physical and environmental features, but on operations, commute traffic, and regional travel patterns. This portion of the screening was also meant to provide a general assessment of how "sensitive" the network might be to major changes.

Criteria & Process

Through discussions with the Permian Basin Metropolitan Planning Organization (PBMPO) and local stakeholders, the study team narrowed down the reasonable alternative alignments intwo two specific route options that generally represent the different geographic areas where an interregional facility could be located. The goal was to infer where a new facility might have the most effective impact on the functionality of the existing transportation network. These two "respresentative" routes were called the Blue and the Orange alternatives (Map 18 on page 78).

The Blue and Orange routes were derived by selecting segments of the Reasonable Alternatives within each zone that are farthest away from one another, resulting in alignment options on opposite sides of the "spectrum" of possibilities. The Orange alternative is near the current activity in the region as it runs adjacent to the urban area. The Blue alternative, on the other hand, runs farther from the population and employment density, and is expected to be less attractive to traffic.

The modeling analysis primarily used 2040 data from the Texas Statewide Analysis Model (SAM) version 4. Map 19 on page 79, Map 20 on page 80, and Map 21 on page 81 show the total flow for passenger vehicles in the PM peak period for the No Build, Orange, and Blue scenarios, respectively. The study team visualized PM Peak hour flow and level of service for passenger vehicles and freight vehicles and compared those to the no-build network, which allowed them to see where a new facility might divert traffic from the existing network and redistribute it to other parts of the network. In this analysis, an evaluation of daily movements did not show a noteworthy difference in network functionality, which is likely due to communting patterns in opposite directions. Peak-hour window evaluation provided a better look at potential benefits.

Results

Table 6 shows the performance measures for the No Build, Orange, and Blue alternatives in 2040. While the flow map (Map 20) and performance measures of the Orange alternative look better compared to the Blue alternative (Map 21) and the No Build scenario (Map 19), discussions with the PBMPO and local stakeholders revealed that the area near loop 338 and US 385 interchange is nearly built out, and building a relief route in 2040 serving that area may not be as beneficial. Consequently, the Blue alternative is the preferred alternative.

Any new facility that is adding capacity is going to result in a quantitative benefit to the network. Both the Orange and the Blue showed improved performance metrics when compared to the no-build network. The question was which one has the greatest impact in the metrics where the study team determined the system would benefit most (eg. delay, VMT, cVHT, etc.)

It is important to note that the modeling step is simply a simulation, and the exact routes that were run through the model are not the only options. These two simple routes were used to start to identify the areas with the most potential benefit. A new interregional loop in any location would likely have significant impacts on overall travel demand and behaviors for both passenger vehicles and freight. It will be critical to assess these effects again more directly when specific route options have been determined.

Table 6: *Performance Measures for the Orange, Blue & No Build Alternatives in 2040*

	Auto VMT	Truck VMT	Auto VHT	Truck VHT	Auto Delay	Truck Delay
2040 No Build	11,683,527	751,063	249,709	16,052	8,032	516
Orange Alternative	11,917,370	704,685	250,026	14,784	6,546	387
% Difference	2.0%	-6.2%	0.1%	-7.9%	-18.5%	-25.0%
Blue Alternative	11,882,470	719,515	250,446	15,165	7,022	425
% Difference	1.7%	-4.2%	0.3%	-5.5%	-12.6%	-17.6%

Table 7: *Performance Measures for the Preferred Alternative in 2050*

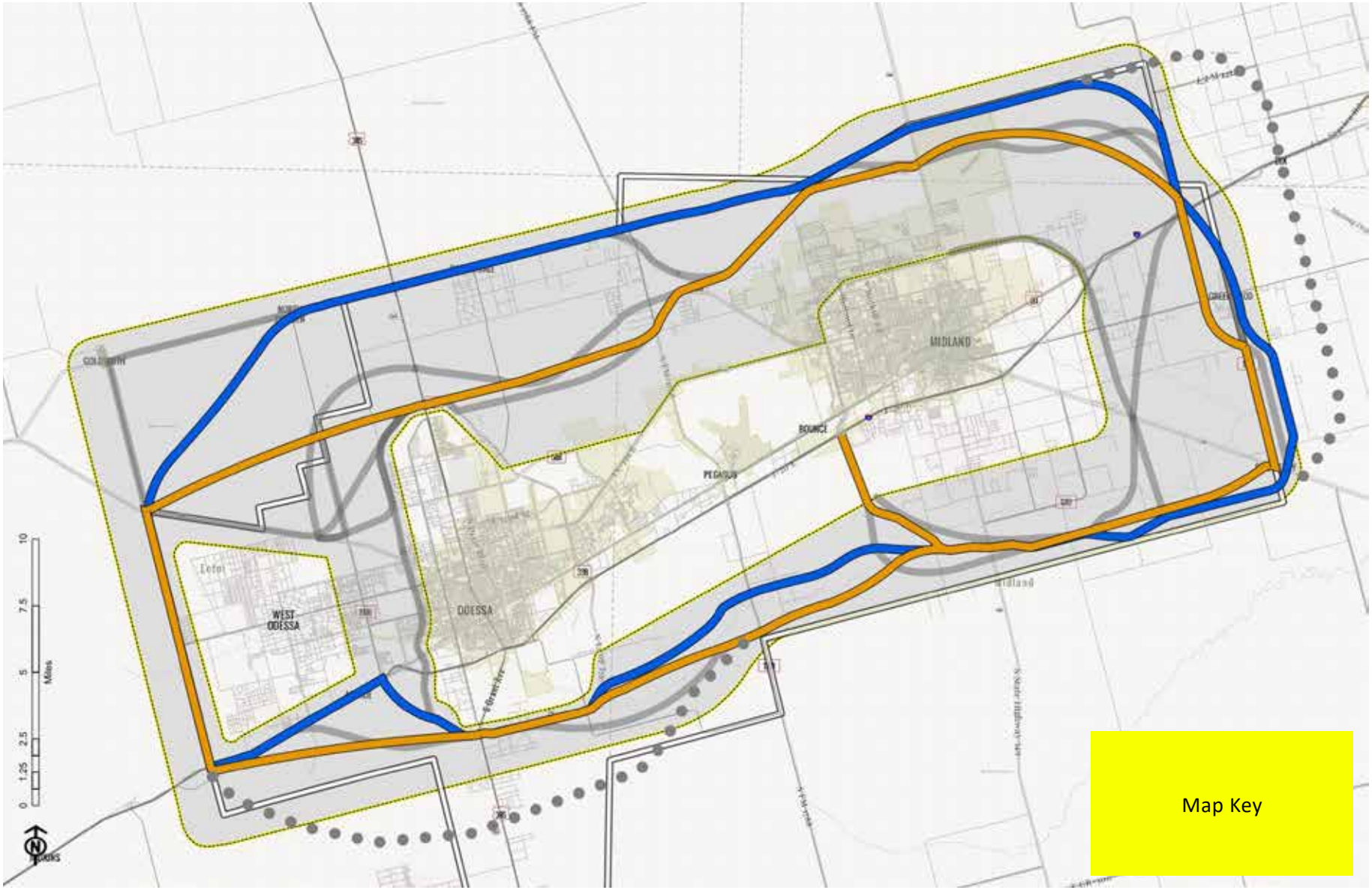
	Auto VMT	Truck VMT	Auto VHT	Truck VHT	Auto Delay	Truck Delay
2050 No Build	12,127,128	1,429,249	241,363	28,446	22,019	2,595
Blue/Preferred Alternative	12,413,241	1,308,958	240,060	25,314	17,356	1,830
% Difference	2.4%	-8.4%	-0.5%	-11.0%	-21.2%	-29.5%

Representing Freight Flows

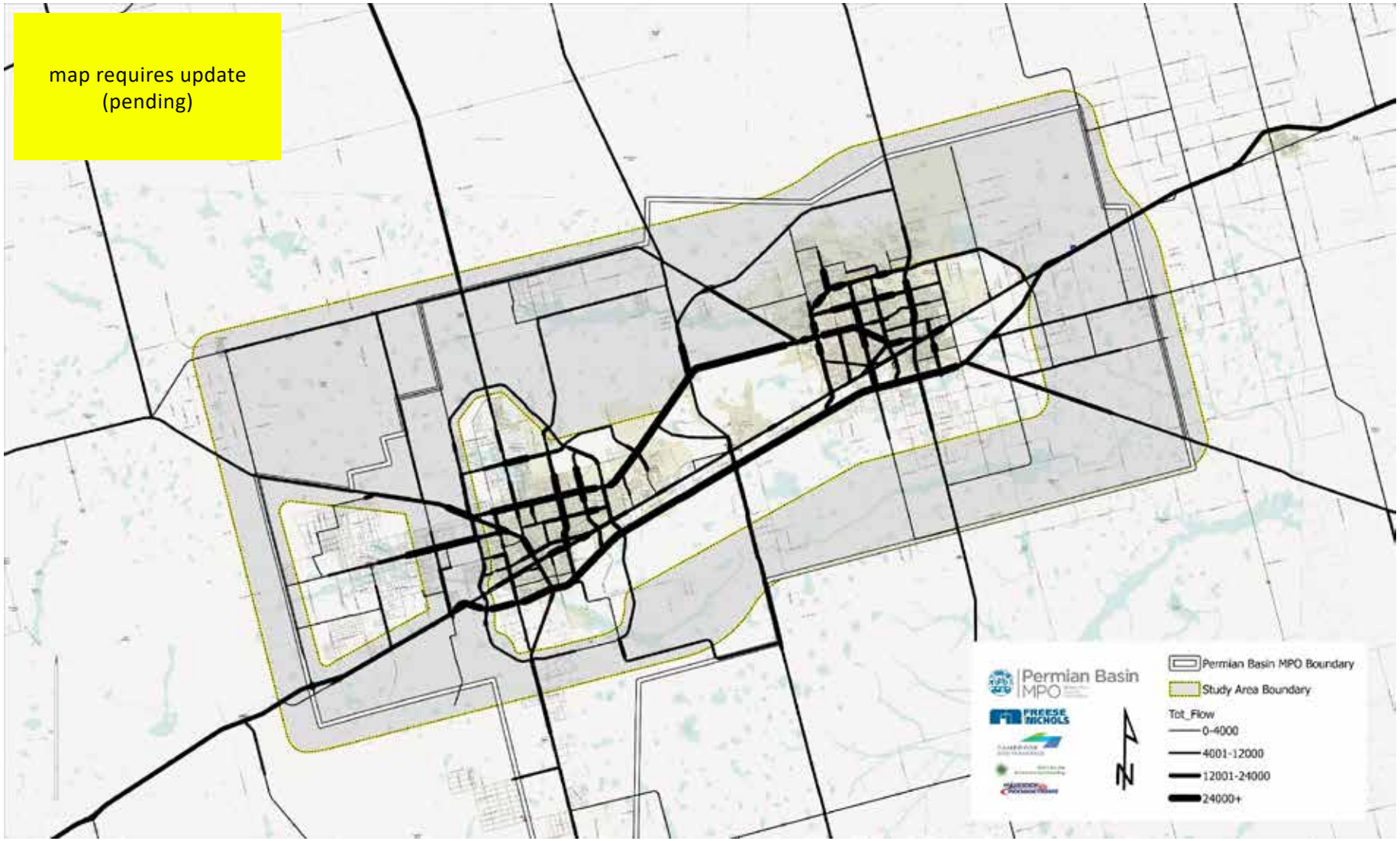
To show the preferred alternative's ("Blue") benefit in improving travel conditions for freight flow in the region, SAM was run with an updated freight truck trip table based on the Transearch commodity flow database extrapolated to 2050 and supplemented with energy sector commodity flows (sand, fresh water and brine). Table 7 shows the performance measures for the No Build and Blue alternative in 2050.

Most of the metrics related to miles traveled, hours traveled, and delay improve drastically with the preferred alternative. Using both the model information and anectodal evidence from the stakeholder engagement process throughout the life of this study, the study team concluded that that the additional distance from both cities' existing urban cores provides a partial explanation for the preference of this alternative. With rapidly growing residential, business, and freight movements, a long-term interregional facility should provide adequate space for continued expansion.

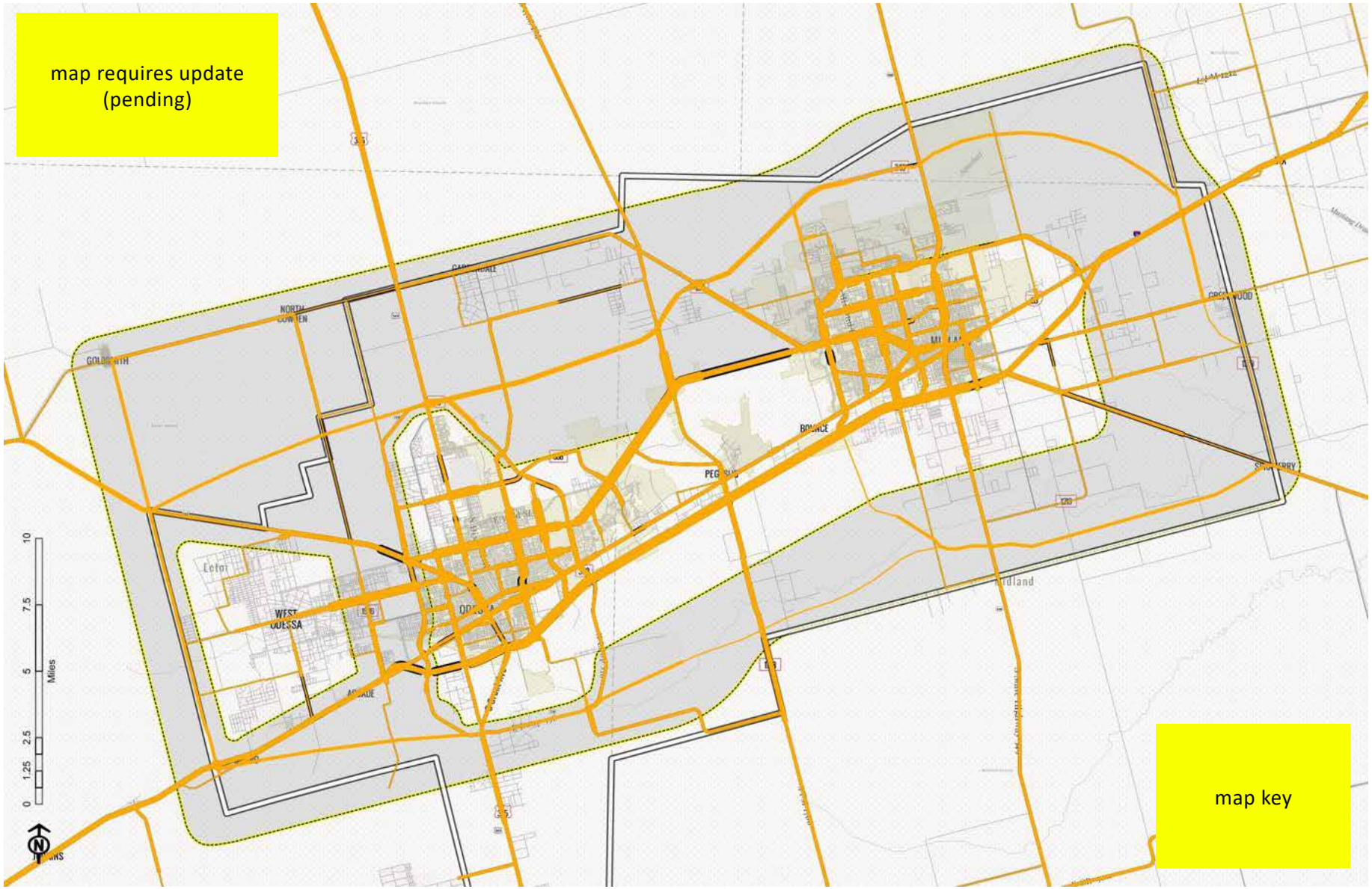
Map 17: *Modeled Alternatives: Orange and Blue Corridor Concepts*



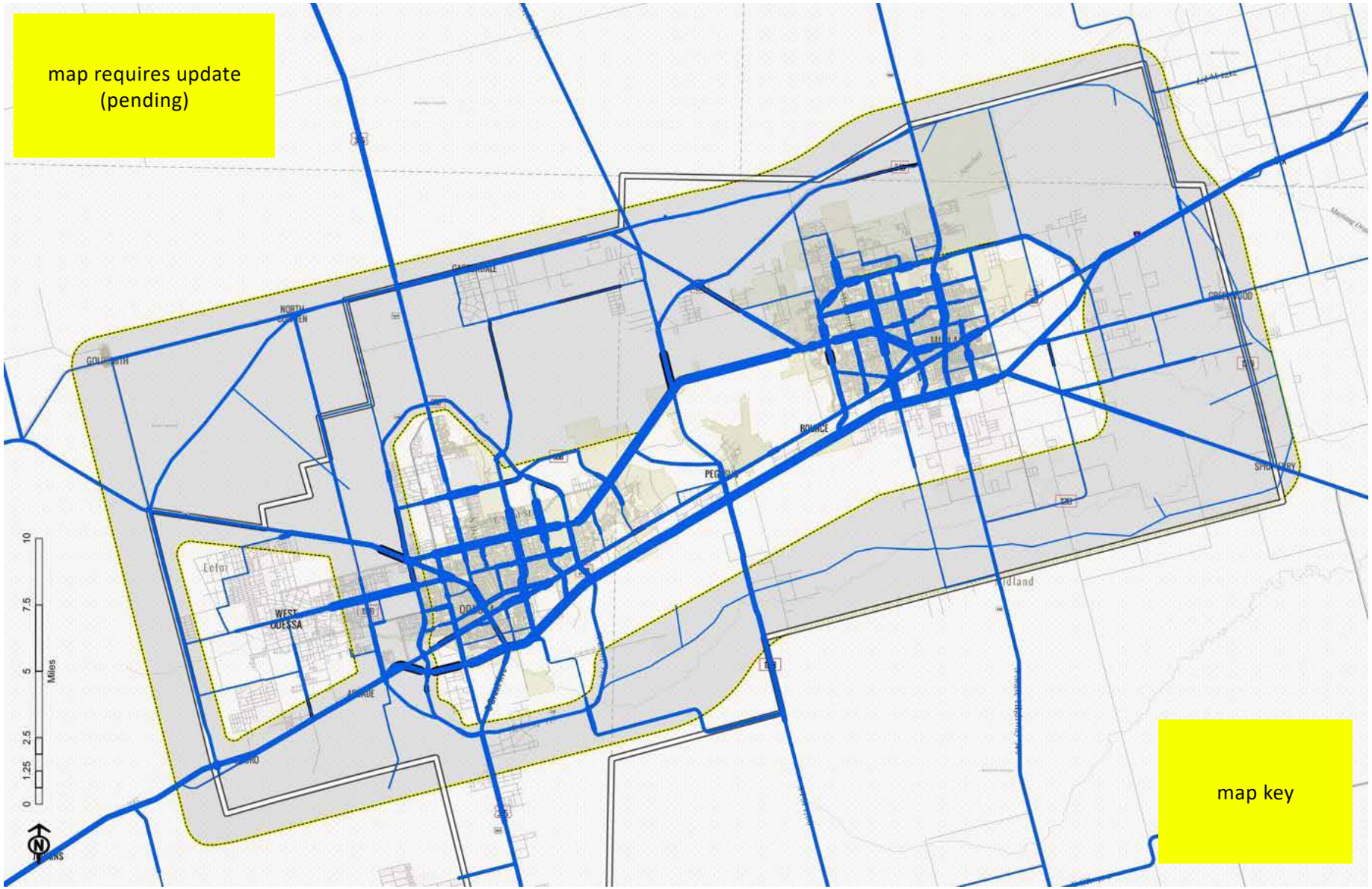
Map 18: *PM Peak Passenger Vehicle Flow for No Build Scenario in 2040*



Map 19: *PM Peak Passenger Vehicle Flow for Orange Alternative in 2040*



Map 20: *PM Peak Passenger Vehicle Flow for Blue Alternative in 2040*



CORRIDORS OF OPPORTUNITY

The final Corridors of Opportunity, or the most successful corridor concepts, are shown in Map 21 on page 83. This PEL study process only assessed a sample of variables and constraints. With these metrics, the most opportunistic corridors provided the most promise in mitigating overall impacts to the natural, human, and built environments. This is not to say any alignment segment might not have both positive and negative effects in certain areas. These potential outcomes will simply require continued consideration of these variables as the project moves forward into concept development and implementation. A sample of noteworthy findings is summarized by corridor segment below. This is not all-inclusive, and a full listing of environmental conflicts is shown in Table 5 on page 72. All numbered alternatives are shown on Map 22 on page 85.

ZONE A

A1 is very similar to A2, but A1 crosses through Goldsmith. A1 generally follows existing facilities. It has impacts of wetlands, displacements, and presents less significant improvements in accessibility. This area shows more future households, which have greater implications for potential residential displacements.

A1 and A2 have the highest number of oil and gas conflicts in this zone. A2 is very similar to A1, with the same general implications but to a lesser degree. A2 does not follow existing facilities but does connect key linkages.

A3 and A4 both include notable conflicts with existing residential development, disadvantaged communities, oil and gas conflicts, and threatened/endangered species. A3 makes less usage of existing and future planned facilities, while A4 traverses both existing alignment and planned improvments. Oil and gas conflicts are not as significant as A1/A2.

A5 shows similar benefits and impacts as A3, though with more wetland and environmental conflicts.

A6 is more favorable in terms of conflicts with the environment and vulnerable communities. It aligns with an existing facility (FM1936), conflicts with relatively fewer pieces of oil and gas infrastructure, and appears average in terms of intersection with future jobs for the purposes of economic development.

A7 and A8 both follow existing and/or planned facilities, and appear to also have an average impact on economic development as measured by future jobs. There is minimum impact on vulnerable communities.

ZONE B

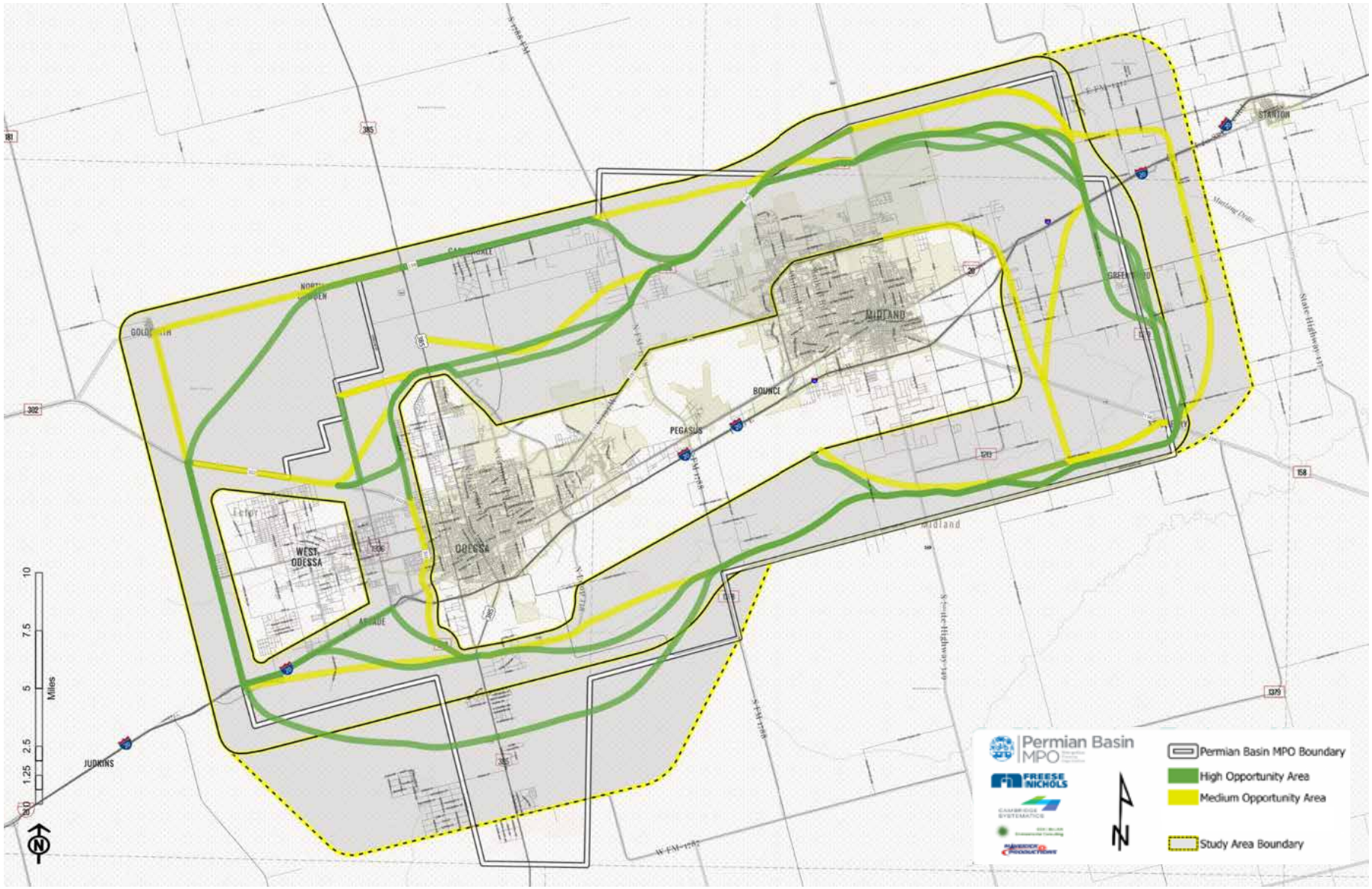
Generally, zone B does not include as many differentiators. A few key elements may affect the assessed outcome, including whether the alignment follows an existing or planned facility and how the concepts may interact with future job and residential growth. For example, its intersections with Gardendale might results in greater residential displacements. All of Zone B has wetland issues.

B1 has no major interferences with threatened and endangered species. It follows existing alignments, but not planned systems. The eastern leg of B1 is new alignment facility, which would mean further ROW acquisition. It does connect with SH349, which is a logical axis for connecting future facilities.

B2 is fully aligned with existing system roads. The analysis showed some impact to agricultural resources, but it is generally similar to B1 regarding netural and environmental resource constraints.

B3, B4, and B5 all have potential wetland conflicts and the potential to impact threatened and endangered species between SH 158 and SH 385. All of them connect with SH349, a logical axis, but B3 doesn't connect with any other logical termini. B3/B4/B5 have some potential residential conflicts near FM 1788. B4 and B5 have the added benefit of connectivity to Loop 338.

Map 21: *PEL Study Corridors of Opportunity*



ZONE C

The primary conflict in zone C which will require continued monitoring is the impact to the Greenwood school system. All alignments in zone C have minimal threatened/endangered and oil and gas infrastructure conflicts. All also have some wetland implications except C7, which aligns with County Road 1232.

C1 and C2 both minimize impacts to school buildings, with minor agricultural land conflicts. C2 aligns with the Midland thoroughfare plan, which could prove beneficial for economic development.

C3 shows the heaviest impacts to schools, with some potential residential displacements at FM 307 that other alignment concepts do not have. These school impacts are a major differentiator in this zone; C3 may also provide fewer intersections with future jobs as identified in the regional TDM. C4 is similar to C3 in most aspects.

C5 is a more neutral option in terms of environmental impacts, but would have more grave implications for demographics and displacements at FM 307. C5 would provide a slightly incongruous connection with SH 158, but at a point along 158 with no existing access opportunities. C5 has no connection to County Road 1232, and appears to show minimal benefit to regional mobility.

A numbering system error in the analysis stage meant no alignment was designated with “C6” and C7 was kept for consistency purposes. C7 connects with the existing County Road 1232, though the southern connection to SH 158 is in a similarly poor location as the C5 connection would be. Analysis showed significant residential development and potential displacements along CR 1130. Intersections with future employment for economic development are generally higher due to being closer to the urbanized area. However, C7 offers limited regional mobility benefit because of this proximity and its regional connection opportunities.

ZONE D

Generally, the concepts in Zone D promote good opportunities for connection with the south Midland system. Most alignments connect with County Road 1232 to SH 158. However, the western portion of Zone D has threatened/endangered and natural environmental impacts, largely due to the ecological benefits of Monahan’s Draw. D1 has the greatest impact on park, wetland, threatened/endangered, and archeo-historical sites. D1 crosses Monhans Draw twice and shows poor compatibility with existing residential development. D2 is mostly similar to D1 regarding environmental and social implications, with no significant differentiators. D2 also crosses the water body twice.

D3 only crosses the Draw one time and shows no archeological conflicts. It presents more positively than D1 and D2 in the area of general environmental constraints.

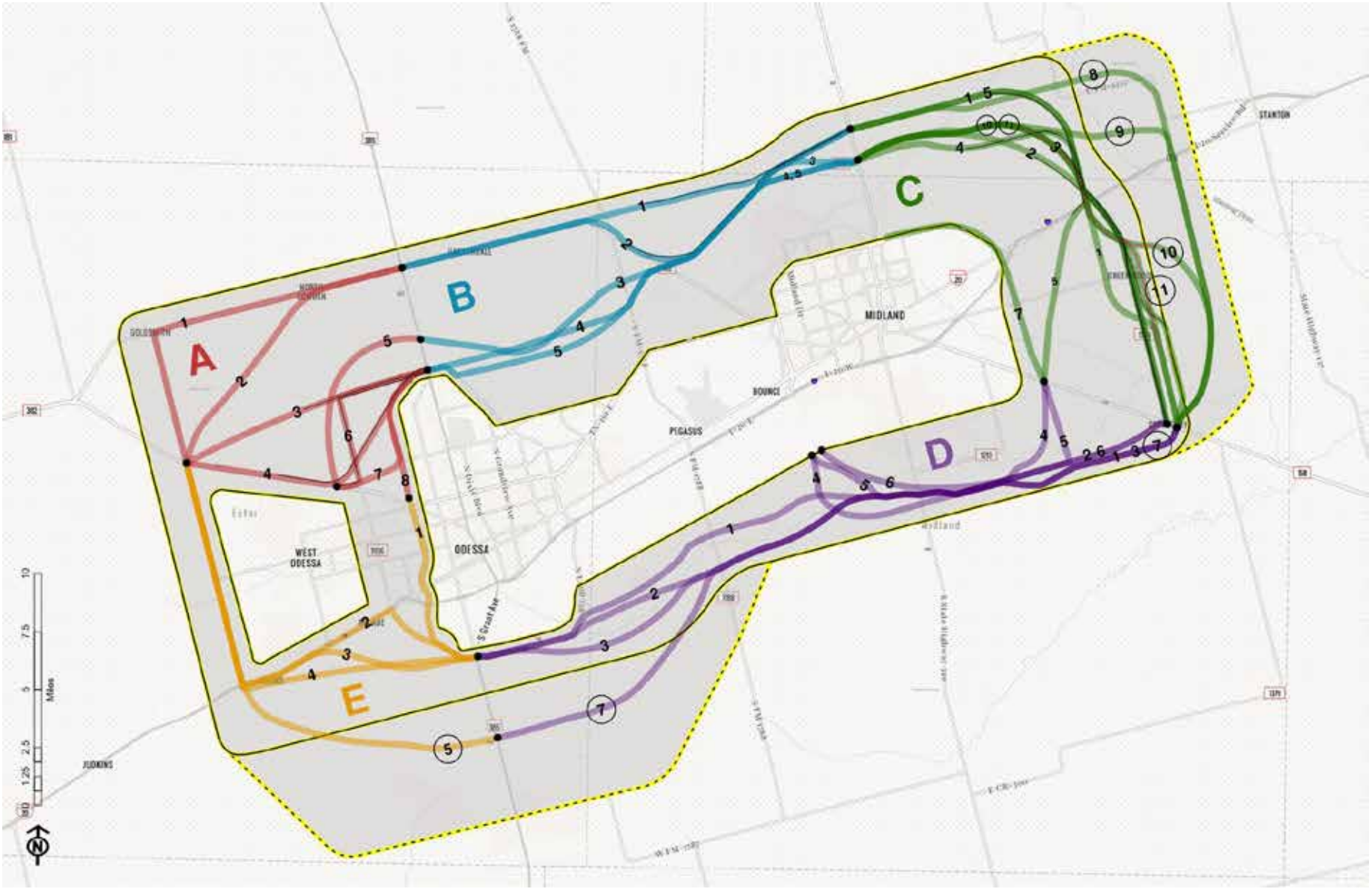
D4, D5, and D6 all connect with SH 158 at a more northern location. There are no archeological or threatened/endangered conflicts but some wetland concerns. These alternatives do not offer access to currently planned facilities and offer less benefit as they would not align with the newly acquired County Road 1232 ROW. There is low employment projected in the future in this area, which minimizes potential economic development, but nonetheless provides a connection in the system that is currently lacking.

ZONE E

The alignment concepts in Zone E generally follow existing roads and planned projects because of their proximity to IH 20 and FM 866. and compatibility with existing highway access points. All four concepts indicated potential negative impacts on vulnerable communities and existing residential development. E1 contains a threatened/endangered species conflict along SL 338. E1 and E2 may interact with oil and gas storage tanks. Other than that, the oil and gas infrastructure impact (eg. wells, pipelines) is about the same for E1, E2, E3, and E4.

E3 and E4 indicate a potential impact on the development plans for a solar farm. The northern portion of E4 may offer the benefit of a connection to a planned natural gas conversion site. E4 appears to offer the most regional mobility benefits due to its distance from the urbanized area.

Map 22: *PEL Study Numbered Corridors for Zone and Segment Analysis*



V. FUTURE WORK

V. FUTURE WORK

OPPORTUNITIES FOR CONTINUED ENGAGEMENT

In order to build on the momentum provided by this study's thorough stakeholder and engagement processes, the study team recommends that the PBMPO works next towards defining a prioritization process for moving certain segments of an interregional loop forward. There has been expressed desire by stakeholders to focus only on pieces of such a facility that would be most beneficial for the community, and establishing a process to arrive at these segments, similar to a region-wide call for projects.

The purpose established during this PEL Study process focused on developing an alternative that would address the needs and issues of the region by:

1. Providing system relief or additional traveler choice via an alternate route for movement of goods and travelers,
2. Creating safer regional movement,
3. Extending or expanding the existing network,
4. Providing an appropriate level of access to existing or anticipated economic and development activity, and
5. Providing regional connectivity and access for both Midland, Odessa; and Ector, Midland, and Martin Counties.

The MPO has the opportunity to reorganize the criteria, segmentation, or other element requiring adjustment to arrive at a prioritization scheme best suited for the path forward.

This prioritization process would provide an excellent opportunity to incorporate elements of the ongoing resilience planning efforts and to continue engaging community groups and agencies. It would also allow for a closer look at continued and future development. A growth-driven engagement process that is responsive toward new development would create a level of sustainability the MPO could use for other projects and planning principles in the future. A transportation and corridor planning process which takes a proactive approach to inevitable changes in the area will be one the MPO can continue to establish as a high standard for both planning and policy making.

Prioritization could further result in MTP amendments to allow for additional, advanced study of these corridors and any portions of an interregional loop. Informing affected agencies so that they can incorporate the concept of the interregional loop into local area and county area thoroughfare planning would be futher beneficial. The study team subsequently recommends that the MPO engage in regularly-scheduled coordination meetings with affected agencies regarding the interregional loop and other ongoing regional efforts outside of the technical advisory committee if this would be beneficial.

NEXT STEPS

NEPA & FURTHER DOCUMENTATION

Preliminary identification of multiple environmental constraints has been documented in this report. Field investigations have not been conducted to verify or supplement these assessments. The information contained in this report should be utilized to avoid and/or minimize impacts to those resources that are protected by state and/or federal regulations. For each type of environmental resource, several GIS database searches were conducted.

Note that this study is from a high-level constraints review and does not include ground truthing or other more detailed analysis that would take place for a subset of stations during the NEPA phase. Nonetheless, the environmental constraints information collected using GIS and summarized here and in the attached tables, graphics, and GIS database layers can assist with the screening process to avoid and minimize potential environmental impacts while achieving the need and purpose of specific routes or alternatives carried forward for project development and NEPA compliance.

IMPLEMENTATION

Given the resuls of the criteria screening, sensitivity analysis, and modeling process, it is clear that any future regional facility might have impacts that are direct and indirect, and may result in positive and or negative impacts to the environment. The wide areas of potential effect (1,500-foot-wide bands) in this study allow for avoidance of environmental impacts in the more detailed design phase. The MPO should monitor funding opportunities and leverage agency cooperation on existing/ongoing projects, such as IH 14 and IH 27.

The final Corridors of Opportunity represent the areas that currently show the most potential for providing a facility that may be able to most comprehensively address the mobility issues faced by the Permian Basin region. The MPO should view this as a starting point for continued evaluation and, eventually, implementation. Several variables such as availability of funding, adequate environmental documentation, continued public and stakeholder involvement, and close cooperation with ongoing projects and affiliated agencies will be key factors for future success.

APPENDICES & REFERENCES

APPENDIX A: AMENDED STUDY AREA CONCEPTUAL ALTERNATIVES

ZONE C: EAST OF MIDLAND

Historic Resources

Zone C, Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended would have low potential to affect recorded historic resources. No NRHP-listed properties or districts, previously identified NRHP-eligible properties or districts, or historical markers are in the Zone C expansion area. The historical Bankhead Highway route intersects all four alternatives; however, the segment in the Zone C expansion area was not previously identified as eligible for the NRHP.

Alternative 8 Extended would traverse four recorded archeological sites totaling approximately 24 acres. Alternative 9 Extended would travers two recorded archeological sites totaling approximately 22 acres. Alternative 10 Extended would affect one site at nine acres, while Alternative 11 Extended would not affect any recorded archeological sites. For cultural resources, Alternative 11 extended would have the most “green” and the fewest “red” constraints categories compared to other Zone C options.

Natural Environment

Water Features and Wetlands

The least impactful alternative in Zone C related to Water Features and Wetlands would be Alternative 11 Extended.

Zone C – Alternative 8 Extended would traverse six streams identified by the NHD for a total of approximately 11,648 linear feet. The NHD also identified 12 waterbodies for approximately 15 acres within the proposed project segment alternative. The NWI identified a total of 71 features, totaling approximately 200 acres of wetlands. Alternative 9 Extended would traverse five streams totaling approximately 10,945 linear feet. Fourteen waterbodies, totaling approximately 13 acres were identified within the proposed project segment alternative. The NWI identified 56 features, totaling approximately 164 acres of wetlands. Alternative 10 Extended would traverse three streams totaling approximately 5,952 linear feet. Twenty-two waterbodies, totaling approximately 29 acres were identified within the proposed project segment alternative. The NWI identified 55 features, totaling approximately 129 acres of wetlands. Alternative 11 Extended would traverse three streams totaling approximately 6,028 linear feet. Fourteen waterbodies, totaling approximately 22 acres were identified within the proposed project segment alternative. The NWI identified 28 features, totaling approximately 48 acres of wetlands.

Threatened and Endangered Species

A review of the TxNDD identified two species within Zone C Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended. The two identified species include the Plateau spot-tailed earless lizard (Holbrookia lacerate) and the Cory’s ephedra (Ephedra coryi).

Zone C – Alternative 8 Extended would traverse one TxNDD habitat polygon for approximately 638 acres while Alternative 9 Extended would travers one polygon over 444 acres. Alternative 10 Extended and Alternative 11 Extended would not cross any TxNDD polygons. Alternatives 8 and 9 Extended would traverse more TxNDD habitat polygon acreage than all other alternatives including the original alternatives 1 through 7.

Parklands and Conservation Areas

Zone C Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended contain no cemeteries or park areas. Zone C - Alternative 8 Extended contains approximately 44 acres of floodplains; Alternative 9 Extended contains 49 acres of floodplains; Alternative 10 Extended contains 56 acres of floodplain; and Alternative 11 Extended contains 95 acres of floodplain.

Hazardous Waste

Zone C Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended contains no PSTs, LPSTs, or IHWCA sites. Zone C Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended would be considered positive impacts for the project based on the Need and Purpose. There are two PSTs in Alternative 7 and one PST in Alternative 4. Known hazardous waste considerations would not pose a barrier to advancing any of these corridors based on data obtained to date.

Agriculture

Zone C Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended would be considered negative impacts for the project based on the Need and Purpose. Zone C - Alternatives 8 Extended would traverse six center pivot farms totaling approximately 113 acres with approximately 285 acres of Prime Farmland/Farmland of Statewide Importance, 9 Extended would traverse three center pivot farms totaling approximately 15 acres with approximately 168 acres of Prime Farmland/Farmland of Statewide Importance, 10 Extended would traverse six center pivot farms totaling approximately 36 acres with approximately 159 acres of Prime Farmland/ Farmland of Statewide Importance, and 11 Extended would traverse two center pivot farms totaling approximately 165 acres with approximately 181 acres of Prime Farmland/ Farmland of Statewide Importance.

Social Environment

Community Facilities and Sensitive Receptors

Alternatives 8 Extended, 9 Extended, 10 Extended, and 11 Extended contain no identified community facilities or sensitive receptors. There are no risks of impacts to community facilities or sensitive receptors for all routes in the Zone C extension area, based on remotely collected data at the current scale of analysis.

Environmental Justice, Vulnerable Populations, and Effects Across Income Levels

Zone C extension area would potentially impact six block groups with 50 percent or more minority populations. Of the six block groups, one would be traversed by Alternative 8 Extended, one would be traversed by Alternative 9 Extended, two would be traversed by Alternative 10 Extended, and two would be traversed by Alternative 11 Extended.

Alternatives 8 and 9 Extended would result in the fewest potential impacts to EJ and vulnerable populations based on the current level of analysis. The original Alternative 7 options would result in the greatest potential adverse impacts compared to all other options for these resources.

ZONE D: SOUTH OF MIDLAND

Alternative 7 Extended would have low potential to impact known places of worship, hazardous materials, or recorded historic or archeological resources. It would have a medium potential to affect some prime farmland and a center pivot. It would have high potential to adversely impact block groups with minority population greater than 50 percent, based on existing census data at this geographic level. There are two known habitat polygons totaling 1,728 acres that could be encountered by this option. There is high potential for adverse impacts to floodplains, water bodies and NWI wetlands. This alternative appears to be preferable to Alternatives 1-4 in Zone D, and when compared to Alternatives 5 and 6, impacts would be of equivalent intensity with the exception of potential impacts to TxNDD habitat being higher for Alternative 7 Extended.

ZONE E: SOUTH OF ODESSA

Alternative 5 Extended would have low potential to impact known places of worship, parks/open space/floodplains, agricultural resource or threatened/endangered species or species of concern. This option would have moderate potential to affect hazardous materials and recorded archeological resources. It would have high potential to adversely impact block groups with minority population greater than 50 percent, based on existing census data at this geographic level. There is high potential for adverse impacts to water bodies and NWI wetlands. This alternative appears to be preferable to Alternatives 1, 2, and 4 in Zone E, and when compared to Alternative 3, impacts would be of equivalent intensity.

APPENDIX B: ENVIRONMENTAL RESOURCE SUPPLEMENTAL INFORMATION

Section 404 of the Clean Water Act (CWA) gives the USACE authority to regulate the discharge of dredged or fill material into Waters of the U.S., including wetlands. Impacts to Waters of the U.S. could require USACE authorization. If a linear transportation project places less than 0.5-acre of fill (permanent impact) into Waters of the U.S., it would typically be authorized under NWP #14, Linear Transportation Projects; permanent impacts of 0.5-acre or more require an IP. Permanent impacts authorized under NWP #14 which exceed 0.1-acre require a Pre-Construction Notification (PCN) to the USACE and mitigation; permanent impacts to special aquatic sites, including wetlands (of any amount) would also require a PCN and mitigation. NWP #14 authorizes temporary impacts, e.g., temporary structures, fills, and work necessary to construct the linear transportation project.

Executive Order 11990 Protection of Wetlands (issued in 1977) requires federal agencies to minimize the destruction or modification of wetlands. Wetlands are defined by the USACE as areas which, due to a combination of hydrologic and soil conditions, can support hydrophytic vegetation. If wetlands are located within the project corridor, all practicable efforts should be taken to avoid impacts to wetlands. Should impacts to wetlands be unavoidable, then minimization and replacement of impacted wetlands functions should be mitigated for within the watershed.

Executive Order 11988 Floodplain Management (issued 1977) requires federal agencies that have determined to, or propose to, conduct, support, or allow an action to be in a floodplain consider alternatives to avoid adverse effects and incompatible development in the floodplain. If a federal agency determines that the only practicable alternative requires siting in a floodplain, the agency must design or modify its action to minimize potential harm to the floodplain and prepare and circulate a notice containing an explanation of why the action is proposed to be in the floodplain.

The United States Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) Permit Program, authorized by the 1972 CWA, controls water pollution by regulating point sources that discharge pollutants into Waters of the U.S. In Texas, the NPDES program is administered by the Texas Commission on Environmental Quality (TCEQ), as part of the Texas Pollutant Discharge Elimination System (TPDES). The CWA established the basic structure for regulating discharges of pollutants into the Waters of the U.S. a NPDES permit may be required if wastewater is discharged into the stormwater system. Since TPDES construction general permit (CGP) authorization and compliance, along with the associated documentation, would occur outside of the environmental clearance process, compliance is ensured by the policies and procedures that govern the design and construction phases of the project.

The Project Development Process Manual and the Plans, Specifications, and Estimates (PS&E) Preparation Manual require a storm water pollution prevention plan (SWP3) be included in the plans of all projects that disturb one or more acres. The Construction Contract Administration Manual requires that the appropriate CGP authorization documents (notice of intent (NOI) or site notice) be completed, posted, and submitted, when required by the CGP, to TCEQ and the municipal separate storm sewer system (MS4) operator. It also requires that projects be inspected to ensure compliance with the CGP.

Environmental Resource References

Hardy, Heck, Moore, Inc. 2014. *Bankhead Highway Historic Resources Survey.* Austin: Texas Historical Commission.

U.S. Census Bureau. 2010. Decennial 2010 Census Redistricting Data. *https://data.census.gov.*

U.S. Census Bureau. 2015-2019 American Community 5-Year Estimates. *https://data.census.gov.*

U.S. Department of Transportation (USDOT). 2021. Department of Transportation Updated Environmental Justice Order 5610.2(C). *https://www.transportation.gov/sites/dot.gov/files/Final-for-OST-C-210312-003-signed.pdf.*

GLOSSARY

Antiquities Code of Texas (ACT): The Antiquities Code of Texas was enacted in 1969 to protect archeological sites and historic buildings on public land. The code requires state agencies and political subdivisions of the state including cities, counties, river authorities, municipal utility districts, and school districts to notify the Texas Historical Commission of ground disturbing activity on public land and work affecting state-owned historic buildings.

Arterial Road: Arterial roads in the United States are high-capacity urban roads that move traffic from collector roads to even busier roads, such as freeways or interstates.

Clean Water Act (CWA): The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the CWA, EPA has implemented pollution control programs such as setting wastewater standards for industry. EPA has also developed national water quality criteria recommendations for pollutants in surface waters.

Corridors: Corridors are linear pathways that connect places and allow for the movement of people, goods, or wildlife. They often center around transportation infrastructure such as streets, highways, and public transit, but can also center around historic sites, habitats, rivers, or other natural features.

Dredged Material: Dredged material is material excavated at or below the ordinary high-water level of water basins, watercourses, public waters, or wetlands. Dredged material can affect the environment. Carriage water and hydrostatic water from hydraulic or mechanical dredging processes, and stormwater runoff from sites where dredged material is stored or managed, can cause harm if it reaches surface water or groundwater.

Ephemeral Stream: A stream or part of a stream that flows only in direct response to precipitation; it receives little or no water from springs, melting snow, or other sources; its channel is at all times above the water table.

Executive Order 11988 Floodplain Management: Issued in 1977, this Executive Order directs Federal Agencies to assert leadership in reducing flood losses and losses to environmental values served by floodplains, avoid actions located in or adversely affecting floodplains unless there is no practicable alternatives, take action to mitigate losses if avoidance is not practicable and establishes a process for flood hazard evaluation based upon the 100-year base flood standard of the National Flood Insurance Program.

Executive Order 11990 Protection of Wetlands: Issued in 1977, the purpose of this Executive Order is to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. To meet these objectives, the order requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided.

Hydrophytic Vegetation: Wetland plants or hydrophytic vegetation, are plants which have adapted to growing in the low-oxygen (anaerobic) conditions associated with prolonged saturation or flooding.

Industrial and Hazardous Waste Corrective Action (IHWCA) site: A site where soil, ground water, surface water or air have become contaminated from industrial hazardous waste, municipal hazardous waste, or industrial nonhazardous waste and is in the process of clean-up.

Intermittent Stream: A stream that flows only when it receives water from rainfall runoff or springs, or from some surface source such as melting snow.

Metropolitan Planning Organization (MPO): A MPO is the policy board of an organization created and designated to carry out the metropolitan transportation planning process. MPOs are required to represent localities in all urbanized areas with populations over 50,000, as determined by the U.S. Census.

National Emergency Management Policy Act (NEPA): The NEPA was signed into law on January 1, 1970. NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. The range of actions covered by NEPA is broad and includes: making decisions on permit applications, adopting federal land management actions, and constructing highways and other publicly-owned facilities. Using the NEPA process, agencies evaluate the environmental and related social and economic effects of their proposed actions. Agencies also provide opportunities for public review and comment on those evaluations.

National Historic Preservation Act of 1966 (NHPA): The NHPA was signed into law in October 1966. It establishes a national preservation program and a system of procedural protections, which encourage both the identification and protection of historic resources, including archeological resources, at the federal level and indirectly at the state and local level. NHPA represents the most extensive preservation legislation ever enacted in the U.S.

NHD Flowline: NHD flowline is the fundamental flow network consisting predominantly of stream/river and artificial path vector features. It represents the spatial geometry, carries the attributes, and contains linear referencing measures for locating features or "events" on the network. Additional NHD flowline features are canal/ditch, pipeline, connector, underground conduit, and coastline.

Passenger Vehicle Level of Service (LOS): LOS is a term used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay, and safety. The level of service of a facility is designated with a letter, A to F, with A representing the best operating conditions and F the worst. It is based on the density of vehicles, expressed in passenger cars per mile per lane on freeway segments.

Perennial Stream: A stream that normally has water in its channel at all times.

Planning and Environmental Linkage (PEL) Study: A PEL is a study process approach that is typically used to identify transportation issues, along with environmental concerns, in a corridor or a specific location. It is generally conducted before any project construction phasing is identified, and before specific problems and solutions are known. PEL studies can be used to make planning decisions and for planning analysis. PEL studies should be able to link planning to environmental issues and result in useful information that can be carried forward into the NEPA process.

River & Harbors Act of 1899 (RHA): The RHA is the initial authority for the U.S. Army Corps of Engineers regulatory permit program to protect navigable waters in the development of harbors and other construction and excavation. Section 10 of the RHA prohibits the unauthorized obstruction or alteration of any navigable water of the U.S.

Superfund Site: A site which, due to hazardous waste being dumped, left out in the open, or otherwise improperly managed, is in the process of decontamination by the EPA. The parties responsible for the contamination either perform the cleanups or reimburse the government for EPA-led cleanup work.

Texas Commission on Environmental Quality (TCEQ): The TCEQ was created by the Texas Legislature in 1991, after the combining of the Texas Water Commission and Texas Air Control Board. The agency focuses on promoting clean air and water and the safe management of waste in Texas. It also serves as a watchdog for the protection of the state's natural resources.

Texas Historic Commission: The agency was established in 1953 with the task of identifying important historic sites across the state. The agency's mission is to: protect and preserve the state's historic and prehistoric resources for the use, education, enjoyment, and economic benefit of present and future generations.

Texas Railroad Commission: The Texas Railroad Commission is a state executive agency in the Texas state government. It is the state agency with primary regulatory jurisdiction over the oil and natural gas industry, pipeline transporters, natural gas and hazardous liquid pipeline industry, natural gas utilities, the LP-gas industry, critical natural gas infrastructure, and coal and uranium surface mining operations.

Travel Demand Modeling (TDM): A TDM is a tool to support the urban transportation planning process. It is a series of analytical techniques used to predict future demand for transportation facilities and services and estimates the impacts of policies and programs on behavior and travel demand. A TDM can predict how changes in size and character of the population will impact the transportation system in the future.

References

About the Railroad Commission of Texas. (n.d.). *https://www.rrc.texas.gov/about-us/*

Corridor planning. (n.d.). American Planning Association. *https://planning.org/publications/document/9159816/*

Descriptions of all policies. (2022, March 25). FEMA.gov. *https://www.fema.gov/emergency-managers/practitioners/environmental-historic/laws/descriptions#11990*

Dredged materials management | Minnesota Pollution Control Agency. (n.d.). Minnesota Pollution Control Agency. *https://www.pca.state.mn.us/business-with-us/dredged-materials-management*

Executive Order 11988 Floodplain Management. (2021, October 20). FEMA.gov. *https://www.fema.gov/glossary/executive-order-11988-floodplain-management*

Hydrophytic Vegetation | Department of Environmental Conservation. (n.d.). *https://dec.vermont.gov/watershed/wetlands/what/id/hydrophytes*

Industrial and hazardous waste cleanups. (n.d.). Texas Commission on Environmental Quality. *https://www.tceq.texas.gov/remediation/corrective_action*

Metropolitan Planning Organization (MPO). (n.d.). FTA. *https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/metropolitan-planning-organization-mpo*

National Historic Preservation Act of 1966 - Archeology (U.S. National Park Service). (n.d.). *https://www.nps.gov/subjects/archeology/national-historic-preservation-act.htm*

National Hydrography Dataset | U.S. Geological Survey. (n.d.). *https://www.usgs.gov/national-hydrography/national-hydrography-dataset*

Summary of the Clean Water Act | US EPA. (2023, June 22). US EPA. *https://www.epa.gov/laws-regulations/summary-clean-water-act*

Texas Historical Commission. (n.d.-a). About us | THC.Texas.gov - Texas Historical Commission about the Texas Historical Commission. *https://www.thc.texas.gov/landing/about-us*

Texas Historical Commission. (n.d.). Antiquities Code of Texas | THC.Texas.gov - Texas Historical Commission. *https://www.thc.texas.gov/project-review/antiquities-code-texas*

Transportation Planning and Programming: Travel Demand Modeling. (n.d.). *http://onlinemanuals.txdot.gov/txdotmanuals/tpp/tdm.htm*

U.S. Roads | DMV.ORG. (n.d.). DMV.ORG. *https://www.dmv.org/travel/us-roads.php*

Water resources glossaries. (n.d.). *https://water.usgs.gov/water-basics_glossary.html*

What is Planning and Environmental Linkages (PEL)? (n.d.). Colorado Department of Transportation. *https://www.codot.gov/projects/studies/study-archives/us6cliftonstudy/what-is-pel.html*

What is Superfund? | US EPA. (2022, November 1). US EPA. *https://www.epa.gov/superfund/what-superfund*

What is the National Environmental Policy Act? | US EPA. (2022, October 26). US EPA. *https://www.epa.gov/nepa/what-national-environmental-policy-act*

What Is The Texas Commission on Environmental Quality? (n.d.). State Impact Texas. *https://stateimpact.npr.org/texas/tag/tceq/*