Appendix G

Natural Ecological Systems and Wildlife Technical Study

Natural Ecological Systems and Wildlife

Technical Study

Texas Department of Transportation

U.S. Department of Transportation
Federal Railroad Administration

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Abbreviations and Acronyms

BMP	best management practice
CWA	Clean Water Act
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FRA	Federal Railroad Administration
HrSR	higher-speed rail
HSR	high-speed rail
IH	Interstate Highway
KCS	Kansas City Southern
mph	miles per hour
MRLC	Multi-Resolution Land Characteristics
NEPA	National Environmental Policy Act
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
ODWC	Oklahoma Department of Wildlife Conservation
Program	Texas-Oklahoma Passenger Rail Program
REAP	Regional Ecological Assessment Protocol
Study	Texas-Oklahoma Passenger Rail Study
TPWD	Texas Parks and Wildlife Department
TRE	Trinity Railway Express
TxDOT	Texas Department of Transportation
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

The Texas Department of Transportation (TxDOT), along with the Federal Railroad Administration (FRA), is preparing a service-level environmental impact statement (EIS) to evaluate intercity passenger rail service alternatives for the Texas-Oklahoma Passenger Rail Program (Program). The purpose of the Program is to enhance intercity mobility by providing enhanced passenger rail service as a transportation alternative that is competitive with automobile, bus, and air travel. Preparation of the service-level EIS, in support of which this technical study has been prepared, is one of two primary objectives of the Texas-Oklahoma Passenger Rail Study (Study). In addition to the service-level EIS, TxDOT and FRA are preparing a service development plan for the corridor to guide further development and capital investment in passenger rail improvements identified in the EIS Record of Decision. The Oklahoma Department of Transportation is a partnering state agency for the Study and the EIS.

The 850-mile corridor analyzed for the Study runs north-south and roughly parallels Interstate Highway (IH)-35, with the northern point in Edmond, Oklahoma (i.e., northern end of the Oklahoma City portion of the corridor), and the southern end in south Texas, potentially in Corpus Christi, Brownsville, Laredo, or the Rio Grande Valley, as shown on Figure 1-1. For this service-level analysis, a preliminary alignment was developed to represent each EIS alternative, based on conceptual engineering that considered and avoided obvious physical or environmental constraints. These alignments were not refined to optimize performance, reduce cost, avoid specific properties or individual environmental resources, or for any other such considerations. If an alternative is selected at the service-level for further development, the above considerations would be assessed at the project level. A broad corridor of study with a width of 500 feet has been identified along each route (EIS Study Area). This EIS Study Area provides an envelope that could accommodate areas for associated effects, including necessary roadway shifts, grade separations, construction activities, and affiliated features such as stations and parking, traction-power substations, power lines, and maintenance-of-way facilities. The area for which data were collected is identified as the Study Vicinity. Typically, county-wide data were collected for counties partially or completely within the Study Area.

The analysis provides quantitative information about natural ecological systems and wildlife within the EIS Study Area for each alternative and compares it against the No Build Alternative and other build alternatives in the same geographic region. The discussion of effects also provides qualitative differences in permanent, temporary, and direct and indirect effects that are associated with the service type (conventional rail, higher-speed rail, or high-speed rail) relative to the environmental context. However, because the 500-foot EIS Study Area does not represent the actual footprint of operation or construction phases, the analysis is primarily comparative, based on the presence of the resource within the EIS Study Area and the likelihood of effects as appropriate for this service-level analysis.

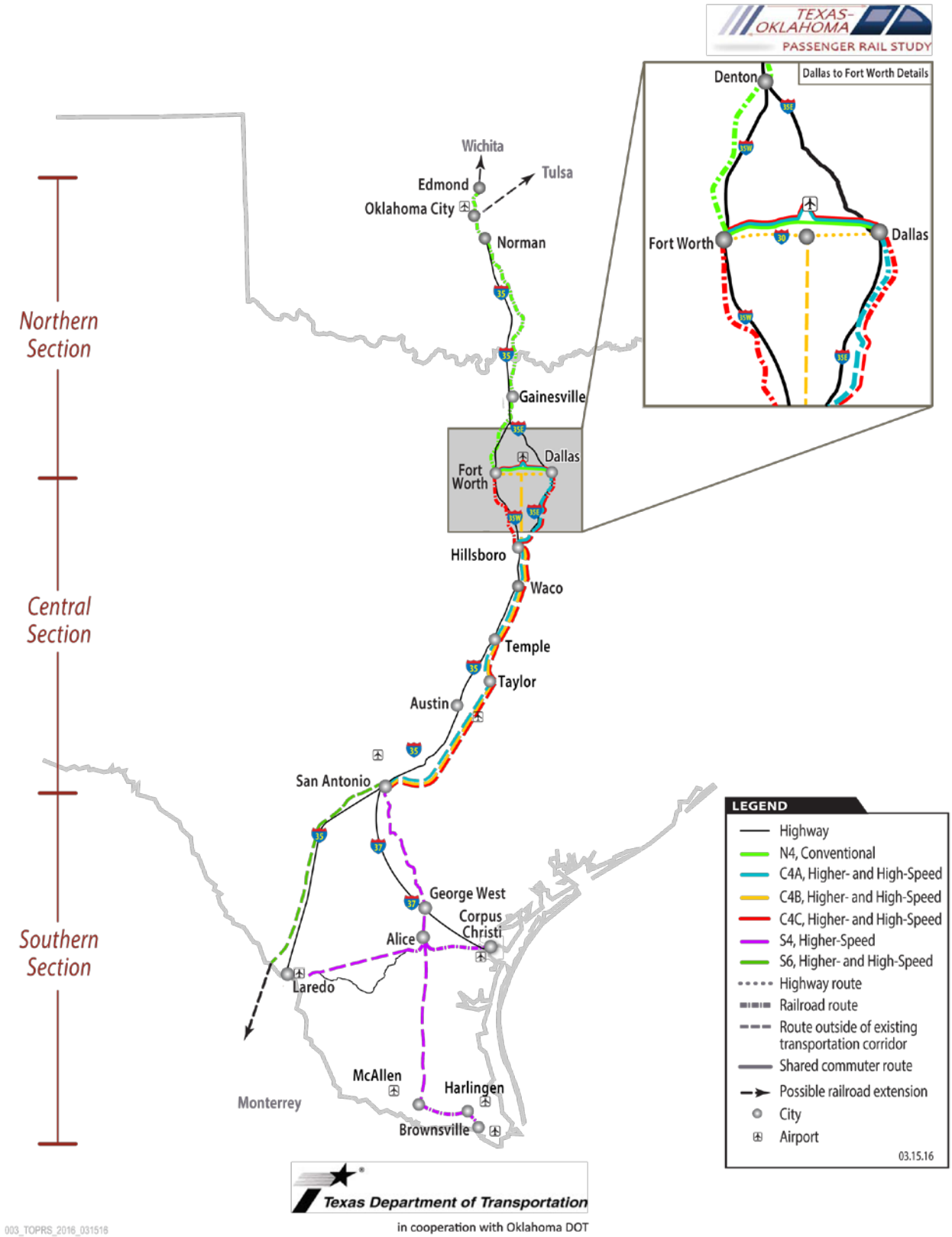


Figure 1-1: Build Alternatives

The build alternatives are divided into the following three geographic sections based on the key regional markets that could be served by passenger rail improvements:

- Northern Section: Oklahoma City to Dallas and Fort Worth
- Central Section: Dallas and Fort Worth to San Antonio
- Southern Section: San Antonio to South Texas

In addition, the alternatives consist of both a route, which refers to the specific corridor that a potential alignment follows, and a service type, which refers to the speed or category of rail transportation (conventional rail, higher-speed rail, or high-speed rail). The alternatives that have been carried forward for analysis in the EIS, including their geographic sections, routes, and service types, are listed in Table 1-1.

Table 1-1: Alternatives Carried Forward for Further Evaluation

Route	Service Type[a]
Northern Section	
N4A	CONV
Central Section	
C4A	HrSR
	HSR
C4B	HrSR
	HSR
C4C	HrSR
	HSR
Southern Section	
S4	HrSR
S6	HrSR
	HSR

[a] CONV = conventional rail (up to 79 to 90 mile per hour [mph]); HrSR = higher-speed rail (up to 110 to 125 mph); HSR = high-speed rail (up to 220 to 250 mph)

The route alternatives were based on the alignments of existing transportation networks with corridors potentially suitable for passenger rail operations (i.e., the existing railroad network and the existing interstate highway network) (the term “operations” includes maintenance of the facilities as well), or they were located on new alignments outside existing transportation corridors. Potential alignments described as “following” railway corridors share existing tracks, are located within an existing right-of-way, or are generally adjacent to existing tracks, depending on the service type. Alternatives that are outside the existing transportation corridor could have greater indirect effects than those located in the existing transportation corridor; for example, alternatives outside

existing corridors could divide neighborhoods or wildlife communities or create a potential new barrier.

1.1 Service Type Descriptions

The three service types (conventional rail, higher-speed rail, and high-speed rail) considered in this EIS are described below.

1.1.1 Conventional Rail

Conventional rail typically includes diesel-powered, steel-wheeled trains operating on steel tracks. Roadway crossings may be grade-separated depending on the type of roadway and amount of traffic, and rail rights-of-way may be fenced. Conventional rail would be operated at speeds up to 79 to 90 miles per hour (mph) and would mostly use existing railroad rights-of-way. For conventional rail alternatives, existing railroad track may be used, or in some cases, modifications such as double-tracking could be constructed within the existing right-of-way to accommodate additional trains.

1.1.2 Higher-Speed Rail

Higher-speed rail is similar to conventional rail in several respects. In many cases, higher-speed rail trains can run on the same steel tracks that support conventional rail, but higher speeds can require improvements such as upgrading wooden ties with concrete ties, improving signaling, and upgrading roadway crossings. In this case, higher-speed rail trains are assumed to be diesel-powered. Higher-speed rail would be operated at speeds up to 110 to 125 mph. Where proposed within an existing railroad right-of-way, a shared right-of-way with separate tracks for freight and passenger services would be constructed. Because of its maximum speed and because train frequency would be similar to conventional rail, higher-speed rail could operate on a single track with passing locations and would not require double-tracking. Where higher-speed rail is proposed outside an existing transportation corridor, the new alignment would be designed with curves and other features that could accommodate high-speed rail service if warranted by ridership and economic feasibility in the future. However, unlike high-speed rail, the design would not include electrification or a full double track, and some at-grade crossings would remain.

1.1.3 High-Speed Rail

High-speed rail includes electric trains powered by an overhead power supply system. Train sets are steel wheel on steel rail, but are designed to operate at high speeds with an aerodynamic shape, and suspension and braking systems are designed for high-speed travel. High-speed rail would be operated at speeds up to 220 to 250 mph. The entire right-of-way would be fenced and fully grade-separated. The alignment would be electrified and double-tracked. This service type could only reach its maximum speeds outside existing transportation corridors because existing railroad alignments are not compatible with the speeds required and they do not have the required space

for separation of freight and high-speed rail. In areas where this service type is within existing transportation corridors, it would operate at lower speeds.

1.2 Alternative Descriptions

For this service-level analysis, a preliminary alignment was developed to represent each route alternative, based on conceptual engineering that considered obvious physical or environmental constraints. They are not detailed alignments that have been refined to optimize performance, reduce cost, avoid specific properties or individual environmental resources, or similar considerations, which would be assessed at the project-level phase for alternatives carried forward for further analysis.

The alternatives evaluated in the service-level EIS, shown on Figure 1-1, have been developed to a level of detail appropriate for a service-level analysis: the route alternatives represent a potential corridor where rail improvements could be implemented but do not specify the precise location of the track alignment. When a route alternative is refined to include a service type (conventional, higher-speed, or high-speed rail), it is then referred to as an alternative. Alternatives in the Northern, Central, and Southern sections could be built as individual, stand-alone projects or in combination with alternatives in another section. In addition, more than one alternative in the Central Section and Southern Section could be built in the future because the alternatives provide different service types for independent destinations. Details on connecting the alternatives would be determined during project-level studies.

Potential alignments are described below in terms of nearby transportation corridors and cities.

The Southern Section alternatives include a potential extension to Monterrey, Mexico. The EIS evaluates alignment corridors only within the United States; however, the potential extension to Monterrey has been included for ridership analysis purposes, and FRA and TxDOT have initiated coordination with the Mexican government about the potential extension.

1.2.1 No Build Alternative

The No Build Alternative would not fulfill the Program's purpose and need but is carried forward as a baseline alternative against which the build alternatives are compared. The No Build Alternative would consist of the existing transportation network, including roadway, passenger rail, and air travel in the Study Vicinity as well as maintenance and committed improvements to these systems. The No Build Alternative includes existing and planned roadway, passenger rail, and air travel in the Study Vicinity (including operation, maintenance, and expansion). Information was collected from current regional transportation plans within the Study Vicinity and websites describing services such as train schedules. These improvements and their evaluation at this service-level stage would require project-specific assessment. Conducting detailed project-specific assessments at this stage of the program development process is not feasible, except from a cumulative analysis perspective as included in the service-level EIS.

1.2.2 Northern Section: Oklahoma City to Dallas and Fort Worth

Due to feasibility based on initial ridership and cost information, only one route alternative with one service type was considered feasible in the Northern Section: Alternative N4A with conventional rail.

1.2.2.1 Alternative N4A Conventional Rail

Alternative N4A would begin in Edmond, Oklahoma, and follow the BNSF rail alignment south to Oklahoma City. The alternative would continue south along the BNSF rail alignment to Norman, Oklahoma; through Metro Junction, near Denton, Texas; and on to Fort Worth (as does the Heartland Flyer). From Fort Worth, the alternative would continue east to Dallas following the Trinity Railway Express (TRE) tracks. From Edmond to Dallas, the route would be approximately 260 miles long. Because existing freight traffic would not preclude passenger service along this section of track, the route would provide passenger rail service on the existing BNSF track, with potential improvements within the existing BNSF right-of-way.

Alternative N4A would provide several improvements over the existing Heartland Flyer service. Alternative N4A would increase the number of daily round trips along this route (the Heartland Flyer currently offers one round trip per day), and the N4A route would extend from Fort Worth to Dallas without requiring a transfer (the Heartland Flyer service currently terminates in Fort Worth). In addition, Alternative N4A would provide improvements to existing station facilities and new train equipment with more onboard amenities, including business class available for a premium price.

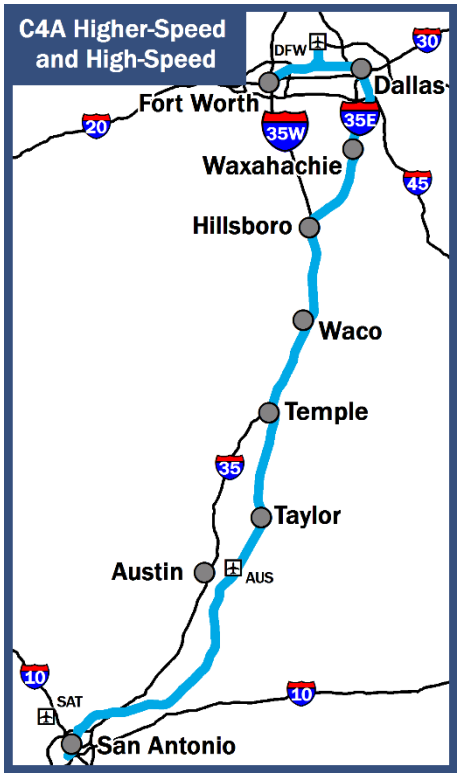
Alternative N4A assumes diesel-locomotive hauled equipment running three to six daily round trips. Two or three of the round trips would operate on an accelerated schedule, making roughly seven stops, with the remaining local trains making up to 12 stops.

1.2.3 Central Section: Dallas and Fort Worth to San Antonio

Three route alternatives, each with higher-speed and high-speed rail options, were evaluated in the Central Section: Alternatives C4A, C4B, and C4C.

The Central Section alternatives would provide several improvements over the existing Texas Eagle service in this corridor. All of the alternatives would increase the number of daily round trips along this route (the Texas Eagle currently offers one round trip per day). The high-speed rail options would provide faster service between Dallas and Fort Worth and Antonio – 2 hours versus 8 hours for the Texas Eagle Service. In addition, the Central Section alternatives would provide improvements to existing station facilities and new train equipment.

1.2.3.1 Alternative C4A Higher-Speed and High-Speed Rail

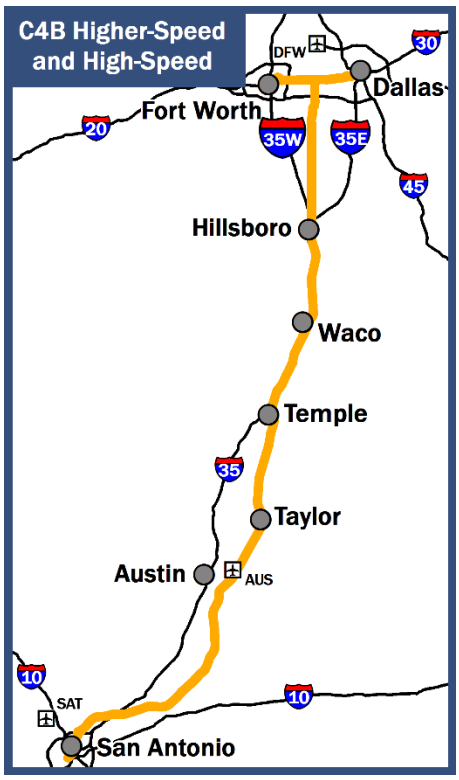


Alternative C4A would begin in Fort Worth and follow the TRE tracks east to Dallas. From Dallas, it would follow the BNSF alignment south toward Waxahachie where it would enter a new alignment outside existing highway and rail corridors to accommodate maximum operating speeds. Though outside existing transportation corridors, the southern portion of Alternative C4A would generally follow the BNSF alignment for about 250 miles, traveling south from Waxahachie through Hillsboro, Waco, Temple, Taylor, and Austin to San Antonio.

Alternative C4A Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running six to 12 daily round trips. Express trains would likely make seven stops, and local trains would make up to 12 stops.

Alternative C4A High-Speed Rail assumes true electric-powered, high-speed service running 12 to 20 daily round trips. Express trains would likely make six stops, and local trains would make up to nine stops.

1.2.3.2 Alternative C4B Higher-Speed and High-Speed Rail

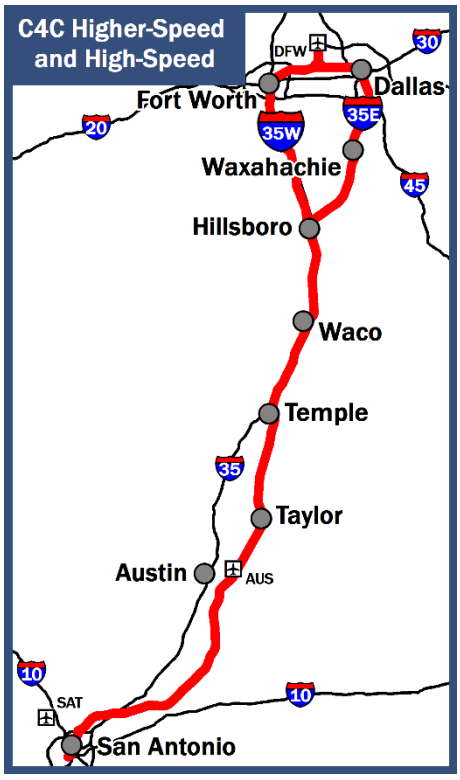


Alternative C4B would serve both Fort Worth and Dallas, with trains following a new elevated high-speed rail alignment over IH-30. In Arlington (between Dallas and Fort Worth), the alternative would turn south to Hillsboro on an alignment outside existing transportation corridors. The alternative would then follow the same high-speed rail alignment as Alternative C4A from Hillsboro to San Antonio.

Alternative C4B Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running six to 12 daily round trips. Express trains would likely make seven stops, and local trains would make up to 12 stops.

Alternative C4B High-Speed Rail assumes true electric-powered, high-speed service running 12 to 20 daily round trips. Express trains would likely make six stops, and local trains would make up to eight stops.

1.2.3.3 Alternative C4C Higher-Speed and High-Speed Rail



Alternative C4C would follow the same potential alignment as Alternative C4A from Fort Worth east to Dallas and south to San Antonio, but would include a link from Hillsboro directly to Fort Worth parallel to the UPRR alignment. Service on the Alternative C4C route would operate in a clockwise direction, running from Hillsboro to Fort Worth, to Dallas, back to Hillsboro, and south to San Antonio in order to serve Fort Worth directly (while also being compatible with the general service for Alternative C4A).

Alternative C4C Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running six to 12 daily round trips. Express trains would likely make seven stops, and local trains would make up to 12 stops.

Alternative C4C High-Speed Rail assumes true electric-powered high-speed service running 12 to 20 daily round trips. Express trains would likely make six stops, and local trains would make up to nine stops.

1.2.4 Southern Section: San Antonio to South Texas

Two route alternatives were evaluated in the Southern Section: Alternative S4, with higher-speed rail, and Alternative S6, with higher-speed and high-speed rail options.

1.2.4.1 Alternative S4 Higher-Speed Rail

Alternative S4 would begin in San Antonio and travel southeast along the UPRR alignment to George West, where it would continue outside existing transportation corridors to Alice. At Alice, the alternative would divide into three legs at a stop. The first leg would travel west along the Kansas City Southern (KCS) Railway to San Diego, Texas; it would then travel outside existing transportation corridors to east of Laredo in an alignment that would allow higher speeds and rejoin the KCS Railway to enter the highly developed Laredo area. The second leg would travel south along abandoned railroad tracks to McAllen and east to Harlingen and Brownsville. The third leg would travel east along the KCS Railway to Corpus Christi.

Alternative S4 assumes new high-performance diesel-locomotive hauled equipment running four to six daily round trips. Depending on corridor demand model forecasts, the primary service may be designated as Laredo-Alice-San Antonio and Corpus Christie-Alice-San Antonio, with a connecting feeder from Brownsville, Harlingen, and McAllen.

1.2.4.2 Alternative S6 Higher-Speed and High-Speed Rail

Alternative S6 would begin in San Antonio and travel south on a new alignment outside existing transportation corridors to a station near the Laredo-Columbia Solidarity Bridge, which crosses the Rio Grande north of Laredo. The alternative would then cross on a new railway bridge to join a new rail line being constructed in Mexico, which would continue to Monterrey. This study only examines the physical effects of the U.S. component of this new line, but it does consider the ridership effect of such a connection.

Alternative S6 Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running four to six daily round trips between San Antonio and Laredo, which would be the only U.S. stops for the alternative. If an extension from Laredo to

Monterrey is added, the frequency of trips to Monterrey is assumed to be the same as those from San Antonio to Laredo.

Alternative S6 High-Speed Rail assumes true electric-powered, high-speed service running eight to 12 daily round trips between San Antonio and Laredo. If an extension from Laredo to Monterrey is added, the frequency of trips to Monterrey is assumed to be the same as those from San Antonio to Laredo.

1.2.5 Station Cities

The study does not evaluate specific station locations, and no conclusion about the exact location of stations will be made as part of the service-level EIS process. However, based on ridership data and transit connectivity information developed as part of the alternatives analysis (TxDOT 2014), and based on stakeholder input, the cities in which stations would most likely be located have been assumed. The size and design of stations would be appropriate for the service type and the route of the alternative. Cities that could have stations are listed in Table 1-2.

Table 1-2: Cities with Potential Stations

Oklahoma	
Edmond	Pauls Valley
Oklahoma City	Ardmore
Norman	
Texas	
Gainesville	Austin
Fort Worth	San Antonio
Arlington	Alice
Dallas	Corpus Christi
Waxahachie	Harlingen
Waco	McAllen
Temple (also serving Killeen)	Brownsville
Taylor	Laredo

2.0 Regulatory Context and Purpose

FRA's *Procedures for Considering Environmental Impacts* states: "The EIS should address both construction period and long-term effects of alternatives on wildlife and vegetation in the affected environment. Where an alternative proposes to control or modify a stream or other body of water in some way, it shall contain evidence of consultation with the U.S. Fish and Wildlife Service (USFWS) of the Department of Interior and with the agencies exercising administration over the wildlife resources of affected States, as required by Section 2(a) of the Fish and Wildlife Coordination Act, 16. U.S.C. 662(a)."

The service-level EIS provides a corridor-level evaluation of reported resources in proximity to the build alternatives, with informal consultation with USFWS, Texas Parks and Wildlife Department (TPWD), and Oklahoma Department of Wildlife Conservation (ODWC). The service-level analysis also supports development of a memorandum of agreement between TxDOT and TPWD for Finalization of 1998 Memorandum of Understanding Concerning Habitat Descriptions and Mitigation. At the service level, the EIS does not include the detailed evaluation of individual potential resources and habitats.

Using database search results and informal consultation with USFWS, TPWD, and ODWC, this technical study identifies habitat and existing wildlife and vegetation conditions by typology within the EIS Study Area and identifies areas where these resources could be affected by the alternatives. The study also identifies existing wildlife movement corridors, natural plant communities, and other significant features (e.g., bird rookeries, bat caves, and prairie dog towns) and potential areas where the alternatives could affect the habitat or movement areas.

3.0 Evaluation Methods

The methodology for this evaluation consists of a combination of qualitative and quantitative assessments. A qualitative level of assessment was used for general comparisons of the alternatives when discussing significance of effects or other issues that require a more detailed approach than what is warranted for this document. A detailed quantification of potential effects and biological analysis would occur during the project-level NEPA process. General conclusions are generated to support the relative predicted change in effects among the alternatives. The intensity of an effect as a result of the build alternatives is characterized as negligible, moderate, or substantial compared with the No Build Alternative. For natural ecological systems and wildlife, these terms are defined as follows:

- Negligible intensity effects from construction and operation of an alternative are those that would have a slight change to natural ecological systems, wildlife corridors and assemblages and sensitive plant communities, and higher ecological importance/value land coverage areas, but are close to the existing conditions.
- Moderate intensity effects from construction and operation of an alternative would have a noticeable effect on natural ecological systems, wildlife corridors and assemblages and sensitive plant communities, and higher ecological importance/value land coverage areas, but would not have an adverse residual effect on resources.
- Substantial intensity effects would be long-term or permanent and would have a noticeable, inevitable effect on natural ecological systems, wildlife corridors and assemblages and sensitive plant communities, and higher ecological importance/value land coverage areas within the buffer zone.

Available information, such as land use coverage, ecoregions, wildlife corridors and assemblages, and sensitive plant communities, was used to assess the potential magnitude or intensity of the effects. As stated previously, a 500-foot-wide EIS Study Area is analyzed for each alternative. To evaluate the potential effects on natural ecological systems and wildlife from the construction and operation of the alternatives, the following acreages were quantified:

- The acreage of NLCD 2011 land cover types that intersect with the EIS Study Area. Quantitative and qualitative potential effects were determined using NLCD 2011 data by comparing acreages of developed land covers (open space, low, medium, and high) with other land cover types (crops, forests, wetlands, pasture, etc.) within the EIS Study Areas for each alternative.
- The acreage of potential wildlife corridors and assemblages and sensitive plant communities within the EIS Study Area. Quantitative and qualitative potential effects were determined by assessing the acreages of wildlife corridors and assemblages and sensitive plant communities that intersect the EIS Study Areas for each alternative.

To determine ecologically sensitive areas within the EIS Study Area and to analyze the overall potential effects on them from construction and operation of the alternatives, the EPA REAP methodology was used, which is a screening-level, rapid assessment tool that uses existing

electronic data. REAP is further described as an ecoregional assessment, applied to the five states in EPA Region 6 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas).

REAP uses 38 ecoregion sections to demonstrate ecosystem patterns at multiple scales, aiding the visualization of differences among ecosystems. Most ecoregions include minimally affected areas that can be used to define reference conditions necessary to compare affected areas. REAP divides 18 individual measures, including land cover, contiguous size of undeveloped area, vegetation rarity, natural heritage rank, taxonomic richness, rare species richness, regularity of ecosystem boundaries, waterway obstructions (i.e., dams), road density, water quality, and air quality, from various databases into sublayers that compose three main layers. These main layers are diversity, rarity, and sustainability (EPA 2011).

The REAP composite data and the three data layers (diversity, rarity, and sustainability) are designed to assess EPA Region 6 by ecoregion and to identify the optimum ecological areas for protection and mitigation based on ecological theory (no political boundaries or regulatory programs). Higher scores indicate higher ecological importance/value, which are divided into the following five groups: 1 (top 1 percent of scores), 10 (top 10 percent of scores), 25 (top 25 percent of scores), 50 (top 50 percent of scores), and 100 (all the rest of the scores). Most of the highly important ecological areas (1 and 10) represent the intersection of the top 10 percent for diversity, rarity, and sustainability. Lower REAP values (1, 10, and 25) represent the highest ecologically important areas. REAP scores were determined to evaluate the potential quantitative effects on natural ecological systems and wildlife using a similar basis of comparison across the alternatives.

4.0 Baseline/Affected Environment

4.1 EIS Study Area

The EIS Study Area is broadly defined by the 850-mile corridor that extends from Edmond, Oklahoma, in the north through Oklahoma City, Dallas, Fort Worth, Austin, and San Antonio to destinations in south Texas, including Laredo, Corpus Christi, and Brownsville.

This service-level analysis used the geographic information system database to identify resources along the Program corridor. The extent of the analysis was limited to a 500-foot-wide buffer for each alternative. Therefore, the EIS Study Area is not the actual area of effect associated with construction and operation (the term "operation" includes maintenance) of any of the alternatives. For example, the construction of a passenger rail alignment can reasonably occur within a 100-foot right-of-way. This service-level analysis uses the EIS Study Area to determine the types of resources that may be affected and the relative magnitude of resources that may be affected.

4.2 Regional Environment

The Program encompasses a broad geographic area with semi-arid, humid subtropical, and modified subtropical conditions. The Program corridor generally lies along low-elevation basins and valleys associated with the Great Plains in the north and the Coastal Plains in the south. Land cover types within the Program corridor include developed land, vegetated land with open grasslands, agricultural land, shrubland, and forests. The climate is characterized by a regime of moderate to hot summer drought and winter rain. Winter rain occurs as a result of low-pressure depressions associated with Pacific and Arctic fronts (University of Oklahoma 2014; Texas Climate Data 2014). In the Northern Section, annual precipitation ranges from 48 inches near Oklahoma City to 37 inches near Dallas and Fort Worth. In the Central Section, annual precipitation ranges from 36 inches in Waco to 34 inches in Austin. In the Southern Section, annual precipitation ranges from 32 inches in San Antonio to 20 inches in Laredo. Precipitation is generally rain except from Dallas and Fort Worth to Oklahoma where snowfall may occur. The daily high temperature ranges from 50 to 94 degrees Fahrenheit (°F) in the Northern Section to 67 to 100°F in the Southern Section. However, temperatures over 100°F are common in summer throughout the entire EIS Study Area (U.S. Climate Data 2014).

4.3 Regulatory Environment

This service-level EIS includes a corridor-level evaluation of reported resources in proximity to the build alternatives, not a detailed evaluation of individual resources and habitats. No specific federal or state laws or regulations apply to natural ecological systems and wildlife, in general. However, a number of federal and state legislation and regulations pertain to wetlands and threatened and endangered species. Aquatic habitats are protected under regulations that limit their use or destruction. Section 404 of the Clean Water Act (CWA) requires authorization for activities that include placement of dredge and fill material or mechanized land clearing, ditching, draining, channelization or other excavation activities into the waters of the U.S., including wetlands. A

detailed discussion of the aquatic habitats protected under Section 404 of the CWA is included in the Water Quality Technical Study, included as Appendix F of this Draft EIS.

Plant and animal species whose populations have declined to a point where extinction is imminent have legal protection under federal and state laws. Section 7 of the Endangered Species Act of 1973 regulates federally listed threatened and endangered species and designated critical habitats. Section 4 (listing of a species, critical habitat, and recovery), Section 9 (prohibited acts), and Section 10 (permitting and conservation plans) also provide legal protection. USFWS and the National Marine Fisheries Service have authority to identify species in danger of extinction and provide for their management and protection. A detailed discussion of threatened and endangered species is included in the Threatened and Endangered Species Technical Study, included as Appendix H of this Draft EIS.

The potential effects on natural ecological systems and wildlife were analyzed in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] §4321, et seq.), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations Parts 1500-1508), FRA policies and procedures for considering environmental impacts, and the TxDOT *Environmental Manual* (TxDOT 2004).

4.4 U.S. EPA Level III Ecoregions

The U.S. Environmental Protection Agency (EPA) Office of Research and Development has developed a system of "ecoregion" definitions that denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. EPA ecoregions serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. The approach was based on the premise that ecological regions can be identified through the analysis of patterns of biotic and abiotic phenomena, including geology, physical geography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another. A Roman numeral hierarchical scheme was adopted for different levels for ecological regions. Level I is the coarsest level, dividing North America into 15 ecological regions. Level II divides the continent into 50 regions. At Level III, the continental United States contains 104 regions (EPA 2014). Level IV ecoregions are further subdivisions of Level III ecoregions. For this service-level analysis, Level III ecoregions were used. Level III ecoregion data are based largely on plant community types; therefore, they can be used to describe general vegetation characteristics throughout the EIS Study Area and identify potential effects associated with the alternatives. EPA Level III ecoregions within the EIS Study Area are summarized below and shown on Figures 4-1 through 4-3.

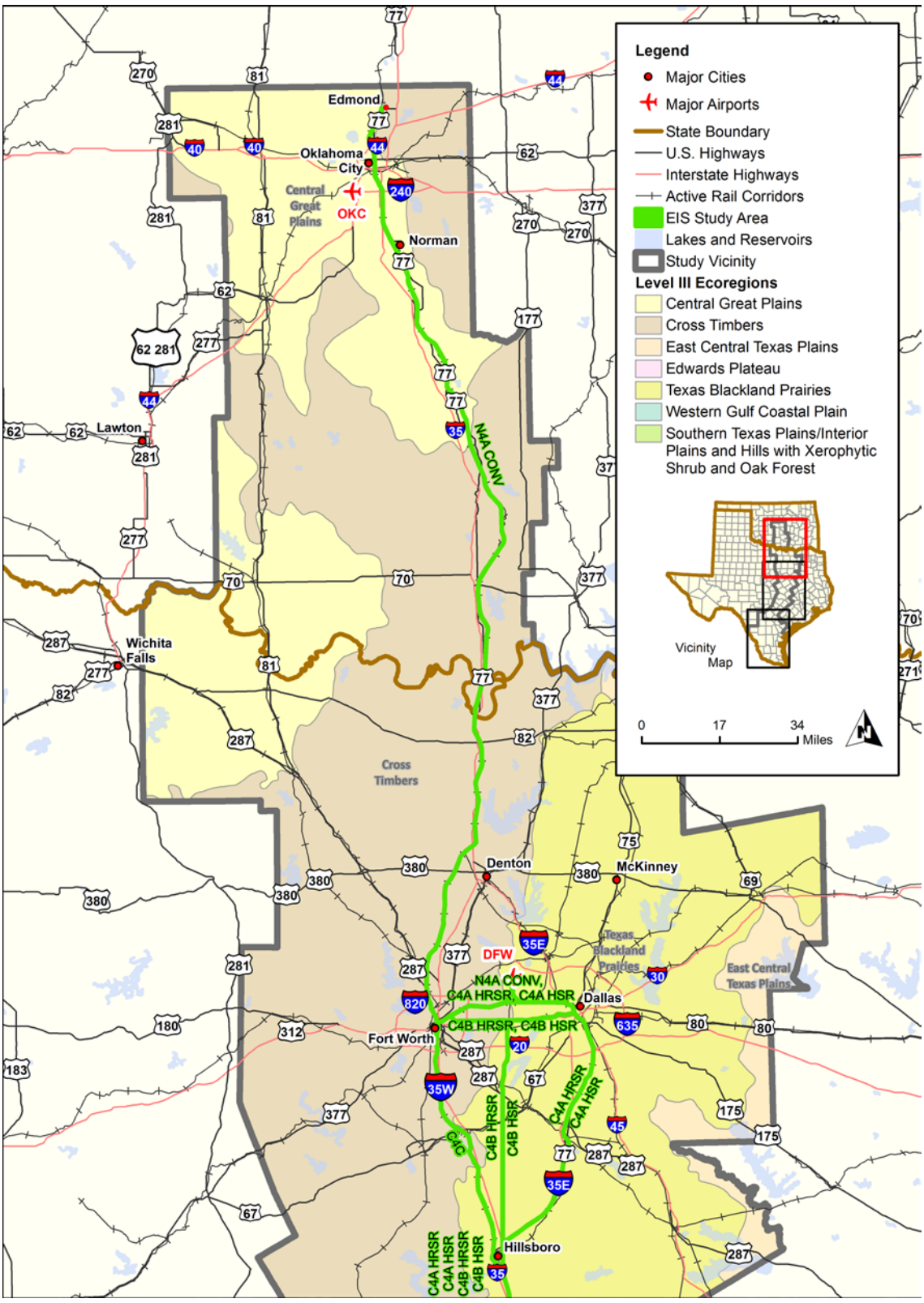


Figure 4-1: U.S. EPA Level III Ecoregions – Northern Section Alternative

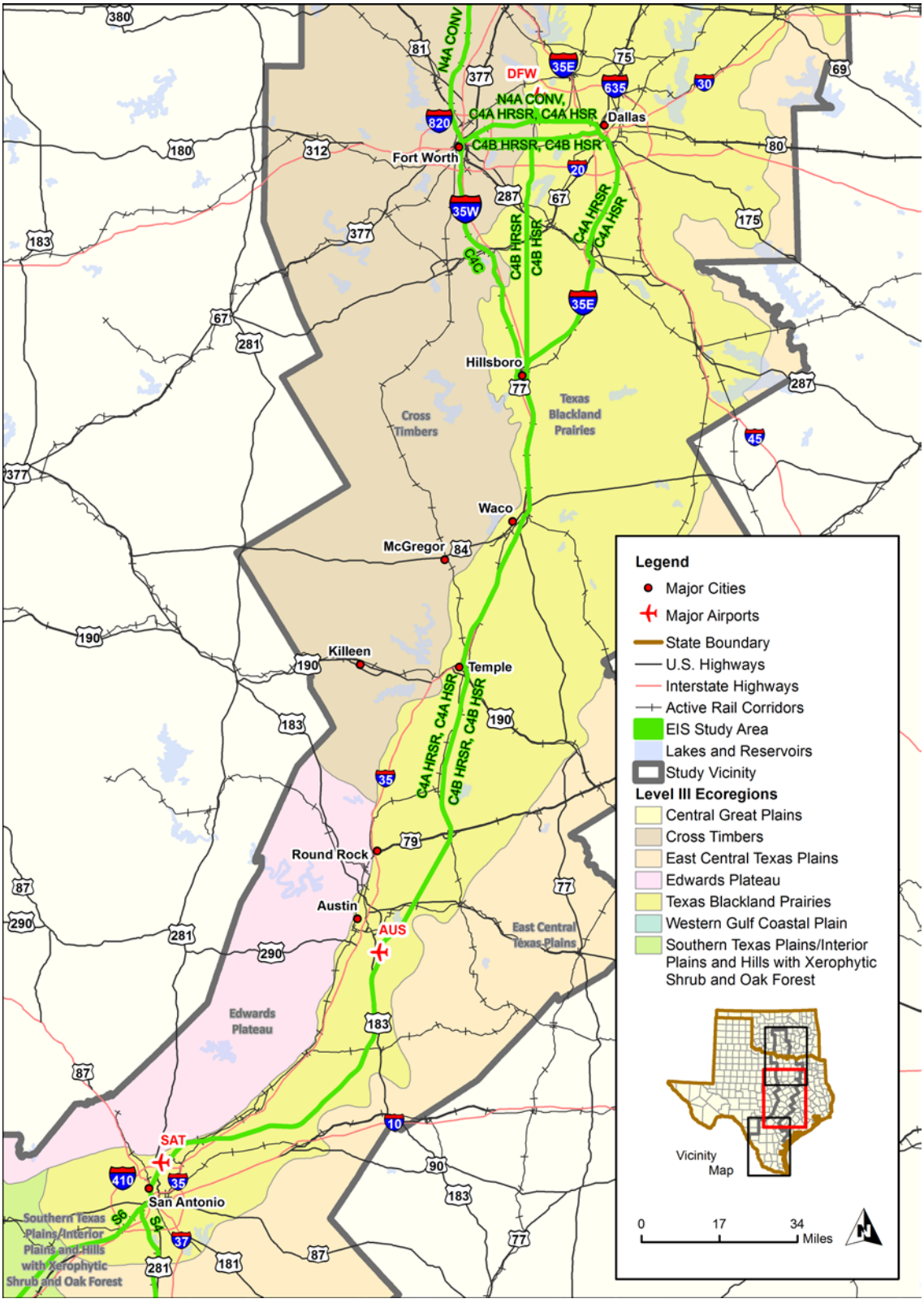


Figure 4-2: U.S. EPA Level III Ecoregions – Central Section Alternatives

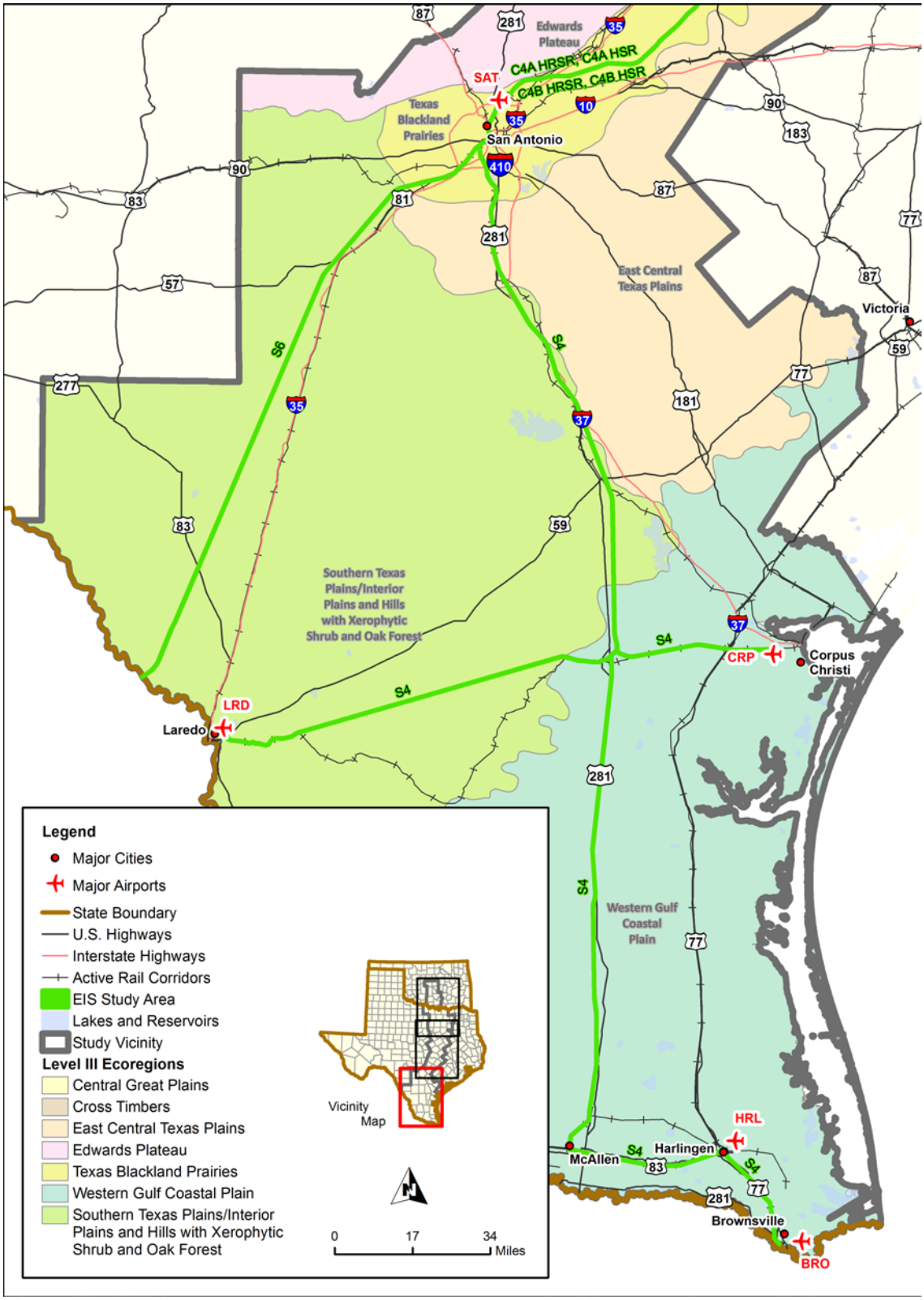


Figure 4-3: U.S. EPA Level III Ecoregions – Southern Section Alternatives

4.4.1 Central Great Plains

Once a grassland with scattered low trees and shrubs in the south, much of the Central Great Plains ecological region is now cropland, with the eastern boundary of the region marking the eastern limits of the major winter wheat growing area of the United States. Subsurface salt deposits and leaching contribute to high salinity in streams in the Central Great Plains ecoregion. The Central Great Plains ecoregion is identified within the EIS Study Area for Alternative N4A near Edmond and Norman, Oklahoma.

4.4.2 Cross Timbers

The Cross Timbers ecoregion is a transition area between what was once prairie and is now winter wheat growing regions to the west, and the forested low mountains or hills of eastern Oklahoma and Texas. The region does not possess the arability and suitability for crops like corn and soybeans that are common in the Central Irregular Plains to the northeast. Transitional cross timbers (Little Bluestem grassland with scattered blackjack oak and post oak trees) is the native vegetation, and rangeland and pastureland compose the predominant land cover types, with areas of woodland. Oil extraction has been a major activity in this region for more than 80 years. The majority of the EIS Study Area for Alternative N4A extends within the Cross Timbers ecoregion south of Norman to Fort Worth. The Cross Timbers ecoregion is also identified within the EIS Study Areas for Alternatives C4A, C4B, and C4C, where these alternatives extend near Fort Worth.

4.4.3 East Central Texas Plains

Also called the Post Oak Savanna or the Claypan Area, the East Central Texas Plains region consists of irregular plains, which was originally covered by post oak savanna vegetation, in contrast to the more open prairie-type regions to the north, south, and west and the pine forests to the east. The boundary with the South Central Plains ecoregion is a subtle transition of soils and vegetation. Many areas have a dense, underlying clay pan affecting water movement and available moisture for plant growth. The bulk of this region is used for pasture and range. The East Central Texas Plains ecoregion is identified within the EIS Study Area for Alternative S4, where this alternative extends south of San Antonio.

4.4.4 Southern Texas Plains/Interior Plains and Hills with Xerophytic Shrub and Oak Forest

The rolling to moderately dissected South Texas Plains/Interior Plains region was once covered with grassland and savannah vegetation that varied during wet and dry cycles. Following long continued grazing and fire suppression, thorny brush, such as mesquite, is now the predominant vegetation type. Also known as the Tamualipan Thornscrub, or the “brush c,” the subhumid to dry region has its greatest extent in Mexico. It is generally lower in elevation with warmer winters than the Chihuahuan Deserts to the northwest, and it contains a high and distinct diversity of plant and animal life. The majority of the EIS Study Area for Alternative S6 extends within this ecoregion south of San Antonio to its termination near Laredo. This ecoregion is also identified within the EIS Study

Area for Alternative S4, where this alternative extends south from San Antonio to Alice and continues from Alice to its termination point near Laredo.

4.4.5 Texas Blackland Prairies

The Texas Blackland Prairies form a disjunct ecological region, distinguished from surrounding regions by fine-textured, clayey soils and predominantly prairie natural vegetation. This region contains a higher percentage of cropland than adjacent regions, and pasture and forage production for livestock is common. The majority of the EIS Study Areas for Alternatives C4A, C4B, and C4C, extending from Dallas to San Antonio, are within the Texas Blackland Prairies ecoregion. The Texas Blackland Prairies ecoregion is also identified within the EIS Study Areas for Alternatives S4 and S6, where these two alternatives extend near San Antonio.

4.4.6 Western Gulf Coastal Plain

The principal distinguishing characteristics of the Western Gulf Coastal Plain are its relatively flat coastal plain topography and mainly grassland potential natural vegetation. Inland from this region, the plains are older and more irregular and have the potential for mostly forest or savannah-type vegetation. Largely because of these characteristics, a higher percentage of the land is in cropland than in bordering ecological regions. Urban and industrial land uses have expanded greatly in recent decades, and oil and gas production is common. The Western Gulf Coastal Plain ecoregion is identified within the EIS Study Area for Alternative S4, where this alternative extends south from Alice to McAllen and onto Brownsville.

4.5 National Land Cover Database – Land Cover Types

The National Land Cover Database (NLCD) is created through a cooperative project by the Multi-Resolution Land Characteristics (MRLC) Consortium. The MRLC Consortium is a partnership of federal agencies, consisting of EPA, USFWS, U.S. Geological Survey, National Oceanic and Atmospheric Administration, U.S. Department of Agriculture, U.S. Forest Service, National Park Service, Bureau of Land Management, and the U.S. Department of Agriculture Natural Resources Conservation Service. NLCD 2011, the most recent version of the database, provides the capability to assess national land cover changes and trends across the United States from 2001 to 2011. As with previous versions of the NLCD (1992 and 2001), NLCD 2011 uses a 16-class land cover classification scheme that has been applied consistently across the United States at a spatial resolution of 30 meters (MRLC 2011). The NLCD is used in this analysis to describe general vegetation characteristics throughout the EIS Study Area, to compare areas of developed versus non-developed land covers by providing a spatial reference and data for characteristics of the land surface (developed, agriculture, forest, etc.), and to identify potential effects associated with the alternatives. The NLCD 2011 land cover types within the EIS Study Area are summarized below. The acres of potential land cover types and their percentages of total area within the EIS Study Areas are shown in Tables 3-1 through 3-3 for Alternative N4A (conventional rail); Alternatives C4A, C4B, and C4C (higher- and high-speed rail); and Alternatives S4 (higher-speed rail) and S6 (higher- and high-speed rail), respectively.

4.5.1 Water

4.5.1.1 Open Water

The NLCD open water land cover type includes areas of open water, generally with less than 25 percent cover of vegetation or soil.

4.5.2 Developed

4.5.2.1 Developed, High Intensity

The NLCD developed, high intensity land cover type includes areas that are highly developed, where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial activities. Impervious surfaces account for 80 to 100 percent of the total cover.

4.5.2.2 Developed, Medium Intensity

The NLCD developed, medium intensity land cover type includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 to 79 percent of the total cover. These areas most commonly include single-family housing units.

4.5.2.3 Developed, Low Intensity

The NLCD developed, low intensity land cover type includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 to 49 percent of total cover. These areas most commonly include single-family housing units.

4.5.2.4 Developed, Open Space

The NLCD developed, open space land cover type includes areas with a mixture of constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

4.5.3 Barren

4.5.3.1 Barren Land (Rock/Sand/Clay)

The NLCD barren land cover type includes areas of bedrock, desert pavement, steep slopes, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15 percent of total cover.

4.5.4 Forest

4.5.4.1 Deciduous Forest

The NLCD forest (deciduous) land cover type includes areas dominated by trees generally greater than 5 meters tall and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.

4.5.4.2 Evergreen Forest

The NLCD forest (evergreen) land cover type includes areas dominated by trees generally greater than 5 meters tall and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.

4.5.4.3 Mixed Forest

The NLCD forest (mixed) land cover type includes areas dominated by trees generally greater than 5 meters tall and greater than 20 percent of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.

4.5.5 Shrubland

4.5.5.1 Shrub/Scrub

The NLCD shrubland (shrub/scrub) land cover type includes areas dominated by shrubs less than 5 meters tall with shrub canopy generally greater than 20 percent of total vegetation. This land cover type includes true shrubs, young trees in an early successional stage, and trees stunted from environmental conditions.

4.5.6 Herbaceous

4.5.6.1 Grassland/Herbaceous

The NLCD herbaceous (grassland/herbaceous) land cover type includes areas dominated by gramanoid or herbaceous vegetation generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be used for grazing.

4.5.7 Planted/Cultivated

4.5.7.1 Pasture/Hay

The NLCD planted/cultivated (pasture/hay) land cover type includes areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.

4.5.7.2 Cultivated Crops

The NLCD planted/cultivated (cultivated crops) land cover type includes areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This land cover type also includes land being actively tilled.

4.5.8 Wetlands

4.5.8.1 Woody Wetlands

The NLCD wetlands (woody) land cover type includes areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

4.5.8.2 Emergent Herbaceous Wetlands

The NLCD wetlands (emergent herbaceous) land cover type includes areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

As shown in Table 4-1, approximately 46 percent (6,947 acres) of the 15,108 acres of the Alternative N4A EIS Study Area is composed of developed land cover types (high, medium, and low intensity or open space). The remaining 54 percent (8,161 acres) is composed of non-developed land cover types, with grasslands composing 30 percent, forest composing 12 percent, cultivated crops composing 6 percent, pasture composing 5 percent, and open water composing 1 percent. Less than 1 percent of the EIS Study Area is composed of wetlands and shrubland/scrub.

Table 4-1: Acres of Potential Land Cover Types within EIS Study Area – Northern Alternative N4A Conventional Rail

Land Cover Type	Alternative	
	N4A (CONV)	
	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area
Developed, High Intensity	1,249	46%
Developed, Low Intensity	2,046	
Developed, Medium Intensity	1,625	
Developed, Open Space	2,027	
Barren Land (Rock/Sand/Clay)	53	<1%
Cultivated Crops	960	6%
Deciduous Forest	1,748	12%
Emergent Herbaceous Wetlands	8	<1%
Evergreen Forest	15	<1%
Grassland/Herbaceous	4,465	30%

Land Cover Type	Alternative	
	N4A (CONV)	
	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area
Mixed Forest	0	-
Open Water	120	1%
Pasture/Hay	783	5%
Shrub/Scrub	2	<1%
Woody Wetlands	7	<1%
Source: MRLC (2011).		

As shown in Table 4-2, approximately 38 percent (7,564 acres) of the 20,129 acres of the EIS Study Area for Alternative C4A is composed of developed land cover types. The remaining 62 percent (12,565 acres) is composed of non-developed land cover types, with grasslands composing 21 percent, cultivated crops composing 15 percent, shrub/scrub composing 9 percent, and forest and pasture composing 7 percent. Wetlands (emergent herbaceous and woody) and open water compose about 2 percent and less than 1 percent, respectively.

As shown in Table 4-2, approximately 36 percent (6,642 acres) of the 18,675 acres of the EIS Study Area for Alternative C4B is composed of developed land cover types. The remaining area is composed of non-developed land cover types, with grasslands composing 21 percent, cultivated crops composing 17 percent, shrub/scrub and pasture composing 9 percent each, and forest composing 5 percent. Wetlands and open water compose 2 and less than 1 percent, respectively.

Approximately 38 percent (9,123 acres) of the 23,713 acres of the EIS Study Area for Alternative C4C is composed of developed land cover types. The remaining area is composed of grasslands (23 percent), cultivated crops (14 percent), forest (8 percent), shrub/scrub (7 percent), pasture (6 percent), and wetlands (2 percent). Less than 1 percent is composed of open water.

Table 4-2: Acres of Potential Land Cover Types – Central Section Alternatives

Land Cover Type	Alternative					
	C4A (HrSR and HSR)		C4B (HrSR and HSR)		C4C (HrSR and HSR)	
	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area
Developed, High Intensity	1,347	38%	1,318	36%	1,533	38%
Developed, Low Intensity	1,667		1,374		2,108	

Land Cover Type	Alternative					
	C4A (HrSR and HSR)		C4B (HrSR and HSR)		C4C (HrSR and HSR)	
	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area
Developed, Medium Intensity	1,809		1,810		2,080	
Developed, Open Space	2,741		2,140		3,401	
Barren Land (Rock/Sand/Clay)	48	<1%	30	<1%	60	<1%
Cultivated Crops	3,013	15%	3,252	17%	3,350	14%
Deciduous Forest	1,284	6%	812	4%	1738	7%
Emergent Herbaceous Wetlands	18	<1%	10	<1%	18	<1%
Evergreen Forest	261	1%	237	1%	264	1%
Grassland/Herbaceous	4,274	21%	3,886	21%	5,415	23%
Mixed Forest	63	<1%	63	<1%	63	<1%
Open Water	80	<1%	59	<1%	84	<1%
Pasture/Hay	1,404	7%	1,602	9%	1,453	6%
Shrub/Scrub	1,720	9%	1,716	9%	1,728	7%
Woody Wetlands	400	2%	366	2%	418	2%
Source: MRLC (2011).						

As shown in Table 4-3, approximately 32 percent (7,998 acres) of the 25,191 acres of the EIS Study Area for Alternative S4 is composed of developed land cover types. The remaining area is composed of non-developed land cover types, with shrub/scrub composing 34 percent, pasture composing 12 percent, and grassland and cultivated crops composing 9 percent each. Wetlands compose about 2 percent, and forests compose about 1 percent.

As shown in Table 4-3, approximately 8 percent (701 acres) of the 8,666 acres of the EIS Study Area for Alternative S6 is composed of developed land cover types. The majority of the land coverage of the EIS Study Area for Alternative S6 is composed of non-developed land cover types, consisting of shrub/scrub (44 percent), grasslands (20 percent), cultivated crops (14 percent), pasture (7 percent), wetlands (3 percent), and forest (3 percent).

Table 4-3: Acres of Potential Land Cover Types within EIS Study Area – Southern Section

Land Cover Type	Alternative			
	S4 (HrSR)		S6 (HrSR and HSR)	
	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area	Acres of Land Cover Types within EIS Study Area	Total Area of EIS Study Area
Developed, High Intensity	776	32%	84	8%
Developed, Low Intensity	2,888		202	
Developed, Medium Intensity	2,019		97	
Developed, Open Space	2,315		318	
Barren Land (Rock/Sand/Clay)	260	1%	108	1%
Cultivated Crops	2,174	9%	1,177	14%
Deciduous Forest	340	1%	112	1%
Emergent Herbaceous Wetlands	64	<1%	9	<1%
Evergreen Forest	41	<1%	58	1%
Grassland/Herbaceous	2,330	9%	1,729	20%
Mixed Forest	24	<1%	52	1%
Open Water	45	<1%	11	<1%
Pasture/Hay	2,948	12%	578	7%
Shrub/Scrub	8,574	34%	3,852	44%
Woody Wetlands	396	2%	279	3%
Source: MRLC (2011).				

4.6 Wildlife Corridors and Assemblages and Sensitive Plant Communities

The analysis of wildlife corridors and assemblages and sensitive plant communities used the *2011 Environmental Occurrences for Federal and State Listed and Tracked Threatened, Endangered, and Rare Species* spatial dataset. This dataset was acquired from the TPWD Texas Natural Diversity Database that was originally clipped for the TxDOT High-Speed Intercity Passenger Rail IH-35 Corridor Constraints Update to meet High-Speed Intercity Passenger Rail project planning needs.

Based on the spatial dataset, one sensitive terrestrial plant community, Little Bluestem-Indiangrass series (*Schizachyrium scoparium-sorghastrum nutans* series), is located within the EIS Study Area. The Little Bluestem-Indiangrass series plant community is an upland prairie, native tall grassland, climax plant community that contains native grasses and forbs. Much of north-central Texas in the

Blackland Prairies, Fort Worth Prairie, Rolling Plains, Edwards Plateau, and Lampasas Cut Plain ecoregions, was historically native prairies or savannahs. Native prairie areas were also within the East and West Cross Timbers ecoregions. Few native prairie sites remain today, although there are extensive grasslands on many private ranches in the northern portion of the Fort Worth Prairie and in the Lampasas Cut Plain, West Cross Timbers, Edwards Plateau, and Rolling Plains ecoregions (TPWD 2014).

Based on the same dataset, one type of animal assemblage, identified as a "rookery," is located within the EIS Study Area. Rookeries, or breeding grounds of colony-forming species, are important to an ecosystem as they are home to migratory and resident wading birds and shorebirds. No other natural plant communities or other significant features (e.g., bird rookeries, bat caves, prairie dog towns) are within the EIS Study Area.

Approximately 85 acres of animal assemblage area (rookeries) are located within the Alternative N4A EIS Study Area. No other wildlife corridors and assemblages or sensitive plant communities were identified within the Alternative N4A EIS Study Area. As shown on Figure 4-4, the rookery is represented by a relatively small circular area, just north of Fort Worth.

Approximately 107, 66, and 107 acres of rookery animal assemblage are within the EIS Study Areas for Alternative C4A, C4B, and C4C, respectively. Approximately 628 acres of Little Bluestem-Indiangrass series terrestrial community are within the EIS Study Areas for Alternative C4A, C4B, and C4C. As shown on Figures 4-5 and 4-6, the animal assemblages and special terrestrial communities are, for the most part, in the portions of each alternative outside of existing transportation corridors.

Approximately 678 acres of Little Bluestem-Indiangrass series terrestrial community are within the EIS Study Area for Alternative S4. No wildlife corridors and assemblages or other sensitive plant communities were identified within the EIS Study Area. As shown on Figures 4-7 through 4-10, the large area of Little Bluestem-Indiangrass series terrestrial community is in Brooks County, in an area of Alternative S4 that would be constructed on an abandoned rail.

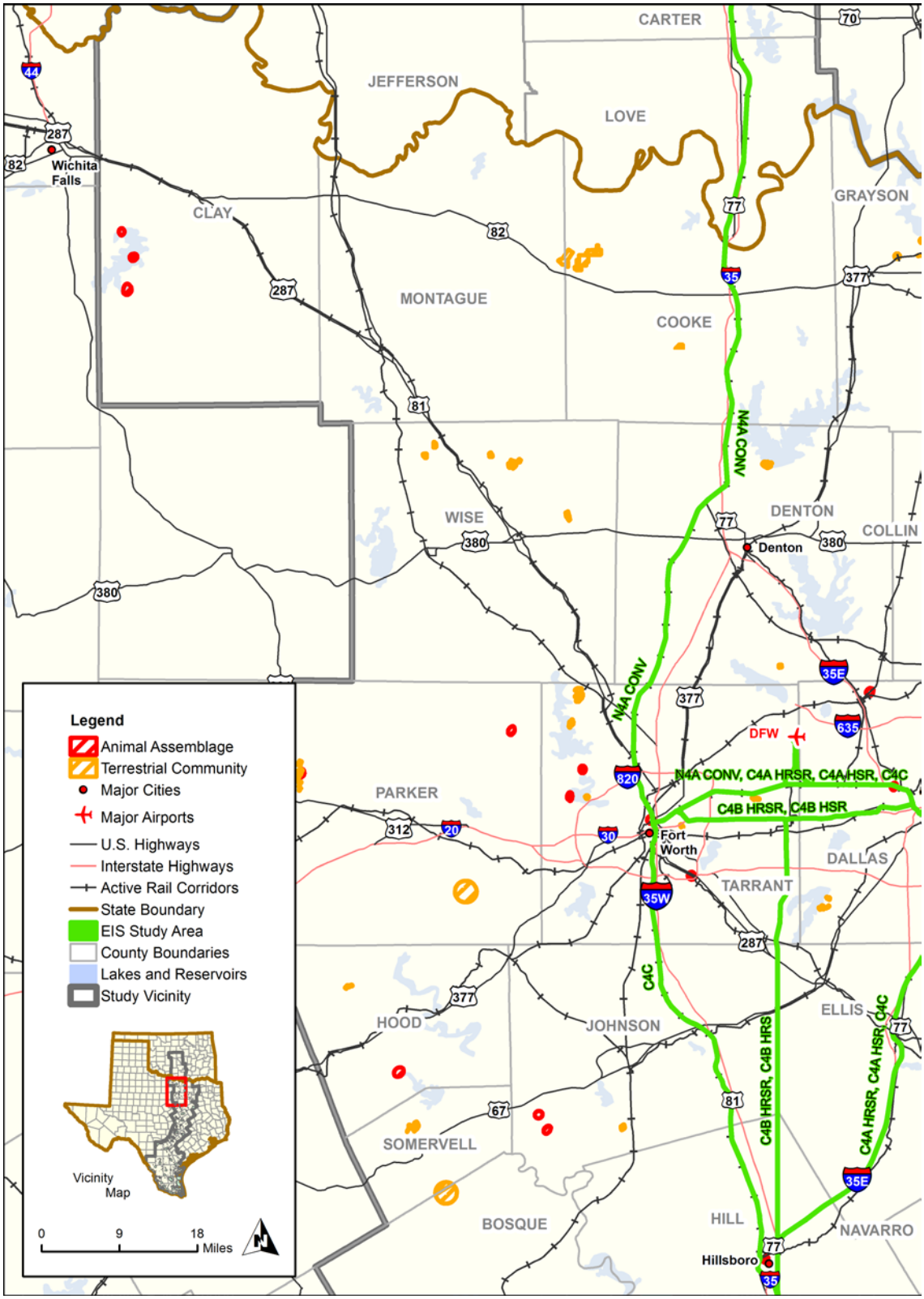


Figure 4-4: Wildlife Corridors/Assemblages and Communities – Northern Section Alternative

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

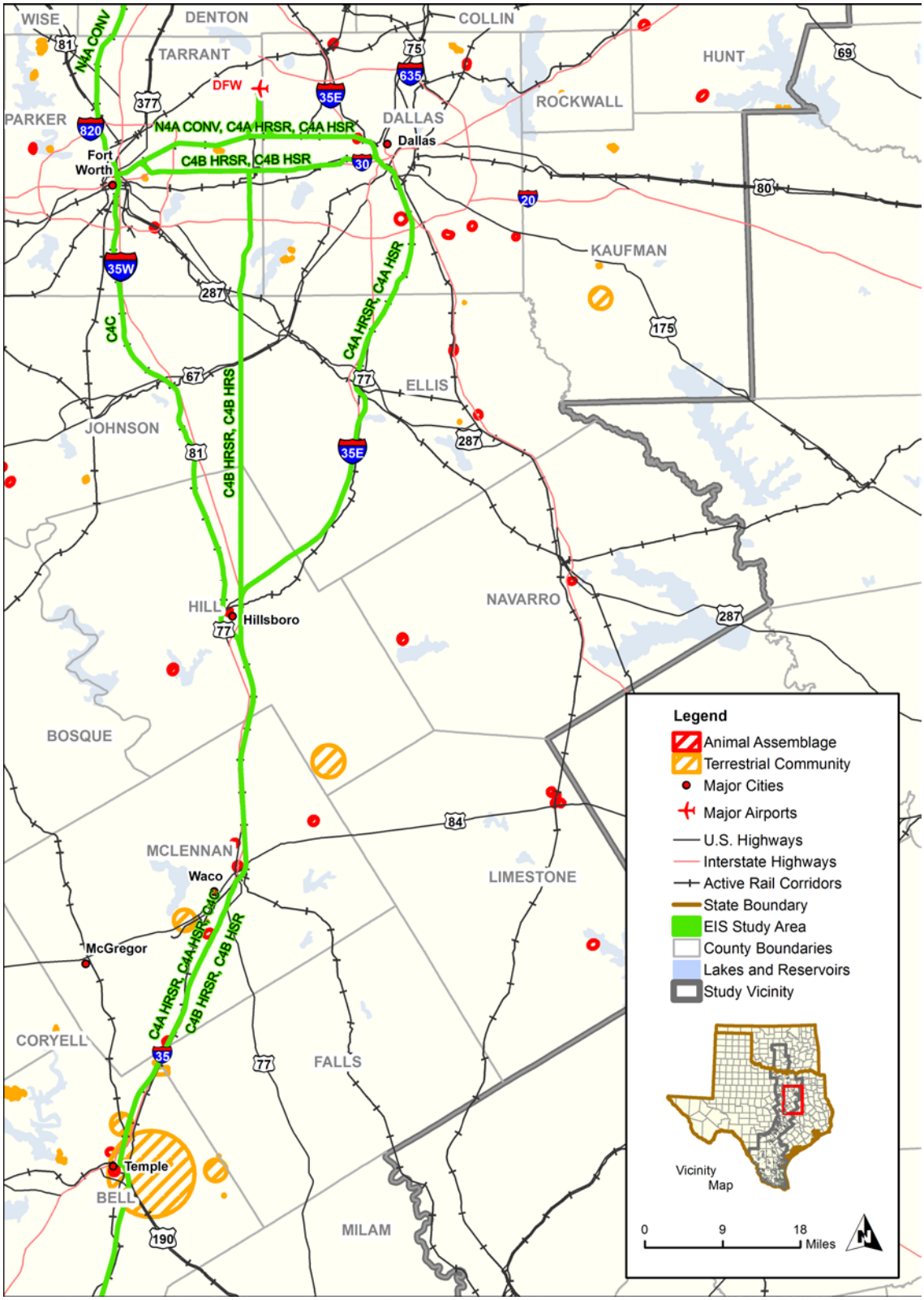


Figure 4-5: Wildlife Corridors/Assemblages and Communities – Central Section Alternatives

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

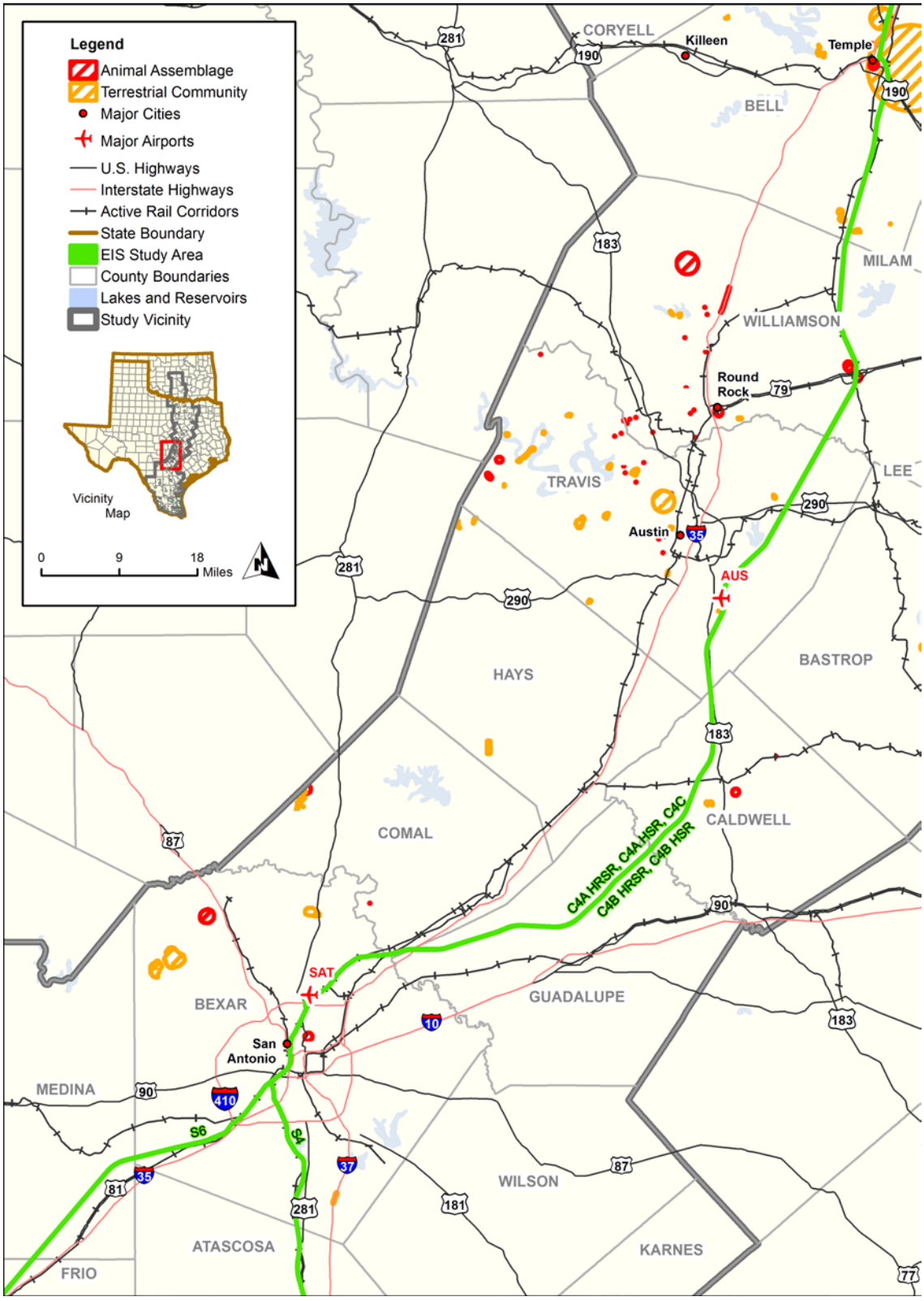


Figure 4-6: Wildlife Corridors/Assemblages and Communities – Central Section Alternatives

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

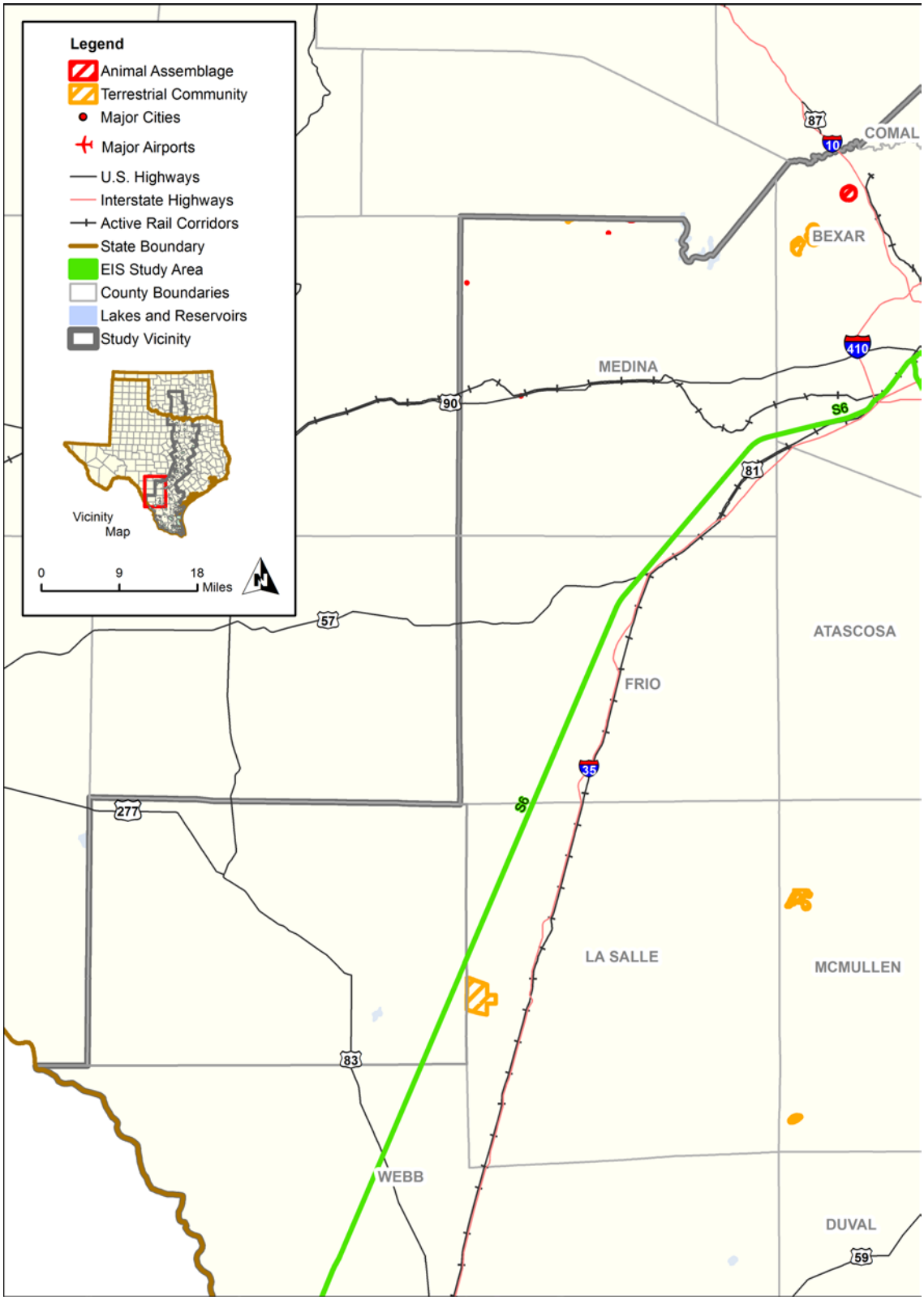


Figure 4-7: Wildlife Corridors/Assemblages and Communities – Southern Section Alternatives

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

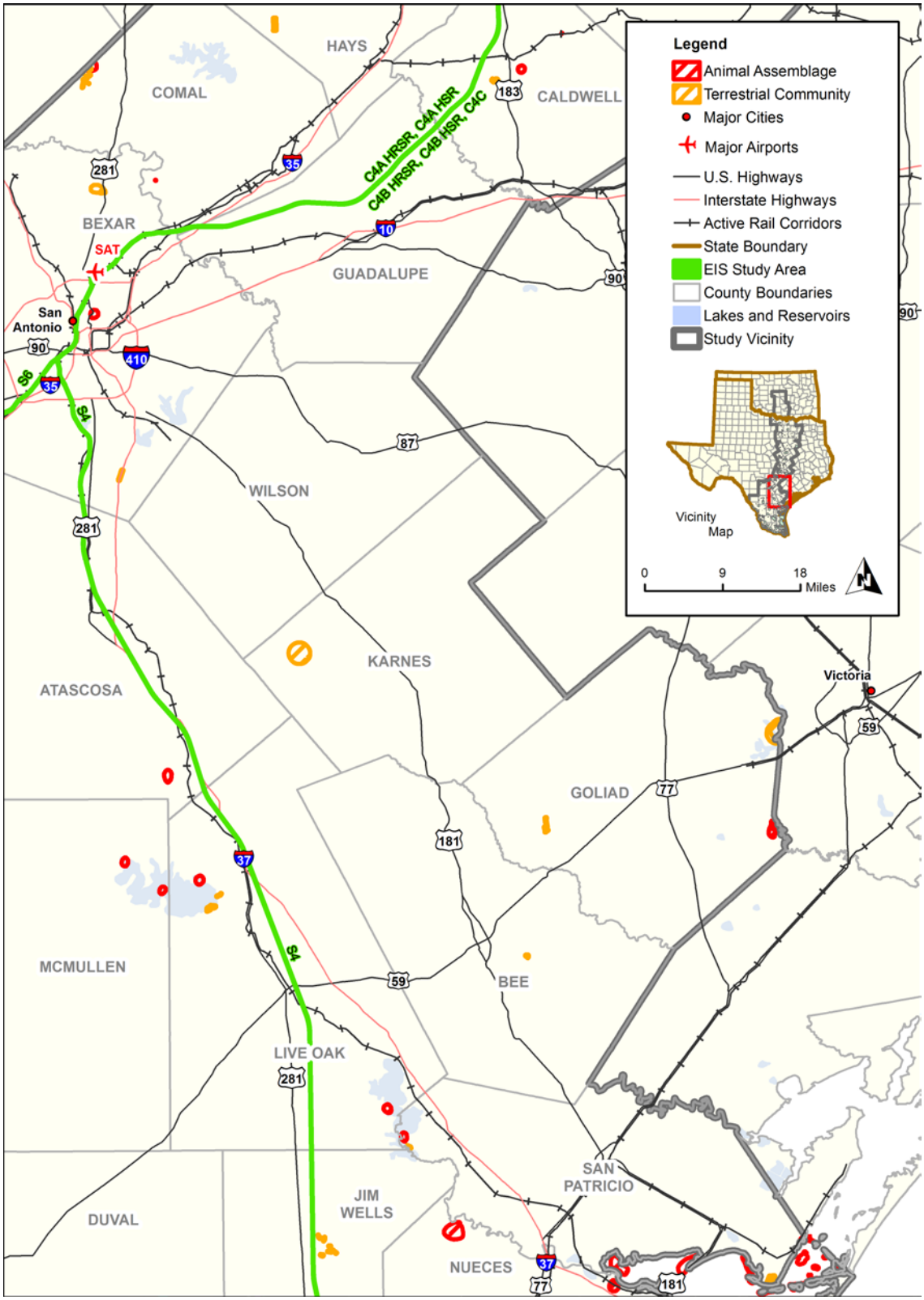


Figure 4-8: Wildlife Corridors/Assemblages and Communities – Southern Section Alternatives

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

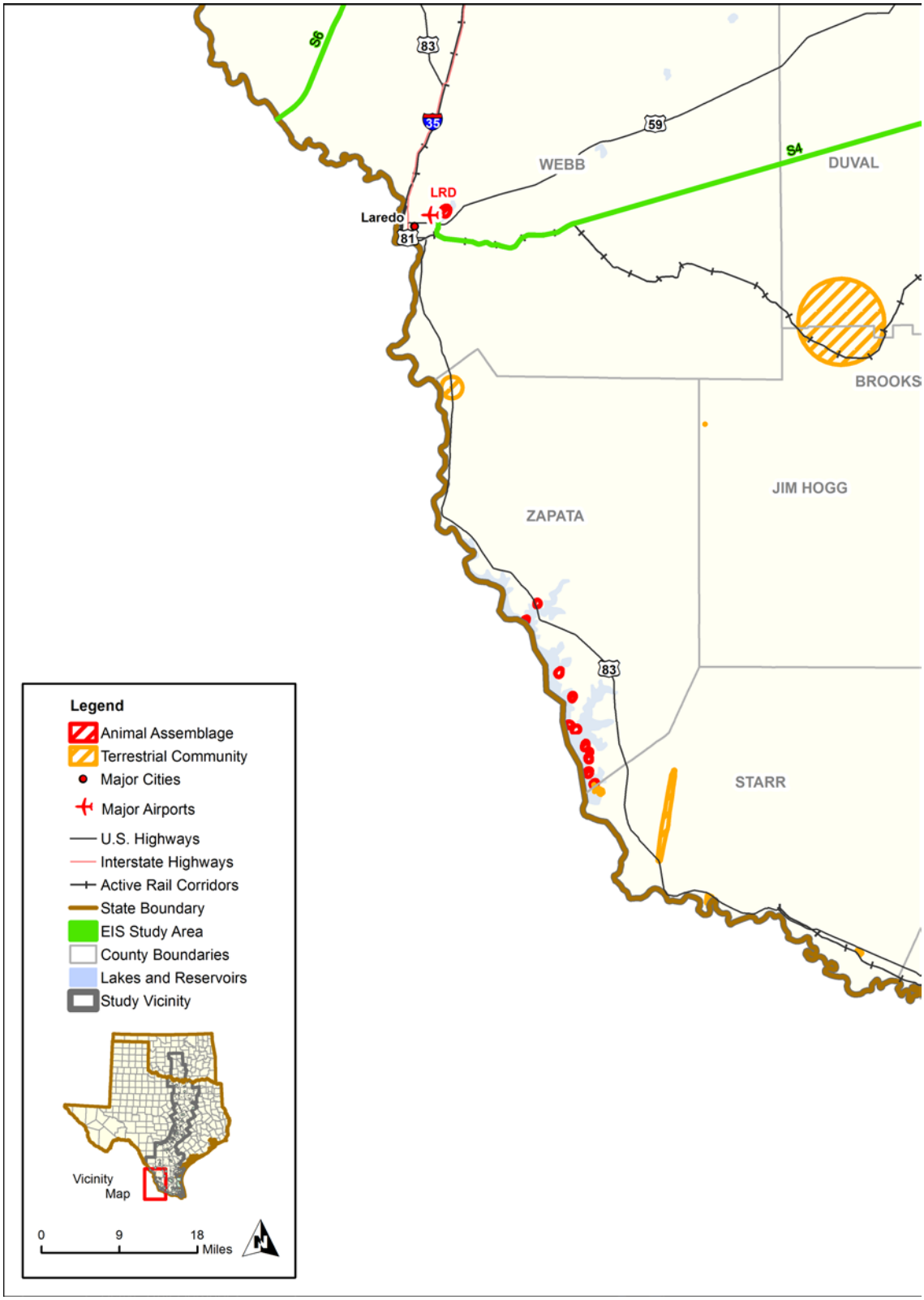


Figure 4-9: Wildlife Corridors/Assemblages and Communities – Southern Section Alternatives

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

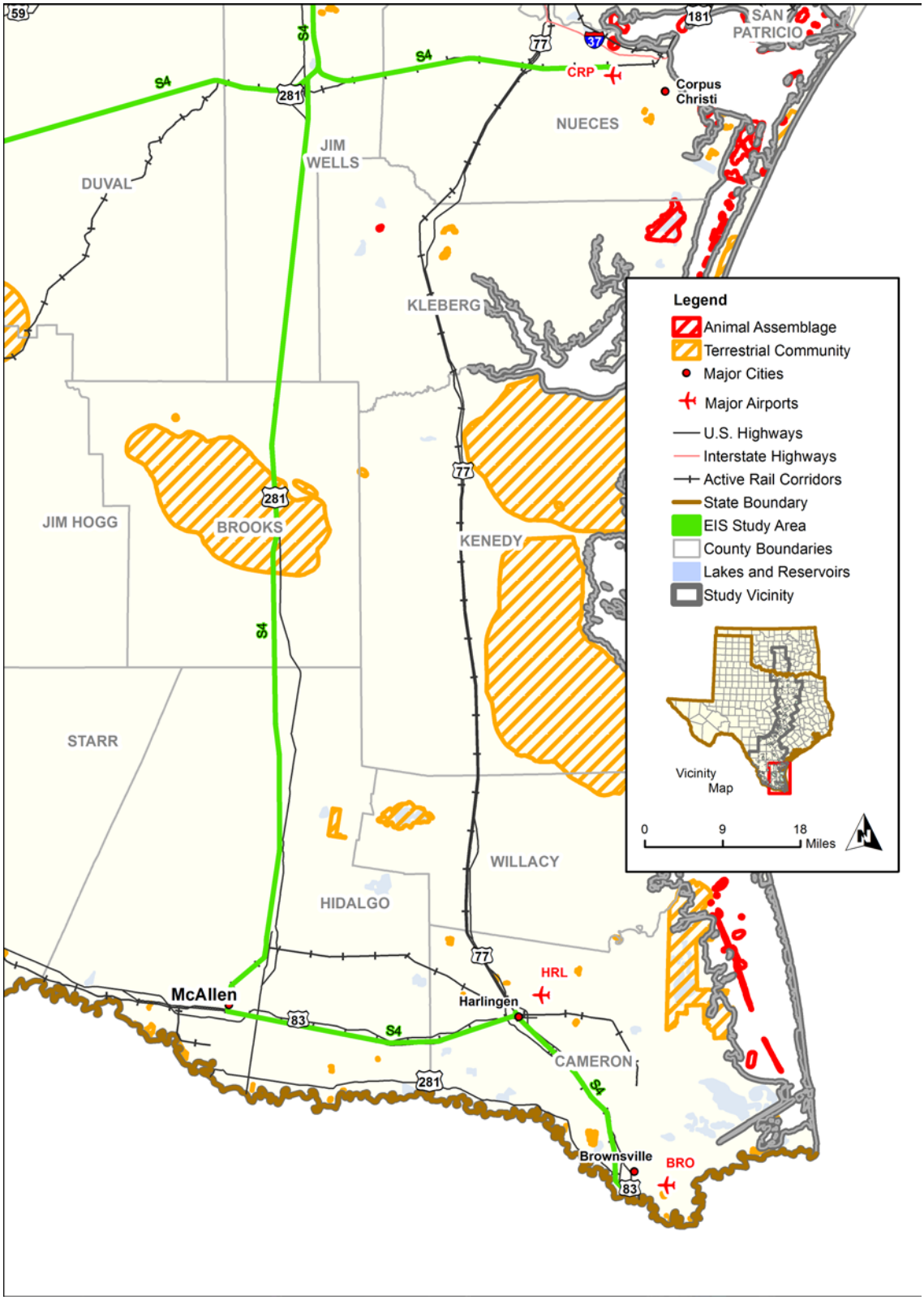


Figure 4-10: Wildlife Corridors/Assemblages and Communities – Southern Section Alternatives

(Note that wildlife corridors and assemblages are included in the figure as Animal Assemblages.)

4.7 Regional Ecological Assessment Protocol (REAP) Composite Score

As shown in Table 4-4, potentially 10 percent (1,535 acres) of the total land coverage of the EIS Study Area for Alternative N4A is composed of higher ecological importance/value land coverage areas (Ecological Importance Rankings of 1, 10, and 25)[1]. As shown on Figures 4-11 and 4-12, the lands with higher ecological importance are just south of Norman, near Murray County. All other areas of Alternative N4A consist predominantly of lower ecological value land types.

Table 4-4: Acres of Potential REAP Composite Ranking Land Coverages – Northern Section

Ecological Importance Rank	Alternative	
	N4A (CONV)	
	Acres of Potential REAP Ecological Importance Ranking Types within EIS Study Area	Total Area of EIS Study Area (High Value versus All Other Land Types)
1	100	10% (1,535 acres)
10	665	
25	770	
50	1,829	90% (13,572 acres)
100	11,743	
Total (acres)	**15,107**	-

Source: EPA (2011).

As shown in Table 4-5, potentially 18 percent (3,537 acres), 18 percent (3,328 acres), and 15 percent (3,556 acres) of the total acreage of the EIS Study Areas for Alternatives C4A, C4B, and C4C, respectively, are composed of higher ecological importance/value land coverage areas (Ecological Importance Rankings of 1, 10, and 25). As shown on Figures 4-13 and 4-14, the majority of lands with higher ecological importance are in the portions of Alternatives C4A, C4B, and C4C outside existing transportation corridors, in areas just south of McGregor and through Temple, and in areas east of Austin and as the corridors pass through Guadalupe County. Areas of Alternatives C4A, C4B, and C4C that consist of predominantly lower ecological value land types are near Dallas and Fort Worth, where the alternatives would either follow the existing TRE tracks to Dallas and continue on the BNSF alignment, or follow a new elevated high-speed alignment in the IH-30 median to Arlington.

[1] To determine ecologically sensitive areas within the EIS Study Area and to analyze the overall potential effects on them from construction and operation of the alternatives, the EPA REAP methodology was used, which is a screening-level, rapid assessment tool that uses existing electronic data.

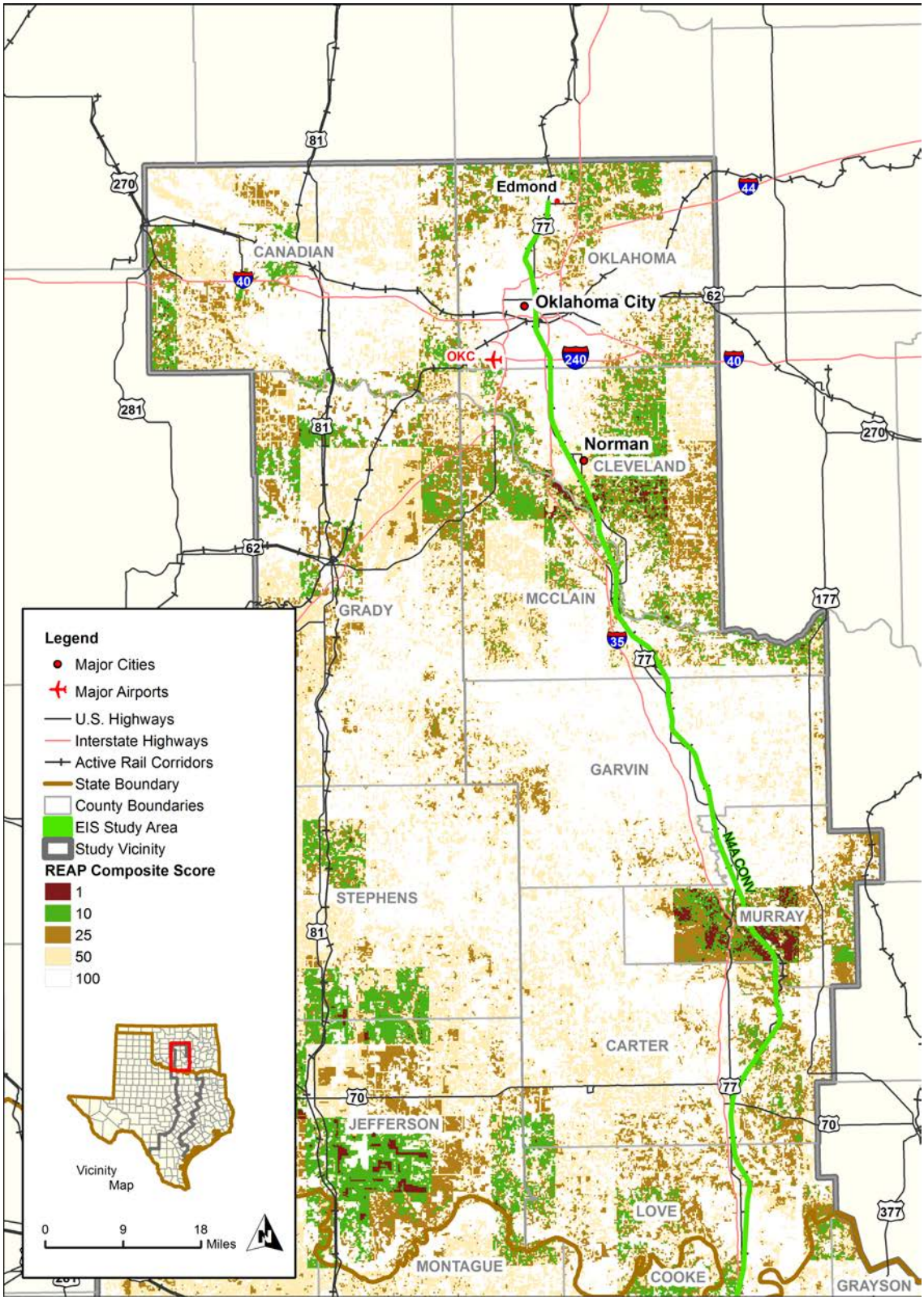


Figure 4-11: REAP Composite Scores – Northern Section Alternative

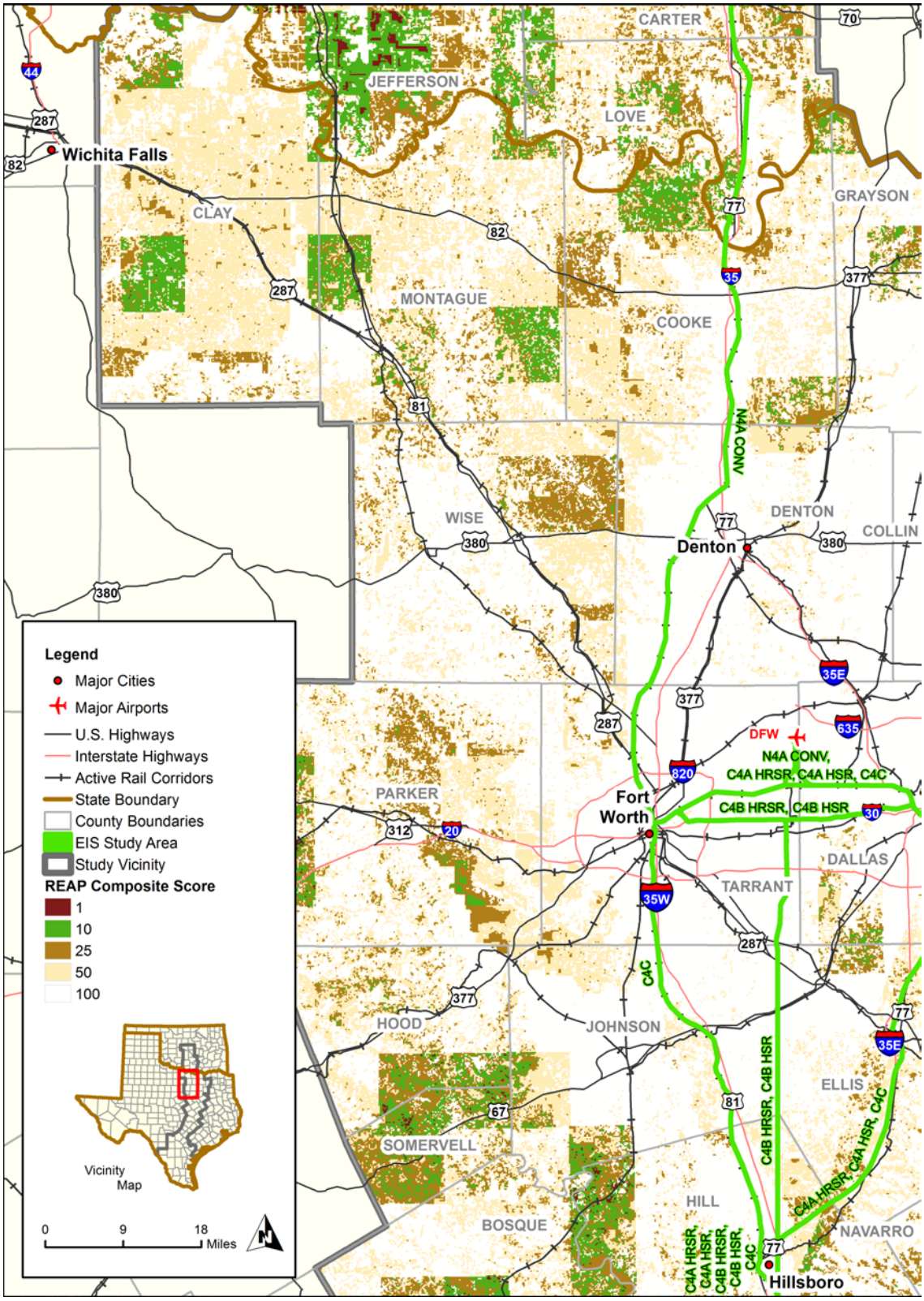


Figure 4-12: REAP Composite Scores – Northern Section Alternative

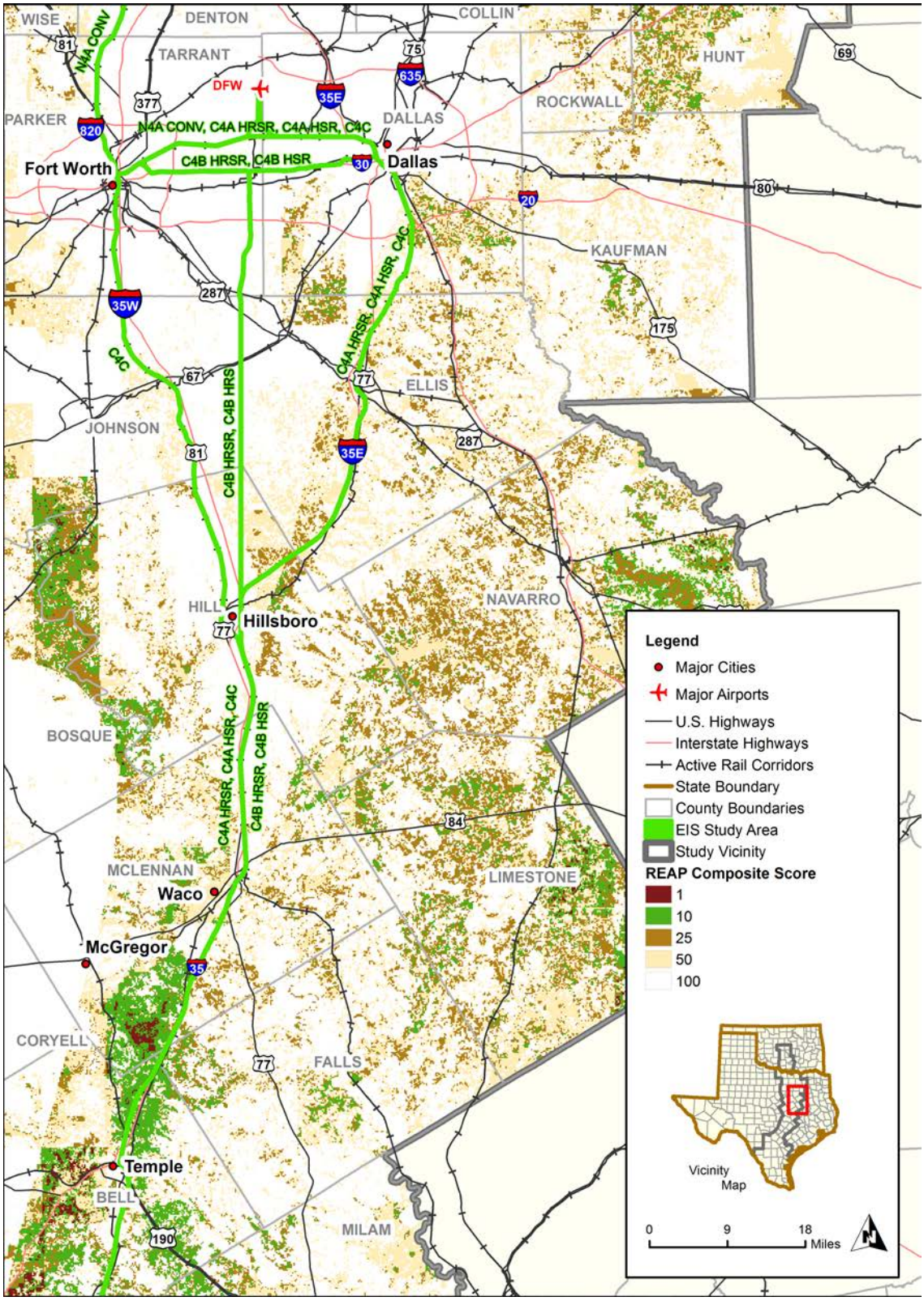


Figure 4-13: REAP Composite Scores – Central Section Alternatives

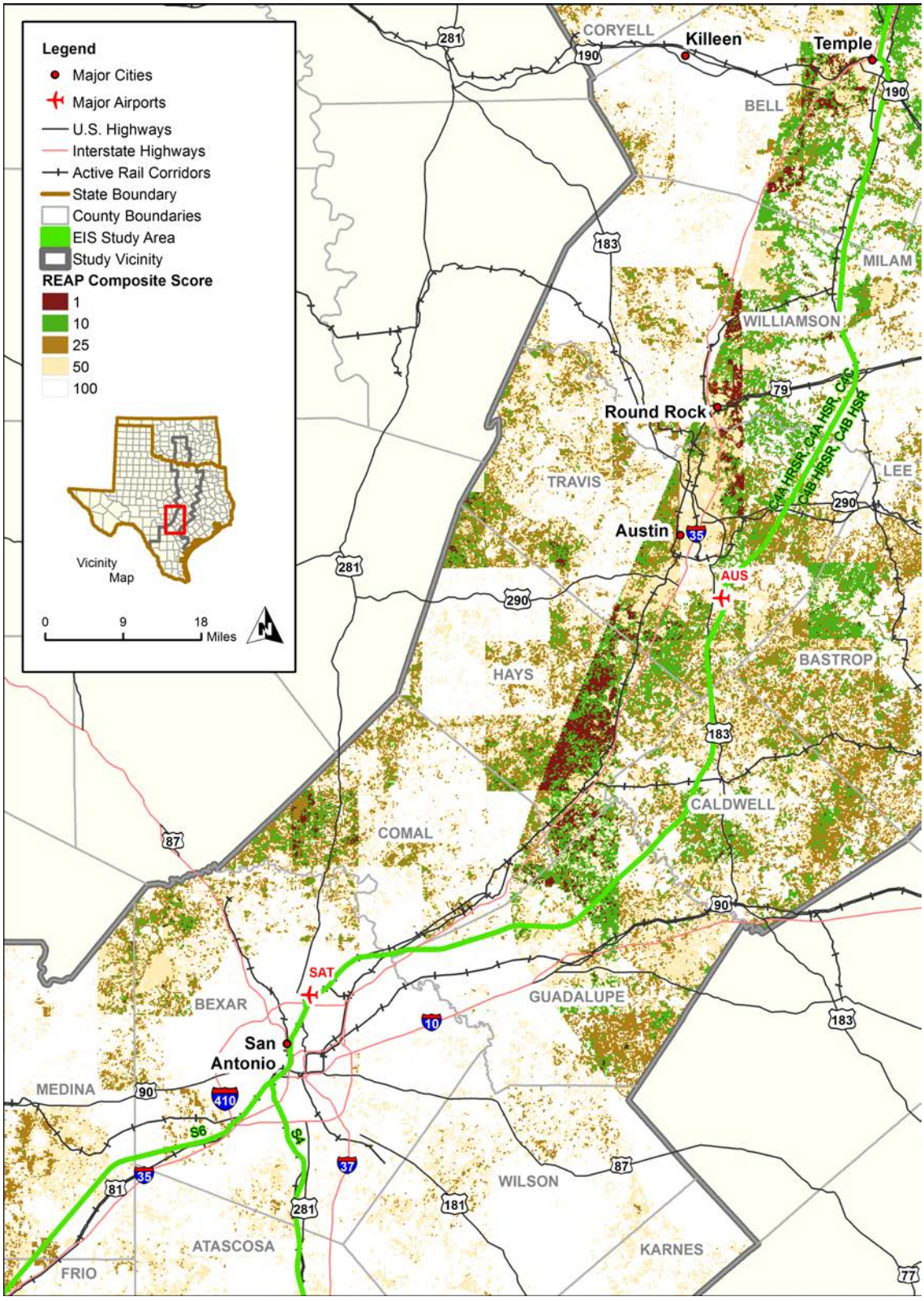


Figure 4-14: REAP Composite Scores – Central Section Alternatives

Table 4-5: Acres of Potential REAP Composite Ranking Land Coverages – Central Section

Ecological Importance Rank	Alternative					
	C4A (HrSR and HSR)		C4B (HrSR and HSR)		C4C (HrSR and HSR)	
	Acres of Potential REAP Ecological Importance Ranking Types within EIS Study Area	Total Area of EIS Study Area (High Value vs. All Other Land Types)	Acres of Potential REAP Ecological Importance Ranking Types within EIS Study Area	Total Area of EIS Study Area (High Value vs. All Other Land Types)	Acres of Potential REAP Ecological Importance Ranking Types within EIS Study Area	Total Area of EIS Study Area (High Value vs. All Other Land Types)
1	32	18% (3,537 acres)	32	18% (3,328 acres)	32	15% (3,556 acres)
10	1,884		1,839		1,884	
25	1,621		1,457		1,640	
50	3,407	82% (16,591 acres)	2,727	82% (15,347 acres)	3,613	85% (20,158 acres)
100	13,184		12,621		16,546	
Total (acres)	**20,128**	-	**18,675**	-	**23,714**	-

Source: EPA (2011).

As shown in Table 4-6, potentially 15 percent (3,659 acres) of the total acreage of the EIS Study Area for Alternative S4 is composed of higher ecological importance/value land coverage areas (Ecological Importance Rankings of 1, 10, and 25). Potentially 21 percent (1,796 acres) of the total acreage of the EIS Study Area for Alternative S6 is composed of higher ecological importance/value land coverage areas. As shown on Figures 4-15 through 4-18, most lands with higher ecological importance for Alternative S4 are near Brooks, Live Oak, Duval, and Webb counties.

Table 4-6: Acres of Potential REAP Composite Ranking Land Coverages – Southern Section

Ecological Importance Rank	Alternative			
	S4 (HrSR)		S6 (HrSR and HSR)	
	Acres of Potential REAP Ecological Importance Ranking Types within EIS Study Area	Total Area of EIS Study Area (High Value vs. All Other Land Types)	Acres of Potential REAP Ecological Importance Ranking Types within EIS Study Area	Total Area of EIS Study Area (High Value vs. All Other Land Types)
1	21	15% (3,659 acres)	31	21% (1,796 acres)
10	1,088		538	
25	2,550		1,227	
50	4,589	85% (21,533 acres)	2,389	79% (6,901 acres)
100	16,943		4,469	
Total (acres)	**25,192**	-	**8,653**	-

Source: EPA (2011).

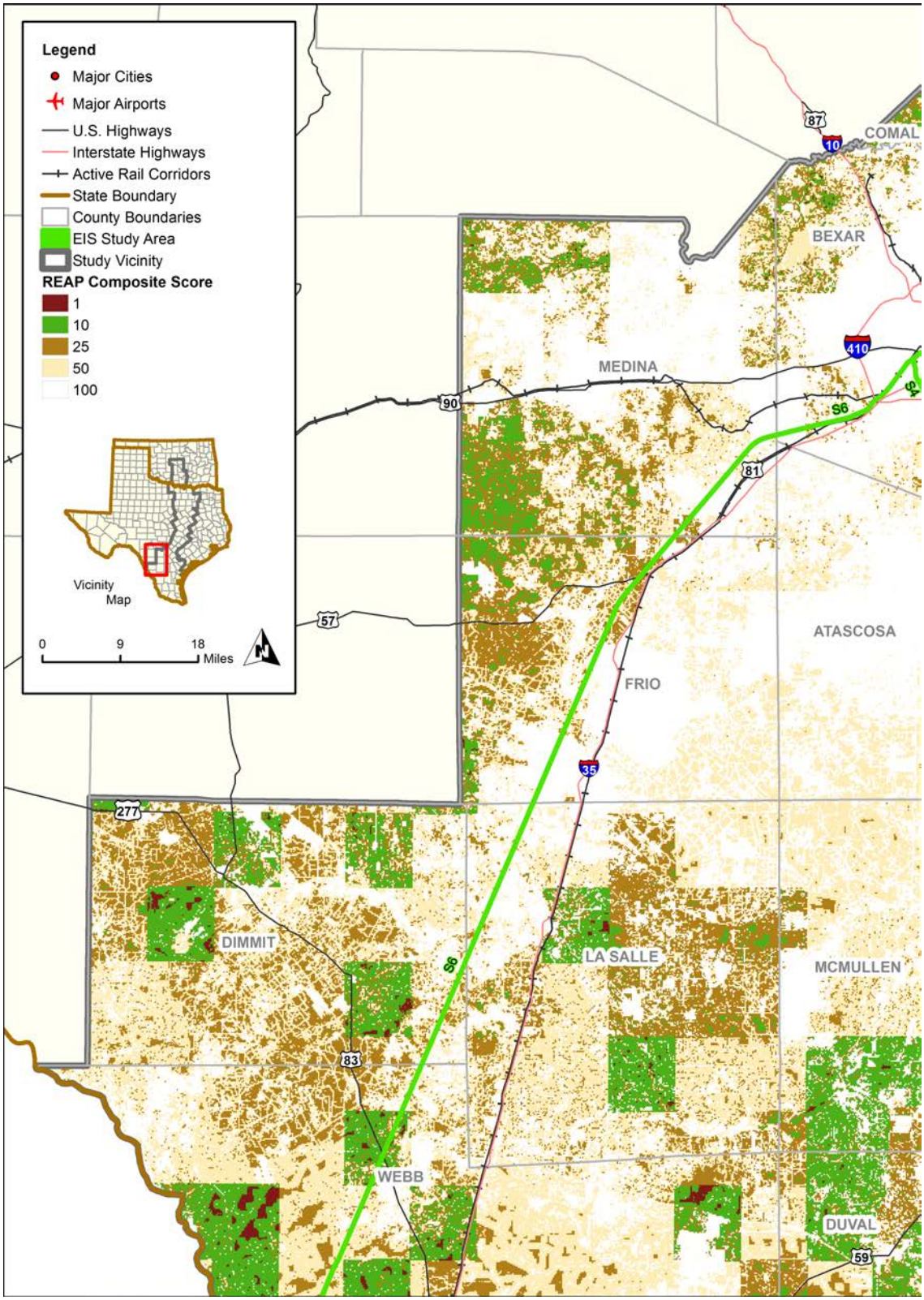


Figure 4-15: REAP Composite Scores – Southern Section Alternatives

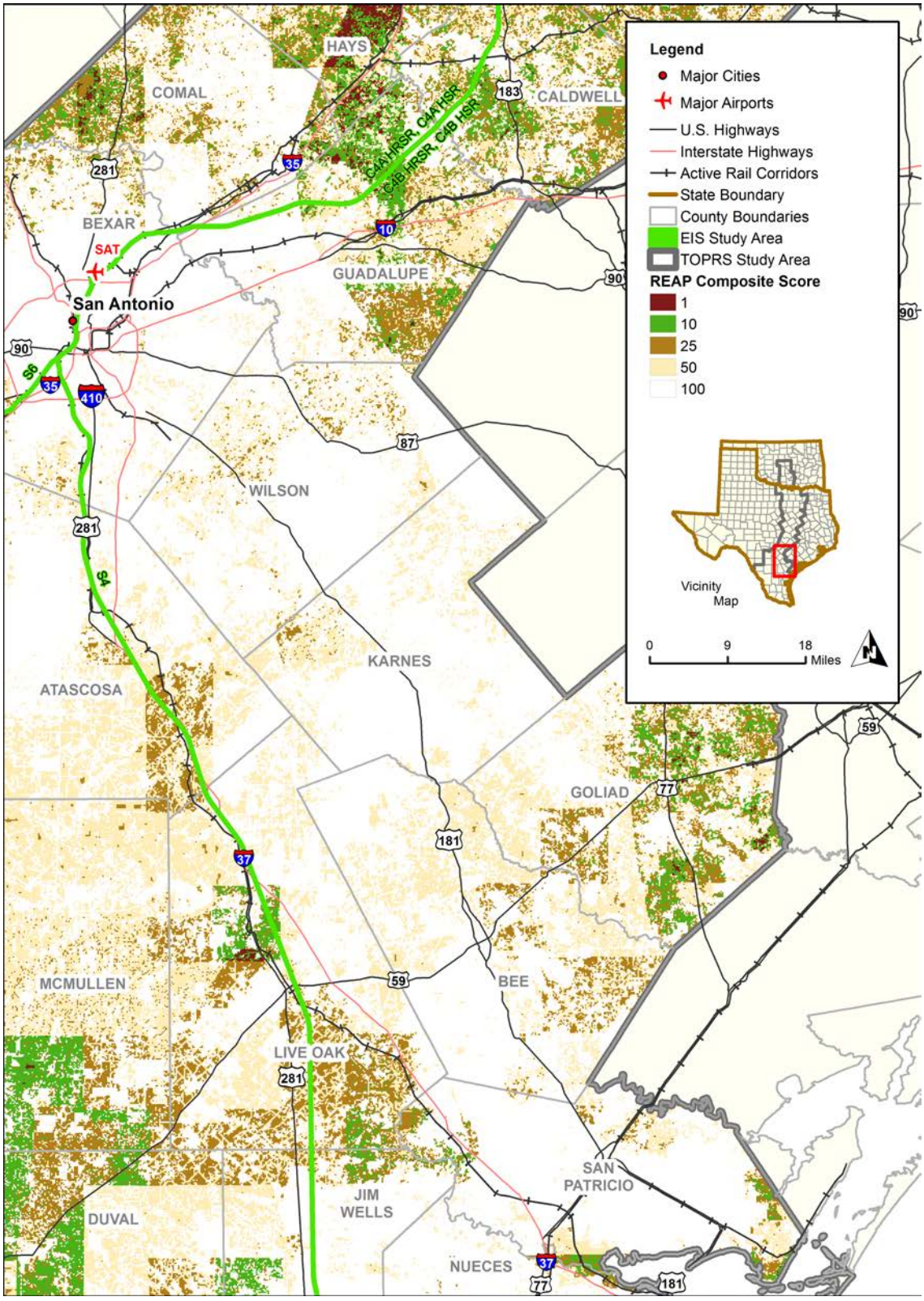


Figure 4-16: REAP Composite Scores – Southern Section Alternatives

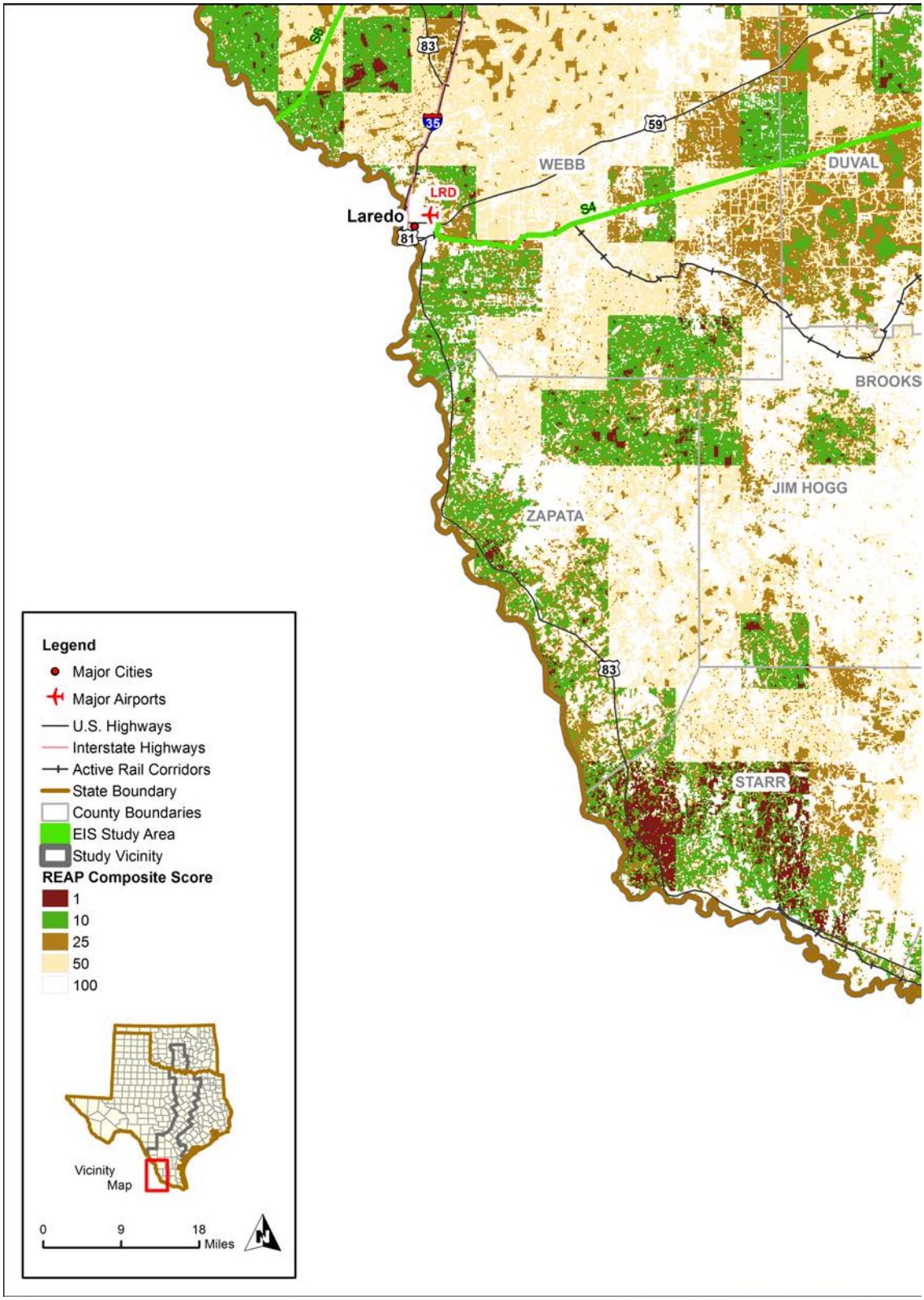


Figure 4-17: REAP Composite Scores – Southern Section Alternatives

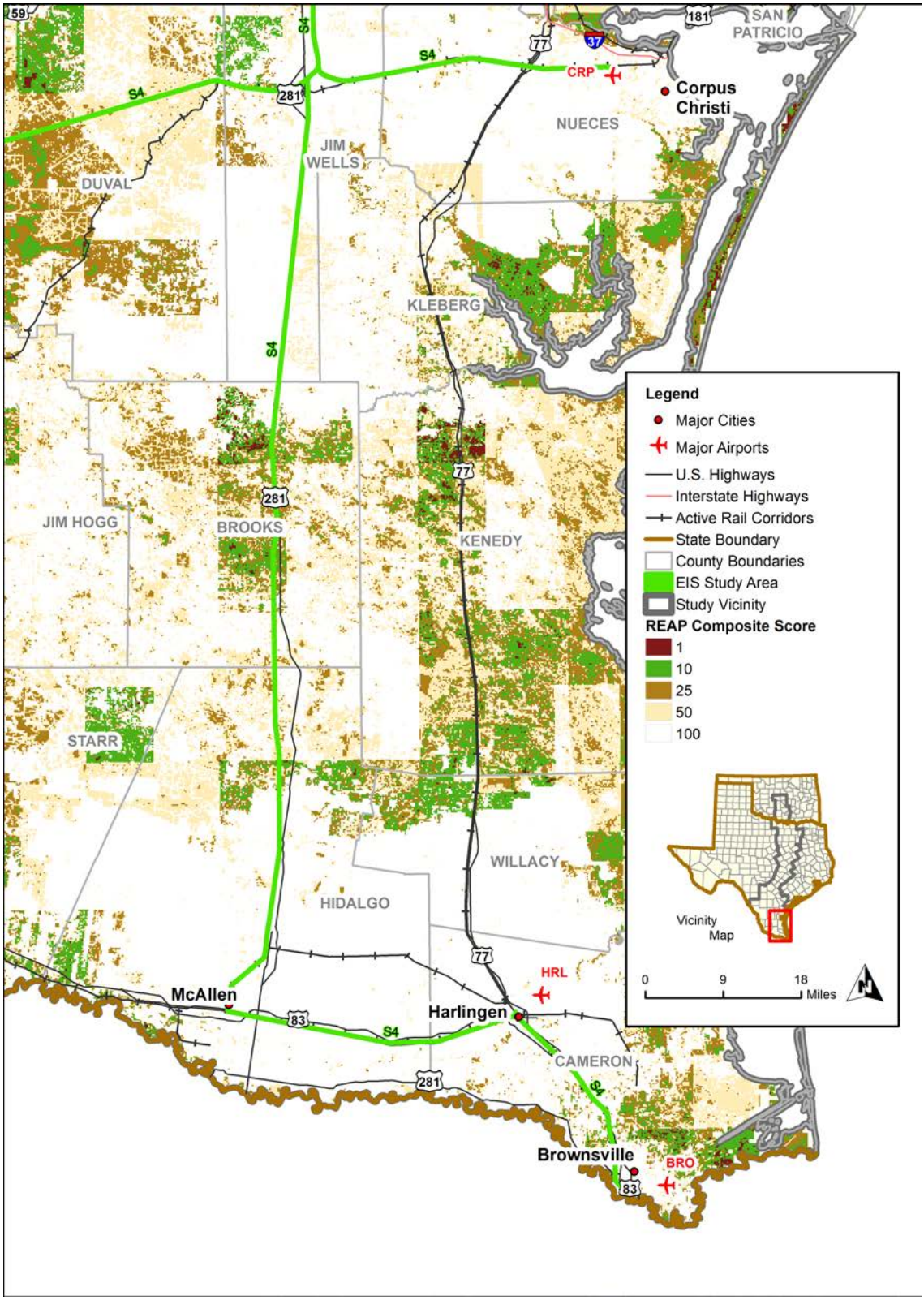


Figure 4-18: REAP Composite Scores – Southern Section Alternatives

5.0 Effects on Natural Ecological Systems and Wildlife

The potential effects and their relative intensity from the construction and operation (including maintenance) of the build alternatives and No Build Alternative on natural ecological systems and wildlife within the EIS Study Area are presented in this section. It is important to note that alignment routes in the Northern, Central, or Southern sections could be built alone, or combined with other section routes. More than one alternative in the Central or Southern sections could also be built in the future as the alternatives provide different service options for the independent destinations. Details about how the alternatives might connect would be analyzed at the project-level EIS phase. Therefore, this study does not summarize effects for the entire route from Oklahoma to Laredo/Brownsville. Rather, this analysis provides information about each individual build alternative compared against the No Build Alternative and, as applicable, compared with other alternatives for that same section.

Specific station locations were not analyzed as part of this service-level analysis. In general, stations are constructed in populated areas (urbanized city or suburban city) and not in undeveloped or rural locations. Therefore, potential effects associated with the construction and operation of stations on natural ecosystems and wildlife would not likely be more than the potential resources identified during the service-level analysis.

5.1 No Build Alternative

The No Build Alternative would not fulfill the Program's purpose and need, but is carried forward as a baseline alternative against which the build alternatives are compared. The No Build Alternative would consist of the existing transportation network, including roadway, passenger rail, and air travel in the Study Vicinity, as well as maintenance and planned improvements to these systems. These improvements and their evaluation at this service-level stage would require project-specific detail and assessment, which is not available. Anticipated natural ecological systems and wildlife effects on the EIS Study Area under the No Build Alternative would be consistent with existing and planned transportation system uses and potential expansions.

5.1.1 National Land Cover Database – Land Cover Types

Under the No Build Alternative, construction of the Program would not occur. Therefore, no significant effects on NLCD land cover types would be anticipated.

5.1.2 Wildlife Corridors and Assemblages and Sensitive Plant Communities

Under the No Build Alternative, construction of the Program would not occur. Therefore, no significant effects on wildlife corridors and assemblages or sensitive plant communities would be anticipated.

5.1.3 REAP Composite Scores

Under the No Build Alternative, construction of the Program would not occur. Therefore, no significant effects on higher ecological importance/value land coverage areas (Ecological Importance Rankings of 1, 10, and 25) would be anticipated.

5.2 Northern Section: Oklahoma City to Dallas and Fort Worth

This section provides potential effects and their relative intensity from the construction and operation of the build alternative in the Northern Section on natural ecological systems and wildlife.

5.2.1 National Land Cover Database – Land Cover Types

Alternative N4A would follow the BNSF rail alignment and the existing TRE tracks. The percentage of total non-developed land cover types within the Alternative N4A EIS Study Area would represent a negligible effect on undeveloped land when compared with the No Build Alternative because the majority of construction would occur within existing right-of-way. The potential operations effects associated with Alternative N4A with regard to developed land covers within the EIS Study Area would be considered negligible as the service would operate within existing rights-of-way.

5.2.2 Wildlife Corridors and Assemblages and Sensitive Plant Communities

The potential effects associated with construction of Alternative N4A would be negligible when compared with the No Build Alternative because Alternative N4A would be constructed within existing rights-of-way and would not be anticipated to have new effects on sensitive communities. Operations effects for Alternative N4A would be moderate because this alternative would not likely be fenced, making wildlife movement vulnerable to an increased risk for strikes from the additional rail traffic along the route. Such effects would have a noticeable effect on wildlife, but the effects could be reduced by the use of best management practices (BMPs).

5.2.3 REAP Composite Scores

The lands with higher ecological importance are just south of Norman, near Murray County, as the route passes through Love and Grayson counties. All other areas of Alternative N4A consist predominantly of lower ecological value land types; in these areas, the alternative would not substantially affect areas of higher ecological importance. The potential effects associated with construction and operation of Alternative N4A Conventional on higher ecological importance/value and land coverage types would be negligible, as most effects from this alternative would be during construction within existing rights-of-way that were disturbed by prior rail development.

5.2.4 Potential Construction Effects

Short-term effects on terrestrial biological resources and habitats would be anticipated as a result of constructing Alternative N4A and could include temporary to long-term effects on vegetation from clearing for construction equipment and the stockpiling of soil, ballast, or other construction

materials. Additionally, short-term noise, vibration, and air pollution from construction equipment and activities could affect nearby terrestrial habitats and their wildlife. However, such effects would negligible given the anticipated size of these potential construction effect areas compared with the amount of undisturbed habitat that would remain in the area. In addition, limited permanent effects would be expected as Alternative N4A would follow existing rail alignments.

5.2.5 Potential Operations Effects

Alternative N4A would follow the BNSF rail alignment and the existing TRE tracks. Potential operations effects would be considered moderate when compared with the No Build Alternative as Alternative N4A would not likely be fenced, making wildlife movement vulnerable to an increased risk for strikes from the additional rail traffic along the route. Such effects would have a noticeable effect on wildlife, but the effects could be mitigated by BMPs during operation.

5.3 Central Section: Dallas and Fort Worth to San Antonio

This section provides potential effects and their relative intensity from the construction and operation of the build alternatives in the Central Section on natural ecological systems and wildlife. The effect intensities would be the same between the higher-speed and high-speed alternatives; however, slight differences for operations-related effects on wildlife corridors/assemblages and sensitive plant communities are explained below and presented in Table 5-1.

5.3.1 National Land Cover Database – Land Cover Types

The percentages of total non-developed land covers within the EIS Study Areas for Alternatives C4A, C4B, and C4C would represent substantial potential construction-related effects on non-developed land when compared with the No Build Alternative. The northern extent of Alternatives C4A and C4C, near Dallas and Fort Worth, would follow the TRE tracks between Fort Worth and Dallas, then continue south on the BNSF alignment. The northern extent of Alternative C4B would follow a new elevated high-speed alignment in the IH-30 median between Fort Worth and Dallas. However, the majority of the three alternatives follow alignments outside existing transportation corridors starting in Waxahachie for Alternatives C4A and C4C and in Arlington for Alternative C4B. Construction of the portions of the alternatives outside existing transportation corridors would have a noticeable, inevitable effect on non-developed land within the EIS Study Area. The potential operations effects associated with Alternative C4A Higher-Speed Rail with regard to developed land covers within the EIS Study Area would be considered moderate because of disruption of wildlife species from noise and vibration from the additional rail traffic along the route.

5.3.2 Wildlife Corridors and Assemblages and Sensitive Plant Communities

The potential effects associated with construction of Alternatives C4A, C4B, and C4C with regard to animal assemblages and terrestrial communities would be considered substantial when compared with the No Build Alternative, as construction of the portions of the alternatives outside existing transportation corridors would have a noticeable, inevitable effect on these resources within the

EIS Study Area. High-speed rail options would likely be fully fenced, lessening the likelihood of strikes when compared with the higher-speed rail options. However, high-speed rail options would have a higher potential for operations effects overall on wildlife corridors and assemblages within the EIS Study Area than the higher-speed rail options as the noise and vibration generated by high-speed rail would travel farther than the noise generated by higher-speed rail. Overall, the potential operations effects on wildlife corridors and assemblages and sensitive plant communities would be moderate.

5.3.3 REAP Composite Scores

The percentages of the total land coverage of the EIS Study Area composed of higher ecological importance/value land coverage areas for the Central Section alternatives would represent a substantial construction-related effect when compared with the No Build Alternative. Construction of the portions of the Central Section alternatives outside existing transportation corridors would have a noticeable, inevitable effect on lands with higher ecological importance within the EIS Study Area. The operations effects would be moderate.

5.3.4 Potential Construction Effects

Short- and long-term effects on terrestrial biological resources and habitats would be anticipated as a result of constructing Alternatives C4A, C4B, and C4C and could include the clearing of vegetation for construction equipment and the stockpiling of soil, ballast, or other construction materials. Additionally, short-term noise, vibration, and air pollution from construction equipment and activities could affect terrestrial habitats and their wildlife. For Alternatives C4A and C4C, such effects would be considered substantial when compared with the No Build Alternative. Although Alternatives C4A and C4C would begin at the Fort Worth and follow the TRE tracks to Dallas, then continue on the BNSF alignment south toward Waxahachie (with Alternative C4C including a link from Hillsboro directly to Fort Worth parallel to the UPRR alignment), the alternatives would enter a new high-speed corridor outside of existing transportation corridors to travel south to Hillsboro and Taylor. For Alternative C4B, such effects would also be considered substantial when compared with the No Build Alternative. Alternative C4B would begin at both Fort Worth and Dallas, with trains following a new elevated high-speed alignment in the IH-30 median to Arlington. However, Alternative C4B would merge and turn south toward Hillsboro on a new high-speed alignment and then follow the same high-speed alignment as Alternative C4A from Hillsboro to Taylor and south to San Antonio.

5.3.5 Potential Operations Effects

Alternatives C4A, C4B, and C4C are higher- and high-speed rail alternatives, with much of their routes constructed within new alignments outside of existing transportation corridors. Potential operations effects from wildlife strikes would be considered moderate when compared with the No Build Alternative as these higher- or high-speed rail alternatives would likely be fully fenced. However, construction of fenced rail lines would result in significant effects on wildlife migration by

preventing or impeding movement across the railroad line. To mitigate such effects, the portions of the routes outside of existing transportation corridors could be designed with alternative pathways or underpasses to maintain wildlife migratory paths, reducing potential effects. Overall, the potential operations effects would be moderate.

5.4 Southern Section: San Antonio to South Texas

This section provides potential effects and their relative intensity from the construction and operation of the build alternatives in the Southern Section on natural ecological systems and wildlife. With the exception of operations-related impacts to wildlife corridors/assemblages and sensitive plant communities, the intensity of effects for the higher- and high-speed rail alternatives would be the same as described below and in Table 5-1.

5.4.1 National Land Cover Database – Land Cover Types

Alternative S4 would begin at the San Antonio VIA Transit Center station and continue southeast along the UPRR alignment to George West, where the alternative would enter a right-of-way outside of existing transportation corridors, to Alice. At Alice, there would be a stop where this alternative would divide into three legs. The first leg would travel west along the KCS Railway to San Diego, Texas, where it would enter a right-of-way outside of existing transportation corridors that would extend to Pescadito, just east of Laredo, and then rejoin the KCS Railway to end at the Laredo International Airport. The second leg would travel south along rebuilt abandoned track to McAllen, where a connection could be made to Harlingen and Brownsville over a proposed commuter rail service. The third leg would travel east along the KCS Railway to Corpus Christi to a new station facility at Corpus Christi International Airport.

Alternative S6 would begin at the San Antonio VIA Transit Center station and continue on a direct new corridor outside of existing transportation corridors to a station near the Laredo-Columbia Solidarity Bridge.

The construction of Alternative S4 would affect non-developed land during construction of the portions of the route outside of existing transportation corridors. However, significant portions of Alternative S4 would be constructed within existing routes (e.g., KCS Railway and revitalization of abandoned tracks), minimizing potential effects on resources to a moderate level. The potential operations effects associated with Alternative S4 with regard to developed land covers within the EIS Study Area would be considered moderate as significant portions of the alternative would operate within existing rights-of-way.

The construction of Alternative S6 would have a substantial effect on non-developed land when compared with the No Build Alternative as this alternative would follow a new direct corridor outside of existing transportation corridors from San Antonio to a station near the Laredo-Columbia Solidarity Bridge. Construction of this alternative would have a noticeable, inevitable effect on non-developed land within the EIS Study Area. The potential operations effects associated with

Alternative S6 on developed land covers within the EIS Study Area would be moderate because of disruption of wildlife species from noise and vibration from the rail traffic along the route. However, the route outside existing transportation corridors could be designed with alternative pathways or undercrossings to maintain wildlife migratory paths or corridors. In addition, the majority of effects on non-developed land covers would be during construction of the alternative.

5.4.2 Wildlife Corridors and Assemblages and Sensitive Plant Communities

The potential effects associated with construction of Alternative S4 with regard to wildlife corridors and assemblages or sensitive plant communities would be considered negligible when compared with the No Build Alternative, as this portion of Alternative S4 would be constructed within existing rights-of-way and would not likely create new effects on sensitive communities.

No wildlife corridors and assemblages or sensitive plant communities were identified within the EIS Study Area for Alternative S6. Under Alternative S6, potential construction and operations effects on wildlife corridors and assemblages and sensitive plant communities would be similar to the No Build Alternative.

5.4.3 REAP Composite Scores

The portions of Alternative S4 that cross Brooks and Live Oak Counties would be constructed on existing rights-of-way and would have a negligible effect on lands with higher ecological importance within the EIS Study Area. However, construction of the portions of Alternative S4 outside of existing transportation corridors, especially near Duval and Webb counties, would represent a substantial effect. Overall, the construction and operation of Alternative S4 would have a substantial effect (noticeable, inevitable effect) on lands with higher ecological importance within the EIS Study Area.

The majority of lands with higher ecological importance for Alternative S6 are near Dimmet and Webb counties. Alternative S6 would have a substantial effect on lands with higher ecological importance when compared with the No Build Alternative as construction and operation of this new alignment outside of existing transportation corridors would have a noticeable, inevitable effect on resources.

5.4.4 Potential Construction Effects

Short- and long-term effects on terrestrial biological resources and habitats would be anticipated as a result of constructing Alternatives S4 and S6 and could include the clearing of vegetation for construction equipment and the stockpiling of soil, ballast, or other construction materials. Additionally, short-term noise, vibration, and air pollution from construction equipment and activities could temporarily affect terrestrial habitats and their wildlife. For Alternative S4, such effects would be considered moderate when compared with the No Build alternative as a portion of this alternative would be constructed on existing rail rights-of-way. For Alternative S6, such effects would be considered substantial when compared with the No Build Alternative as this alternative would begin at the San Antonio VIA Transit Center station and continue on a new, direct high-speed

corridor outside of existing transportation corridors to a station near the Laredo-Columbia Solidarity Bridge. Construction of the new route outside of existing transportation corridors would have a noticeable, inevitable effect on resources within the EIS Study Area.

5.4.5 Potential Operations Effects

Alternative S4 is a higher-speed rail alternative, and Alternative S6 is a higher- and high-speed rail alternative. Potential operations effects from wildlife strikes would be considered negligible when compared with the No Build Alternative as these higher- or high-speed rail alternatives would likely be fully fenced. However, construction of fenced rail lines would result in significant effects on wildlife migration by preventing or impeding movement across the railroad line. To mitigate such effects, the portions of the routes outside of existing transportation corridors could be designed with alternative pathways to maintain wildlife migratory paths, reducing potential effects.

5.5 Summary of Potential Effects

Table 5-1 summaries the qualitative assessment of potential effects (negligible, moderate, or substantial) for the alternatives. As stated previously, it is important to note that the acreages listed below are not the actual areas of effect associated with construction and operation of any of the alternatives. This service-level analysis uses the 500-foot EIS Study Area to determine the types of resources that may be affected and, more importantly, the relative magnitude of resources that may be affected. As stated previously, alignment routes could be built alone, or combined with other section routes. More than one alternative in the Central or Southern sections could also be built in the future as the alternatives provide different service options for the independent destinations. Details about how alternatives might connect would be analyzed at the project-level EIS phase.

5.6 Subsequent Analysis and Avoidance, Minimization, and Mitigation Strategies

Once a preferred alternative is selected, field investigations or surveys will be conducted to determine the likelihood of effects on sensitive habitats within the EIS Study Area and to determine the extent and type of general and sensitive natural ecological systems and wildlife, including formal biological assessments for protected species and consultation with USFWS, TPWD, and ODWC, as needed. The boundaries of sensitive wildlife corridors, sensitive plant communities, or areas identified as having a higher ecological importance/value land coverage will be confirmed to avoid or minimize effects on these areas. Habitat and species assessments will be conducted in accordance with federal and state regulations.

Avoidance and minimization of project-level effects would be incorporated when feasible. If effects cannot be avoided or minimized, mitigation strategies would be implemented. Mitigation measures to reduce or eliminate effects on sensitive habitats and species would be coordinated with federal and state agencies. To minimize construction effects and minimize disturbance of terrestrial and

aquatic habitats and wildlife, BMPs would be used during construction and operations. BMPs may include the following:

- Construct multiple and varying crossing structures at a wildlife crossing point to provide connectivity for species likely to use a given area.
- Determine and construct the appropriate number, spacing, and location of crossing structures based on species-specific information.
- Monitor structures for obstructions, such as detritus or silt blockages, that impede movement.
- Manage human activity near crossing structures, with use of measures such as fencing and signage.
- Routes outside existing transportation corridors could be designed with alternative pathways or undercrossings to maintain wildlife migratory paths or corridors.

Local ordinances would be followed for erosion, sediment, and stormwater controls during construction to minimize potential effects on aquatic resources. For terrestrial habitats that might be temporarily disturbed by construction, preconstruction conditions or better would be restored once construction is complete.

Table 5-1: Summary of Acreages and Effects

Resource	No Build[a]	Northern Section		Central Section						Southern Section			
		N4A (CONV)		C4A (HrSR and HSR)		C4B (HrSR and HSR)		C4C (HrSR and HSR)		S4 (HrSR)		S6 (HrSR and HSR)	
Land Cover Type		Acres of Land Cover	Total Area of EIS Study Area	Acres of Land Cover	Total Area of EIS Study Area	Acres of Land Cover	Total Area of EIS Study Area	Acres of Land Cover	Total Area of EIS Study Area	Acres of Land Cover	Total Area of EIS Study Area	Acres of Land Cover	Total Area of EIS Study Area
Developed, High Intensity	N/A	1,249	46%	1,347	38%	1,318	36%	1,533	38%	776	32%	84	8%
Developed, Low Intensity	N/A	2,046		1,667		1,374		2,108		2,888		202	
Developed, Medium Intensity	N/A	1,625		1,809		1,810		2,080		2,019		97	
Developed, Open Space	N/A	2,027		2,741		2,140		3,401		2,315		318	
Barren Land (Rock/Sand/Clay)	N/A	53	<1%	48	<1%	30	<1%	60	>1%	260	1%	108	1%
Cultivated Crops	N/A	960	6%	3,013	15%	3,252	17%	3,350	14%	2,174	9%	1,177	14%
Deciduous Forest	N/A	1,748	12%	1,284	6%	812	4%	1738	7%	340	1%	112	1%
Emergent Herbaceous Wetlands	N/A	8	<1%	18	<1%	10	<1%	18	<1%	64	<1%	9	<1%
Evergreen Forest	N/A	15	<1%%	261	1%	237	1%	264	1%	41	<1%	58	1%
Grassland/Herbaceous	N/A	4,465	30%	4,274	21%	3,886	21%	5,415	23%	2,330	9%	1,729	20%
Mixed Forest	N/A	0	0	63	<1%	63	<1%	63	<1%	24	0%	52	1%
Open Water	N/A	120	1%	80	<1%	59	<1%	84	<1%	45	<1%	11	<1%
Pasture/Hay	N/A	783	5%	1,404	7%	1,602	9%	1,453	6%	2,948	12%	578	7%
Shrub/Scrub	N/A	2	<1%	1,720	9%	1,716	9%	1,728	7%	8,574	34%	3,852	44%
Woody Wetlands	N/A	7	<1%	400	2%	366	2%	418	2%	396	2%	279	3%
Qualitative Analysis	-		Negligible		Substantial		Substantial		Substantial		Moderate		Substantial
Wildlife Corridors and Assemblages and Sensitive Plant Communities (potential acres in EIS Study Area/Qualitative Analysis)													
Wildlife Corridors and Assemblages/Rookeries	0	85 Negligible		107 Substantial		66 Substantial		107 Substantial		0 Negligible		0 Negligible	
Sensitive Plant Communities	0	0 Negligible		628 Substantial		628 Substantial		628 Substantial		678 Negligible		0 Negligible	
REAP Composite Scores/Ecological Importance Rank													
		Acres within EIS Study Area	Total Area of EIS Study Area	Acres within EIS Study Area	Total Area of EIS Study Area	Acres within EIS Study Area	Total Area of EIS Study Area	Acres within EIS Study Area	Total Area of EIS Study Area	Acres within EIS Study Area	Total Area of EIS Study Area	Acres within EIS Study Area	Total Area of EIS Study Area
1	N/A	100	10%	32	18%	32	18%	32	15%	21	15%	31	21%
10	N/A	665		1,884		1,839		1,884		1,088		538	
25	N/A	770		1,621		1,457		1,640		2,550		1,227	
50	N/A	1,829	90%	3,407	82%	2,727	82%	3,613	85%	4,589	85%	2,389	79%
100	N/A	11,744		13,184		12,621		16,546		16,943		4,469	
Total (acres)	N/A	**15,107**	-	**20,128**	-	**18,675**	-	**23,714**	-	**25,193**	-	**8,653**	-
Qualitative Analysis	-		Negligible		Substantial		Substantial		Substantial		Substantial		Substantial

[a] The No Build Alternative, as identified, includes existing and potential expansion of roadway, passenger rail, and air travel facilities within the EIS Study Area; however, for the service-level evaluation, identifying levels of effect from potential expansion of those facilities is speculative and would be dependent on project-specific analysis

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