DRAFT ENVIRONMENTAL IMPACT STATEMENT

LOOP 9, SEGMENT A

US 67 TO IH 35E

Dallas and Ellis Counties, Texas

CSJ: 2964-10-006

October 2022

Prepared by the Texas Department of Transportation

Submitted Pursuant to 42 USC § 4332(2)(c)
and 49 USC § 303

Cooperating Agencies:

United States Environmental Protection Agency
United Stated Army Corps of Engineers

This Draft EIS presents the purpose and need for this project and evaluates the potential environmental consequences of multiple reasonable alternatives for this project. The reasonable alternatives evaluated are four alignment alternatives (Alternatives 1 – 4), four alternative modifications (Modifications A-D) and a No-Build Alternative. Potential environmental impacts of the alternatives are evaluated across multiple resource areas, including community impacts, visual/aesthetic impacts, cultural resources, protected lands, water resources, biological resources, air quality, hazardous materials, traffic noise, and induced growth. This Draft EIS identifies Alternative 3 B/C/D as the Recommended Preferred Alternative.

For additional information on this document, please contact: Mr. Doug Booher, Director of Environmental Affairs, Texas Department of Transportation, 125 East 11th Street, Austin, Texas 78701; Telephone: (512) 416-2663.

Comments on the Draft Environmental Impact Statement are due **January 3, 2023**.

After circulation of the Draft Environmental Impact Statement and consideration of comments received, TxDOT will issue a single Final Environmental Impact Statement and Record of Decision document pursuant to 23 USC §139(n)(2) unless TxDOT determines statutory criteria or practicability considerations preclude issuance of the combined document.

This environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 USC § 327 and a Memorandum of Understanding dated December 9, 2019, and executed by FHWA and TxDOT.

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Director, Environmental Affairs Division
Texas Department of Transportation

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

The proposed Loop 9, Segment A project would provide a facility creating a direct east-west link from United States (US) Highway 67 to Interstate Highway 35 East (IH 35E) through Dallas and Ellis Counties, Texas. This proposed project would likely be constructed in phases based on traffic needs and project funding. Sufficient design will be conducted during the first phase of project development to determine the right of way (ROW) requirements for the full phase ultimate facility. This would allow the Texas Department of Transportation (TxDOT) to purchase the necessary ROW for the entire future facility during Phase 1 of the project for this corridor.

ES 1.0 Purpose and Need for the Proposed Project

The need for the Loop 9, Segment A project is to address transportation demand resulting from population and economic growth in the region, system linkages, and connectivity among the existing roadway facilities. Loop 9, Segment A would provide a direct link from US 67 to IH 35E and would serve the residents in the area.

Factors driving the need for substantial transportation improvements in the proposed Loop 9, Segment A study area include:

- Population growth: Population and economic growth, as indicators for travel demand, is forecasted to increase nearly 32.5% in Dallas County and approximately 84% in Ellis County between 2017 to 2045.
- Transportation Demand: Increasing development of industrial and commercial facilities has positively affected economic growth for communities within the study area, which has in-turn increased transportation demand. Additionally, there is a demand to promote intermodal connections in the study area and surrounding Dallas-Fort Worth region. All roadways in the study area would experience deterioration in Level of Service (LOS) between 2018 and 2045. Therefore, the transportation demand exceeds the current and future capacity of the existing transportation infrastructure.
- System linkage: Within the study area, the existing roadway system provides sufficient north-south radial access along IH 35E and US 67 but lacks continuous east-west transportation facilities to serve these growing communities. The existing roadways serve local street access and do not provide sufficient east-west linkage for the current or proposed traffic to north-south major roadway networks.
- Connectivity of existing roadway facilities: The current transportation infrastructure does not adequately provide connectivity between the communities in the study area, thereby inhibiting emergency response as well as, access to services, employers, major freight and trucking yards, transit services, and other community facilities.

The purpose of the proposed Loop 9, Segment A project is to provide an east-west transportation facility to serve the communities in the area, reduce local area congestion and travel time, and provide support for economic development within the region.

ES 2.0 Alternatives Analysis

The alternatives analysis approach for this DEIS allowed for a full comparison and evaluation of alternatives throughout the entire environmental process. The process led to the selection of a single Recommended Preferred Alternative that would best serve the need and purpose of the proposed Loop 9, Segment A Project.

ES 2.1 Previous Studies and Reports

Loop 9 has been identified in transportation plans for the last 40 years. Originally conceived as a circumferential loop around the Dallas metropolitan area, changes in demographics, legislation and forecasted traffic growth have altered the development of the project as an "outer loop".

There have been several studies on the proposed Loop 9 concept, listed below, each of which resulted in a need that correlates with the proposed transportation improvements documented in this DEIS.

- Loop 9 Feasibility Study/Major Investment Study (1995-1997): The South Outer Loop (Loop 9) Feasibility Study/Major Investment Study (MIS) was authorized by Dallas County in 1995 to help address future regional transportation needs between I-20 and State Highway (SH) 360. The primary objectives of the study were to identify the type of facility that should ultimately be constructed, establish an approximate centerline in sufficient detail for affected jurisdictions and property owners to understand, and seek community consensus on a locally preferred alternative.
- Major Investment Study/Draft Environmental Impact Statement (2002-2006): The Loop 9 Feasibility Study was reinitiated to identify viable corridor alignments and modal alternatives for the study area. These alternatives represented a full range of alternatives consisting of 14 initial improvement alternatives, including a No-Build Alternative, a Transportation Systems Management (TSM)/ Transportation Demand Management (TDM) Alternative, and numerous Build Alternatives.
- Preliminary Loop 9 Southeast Draft Environmental Impact Statement (2011): Between 2006 and 2011, TxDOT prepared the Preliminary Loop 9 Southeast DEIS to consider substantial design modifications so that the project would conform to TxDOT high-speed roadway design criteria. Changes in TxDOT policy, the No Action on the Trans Texas Corridor-35 EIS, funding constraints for transportation projects, and the current economic climate at the time impacted the assumptions and development of the Regional Transportation Council (RTC) approved *Mobility 2035: The Metropolitan Transportation Plan for North Central Texas* (*Mobility 2035*). As a result of these changes, work on the Loop 9 Southeast Preliminary DEIS was suspended until a determination on how the project should proceed was made.
- Loop 9 Southeast Corridor/Feasibility Study (2012-2014): TxDOT began the Feasibility Study for the revised Loop 9 project concept from US 67 to I-20 (Southeast Project). The purpose of the Feasibility Study was to assist in guiding future infrastructure investments to advance the proposed Loop 9 Southeast Project. The Feasibility Study also followed a collaborative and integrated Planning and Environment Linkages (PEL) approach to transportation decision-making that considered environmental, community, and economic goals early in the transportation planning process for use in the NEPA process.

In September 2012, TxDOT began the Loop 9 Southeast Corridor/Feasibility Study (Feasibility Study) for the revised Loop 9 project concept from US 67 to Interstate (I)-20 (Southeast project). The purpose of the Feasibility Study was to assist in guiding future infrastructure investments to advance the proposed Loop 9 Southeast project. The Feasibility Study follows the Planning and Environment Linkages (PEL) approach to help evaluate environmental issues early in the planning process. The Feasibility Study incorporates more flexible design standards, a reduced ROW, and a shorter project length, and minimizes the overall impacts when compared to past options. These changes alter the project to be more closely aligned with the transportation and development needs of the southeast Dallas region.

The ultimate goal of the Feasibility Study was to develop a program of independent projects to advance into the National Environmental Policy Act (NEPA) process based on mobility needs, engineering and environmental data, and coordination with the North Central Texas Council of Governments (NCTCOG), local officials, the public, and resource agencies. Based on discussions with local governments and major stakeholders within the study area along with consideration of logical termini (project endpoints such as major thoroughfares), and independent utility (the ability of a transportation project to function without recurring additional transportation improvements), the project area was divided into three major corridors for development: Corridor A, Corridor B and Corridor C.

The proposed Loop 9 project discussed in this document represents Corridor A as identified in the Feasibility Study. For the purpose of this report, Corridor A is referred to as Loop 9, Segment A henceforth.

ES 2.2 Alternative Transportation Modes

The initial screening step for the full range of alternatives was to screen various transportation modes against the project's purpose and need. Transportation System Management (TSM)/Intelligent Transportation Systems (ITS), Travel Demand Management (TDM), bus and rail transit, HOV lanes, and access roadway expansion were considered and were eliminated from further study because they do not increase the overall capacity needed to address future congestion needs. As described in **Section 2.1**, the study area lacks an east-west corridor needed to address travel demand and connectivity to other major north-south roadways. These alternative transportation measures are not designed to address this type of problem and therefore cannot offer a complete solution for future travel needs. Elimination of alternative transportation modes from detailed study is consistent with 23 CFR 771. 123(c). Even though these alternative transportation modes were eliminated from further study on their own, TSM, TDM, and modal alternatives currently in the *Mobility 2045 Update* remain complement to the Build Alternatives. While bicycle and pedestrian facilities could be included in the final design of the proposed roadway, they were not treated as a stand-alone alternative transportation mode.

ES 2.3 Screening Summary of the DEIS Reasonable Alternative Alignments

ES 2.3.1 No-Build Alternative

The No-Build Alternative assumes no major investments in transportation improvements in the project corridor beyond those already programmed and funded by the city of Cedar Hill, city of Ovilla, city of Glenn Heights, city of Red Oak, Dallas and Ellis Counties, Dallas Area Rapid Transit (DART), TxDOT, or federal entities by the year 2045. These programmed and funded improvements are

included in the approved Metropolitan Transportation Plan (MTP) [NCTCOG *Mobility 2045 Update*], Capital Improvement Plans (CIP) for each of the cities, and the 2021-2024 *Transportation Improvement Program* (TIP). The No-Build Alternative is considered the baseline alternative and was carried throughout the DEIS for comparison to other alternatives.

ES 2.3.2 Build Alternatives

Common Alignment

The Common Alignment is the portion of the proposed alignment that is the same for each of the build alternatives. The proposed roadway shares a Common Alignment on the east and west ends. From US 67, the Common Alignment heads east for a distance of approximately 0.8 miles until intersecting Tar Road where the alternatives diverge from the Common Alignment. The Common Alignment in this location runs parallel to and just south of the Dallas/Ellis County line in Ellis County. A grade separation at the BNSF Railroad would be constructed in this portion of the Common Alignment. In addition, the western limit of the project would tie into a grade separation at US 67 which would be constructed under a separate project prior to construction of Loop 9, Segment A.

After the divergence of the build alternatives, the Common Alignment comes back together approximately 0.4 miles east of S. Duncanville Road. At this point, it follows a generally easterly direction for approximately 4.6 miles before terminating at the intersection with IH 35E. This portion of the Common Alignment includes intersections with four major crossroads: S. Cockrell Hill Road, S. Westmoreland Road, S. Hampton Road, and Uhl Road. The eastern limit of the project would tie into a grade separation at IH 35E which would be constructed under a separate project prior to construction of Loop 9, Segment A.

Alternative 1

Alternative 1 (9.4 miles), the north-central alternative, diverges from the Common Alignment at Tar Road heading east, then immediately turns northeast before crossing S. Joe Wilson Road and converging back with the Common Alignment.

Alternative 2

Alternative 2 (9.39 miles), the south-central alternative, diverges from the Common Alignment at Tar Road heading east, then immediately turns northeast; however, this alignment follows a straighter path between Tar Road and S. Joe Wilson Road. After S. Joe Wilson Road, the alternative continues in a northeast direction before converging back with the Common Alignment.

Alternative 3

Alternative 3 (9.46 miles), the southernmost alternative, diverges from the Common Alignment at Tar Road and keeps east, centered on existing Knight Street. At the end of Knight Street, the alternative shifts northeast before crossing S. Joe Wilson Road and converging back with the Common Alignment.

Alternative 4

Alternative 4 (9.47 miles), the northernmost alternative, diverges from the Common Alignment at Tar Road, heading northeast, then continues for approximately 2 miles before turning east and crossing S. Joe Wilson Road. After S. Joe Wilson Road, the alignment continues east, north of and parallel to

Bear Creek Road, before converging back with the Common Alignment approximately 0.4 miles east of S. Duncanville Road.

Design Modifications

As a result of public and stakeholder comments following the February 2020 Public Meetings and continued stakeholder meetings, four modifications (Modifications A-D) to the four alternatives were developed and are also being evaluated. Modifications A and B to the Common Alignment were developed to reduce potential residential impacts at Lindell Estates. Modification C was developed to optimize the intersection with S. Westmoreland Road and reduce potential residential impacts to homes on Shady Meadows Lane. Modification D was developed along Alternative 3 to reduce potential residential and environmental impacts near Knight Street.

Modification A

Modification A begins approximately 0.27 miles west of Hampton Road where it diverges slightly to the south of the Common Alignment, continuing east, before crossing back over the Common Alignment approximately 0.36 miles east of Hampton Road. At this point, Modification A travels northeast of the Common Alignment for a distance of 1.5 miles before converging back with the Common Alignment. At its furthest point, the centerline of Modification A is 0.15 miles north of the centerline of the Common Alignment.

Modification B

Modification B follows the same path as Modification A; however, it does not extend as far north of the Common Alignment. At its furthest point, the centerline of Modification B is 0.07 miles north of the of the centerline of the Common Alignment.

Modification C

Modification C, along the Common Alignment, begins approximately 0.86 miles west of S. Westmoreland Road. At this point, Modification C diverges south of the Common Alignment and then continues east past S. Westmoreland Road for a distance of 0.19 miles before converging back with the Common Alignment. At its furthest point, the centerline of Modification C is 0.03 miles north of the centerline of the Common Alignment. Modification C is separate from, and further west of, Modifications A and B.

Modification D

Modification D begins approximately 0.43 miles west of Tar Road. At this point, it begins to shift north of Alternative 3. Modification D continues east, crossing Tar Road and running parallel with Knight Street. At its furthest point, the centerline of Modification D is approximately 300 feet north of the centerline of Alternative 3. After Knight Street, Modification D turns northeast before converging back with Alternative 3 approximately 0.04 miles west of S. Joe Wilson Road.

ES 2.4 Screening of the Recommended Preferred Alternative

Table ES-1 summarizes the impacts discussed throughout the DEIS for the alternative alignments.

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Table ES-1: Screening Summary of Draft Environmental Impact Statement Reasonable Alternative Alignments

Alternative Alignment Option[1,2,3]	Area (acres)	Community Impacts			Natural Resources													
					State and Federal Protected Species[4]				EMST Habitat Obs.	Water Resources				Flood Zones			Farmlands	
		Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils
Alternative 1																		
Alt 1	598	57	53	4	2	1	6	29	32	2.16	0.78	15,250	23	18.6	6.7	1.4	127	157
Alt 1 Mod A	594	31	55	4	2	1	6	29	32	2.04	1.59	14,760	23	18.6	6.7	1.4	136	161
Alt 1 Mod A & C	587	30	55	4	2	1	6	29	33	2.04	1.59	15,031	22	19.0	8.3	1.8	130	157
Alt 1 Mod B	594	34	53	4	2	1	6	29	32	2.78	1.40	14,881	23	18.6	6.7	1.4	128	164
Alt 1 Mod B & C	588	33	53	4	2	1	6	29	33	2.78	1.40	15,152	22	19.0	8.3	1.8	122	160
Alt 1 Mod C	591	56	53	4	2	1	6	29	33	2.16	0.78	15,521	22	19.0	8.3	1.8	120	154
Alternative 2																		
Alt 2	596	57	54	4	2	1	6	29	39	2.23	3.39	14,554	22	17.8	4.3	1.3	136	156
Alt 2 Mod A	592	31	56	4	2	1	6	29	39	2.12	4.20	14,063	22	17.8	4.3	1.3	145	159
Alt 2 Mod A & C	586	30	56	4	2	1	6	29	40	2.12	4.20	14,334	21	18.3	5.8	1.7	139	156
Alt 2 Mod B	593	34	54	4	2	1	6	29	39	2.85	4.01	14,185	22	17.8	4.3	1.3	137	162
Alt 2 Mod B & C	586	33	54	4	2	1	6	29	40	2.85	4.01	14,456	21	18.3	5.8	1.7	131	159
Alt 2 Mod C	590	56	54	4	2	1	6	29	40	2.23	3.39	14,825	21	18.3	5.8	1.7	129	152
Alternative 3																		
Alt 3	605	64	58	3	2	1	6	29	32	3.14	2.48	14,435	21	22.3	4.3	1.3	131	156
Alt 3 Mod A	601	38	60	3	2	1	6	29	32	3.03	3.29	13,944	21	22.3	4.3	1.3	140	159
Alt 3 Mod A & C	594	37	60	3	2	1	6	29	33	3.03	3.29	14,215	20	22.8	5.8	1.7	134	156
Alt 3 Mod A & D	603	34	61	3	2	1	6	29	33	3.63	3.31	13,895	20	24.1	4.3	1.3	143	156
Alt 3 Mod A, C & D	596	33	61	3	2	1	6	29	34	3.63	3.31	14,166	19	24.5	5.8	1.7	137	153
Alt 3 Mod B	601	41	58	3	2	1	6	29	32	3.76	3.10	14,066	21	22.3	4.3	1.3	132	162
Alt 3 Mod B & C	595	40	58	3	2	1	6	29	33	3.76	3.10	14,336	20	22.8	5.8	1.7	126	159
Alt 3 Mod B & D	603	37	59	3	2	1	6	29	33	4.36	3.11	14,016	20	24.1	4.3	1.3	135	159
Alt 3 Mod B, C & D	597	36	59	3	2	1	6	29	34	4.36	3.11	14,287	19	24.5	5.8	1.7	128	156
Alt 3 Mod C	598	63	58	3	2	1	6	29	33	3.14	2.48	14,706	20	22.8	5.8	1.7	124	152
Alt 3 Mod C & D	600	59	59	3	2	1	6	29	34	3.75	2.49	14,656	19	24.5	5.8	1.7	127	149
Alt 3 Mod D	607	60	59	3	2	1	6	29	33	3.75	2.49	14,385	20	24.1	4.3	1.3	134	153

Table ES-1: Screening Summary of Draft Environmental Impact Statement Reasonable Alternative Alignments (continued)

Alternative Alignment Option[1,2,3]	Area (acres)	Community Impacts			Natural Resources													
					State and Federal Protected Species[4]				EMST Habitat Obs.	Water Resources				Flood Zones			Farmlands	
		Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils
Alternative 4																		
Alt 4	604	57	59	3	2	1	6	29	35	2.09	1.16	13,768	21	12.2	6.5	1.8	139	170
Alt 4 Mod A	600	31	61	3	2	1	6	29	35	1.97	1.98	13,278	21	12.2	6.5	1.8	148	173
Alt 4 Mod A & C	594	30	61	3	2	1	6	29	36	1.97	1.98	13,549	20	12.7	8.1	2.1	142	170
Alt 4 Mod B	601	34	59	3	2	1	6	29	35	2.71	1.78	13,399	21	12.2	6.5	1.8	140	176
Alt 4 Mod B & C	594	33	59	3	2	1	6	29	36	2.71	1.78	13,670	20	12.7	8.1	2.1	134	173
Alt 4 Mod C	598	56	59	3	2	1	6	29	36	2.09	1.16	14,039	20	12.7	8.1	2.1	133	167

Note:
1. Estimates provided are current as of July 2022. All information is subject to change.
2. Data derived from both desktop/online resources and field studies where access was granted.
3. Environmental Constraints Matrix will be updated as design continues, environmental technical reports are approved, and field evaluations continue.
4. Alternative is within range of and contains suitable habitat for listed species.

ES 3.0 Environmental Issues

ES 3.1 Land Use

Land use within the proposed Loop 9, Segment A study area consists primarily of residential development and undeveloped land. According to the Texas Parks and Wildlife Department (TPWD), the habitat within the undeveloped areas within the study are predominately Edwards Plateau savannah, woodland, and shrubland. The most heavily developed parts of the Loop 9, Segment A study area are in its northern half, mostly in Cedar Hill along the US 67 corridor, DeSoto, and parts of Glenn Heights. There are approximately 58 residential communities/subdivisions located within the study area that have been completed (all phases) as of 2022 (NCTCOG, 2018, Study Team, 2022). Current 2021 aerials show that approximately 1,347 additional acres of development have occurred in the study area since 2015 (date of NCTCOG's current Mobility Plan land use maps). This development primarily consists of new and expanded residential areas. This land use breakdown reflects population and residential growth in the study area, though the low amount of commercial development suggests that local populations may still commute closer into Dallas for work.

The proposed Loop 9, Segment A would convert existing non-transportation land uses to a transportation use through the acquisition of ROW. The majority of land use effects, for all four alternative alignments and modifications, would be the conversion of undeveloped land to a transportation use.

The No-Build Alternative would not result in the conversion of existing land uses. Land use changes would continue to occur based on market conditions and as parcels are platted for development.

ES 3.2 Geologic and Soil Resources

The project area is located in North Central Texas, within the Environmental Protection Agency's (EPA) Level III Texas Blackland Prairies ecoregion. This area is characterized by gently rolling hills and an elevation ranging from 500-900 feet above mean sea level. Elevation varies throughout the project area from hillsides, hilltops, and valleys. Topography within the project area slopes in a general southeastern direction within the Red Oak Creek and North Prong Creek drainage areas.

The proposed project, which is defined as any of the possible build alternatives, would likely have nominal effects on geology of the area. The seismicity of North Texas is relatively low, and the proposed project is unlikely to encounter geologic conditions that would cause adverse effects. Alternatives 1-4 and Modifications A-D would involve slight effects on surface topography within the project area due to excavation, cut and fill, implementation of embankments and stabilization slopes.

According to the Natural Resources Conservation Services (NRCS) mapped soil types, there are prime farmlands and farmlands of statewide importance within the project areas of all alternatives and modifications. The Farmland Conversion Impact Rating for Corridor Type Projects (NRCS-CPA-106) was prepared for all alternatives to determine if coordination with the United States Department of Agriculture (USDA) NRCS would be required. The maximum score for the Part VI of the form is 160 points, and if the corridor assessment score in Part VI is 60 points or greater, then coordination with the NRCS is required. As the score of Part VI of the form was less than 60, no coordination with the NRCS is required.

The purpose of the Federal Farmland Protection Policy Act (FPPA) of 1981 is to minimize the amount that federal projects contribute to the unnecessary and irreversible conversion of prime or farmlands of statewide importance.

The No-Build Alternative would have no effect on geologic and soil resources in the area.

ES 3.3 Social Characteristics

ES 3.3.1 Population and Demographics

As stated in the Need for the project, population growth is forecasted to increase approximately 28% in Dallas County and approximately 53% in Ellis County between 2023 and 2045. As population increases, employment is also expected to increase by over 39% in Dallas County and 45% in Ellis County. Dallas County is expected to have the highest percentage of employment growth for the 12-county Metropolitan Planning Area. Given the availability of developable land in the project area, forecasted population growth is anticipated to compound the need for transportation improvements. Currently, there is an insufficient transportation network to connect the communities in the project area. Increased population, under the No-Build Alternative, is anticipated to increase traffic congestion, and effect property value for the continued developments. The proposed project would support the rapid growth in population exhibited within the project area, as supported by local and regional plans and projections. The proposed project would help manage the long-term regional congestion from population and employment growth by improving the movement of persons and goods, which would minimize barriers among businesses, consumers, and transportation infrastructure.

ES 3.3.2 Housing, Neighborhoods, and Community Cohesion

The study area consists of subdivisions and more widely separated residences located on individual tracts of land or parcels. The purpose of the project is to provide adequate connectivity, as well as relieve congestion on local arterial roadways and to increase capacity, mobility, and accessibility for the region. As a new location roadway, the proposed project would create a physical separation within the study area. However, while a physical barrier would exist with the construction of the proposed Loop 9, Segment A, one of the benefits of the proposed project would be improved accessibility and mobility within the community overall. Additionally, the alternative alignments have been aligned to avoid separating more densely populated neighborhoods. The proposed project runs adjacent to the subdivisions of Bear Creek Ranch, Kingston Meadows, Meadow Springs, Stone Creek, Harmony, The Mesa, Top of the Hill Farms, Westmoreland Road Estates, Stonehill, and Lindell Estates.

The proposed project may have effects to community cohesion. the Common Alignment would potentially displace 41% (27) of the 66 homes in Lindell Estates. Since 2017, 26 new homes have been constructed within Lindell Estates, resulting in a 65% increase in homes. As such, the Lindell Estates neighborhood may undergo significant change due to new home construction, regardless of the construction of the proposed Loop 9, Segment A project. Of the 27 potential residential displacements in Lindell Estates, 16 of them have been constructed within the original Common Alignment since 2017. There are lots available within Lindell Estates; therefore, residents may be able to relocate within the neighborhood, but it is difficult to predict the housing market and individual housing circumstances and personal relocation decisions.

Although the study area would experience a physical separation with the construction of a new east-west roadway, effects of this barrier would be mitigated by maintaining north-south access along the alignment. The community study area may experience altered travel patterns, but residents within them would maintain access to the entire community. People within the community may access other parts of the community in a slightly different manner after the construction of the proposed project; however, their ability to access the community will not be removed, and they will continue to be able to participate in local activities. Intersections would be constructed at the major roadways within the study area to allow community members continued access to their community facilities, places of work, and neighbors.

Each of the proposed Alternative Alignments would potentially affect housing, neighborhoods, and various community members by potential residential displacements and three to four commercial displacements. The proposed project would not displace any community facilities and would not negatively impact community facilities located within the study area. The proposed project would not restrict access to any existing community facility; however, access within the study area will change.

The No-Build Alternative would not affect the existing structure of local communities; however, deterioration of mobility may occur with increased traffic volumes since the existing roadway network will continue to be used heavily. As a result of the increased traffic volumes, future negative effects to the community may occur from the No-Build Alternative.

ES 3.3.3 Right of Way and Displacements

The proposed project is a new location roadway; therefore, new ROW is anticipated for each proposed alternative alignment. The required ROW is similar for each alternative and ranges from 586 acres to 607 acres. As part of the Alternatives Analysis process, areas of proposed ROW have been reduced by up to 100 feet in some locations. During the final design phase of the project, it is anticipated that ROW effects will be reduced further in areas where it is feasible. These areas may consist of bridge crossings, along existing roadway ROW, and within floodplain crossings.

The proposed alternatives and modifications were aligned to avoid bisecting the most densely populated areas to minimize the number of residential displacements. The number of potential residential displacements varies by alternative and by alternative with potential modifications. Alternatives 1, 2, and 4, depending on potential modifications chosen, would potentially displace between 30 to 57 residences. Alternative 3, depending on potential modifications chosen, would potentially displace between 33 to 64 residences.

Businesses located within the study area consist of gas stations, agricultural and industrial operations, and bar/restaurants. Three to four commercial businesses would potentially be displaced depending upon the alternative chosen. The businesses that may be potentially displaced are not unique to the area and do not service a population such as persons with disabilities, children, the elderly, a specific ethnic group, low-income families, or a specific religious group. If the businesses do not relocate within the project area or choose to not re-open, the community would have access to comparable businesses within the study area.

During the planning phase of the project, TxDOT has acquired two properties through the Early Acquisition process.

Under the No-Build Alternative, no ROW acquisition or displacement of residences and commercial properties would occur.

ES 3.3.4 Environmental Justice

The proposed project may potentially displace up to 64 single-family residences and 4 commercial properties. For all alternatives and modifications, there are residential displacements and commercial displacements located within census blocks that have a minority population higher than 50%.

The minority populations are primarily located in the northern half of the study area, adjacent to its northern boundary. There is one census block group (CT 166.21 BG 3) within the study area that has a median income below the Department of Health and Human Services (DHHS) poverty guideline for a family of four. This census block group and the next lowest income population block group (CT 166.26 BG 3) were reviewed to determine if they would be disproportionally impacted. CT 166.21 BG has a median income of $21,982 and CT 166.26 BG 3 has a median income of $57,244. These block groups are located north of the proposed project and no displacements would take place within them.

One neighborhood (Lindell Estates) includes homes that are appraised for less than $100,000. In addition, based on public involvement, it was determined that this area has a high Spanish speaking population. The Common Alignment would result in up to 27 potential residential displacements in this neighborhood. Since 2017, 26 new homes have been constructed within Lindell Estates, resulting in a 65% increase in homes. As such, the Lindell Estates neighborhood may undergo significant change due to new home construction, regardless of the construction of the proposed Loop 9, Segment A project. Of the 27 potential residential displacements in Lindell Estates, 16 of them have been constructed within the original Common Alignment since 2017.

In 2021, based on potential significant effects to Lindell Estates and response to public and stakeholder comments, Modifications A and B to the Common Alignment were established to reduce effects to the Lindell Estates subdivision by shifting the proposed alignment north. Modification A would avoid displacing any residences in Lindell Estates; however, one home north of Lindell Estates would be potentially displaced. Modification B would reduce the number of potential displacements in Lindell Estates to three and would potentially displace two homes north of Lindell Estates. Modification B would also displace the city of Glenn Heights municipal water tower.

Substantial efforts have been made through the planning process to minimize effects to EJ populations by evaluating alternatives and modifications near the Lindell Estates community. Additionally, communication and outreach with stakeholders in the area is ongoing to inform new potential residents within this area of the upcoming proposed project.

The purpose of the project is to provide adequate connectivity, as well as relieve congestion on local arterial roadways and to increase capacity, mobility, and accessibility for the region. These offsetting benefits to potential displacements would be provided by the proposed project to EJ communities throughout the study area. Displacements, access and travel pattern changes, and construction impacts would also be spread throughout the study area and not targeted in a specific community.

Under USDOT guidance, a "disproportionately high and adverse effect" on EJ populations exists if there is an "adverse effect that is predominantly borne by a minority population and/or a low-income population." USDOT Order No. 5610.2C (May 16, 2021), at Section 1.g. of the Appendix. Because a majority of the displacements for this project would necessarily occur in census blocks that meet EJ thresholds and applying a conservative assumption that all displacees would in fact be low-income or minority persons, TxDOT conservatively assumes that the displacements would be "predominantly borne by a minority population and/or a low-income population," and according to USDOT guidance, there would therefore be a "disproportionately high and adverse effect" on EJ populations.

USDOT guidance provides that such a project may nevertheless proceed if (i) a substantial need of the project exists based on the overall public interest, and (ii) alternatives that would have less adverse effects on protected populations (and still satisfy the need for the project) would either have other adverse social, economic, environmental or human health impacts that are severe or involve increased costs of extraordinary magnitude (USDOT Order No. 5610.2C (May 16, 2021) at Section 9.d). The substantial need for this project is established in **Section 2** of the DEIS. Regarding alternatives, the Recommended Preferred Alternative was developed and selected because of the relatively lower number of overall displacements, which necessarily includes EJ populations given the demographic makeup of the project area.

The No-Build Alternative would not result in disproportionately high or adverse effects to minority and low-income persons. The entire community, including minority and low-income populations, would not experience potential effects from the proposed Loop 9, Segment A. However, the community would also not experience the benefits of decreased traffic congestion, improved mobility, creation of short and long-term jobs, and improved safety conditions resulting from the proposed Loop 9, Segment A.

ES 3.4 Economics

All alternatives and modifications would pass through several taxing jurisdictions and potentially remove property from the tax rolls through the acquisition of ROW and as a result of displacements. Estimated tax revenue loss by alternative are as follows: Alternative 1 – between $480,354.03 and $686,713.20, Alternative 2 – between $484,030.13 and $690,392.47, Alternative 3 – between $415,662.93 and $712,276.77, Alternative 4 – between $482,685.16 and $689,047.44.

The construction of the proposed Loop 9, Segment A would potentially generate local, regional, and state economic benefits from construction spending. The benefits would be direct employment and income for the construction industry, indirect effects for industries that supply equipment and materials, and induced effects based on the spending of the new employees. The direct employment effect would involve all people who work on the proposed Loop 9, Segment A, such as construction workers, engineers, and equipment operators. The indirect employment effect would involve others (e.g., truck drivers and steelworkers) that are employed by companies that provide materials, products, and services purchased to support construction. People employed directly and indirectly for the proposed Loop 9, Segment A, would have new income to spend on consumer goods and services. The consumer needs of the employees would potentially generate new jobs in the retail, personal services, food services, and the manufacturing of consumer goods.

Under the No-Build Alternative, there would be no effect to property tax revenue or the removal of property from the tax rolls through the acquisition of ROW or because of displacements. However, the community would not experience the benefits of short-term employment, income during construction, and potential long-term growth. The increased traffic congestion and deteriorating mobility resulting from the No-Build Alternative could also limit short and long-term economic growth in the study area and larger region.

ES 3.5 Pedestrians and Bicyclists

There are no designated bike lanes within the vicinity of the proposed alternatives and no bike lanes are proposed as part of Loop 9, Segment A. The proposed 8-foot outside shoulders along the frontage road system could accommodate bicycle traffic within the rural section of the proposed roadway. Additionally, a 10-foot-wide berm has been preserved on either side of the proposed roadway within the proposed footprint to accommodate a future shared-use path. Construction of this path would take place at a time of TxDOT's discretion and availability of funds. All existing sidewalks within the study area should remain in place. Pedestrians would have the opportunity to cross north/south across the proposed Loop 9, Segment A at designated intersections. No shared-use pathways or sidewalks are proposed along Loop 9, Segment A due to the relatively low-density nature of the surrounding population and an absence of need.

NCTCOG's 2045 Regional Veloweb, is a regional network of off-street shared use paths (trails) designed for multi-use trip purposes by bicyclists, pedestrians, and other non-motorized transportation. The Regional Veloweb shows two planned shared use paths crossing the Common Alignment perpendicularly near the BNSF railroad. The Veloweb also shows one shared use path starting from Lake Ridge Parkway, located parallel with the Common Alignment, traveling northeast, and continuing parallel with Bear Creek Road. This path is shown as part of the planned Outer Loop Core Trail in Cedar Hill's Parks, Recreation, Trails & Open Space Master Plan 2019 Update. The proposed project is not anticipated to impact the planned shared use paths identified in the Regional Veloweb.

The No-Build Alternative would not impact existing sidewalks. The No-Build Alternative may have an indirect effect to existing pedestrian facilities because of increased congestion on existing local roadways, which may cause a decrease in safety and bicyclist/pedestrian mobility along existing roadways.

ES 3.6 Air Quality

The proposed project is consistent with the NCTCOG financially constrained 2045 MTP Update and 2021-2024 TIP, as amended, which were found to conform to the Texas Commission on Environmental Quality (TCEQ) State Implementation Plan (SIP) by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) on November 21, 2018, and July 22, 2021, respectively.

Although it is included in NCTCOG's fiscally constrained *Mobility 2045 Update,* the plan shows the western connection of proposed Loop 9, Segment A with US 67 approximately 0.22 miles south of the currently proposed connection within all four Reasonable Alternatives (Lake Ridge Parkway at US

67). An official project-level conformity determination will be coordinated on the Recommended Preferred Alternative 60 days prior to the anticipated date of environmental decision.

The vehicle miles traveled (VMT) estimated for each of the Build Alternatives is slightly higher than that for the No-Build Alternative, because the interchange facilitates new development that attracts trips that would not otherwise occur in the area. There could also be localized differences in Mobile Source Air Toxics (MSAT) from indirect effects of the project such as associated access traffic, emissions of evaporative MSAT (e.g., benzene) from parked cars, and emissions of diesel particulate matter from delivery trucks. The travel lanes contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSAT would be higher under certain Alternatives than others. The localized differences in MSAT concentrations would likely be most pronounced along the new/expanded roadway sections that would be built at the intersections of US 67, IH 35E, S. Joe Wilson Road, S. Duncanville Road, S. Cockrell Hill Road, S. Westmoreland Road, and S. Hampton Road. However, the magnitude and the duration of these potential increases cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health effects. Also, travel to other destinations would be reduced with subsequent decreases in emissions at those locations. For all Alternatives, emissions are virtually certain to be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent from 2010 to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future than they are today.

Traffic data for the estimated time of completion (ETC) year (2028) and design year (2048) is 17,040 vehicles per day (vpd) and 39,430 vpd, respectively. A prior TxDOT modeling study and previous analyses of similar projects demonstrated that it is unlikely that the carbon monoxide standard would be exceeded as a result of any project with an average annual daily traffic (AADT) below 140,000. The AADT projections for the project do not exceed 140,000 vpd; therefore, a Traffic Air Quality Analysis was not required.

In an effort to reduce congestion and the need for single occupancy vehicle (SOV) lanes in the region, TxDOT and NCTCOG will continue to promote appropriate congestion reduction strategies through the Congestion Mitigation and Air Quality Improvement (CMAQ) program, the Congestion Management process (CMP), and the MTP. The congestion reduction strategies considered for this project would help alleviate congestion in the SOV study boundary but would not eliminate it.

ES 3.7 Noise

Four preliminary Build Alternatives, and four modifications to these alternatives were evaluated for noise effects. Modeled noise receivers were primarily residential, but also included an equestrian center and a neighborhood playground. The noise analysis determined that out of 93 representative receptors, between 26 and 40 depending on the alternative alignment, were predicted to have noise levels that approach or exceed the FHWA noise abatement criteria or that substantially exceed the existing noise abatement criteria; therefore, the proposed project would result in traffic noise effects.

Noise abatement measures were considered and analyzed for each effected receptor location. One noise barrier was found to be both reasonable and feasible and is recommended for incorporation into the project, depending on the selected alternative. This barrier is located along the Common Alignment at Craddock Drive and would be incorporated into all possible alternative and modification combinations except for those that include Modifications A and B. The noise barrier would benefit 19 receivers located along Craddock Drive.

Under the No-Build Alternative, the proposed project would not be constructed. If the No-Build Alternative were implemented, traffic noise levels would increase with increasing traffic volumes on local arterial roadways.

ES 3.8 Water Resources

ES 3.8.1 Surface Water

The proposed project crosses four named streams (North Prong Creek, Sanders Branch, Red Oak Creek, and Little Creek) and multiple unnamed tributaries. Sanders Branch is crossed by Alternative 3 only, Red Oak Creek is crossed by Alternatives 1-4 and Modification D, and Little Creek is crossed by the Common Alignment and Modification C.
Waterbodies were delineated according to United States Army Corps of Engineers (USACE) guidance. Wetlands were delineated using the routine method described in the USACE 1987 Wetlands Delineation Manual and the USACE Regional Supplement.

Permanent effects to water features, including wetlands, would be avoided and minimized to the greatest extent practicable. Actual effects, where applicable, would be less than the delineated features within the project area because of avoidance and minimization measures. The proposed project would cross water bodies using bridges where feasible, thereby minimizing effects to streams. Bridges that span streams and wetlands would minimize disturbances to aquatic and wetlands functions and habitat.

The USACE has final determination on the jurisdiction of all features identified within the project area. A review of USACE requirements would be conducted as design plans are finalized, and all appropriate permits would be acquired by TxDOT prior to construction. A Section 404 application would be submitted to the USACE-Fort Worth District, and any coordination received by the USACE would be included in this document upon approval. During the permitting process, if unavoidable effects to water features occur, appropriate mitigation would be obtained to offset any unavoidable functional loss. Mitigation would be in compliance with the 2008 Federal Mitigation Rule and approved by the USACE during project permitting.

The proposed project would adhere to the appropriate TCEQ Section 401 water quality certification process for effects to streams. Section 401 certification would be completed as part of the Section 404 permitting process once design is finalized.

The Build Alternative would disturb more than one acre; therefore, TxDOT would be required to comply with the TCEQ Texas Pollutant Discharge Elimination System (TPDES) Construction General

Permit (CGP), under provisions of Section 402 of the Clean Water Act (CWA) and Chapter 26 of the Texas Water Code.

None of the Build Alternatives are located within five linear miles of, are within the watershed of, or drain to, an impaired assessment unit under Section 303(d) of the federal CWA.

The No-Build Alternative would have no effects to surface water resources.

ES 3.8.2 Groundwater

Construction and operation of the proposed project would have minimal effects to groundwater throughout the project area. Potential short-term effects to groundwater could occur from spilling hazardous or toxic materials during construction of the proposed project. Proper maintenance, adherence to Best Management Practices (BMPs) outlined in the CGP, and fast response times to any spills would control such effects. Long-term effects to groundwater from the operation of the roadway are not expected, and deeper aquifers would not incur substantial effects as a result of the proposed project.

The Build Alternative is not anticipated to have any environmental consequences to the quality of groundwater throughout the project area.

The No-Build Alternative would have no effects to groundwater resources.

ES 3.8.3 Public Drinking Water Systems

A portion of the city of Glenn Heights Public Works facility is located within the Common Alignment. The city of Glenn Heights municipal water tower is located within the alignment of Modification B. However, the water supply for this facility is not located within the project area. The water tower would be impacted by the proposed project should Modification B be selected, however the water supply for the tower would not be impacted. TxDOT will coordinate directly with the city of Glenn Heights during the utility relocation process should Modification B be selected. If the municipal water tower is relocated, the relocation process would be timed so that there is minimal interruption to the water supply for city residents.

The Build Alternative is not anticipated to have any environmental consequences to public drinking water systems throughout the project area.

The No-Build Alternative would have no effects to any public drinking water systems.

ES 3.9 Vegetation and Wildlife

ES 3.9.1 Vegetation

The primary effect to vegetation would be the removal of existing vegetation to accommodate ROW, site preparation, and construction of the proposed project. Under all Alternative Alignments, the direct effects of construction, operation, and maintenance of the new roadway ROW would add an element of disturbance to the ecosystem, and the effects would potentially alter vegetation, soils, and hydrology. Vegetation may be mowed or removed in preparation for construction. Depending on construction needs, soils would be graded or amended with fill, and heavy equipment would compact soils, which often alters drainage capability. As topography and vegetation are altered,

hydrologic conditions associated with runoff and drainage flow would also change. Appropriate design measures would minimize the effects. Disturbed areas are expected to be revegetated. Early coordination with the TPWD was initiated for Alternatives 1-4 on 12/31/2020 and completed on 03/23/2021. Early coordination with TPWD will be re-initiated on the Recommended Preferred Alternative during the FEIS.

The No-Build Alternative would not have any effect on the existing vegetation in the project area. The No-Build Alternative would not require coordination with TPWD.

ES 3.9.2 Wildlife

Construction of the proposed Loop 9, Segment A would directly impact animals that reside within the path of the Recommended Preferred Alternative. Wildlife communities would be impacted by the permanent loss of habitat. In addition to direct, construction-related mortality or injury, wildlife populations often suffer effects associated with displacement into adjacent habitats. Heavy machinery and other construction equipment may cause mortality of wildlife species that are slow moving or species that seek cover in debris and fallen vegetation. Construction-related effects would be short-term and primarily occur during initial ROW clearing activities. No substantial long-term effects to wildlife populations would result from increased noise and visual disturbances beyond the buffered area adjacent to the Recommended Preferred Alternative's ROW. Effects from roadway pollutants would be minimized by utilizing BMPs designed to limit erosion and to filter contaminants before entering aquatic systems.

Habitat fragmentation is the partitioning of existing habitats along the corridor. Habitat fragmentation as a result of road and other linear projects has been well documented (Spellerberg, 1998). Habitat fragmentation reduces the value of adjacent habitats in several ways, primarily by creating multiple smaller habitats that are bisected by a dangerous or impassable obstacle. The result is a decrease in carrying capacity of adjacent habitats and an increase in the potential for animal mortality due to collisions with vehicular traffic.

The No-Build Alternative would not result in direct effects to wildlife. However, under the No-Build, traffic conditions on the existing roadways would have a high likelihood of increased current and future traffic congestion, affecting wildlife communities over time.

ES 3.10 Threatened and Endangered Species

Descriptions of suitable habitats in TPWD's Rare Threatened and Endangered Species (RTEST) lists were reviewed, and field work was completed by qualified biologists. Suitable habitat for six state-listed threatened or endangered species, two federally proposed threatened species, one federally listed candidate species, and 29 Species of Greatest Conservation Need (SGCN) is potentially found in the project area. The suitable habitat identified is located within all Alternative Alignments. TxDOT BMPs would be implemented for the state-listed threatened or endangered species and the SGCN to minimize or avoid impacts to the species. Additional TxDOT BMPs have been proposed by TxDOT and were confirmed through the coordination process. Early coordination with the TPWD was initiated for Alternatives 1-4 on 12/31/2020 and completed on 03/23/2021. Early coordination with TPWD will be re-initiated on the Recommended Preferred Alternative during the FEIS.

Four species and four natural vegetation communities were identified on the Texas Natural Diversity Database (TXNDD) list within a ten-mile buffer of the project area. None of the listed vegetation communities were located within the project area during a survey by a qualified biologist. The proposed project would have no impact on the vegetation communities listed.

The U.S. Fish and Wildlife Service (USFWS) Official Species List was reviewed as a list of federally listed species that are within the range of the project area. Descriptions of suitable habitat were evaluated using best available resources, and field work was completed by qualified biologists. Suitable habitat was identified within the project area for two federally proposed threatened species and one federally listed candidate species, however, no suitable habitat for federally listed threatened or endangered species with a full listing status was found in the project area. The current analysis indicates no effect to federally listed species with a full listing status. If federally listed species change, those species would be analyzed and section 7 consultation with USFWS would be initiated as necessary.

The No-Build Alternative would not result in impacts to any listed species.

ES 3.11 Floodplains

Portions of the project area adjacent to Sanders Branch, Red Oak Creek, Little Creek, and tributaries of Little Creek are located within the 100-year floodplain. Additionally, portions of the project area adjacent to Red Oak Creek and Little Creek are within the 500-year floodplain and the regulated floodway. The remainder of the project area is located outside of the floodplain. The floodplains adjacent to Sanders Branch cross through Alternative 3. The floodplains adjacent to Red Oak Creek cross through Alternatives 1-4 and Modification D. The floodplains adjacent to Little Creek and tributaries of Little Creek cross through the proposed project in the area of the Common Alignment and Modification C.

The proposed project could increase the surface water runoff in the area through an increase in impervious cover of the roadway. Complete avoidance of floodplains by the proposed project is not possible due to the location of floodplains in the area. However, the surface water runoff and the effect to floodplains would be minimized by applicable mitigation measures in the design of the roadway. Conveyance of tributaries and named streams throughout the project area will be accomplished by the installation of culverts or the construction of bridges, where applicable, which reduces the effects of flooding along those features. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), of which Dallas and Ellis Counties are participating members. The project will be coordinated with the county floodplain administrators.

This project is federally funded and therefore is subject to Executive Order 11988, Floodplain Management, and will not involve a significant encroachment in the floodplain.

The No-Build Alternative would have no construction within a floodplain, therefore would have no effects to floodplains.

ES 3.12 Cultural Resources

ES 3.12.1 Archeological Resources

An Archeological Resources Background Study was prepared for the proposed project in 2020. Research focused on the identification of archeological sites, sites listed as State Antiquities Landmarks (SAL), Recorded Texas Historic Landmarks (RTHL), sites listed on the National Register of Historic Places (NRHP), cemeteries, and previously conducted archeological surveys within one kilometer (0.62 miles) of the area of potential effects (APE).

The APE for the archeological resources is defined as the project footprint of Alternatives 1-4, to the maximum depth of effect, including all easements, and project specific locations. The vertical APE would extend less than four feet deep throughout the project area, except at new bridge locations where effects will extend more than 25 feet subsurface.

An Interim Report for Archeological Survey was prepared on Alternatives 1-4 in 2020 and is on file at the TxDOT Dallas District Office. Fieldwork for the proposed project was conducted under Antiquities Permit 9195. Fieldwork, including an intensive archeological survey of a portion of the 1,110.63-acre APE, occurred January 8 – 13, 2020.
Additionally, an Archeological Background Study has been prepared in March of 2022 as a continuation of the previous investigations to evaluate Modifications A – D. The APE is defined to encompass the limits of the existing ROW; proposed, new project ROW; permanent and temporary easement; and any project-specific locations and utility relocations designated by TxDOT.

Though a survey was conducted for this project under Permit 9195, there were several areas adjacent to the proposed Design Modifications where right-of-entry (ROE) was not granted and/or the Modifications extend a significant distance away from the original alignments, so survey results cannot confidently be applied to the Design Modification areas. Once a Recommended Preferred Alternative has been approved as part of the DEIS process, all portions of the alternative and modifications within that Recommended Preferred Alternative not previously surveyed, are recommended to be surveyed.

The No-Build Alternative would have no effects to archeological resources and would not require additional archeological studies to be performed.

TxDOT initiated project-specific consultation under Section 106 of the NHPA with the Kiowa Tribe, Mescalero Apache Tribe, Wichita and Affiliated Tribes, Caddo Nation, Cherokee Nation, Tonkawa Tribe of Oklahoma, and Comanche Nation of Oklahoma on June 2, 2020. On July 1, 2020, the Cherokee Nation responded that the project would have no effect on sites of cultural or religious significance to them. No other tribe has objected or otherwise responded. TxDOT also coordinated with the Texas Historical Commission in compliance with the Antiquities Code of Texas and Section 106 of the National Historic Preservation Act. THC concurred with the findings of the survey conducted for this project on October 22, 2020. Coordination with THC and federally recognized tribes will resume once access to the remaining unsurveyed portions of the APE has been obtained and those studies have been completed.

ES 3.12.2 Historical Non-Archeological Properties

A Project Coordination Request for Historical Studies Project has been prepared in May of 2019 and a Historical Resources Survey Report documenting the results of a reconnaissance survey has been prepared in June of 2020.

The historical resources reconnaissance survey was conducted on October 28 and 29 and April 10, 2020, within the APE of Alternatives 1-4. The survey identified and documented 84 properties with historic-age resources within the project area. None of the properties were listed in the NRHP. Following evaluation of the surveyed properties, project historians recommended that 80 of the properties were not eligible for listing in the NRHP. TxDOT historians conducted a review of the remaining four properties that were inaccessible during field surveys and determined project activities have no potential for adverse effects and individual project coordination with SHPO is not required.

A Project Coordination Request for Historical Studies Project was prepared in March of 2022 as a continuation of the previous investigations due to the need for investigations of Modifications A – D. Per the previous coordination, the APE for the Design Modifications was recommended to be 300 ft from the proposed ROW. TxDOT historians conducted a review of revised APE and determined there would be no affect to any historic properties.

In compliance with the Section 106 PA, TxDOT historians determined project activities will not affect historic properties. In compliance with the Antiquities Code of Texas and the MOU, TxDOT historians determined project activities have no potential for adverse effects.

The No-Build Alternative would have no effect to historic resources.

ES 3.13 Section 4(f)

There are no publicly owned park and recreation lands, or wildlife and waterfowl refuges present in the project area. Four properties with historic age resources were identified in the Historical Resources Survey Report. The NRHP eligibility for those resources is undetermined; therefore, further study was recommended to determine eligibility and potential Section 4(f) effects. This future analysis will be documented in the FEIS or when additional ROE is granted for these properties.

The No-Build Alternative would have no effects to Section 4(f) resources.

ES 3.14 Hazardous Materials

A Hazardous Materials Initial Site Assessment (ISA) was conducted in 2020 and a re-evaluation ISA was prepared in 2022 after project area modifications were made. The ISAs were prepared to determine the potential for encountering hazardous substances and/or contamination within the proposed project. The regulatory database searches identified 10 regulatory listings at nine sites (based on addresses) within the ASTM search radii. The nine sites identified were determined to pose a low environmental risk or no environmental concern to the proposed project.

The proposed project includes the reconstruction of two bridge structures and one bridge class culvert. Applicable asbestos and lead-based paint inspections, specification, notification, license,

accreditation, abatement and disposal, would follow federal, state, and local regulations. Bridge structure asbestos and/or lead-based paint issues would be addressed prior to construction.

The proposed project includes the demolition and/or relocation of buildings within the proposed ROW. The buildings may contain asbestos or lead paint containing materials. Asbestos and lead paint inspections, specifications, notification, license, accreditation, abatement, and disposal, as applicable, would comply with federal and state regulations. Asbestos issues would be addressed during the ROW acquisition process prior to construction.

During construction, the contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in construction staging areas. The use of construction equipment within sensitive areas should be minimized or eliminated. All construction materials used for this project should be removed as soon as the work schedule permits. The contractor would initiate early regulatory agency coordination during project development.

Should unanticipated hazardous materials or substances be encountered during construction, TxDOT and/or the contractor would be notified, and steps would be taken to protect personnel and the environment. Any unanticipated hazardous materials encountered during construction would be handled according to applicable federal, state, and local regulations per TxDOT Standard Specifications.

The No-Build Alternative would not have any environmental consequences on potential hazardous materials sites located near the proposed project.

ES 3.15 Visual and Aesthetic Qualities

The area that the proposed alternatives and modifications are located within consist of a mix of residential and agriculture land, with commercial properties located along US 67 and IH 35E. Views throughout the study area currently consist of high-density subdivisions, residences on large lots, and open maintained and unmaintained agriculture fields. Views in the vicinity of US 67 and IH 35E also include commercial businesses and highways.

The visual effects of the proposed project would vary by location. The proposed Loop 9, Segment A would be constructed at grade, which limits the degree of effects to visual resources. The greatest effects to the viewshed would be at intersections because of the concentration of roadways and traffic lights required at these locations. Where reasonable and feasible, mitigation measures that would result in beneficial visual and aesthetic treatments may be programmed for this project. These measures may include aesthetic enhancements, such as landscaping, lighting, and/or decorative details.

Under the No-Build Alternative, there would be no visual or aesthetic impact within the study area because the No-Build Alternative would not directly alter any visual or aesthetic resource.

ES 3.16 Greenhouse Gas and Climate Change

TxDOT has prepared a Statewide On-Road Greenhouse Gas Analysis and Climate Change Assessment technical report (TxDOT, 2021). The report discloses: 1) an analysis of available data

regarding statewide greenhouse gas (GHG) emissions for on-road GHG emissions, 2) TxDOT actions and funding that support reducing GHG emissions, 3) projected climate change effects for the state of Texas and 4) TxDOT's current strategies and plans for addressing the changing climate. Please refer to the technical report for more details.

TxDOT has implemented programmatic strategies that reduce GHG emissions including: 1) travel demand management projects and funding to reduce VMT, such as bicycle and pedestrian facilities, 2) traffic system management projects and funding to improve the operation of the transportation system, 3) participation in the national alternative fuels corridor program, 4) clean construction activities, 5) clean fleet activities, 6) CMAQ funding, 7) transit funding, and 8) two statewide campaigns to reduce tailpipe emissions.

ES 4.0 Indirect Impacts and Cumulative Analysis

ES 4.1 Indirect Impacts Analysis

The indirect impacts analysis was completed using a Planning Judgement and a Collaborative Judgment approach. The Planning Judgment approach was the primary form of analysis used to identify development trends and the potential effect of the proposed project on regional land use patterns. Geographic Information Systems (GIS)-based Cartographic techniques were also utilized to quantify the amounts of developed land, developable land, and undevelopable land. Additionally, Indirect and Cumulative Impacts Analysis questionnaires were sent to city and county stakeholders in support of the Collaborative Judgment methodology in an effort to gain information regarding future developments within their areas of jurisdiction. While no questionnaires were returned, continued stakeholder meetings have provided updated information on planned developments within the study area. The cities of Cedar Hill, Midlothian, Glenn Heights and Red Oak have provided the Study Team with site plans and plats as they become available.

The area studied for Indirect effects will be referred to as the Area of Influence (AOI). The AOI for the proposed project encompasses approximately 20,688 acres, 2,246 acres of which is currently considered developable. The AOI is part of the greater Dallas-Fort Worth-Arlington Metropolitan Statistical Area (MSA), which has been experiencing sustained population growth and associated residential, commercial, and industrial development and is projected to do so into the future. The proposed Loop 9, Segment A project is planned to accommodate this growth but will likely also induce associated development and/or cause it to accelerate. Three resources were identified that may be impacted by this induced growth, which are threatened and endangered species and vegetation/wildlife habitat, water resources, and prime farmlands.

Development in the area will be greatly influenced by future land use planning efforts by the cities within the AOI, which comprise 87% of its land area, as most of the developable land identified in this analysis has been reserved for future residential, commercial/industrial, or mixed-use development. These municipalities can also act to mitigate potential effects on threatened and endangered species and vegetation/wildlife habitat, water resources, and prime farmland in the AOI through zoning and other requirements that prohibit or discourage development in floodplains and other wet areas or require or encourage open space preservation or activities consistent with working farmland or ranch land.

ES 4.2 Cumulative Analysis

The project is expected to have direct and indirect effects on 1) Threatened and Endangered Species and Vegetation/Wildlife Habitat; 2) Water Resources; and 3) Prime Farmland. Therefore, a cumulative analysis is required. To complete the cumulative analysis, a Resource Study Area (RSA) was chosen for each resource that was included in the cumulative analysis and their conditions and trends were reviewed. Other actions, including past, present, and reasonably foreseeable actions and their effect on the identified resources were analyzed. Then, the overall effects of the proposed project combined with other actions were calculated to determine estimated cumulative impacts.

Through a cumulative effects analysis, it was determined that the proposed project would contribute to cumulative actions impacting these same resources (threatened and endangered species, vegetation/wildlife habitat, water resources, and prime farmland) within their respective RSAs. Past and reasonably foreseeable actions in the RSAs are an extension of the regional trend towards urbanization and have impacted or will impact resources both directly and indirectly. However, existing governmental regulations, in conjunction with the goals and coordination of community planning efforts, address the many and varied issues that influence local and ecosystem-level conditions. The regulatory powers of state and federal programs, such as the CWA, serve to safeguard resources and avoid or minimize negative impacts that would threaten the general health and sustainability of the region. The proposed project is consistent with the historical growth rates, patterns, and land use changes found in the RSAs. The analysis provided concludes that there are no substantial adverse cumulative impacts to resources in the RSAs, when taken into consideration with other past, present, and reasonably foreseeable actions, and no specific mitigation is proposed by TxDOT based on cumulative impacts to these resources.

ES 5.0 Agency and Public Coordination

A Public Involvement Plan (PIP) was developed as part of the overall Project Coordination Plan (PCP), and continuously updated throughout the DEIS process to define and guide the public involvement effort based on the TxDOT Public Involvement Policy tenets. The following public involvement activities were prepared and implemented throughout the DEIS process:

- Mailing List: Names of adjacent property owners, as well as those of local, state, and federal government officials were collected and recorded in a database.
- Notice of Intent: On May 20, 2019, a notice of intent (NOI) to prepare an EIS for Loop 9, Segment A was published in the Federal Register (Environmental Impact Statement: Dallas and Ellis Counties, Texas, 84 Fed. Reg. 22,928 (May 20,2019)) initiating the formal scoping process for the project in accordance with NEPA.
- Stakeholder Meetings: TxDOT held meetings with various stakeholders or local public officials as part of the DEIS process.
- Public Scoping Meetings: Two public scoping meetings were held in July 2019.
- Agency Coordination: TxDOT held an Agency Scoping Meeting in August 2019.
- Public Meetings: Two public meetings were held in February 2020 and two public meetings were held in March 2022.
- Community Meetings: Two community meetings were held for the Lindell Estates and Bear Creek Ranch subdivisions in February 2022.

- Notifications: TxDOT advertised all meetings in local newspapers approximately 30 days prior to the meetings, noting that every reasonable effort would be made to accommodate special communication requirements.
- Comment forms: Participants at the public scoping meetings and public meetings were given the opportunity to submit written comments. Comment forms were available in English and Spanish.
- Project website: TxDOT developed a project website to update the public on the status of the Loop 9 project. www.txdot.gov/loop9.

A public hearing is anticipated for late 2022, pending the approval and release of the DEIS. The purpose of the public hearing is to communicate to the public the environmental findings and status of the DEIS, the factors considered in the environmental process, a summary of the public input received, and provide an additional opportunity to comment.

As part of the development process for the proposed Loop 9, Segment A project, local, federal, and state government agencies were consulted prior to and during preparation of the DEIS. Cooperating and Participating agencies are responsible to identify, as early as practicable, any issues of concern regarding the project's potential environmental or socioeconomic effects that could substantially delay or prevent an agency from granting a permit or other approval that is needed for the project.

ES 6.0 Recommendation of the Preferred Alternative

The Recommended Preferred Alternative is Alternative 3 with Modifications B, C, and D (henceforth referred to as Alternative 3 B/C/D). The need for the Loop 9, Segment A project is to address transportation demand resulting from population and economic growth in the region, system linkages, and connectivity among the existing roadway facilities. Loop 9, Segment A would provide a direct link from US 67 to IH 35E and would serve the residents in the area.

The No-Build Alternative would neither safely nor adequately accommodate existing and future predicted traffic volumes on roadways within the Loop 9, Segment A study area. The No-Build Alternative would not provide system linkage or accommodate connectivity among any existing roadway facilities.

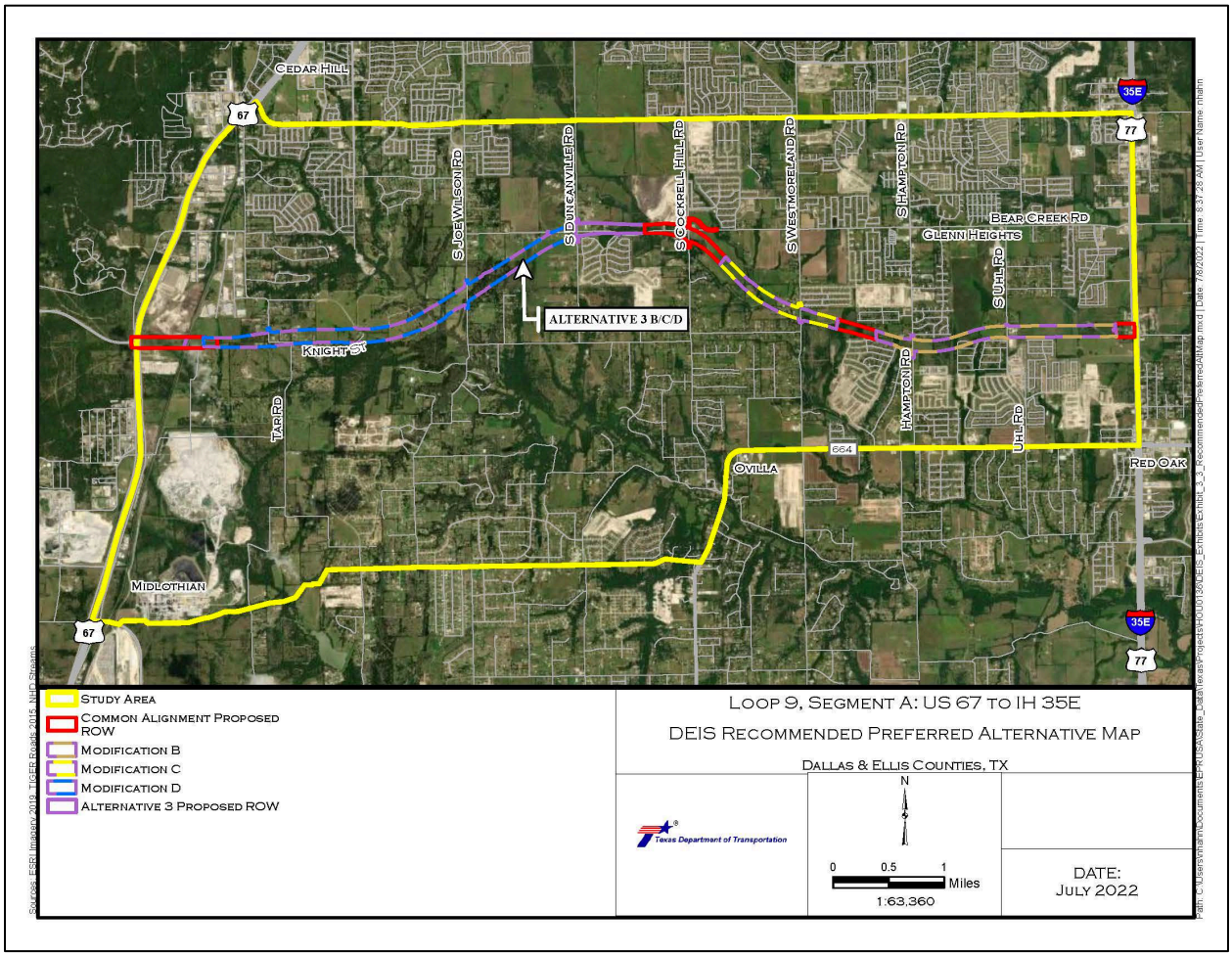
During the environmental/socioeconomic screening, the alignments had very similar proposed effects associated with each alternative. In nearly every resource category evaluated in the DEIS, Alternative 3 B/C/D falls in the middle of the range of effects except for acreage of 100-yr floodplain and individual stream crossings. While Alternative Alignment 3 B/C/D does propose the most acreage of 100-yr floodplain crossing, it is tied for least number of individual stream crossings. The Loop 9, Segment A design will incorporate bridging a large portion of the floodway and 100-yr floodplain associated with stream crossings to minimize direct effects to the floodplain. Alternative 3 B/C/D also has one of the lowest potential for residential displacements (36), nearly half of proposed Alternative 3 (64).

Input from the public and stakeholders was critical to the selection of the Recommended Preferred Alternative. Stakeholder input on the location of the alignment through their jurisdictions was important during the evaluation process since. Loop 9, Segment A is a planned major roadway

traversing several cities and has been a part of city planning documents for years. It was the expressed preference of the city of Cedar Hill to consider Alternative 3 (the southernmost alternative) for many years. To lesson environmental effects and potential displacements, Modification D was developed to shift the Alternative 3 alignment north from the original location in Cedar Hill. In Glenn Heights, the Lindell Estates subdivision has experienced high volumes of new development within the proposed Common Alignment. Because of this, Modifications A and B were established to shift the alignment north and out of the subdivision. Meetings with the cities of Glenn Heights and Red Oak resulted in an expressed preference for Modification B which would be most suitable for current plans within the cities.

For the above noted reasons, Alternative Alignment 3 B/C/D was selected as the Recommended Preferred Alternative (**Figure ES-1**).

Figure ES-1: DEIS Recommended Preferred Alternative Map



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AADT	Average Annual Daily Traffic
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AOI	Area of Influence
APE	Area of Potential Effects
APAR	Affected Property Assessment Report
AST	Aboveground Storage Tanks
ASTM	American Society for Testing Materials
BF	Brownfields Management System
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
CAAA	Clean Air Act Amendments
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CDC	Corridor Development Certificate
CFR	Code of Federal Regulations
CGP	Construction General Permit
CLI	Closed Landfill Inventory
CMAQ	Congestion Mitigation and Air Quality Improvement
CMP	Congestion Management Process
COC	Chemical of Concern
CPA	Corridor Type Project
CTS	Community Transit Service
CWA	Clean Water Act
DART	Dallas Rapid Transit
dB(A)	A-weighted Decibels
DCAD	Dallas County Appraisal District
DEIS	Draft Environmental Impact Statement
DFW	Dallas-Fort Worth
DHHS	Department of Health and Human Services
Diesel PM	Diesel Particulate Matter
DOI	Department of the Interior
ECAD	Ellis County Appraisal District
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMST	Ecological Mapping Systems of Texas
EP	Edwards Plateau
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETC	Estimated Time of Completion
FCMA	Magnuson-Stevens Fishery Conservation and Management Act
FED Brownfields	Brownfields Management System
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FM	Farm-to-Market
FPPA	Federal Farmland Protection Policy Act
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
GBA	General Bridge Act
GHG	Greenhouse gas

GIS	Geographic Information System
HEI	Health Effects Institute
HOV	High Occupancy Vehicle
HUC	Hydrologic Unit Code
I	Interstate
IBWC	International Boundary and Water Commission
IH	Interstate Highway
IIPOD	International Inland Port of Dallas
IPaC	Information for Planning and Consultation
IRIS	Integrated Risk Information System
ISA	Initial Site Assessment
ITS	Intelligent Transportation System
LEP	Limited English Proficiency
LOS	Level of Service
LRR	Land Resource Region
LWCF	Land and Water Conservation Fund
ma	Million years ago
MBTA	Migratory Bird Treaty Act
MIS	Major Investment Study
MLRA	Major Land Resource Area
MMPA	Marine Mammal Protection Act
MMT	Million metric tons
MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emissions Simulator
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxics
MS4	Municipal Separate Storm Sewer System
MSWLF	Municipal Solid Waste Landfill Sites
MTP	Metropolitan Transportation Plan
MVEB	Motor Vehicle Emission Budgets
MY	Model Year
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NCHRP	National Cooperative Highway Research Program
NLCD	National Land Cover Database
NCTCOG	North Central Texas Council of Government
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
PALM	Potential Archeological Liability Map
PCB	Polychlorinated Biphenyls
PCN	Pre-construction Notification
PCP	Project Coordination Plan
PEL	Planning and Environment Linkages
PEM	Palustrine Emergent Wetlands

PS&E	Plans, Specifications, and Estimates
PSS	Palustrine Scrub Shrub
PST	Petroleum Storage Tanks
RGL	Regulatory Guidance Letter
RHA	Rivers and Harbors Act
ROD	Record of Decision
ROE	Right-of-Entry
ROW	Right of Way
RRC	Railroad Commission of Texas
RSA	Resource Study Area
RTC	Regional Transportation Council
RTEST	Rare Threatened and Endangered Species
RTHL	Recorded Texas Historic Landmarks
RPZ	Runway Protection Zones
SAL	State Antiquities Landmarks
SGCN	Species of Greatest Conservation Need
SH	State Highway
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SOV	Single Occupancy Vehicle
SW3P	Storm Water Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCM	Transportation Control Measures
TERP	Texas Emissions Reduction Plan
TDM	Transportation Demand Management
THC	Texas Historical Commission
TIP	Transportation Improvement Program
TLMI	Texas Labor market Information
TMDL	Total Maximum Daily Load
TNM	Traffic Noise Measurement
TGLO	Texas General Land Office
TPDES	Texas Pollutant Discharge Elimination System
TP&P	TXDOT Transportation Planning & Programming Division
TPWD	Texas Parks and Wildlife Department
TSM	Transportation Systems Management
TSS	Total Suspended Soils
TTC	Trans-Texas Corridor
TxDOT BMP	TxDOT Beneficial Management Practices
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
TWDB	Texas Water Development Board
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tanks
VCP	Voluntary Cleanup Program
VMT	Vehicle Miles Travelled
WOTUS	Waters of the United States

SECTION 1. INTRODUCTION

The proposed Loop 9, Segment A project includes the construction of a six-lane new location frontage road system between United States 67 (US 67) and Interstate Highway 35 East (IH 35E) through Dallas and Ellis Counties, Texas, and is approximately 9.4 miles in length (**Exhibit 1-1**). The proposed Loop 9, Segment A roadway system would pass through the cities of Cedar Hill, Ovilla, Glenn Heights, and Red Oak. The proposed project right of way (ROW) would include a median that would accommodate the future construction of an ultimate access-controlled mainlane facility. Construction of the ultimate access-controlled mainlane facility would be based on projected traffic and funding and would require additional environmental analysis prior to construction.

The new location Loop 9, Segment A frontage road system would include an eastbound and westbound frontage road facility, each consisting of three 12-foot lanes, an 8-foot inside shoulder, and an 8-foot outside shoulder for bicycle accommodations within the rural section of the proposed roadway. The proposed project ROW would include a median (358 to 512 feet wide) that would accommodate the future construction of an ultimate access-controlled mainlane facility.

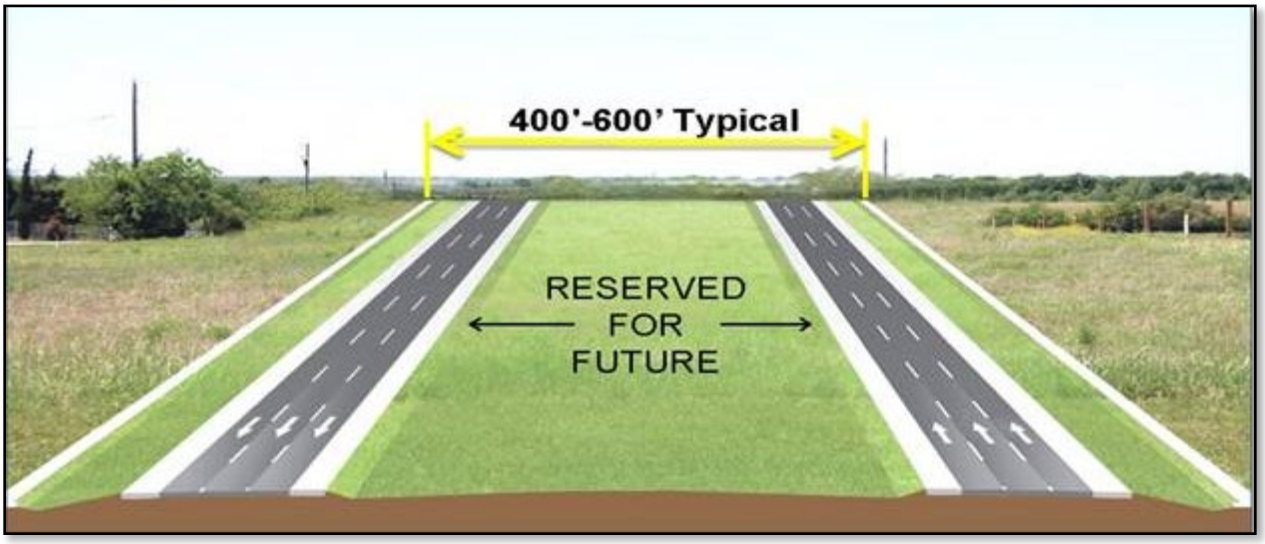
The proposed project would construct intersections at eight major crossroads as follows: Tar Road, future Clark Road, S. Joe Wilson Road, S. Duncanville Road, S. Cockrell Hill Road, S. Westmoreland Road, S. Hampton Road, and Uhl Road. The proposed project would also construct a grade separation at the BNSF Railroad. In addition, the western limit of the project would tie into a grade separation at US 67 which would be constructed under a separate project prior to construction of Loop 9, Segment A. The eastern limit of the project would tie into a grade separation at IH 35E which would be constructed under a separate project prior to construction of Loop 9, Segment A.

The proposed Loop 9, Segment A project, from US 67 to IH 35E, would likely be constructed in three phases based on traffic needs and project funding. A logical sequence for staging the various elements for construction of the new location frontage road system could be as follows:

- Phase 1 would construct a single two-lane, two-way frontage road, and would also acquire the proposed ROW to accommodate a six-lane frontage road system and the future ultimate access-controlled mainlane facility. This phase would also include restriping of the US 67 intersection to accommodate the new Loop 9, Segment A frontage road turning movements.
- Phase 2 would involve the construction of the three-lane frontage road in each direction, which would include the conversion of the two-way frontage road built in Phase 1 to a one-way operation, and the construction of grade separations at specific high-volume intersections (**Figure 1-1**). Phase 2 would be constructed as traffic warrants and funding becomes available.
- Phase 3 would involve the construction of the ultimate access-controlled mainlane facility in both directions. Construction of the ultimate access-controlled mainlane facility would be based on projected traffic and funding and would require additional environmental analysis prior to construction.

Studies conducted for the proposed Loop 9, Segment A involved substantial interaction with project stakeholders (including the public), landowners, public officials, community leaders, and regulatory agencies.

Figure 1-1: Segment A, Phase II Construction of One-Way Frontage Roads



1.1 Logical Termini and Independent Utility

Federal regulations require that federally funded transportation projects have logical termini (23 Code of Federal Regulations [CFR] 771.111(f)(1)). Simply stated, this means that a project must have rational beginning and end points. Those end points may not be created simply to avoid proper analysis of environmental impacts. The termini of the proposed project are US 67 to the west and IH 35E to the east. Both US 67 and IH 35E are major north-south corridors in the Dallas Metroplex area for commuters traveling from suburban areas into Dallas; therefore, there are logical endpoints for the project.

Federal regulations require that a project have independent utility and be a reasonable expenditure even if no other transportation improvements are made in the area (23 CFR 771.111(f)(2)). This means a project must be able to provide benefit by itself and not compel further expenditures to make the project useful. Stated another way, a project must be able to satisfy its purpose and need with no other projects being built. The proposed Loop 9, Segment A project consists of an independent utility project as the construction of a new roadway between the logical termini. It also consists of a usable roadway to the traveling public and is a reasonable expenditure of funds even if no additional transportation improvements are made in the general project area. The project adds capacity by adding three travel lanes in each direction through a phased-construction approach, which satisfies the project need (discussed in **Section 2**). As an independent utility project, any construction activities would require a commitment to a substantial financial expenditure which cannot and does not irretrievably or irreversibly commit future federal funds.

Additionally, federal law prohibits a project from restricting consideration of alternatives for other reasonably foreseeable transportation improvements (23 CFR 771.111(f)(3)). This means that a project must not dictate or restrict any future roadway alternatives. The proposed Loop 9, Segment A project would not restrict the consideration of alternatives for other foreseeable transportation improvements.

1.2 Planning and Funding

The North Central Texas Council of Governments (NCTCOG) serves as the Metropolitan Planning Organization (MPO) for regional transportation planning for the Dallas-Fort Worth (DFW) Metroplex. As the MPO for the DFW area, NCTCOG has the responsibility of preparing and maintaining the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Program (TIP).

NCTCOG's current MTP, covering transportation planning through the year 2045, is the *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas – 2022 Update* (*Mobility 2045 Update*). The MTP is a long-range planning document that serves as a guide for the projects and programs the region would like to implement over the life of the MTP. It also identifies potential ways in which the desired improvements could be funded. The NCTCOG's current *2021-2024 TIP* is a short-range program of transportation improvements, based on the *Mobility 2045 Update*, that lists the specific projects that will be programmed for funding, typically within the next two to four years.

Loop 9, Segment A is currently programmed in the NCTCOG's *Mobility 2045 Update* and the *2021-2024 TIP* as a 2-lane (ultimate 6-lane) frontage road facility. Based on the *Mobility 2045 Update*, the total project cost is $1.2 billion (based on year of expenditure) for all three segments of Loop 9 between US 67 and IH 20. The current construction and ROW costs for Segment A are $368 million based on 2022 dollars. Although it is included in NCTCOG's fiscally constrained *Mobility 2045 Update,* the plan shows the western connection of proposed Loop 9, Segment A with US 67 approximately 0.22 miles south of the currently proposed connection within all four Reasonable Alternatives (Lake Ridge Parkway at US 67) discussed in **Section 3.3.2**. Loop 9, Segment A is also included in Appendix D (Environmental Clearance and Out-Year Projects) of the *2021-2024 TIP*. Projects in Appendix D of the *2021-2024 TIP* are not currently funded but are included in the TIP by reference to allow engineering, feasibility, environmental clearance, or other pre-construction/project development efforts to continue. Copies of the MTP and TIP pages are included in **Appendix A**.

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SECTION 2. PURPOSE AND NEED

2.1 Need for the Proposed Project

The need for the Loop 9, Segment A project is to address transportation demand resulting from population and economic growth in the region, system linkages, and connectivity among the existing roadway facilities. Loop 9, Segment A would provide a direct link from US 67 to IH 35E and would serve the residents in the area.

Factors driving the need for substantial transportation improvements in the proposed Loop 9, Segment A study area include:

- Population growth: Population and economic growth, as indicators for travel demand, is forecasted to increase nearly 32.5% in Dallas County and approximately 84% in Ellis County between 2017 to 2045.
- Transportation Demand: Increasing development of industrial and commercial facilities has positively affected economic growth for communities within the study area, which has in-turn increased transportation demand. Additionally, there is a demand to promote intermodal connections in the study area and surrounding DFW region. All roadways in the study area would experience deterioration in Level of Service (LOS) between 2018 and 2045. Therefore, the transportation demand exceeds the current and future capacity of the existing transportation infrastructure.
- System linkage: Within the study area, the existing roadway system provides sufficient north-south radial access along IH 35E and US 67 but lacks continuous east-west transportation facilities to serve these growing communities. The existing roadways serve local street access and do not provide sufficient east-west linkage for the current or proposed traffic to north-south major roadway networks.
- Connectivity of existing roadway facilities: The current transportation infrastructure does not adequately provide connectivity between the communities in the study area thereby inhibiting emergency response as well as access to services, employers, major freight and trucking yards, transit services, and other community facilities.

A copy of the Purpose and Need Technical Report is available for review at the Texas Department of Transportation (TxDOT) Dallas District office or online at www.txdot.gov/loop9.

2.2 Supporting Facts and/or Data

Population and employment growth are primary demographic and economic indicators for travel demand. In 2010, the NCTCOG 12-county Metropolitan Planning Area (MPA), (comprised of Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties) had a population of 6.4 million. According to NCTCOG, the total population of the 12-county MPA is projected to increase to 11.2 million residents by 2045, which represents a 75% increase for the region within a 35-year period. The expected growth in and around the study area would continue to strain existing transportation infrastructure. The existing transportation infrastructure serving these communities is insufficient to effectively meet the access and mobility needs associated with this growth.

2.2.1 Population Growth

Population (as indicated by an increase in the number of households) and total employment growth are primary demographic and economic indicators for travel demand, which is defined as the number, purpose, and type of trips. The statistics below are indicative of the need for transportation improvements within the proposed Loop 9, Segment A study area to accommodate growth. The existing transportation infrastructure serving these communities is insufficient to effectively meet the access and mobility needs associated with this growth.

NCTCOG uses demographic forecasts to develop transportation recommendations. The year 2023 is used as a base year to illustrate general trends in population and employment growth through 2045. **Table 2-1** shows the historical and projected population distribution for Dallas and Ellis Counties.

Table 2-1: Historical and Projected Population Data

County	1990[a]	2000[a]	2010[a]	2023[b] Projected	2045[b] Projected	Percent Change (1990-2000)	Percent Change (2000-2010)	Percent Change (2010-2023)	Percent Change (2023-2045)
Dallas	1,852,810	2,218,899	2,368,139	2,753,334	3,533,521	19.8%	6.7%	16.3%	28.3%
Ellis	85,167	111,360	149,610	208,313	318,261	30.8%	34.3%	39.2%	52.8%

Source: [a] U.S. Census – 1990, 2000, 2010; [b] NCTCOG *Mobility 2045 Update*, 2022.

According to NCTCOG's *Mobility 2045 Update* plan, Dallas County's population is expected to grow by approximately 28.3% from 2,753,334 in 2023 to approximately 3,533,521 in 2045. Neighboring Ellis County is expected to have an even greater population increase, about 52.8%, from 208,313 in 2023 to 318,261 residents in 2045.

Table 2-2 shows the historical and projected population distribution for each of the communities within the study area.

Table 2-2: Population Growth by City within the Study Area

	1970[a]	1980[a]	1990[a]	2000[a]	2010[a]	2020[a]	2030[b]	2040[b]	2050[b]
Cedar Hill	2,160	6,849	19,976	32,093	45,028	49,148	65,133	76,989	83,579
Percent Population Change		1970-80	1980-90	1990-2000	2000-10	2010-20	2020-30	2030-40	2040-50
		217 %	192 %	61%	40%	9%	22%	18%	9%
DeSoto	6,617	15,538	30,544	37,646	49,047	56,145	58,941	64,281	70,078
Percent Population Change		1970-80	1980-90	1990-2000	2000-10	2010-20	2020-30	2030-40	2040-50
		135%	97%	23%	30%	14%	8%	9%	9%

Table 2-2 Population Growth by City within the Study Area (continued)

	1970[a]	1980 [a]	1990 [a]	2000 [a]	2010 [a]	2020[b]	2030[b]	2040[b]	2050[b]
Glenn Heights	257	1,033	4,564	7,224	11,278	15,819	18,831	23,973	29,555
Percent Population Change		**1970-80** 302%	**1980-90** 341%	**1990-2000** 58%	**2000-10** 56%	**2010-20** 40%	**2020-30** 36%	**2030-40** 27%	**2040-50** 23%
Midlothian	2,322	3,219	5,141	7,480	18,037	35,125	30,895	32,500	34,500
Percent Population Change		**1970-80** 39%	**1980-90** 60%	**1990-2000** 45%	**2000-10** 141%	**2010-20** 95%	**2020-30** 50%	**2030-40** 5%	**2040-50** 6%
Ovilla	339	1,067	2,027	3,405	3,492	4,304	5,713	7,120	9,110
Percent Population Change		**1970-80** 215%	**1980-90** 90%	**1990-2000** 68%	**2000-10** 3%	**2010-20** 23%	**2020-30** 27%	**2030-40** 25%	**2040-50** 28%
Red Oak	767	1,822	3,124	4,301	10,769	14,222	8,635	11,660	16,615
Percent Population Change		**1970-80** 138%	**1980-90** 71%	**1990-2000** 38%	**2000-10** 150%	**2010-20** 32%	**2020-30** 13%	**2030-40** 35%	**2040-50** 42%

Source: [a] U.S. Census – 1970, 1980, 1990, 2000, 2010, 2020; [b] Texas Water Development Board (TWDB) 2021 Regional Water Plan population projections.

Note: TWDB population projections are based on water utility service areas, which may be the same or very similar to established political boundaries (e.g., city limits), but not in every case.

As population increases, employment is also expected to increase by over 39% in Dallas County and 45% in Ellis County. Dallas County is expected to have the highest percentage of employment growth for the 12-county MPA. Employment projections for Dallas and Ellis Counties are shown in **Table 2-3**.

Table 2-3: Forecasted Employment Growth by County, 2023 and 2045

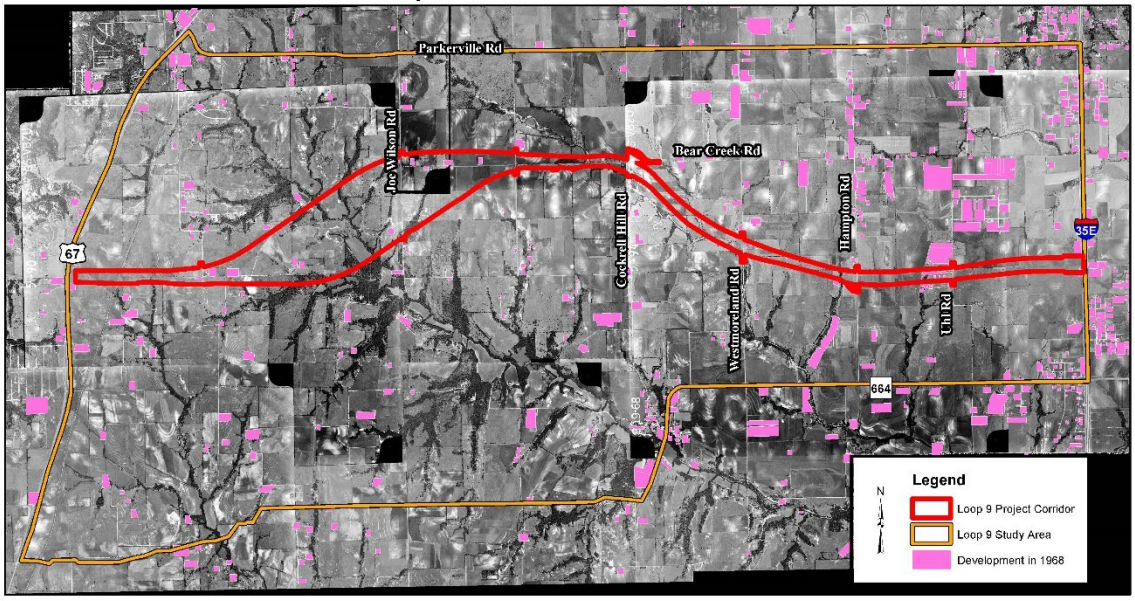
County	2023	2045	Growth	Percent Growth
Dallas	2,568,346	3,577,033	1,008,687	39%
Ellis	93,765	136,112	42,347	45%

Source: NCTCOG *Mobility 2045 Update*, 2022.

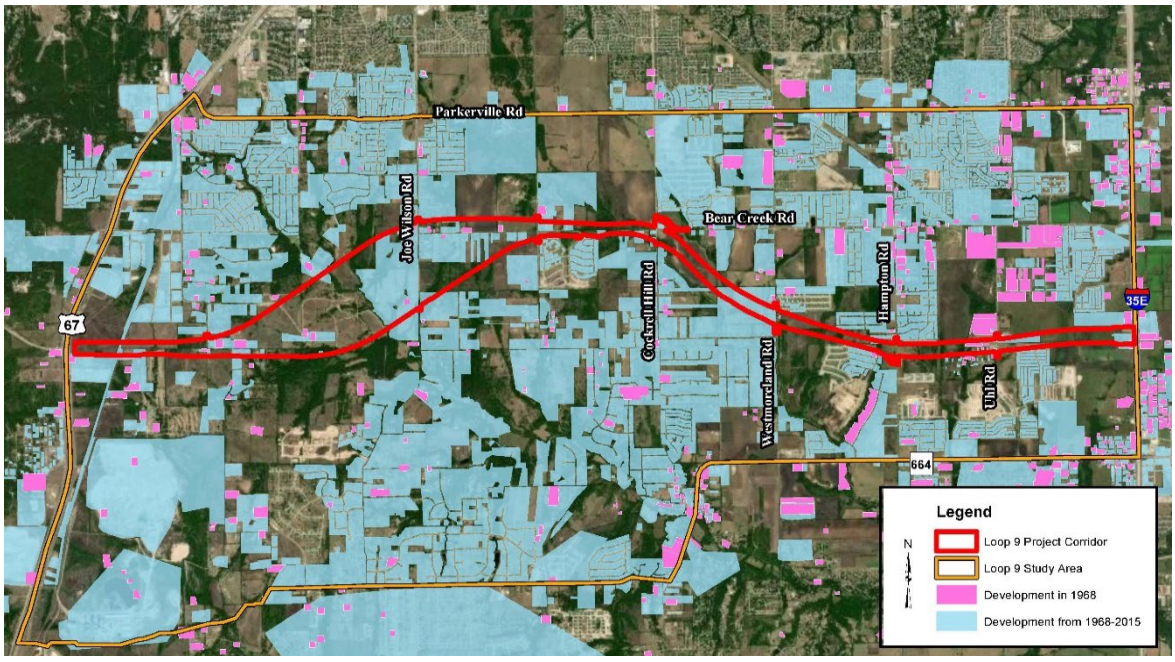
Given the availability of undeveloped land and a discontinuous east-west roadway network in the study area, mobility impacts are likely and the need for transportation improvement to these newly developed and developing areas of the counties are necessary. **Figure 2-1** illustrates the increase in land development within the study area over the past nearly 50 years.

Figure 2-1: Historic and Current Land Development

Land Development Trends – 1968 Aerial



Land Development Trends – 2015 Aerial



Source: ESRI Aerials 1968 and 2015.

In 1968, there was approximately 3,336 acres (16%) of developed land within the study area. By 2015, approximately 9,785 acres of land had been developed representing approximately 47% of the 20,688-acre study area.

Mobility improvements for the DFW metropolitan area have traditionally focused on improving travel time and reducing traffic congestion along the major roadway corridors. Historically, the majority of industrial and commercial developments have been in urban centers within the major loop facilities such as Interstate (I)-635. Most of the peak hour travel demand originated from commuters in suburban communities traveling to and from their respective places of employment. Industrial and commercial developments have now expanded beyond the major loop freeways/tollways into the suburban communities, causing a change in travel patterns. Increasing development of industrial and commercial facilities has positively affected economic growth for these communities, which has in-turn increased population growth and transportation demand (TxDOT, 2014a).

Not only have population and travel increased, but the nature of travel has changed in ways that contribute to greater traffic congestion. The travel patterns of many people have altered with changes in land use. The changes in land use associated with suburbanization influence the characteristics of travel, causing more widely scattered inter- and intra-suburban travel as opposed to the more suburb-to-central city commute of the past. As commercial establishments and employers increase in these suburban areas, changes in travel patterns inherently result in increased localized traffic and congestion.

The study area for the proposed Loop 9, Segment A facility is primarily rural and has historically been characterized as a relatively low-density, rural suburban area of Dallas and Ellis Counties. A major development northeast of the study area is the International Inland Port of Dallas (IIPOD), a regional intermodal development focused on logistics and freight distribution (IIPOD, 2020). The IIPOD is a public-private partnership that serves as a third phase of regional intermodal development. It is a coordinated effort partnering communities and developers and a key driver in making Dallas one of the nation's premier logistics and distribution centers. The IIPOD is a catalyst for investment, job growth, and development of sustainable communities.

The IIPOD is considered an influence within the Loop 9, Segment A study area due to the anticipated industrial/commercial growth and heavy freight traffic within and adjacent to the development. It is also a key factor in transportation demand within the study area. Projected growth and traffic generation from this area has been incorporated into the Loop 9, Segment A traffic forecast analysis obtained from the Feasibility Study. The IIPOD development area encompasses 7,500 acres and five municipalities, including Dallas County. The project has direct access to three major interstate highways (IH 35E, I-45, and I-20) and currently employs over 17,000 people. (IIPOD, 2020).

2.2.2 Transportation Demand

2.2.2.1 Feasibility Study Traffic

The traffic study generated for the Feasibility Study used the NCTCOG's regional travel demand model as its basis of analysis and evaluates traffic growth potential for two scenarios within the study area: Baseline Forecast and Higher Growth Forecast. The Baseline Forecast utilizes historic traffic growth as well as the estimated population and employment growth between the base year (2012) and horizon year (2035) in the NCTCOG *2040 Demographic Forecast*. The Higher Growth Forecast considers future land use plans of jurisdictions within the study area, potential timing of different developments that are envisioned to occur in the vicinity of the corridor, and accelerated

developments usually associated with the opening of a new road. The network used for this evaluation included all planned projects in *Mobility* 2035, except the Loop 9 project. Between 2012 and 2035, the study projected a daily increase in vehicle miles travelled (VMT) (77% increase) and vehicle hours of travel (89% increase) within the study area. The increased travel would result in an increase in vehicle hours of congestion delay (125% increase). In addition, the percentage of lane miles operating at LOS D, E is forecasted to increase from 5.6 to 12.6% (126.4% increase), and the percentage operating at LOS F is forecasted to increase from 4.2 to 18.7% (349.5% increase). Based on this analysis, all functional roadway classifications in the study area would experience deterioration in LOS between 2012 and 2035, thereby inhibiting overall mobility. The details of the Traffic Study are available in the 2014 Feasibility Study at the TxDOT Dallas District Office.

2.2.2.2 Level of Service

LOS is a qualitative measure for rating roadways based on operating conditions. LOS categories range from ratings of A through F, and the range describes a progressive deterioration of operating conditions from A (which indicates very good operating conditions) through F (which essentially represents the functional failure of the roadway in terms of traffic movement). **Table 2-4** describes the characteristics of LOS.

Table 2-4: Level of Service Characteristics

LOS Rating	Description
A	Free flow with low volumes and high speeds
B	Reasonably free flow, but speeds beginning to be restricted by traffic conditions
C	In stable flow zone, but most drivers are restricted in the freedom to select their own speeds
D	Approaching unstable flow where drivers have little freedom to select their own speeds
E	Unstable flow and may require short stoppages
F	Unacceptable congestion, stop-and-go, and forced flow

Traffic LOS measures were used to evaluate justification to open the project or upgrade to the next phase. Traffic volumes that correspond to a LOS of B for arterials were deemed appropriate to justify opening Phase 1 of the project. This would correspond to average daily traffic (ADT) volume of at least 4,000. The results of both traffic forecast scenarios showed that Phase 1 could open by year 2025 with a projected Baseline Forecast of 5,000-6,700 ADT and a projected Higher Growth forecast of 6,900-10,600.

2.2.3 Draft Environmental Impact Statement Traffic Analysis

Subsequent to traffic analysis prepared for the Feasibility Study, a traffic study was conducted for the proposed phased construction of the free frontage road system. NCTCOG's Travel Demand Model (TDM) for future traffic projections in years 2028, 2037 and 2045 were used to develop Loop 9, Segment A projections. Using the NCTCOG TransCAD models, ADT volumes were extracted for Loop 9, Segment A. Volume growth rates were determined for this segment based on the NCTCOG data

and applied to ADT volumes to determine both 2048 and 2058 volume projections. The 2048 is used for Traffic Operational Analysis and 2058 volumes are used for pavement design.

The methodology and traffic projections were submitted for review and have been approved by TxDOT Transportation Planning & Programming Division (TP&P) (**Appendix B**). **Table *2-5*** displays Traffic volumes (ADT) for 2028 (open year), 2048 (design year) and 2058 (pavement design year) for Loop 9, Segment A.

Traffic Operation Analysis consists of using software such as Synchro at all at-grade intersections within the corridor to determine LOS.

Traffic Analysis of the proposed design compared to the No-Build Alternative shows that the No-Build Alternative would result in higher traffic volumes on existing roadways, which would lead to increased congestion and longer travel times in and around the study area.

Table 2-5: Baseline and Projected Daily Traffic Volumes for the Proposed Loop 9, Segment A

	2028	2048	2058
Roadway Segment: US 67 to IH 35E	17,040	39,430	59,740
Source: TxDOT: Traffic Analysis for Highway Design (Option C), April 3, 2020.			

2.2.4 System Linkage

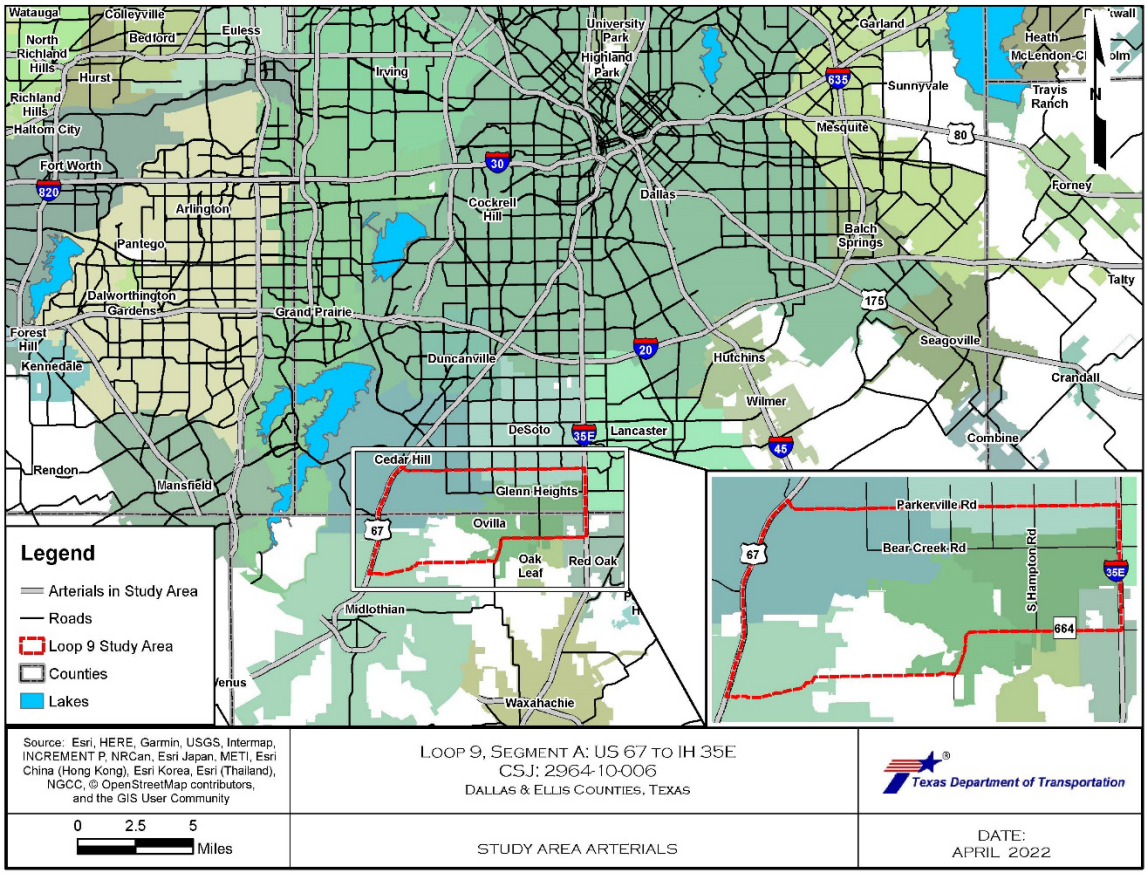
Within the study area, the existing roadway system provides sufficient north-south radial access but lacks continuous east-west transportation facilities to serve these growing communities. There is one interstate highway (IH 35E) and one principal US highway (US 67) within the study area; both of which provide north-south travel access. Existing east-west facilities within the study area include, Bear Creek Road to the north (approximately 0.9 miles, intersecting at western termini of Bear Creek Road), Parkerville Road to the north (approximately 0.9 miles) and Farm-to-Market (FM) 664 (Ovilla Road) to the south (approximately 0.8 miles at its nearest location to the study area) (**Figure 2-2**). Parkerville Road and Bear Creek Road are not continuous throughout the study area, therefore do not provide a through connection between US 67 and IH 35E.

- Bear Creek Road is an east-west, undivided, two-lane rural roadway. The road is currently being considered for improvements by TxDOT. The proposed improvements would reconstruct and widen the existing roadway for a distance of over two miles from Hampton Road to IH 35E. According to a TxDOT press release, improvements would include two travel lanes in each direction with a raised median, curb and gutter, as well as continuous sidewalks and a 12-foot shared-use path. The project would also increase the existing ROW of 80 feet to approximately 112 feet. Additional improvements include reconstructing the intersection of IH 35E and Bear Creek Road and replacing the IH 35E frontage road bridges.

- Additionally, in the city of Glenn Heights, East Bear Creek Road is planned for expansion. The East Bear Creek Road Expansion would take the existing two-lane road to four lanes with enhanced mobility for pedestrians and other transit modes for bikers from IH 35E (Exit 412) to South Hampton Road. Overall, the project will enable automobile, bicycle and pedestrian traffic to travel through Glenn Heights safely and efficiently.
- Parkerville Road is an east-west, four-lane, divided rural roadway from the eastern terminus at IH 35E in the town of DeSoto to S. Uhl Road, and from S. Joe Wilson Road to the western terminus at US 67 in Cedar Hill. Parkerville Road is a two-lane, undivided rural roadway from S. Uhl Road to S. Joe Wilson Road with a discontinuous 0.5-mile section closed to traffic between Keswick Drive and Duncanville Road; at this location traffic must travel north to circumvent a private property before connecting back to Parkerville Road. Parkerville Road establishes the northern study area boundary and crosses most of the same north-south arterials that would be crossed by the proposed Loop 9, Segment A project. Parkerville Road ROW varies from approximately 40-80 feet.
- FM 664 (Ovilla Road) is an east-west, two-lane, undivided rural roadway, with an eastern terminus at IH 35E in Red Oak and a western terminus at US 67 in the city of Midlothian. FM 664 travels west from IH 35E for a distance of about 3.7 miles, then turns south for almost 3 miles before heading west again. While it establishes an east-west corridor, the 3-mile detour makes the roadway inefficient for communities more central to and north of the study area. FM 664 establishes the southern study area boundary and crosses most of the same north-south arterials that would be crossed by the proposed Loop 9, Segment A project. FM 664 ROW is approximately 100 feet. Various portions of FM 664 are currently undergoing studies for future widening to support the traffic demand in this region.

Additionally, commuters more frequently use the east-west movement of taking FM 1387 west/east at its terminus with FM 664. This is more common than using FM 664 in its entirety. Despite this routing being quicker than utilizing all of FM 664, it still presents issues and challenges from being a capable east-west route.

Figure 2-2: Study Area Arterials Map



While existing east-west roadways are available within the study area, these roadways serve local street access and do not provide sufficient east-west linkage for the current or proposed traffic demand to north-south major roadway networks. The proposed project will better serve the needs of area motorists resulting in the alleviation of traffic on parallel roadways. The project will allow area residents, who might work outside of the communities in which they reside, an easier commute.

Loop 9 has been a substantial and long-standing component of the regional long-range transportation plan and has been included in each of the 12 regional transportation plans developed since 1974. The inclusion of Loop 9 in *Mobility 2045 Update* as well as future land use plans for many of the communities within the study area indicates continuing regional support for the proposed project.

2.2.5 Connectivity among Existing Roadway Facilities

The current transportation infrastructure does not adequately provide connectivity between the communities in the study area thereby inhibiting emergency response, access to services, employers, major freight and trucking yards, transit services, and other community facilities. Additionally, there is a demand to promote intermodal connections in the study area and the surrounding DFW region. Major employers within the study area were also identified using the NCTCOG Development Monitoring Employers Report and Employers Geographic Information System

(GIS) dataset. Due to the rural nature of the study area; there are a limited number of major employers.

Public transportation services within the study area include Community Transit Services which provides scheduled transportation services in Ellis and Navarro Counties. Community Transit Services provides a safe and efficient mode of transportation to the general public and persons with special needs. Dallas Area Rapid Transit (DART) provides paratransit services in select cities – one of which is Glenn Heights. This public transportation service is for people with disabilities who are unable to use DART fixed route buses or trains. DART fixed bus routes within the study area are Bus Routes 206, 278 and DART on-call services for personalized neighborhood services. DART's Glenn Heights Park and Ride is located on these routes. There are no rail services currently located within the study area. Loop 9, Segment A would provide a reliable route for transit, school buses, and potential future transit service within the project area.

No emergency facilities are near the study area. Two major hospitals are located along I-20 near DeSoto and Duncanville. The distance to I-20 from the Loop 9, Segment A project area is approximately 3 miles in Red Oak. The Baylor Scott & White Medical Center in Waxahachie is located approximately 8 miles from Loop 9, Segment A and IH 35E in Red Oak. The Methodist Midlothian Medical Center is a new full-service acute care hospital located at 1201 E. US 287 in Midlothian and located approximately 10 miles from the western project limits. Smaller urgent care facilities are also located along I-20 and near IH 35E in Lancaster. Loop 9, Segment A would provide a reliable route for emergency response vehicles within the study area.

2.3 Purpose of the Proposed Project

The Purpose of the proposed action is to develop a facility that would help address transportation demand and system linkage within the study area by providing a direct link from US 67 to IH 35E, which would serve the residents and businesses in the area.

- Population growth: The proposed project would support the rapid growth in population, as supported by local and regional planning plans and projections. The proposed project will support the economic development within the region and provide adequate connectivity for commuters, as well as relieve congestion on local arterial roadways.
- Transportation Demand: The proposed Loop 9, Segment A project would increase capacity, mobility, and accessibility for the region. The proposed project would help manage the long-term regional congestion from population and employment growth by improving the movement of persons and goods, which would minimize barriers among businesses, consumers, and transportation infrastructure.
- System linkage: The proposed project would improve system linkage by providing access and connectivity to major highways/arterial roadways (IH 35E and US 67).
- Connectivity among existing roadway facilities: The proposed project would serve a population that is currently without a continuous east-west travel route and provide transportation alternatives during emergency response times, access to services, employers, and other community facilities located within the study area.

A copy of the Purpose and Need Technical Report is available for review at the TxDOT Dallas District office or online at www.txdot.gov/loop9.

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SECTION 3. ALTERNATIVES ANALYSIS

Section 3 documents the development of alternatives, the decision-making process used during the project-planning phase, and the alternative selection criteria that was applied when analyzing the environmental and engineering criteria for each of the proposed Loop 9, Segment A alternative alignments. Input and comments from members of the public and local, state, and federal agencies were considered and implemented throughout the evaluation process.

Section 4 provides a thorough and systematic account of resource and constraint mapping, environmental issues, engineering, and public involvement. The approach allowed for a full comparison and evaluation of alternatives through an iterative series of phases. As presented in **Section 3.5** of the DEIS, the process led to the selection of a single Recommended Preferred Alternative that would best serve the need and purpose of the proposed Loop 9, Segment A project and would best avoid or minimize environmental impacts.

3.1 Previous Studies and Reports

Loop 9 has been identified in transportation plans for the last 40 years. Originally conceived as a circumferential loop around the Dallas metropolitan area, changes in demographics, legislation and forecasted traffic growth have altered the development of the project as an "outer loop". There have been several studies on the proposed Loop 9 concept, discussed below, each of which resulted in a need that correlates with the proposed transportation improvements documented in this DEIS.

3.1.1 Loop 9 Feasibility Study/Major Investment Study (1995-1997)

The South Outer Loop (Loop 9) Feasibility Study/Major Investment Study (MIS) was authorized by Dallas County in 1995 to help address future regional transportation needs between I-20 and State Highway (SH) 360. The primary objectives of the study were to identify the type of facility that should ultimately be constructed, establish an approximate centerline in sufficient detail for affected jurisdictions and property owners to understand, and seek community consensus on a locally preferred alternative. The study included an extensive public and agency involvement process, newsletters, project fact sheets, media notification, and Technical Steering Committee (technical staff from each jurisdiction) and Policy Advisory Group (elected officials from each participating jurisdiction) meetings.

In 1997, study efforts resulted in a "Technically Preferred Alignment" of a new roadway facility that was adopted by many of the cities and agencies involved in the study. However, study efforts were temporarily suspended before a "Locally Preferred Alignment" could be identified (TxDOT, 2014a). A copy of the MIS is available for viewing at the TxDOT Dallas District office.

3.1.2 Major Investment Study/Draft Environmental Impact Statement (2002-2006)

In May 2002, the Loop 9 Feasibility Study was reinitiated to identify viable corridor alignments and modal alternatives for the study area. From 2002 to 2006, alignment and environmental constraints, coupled with the growth and desires of surrounding communities, resulted in further alignment revisions to avoid and minimize impacts. A range of conceptual alternatives was developed within the study corridor extending from I-20 to US 287. These alternatives represented a full range of alternatives consisting of 14 initial improvement alternatives, including a No-Build

Alternative, a Transportation Systems Management (TSM)/ Transportation Demand Management (TDM) Alternative, and numerous Build Alternatives. The Build Alternatives consisted of variations of freeway, tollway, and parkway facilities with consideration of access roads, High Occupancy Vehicle (HOV)/managed lanes, transit bus and rail, and combinations of these improvements. The alternatives were developed to avoid or minimize impacts to the extent possible based on information gathered and input from the public and agencies (TxDOT, 2011).

3.1.3 Preliminary Loop 9 Southeast Draft Environmental Impact Statement (2011)

By 2006, a possible connection between the Loop 9 project and other statewide transportation improvements required Loop 9 stakeholders to consider substantial design modifications so that the project would conform to TxDOT high-speed roadway design criteria. In 2006, TxDOT became the lead agency for advancing the Loop 9 Southeast project through the National Environmental Policy Act (NEPA) process (TxDOT, 2011).

Between 2006 and 2011, TxDOT prepared the Preliminary Loop 9 Southeast DEIS and associated concept designs. The proposed project would have advanced a 6-lane new location, controlled access tollway with intermittent one-way access roads between I-20 and US 287, a distance of approximately 44 miles. The proposed ROW varied from 450 to 600 feet depending on the interchange configuration and location. The Loop 9 Southeast project was included in *Mobility 2030 – 2009 Amendment* as a toll road with a total project cost estimate of $5.76 billion.

While the Loop 9 Southeast Preliminary DEIS was under review in 2009, TxDOT published the Innovative Connectivity in Texas/Vision 2009 which defined a new vision for the TxDOT corridor development process and resulted in the retirement of the Trans-Texas Corridor (TTC) concept. In 2010 the Federal Highway Administration (FHWA) issued a Record of Decision (ROD) for the Tier One Environmental Impact Statement (EIS) for the TTC-35 project, which advanced No Action as the selected alternative. In late 2011, NCTCOG concluded the Regional Outer Loop Corridor Feasibility Study. This study determined that a continuous, circumferential outer loop was not warranted based on the forecasted year 2035 travel demand and the lack of statewide connections (TxDOT, 2014a).

The changes in TxDOT policy, the No Action on the TTC-35 EIS, funding constraints for transportation projects, and the current economic climate at the time impacted the assumptions and development of the Regional Transportation Council (RTC) approved *Mobility 2035: The Metropolitan Transportation Plan for North Central Texas* (*Mobility 2035*). As a result of these changes, work on the Loop 9 Southeast Preliminary DEIS was suspended until a determination on how the project should proceed was made. The Preliminary DEIS was put on hold in November 2011 and was officially concluded in January 2012. The Notice of Intent (NOI) was rescinded in the Federal Register on March 20, 2013, and in the Texas Register on July 23, 2013 (TxDOT, 2014a).

Several planning factors/considerations used in the development of *Mobility 2035* influenced the change in direction for the Loop 9 Southeast project. These factors include:

- Changes in the travel model and MPA boundary,
- Changes to the transportation network (e.g., the deferral of over $45 billion in transportation projects due to limited transportation funding),
- Revised regional demographics which forecasted more focused growth and development in Dallas and Tarrant Counties in comparison to previous forecasts,
- No Action on the TTC-35 EIS, and
- Removal of the Regional Outer Loop concept and its connectivity to Loop 9 Southeast.

Additionally, traffic studies conducted by NCTCOG indicated that the portion of the Loop 9 Southeast project between US 287 and US 67 would not be warranted. As a result, the Loop 9 Southeast project western terminus was changed to US 67.

These factors contributed to a substantial decrease in the projected travel demand for the proposed project by 2035, the horizon year of the MTP at the time. The lower traffic levels in the project corridor would not warrant full implementation of the Loop 9 Southeast project by 2035 as proposed in the 2011 Preliminary DEIS. As a result, TxDOT, NCTCOG, and local leaders recommended a Corridor/Feasibility Study to determine a new direction for the project corridor (TxDOT, 2014a).

3.1.4 Loop 9 Southeast Corridor/Feasibility Study (2012-2014)

While the previous studies laid some groundwork for developing the alternative alignments evaluated in this DEIS, the most influential study on the developmental process was the *Loop 9 Southeast Corridor/Feasibility Study* (Feasibility Study) prepared by TxDOT in 2014. In September 2012, TxDOT began the Feasibility Study for the revised Loop 9 project concept from US 67 to I-20 (Southeast Project). The purpose of the Feasibility Study was to assist in guiding future infrastructure investments to advance the proposed Loop 9 Southeast Project. The Feasibility Study also followed a collaborative and integrated Planning and Environment Linkages (PEL) approach to transportation decision-making that considered environmental, community, and economic goals early in the transportation planning process for use in the NEPA process.

The Loop 9 Southeast Corridor/Feasibility Study identified a program of projects to:

- Evaluate projected traffic, project needs and other elements of the proposed project and determine independent projects for possible phased development and the associated logical termini, if appropriate (e.g., Sections of Independent Utility).
- Establish a cohesive program of individual projects that can be developed through the proposed planning horizon (2035) and beyond to meet the project needs and accomplish the goal of advancing the sequenced development of a new location transportation facility that serves the south Dallas, north Ellis and west Kaufman County area.
- Prioritize the sequence of individual projects based on urgency of the needs to be addressed, availability of funding, and the expectations of the local communities.

The Feasibility Study incorporated more flexible design standards, a reduced ROW, a shorter project length, and minimized the overall impacts when compared to past options studied in the MIS. These

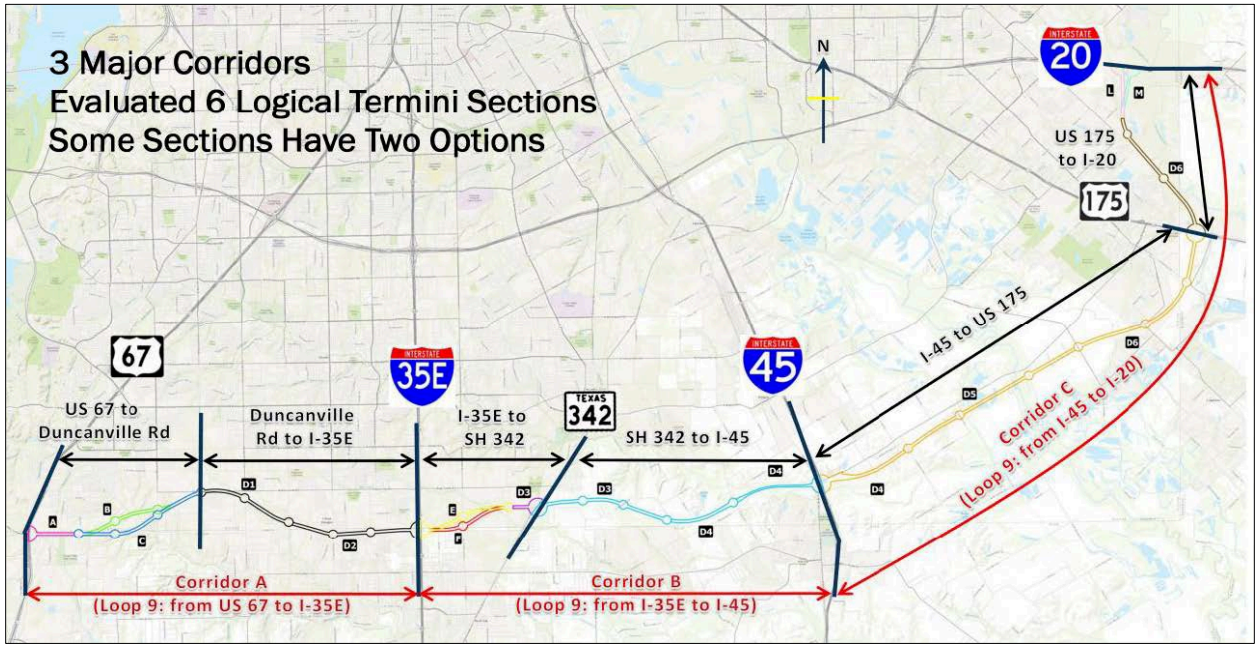
changes altered the project to be more closely aligned with the transportation and development needs of the southeast Dallas region.

The ultimate goal of the Feasibility Study was to develop independent projects to advance into the NEPA process based on mobility needs, engineering and environmental data, and coordination with the NCTCOG, local officials, the public, and resource agencies. Based on discussions with local governments and major stakeholders within the study area, along with consideration of logical termini (project endpoints such as major thoroughfares), and independent utility (the ability of a transportation project to function without recurring additional transportation improvements), the Feasibility Study proposed developing the Loop 9 project in three major corridors, for up to six separate and independent projects, utilizing a phased construction approach: Corridor A, Corridor B and Corridor C.

The proposed Loop 9, Segment A project discussed in this DEIS document represents Corridor A as identified in the Feasibility Study (**Figure 3-1**). For the purpose of this DEIS, Corridor A is referred to as Loop 9, Segment A henceforth.

Corridor A in the Feasibility Study (Loop 9, Segment A), contained two viable alternative alignment options, labeled as "B" and "C" in **Figure 3-1**, carried forward for analysis between US 67 and Duncanville Road. The section of the corridor between Duncanville Road and IH 35E contained only one viable option carried forward for analysis.

Figure 3-1: Loop 9 Southeast Corridor/Feasibility Study Corridors



The Feasibility Study Team evaluated the major corridors to determine which corridor could be developed first. **Table 3-1** shows the results of the evaluation.

Table 3-1: Major Corridor Evaluation

Criteria	Measure	Corridor A (US 67 to I-35E)	Corridor B (I-35E to I-45)	Corridor C (I-45 to I-20)
Section Length	Mile	9.4	9.5	15.5
Total Estimated Cost (in 2013 $)*	$	$771 M	$710 M	$1.3 B
Anticipated Growth	High, Med, Low	High	High	Low
Supports economic development opportunities (IIPOD**, etc.)	High, Med, Low	Med	High	Low
Supported by Local Governments	Yes, No	Yes	Yes	Yes
Supported by Major Stakeholders	Yes, No	Yes	Yes	Yes
Impact on Human (Built) Environment (displacements, cultural resources, etc.)	High, Med, Low	High	Med	Low
Impact on Natural Environment (wetlands, habitat, etc.)	High, Med, Low	Med	High	Med
Impacts to Major Utilities (transmission lines, railroads, TV towers, pipelines, etc.)	Yes, No	Yes	Yes	No
(TxDOT, 2014) *Includes ROW, utilities and construction costs for all four phases. ** International Inland Port of Dallas				

3.2 Alternative Transportation Modes Previously Considered

This DEIS builds on the work completed by TxDOT in the previous studies. The initial task in determining the full range of alternatives included the evaluation of various transportation modes in the MIS (TxDOT, 2011). The identified conceptual alternatives consisted of 14 initial improvement alternatives within four main categories of alternative transportation modes:

- No-Build Alternative
- TSM/Intelligent Transportation System (ITS) Alternatives
- TDM
- Modal Alternatives
    - Bus and rail transit
    - Access roadway expansion
    - HOV/managed lanes
    - Build (new highway)

Operational efficiency alternatives offer lower cost and quick implementation projects as part of the overall congestion management process. These strategies include TSM/ITS and TDM. They encourage the use of alternative travel modes and improve the efficiency of the transportation

system. A list of currently planned projects aimed at reducing the travel demand in the project study area are:

- HOV/Managed lanes as part of the facility expansion improvements on US 67 (Southern Gateway);
- Regional Rail traversing through the study area along the UP Railroad (running adjacent to US 67); and
- The Veloweb, a planned regional system of bicycle improvements in the *Mobility 2045 Update*, identifies three planned shared use paths within the study area.

DART is a transit agency serving the DFW metroplex of Texas. It operates bus, rail, paratransit and ride share services in Dallas and twelve surrounding cities. DART was created in 1983 to replace a municipal bus system and funded expansion of the regions transit network through a sales tax levied in member cities (www.dart.org, accessed May 10, 2022). The city of Glenn Heights is a member of DART, and although there are no direct rail lines to the community, the city is served under DART's Park and Ride Center located off Bear Creek Road. Also, residents are afforded the service of DART's on-call shuttle service for transportation to and from the Park and Ride Center.

The cities of Red Oak, Ovilla and Cedar Hill, although eligible, are not currently members of DART. Transit improvements associated with the expansion of DART would benefit residents of Cedar Hill, Red Oak, and Ovilla; however, there are no future plans to expand DART into these cities.

Community Transit Service (CTS), a public transportation service largely funded by the TxDOT, provides curb-to-curb transit services to any Ellis County resident, regardless of income. Buses will pick up and drop off riders to desired destinations determined at the time of reservation. These transportation services were developed to provide safe and efficient transportation to the general public and to persons with special needs as specified by the Americans with Disabilities Act (ADA).

The initial screening step for the full range of alternatives was to screen various transportation modes against the project's purpose and need. TSM/ITS, TDM, bus and rail transit, HOV lanes, and access roadway expansion were considered and were eliminated from further study because they do not increase the overall capacity needed to address future congestion needs. As described in Section 2.1, the study area lacks an east-west corridor needed to address travel demand and connectivity to other major north-south roadways. These alternative transportation measures are not designed to address this type of problem and therefore cannot offer a complete solution for future travel needs. Elimination of alternative transportation modes from detailed study is consistent with 23 CFR 771. 123(c). Even though these alternative transportation modes were eliminated from further study on their own, TSM, TDM, and modal alternatives currently in the *Mobility 2045 Update* remain complement to the Build Alternatives. While bicycle and pedestrian facilities could be included in the final design of the proposed roadway, they were not treated as a stand-alone alternative transportation mode. The Feasibility Study, dated March 2014, follows the PELs process for the identification of reasonable alternatives to move forward into the process for additional study

and is the foundation for the alternatives analysis used in the current study. This DEIS is intended to advance only one component of the Feasibility Study, Corridor A (Loop 9, Segment A).

Based upon defined goals and objectives of potential transportation improvements, the alternatives in the MIS, and input from public agencies and the Loop 9 Task Force, the analysis showed a four- to six-lane parkway facility (initial construction of access roads with a wide median to accommodate future construction of freeway mainlanes) would best meet the needs of the corridor based on traffic projections.

3.3 Development of the Alternatives in this Draft Environmental Impact Statement

As noted above, the alternative alignments under consideration for this DEIS originated, in part, from the Loop 9 Segment A analyzed and refined by public and agency comment in the Feasibility Study which is available for review at the TxDOT Dallas District office and on online at www.txdot.gov/loop9. Loop 9, Segment A (labeled as Corridor A in the Feasibility Study), this corridor contained two viable alignment options carried forward for analysis between US 67 and Duncanville Road. The section of the corridor between Duncanville Road and IH 35E contained only one viable option carried forward for analysis. The corridor was selected because it limited community disruption and improved access to Harmony subdivision (west of IH 35E), Bear Creek subdivision (east of Duncanville Road), and Meadow Springs subdivision (east of Westmoreland Road), while simultaneously increasing capacity, mobility, and accessibility by creating a direct link from US 67 to IH 35E. It would serve a population that is currently without a direct east-west travel route to these major intersections. The long-term congestion from high population and employment growth, urban development, and overall growth from the DFW region would also be managed, in part, with the proposed project.

3.3.1 No-Build Alternative

The No-Build Alternative represents the case in which Loop 9, Segment A would not be built. The No-Build Alternative would include all existing conditions and the construction of all projects already programmed and funded by TxDOT, Ellis County, Dallas County, city of Cedar Hill, city of Glenn Heights, city of Ovilla, city of Red Oak, DART, or Federal entities. These improvements incorporate: TSM/ITS, TDM, and modal alternatives currently programmed and funded in the approved MTP (*Mobility 2045 Update*), Capital Improvement Plans for the city of Cedar Hill, city of Glenn Heights, city of Red Oak and city of Ovilla, and the 2021-2024 TIP. A list of currently programmed projects is shown in **Section 6**.

Based on conditions presented in **Section 2** of this DEIS, the No-Build Alternative would not adequately accommodate existing and future traffic volumes on roadways in or around the proposed Loop 9, Segment A study area. Furthermore, the No-Build Alternative would not reduce congestion or improve mobility on the existing roadways within the study area. Although the No-Build Alternative would not satisfy the purpose and need of the proposed project, it was retained as the baseline alternative considered throughout the DEIS for comparison purposes.

3.3.2 Build Alternatives

During the scoping process of this DEIS, and in coordination with project stakeholders, a third alternative was added between the original two alternatives identified in the Feasibility Study. The limits for all three alternatives were refined as being generally between Tar Road and S. Duncanville Road. The addition of the third alternative, referenced as Alternative 2 moving forward, was done to straighten the alignment and take out a curve in an area where the alignment crosses Red Oak Creek, thereby minimizing impacts because of a shorter bridge structure. This alternative removes super-elevations needed for both mainlanes (ultimate facility design) and frontage roads, and it creates more desirable ramp spacing for the ultimate design.

Additionally, the intersection with US 67 was added to each of the three Alternatives after the scoping meetings (**Exhibit 3-1**).

As summarized in **Table 3-2**, an evaluation matrix was used in screening the Preliminary Alternative Alignments (Alternatives 1-3) and presented to the public and resource agencies during the public and agency scoping meetings (2019).

Table 3-2: Screening of Preliminary Alternative Alignments

Alternative Alignment	Length	Land Use		Changes in Community Cohesion	Environmental Justice (EJ) Issues	Air Quality Impacts	Traffic Noise Impacts	Residence Displacements	Commercial Displacements	School Properties	Churches	Cemeteries	Parks	Natural Resources												Cultural Resources				Pipeline Crossings	Potential Hazardous Materials Sites	Water Wells	
														Special Resource Areas				Aquatic Resources				Flood Zones											
		Visual and Potential Access Impacts	Separation of Farmland from Homestead											Threatened and Endangered Species	Species of Concern	Bottomland Hardwoods (acres)	Riparian Forest (acres)	Adjacent Wetlands (acres)	Isolated Wetlands (acres)	Total Wetlands (acres)	Stream Crossings	100-Year Floodplain (acres) [1]	Floodway (acres) [1]	Prime Farmland (acres)	Statewide Important Farmland Soils	Recorded Archeology Sites	Historic Properties	Century Farm Sites	High Probability Area (acres)			Public[2]	Private[2]
1	9.60	Yes/ No[3]	Yes/ No	Yes /No	Yes/ No	Yes/ No	Under Evalu-ation	64	5	-	-	-	-	No	Yes	0.0	14.7	1.93	0.31	2.23	24	28.5	7.91	183.8	203.5	0	0	0	0	4	4	1	1
2	9.58	Yes/ No	Yes/ No	Yes /No	Yes/ No	Yes/ No	Under Evalu-ation	64	5	-	-	-	-	No	Yes	0.0	21.7	2.0	0.31	2.31	22	25.12	5.41	264.4	201.4	0	0	0	0	4	4	1	1
3	9.66	Yes/ No	Yes/ No	Yes /No	Yes/ No	Yes/ No	Under Evalu-ation	71	4	-	-	-	-	No	Yes	0.0	15.0	1.93	1.42	3.35	21	31.27	5.41	187.3	201.2	0	0	0	0	4	4	1	1

[1/2] Data derived from hazards.fema.gov GIS online server
[3] Yes/No-these categories were under evaluation at the time of the 2019 Public Scoping Meetings
Note: Screening Evaluation based on alignments presented at the 2019 Public Scoping Meetings. Some data were still under evaluation.

3.3.2.1 Common Alignment

The Common Alignment is the portion of the proposed alignment that is the same for each of the build alternatives. The proposed roadway shares a Common Alignment on the east and west ends. From US 67, the Common Alignment heads east for a distance of approximately 0.8 miles until intersecting Tar Road where the alternatives diverge from the Common Alignment. The Common Alignment in this location runs parallel to and just south of the Dallas/Ellis County line in Ellis County. A grade separation at the BNSF Railroad would be constructed in this portion of the Common Alignment. In addition, the western limit of the project would tie into a grade separation at US 67 which would be constructed independently under a separate project prior to construction of Loop 9, Segment A.

After the divergence of the build alternatives, the Common Alignment comes back together approximately 0.4 miles east of S. Duncanville Road. At this point, it follows a generally easterly direction for approximately 4.6 miles before terminating at the intersection with IH 35E. This portion of the Common Alignment includes intersections with four major crossroads: S. Cockrell Hill Road, S. Westmoreland Road, S. Hampton Road, and Uhl Road. The eastern limit of the project would tie into a grade separation at IH 35E which would be constructed independently under a separate project prior to construction of Loop 9, Segment A (**Exhibit 3-2**).

3.3.2.2 Alternative 1

Alternative 1 (9.4 miles), the north-central alternative, diverges from the Common Alignment at Tar Road heading east, then immediately turns northeast before crossing S. Joe Wilson Road and converging back with the Common Alignment (**Exhibit 3-2**).

3.3.2.3 Alternative 2

Alternative 2 (9.39 miles), the south-central alternative, diverges from the Common Alignment at Tar Road heading east, then immediately turns northeast; however, this alignment follows a straighter path between Tar Road and S. Joe Wilson Road. After S. Joe Wilson Road, the alternative continues in a northeast direction before converging back with the Common Alignment (**Exhibit 3-2**).

3.3.2.4 Alternative 3

Alternative 3 (9.46 miles), the southernmost alternative, diverges from the common alignment at Tar Road and keeps east, centered on existing Knight Street. At the end of Knight Street, the alternative shifts northeast before crossing S. Joe Wilson Road and converging back with the common alignment (**Exhibit 3-2**).

Screening of the Preliminary Alternative Alignments

The Preliminary Alternative Alignments (Alternatives 1-3) were presented to the public at a series of Public Scoping Meetings held on July 9 and 11, 2019 and to the resource agencies at an Agency Scoping Meeting on August 8, 2019. As a result of these meetings and changes to project needs within the Dallas District, several changes were made to the Preliminary Alternative Alignments:

1. The US 67 intersection at Lake Ridge Parkway was eliminated from the scope of the project due to need for the intersection to be built sooner with the Horizon Gateway project (US 67

expansion project). As such, the intersection of US 67 and Loop 9, Segment A was removed and evaluated as a separate project. Results of this project are available for review at the TxDOT Dallas District office (CSJ 0261-01-041).

2. The ROW at the intersection with IH 35E was reduced because the previously approved Loop 9, Segment B project required additional ROW to accommodate construction of the interchange of Segment B at IH 35E. As such, the additional ROW was evaluated as a Reevaluation to Loop 9, Segment B and covered under a separate environmental document. Results of this project are available for review at the TxDOT Dallas District office (CSJ 2964-10-005).
3. A fourth alternative was added which would avoid potential cultural and protected species impacts south of Knight Street as well as reduce floodplain impacts associated with Red Oak Creek. This alternative would also utilize more existing ROW by paralleling a portion of Bear Creek Road.

3.3.2.5 Alternative 4

Alternative 4 (9.47 miles), the northernmost alternative, diverges from the Common Alignment at Tar Road, heading northeast, then continues for approximately 2 miles before turning east and crossing S. Joe Wilson Road. After S. Joe Wilson Road, the alignment continues east, north of and parallel to Bear Creek Road before converging back with the Common Alignment approximately 0.4 miles east of S. Duncanville Road (**Exhibit 3-2**).

As stated above, a fourth alternative was added to the evaluation of alternatives as a result of initial data collection and public scoping. These four alternatives were presented to the public in a series of Public Meetings held on February 6 and 13, 2020 (**Figure 3-2**). **Table 3-3** below illustrates the evaluation matrix of the Reasonable Alternative Alignments (Alternatives 1-4) and presented to the public during the 2020 Public Meetings.

Figure 3-2: Four Reasonable Alternatives Presented at the February 2020 Public Meetings

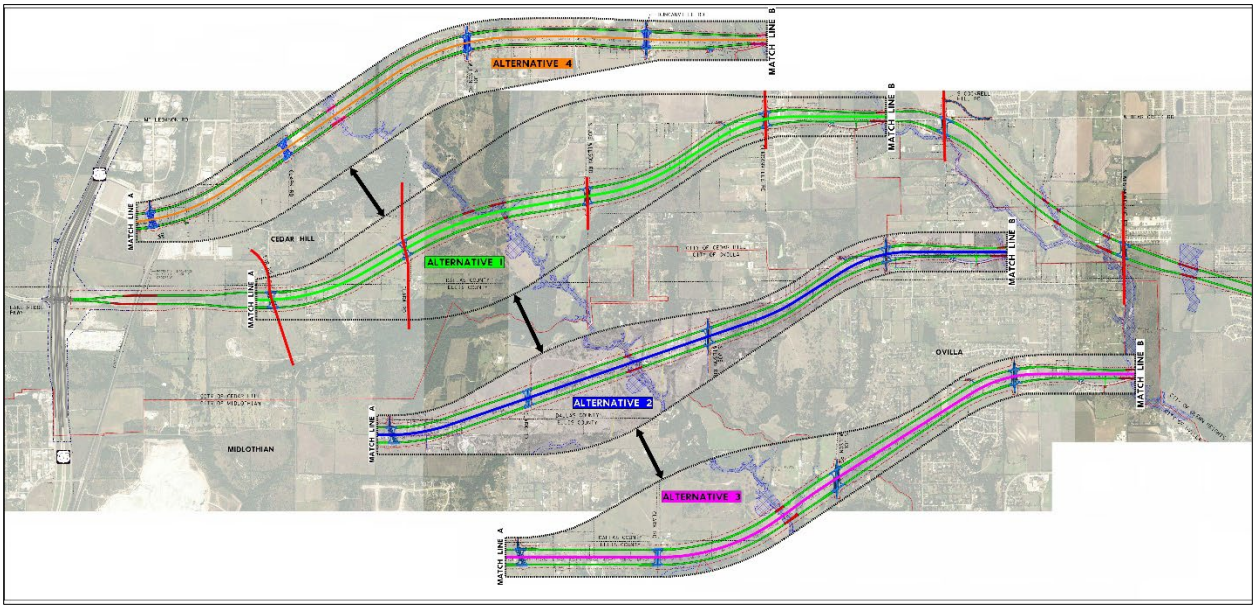


Table 3-3: Reasonable Alternative Alignments Environmental Constraints Analysis

Alternative Alignment	Length (miles)	Visual and Potential Access Impacts	Changes in Community Cohesion	Environmental Justice (EJ) Issues	Public Services	Air Quality Impacts	Traffic Noise Impacts	Potential Residential Displacements	Potential Commercial Displacements	School Properties	Churches	Cemeteries	Parks	Natural Resources												Cultural Resources				Pipeline Crossings	Potential Hazardous Materials Sites	Water Wells	
														Special Resource Areas				Water Resources				Flood Zones													
														Threatened and Endangered Species	Species of Concern	Bottomland Hardwoods (acres)	Riparian Forests (acres)	Total Wetlands (acres)	Total Ponds	Total Linear Feet of Stream	Stream Crossings	100-Year Floodplain (acres)	Floodway (acres)	Prime Farmland (acre s)	Statewide Important Farmland Soils	Recorded Archeology Sites	Recorded Historic Properties	Century Farm Sit es	High Probability Area (acre s)			Public	Private
1	9.40							54	4	0	0	0	0	No	Yes	0.0	34.3	2.40	1.00	16,117	23	14.7	N/A	156.3	178.6	0	0	0	0	3	6	0	1
2	9.37							54	4	0	0	0	0	No	Yes	0.0	41.2	2.47	3.62	15,642	22	13.12	N/A	165.4	176.5	0	0	0	0	3	6	0	1
3	9.46							58	4	0	0	0	0	No	Yes	0.0	34.5	3.52	2.98	15,616	21	13.54	N/A	159.8	176.2	0	0	0	0	3	6	0	1
4	9.47							59	3	0	0	0	0	No	Yes	0.0	32.3	2.22	1.59	15,228	22	12.39	N/A	168.3	193.8	0	0	0	0	3	6	0	1
Preferred														TO BE DETERMINED																			
Selected														TO BE DETERMINED																			

NOTES:

Resources are currently under evaluation, pending additional project information. Updates will be provided at a later date.

1 **Estimates provided are current as of January 31, 2020. All information is subject to change.**

2 **Data derived from both desktop/online resources and field studies where access was granted.**

3 **Environmental Constraints Matrix will be updated as design continues, environmental technical reports are approved, and field evaluations continue.**

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3.3.2.6 Design Modifications

As a result of public and stakeholder comments following the February 2020 Public Meetings and continued stakeholder meetings, four modifications (Modifications A-D) to the four alternatives were developed and are also being evaluated (**Figure 3-3**) Modifications A and B to the Common Alignment were developed to reduce potential residential impacts at Lindell Estates. Modification C was developed to optimize the intersection with S. Westmoreland Road and reduce potential residential impacts to homes on Shady Meadows Lane. Modification D was developed along Alternative 3 to reduce potential residential and environmental impacts near Knight Street.

Modification A

Modification A begins approximately 0.27 miles west of Hampton Road where it diverges slightly to the south of the Common Alignment, continuing east, before crossing back over the Common Alignment approximately 0.36 miles east of Hampton Road. At this point, Modification A travels northeast of the Common Alignment for a distance of 1.5 miles before converging back with the Common Alignment. At its furthest point, the centerline of Modification A is 0.15 miles north of the centerline of the Common Alignment.

Modification B

Modification B follows the same path as Modification A; however, it does not extend as far north of the Common Alignment. At its furthest point, the centerline of Modification B is 0.07 miles north of the of the centerline of the Common Alignment.

Modification C

Modification C, along the Common Alignment, begins approximately 0.86 miles west of S. Westmoreland Road. At this point, Modification C diverges south of the Common Alignment and then continues east past S. Westmoreland Road for a distance of 0.19 miles before converging back with the Common Alignment. At its furthest point, the centerline of Modification C is 0.03 miles north of the centerline of the Common Alignment. Modification C is separate from, and further west of, Modifications A and B and can be combined with either of these.

Modification D

Modification D begins approximately 0.43 miles west of Tar Road. At this point, it begins to shift north of Alternative 3. Modification D continues east, crossing Tar Road and running parallel with Knight Street. At its furthest point, the centerline of Modification D is approximately 300 feet north of the centerline of Alternative 3. After Knight Street, Modification D turns northeast before converging back with Alternative 3 approximately 0.04 miles west of S. Joe Wilson Road.

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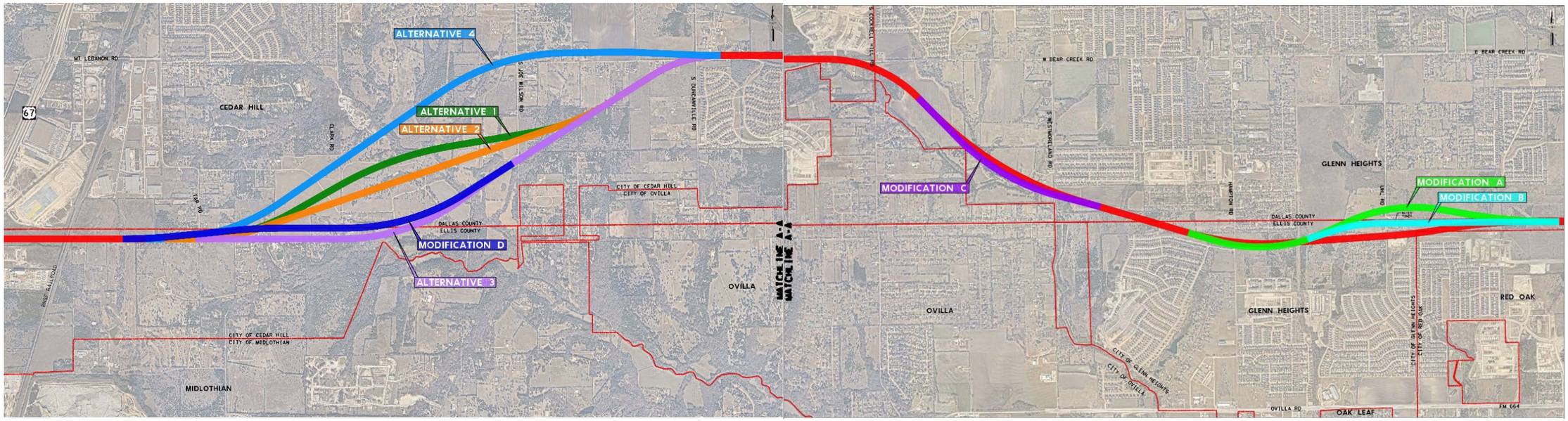
Figure 3-3: Four Alternatives and Design Modifications Evaluated in this Draft Environmental Impact Statement



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3.4 Screening the Reasonable Alternative Alignments for the Draft Environmental Impact Statement

Based on public and stakeholder comments, four reasonable alternatives and four design modifications to these alternatives have been developed and evaluated in this DEIS. On-going environmental studies and additional right-of-entry (ROE), along with further development of the technical reports have provided more detailed analysis and updates to the Evaluation Matrix since the public meetings. Given the nature and location of each design modification (three of the four are located along the Common Alignment), the result was 30 possible alternative combinations that were considered during the analysis (**Table 3-4**). Additionally, design updates since the time of 2019 Scoping and 2020 Public Meetings reduced the ROW limits along portions of the alignment, minimizing the environmental footprint of the project by as much as 100 feet in some areas. **Exhibit 3-2** presents the constraints identified during this process.

The scale and magnitude of potential impacts associated with each alternative was analyzed. The analysis determined that for the size and length of the proposed project, the variance of potential impacts was minimal. By applying a series of established engineering and environmental/socioeconomic screening criteria, the DEIS identified each of the four alternatives and four modifications as Reasonable Alternatives, that consider measurable, comparable impacts; public and stakeholder consideration; and constructability. As such, the DEIS Reasonable Alternative Alignments carried forward for further study in the subsequent sections of the DEIS are Alternative Alignments 1, 2, 3, 4; Modifications A, B, C, D; and the No-Build Alternative. For the analyses, each alternative and modification alignment were evaluated, totaling 30 possible alternative combinations (e.g., Alt 1, Alt 1 with Mod A, Alt 1 with Mod B, Alt 1 with Mod C, Alt 1 with Mod A and C, Alt 1 with Mod B and C. etc.). Tables detailing the specific impacts are available in **Section 4** of the DEIS.

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Table 3-4: Reasonable Alternative Alignment/Modification Combinations Environmental Constraints Analysis Considered in this DEIS

Alternative Alignment Option[1,2,3]	Area (acres)	Visual and Aesthetic Impacts	Air Quality Impacts	Traffic Noise Impacts	Community Impacts								Natural Resources																Cultural Resources			HazMat		Water Wells		Other
													State and Federal Protected Species[8]				EMST Habitat Observed				Water Resources				Flood Zones			Farmland Protection									
					Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Community Facilities Within the Project Area	Changes in Community Cohesion[4]	Environmental Justice Communities[5]	Access and Travel Patterns[6]	Public Services [7]	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Agriculture	Disturbed Prairie	Edwards Plateau Savannah, Woodland and Shrubland	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils	Recorded Archeology Sites[9]	Recorded Historic Properties	Century Farm Sites	Pipeline Crossings	Hazardous Materials Sites of Potential Concern	Public	Private	Airport
Alternative 1																																				
Alt 1	598	Yes	No	34	57	53	4	0	High	Yes	Yes	No	2	1	6	29	83	192	135	32	2.16	0.78	15,250	23	18.6	6.7	1.4	127	157	0	0	0	3	0	0	1	0
Alt 1 Mod A	594	Yes	No	26	31	55	4	0	Low	Yes	Yes	No	2	1	6	29	81	222	133	32	2.04	1.59	14,760	23	18.6	6.7	1.4	136	161	0	0	0	3	0	0	1	0
Alt 1 Mod A & C	587	Yes	No	28	30	55	4	0	Low	Yes	Yes	No	2	1	6	29	76	221	134	33	2.04	1.59	15,031	22	19.0	8.3	1.8	130	157	0	0	0	3	0	0	1	0
Alt 1 Mod B	594	Yes	No	26	34	53	4	0	Low	Yes	Yes	No	2	1	6	29	81	212	133	32	2.78	1.40	14,881	23	18.6	6.7	1.4	128	164	0	0	0	3	0	0	1	0
Alt 1 Mod B & C	588	Yes	No	28	33	53	4	0	Low	Yes	Yes	No	2	1	6	29	76	211	134	33	2.78	1.40	15,152	22	19.0	8.3	1.8	122	160	0	0	0	3	0	0	1	0
Alt 1 Mod C	591	Yes	No	36	56	53	4	0	High	Yes	Yes	No	2	1	6	29	78	191	136	33	2.16	0.78	15,521	22	19.0	8.3	1.8	120	154	0	0	0	3	0	0	1	0
Alternative 2																																				
Alt 2	596	Yes	No	35	57	54	4	0	High	Yes	Yes	No	2	1	6	29	83	184	136	39	2.23	3.39	14,554	22	17.8	4.3	1.3	136	156	0	0	0	3	0	0	1	0
Alt 2 Mod A	592	Yes	No	27	31	56	4	0	Low	Yes	Yes	No	2	1	6	29	81	214	134	39	2.12	4.20	14,063	22	17.8	4.3	1.3	145	159	0	0	0	3	0	0	1	0
Alt 2 Mod A & C	586	Yes	No	28	30	56	4	0	Low	Yes	Yes	No	2	1	6	29	76	213	134	40	2.12	4.20	14,334	21	18.3	5.8	1.7	139	156	0	0	0	3	0	0	1	0
Alt 2 Mod B	593	Yes	No	27	34	54	4	0	Low	Yes	Yes	No	2	1	6	29	81	204	134	39	2.85	4.01	14,185	22	17.8	4.3	1.3	137	162	0	0	0	3	0	0	1	0
Alt 2 Mod B & C	586	Yes	No	28	33	54	4	0	Low	Yes	Yes	No	2	1	6	29	76	203	135	40	2.85	4.01	14,456	21	18.3	5.8	1.7	131	159	0	0	0	3	0	0	1	0
Alt 2 Mod C	590	Yes	No	36	56	54	4	0	High	Yes	Yes	No	2	1	6	29	78	183	137	40	2.23	3.39	14,825	21	18.3	5.8	1.7	129	152	0	0	0	3	0	0	1	0
Alternative 3																																				
Alt 3	605	Yes	No	38	64	58	3	0	High	Yes	Yes	No	2	1	6	29	77	174	151	32	3.14	2.48	14,435	21	22.3	4.3	1.3	131	156	0	0	0	3	0	0	1	0
Alt 3 Mod A	601	Yes	No	30	38	60	3	0	Low	Yes	Yes	No	2	1	6	29	75	203	149	32	3.03	3.29	13,944	21	22.3	4.3	1.3	140	159	0	0	0	3	0	0	1	0
Alt 3 Mod A & C	594	Yes	No	32	37	60	3	0	Low	Yes	Yes	No	2	1	6	29	70	202	149	33	3.03	3.29	14,215	20	22.8	5.8	1.7	134	156	0	0	0	3	0	0	1	0
Alt 3 Mod A & D	603	Yes	No	29	34	61	3	0	Low	Yes	Yes	No	2	1	6	29	76	228	135	33	3.63	3.31	13,895	20	24.1	4.3	1.3	143	156	0	0	0	3	0	0	0	0
Alt 3 Mod A, C & D	596	Yes	No	31	33	61	3	0	Low	Yes	Yes	No	2	1	6	29	72	227	136	34	3.63	3.31	14,166	19	24.5	5.8	1.7	137	153	0	0	0	3	0	0	0	0
Alt 3 Mod B	601	Yes	No	30	41	58	3	0	Low	Yes	Yes	No	2	1	6	29	75	194	149	32	3.76	3.10	14,066	21	22.3	4.3	1.3	132	162	0	0	0	3	0	0	1	0
Alt 3 Mod B & C	595	Yes	No	32	40	58	3	0	Low	Yes	Yes	No	2	1	6	29	71	193	150	33	3.76	3.10	14,336	20	22.8	5.8	1.7	126	159	0	0	0	3	0	0	1	0
Alt 3 Mod B & D	603	Yes	No	29	37	59	3	0	Low	Yes	Yes	No	2	1	6	29	77	218	135	33	4.36	3.11	14,016	20	24.1	4.3	1.3	135	159	0	0	0	3	0	0	0	0
Alt 3 Mod B, C & D	597	Yes	No	31	36	59	3	0	Low	Yes	Yes	No	2	1	6	29	72	217	136	34	4.36	3.11	14,287	19	24.5	5.8	1.7	128	156	0	0	0	3	0	0	0	0
Alt 3 Mod C	598	Yes	No	40	63	58	3	0	High	Yes	Yes	No	2	1	6	29	72	172	152	33	3.14	2.48	14,706	20	22.8	5.8	1.7	124	152	0	0	0	3	0	0	1	0
Alt 3 Mod C & D	600	Yes	No	39	59	59	3	0	High	Yes	Yes	No	2	1	6	29	74	197	138	34	3.75	2.49	14,656	19	24.5	5.8	1.7	127	149	0	0	0	3	0	0	0	0
Alt 3 Mod D	607	Yes	No	37	60	59	3	0	High	Yes	Yes	No	2	1	6	29	79	198	138	33	3.75	2.49	14,385	20	24.1	4.3	1.3	134	153	0	0	0	3	0	0	0	0

Table 3-4: Reasonable Alternative Alignment/Modification Combinations Environmental Constraints Analysis Considered in this DEIS (continued)

Alternative Alignment Option[1,2,3]	Area (acres)	Visual and Aesthetic Impacts	Air Quality Impacts	Traffic Noise Impacts	Community Impacts								Natural Resources																Cultural Resources			HazMat		Water Wells		Other
													State and Federal Protected Species[8]				EMST Habitat Observed				Water Resources				Flood Zones			Farmland Protection										
					Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Community Facilities Within the Project Area	Changes in Community Cohesion[4]	Environmental Justice Communities[5]	Access and Travel Patterns[6]	Public Services [7]	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Agriculture	Disturbed Prairie	Edwards Plateau Savannah, Woodland and Shrubland	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils	Recorded Archeology Sites[9]	Recorded Historic Properties	Century Farm Sites	Pipeline Crossings	Hazardous Materials Sites of Potential Concern	Public	Private	Airport
Alternative 4																																			
Alt 4	604	Yes	No	39	57	59	3	0	High	Yes	Yes	No	2	1	6	29	103	182	130	35	2.09	1.16	13,768	21	12.2	6.5	1.8	139	170	0	0	0	3	0	0	1	0
Alt 4 Mod A	600	Yes	No	31	31	61	3	0	Low	Yes	Yes	No	2	1	6	29	101	212	128	35	1.97	1.98	13,278	21	12.2	6.5	1.8	148	173	0	0	0	3	0	0	1	0
Alt 4 Mod A & C	594	Yes	No	32	30	61	3	0	Low	Yes	Yes	No	2	1	6	29	96	211	128	36	1.97	1.98	13,549	20	12.7	8.1	2.1	142	170	0	0	0	3	0	0	1	0
Alt 4 Mod B	601	Yes	No	31	34	59	3	0	Low	Yes	Yes	No	2	1	6	29	101	203	128	35	2.71	1.78	13,399	21	12.2	6.5	1.8	140	176	0	0	0	3	0	0	1	0
Alt 4 Mod B & C	594	Yes	No	32	33	59	3	0	Low	Yes	Yes	No	2	1	6	29	96	202	129	36	2.71	1.78	13,670	20	12.7	8.1	2.1	134	173	0	0	0	3	0	0	1	0
Alt 4 Mod C	598	Yes	No	40	56	59	3	0	High	Yes	Yes	No	2	1	6	29	98	181	131	36	2.09	1.16	14,039	20	12.7	8.1	2.1	133	167	0	0	0	3	0	0	1	0

1 Estimates provided are current as of July 2022. All information is subject to change.
2 Data derived from both desktop/online resources and field studies where access was granted.
3 Environmental Constraints Matrix will be updated as design and field evaluations continue.
4 Impacts (ranked High, Medium or Low) to community cohesion involve the bisecting, separating, or isolating of neighborhoods.
5 Because a majority of the displacements for this project would necessarily occur in census blocks that meet EJ thresholds and applying a conservative assumption that all displacees would in fact be low-income or minority persons, TxDOT conservatively assumes that the displacements would be predominantly borne by a minority population and/or a low-income population, and according to USDOT guidance, there would therefore be a "disproportionately high and adverse effect" on EJ populations. EJ is discussed further in Section 4.4.5.
6 Travel patterns may change as a result of the proposed project; however, negative impacts to access and travel patterns are not anticipated as discussed further in the Community Impact Analysis.
7 The proposed project is not anticipated to have an adverse effect on Public Services, including Emergency Services as discussed further in the Community Impact Analysis.
8 Alternative is within range of and contains suitable habitat for listed species.
9 As of the date of the DEIS, field efforts have not identified any sites eligible for NRHP or SAL. Additional Intensive surveys would be required for the Recommended Preferred Alternative for areas which have been not granted field access.

3.4.1 Screening Criteria

An overview of each criterion is discussed below, with the modified results of the analysis summarized in **Table 3-5.** Modifications include exclusion of resources that were either found not to exist in the project area or were impacted equally/nearly equal among all alternatives, therefore differences were not measurable.

3.4.1.1 Engineering Criteria

The major engineering criteria included the length of the alignment, estimated ROW needs, desirable curvature ratings, floodplain impacts, stream crossings, and geometrics while considering roadway alignment and profile. Note that the ultimate facility (mainlanes, ramps, and grade separations) are not covered under the current DEIS, however, are considered in the evaluation criteria since the project is designed for the ultimate Loop 9, Segment A facility.

Desirable Curvature Ratings

Desirable horizontal curvature for the ultimate mainlane alignment is to have the lowest superelevation rate as possible. Superelevation is the slope created between the heights of inner and outer edges of highway pavement. A lower superelevation rate reduces the tendency of vehicle to overturn and to skid laterally. For the traveling public, a lower superelevation rate increases safety and improves operations.

Flood Zones

There are numerous streams and other water bodies in the proposed Loop 9, Segment A study area, which could lead to impacts on floodplains associated with each Reasonable Alternative Alignment. Determined by data obtained from the Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Maps (FIRMs), the floodplain impacts were established by the acreage of identified 100-year floodplain, 500-year floodplain, and regulated floodway (FEMA 2014, accessed February 2022) within each alignment.

Stream Crossings

The stream crossing criterion helps when evaluating construction costs, construction complexities, and interagency coordination. During the evaluation, sufficiently detailed data were not developed to specify the level of impacts related to each stream crossing. As such, all crossings were considered as having an equal impact, and each alignment crossing was counted as one crossing.
In February 2019, an agency meeting was held with the Fort Worth District of the United States Army Corps of Engineers (USACE). During this meeting, there was expressed desire to select an alignment with the least number of stream crossings and impacts to 100-year floodplain.

Geometrics

The proposed Loop 9, Segment A project would include intersections with eight major crossroads. Desirable ramp design improves safety and operations (i.e. ramp spacing and sight distance) and could potentially lower construction costs by avoiding/reducing the need for retaining walls.

Likewise, consideration is given to intersection angles with frontage roads that are less skewed, which improves safety and operation of the intersections.

3.4.1.2 Environmental/Socioeconomic Criteria

The major environmental/socioeconomic screening criteria included community impacts (including public involvement/comments and displacements), natural resource impacts (wetland impacts, stream impacts, and protected species impacts), and cultural resources. Additionally, potential impacts to recorded cemeteries, Section 4(f) properties, and hazardous materials sites were also considered. However, initial analysis of the alignments did not uncover any measurable differences with regard to these three criteria.

Residential and Commercial Displacements

Because of the amount of existing and planned development within the Loop 9, Segment A study area, the number of residential and/or commercial displacements was considered a critical criterion for determining alternative alignments.

Stream and Wetland Impacts

A water features delineation was conducted for Loop 9, Segment A from US 67 to IH 35E in Dallas and Ellis Counties, Texas in January 28-31, April 2, May 1, October 8, and December 23, 2019, and February 9-10, 2022. ROE was requested on all parcels, and where access was granted, field surveys have been conducted.

For parcels that could not be field surveyed due to lack of ROE, those areas have been desktop delineated using United States Geological Survey (USGS) topographic maps, FEMA FIRM maps, LiDAR, aerial photography, Natural Resources Conservation Services (NRCS) Soil Survey data and U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps.

Threatened and Endangered Species

Species Analysis Documentation was completed for Loop 9, Segment A and field surveys were conducted in January 28-31, April 2, May 1, October 8, and December 23, 2019, and February 9-10, 2022. Information from the Texas Natural Diversity Database (TXNDD), Texas Parks and Wildlife Department (TPWD) Rare Threatened and Endangered Species (RTEST) List, and USFWS's Information for Planning and Consultation (IPaC) species list was accessed.

Riparian Corridor

Identifying riparian corridors helps when evaluating vegetation, wildlife, and threatened and endangered species impacts. To better describe the types of vegetation occurring within the project area, field surveys were conducted by qualified biologists in January, April, May, October, and December 2019, and February 2022. Riparian vegetation associations were identified along stream crossings within the project area, including North Prong Creek, Sanders Branch, Red Oak Creek, Little Creek, and their tributaries.

Farmland Protection

Because of the amount of farmland along the corridor, farmland impacts were considered during the evaluation of alternatives. Impacts to prime farmlands protected under the FPPA are also a consideration.

3.4.2 Screening Results

Through continued public involvement and coordination with the public, stakeholders, and adjacent property owners, the additional alternative alignment (Alternative 4) and four modifications, were developed to address engineering and environmental/socioeconomic concerns.

Table 3-5 summarizes the modified results of the analysis.

Table 3-5: Screening Summary of Draft Environmental Impact Statement Reasonable Alternative Alignments

Alternative Alignment Option[1,2,3]	Area (acres)	Community Impacts			Natural Resources													
					State and Federal Protected Species[4]				EMST Habitat Obs.	Water Resources				Flood Zones			Farmlands	
		Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils
Alternative 1																		
Alt 1	598	57	53	4	2	1	6	29	32	2.16	0.78	15,250	23	18.6	6.7	1.4	127	157
Alt 1 Mod A	594	31	55	4	2	1	6	29	32	2.04	1.59	14,760	23	18.6	6.7	1.4	136	161
Alt 1 Mod A & C	587	30	55	4	2	1	6	29	33	2.04	1.59	15,031	22	19.0	8.3	1.8	130	157
Alt 1 Mod B	594	34	53	4	2	1	6	29	32	2.78	1.40	14,881	23	18.6	6.7	1.4	128	164
Alt 1 Mod B & C	588	33	53	4	2	1	6	29	33	2.78	1.40	15,152	22	19.0	8.3	1.8	122	160
Alt 1 Mod C	591	56	53	4	2	1	6	29	33	2.16	0.78	15,521	22	19.0	8.3	1.8	120	154
Alternative 2																		
Alt 2	596	57	57	4	2	1	6	29	39	2.23	3.39	14,554	22	17.8	4.3	1.3	136	156
Alt 2 Mod A	592	31	31	4	2	1	6	29	39	2.12	4.20	14,063	22	17.8	4.3	1.3	145	159
Alt 2 Mod A & C	586	30	30	4	2	1	6	29	40	2.12	4.20	14,334	21	18.3	5.8	1.7	139	156
Alt 2 Mod B	593	34	34	4	2	1	6	29	39	2.85	4.01	14,185	22	17.8	4.3	1.3	137	162
Alt 2 Mod B & C	586	33	33	4	2	1	6	29	40	2.85	4.01	14,456	21	18.3	5.8	1.7	131	159
Alt 2 Mod C	590	56	56	4	2	1	6	29	40	2.23	3.39	14,825	21	18.3	5.8	1.7	129	152
Alternative 3																		
Alt 3	605	64	58	3	2	1	6	29	32	3.14	2.48	14,435	21	22.3	4.3	1.3	131	156
Alt 3 Mod A	601	38	60	3	2	1	6	29	32	3.03	3.29	13,944	21	22.3	4.3	1.3	140	159

Table 3-5: Screening Summary of Draft Environmental Impact Statement Reasonable Alternative Alignments (continued)

Alternative Alignment Option[1,2,3]	Area (acres)	Community Impacts			Natural Resources													
					State and Federal Protected Species[4]				EMST Habitat Obs.	Water Resources				Flood Zones			Farmland Protection	
		Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils
Alternative 3 (Cont.)																		
Alt 3 Mod A & C	594	37	60	3	2	1	6	29	33	3.03	3.29	14,215	20	22.8	5.8	1.7	134	156
Alt 3 Mod A & D	603	34	61	3	2	1	6	29	33	3.63	3.31	13,895	20	24.1	4.3	1.3	143	156
Alt 3 Mod A, C & D	596	33	61	3	2	1	6	29	34	3.63	3.31	14,166	19	24.5	5.8	1.7	137	153
Alt 3 Mod B	601	41	58	3	2	1	6	29	32	3.76	3.10	14,066	21	22.3	4.3	1.3	132	162
Alt 3 Mod B & C	595	40	58	3	2	1	6	29	33	3.76	3.10	14,336	20	22.8	5.8	1.7	126	159
Alt 3 Mod B & D	603	37	59	3	2	1	6	29	33	4.36	3.11	14,016	20	24.1	4.3	1.3	135	159
Alt 3 Mod B, C & D	597	36	59	3	2	1	6	29	34	4.36	3.11	14,287	19	24.5	5.8	1.7	128	156
Alt 3 Mod C	598	63	58	3	2	1	6	29	33	3.14	2.48	14,706	20	22.8	5.8	1.7	124	152
Alt 3 Mod C & D	600	59	59	3	2	1	6	29	34	3.75	2.49	14,656	19	24.5	5.8	1.7	127	149
Alt 3 Mod D	607	60	59	3	2	1	6	29	33	3.75	2.49	14,385	20	24.1	4.3	1.3	134	153
Alternative 4																		
Alt 4	604	57	59	3	2	1	6	29	35	2.09	1.16	13,768	21	12.2	6.5	1.8	139	170
Alt 4 Mod A	600	31	61	3	2	1	6	29	35	1.97	1.98	13,278	21	12.2	6.5	1.8	148	173
Alt 4 Mod A & C	594	30	61	3	2	1	6	29	36	1.97	1.98	13,549	20	12.7	8.1	2.1	142	170
Alt 4 Mod B	601	34	59	3	2	1	6	29	35	2.71	1.78	13,399	21	12.2	6.5	1.8	140	176
Alt 4 Mod B & C	594	33	59	3	2	1	6	29	36	2.71	1.78	13,670	20	12.7	8.1	2.1	134	173

Table 3-5: Screening Summary of Draft Environmental Impact Statement Reasonable Alternative Alignments (continued)

Alternative Alignment Option[1,2,3]	Area (acres)	Community Impacts			Natural Resources														
					State and Federal Protected Species[4]				EMST Habitat Obs.	Water Resources				Flood Zones			Farmland Protection	
		Potential Displacements: Residential	Potential Displacements: Sheds/Barns	Potential Displacements: Commercial	Federally Proposed Threatened Species	Federally Listed Candidate Species	State Threatened and Endangered Species	Species of Greatest Conservation Need	Riparian	Total Wetlands (acres)	Total Open Waters (acres)	Total Streams (Linear Feet)	Individual Streams	100-Year Floodplain (acres)	Floodway (acres)	500-Year Floodplain (acres)	Prime Farmland (acres)	Statewide Important Farmland Soils
Alternative 4 (cont.)																		
Alt 4 Mod C	598	56	59	3	2	1	6	29	36	2.09	1.16	14,039	20	12.7	8.1	2.1	133	167

Note:
1. Estimates provided are current as of July 2022. All information is subject to change.
2. Data derived from both desktop/online resources and field studies where access was granted.
3. Environmental Constraints Matrix will be updated as design continues, environmental technical reports are approved, and field evaluations continue.
4. Alternative is within range of and contains suitable habitat for listed species.

The DEIS Reasonable Alternative Alignments carried forward for further study in the subsequent sections of the DEIS are Alternative Alignments 1, 2, 3, 4, Modifications A, B, C, D and the No-Build Alternative.

3.5 Identification of the Recommended Preferred Alternative

The need for and purpose of the proposed Loop 9, Segment A is to improve the mobility, system linkages, and connectivity among the existing roadway facilities within the surrounding transportation network. As discussed in **Section 2** of the DEIS, the No-Build Alternative would not adequately accommodate existing and future traffic volumes on roadways within the proposed Loop 9, Segment A study area. The No-Build Alternative would result in higher traffic volumes on existing roadways, which would lead to increased congestion and longer travel times in and around the study area.

While construction costs for the No-Build Alternative would be substantially lower than for any of the Build Alternative Alignments, the No-Build Alternative would result in higher maintenance costs for the area's existing roadways because of increased traffic volumes and roadway use. The No-Build Alternative would also require additional short-term restoration and safety improvements to enhance operations of the existing transportation network. When compared to all alternative alignments, maintenance improvements for the No-Build Alternative would cause more traffic disruptions along the existing roadways. Under the No-Build Alternative, traffic conditions would remain essentially unchanged with a high likelihood of increased current and future traffic congestion. In all, the No-Build Alternative would not offer a complete solution for improving mobility and the transportation network effectiveness. Therefore, the No-Build Alternative does not meet the need for and purpose of the proposed Loop 9, Segment A project.

All the Reasonable Alternative Alignments meet the purpose and need of the proposed project; however, the Recommended Preferred Alternative Alignment is Alternative Alignment 3 with Modifications B, C and D (Alternative 3 B/C/D) (**Exhibit 3-3**). During the environmental/socioeconomic screening, the alignments had very similar proposed impacts associated with each alternative. In nearly every resource category in **Table 3-4**, Alternative 3 B/C/D falls in the middle of the range of impacts.

Input from the public and stakeholders was critical to the selection of the Recommended Preferred Alternative. Loop 9, Segment A is a planned major roadway traversing several cities and has been a part of city planning documents for years. It was the expressed preference of the city of Cedar Hill to consider Alternative 3 (a southernmost alignment) for many years. To lesson environmental impacts and potential displacements, Modification D was developed to shift the Alternative 3 alignment north from the original location in Cedar Hill. In Glenn Heights, the Lindell Estates subdivision has experienced high volumes of new development within the proposed Common Alignment. Because of this, Modifications A and B were established to shift the alignment north and out of the subdivision. Meetings with city of Glenn Heights and Red Oak resulted in an expressed preference for Modification B which would be most suitable for current plans within the cities.

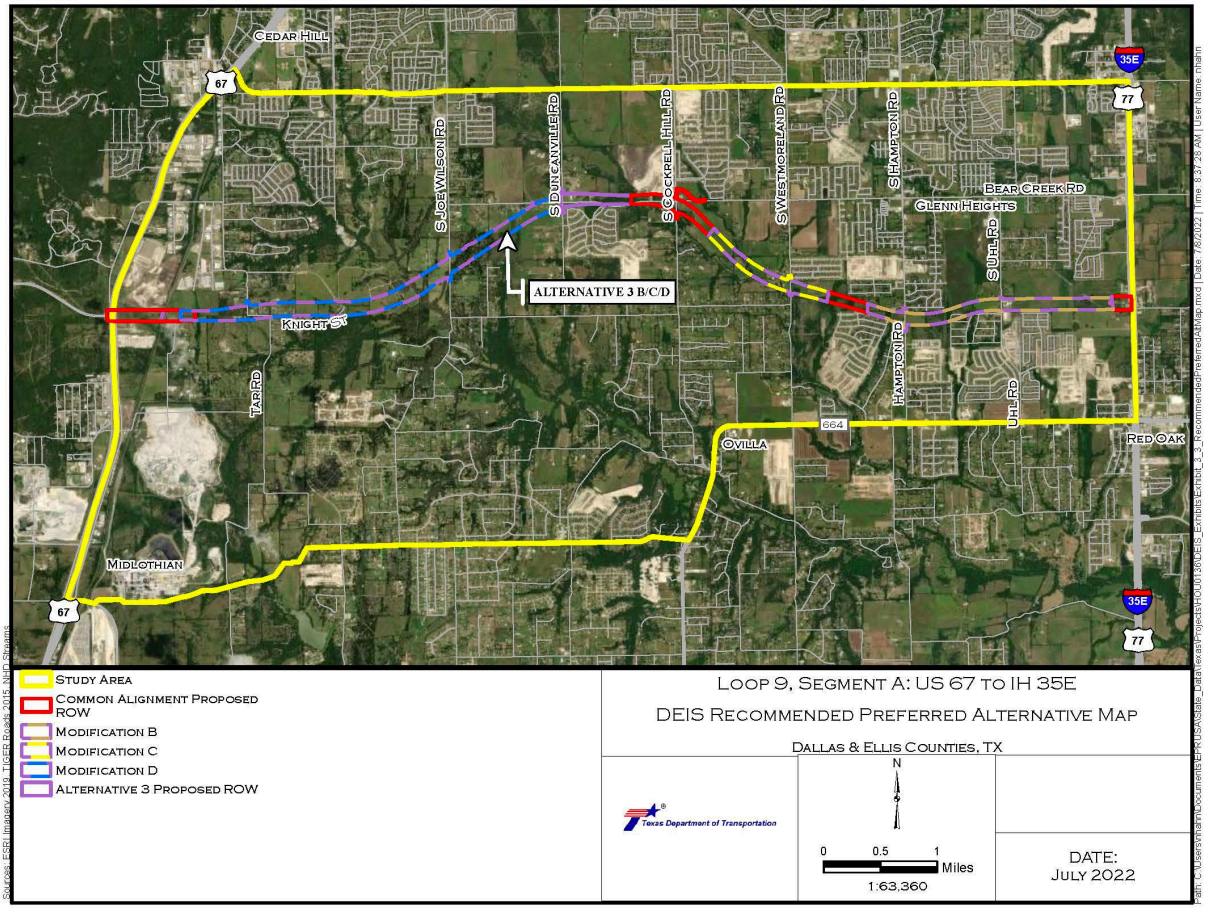
Based on the research and surveys conducted for this DEIS, all alternatives, including the Recommended Preferred Alternative Alignment, do not affect, cemeteries, parks, federally listed threatened or endangered species (based on current listed status), recorded archeological sites, potential historic sites, or public water wells. Apart from the potential displacements in the Lindell Estates neighborhood, all

alternatives, including the Recommended Preferred Alternative Alignment, would not separate or isolate any distinct neighborhoods, ethnic groups, or other specific groups. All alternatives, including the Recommended Preferred Alternative Alignment, would affect the visual quality of surrounding areas, present potential changes in travel patterns, and divide some farms.

The Recommended Preferred Alternative Alignment meets the purpose and need for the proposed project and is the preferred alignment of the city of Cedar Hill, Glenn Heights and Red Oak within their respective jurisdictions.

For the above noted reasons, Alternative Alignment 3 B/C/D was selected as the Recommended Preferred Alternative (**Figure 3-4** and **Exhibit 3-3**).

Figure 3-4: DEIS Recommended Preferred Alternative Map



SECTION 4. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES AND MITIGATION

The following sections describe the existing condition and the environmental consequences for the Reasonable Alternatives and the No-Build Alternative. As required by NEPA, environmental consequences are discussed in terms of anticipated direct effects, encroachment-alteration effects, indirect effects or induced growth effects, and cumulative impacts.

Two types of indirect effects are commonly recognized: induced growth effects and encroachment-alteration effects. Induced growth effects include potential changes or shifts in development as a result of transportation project influence, including improved travel time and accessibility. Encroachment-alteration effects are physical, chemical, or biological changes in the environment that occur as a result of the project but are removed in time or distance from the direct effects (AASHTO Practitioner's Handbook, 2016).

- Direct effects and encroachment-alteration effects (as applicable) are discussed by resource in Sections 4.1 through 4.16.
- Indirect effects and cumulative impacts are discussed in Sections 5 and 6, respectively.

In support of this DEIS, the following Technical Documentation were prepared:

- Interim Report for Archeological Survey (**Appendix F**)
- Community Impacts Assessment Technical Report (**Appendix G**)
- Hazardous Materials Initial Site Assessment Technical Report (**Appendix H**)
- Historical Resources Survey Report (**Appendix I**)
- Public Meeting Summary Reports (www.txdot.gov/loop9)
- Species Analysis Spreadsheet & Documentation (**Appendix J**)
- DEIS Reasonable Alternatives Traffic Noise Analysis Report (**Appendix K**)
- Water Features Delineation Report (**Appendix L**)

The technical reports are also available for review at the TxDOT Dallas District Office at 4777 US-80, Mesquite, TX 75150 or online at www.txdot.gov/loop9.

4.1 Resources Eliminated from Further Study

The following issues were evaluated and found not to have any bearings on the proposed project and would not affect a decision regarding the proposed project.

4.1.1 Section 6(f) of the Land and Water Conservation Act

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act requires evaluation of any project that would convert lands or facilities acquired with LWCF Act funds, and that any such project shall be coordinated with the U.S. Department of the Interior (DOI).
There are no Section 6(f) properties present in the project area.

4.1.2 Chapter 26 of the Parks and Wildlife Code

Chapter 26 of the Parks and Wildlife Code prohibits the use of any public lands, such as a park, recreation area, scientific area, wildlife refuge, or historic site, unless there are no feasible and prudent alternatives.

There are no Chapter 26 properties present in the project area. The proposed project does not result in any take or use of property covered by Parks and Wildlife Code, Chapter 26.

4.1.3 Airway-Highway Clearance

As discussed in 23 CFR 620, airway and highway development must be coordinated to ensure that airway-highway clearances are adequate for the safe movement of air and highway traffic.

The Dallas Executive Airport is located approximately 7.6 miles to the north of the proposed Loop 9, Segment A on the west side of US 67 between Red Bird Lane and Hampton Rd. The Loop 9, Segment A project area is aligned outside the Runway Protection Zones (RPZ) and would not penetrate the horizontal and vertical slope requirements for the existing runways of the Dallas Executive Airport. Although the proposed project is outside the RPZ requiring coordination with the Federal Aviation Administration, the Dallas Executive Airport would be notified of project construction activities.

4.1.4 Rivers and Harbors Act of 1899

As defined in the 33 CFR 329, navigable Waters of the U.S. (WOTUS) are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Section 9 of the Rivers and Harbors Act (RHA) of 1899 and the General Bridge Act (GBA) of 1946 prohibit the unauthorized obstruction (including bridge construction) or alteration of any navigable WOTUS, unless the work has been authorized by permit from the U.S. Coast Guard (USCG). Section 10 of the RHA requires authorization from the USACE if the project involves any work in or affecting navigable waters.

No navigable waterways or waters subject to the ebb and flow of the tide occur in areas traversed by the proposed project. No waters regulated under the RHA are found within the project area; therefore, this project will not require coordination or authorization under Section 9 or Section 10 of the RHA.

4.1.5 Coastal Zone Management Conservation and Management Act

In accordance with the federal Coastal Zone Management Act of 1972, for projects within or likely to affect land or water uses within the Texas Coastal Management Area, consultation with the Texas General Land Office (TGLO) is required.

The proposed project is not located within the Texas Coastal Management Program (Texas CMP) boundary. Therefore, a consistency determination is not required.

4.1.6 Coastal Barrier Resources

The Coastal Barrier Resources Act (CBRA) of 1982 and its amendments designated relatively undeveloped coastal barriers as part of the John H. Chafee Coastal Barrier Resources System (CBRS). These areas became ineligible for most new federal expenditures and financial assistance and therefore discouraged development on designated coastal barriers.

The CBRA does not apply. The proposed project is not located within any CBRA unit, therefore, coordination with the USFWS for this resource is not required.

4.1.7 Magnuson-Stevens Fishery Conservation and Management Act

First passed in 1976, the Magnuson-Stevens Fishery Conservation and Management Act (FCMA) is the primary law governing marine fisheries management in U.S. federal waters.

There are no tidally influenced waters within the project area, and the proposed project would not affect Essential Fish Habitat (EFH); therefore, no coordination with the National Marine Fisheries Service (NMFS) is required. The EFH/FCMA does not apply.

4.1.8 Marine Mammal Protection Act

Marine mammals are protected under the Marine Mammal Protection Act (MMPA) established in 1972. Jurisdiction for the MMPA is shared by the USFWS and the NMFS. The Texas coast provides suitable habitat and is within range of several marine mammals.

The project area does not contain suitable habitat for marine mammals. Therefore, no coordination with the NMFS is required.

4.1.9 Trinity River Corridor Development Certification

The Trinity River Corridor Development Certificate (CDC) affirms local government authority for floodplain management and established a set of regional criteria and procedures for development within the Trinity River Corridor. The goal of the CDC is to stabilize flooding risks along the Trinity River Corridor in North Central Texas.

The proposed project is not located within the geographic boundaries of the CDC and would not be subject to the CDC requirements.

4.1.10 International Boundaries and Water Commission

Established in 1889, the International Boundary and Water Commission (IBWC) is an international body composed of the United States and Mexico. The IBWC has responsibility for applying the boundary and water treaties between the United States and Mexico.

This project does not cross or encroach upon the floodway of the IBWC ROW or an IBWC flood control project.

4.1.11 Wild and Scenic Rivers

The Wild and Scenic Rivers Act was passed in 1968 (Public Law 90-542, as amended; 16 U.S.C. 1271-1287). As of March 2019, the National System protects 13,413 miles of river in numerous states and territories. Texas has just one river segment designated under this Act, a segment of the Rio Grande from above Mariscal Canyon in Brewster County to the Terrell-Val Verde County line. There are no designated Wild and Scenic Rivers within or nearby the project area.

4.1.12 Edwards Aquifer

The proposed project is not located over the recharge, contributing, or transition zones of the Edwards Aquifer; therefore, the project is not subject to regulation under the Texas Commission on Environmental Quality's (TCEQ's) Edwards Aquifer Protection Plan. The TCEQ Edwards Aquifer Rules do not apply.

4.2 Land Use

4.2.1 Historical and Projected Socioeconomic Patterns

Development patterns and land use change occur in response to trends in population and employment growth. The proposed Loop 9, Segment A study area, identified as the area that would most likely be impacted by the construction of Loop 9, Segment A, is located in southwestern Dallas County and northwestern Ellis County and includes parts of six municipalities: Cedar Hill, DeSoto, Glenn Heights, Midlothian, Ovilla, and Red Oak shown on **Exhibit 1-1**. In addition, there is an unincorporated area of Ellis County in the south-central part of the study area, between Ovilla and Midlothian. The Loop 9, Segment A study area was defined as the area between the proposed project and the closest major roadways. The closest major roadways were chosen as the boundaries of this study area because areas outside of this study area are better served by other roadways. The study area limits are Parkerville Road to the north, IH 35E to the east, and US 67 to the west. The southern study limit runs along FM 664 (Ovilla Road), from IH 35E west until the intersection of Ovilla Road and Shiloh Road shown on **Exhibit 4-1**. The southern study area limit then follows Shiloh Road heading west until the road dead ends. From here, the limits follow along natural barriers and property boundaries until the limits reach US 67.

The study area would be influenced by the regional socioeconomic conditions in the greater NCTCOG MPA, which includes 12 counties. The largest communities (> 200,000 population) in the MPA, in order of population, are Dallas, Fort Worth, Arlington, Plano, Irving, Garland, and Frisco (U.S. Census, 2020).

As quantified in **Table 4-1**, population grew from 2000 to 2020 in both Dallas and Ellis Counties and all six municipalities in the study area, particularly within Ellis County and the towns of Red Oak and Midlothian (both in Ellis County). Forecasts by the TWDB predict that the county-level growth trend between 2000 and 2020 will accelerate through 2050, particularly in Ellis County. Similarly, city/town population growth is predicted to continue through 2050, particularly for Glenn Heights and Ovilla.

Table 4-1: Area Historical and Predicted Population

County/City	2000[a]	2010[a]	2020[a]	2000 to 2020 Percent Change	2050[b]	2010 to 2050 Percent Change
Dallas County	2,218,899	2,368,139	2,613,539	18%	3,429,783	44.8%
Ellis County	111,360	149,610	192,455	73%	360,584	141%
Cedar Hill	32,093	45,028	49,148	53%	83,579	85.6%
DeSoto	37,646	49,047	56,145	49%	70,078	42.9%
Glenn Heights	7,224	11,278	15,819	119%	29,455	162%
Midlothian	7,480	18,037	35,125	370%	34,500	91.3%
Ovilla	3,405	3,492	4,304	26%	9,110	160.9%
Red Oak	4,301	10,769	14,222	231%	16,615	54.3%

Source: [a] U.S. Census – 2000, 2010, and 2020; [b] TWDB 2021 Regional Water Plan population projections.
Note: TWDB population projections are based on water utility service areas, which may be the same or very similar to established political boundaries (e.g., city limits), but not in every case.

Table 4-2 identifies historical and forecast employment for the counties in the NCTCOG MPA. From 2000 to 2045, total employment in the MPA is predicted to grow almost 182%.

Table 4-2: 2000 to 2045 Employment Growth in the North Central Texas Council of Government Metropolitan Planning Area

County	Employment			
	2000[a]	2020[b]	2045[c]	2000 to 2045 Percent Change
Collin	287,350	525,501	1,068,578	271.9%
Dallas	1,237,748	1,315,229	3,577,033	189.0%
Denton	258,009	469,099	715,813	177.4%
Ellis	57,325	89,482	136,112	137.4%
Hood	17,642	25,206	47,311	168.2%
Hunt	37,430	43,590	70,597	88.6%
Johnson	63,491	79,953	120,534	89.8%
Kaufman	34,392	61,918	82,628	140.3%
Parker	43,692	64,875	102,271	134.1%
Rockwall	23,265	51,164	88,711	281.3%
Tarrant	791,873	1,036,766	2,047,118	158.5%
Wise	24,190	31,916	54,376	124.8%
MPA Total	**2,876,407**	**3,794,699**	**8,111,082**	182.0%

Source: [a] U.S Census - 2000; [b] American Community Survey 2016-2020 5-year estimates; [c] NCTCOG *Mobility* 2045 Update, 2022.

Much of the forecasted growth in those communities affected by the proposed Loop 9, Segment A is a function of economic growth in the region, the availability of land for future development in the study area, and the planning goals and objectives of Dallas and Ellis Counties and the surrounding communities.

4.2.2 Land Use Planning

Land use planning by municipalities in the study area directs the development of land for certain uses within their boundaries, often through comprehensive planning documents. These planning documents usually account for constraints to land use resulting from large transportation projects like Loop 9, Segment A (See **Exhibits 5-3 through 5-8** for municipalities future land use plan maps). These plans also direct the placement and growth of commercial and residential development. In the study area, many residential subdivisions are still being developed, and planned residential and commercial developments have been platted or are in the process of being platted (**Table 4-3**; NCTCOG, 2018).

Table 4-3: Active and Proposed Residential Subdivisions and Commercial Properties

Development Name	Active / Proposed	Location	Type/Number of Lots	Year Initiated or Development Stage
Ashford Prairie Estates	Active	Midlothian	Single Family/24 lots	Initiated 2001
Azalea Meadows[e]	Active	Midlothian	Single Family/Unknown	Under Construction
Bear Creek Ranch	Active	Cedar Hill	Single Family/481 lots	Initiated 2005
Brookview	Active	Cedar Hill	Mobile Home/89 lots	Initiated 1937
Bryson Manor	Active	Ovilla	Single Family/92 lots	NA[a]
Cinnamon Springs	Active	Glenn Heights	Single Family/80 lots	Initiated 1978
Cole Crossing Estates[e]	Active	Desoto	Single Family/Unknown	Under Construction
Creek Bend[e]	Active	Red Oak	Single Family/unknown	Under Construction
Dynasty	Active	Glenn Heights	Single Family/128 lots	Initiated 1984
Fern Heights	Active	DeSoto	Single Family/155 lots	Initiated 1988
Four Trees Estates	Active	Midlothian	Single Family/130 lots	Initiated 1969
Hampton Meadows	Active	DeSoto	Single Family/117 lots	Initiated 2008
Hidden Lake Estates	Active	Ellis County (unincorporated)	Single Family/19 lots	Initiated 1984
Hilltop Acres	Active	Red Oak	Single Family/80 lots	Initiated 1940
Kentsdale Farm	Active	DeSoto	Single Family/159 lots	Initiated 2005
La Rinconada	Active	Ellis County (unincorporated)	Single Family/28 lots	Initiated 1983
Lindell Estates	Active	Glenn Heights	Mobile Home/289 lots	Initiated 1940
Magnolia Meadows	Active	Glenn Heights	Single Family/540 lots	Under construction
Maplewood	Active	Glenn Heights	Single Family/135 lots	NA[a]
Meadow Creek Estates	Active	Glenn Heights	Single Family/126 lots	Initiated 2004
Meadow Ridge[b]	Active[e]	Red Oak	Single Family (86 lots) and Townhomes (146 lots)	Final Plat dated November 2019
Meadow Springs	Active	Glenn Heights	Single Family/217 lots	Initiated 2003
Melody Acres	Active	Desoto	Single Family/unknown	NA[a]
Old Farmhouse Estates	Active	Midlothian	Single Family/40 lots	Initiated 1997
Ovilla Creek Estates	Active	Ovilla	Single Family/61 lots	Initiated 2006
Palladium	Active[e]	Glenn Heights	Multi-Family/270 units	Under construction
Parkerville Meadows[e]	Active	Desoto	Single Family/Unknown	Under construction

Table 4-3: Active and Proposed Residential Subdivisions and Commercial Properties (continued)

Development Name	Active / Proposed	Location	Type/Number of Lots	Year Initiated or Development Stage
Red Oak Legacy Business Park[c]	Proposed	Red Oak	Commercial	Proposed (Concept Plan only)
Rookwood	Active	Ovilla	Single Family/62 lots	Initiated 1973
Shady Oaks	Active	Ellis County (unincorporated)	Single Family/39 lots	Initiated 1985
Shiloh Forest	Active	Ellis County (unincorporated)	Single Family/238 lots	Initiated 2006
Stone Creek	Active	Glenn Heights	Single Family/324 lots	Initiated 1987
Stonehill[b]	Active[e]	Cedar Hill	Single Family/328 lots	Preliminary Plat dated June 2019
The Villages at Charleston	Active	Glenn Heights	Single Family/94 lots	NA[a]
The Vineyards at Bear Creek[b]	Proposed	Cedar Hill	Single Family/56 lots	Proposed (Final Plat dated October 2019)
Town Center[d]	Proposed	Glenn Heights	Commercial	Proposed (Concept Plan only)
Westmoreland Road Estates	Active	Ovilla	Single Family/110 lots	Initiated 1970
Willow Creek Estates	Active	Ovilla	Single Family/57 lots	Initiated 1975
Wolf Creek Estates	Active	Desoto	Single Family/120 lots	Initiated 2002

Source: NCTCOG *Mobility 2045*, 2018 [a] Year not specified in the source data provided by NCTCOG; [b] Plans provided by TxDOT, 2019; [c] Plans provided by city of Red Oak, 2020; [d] Plans provided by city of Glenn Heights, 2019. Study Team May 2022[e], based on field surveys and aerial photography review, the development stage may be different than the NCTCOG 2018 reported data.

4.2.3 Existing Land Uses

Land use within the proposed Loop 9, Segment A study area consists primarily of residential development and undeveloped land. The NCTCOG 2015 land use categories are listed in **Table 4-4** and shown in **Exhibit 4-1**. According to the TPWD, the habitat within the undeveloped areas within the study are predominately Edwards Plateau (EP) savannah, woodland, and shrubland. This land use breakdown reflects population and residential growth in the study area, though the low amount of commercial development suggests that local populations may still commute closer into Dallas for work.

Table 4-4: 2015 Land Use in the Study Area

NCTCOG (2015) Land Use	Acres	Percentage of Study Area
Commercial, communication, railroad, runway	513	2.5%
Industrial	1,434	6.9%
Residential (high- and low-density single family, multifamily, and mobile homes)	7,848	37.9%
Institutional/Semi-public	222	1.1%
Roads*	1,426	6.9%
Water bodies, parks, cemeteries, and utilities	695	3.4%
Timberland, ranchland, and vacant land	8,551	41.3%
Total	20,688	100%

Source: NCTCOG, 2015. Note: *the land identified in this category was unclassified in the NCTCOG data

4.2.3.1 Residential Development

The most heavily developed parts of the Loop 9, Segment A study area are in its northern half, mostly in Cedar Hill along the US 67 corridor, DeSoto, and parts of Glenn Heights. There are approximately 58 residential communities/subdivisions located within the study area that have been completed (all phases) as of 2022 (NCTCOG, 2018, Study Team, 2022). Current 2021 aerials show that approximately 1,347 additional acres of development have occurred in the study area since 2015. This development primarily consists of new and expanded residential areas. **Exhibit 4-2** shows the location of each subdivision and **Table 4-5** presents the number of subdivisions and their acreage in each municipality as well as unincorporated areas of Ellis County within the study area. Active, complete, and proposed subdivisions are shown on **Exhibit 4-2**.

Table 4-5: Number and Identity of Completed Residential Subdivisions

Location	Number of Subdivisions (Total Acres)	Subdivisions
Cedar Hill	13 (718 acres)	Bluebonnet Acres, Cedar Crest, Cedar Trails Estates, Hidden Lakes, Little Creek, Little Creek Corner, Meadowbrooke, Park Plaza, Parkway Place, South Hills Park, Springfield, Stonewood Heights, Stony Creek Estates
DeSoto	6 (429 acres)	Dynamic Mobile Home Park, Hampton Acres Mobile Home Park, Mockingbird Hill, Parkerville Meadows, Park Place, Summer Meadow
Glenn Heights	14 (784 acres)	Bear Creek Meadows, Beaver Creek Estates, Beckley Apartment Homes, Gateway Estates, Gateway Place, Heritage Heights, Heritage Lakes, Hollywood, Jenkins Subdivision, Kingston Meadows, Magnolia Farms, Russell Heights, The Mesa, Top of the Hill Farms
Midlothian	2 (0.83 acre)	Eagles Nest, Juneau Estates
Ovilla	12 (532 acres)	Ashburne Glen Estates, Cumberland Forest, Green Meadows, Meadow Glen Estates, Ovilla Parc, Shadow Wood Estates, Split Rock, Suburban Estates, Thorntree Estates, Westmoreland Road Estates, Woodbridge, Woodlawn Acres
Red Oak	4 (290 acres)	Forest Glenn Mobile Home Park, Glenn Heights Mobile Home Community, Glenn Heights Town and Country Village, Harmony
Ellis County (Unincorporated)	7 (354 acres)	Crystal Springs Estates, Pecan Creek Country Estates, Shiloh Grove Acres, Shiloh Manor Estates, Stonewood Ranch, Victory Estates, Westchester

Source: NCTCOG *Mobility* 2045, 2018. Study Team May 2022, based on field surveys and aerial photography review, the development stage may be different than the NCTCOG 2018 reported data.

4.2.3.2 Timberland, Ranch land, and Vacant land

The other primary land uses within the Loop 9, Segment A study area is undeveloped land which includes timberland, ranchland and vacant land. Much of this land is concentrated in southern and eastern Cedar Hill, eastern Glenn Heights, Red Oak, and the northern section of the unincorporated area of Ellis County in the study area.

4.2.3.3 Transportation Land Use

The proposed Loop 9, Segment A study area is located between two major thoroughfares, both of which serve as spokes in the wheel of highways that connect Dallas to its southern suburbs. On the eastern edge is IH 35E, which runs north and south. On the western edge is US 67, which runs northeast and southwest. The main east-west roadway in the study area is Bear Creek Road; however, Parkerville Road, which forms the northern boundary of the Loop 9, Segment A study area, is the only roadway that currently provides a complete east-west connection between US 67 and IH 35E in the study area. Major public infrastructure and utilities are found throughout the study area, and include roadways, railways, electrical transmission lines, and petroleum pipelines.

A BNSF railway extends through the entire study area east of US 67 and runs parallel to it. This railway starts just north of Duncanville and runs to the city of Midlothian, where it connects with railways going to Houston and Galveston, as well as points farther south. There is no passenger rail service within the study area.

4.2.4 Environmental Effects

The proposed Loop 9, Segment A would convert existing non-transportation land uses to a transportation use through the acquisition of ROW. The proposed project would require between approximately 586 and 607 acres of additional ROW as shown in **Table 4-6** and **Exhibit 4-1**. The majority of land use effects, for all four alternative alignments and modifications, would be the conversion of undeveloped land to a transportation use.

Table 4-6: Land Use Effects by Alternative Alignment

	Land Use Categories							
	Commercial, communication, railroad, runway	Industrial	Residential (high- and low-density single family, multifamily, and mobile homes)	Institutional	Roads*	Water bodies, parks, cemeteries, and utilities	Timberland, ranch land, vacant land	Total
Alternative 1								
Alternative 1	10.8	0.0	121.6	0.0	30.3	15.4	419.8	**597.9**
Alternative 1 Mod A	10.8	0.0	126.3	0.0	27.3	5.8	423.9	**594.1**
Alternative 1 Mod A & C	10.8	0.0	125.3	0.0	26.4	5.8	419.1	**587.4**
Alternative 1 Mod B	10.8	0.0	120.7	0.0	26.9	20.8	415.0	**594.2**
Alternative 1 Mod B & C	10.8	0.0	119.7	0.0	26.2	20.8	410.1	**587.6**
Alternative 1 Mod C	10.8	0.0	120.6	0.0	29.5	15.4	415.0	**591.3**
Alternative 2								
Alternative 2	10.8	0.0	118.4	0.0	30.0	16.0	421.1	**596.3**
Alternative 2 Mod A	10.8	0.0	123.0	0.0	27.1	6.3	425.2	**592.4**
Alternative 2 Mod A & C	10.8	0.0	121.98	0.0	26.3	6.3	420.4	**585.8**
Alternative 2 Mod B	10.8	0.0	117.4	0.0	26.9	21.3	416.3	**592.7**
Alternative 2 Mod B & C	10.8	0.0	116.4	0.0	26.0	21.3	411.5	**586.0**
Alternative 2 Mod C	10.8	0.0	117.3	0.0	29.3	16.0	416.3	**589.7**
Alternative 3								
Alternative 3	10.8	0.0	126.3	0.0	32.2	16.0	419.6	**604.9**
Alternative 3 Mod A	10.8	0.0	131.0	0.0	29.1	6.4	423.7	**601.0**
Alternative 3 Mod A & C	10.8	0.0	130.0	0.0	28.3	6.4	418.8	**594.3**
Alternative 3 Mod A & D	10.6	0.0	147.1	0.0	28.5	6.1	410.8	**603.1**
Alternative 3 Mod A C & D	10.6	0.0	146.0	0.0	27.7	6.1	406.0	**596.4**
Alternative 3 Mod B	10.8	0.0	125.4	0.0	29.0	21.3	414.7	**601.2**
Alternative 3 Mod B & C	10.8	0.0	124.4	0.0	28.2	21.3	409.9	**594.6**
Alternative 3 Mod B & D	10.6	0.0	141.5	0.0	28.3	21.0	401.9	**603.3**
Alternative 3 Mod B C & D	10.6	0.0	140.5	0.0	27.5	21.0	397.0	**596.6**

Table 4-6: Land Use Effects by Alternative Alignment

	Land Use Categories							
	Commercial, communication, railroad, runway	Industrial	Residential (high- and low-density single family, multifamily, and mobile homes)	Institutional	Roads*	Water bodies, parks, cemeteries, and utilities	Timberland, ranch land, vacant land	Total
Alternative 3 (continued)								
Alternative 3 Mod C	10.8	0.0	125.3	0.0	31.4	16.0	414.7	**598.2**
Alternative 3 Mod C & D	10.6	0.0	141.4	0.0	30.7	15.7	401.9	**600.3**
Alternative 3 Mod D	10.6	0.0	142.4	0.0	31.5	15.7	406.7	**606.9**
Alternative 4								
Alternative 4	11.3	0.0	103.1	4.0	37.9	16.5	431.5	**604.3**
Alternative 4 Mod A	11.3	0.0	107.7	4.0	34.9	6.9	435.6	**600.4**
Alternative 4 Mod A & C	11.3	0.0	106.7	4.0	34.0	6.9	430.8	**593.7**
Alternative 4 Mod B	11.3	0.0	102.1	4.0	34.7	21.8	426.7	**600.6**
Alternative 4 Mod B & C	11.3	0.0	101.1	4.0	34.0	21.8	421.8	**594.0**
Alternative 4 Mod C	11.3	0.0	102.1	4.0	37.0	16.5	426.7	**597.6**

Source: NCTCOG, 2015, ESRI 2019.
Note: The areas of overlap with the US 67 and IH 35E project are not included in these calculations.
*the land identified in this category was unclassified in the NCTCOG data

All alternative alignments would cross existing transportation land uses that range from an active BNSF railway to several main roadways (e.g., Duncanville Road, Joe Wilson Road, Hampton Road). In addition, proposed Loop 9, Segment A will replace a section of Bear Creek Road between Duncanville and S. Cockrell Hill Roads. The BNSF railway will be bridged; however, in Phases 1 and 2 (frontage roads only) only at-grade intersections would be constructed at road crossings.

4.2.5 Encroachment-Alteration Effects

Encroachment alteration effects to land use could occur as a result of changes in adjacent parcel size and access, which may alter future development opportunities for those tracts. However, these effects are minimized for the local cities that have already accounted for the proposed project in their comprehensive land use planning documents.

4.2.6 No-Build Alternative

The No-Build Alternative would not result in the conversion of existing land uses. Land use changes would continue to occur based on market conditions and as parcels are platted for development.

4.3 Geologic and Soil Resources

4.3.1 Geology

The formations found in Dallas and Ellis Counties are generally of Cretaceous Age, approximately 145 to 66 million years ago (ma) or Quaternary Period, 2.6 ma to present. Cretaceous deposits in North Texas are largely marine in origin, deposited from the seaway that spanned much of the North American continent. As the sea level rose and fell during the Cretaceous period, multiple layers were deposited leaving behind various geologic compositions. After the Cretaceous age, the area tilted slightly to the east which exposed the thin deposited layers.

According to the Geologic Atlas of Texas (Texas Almanac, 2018), the project area is underlain by chalk and marl in the Austin Chalk formation of the Cretaceous age. Exposures of Austin Chalk can be seen in quarries, roadcuts, and stream beds where the water has eroded the topsoil. The Trinity River, east of the project area, eroded portion of younger overlying sediments and exposed the Austin Chalk formation. The limestones of the Austin Chalk are generally found to have high foundational strength.

4.3.1.1 Existing Conditions

The project area is located in North Central Texas, within the Environmental Protection Agency's (EPA) Level III Texas Blackland Prairies ecoregion. This area is characterized by gently rolling hills. Elevation in the surrounding area can range from 500-900 feet in elevation above mean sea level (msl).

The USGS topographic maps illustrate elevation contours, drainage patterns, and hydrography. The USGS Cedar Hill and Lancaster, Texas 7.5-minute topographic quadrangle maps from 2019 were reviewed to assess the surface topography within the project area. Elevation varies throughout the project area from hillsides, hilltops, and valleys. Topography within the project area slopes in a general southeastern direction within the Red Oak Creek and North Prong Creek drainage areas.

4.3.1.2 Environmental Effects

The proposed project would likely have nominal effects on geology of the area. The seismicity of North Texas is relatively low, and the proposed project is unlikely to encounter geologic conditions that would cause adverse effects.

All alternatives and modifications would involve slight effects on surface topography within the project area due to excavation, cut and fill, implementation of embankments and stabilization slopes. The exact volumes of fill material would be calculated during final design.

4.3.1.3 Encroachment-Alteration Effects

Since the likelihood of encountering geologic conditions that would cause adverse effects is low, encroachment-alteration effects are not anticipated for this resource as a result of the proposed project

4.3.1.4 No-Build Alternative

The No-Build Alternative would have no effect on geology in the area.

4.3.2 Farmlands

4.3.2.1 Existing Conditions

The Federal Farmland Protection Policy Act of 1981 (FPPA) requires that federal agencies identify and consider the adverse effects of their programs on the preservation of farmlands; consider alternative actions, as appropriate, that could lessen adverse effects; and ensure that the proposed project is compatible with state and local programs and policies to protect farmlands (7 CFR Part 658). Stated another way, the purpose of the FPPA is to minimize the amount that federal projects contribute to the unnecessary and irreversible conversion of prime farmland or farmlands of statewide importance.

NRCS-mapped soil types at all alternatives and modifications were reviewed to determine which of the soils were identified as prime or important farmlands. As defined by the United States Department of Agriculture (USDA), prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Prime farmland has sufficient growing season, soil quality, and moisture to produce sustained high yields of crops. USDA defines farmlands of statewide importance as lands that do not meet the criteria for prime or unique farmlands, but include areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods.

The proposed project is a new location roadway and would require additional ROW. According to the NRCS soils there are prime farmlands and farmlands of statewide importance within the project areas of all alternatives and modifications. **Table 4-7** describes the acreages of the farmlands per alternative and modification. Alternative 1 Modification C has the least amount of prime farmlands at 120 acres and Alternative 4 Modification A has the most amount at 148 acres. Soils units that are considered prime farmlands or farmlands of statewide importance are discussed in **Section 4.3.3.**

Table 4-7: Farmlands within the Alternatives

Alternative	Prime Farmlands (acres)	Farmlands of Statewide Importance (acres)
Alternative 1		
Alternative 1	127	157
Alternative 1 Mod A	136	161
Alternative 1 Mod A & C	130	157
Alternative 1 Mod B	128	164
Alternative 1 Mod B & C	122	160
Alternative 1 Mod C	120	154
Alternative 2		
Alternative 2	136	156
Alternative 2 Mod A	145	159
Alternative 2 Mod A & C	139	156
Alternative 2 Mod B	137	162
Alternative 2 Mod B & C	131	159
Alternative 2 Mod C	129	152
Alternative 3		
Alternative 3	131	156
Alternative 3 Mod A	140	159
Alternative 3 Mod A & C	134	156
Alternative 3 Mod A & D	143	156
Alternative 3 Mod A C & D	137	153
Alternative 3 Mod B	132	162
Alternative 3 Mod B & C	126	159
Alternative 3 Mod B & D	135	159
Alternative 3 Mod B C & D	128	156
Alternative 3 Mod C	124	152
Alternative 3 Mod C & D	127	149
Alternative 3 Mod D	134	153
Alternative 4		
Alternative 4	139	170
Alternative 4 Mod A	148	173
Alternative 4 Mod A & C	142	170
Alternative 4 Mod B	140	176
Alternative 4 Mod B & C	134	173
Alternative 4 Mod C	133	167

Source: Loop 9, Segment A Species Analysis Documentation, 2022.
Note: The areas of overlap with the US 67 and IH 35E project are not included in these calculations.

4.3.2.2 Environmental Effects

The Farmland Conversion Impact Rating for Corridor Type Projects (NRCS-CPA-106) was prepared for all alternatives to determine if coordination with the USDA NRCS would be required. The maximum score for the Part VI of the form is 160 points, and if the corridor assessment score in Part VI is 60

points or greater, then coordination with the NRCS is required. As the score of Part VI of the form was less than 60, no coordination with the NRCS is required. The NRCS-CPA form is part of the biological documentation and is included as part of **Appendix J**, is available for review at the TxDOT Dallas District office or online at www.txdot.gov/loop9.

4.3.2.3 Encroachment-Alteration Effects

Some areas of the Reasonable Alternatives on new location or within new ROW and surrounding areas are classified as agricultural land use. Many of these areas are currently undeveloped pastures for grazing, but some are cultivated croplands. Potential adverse effects to some of the areas mapped as prime farmland soils are possible. Some tracts could no longer be viable as farmland because of direct ROW effects, or because access may be altered to portions of the tract. Such effects may include crop potential, crop rotations, and direct grazing opportunities. All Reasonable Alternatives would result in comparable encroachment-alteration effects.

4.3.2.4 No-Build Alternative

The No-Build Alternative would have no effect on farmlands in the area.

4.3.3 Soils and Soil Associations

4.3.3.1 Existing Conditions

The USDA NRCS maintains an online Web Soil Survey database. The data provided in the Web Soil Survey provides a good basis for the soil textures and types one can expect to find at a particular area. NRCS-mapped soil types at the project area were reviewed to determine various soil characteristics. **Table 4-8** summarizes the soil units represented within the project area based on information collected from the Web Soil Survey database, shown in **Appendix L**.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the NRCS maps. The soil map unit generally contains one major component and multiple minor components. The objective of soil mapping is to separate landform segments with similar land use and management requirements. Understanding the characteristics and limitations of the soils in an area can help in land use planning and management decisions.

A Water Features Delineation Report has been prepared (**Appendix L**) and is on file at the TxDOT Dallas District Office. The report outlines the methods used for collecting soil information. During the field survey, common soils found within the project area included clay and clay loam with dark matrix colors with a chroma of 2, 3, or 4 and low value of 1 or 2. These field observations closely align to the mapped soil units found in the Web Soil Survey.

Table 4-8: Natural Resources Conservation Services Soil Units

Soil Unit (Dallas/Ellis Soil Unit Code)	Soil Unit Name	Description	Hydric/ Non-hydric	Prime Farmland
5/AuB	Austin silty clay, 1 to 3% slopes	Found in landform ridges, well drained and high runoff class, Parent material: Residuum weathered from chalk	Non-hydric	Farmland of statewide importance
6/AuC2	Austin silty clay, 2 to 5% slopes, moderately eroded	Found in landform ridges, well drained and high runoff class, Parent material: Residuum weathered from chalk	Non-hydric	Not prime farmland
7/–	Austin-Lewisville complex, 5 to 8% slopes, eroded	Found in landform ridges, well drained, Parent material: Residuum weathered from chalk	Non-hydric	Not prime farmland
–/Br	Broken alluvial land, rarely flooded	Found in landform drainageways, well drained, Parent material: Silty alluvium of quaternary age derived from chalk	Non-hydric	Not prime farmland
23/–	Dalco clay, 1 to 3% slopes	Found in landform ridges, moderately well drained, Parent material: Residuum weathered from Austin chalk formation	Non-hydric	Prime farmland
26/–	Eddy clay loam, 1 to 3% slopes	Found in landform ridges, well drained and low runoff class, Parent material: Loamy residuum weathered from chalk	Non-hydric	Not prime farmland
27/–	Eddy clay loam, 3 to 8% slopes	Found in landform ridges, well drained, Parent material: Residuum weathered from Austin chalk	Non-hydric	Not prime farmland
–/EcB	Eddy gravelly clay loam, 1 to 3% slopes	Found in landform ridges, well drained, Parent material: Residuum weathered from Austin chalk	Non-hydric	Not prime farmland
–/EdD2	Eddy soils, 3 to 8% slopes, eroded	Found in landform ridges, well drained, Parent material:	Non-hydric	Not prime farmland
30/–	Eddy-Stephen complex, 1 to 5% slopes	Found in landform ridges, well drained, Parent material: Residuum weathered from Austin chalk	Non-hydric	Not prime farmland
37/–	Frio silty clay, 0 to 1% slopes, frequently flooded	Found in landform flood plains, well drained and medium runoff class, Parent material: Calcareous clayey alluvium derived from mudstone and/or calcareous loamy alluvium derived from mudstone	Hydric	Not prime farmland
41/–	Heiden clay, 1 to 3% slopes	Found in landform ridges, well drained and a very high runoff class, Parent material: Clayey residuum weathered from mudstone	Non-hydric	Prime farmland

Table 4-8: Natural Resources Conservation Services Soil Units (continued)

Soil Unit (Dallas/Ellis Soil Unit Code)	Soil Unit Name	Description	Hydric/ Non-hydric	Prime Farmland
44/HaB	Houston Black clay, 1 to 3% slopes	Found in landform ridges, moderately well drained and a very high runoff class, Parent material: Clayey residuum weathered from calcareous mudstone of upper cretaceous age	Non-hydric	Prime farmland
67/StB	Stephen silty clay, 1 to 4% slopes	Found in landform ridges, well drained and a very high runoff class, Parent material: Calcareous clayey residuum weathered from chalk	Non-hydric	Not prime farmland
–/SeB2	Stephen-Eddy complex, 1 to 3% slopes, eroded	Found in landform ridges, well drained, Parent material: Residuum weathered from Austin chalk formation	Non-hydric	Not prime farmland
–/SeC2	Stephen-Eddy complex, 2 to 5% slopes	Found in landform ridges, well drained and medium runoff class, Parent material: Calcareous clayey residuum weathered from chalk	Non-hydric	Not prime farmland

Source: NRCS, 2022.

4.3.3.2 Environmental Effects

All alternatives and modifications would have similar effects on soils within the area. Sealed roads increase the area of impervious surfaces and in doing so increase and concentrate water runoff (Ian Spellerberg, 2002). Engineering and design considerations would be expected to mitigate the effects of increased impervious cover. Considerations to mitigate effects to soil include, avoidance of soil compaction in areas adjacent to the roadway, where applicable, and seeding of native vegetation cover to reduce exposed soils and prevent runoff.

During construction there will be areas of exposed soils which can lead to an increase in erosion and sedimentation in nearby waterways. However, soil erosion is expected to be controlled by Best Management Practices (BMPs), additionally discussed in **Section 4.9**. The proposed project would incorporate TCEQ's recommended BMPs at appropriate stages during construction to control erosion and sedimentation. For erosion control, mulch filter berm and socks, temporary vegetation, or erosion control matting and/or sod may be used to stabilize disturbed areas. For sediment control, mulch filter berm and socks, silt fences, and rock berms may be used as appropriate.

4.3.3.3 Encroachment-Alteration Effects

Development of varying degrees, primarily adjacent to subdivisions, has already occurred throughout the limits of the project area. Therefore, encroachment-alteration effects to soils would be limited as a result of the proposed project build alternatives. Use of BMPs such as erosion control matting, mulch filter berm and socks, or silt fences during construction would minimize erosion and sedimentation, with particular attention paid to water crossings or any areas with steep embankments.

4.3.3.4 No-Build Alternative

The No-Build Alternative would have no effect on soils in the area.

4.4 Social Characteristics

A community impact study area (study area) was chosen to identify the area mostly likely to be impacted by the proposed Loop 9, Segment A project and includes parts or all of the following communities: Cedar Hill, DeSoto, Glenn Heights, Midlothian, Ovilla, and Red Oak. The study area was defined as the area between the proposed project and the closest major roadways (see **Section 4.2**). The boundaries of the study area are shown in **Appendix G**.

The current land use within the study area is primarily a mix of residential and undeveloped land (including timberland, ranch land, and vacant land) (see **Table 4-4** from **Section 4.2**), with commercial properties located along US 67 and IH 35E. The NCTCOG land use data from 2005 and 2015 were compared to determine land use trends within the study area. The categories varied from 2005 to 2015 but were similar enough to allow for a comparison. During this period, vacant and ranch land decreased by approximately 4,000 acres, or 21 percent of the study area, and residential land increased by approximately 3,000 acres, or 16 percent of the study area. The 2015 land uses are shown on **Exhibit 4-1**.

4.4.1 Population and Demographic Characteristics

4.4.1.1 Existing Conditions

To determine the existing and projected population trends within the study area and surrounding area data from the NCTCOG 12-county MPA, US Census Bureau and TWDB were reviewed. In 2010, the NCTCOG MPA, which includes Dallas and Ellis Counties, had a population of 6.4 million. According to NCTCOG, the total population of the 12-county MPA is projected to increase to 11.2 million residents by 2045, which represents a 75% increase for the region within a 35-year period.

US Census population counts from 2000, 2010, and 2020 and population projections for the TWDB for 2030, 2040, and 2050 were reviewed for each of the communities within the study area. **Table 4-9** shows the historical and projected population distribution for each of the communities.

Table 4-9: Population Growth by City within the Study Area

	2000[a]	2010[a]	2020[a]	2030[b]	2040[b]	2050[b]
Cedar Hill	32,093	45,028	49,148	65,133	76,989	83,579
Percent Population Change		**2000-10** 40%	**2010-20** 9%	**2020-30** 22%	**2030-40** 18%	**2040-50** 9%
DeSoto	37,646	49,047	56,145	58,941	64,281	70,078
Percent Population Change		**2000-10** 30%	**2010-20** 14%	**2020-30** 8%	**2030-40** 9%	**2040-50** 9%
Glenn Heights	7,224	11,278	15,819	18,831	23,973	29,555
Percent Population Change		**2000-10** 56%	**2010-20** 40%	**2020-30** 36%	**2030-40** 27%	**2040-50** 23%

Table 4-9: Population Growth by City within the Study Area (continued)

	2000[a]	2010 [a]	2020[a]	2030[b]	2040[b]	2050[b]
Midlothian	7,480	18,037	35,125	30,895	32,500	34,500
Percent Population Change		**2000-10** 141%	**2010-20** 95%	**2020-30** 50%	**2030-40** 5%	**2040-50** 6%
Ovilla	3,405	3,492	4,304	5,713	7,120	9,110
Percent Population Change		**2000-10** 3%	**2010-20** 23%	**2020-30** 27%	**2030-40** 25%	**2040-50** 28%
Red Oak	4,301	10,769	14,222	8,635	11,660	16,615
Percent Population Change		**2000-10** 150%	**2010-20** 32%	**2020-30** 13%	**2030-40** 35%	**2040-50** 42%

Source: [a] U.S. Census – 2000, 2010, 2020; [b] TWDB 2021 Regional Water Plan population projections.
Note: The 2045 plan year data were not available. Available data from the Census and TWDB was used. TWDB population projections are based on water utility service areas, which may be the same or very similar to established political boundaries (e.g., city limits), but not in every case.

To determine the demographics of the study area, data were obtained from the US Census Bureau, the American Community Survey (ACS), site visits (conducted in January and April 2019 and February 2022), and current and historical aerial photographs. Within the study area there are 563 census blocks, 21 census block groups, and 9 census tracts. Detailed information regarding community effects can be found in the June 2022 Community Impacts Assessment Technical Report at the TxDOT Dallas District Office or online www.txdot.gov/loop9.

Minority Populations

Of the 563 blocks within the study area, 391 have a 50% or higher minority population, shown in **Appendix G**. The minority population located within the study area is primarily Black or African American (66% of the minority population) and Hispanic or Latino (29% of the minority population). A table showing the percent minority by block within the study area is included in the Community Impacts Assessment in **Appendix G**.

Table 4-10 shows the minority populations of the cities and counties within the study area. The percent minority by block is comparable to Dallas County and lower than the cities of Cedar Hill, Glenn Heights, and DeSoto. The percentage minority by block is higher than Ellis County and the cities of Midlothian, Ovilla, and Red Oak.

Table 4-10 Minority Populations - Counties/Cities

Geography	Total Population	Minority Population	Percent Minority
Dallas County	2,613,539	1,888,552	72%
Ellis County	192,455	85,960	45%
Cedar Hill	49,148	40,502	82%
DeSoto	56,145	50,505	90%
Glenn Heights	15,819	13,424	85%
Red Oak	35,125	10,936	31%
Ovilla	4,304	1,554	36%
Midlothian	14,222	8,789	62%
Source: Loop 9, Segment A Community Impacts Assessment Technical Report, 2022.			

Low-income Populations

To determine if there were low-income populations located within the study area, the 2020 ACS 5-year estimates for median income for the block groups located within the study area were analyzed. There are 21 block groups located within the study area, for which the median income ranges from $21,982 to $174,861. One block group (CT 166.21, BG 3) within the study area has a median income below the 2022 US Department of Health and Human Services (DHHS) poverty guideline for a family of four ($27,750). **Table 4-11** lists the medium income of the counties and cities within the study area. **Appendix G** shows the median income by block group and includes a table showing the median income by block group within the study area.

Table 4-11: Median Income - Counties/Cities

Geography	Total Population
Dallas County	$61,870
Ellis County	$79,834
Cedar Hill	$75,715
DeSoto	$71,124
Glenn Heights	$72,695
Midlothian	$95,603
Ovilla	$102,917
Red Oak	$78,646
Source: Loop 9, Segment A Community Impacts Assessment Technical Report, 2022.	

Limited English Proficiency

Executive Order 13166, entitled "Improving Access to Services for Persons with Limited English Proficiency (LEP)", mandates that Federal agencies examine the services they provide, identify any need for services to those with LEP, and develop and implement a system to provide those services so LEP persons can have meaningful access to them. It is expected that agency plans will provide for such meaningful access consistent with, and without unduly burdening, the fundamental mission of the agency. Each agency shall also work to ensure that recipients of federal financial assistance (recipients) provide meaningful access to their LEP applicants and beneficiaries (65 Federal Register 50123, August 16, 2000).

The 21 block groups within the study area were analyzed to determine the percent of persons who speak English less than 'very well,' which is considered LEP. The percent of LEP persons within the block groups ranges from 0% to 50%. The most common primary language spoken by LEP persons was Spanish (92% of the study area LEP population). Other languages such as Indo-European languages (4%) and Asian and Pacific Island (1%) languages were present in smaller amounts. A table showing the LEP population by block group within the study area is included in **Appendix G**.

4.4.1.2 Environmental Effects

The potential environmental effects of the demographics identified within the study area are detailed in **Section 4.4.5** Environmental Justice.

4.4.1.3 Encroachment-Alteration Effects

The potential encroachment-alteration effects of the demographics identified within the study area are detailed in **Section 4.4.5** Environmental Justice.

4.4.1.4 No-Build Alternative

The No-Build Alternative would have no impacts to the population and demographic characteristics of the study area.

4.4.2 Housing, Neighborhoods, and Community Cohesion

4.4.2.1 Existing Conditions

The NCTCOG inventory of existing and planned subdivisions within the study area was reviewed. From 1930 to 1989 approximately 46 residential developments were built and from 1990 to 2020 approximately 47 residential developments were built, with three additional subdivisions planned. The residential development within the study area has nearly doubled over the last 30 years compared to the previous 60 years. Loop 9 has been identified in transportation planning efforts for the last 40 years and a majority of newly constructed and planned subdivisions were designed to accommodate and have access to the proposed Loop 9, Segment A project. There are 26 major employers within and adjacent to the study area, indicating that this area acts as more than a commuter community to the DFW metro area. Major employer is defined as an employer with at least 100 employees at a given location. The presence of employment opportunities will cause this area to continue to grow. The existing and proposed residential subdivisions and commercial properties and major employers are shown **Exhibit 4-2**.

Within the study area, the community consists of subdivisions and more widely separated residences located on individual parcels. The primary form of accessing the community by those living within or visiting the community is by car. Community members within the subdivisions may use sidewalks to visit neighbors; however, commercial businesses are not within walking distance and would need to be accessed by car.

The alternatives and modifications of the proposed project have been aligned to avoid separating more densely populated neighborhoods. These alternatives and modifications run adjacent to the subdivisions of Bear Creek Ranch, Kingston Meadows, Meadow Springs, Stone Creek, Harmony, The Mesa, Top of the Hill Farms, Westmoreland Road Estates, Stonehill, and Lindell Estates. The original Common Alignment traverses through the northern portion of Lindell Estates, while Modifications A and B reroute the Common Alignment to the north, paralleling Lindell Estates.

4.4.2.2 Environmental Effects

The proposed project is a new location roadway; therefore, a physical separation within the study area would be created with the construction of the proposed project. Within the study area, residents currently use the following roads for north/south access: Tar Road, S. Joe Wilson Road, S. Duncanville Road, S. Cockrell Hill Road, S. Westmoreland Road, Hampton Road, and Uhl Road. Bear Creek Road and Ovilla Road are the primary roads used for east/west access. These are the primary roads used to access community services and access will continue to be provided to these roadways. Where access currently exists, temporary access driveways would be provided to adjacent property owners during construction and permanent access would be provided after construction is complete.

The purpose of the project is to provide adequate connectivity, as well as relieve congestion on local arterial roadways and to increase capacity, mobility, and accessibility for the region. While a physical barrier would exist with the construction of the proposed Loop 9, Segment A, one of the benefits of the proposed project would be improved accessibility and mobility within the community overall.

The proposed project may have effects to community cohesion. The northwestern portion of Lindell Estates would be displaced by the proposed Loop 9, Segment A, Common Alignment if Modifications A or B are not selected. Modifications A and B would still potentially effect Lindell Estates; however, the number of potential displacements would be reduced. If Modifications A or B are not selected, two roads would be removed, and 27 residences would be potentially displaced . There are 66 total residences in Lindell Estates; therefore, the Common Alignment would potentially displace 41% of the total residences. Since 2017, 26 new homes have been constructed within Lindell Estates, resulting in an 65% increase in homes. As such, the Lindell Estates neighborhood may undergo significant change due to new home construction, regardless of the construction of the proposed Loop 9, Segment A project. Of the 27 potential residential displacements in Lindell Estates, 16 of them have been constructed within the original Common Alignment since 2017. There are lots available within Lindell Estates; therefore, residents may be able to relocate within the neighborhood, but it is difficult to predict the housing market and individual housing circumstances and personal relocation decisions. The neighborhood will continue to have access to all currently available community services and businesses.

The community study area may experience altered travel patterns; however, residents would maintain access to the entire community that remains. People within the community may access other parts of the community in a slightly different manner after the construction of the proposed project; however, their ability to access the community will not be removed and they will continue to be able to participate in local activities. Intersections would be constructed at the major roadways within the study area to allow community members continued access to their community facilities, places of work, and neighbors.

The proposed project would not displace any community facilities and would not negatively impact community facilities located within the study area. The proposed project would not restrict access to any existing community facility; however, access within the study area will change as discussed in Section 8.0 of the Community Impacts Assessment Technical Report (available online at www.txdot.gov/loop9 or at the Dallas District Office).

TxDOT would offer relocation counselling and financial assistance to potentially displaced residents as discussed in **Section 4.4.4** Right of Way and Displacements.

Lindell Estates currently has two access points to Uhl Road: Green Mound Drive and East Overhill Drive. Uhl Road allows residents to travel north and south to access community facilities, stores, and jobs. The Common Alignment would remove the Green Mound Drive access point and maintain the East Overhill Drive access point. Additionally, access would be provided to Loop 9, Segment A from Water Crest Lane and Lakeshore Lane, which are two neighborhood streets providing north/south access. Modifications A and B to the Common Alignment in this area would not remove Green Mound Drive and this access point to Uhl Road would remain.

Apart from the potential displacements resulting from the original Common Alignment option in the Lindell Estates neighborhood, the proposed project would not separate or isolate any distinct neighborhoods, ethnic groups, or other specific groups.

4.4.2.3 Encroachment-Alteration Effects

Alterations to existing neighborhoods, neighborhood cohesion and neighborhood stability could occur because of the proposed project, but they are not anticipated to be substantial. Socioeconomic effects such as changes in travel patterns and access and property values as a result of land use changes could occur. The Build Alternative would construct a new location frontage road system that would improve safety and mobility. As a result, this proposed project is not anticipated to cause indirect effects on community cohesion or community stability. The Build Alternative is anticipated to have beneficial effects on the local economy, changes in travel patterns and access within the communities. Further analysis of encroachment effects to socioeconomic resources will not be necessary.

4.4.2.4 No-Build Alternative

The No-Build Alternative would not affect the existing structure of local communities; however, deterioration of mobility may occur with increased traffic volumes since the existing roadway network will continue to be used heavily. As a result, of the increased traffic volumes, future negative effects to the community may occur from the No-Build Alternative.

4.4.3 Community Facilities, Services, and Resources

4.4.3.1 Existing Conditions

The study area was reviewed to determine what community facilities were present and what population they served. The community facilities consist of five emergency services (3 fire stations and 2 police departments), twenty schools (10 public and 10 private), thirty-two places of worship, two cemeteries, eleven parks, one recreation center, one park and ride, and one golf course.

Appendix G shows the locations of the community facilities located within the study area and the tables within **Appendix G** list the names.

4.4.3.2 Environmental Effects

The community facilities located within the study area were reviewed to determine potential effects of the project to their access points. No community facilities are located adjacent to the proposed project; therefore, no access effects are anticipated.

Intersections would be constructed at the major roadways within the study area to allow community members continued access to their community facilities, places of work, and neighbors.

The proposed project would not displace any community facilities and would not negatively impact community facilities located within the study area. The proposed project would not restrict access to any existing community facility; however, access within the study area will change as discussed in detail in the Community Impacts Assessment Technical Report Section 8.0 Access and Travel Patterns.

4.4.3.3 Encroachment-Alteration Effects

No additional encroachment-alteration effects are anticipated for this resource than what is discussed in **Section 4.4.2.3**. Since impacts to community services are not anticipated as a result of the proposed project.

4.4.3.4 No-Build Alternative

The No-Build Alternative would have no effects to the function of and/or access to community facilities within the study area.

4.4.4 Right of Way and Displacements

4.4.4.1 Existing Conditions

Within the study area, the community consists of subdivisions and more widely separated residences located on individual parcels. The study area is primarily a combination of rural areas and developing residential areas; there are a limited number of commercial businesses within the study area. Businesses located within the study area consist of gas stations, agricultural and industrial operations, and bar/restaurants.

4.4.4.2 Environmental Effects

Right of Way

Alternative 1 would require approximately between 587 and 598 acres, Alternative 2 would require between 586 and 596 acres, Alternative 3 would require between 594 and 607 acres, and Alternative 4 would require between 594 and 604 acres of additional ROW. The following sections outline the number of displacements by alternative. The potential displacements are shown on **Exhibit 4-3**.

The ROW acreages above do not consider two advanced ROW acquisition properties that were obtained by TxDOT in what is now referred to as the Common Alignment. These parcels were acquired in advance to ensure enough ROW would be available to analyze reasonable and feasible alternatives. This process is done in an effort to prevent development in the proposed ROW, thereby reducing potential residential displacements. The first early acquisition process was approved in 2009. TxDOT was approved for one parcel located in Segment B of Loop 9 and three parcels in Segment A within the Harmony subdivision located in the southwest quadrant of the IH 35E interchange. TxDOT ultimately only purchased one of the three Harmony subdivision parcels. The one Harmony subdivision parcel is referred to as Early Acquisition Property #1 on **Exhibit 4-3**. In 2017, the second early acquisition process was approved for a portion of the Vineyards subdivision north of Bear Creek Rd. This parcel is referred to as Early Acquisition Property #2 on **Exhibit 4-3**. Copies of the environmental documentation can be found in **Appendix E**.

Residential Displacements

The proposed project alternatives were aligned to avoid bisecting the most densely populated areas to minimize the number of residential displacements. **Table 4-12** outlines the number of potential residential displacements by alternative.

Table 4-12: Potential Residential Displacements

Alternative	Single-family Residence	Shed/Barn
Alternative 1		
Alternative 1	57	53
Alternative 1 Modification A	31	55
Alternative 1 Modification A and C	30	55
Alternative 1 Modification B	34	53
Alternative 1 Modification B and C	33	53
Alternative 1 Modification C	56	53
Alternative 2		
Alternative 2	57	54
Alternative 2 Modification A	31	56
Alternative 2 Modification A and C	30	56

Table 4-12: Potential Residential Displacements (continued)

Alternative	Single-family Residence	Shed/Barn
Alternative 2 (continued)		
Alternative 2 Modification B	34	54
Alternative 2 Modification B and C	33	54
Alternative 2 Modification C	56	54
Alternative 3		
Alternative 3	64	58
Alternative 3 Modification A	38	60
Alternative 3 Modification A and C	37	60
Alternative 3 Modification A and D	34	61
Alternative 3 Modification A, C and D	33	61
Alternative 3 Modification B	41	58
Alternative 3 Modification B and C	40	58
Alternative 3 Modification B and D	37	59
Alternative 3 Modification B, C and D	36	59
Alternative 3 Modification C	63	58
Alternative 3 Modification C and D	59	59
Alternative 3 Modification D	60	59
Alternative 4		
Alternative 4	57	59
Alternative 4 Modification A	31	61
Alternative 4 Modification A and C	30	61
Alternative 4 Modification B	34	59
Alternative 4 Modification B and C	33	59
Alternative 4 Modification C	56	59
Source: Loop 9, Segment A Community Impacts Assessment Technical Report, 2022.		

The market value of the potentially displaced residential properties ranges from $12,140 to $1,456,710, with the majority ranging from $200,000 to $400,000. To assess availability of replacement properties within the study area, a search of available real estate was conducted using www.zillow.com/ (February 2022). Available residential properties were searched by the zip codes that the project is located within or adjacent to where the potential displacements would occur: 75104 (Cedar Hill), 75115 (DeSoto), 75146 (Lancaster), 75154 (Ovilla/Red Oak), and 76065 (Midlothian).

Based on the results of this study, it was determined that there is an adequate quantity of comparable replacement housing available within the general study area for the potentially displaced residences that range in value from $250,000 to $1,500,000. There are 73 potentially displaced residential properties, across all alternatives and modifications, that range in value from $12,140 to $249,370. No alternative or modification would displace all 73 residences that are valued under $250,000. There is limited replacement housing available for homes in the $10,000 to

$250,000 value range. A detailed analysis of the available replacement housing can be found in the Community Impacts Assessment Technical Report, Section 7.0 Displacements.

TxDOT offers relocation counseling and financial assistance to residences and businesses that are displaced by the acquisition of highway ROW in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (PL 91-646). TxDOT will fully compensate the property owners for the land based on current appraisal value. Other effects will be considered by an appraiser when TxDOT begins the ROW acquisition process after environmental clearance. Any ROW acquisition by TxDOT would be in accordance with the U.S. Department of Transportation (USDOT) policy as mandated by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended in the Surface Transportation and Uniform Relocation Assistance Act of 1987 (the Uniform Act).

If it is determined that a property is required for construction of the proposed project, a letter would be mailed to the property owner. The letter serves as the TxDOT ROW Division's (the appraiser's) initial contact with the property owner notifying them of (1) TxDOT's interest in acquiring the property, (2) TxDOT's obligation to secure any necessary appraisals (to inspect the property and to determine an initial fair market value), and (3) to provide any other useful information regarding the acquisition process. This is the property owner's opportunity to inform the appraiser (and/or point out) any relevant, unusual, or hidden features of the property that the appraiser could overlook. In addition, the property owner should also advise the appraiser if any of these conditions exist such as: (1) Other persons who have ownership or interest in the property; (2) Tenants on the property; (3) Items of real or personal property that belong to someone else located on your property; or (4) The presence of hazardous material, underground storage, or utilities.

The Uniform Act ensures relocation of displaced tenants to a comparable replacement that is comparable in size, features and location; is decent, safe and sanitary; and within the financial means of the displaced person(s) (49 CFR Part 24.204). This assistance applies to tenants as well as owners occupying the real property needed for the project. TxDOT would also provide assistance to displaced businesses and non-profit organizations to aid in their satisfactory relocation with a minimum of delay. Replacement structures must be located in the same type of neighborhood and be equally accessible to public services and places of employment. All property owners from whom property is needed are entitled to receive just compensation for their land and property. Just compensation is based upon the fair market value of the property. TxDOT also provides, through its Relocation Assistance Program, payment and services to aid in movement to a new location.

The proposed project would proceed to construction only when all displaced families and businesses have been provided the opportunity to be relocated to adequate replacement sites. The available structures must also be open to persons regardless of race, color, religion, or nationality and be within the financial means of those individuals affected.

Commercial Displacements

Businesses located within the study area consist of general-purpose stores, gas stations, agricultural and industrial operations, and bar/restaurants. Three to four commercial businesses would

potentially be displaced depending upon the alternative chosen. The design modifications A, B, and D would not impact any commercial businesses. Modification C would potentially displace structures associated with the Stone Canyon Cabins. **Table 4-13** below outlines the number of commercial business displacements and the number of structures associated with each business that may be displaced. The businesses that may be displaced include: The Box Car (bar/restaurant), Stone Canyon Cabins (vacation rental), Noble Champion Horse Barn, and The Barn at Cedar Hill – Neils Creek Arabians.

Table 4-13: Potential Commercial Displacements

Alternative	The Barn at Cedar Hill – Neils Creek Arabians	Noble Champion Sport Horses	The Box Car	Stone Canyon Cabins
Alternative 1				
Alternative 1	1 business (4 associated structures)	1 business (6 associated structures)	1 business (1 Structure)	1 business (8 associated structures)
Alternative 1 Modification A and C				1 business (7 associated structures)
Alternative 1 Modification A				1 business (8 associated structures)
Alternative 1 Modification B and C				1 business (7 associated structures)
Alternative 1 Modification B				1 business (8 associated structures)
Alternative 1 Modification C				1 business (7 associated structures)
Alternative 2				
Alternative 2	1 business (6 associated structures)	1 business (6 associated structures)	1 business (1 Structure)	1 business (8 associated structures)
Alternative 2 Modification A and C				1 business (7 associated structures)
Alternative 2 Modification A				1 business (8 associated structures)

Table 4-13: Potential Commercial Displacements (continued)

Alternative	The Barn at Cedar Hill – Neils Creek Arabians	Noble Champion Sport Horses	The Box Car	Stone Canyon Cabins
Alternative 2 (continued)				
Alternative 2 Modification B and C	1 business (6 associated structures)	1 business (6 associated structures)	1 business (1 Structure)	1 business (7 associated structures)
Alternative 2 Modification B				1 business (8 associated structures)
Alternative 2 Modification C				1 business (7 associated structures)
Alternative 3				
Alternative 3	Not displaced by Alternative 3	1 business (6 associated structures)	1 business (1 Structure)	1 business (8 associated structures)
Alternative 3 Modification A, C and D				1 business (7 associated structures)
Alternative 3 Modification A and C				1 business (7 associated structures)
Alternative 3 Modification A and D				1 business (8 associated structures)
Alternative 3 Modification A				1 business (8 associated structures)
Alternative 3 Modification B, C and D				1 business (7 associated structures)
Alternative 3 Modification B and C				1 business (7 associated structures)
Alternative 3 Modification B and D				1 business (8 associated structures)
Alternative 3 Modification B				1 business (8 associated structures)
Alternative 3 Modification C and D				1 business (7 associated structures)

Table 4-13: Potential Commercial Displacements (continued)

Alternative	The Barn at Cedar Hill – Neils Creek Arabians	Noble Champion Sport Horses	The Box Car	Stone Canyon Cabins
Alternative 3 (continued)				
Alternative 3 Modification C	Not displaced by Alternative 3	1 business (6 associated structures)	1 business (1 Structure)	1 business (7 associated structures)
Alternative 3 Modification D				1 business (8 associated structures)
Alternative 4				
Alternative 4	Not displaced by Alternative 4	1 business (6 associated structures)	1 business (1 Structure)	1 business (8 associated structures)
Alternative 4 Modification A and C				1 business (7 associated structures)
Alternative 4 Modification A				1 business (8 associated structures)
Alternative 4 Modification B and C				1 business (7 associated structures)
Alternative 4 Modification B				1 business (8 associated structures)
Alternative 4 Modification C				1 business (7 associated structures)

Source: Loop 9, Segment A Community Impacts Assessment Technical Report, 2022.

The products and services offered by the businesses that may be displaced would be available through other retailers, while the displaced businesses relocate. In addition, the businesses are not unique to the area and do not service a specific population such as persons with disabilities, children, the elderly, a specific ethnic group, low-income families, or a specific religious group. Members of the community would have access to comparable businesses throughout the study area.

The Noble Champion Sport Horse facility and the Barn at Cedar Hill may be able to relocate within the current property they are operating on, allowing for them to provide continued services. In addition, horse training and horse breeding services are available in the surrounding towns (Midlothian and Waxahachie). The horse training and breeding services in Midlothian and Waxahachie are located 8 to 10 miles away from the potentially displaced facilities.

To assess availability of replacement properties within the project study area, a search of available commercial properties, hospitality properties, and developable/agricultural properties was conducted using www.loopnet.com/ (February 2022). Available properties were searched by the zip codes that the project is located within or adjacent to where the displacements would occur. A detailed analysis of the available comparable commercial properties can be found in Community Impacts Technical Report, Section 7.0 Displacements.

Based on the results of this study, it was determined that there is an adequate quantity of comparable replacement commercial properties available within the general study area for the potentially displaced commercial properties.

Other Displacements

The proposed project may displace one municipal structure. The city of Glenn Heights municipal water tower is located within the alignment of Modification B. TxDOT has coordinated with the city of Glenn Heights to present the potential effects of Modification B during Stakeholder Meetings. Glenn Heights reviewed the information provided by TxDOT, and to preserve developable land for the future, they would prefer the modification that effects their water tower; however, the city recognizes there is a time and financial constraint to have this facility relocated. TxDOT will coordinate directly with the city of Glenn Heights during the utility relocation process should Modification B be selected. If the municipal water tower is relocated, the relocation process would be timed so that there is minimal interruption to the water supply for city residents.

4.4.4.3 Encroachment-Alteration Effects

Encroachment-alteration effects are not anticipated for this resource as a result of the proposed project because the ultimate Loop 9, Segment A project ROW is being evaluated in this study. No additional ROW is anticipated.

4.4.4.4 No-Build Alternative

The No-Build Alternative would require no ROW acquisition or displacements of residences and commercial properties.

4.4.5 Environmental Justice

4.4.5.1 Existing Conditions

Executive Order 12898, Federal Actions to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations (February 11, 1994), requires each federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The FHWA has identified three fundamental principles of EJ:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
- To ensure the full and fair participation by all potentially affected communities in the decision-making process; and

- To prevent the denial of, reduction in, or substantial delay in the receipt of benefits by minority and low-income populations.

FHWA defines disproportionately high and adverse human health or environmental effects as those that:

- Are predominantly borne by a minority population and/or a low-income population; or
- Will be suffered by the minority population and/or low-income population and are appreciably more severe or greater in magnitude than the adverse effects that will be suffered by the non-minority population and/or non-low-income population.

4.4.5.2 Environmental Effects

Displacements

The proposed project may potentially displace up to 64 single-family residences and 4 commercial properties. Table 4-14 outlines the potential residential and commercial displacements in census blocks with 50% or greater minority population by alternative. Table 4-15 outlines potential residential displacements within census blocks with 50% or greater minority population and potential residential displacements within census blocks with fewer than 50% minority population.

Table 4-14: Potential Displacements within Census Blocks with 50% or Greater Minority Population by Alternative

	CT 166.24 BG 1 Block 1001		CT 166.24 BG 1 Block 1017		CT 166.23 BG 1 Block 1047		CT 166.23 BG 1 Block 1048		CT 166.23 BG 13 Block 3000		CT 166.22 BG 1 Block 1004		CT 166.22 BG 3 Block 3008		CT 166.16 BG 2 Block 2014		CT 607.02 BG 2 Block 2002		CT 602.16 BG 1 Block 1011		CT 602.16 BG 1 Block 1013		CT 602.16 BG 1 Block 1020		CT 602.16 BG 2 Block 2000	
	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R
Alternative 1	0	0	0	4	1	6	1	0	0	4	0	0	0	0	0	2	0	2	0	10	0	3	0	14	0	1
Alternative 1 Mod A	0	0	0	4	1	6	1	0	0	4	0	1	0	0	0	2	0	2	0	1	0	0	0	0	0	0
Alternative 1 Mod A & C	0	0	0	4	1	6	1	2	0	1	0	1	0	0	0	2	0	2	0	1	0	0	0	0	0	0
Alternative 1 Mod B	0	0	0	4	1	6	1	0	0	4	0	1	0	0	0	2	0	2	0	4	0	0	0	0	0	0
Alternative 1 Mod B & C	0	0	0	4	1	6	1	2	0	1	0	1	0	0	0	2	0	2	0	4	0	0	0	0	0	0
Alternative 1 Mod C	0	0	0	4	1	6	1	2	0	1	0	0	0	0	0	2	0	2	0	10	0	3	0	14	0	1
Alternative 2	0	0	0	4	1	6	1	0	0	4	0	0	0	0	0	2	0	2	0	10	0	3	0	14	0	1
Alternative 2 Mod A	0	0	0	4	1	6	1	0	0	4	0	1	0	0	0	2	0	2	0	1	0	0	0	0	0	0
Alternative 2 Mod A & C	0	0	0	4	1	6	1	2	0	1	0	1	0	0	0	2	0	2	0	1	0	0	0	0	0	0
Alternative 2 Mod B	0	0	0	4	1	6	1	0	0	4	0	1	0	0	0	2	0	2	0	4	0	0	0	0	0	0
Alternative 2 Mod B & C	0	0	0	4	1	6	1	2	0	1	0	1	0	0	0	2	0	2	0	4	0	0	0	0	0	0
Alternative 2 Mod C	0	0	0	4	1	6	1	2	0	1	0	0	0	0	0	2	0	2	0	10	0	3	0	14	0	1
Alternative 3	0	0	0	6	1	6	1	0	0	4	0	0	0	0	0	2	0	2	0	10	0	3	0	14	0	1
Alternative 3 Mod A	0	0	0	6	1	6	1	0	0	4	0	1	0	0	0	2	0	2	0	1	0	0	0	0	0	0
Alternative 3 Mod A & C	0	0	0	6	1	6	1	2	0	1	0	1	0	0	0	2	0	2	0	1	0	0	0	0	0	0
Alternative 3 Mod A & D	0	0	0	6	1	6	1	0	0	4	0	1	0	0	0	4	0	1	0	1	0	0	0	0	0	0
Alternative 3 Mod A C & D	0	0	0	6	1	6	1	2	0	1	0	1	0	0	0	4	0	1	0	1	0	0	0	0	0	0
Alternative 3 Mod B	0	0	0	6	1	6	1	0	0	4	0	1	0	0	0	2	0	2	0	4	0	0	0	0	0	0
Alternative 3 Mod B & C	0	0	0	6	1	6	1	2	0	1	0	1	0	0	0	2	0	2	0	4	0	0	0	0	0	0
Alternative 3 Mod B & D	0	0	0	6	1	6	1	0	0	4	0	1	0	0	0	4	0	1	0	4	0	0	0	0	0	0
Alternative 3 Mod B C & D	0	0	0	6	1	6	1	2	0	1	0	1	0	0	0	4	0	1	0	4	0	0	0	0	0	0
Alternative 3 Mod C	0	0	0	6	1	6	1	2	0	1	0	0	0	0	0	2	0	2	0	10	0	3	0	14	0	1
Alternative 3 Mod C & D	0	0	0	6	1	6	1	2	0	1	0	0	0	0	0	4	0	1	0	10	0	3	0	14	0	1
Alternative 3 Mod D	0	0	0	6	1	6	1	0	0	4	0	0	0	0	0	4	0	1	0	10	0	3	0	14	0	1
Alternative 4	0	7	0	2	1	6	1	0	0	4	0	0	0	0	0	2	0	1	0	10	0	3	0	14	0	1
Alternative 4 Mod A	0	7	0	2	1	6	1	0	0	4	0	1	0	0	0	2	0	1	0	1	0	0	0	0	0	0
Alternative 4 Mod A & C	0	7	0	2	1	6	1	2	0	1	0	1	0	0	0	2	0	1	0	1	0	0	0	0	0	0
Alternative 4 Mod B	0	7	0	2	1	6	1	0	0	4	0	1	0	0	0	2	0	1	0	4	0	0	0	0	0	0
Alternative 4 Mod B & C	0	7	0	2	1	6	1	2	0	1	0	1	0	0	0	2	0	1	0	4	0	0	0	0	0	0
Alternative 4 Mod C	0	7	0	2	1	6	1	2	0	1	0	0	0	0	0	2	0	1	0	10	0	3	0	14	0	1

Source: Study team, 2022.

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Table 4-15: Potential Displacements within Census Blocks with 50% or Greater Minority Population and within Census Blocks with Fewer than 50% Minority Population

	Total Residential Displacements	Residential Displacements within Census Blocks with 50% or Greater Minority Population	Residential Displacements within Census Blocks with Fewer than 50% Minority Population
Alternative 1			
Alternative 1	57	46	11
Alternative 1 Mod A	31	20	11
Alternative 1 Mod A & C	30	19	11
Alternative 1 Mod B	34	23	11
Alternative 1 Mod B & C	33	22	11
Alternative 1 Mod C	56	45	11
Alternative 2			
Alternative 2	57	46	11
Alternative 2 Mod A	31	20	11
Alternative 2 Mod A & C	30	19	11
Alternative 2 Mod B	34	23	11
Alternative 2 Mod B & C	33	22	11
Alternative 2 Mod C	56	45	11
Alternative 3			
Alternative 3	64	48	16
Alternative 3 Mod A	38	22	16
Alternative 3 Mod A & C	37	21	16
Alternative 3 Mod A & D	34	23	11
Alternative 3 Mod A C & D	33	22	11
Alternative 3 Mod B	41	25	16
Alternative 3 Mod B & C	40	24	16
Alternative 3 Mod B & D	37	26	11
Alternative 3 Mod B C & D	36	25	11
Alternative 3 Mod C	63	47	16
Alternative 3 Mod C & D	59	48	11
Alternative 3 Mod D	60	49	11
Alternative 4			
Alternative 4	57	50	7
Alternative 4 Mod A	31	24	7
Alternative 4 Mod A & C	30	23	7
Alternative 4 Mod B	34	27	7
Alternative 4 Mod B & C	33	26	7
Alternative 4 Mod C	56	49	7
Source: Study team, 2022.			

The potential residential displacements represent a relatively small portion of the community that would be impacted by the loss of housing structures. The displacements caused by the proposed project may have temporary effects on the community while the displaced residents are being relocated; however, once the relocation process is complete the current residents should be able to remain a member of their current community if they choose to relocate within their community.

The potential commercial displacements include The Box Car (bar/restaurant), Stone Canyon Cabins (vacation rental), Noble Champion Sport Horses, and The Barn at Cedar Hill. The Box Car and The Stone Canyon Cabins are located within Census Blocks that have a 50% or higher minority population. The products and services offered by the businesses that may be displaced would be available through other retailers while the displaced businesses relocate. In addition, these businesses do not specifically service minority or low-income populations.

The minority populations are primarily located in the northern half of the study area, adjacent to its northern boundary. There is one census block group (CT 166.21 BG 3) within the study area that has a median income below the DHHS poverty guideline for a family of four. This census block group and the next lowest income population block group (CT 166.26 BG 3) were reviewed to determine if they would be disproportionally impacted. CT 166.21 BG has a median income of $21,982 and CT 166.26 BG 3 has a median income of $57,244. These block groups are located north of the proposed project and no displacements would take place within them.

One neighborhood (Lindell Estates) includes homes that are appraised for less than $100,000. In addition, based on public involvement, it was determined that this area has a high Spanish speaking population. The Common Alignment would result in up to 27 potential residential displacements in this neighborhood. Since 2017, 26 new homes have been constructed within Lindell Estates, resulting in a 65% increase in homes. As such, the Lindell Estates neighborhood may undergo significant change due to new home construction, regardless of the construction of the proposed Loop 9, Segment A project. Of the 27 potential residential displacements in Lindell Estates, 16 of them have been constructed within the original Common Alignment since 2017. There are lots available within Lindell Estates; therefore, residents may be able to relocate within the neighborhood, but it is difficult to predict the housing market and individual housing circumstances and personal relocating decisions.

The potentially impacted property owners and adjacent property owners to the proposed Loop 9, Segment A were mailed notices for opportunities to attend two Public Scoping Meetings in July 2019 and two Public Meetings in February 2020. Based on the sign-in sheets, it was determined that at least three residents of Lindell Estates attended the July 2019 public meetings; these three attendees would be potentially displaced by the proposed project. Based on sign-in sheets received, it was determined that at least three residents of Lindell Estates attended the February 2020 public meetings; two of these attendees would be potentially displaced by the proposed project. TxDOT employees who specialize in ROW acquisition were at the public scoping meetings and the public meetings to answer questions regarding the ROW acquisition process and provide materials for the attendees to take home that cover the process.

In addition, one potentially displaced resident e-mailed TxDOT requesting information about the proposed project. The resident was provided with project information and a figure showing their home in relation to the proposed project. No additional comments were received from this resident.

One potentially displaced resident of Lindell Estates contacted FHWA to express their concern about the proposed project's effect on persons in Dallas and Ellis Counties and the proposed displacements that would affect minorities.

In 2021, based on potential significant effects to Lindell Estates and response to public and stakeholder comments, Modifications A and B to the Common Alignment were established to reduce effects to the Lindell Estates subdivision by shifting the proposed alignment north. Modification A and B would reduce effects to the Lindell Estates subdivisions by shifting the proposed alignment north. Modification A would avoid displacing any residences in Lindell Estates; however, one home north of Lindell Estates would be potentially displaced. Modification B would reduce the number of potential displacements in Lindell Estates to three and would potentially displace two homes north of Lindell Estates. Modification B would also displace the city of Glenn Heights municipal water tower. TxDOT held a community meeting at Frank D. Moates Elementary cafeteria on February 8, 2022, to present Modifications A and B to the residents of Lindell Estates. 21 members of the public and three elected officials attended the meeting. This was the first time the public had been presented with the modifications to the north of Lindell Estates.

The area surrounding Lindell Estates in all locations is constrained by existing and new residential developments, many of which are growing at high rates. To further adjust the alignment, beyond Modifications A and B, would create more residential impacts for the project as a whole. **Exhibit 4-2** illustrates the existing and planned residential developments in the area. In addition to the increased displacements, the close proximity of Lindell Estates to the eastern terminus does not leave many design options for the tie-in location at IH 35E. To alter the design to "zig-zag" through communities and ultimately end up miles from its intended terminus would not meet the purpose and need of the project to provide a continuous east-west route through the project area.

Access and Travel Patterns

Effects to access and travel patterns will occur throughout the project corridor and would not be limited to one community, including those with higher minority or low-income populations. The purpose of the project is to provide adequate connectivity, as well as relieve congestion on local arterial roadways and to increase capacity, mobility, and accessibility for the region. Based on the purpose of the proposed project, overall access should improve with the construction of the proposed project.

Community Cohesion

The proposed project is a new location roadway; therefore, a physical separation within the study area would be created with the construction of the proposed project. While a physical barrier would exist with the construction of the proposed Loop 9, Segment A project, one of the benefits of the proposed project would be improved accessibility and mobility within the community overall. The proposed project is not anticipated to have an adverse effect on community cohesion. Apart from the potential displacements resulting from the original Common Alignment option in the Lindell Estates

neighborhood, the proposed project would not separate or isolate any distinct neighborhoods, ethnic groups, or other specific groups.

There may be short term, localized effects to air quality (i.e., dust) as well as noise levels generated by construction equipment during construction. These effects would be temporary and would not be selectively limited to minority or low-income communities but would potentially affect all residential and business communities located in the areas adjacent to the proposed project. Short term effects would occur along the entire length of the proposed ROW and would not disproportionately affect EJ populations as compared to non-EJ populations within the study area. Air quality and noise impacts were analyzed for the proposed project and are discussed in their respective **Sections 4.7 and 4.8**.

The study area was reviewed to determine if any members of the community had experienced substantial effects from past projects. FM 664 from Westmoreland Road to IH 35E has recently been widened from a two-lane undivided roadway to a six-lane divided roadway. FM 664 from Westmoreland Road to FM 1387 is planned to be widened from a two-lane undivided roadway to a four-lane divided roadway. Bear Creek Road from Hampton Road to IH 35E is planned to be widened from a two-lane undivided roadway to a four-lane divided roadway. Loop 9, Segment B from I-35E to I-45 has begun construction in areas where ROW has been acquired. High Point 67 Logistics Center is under construction and will be an industrial park with up to 2,003,960 square feet available to lease. The industrial park is located on the east side of US 67, just north of the proposed Common Alignment. No other major infrastructure projects, industrial facilities, or other large-scale developments have been constructed in, or adjacent to, the community study area. Additionally, the intersection of US 67 at Lake Ridge Parkway (which will also connect to this proposed project in the future) is undergoing environmental studies for a proposed grade separation.

Limited English Proficiency

Based on a review of the available census data, it was determined that there is a LEP population located within the study area and the predominant language spoken among the LEP population is Spanish. The proposed project had a series of public involvement opportunities, including Public Scoping Meetings, Community Meetings, and Public Meetings. A series of Public Hearings will be held for the proposed project in late 2022. The Public Scoping Meetings and Public Meetings were held at two locations in order to allow all members of the community to have an accessible opportunity to be involved. The public involvement opportunities were published in English and Spanish. English and Spanish comment forms were available at the meetings and posted on the study webpage. A Spanish language interpreter was provided for each public involvement opportunity. In addition, English translation of any Spanish comment made during the comment period was available, if needed. The Public Hearings would be advertised and planned in the same manner as the Public Scoping Meetings and Public Meetings to accommodate the LEP population. To the extent possible, Public Meeting/Hearing venues would be chosen that are near public transportation for interested parties that require or choose an alternate form of transportation, some of which may be EJ and/or LEP persons.

Substantial efforts have been made through the planning process to minimize effects to EJ populations by evaluating alternatives and modifications near the Lindell Estates community

(Section 3.3.2.6). Additionally, communication and outreach with stakeholders in the area is ongoing to inform new potential residents within this area of the upcoming proposed project (Section 7.2.7).

Although individual minority and low-income personals may be affected by the proposed project, over the long-term, the entire community, including minority and low-income populations, would likely benefit from the proposed project.

The purpose of the project is to provide adequate connectivity, as well as relieve congestion on local arterial roadways and to increase capacity, mobility, and accessibility for the region. These offsetting benefits to potential displacements would be provided by the proposed project to EJ communities throughout the study area. Displacements, access and travel pattern changes, and construction impacts would also be spread throughout the study area and not targeted in a specific community.

Under USDOT guidance, a "disproportionately high and adverse effect" on EJ populations exists if there is an "adverse effect that is predominantly borne by a minority population and/or a low-income population." USDOT Order No. 5610.2C (May 16, 2021), at Section 1.g. of the Appendix. Because a majority of the displacements for this project would necessarily occur in census blocks that meet EJ thresholds, and applying a conservative assumption that all displacees would in fact be low-income or minority persons, TxDOT conservatively assumes that the displacements would be "predominantly borne by a minority population and/or a low-income population," and according to USDOT guidance, there would therefore be a "disproportionately high and adverse effect" on EJ populations.

USDOT guidance provides that such a project may nevertheless proceed if (i) a substantial need of the project exists based on the overall public interest, and (ii) alternatives that would have less adverse effects on protected populations (and still satisfy the need for the project) would either have other adverse social, economic, environmental or human health impacts that are severe or involve increased costs of extraordinary magnitude (USDOT Order No. 5610.2C (May 16, 2021) at Section 9.d). The substantial need for this project is established in Section 2 of the DEIS. Regarding alternatives, the Recommended Preferred Alternative was developed and selected because of the relatively lower number of overall displacements, which necessarily includes EJ populations given the demographic makeup of the project area.

4.4.5.3 Encroachment-Alteration Effects

With respect to encroachment alteration effects to Environmental Justice communities, indirect impacts would be driven by changes in travel patterns and access changes associated with the proposed project, largely tied to any direct impacts to Community Services provided to these communities. Since no Community Services will be impacted by the proposed project, , encroachment alteration effects are not anticipated for this resource as a result of the proposed project.

4.4.5.4 No-Build Alternative

The No-Build Alternative would not result in disproportionately high or adverse effects to minority and low-income persons. The entire community, including minority and low-income populations, would not experience potential effects from the proposed Loop 9, Segment A. However, the community would also not experience the benefits of decreased traffic congestion, improved mobility, creation of

short and long-term jobs, and improved safety conditions resulting from the proposed Loop 9, Segment A.

4.5 Economics

4.5.1 Property Tax Revenue

The alternative alignments would pass through several taxing jurisdictions and potentially remove property from the tax rolls through the acquisition of ROW and as a result of displacements. **Table 4-16** lists the taxing jurisdictions included in the proposed Loop 9, Segment A alternative alignments and the adopted 2020 and 2021 tax rates per $100 of property value.

Table 4-16: Property Tax Rates in the Study Area

Taxing Jurisdiction	2021 Tax Rate per $100 Value
Dallas	
Cedar Hill	0.6970
Cedar Hill ISD	1.2384
Dallas County	0.2279
Dallas County Community College	0.1235
DeSoto ISD	1.3886
Glenn Heights	0.7691
Ovilla	0.6600
Parkland Hospital	0.2550
Ellis	
Cedar Hill	0.6881
Ellis County	0.3202
Ellis County ESD #2	0.0995
Ellis County ESD #4	0.1000
Ellis County Lateral Road	0.0301
Glenn Heights	0.8044
Midlothian	0.6750
Midlothian ISD	1.3798
Red Oak	0.7036
Red Oak ISD	1.3592

Source: DCAD 2021; ECAD 2020.
Note: ISD = Independent School District; ESD = Emergency Services District.

The effects of the proposed ROW on property tax revenue were quantified using the Dallas County Appraisal District (DCAD) and Ellis County Appraisal District (ECAD) 2022 assessed land value, improvement value, and agricultural value (note: any other tax exemptions besides those associated with agriculture were not calculated for this exercise). Parcel data were downloaded from the county's appraisal district website and loaded into a GIS database. The effected acres per parcel were calculated using GIS. The value of the effected land was quantified by multiplying the share of the parcel effected by the assessed land or agricultural value. The value was then divided by $100 and multiplied by the tax rate to determine the amount of potentially lost tax revenue.

Example: A 10-acre parcel located in the Dallas County taxing jurisdiction is assessed at $100,000. Alternative X would require 1 acre of land. The 1 acre is equal to 10% of the total parcel and is worth

$10,000 (one-tenth of $100,000). The tax rate for the county is 0.2431 for every $100 of value. Therefore, taking 1 acre would result in a $24.31 loss in tax revenue.

If a primary structure would be displaced, the full improvement value was added to the total value of the effected land. **Table 4-17** summarizes the effects to properties within the alternative alignments and the total appraised value of the affected land and improvements. **Tables 4-18** through **4-21** summarize the effects to property tax revenue by alternative alignment and taxing jurisdiction.

Table 4-17: Effected Parcels and Land Value by Alternative Alignment

Alternative Alignment	Number of Effected Parcels	Number of Effected Acres	Total Assessed Value of Effected Property
Alternative 1			
Alternative 1	258	572	$26,904,159.12
Alternative 1 Mod A	205	560	$19,241,729.98
Alternative 1 Mod A & C	200	554	$18,707,606.53
Alternative 1 Mod B	214	576	$21,115,560.43
Alternative 1 Mod B & C	209	570	$20,621,436.98
Alternative 1 Mod C	253	566	$26,369,935.67
Alternative 2			
Alternative 2	257	570	$27,049,332.32
Alternative 2 Mod A	204	559	$19,386,780.29
Alternative 2 Mod A & C	199	553	$18,852,744.81
Alternative 2 Mod B	213	574	$21,300.610.75
Alternative 2 Mod B & C	208	569	$20,766,575.26
Alternative 2 Mod C	252	564	$26,515,296.83
Alternative 3			
Alternative 3	271	579	$27,959,281.61
Alternative 3 Mod A	218	568	$20,296,952.59
Alternative 3 Mod A & C	213	562	$19,762,829.14
Alternative 3 Mod A & D	215	569	$19,597,242.80
Alternative 3 Mod A C & D	210	563	$19,063,119.35
Alternative 3 Mod B	227	583	$22,210,783.04
Alternative 3 Mod B & C	222	577	$21,676,659.59
Alternative 3 Mod B & D	224	584	$21,511,073.26
Alternative 3 Mod B C & D	219	578	$20,976,949.81
Alternative 3 Mod C	266	573	$27,425,158.16
Alternative 3 Mod C & D	263	574	$26,725,448.38
Alternative 3 Mod D	268	580	$27,259,571.83
Alternative 4			
Alternative 4	265	570	$26,922,658.60
Alternative 4 Mod A	212	558	$19,260,106.68
Alternative 4 Mod A & C	207	553	$18,726,071.20
Alternative 4 Mod B	221	574	$21,173,937.14
Alternative 4 Mod B & C	216	568	$20,639,901.65
Alternative 4 Mod C	260	564	$26,388,623.11

Source: DCAD 2022; ECAD 2022.

Table 4-18: Effects to Property Tax Revenue by Alternative Alignment and County – Alternative 1

Tax entity	Estimated tax revenue loss ($)					
	Alternative 1	Alternative 1 Mod A	Alternative 1 Mod A & C	Alternative 1 Mod B	Alternative 1 Mod B & C	Alternative 1 Mod C
	Dallas County jurisdictions					
Cedar Hill	$48,622.86	$48,622.86	$48,622.86	$48,622.86	$48,622.86	$48,622.86
Glenn Heights	$33,442.80	$35,421.21	$31,385.44	$34,790.53	$30,754.76	$29,407.04
Ovilla	$347.04	$347.04	$285.10	$347.04	$285.10	$285.10
Dallas County	$25,927.97	$26,514.21	$25,296.94	$26,327.33	$25,110.06	$24,710.70
Cedar Hill ISD	$56,988.29	$56,988.29	$56,988.29	$56,988.29	$56,988.29	$56,988.29
Desoto ISD	$94,079.56	$97,651.54	$90,234.70	$96,512.86	$89,096.02	$86,662.72
Dallas Co Community College	$14,050.48	$14,368.17	$13,708.52	$12,266.89	$13,607.25	$13,390.84
Parkland Hospital	$29,011.11	$29,667.06	$28,305.05	$29,457.96	$28,095.94	$27,649.09
	Ellis County jurisdictions					
City Of Cedar Hill	$25,907.52	$25,907.52	$25,907.52	$25,907.52	$25,907.52	$25,907.52
City Of Glenn Heights	$90,076.92	$28,446.64	$28,446.64	$44,158.86	$44,158.86	$90,076.92
City Of Midlothian	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
City Of Red Oak	$1,701.66	$18.54	$18.54	$184.72	$184.72	$1,701.66
Ellis County	$49,717.95	$24,359.50	$24,359.50	$30,750.15	$30,750.15	$49,717.95
Ellis County Lateral Road	$4,655.68	$2,273.31	$2,273.31	$2,873.70	$2,873.70	$4,655.68
Midlothian ISD	$51,950.43	$51,950.43	$51,950.43	$51,950.43	$51,950.43	$51,950.43
Red Oak ISD	$159,861.32	$52,218.58	$52,218.58	$79,345.94	$79,345.94	$159,861.32
EC ESD #2	$49.63	$49.63	$49.63	$49.63	$49.63	$49.63
EC ESD #4	$321.98	$302.98	$302.98	$321.98	$321.98	$321.98
Dallas County Total:	**$302,470.11**	**$309,580.38**	**$294,826.90**	**$305,313.76**	**$292,560.28**	**$287,716.64**
Ellis County Total:	**$384,243.09**	**$185,527.13**	**$185,527.13**	**$235,542.93**	**$235,542.93**	**$384,243.09**
Alternative Total:	**$686,713.20**	**$495,107.51**	**$480,354.03**	**$540,856.69**	**$528,103.21**	**$671,959.73**

Source: DCAD 2022; ECAD 2022.
Notes: ISD = Independent School District; ESD = Emergency Services District.

Table 4-19 Effects to Property Tax Revenue by Alternative Alignment and County – Alternative 2

Tax entity	Estimated tax revenue loss ($)					
	Alternative 2	Alternative 2 Mod A	Alternative 2 Mod A & C	Alternative 2 Mod B	Alternative 2 Mod B & C	Alternative 2 Mod C
	Dallas County jurisdictions					
Cedar Hill	$49,558.52	$49,558.52	$49,558.52	$49,558.52	$49,558.52	$49,558.52
Glenn Heights	$33,442.61	$35,421.21	$31,385.90	$34,790.53	$30,755.22	$29,407.29
Ovilla	$346.84	$346.84	$285.10	$346.84	$285.10	$285.10
Dallas County	$26,233.78	$26,820.08	$25,603.01	$26,633.19	$25,416.13	$25,016.71
Cedar Hill ISD	$58,649.43	$58,649.43	$58,649.43	$58,649.43	$58,649.43	$58,649.43
Desoto ISD	$94,080.24	$97,652.59	$90,236.97	$96,513.91	$89,098.29	$86,664.63
Dallas Co Community College	$14,216.20	$14,533.92	$13,874.38	$14,432.64	$13,773.11	$13,556.66
Parkland Hospital	$29,353.28	$30,009.30	$28,647.51	$29,800.19	$28,438.40	$27,991.49
	Ellis County jurisdictions					
City Of Cedar Hill	$25,982.10	$25,982.10	$25,982.10	$25,982.10	$25,982.10	$25,982.10
City Of Glenn Heights	$90,078.92	$28,446.64	$28,446.64	$44,158.86	$44,158.86	$90,078.92
City Of Midlothian	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
City Of Red Oak	$1,701.66	$18.54	$18.54	$184.72	$184.72	$1,701.66
Ellis County	$49,753.50	$24,394.20	$24,394.20	$30,784.86	$30,784.86	$49,753.50
Ellis County Lateral Road	$4,658.97	$2,276.53	$2,276.53	$2,876.91	$2,876.92	$4,658.97
Midlothian ISD	$52,099.98	$52,099.98	$52,099.98	$47,384.01	$52,099.98	$52,099.98
Red Oak ISD	$159,864.70	$52,218.58	$52,218.58	$79,345.94	$79,345.94	$159,864.70
EC ESD #2	$49.76	$49.76	$49.76	$49.76	$49.76	$49.76
EC ESD #4	$321.98	$302.98	$302.98	$321.98	$321.98	$321.98
Dallas County Total:	**$305,880.90**	**$312,991.89**	**$298,240.82**	**$310,725.25**	**$295,974.20**	**$291,129.83**
Ellis County Total:	**$384,511.57**	**$185,789.31**	**$185,789.31**	**$231,089.14**	**$235,805.21**	**$384,511.57**
Alternative Total:	**$690,392.47**	**$498,781.20**	**$484,030.13**	**$541,814.39**	**$531,779.41**	**$675,641.40**

Source: DCAD 2022; ECAD 2022.
Notes: ISD = Independent School District; ESD = Emergency Services District.

Table 4-20 Effects to Property Tax Revenue by Alternative Alignment and County – Alternative 3

Tax entity	Estimated tax revenue loss ($)					
	Alternative 3	Alternative 3 Mod A	Alternative 3 Mod A & C	Alternative 2 Mod A & D	Alternative 3 Mod A C & D	Alternative 3 Mod B
	Dallas County jurisdictions					
Cedar Hill	$48,953.93	$48,953.93	$48,953.93	$51,707.70	$51,707.70	$48,953.93
Glenn Heights	$33,442.80	$35,421.21	$31,385.44	$35,421.21	$31,385.44	$34,790.53
Ovilla	$347.04	$347.04	$285.10	$347.04	$285.10	$347.04
Dallas County	$26,036.22	$26,622.46	$25,405.19	$27,522.87	$26,305.60	$26,435.58
Cedar Hill ISD	$57,576.53	$47,087.29	$57,576.53	$51,980.05	$51,980.05	$57,576.53
Desoto ISD	$94,079.56	$97,651.54	$90.234.70	$97,651.54	$90,234.70	$96,512.86
Dallas Co Community College	$14,109.14	$14,426.83	$13,767.18	$14,914.76	$14,255.12	$14,325.55
Parkland Hospital	$29,132.23	$29,788.19	$28,426.17	$30,795.66	$29,433.64	$29,579.08
	Ellis County jurisdictions					
City Of Cedar Hill	$32,827.96	$32,827.96	$32,827.96	$25,308.36	$25,308.36	$32,827.96
City Of Glenn Heights	$90,076.92	$28,446.64	$28,446.64	$28,446.64	$28,446.64	$44,158.86
City Of Midlothian	$0.01	$0.01	$0.01	$0.00	$0.00	$0.01
City Of Red Oak	$1,701.66	$18.54	$18.54	$18.54	$18.54	$184.72
Ellis County	$52,944.67	$27,586.23	$27,586.23	$24,080.69	$24,080.69	$33,976.88
Ellis County Lateral Road	$4,958.22	$2,575.86	$2,575.86	$2,247.95	$2,247.95	$3,176.24
Midlothian ISD	$65,854.98	$65,854.98	$65,854.98	$50,748.97	$46,033.00	$65,854.98
Red Oak ISD	$159,861.31	$52,218.58	$52,218.58	$52,218.58	$52,218.58	$79,345.94
EC ESD #2	$51.61	$51.61	$51.61	$46.89	$46.89	$51.61
EC ESD #4	$321.98	$302.98	$302.98	$302.98	$302.98	$321.98
Dallas County Total:	**$303,677.45**	**$300,298.49**	**$205,779.54**	**$310,340.83**	**$295,587.35**	**$308,521.10**
Ellis County Total:	**$408,599.32**	**$209,883.39**	**$209,883.39**	**$183,419.60**	**$178,703.63**	**$259,899.18**
Alternative Total:	**$712,276.77**	**$510,181.88**	**$415,662.93**	**$493,760.43**	**$474,290.98**	**$568,420.28**

Source: DCAD 2022; ECAD 2022.
Notes: ISD = Independent School District; ESD = Emergency Services District.

Table 4-20 Effects to Property Tax Revenue by Alternative Alignment and County – Alternative 3 (continued)

Tax entity	Estimated tax revenue loss ($)					
	Alternative 3 Mod B & C	Alternative 3 Mod B & D	Alternative 3 Mod B C & D	Alternative 3 Mod C	Alternative 3 Mod C & D	Alternative 3 Mod D
	Dallas County jurisdictions					
Cedar Hill	$48,953.93	$51,707.69	$51,707.69	$48,953.93	$51,707.69	$51,707.69
Glenn Heights	$30,754.76	$34,790.53	$30,754.76	$29,407.04	$29,407.04	$33,442.80
Ovilla	$285.10	$347.04	$285.10	$285.10	$285.10	$347.04
Dallas County	$25,218.31	$27,335.98	$26,118.71	$24,818.95	$25,719.36	$26,936.62
Cedar Hill ISD	$57,576.53	$51,980.05	$62,469.30	$57,576.53	$62,469.30	$62,469.30
Desoto ISD	$61,156.55	$96,512.86	$89,096.02	$86,662.72	$86,662.72	$94,079.56
Dallas Co Community College	$13,665.91	$14,813.49	$14,153.85	$13,449.50	$13,937.43	$14,579.97
Parkland Hospital	$28,217.07	$30,586.55	$29,224.54	$27,770.22	$28,777.69	$30,139.71
	Ellis County jurisdictions					
City Of Cedar Hill	$32,827.96	$25,308.36	$25,308.36	$32,827.96	$25,308.36	$25,308.36
City Of Glenn Heights	$44,158.86	$44,158.86	$44,158.86	$90,076.92	$90,076.92	$90,076.92
City Of Midlothian	$0.01	$0.00	$0.00	$0.01	$0.00	$0.00
City Of Red Oak	$184.72	$184.72	$184.72	$1,701.66	$1,701.66	$1,701.66
Ellis County	$33,976.88	$30,471.34	$30,471.34	$52,944.67	$49,439.13	$49,439.13
Ellis County Lateral Road	$3,176.24	$2,848.33	$2,848.33	$4,958.22	$4,630.31	$4,630.31
Midlothian ISD	$65,854.98	$50,748.97	$50,748.97	$65,854.98	$50,748.97	$50,748.97
Red Oak ISD	$79,345.94	$79,345.94	$79,345.94	$159,861.31	$159,861.31	$159,861.31
EC ESD #2	$51.61	$46.89	$46.89	$51.61	$46.89	$46.89
EC ESD #4	$321.98	$321.98	$321.98	$321.98	$321.98	$321.98
Dallas County Total:	**$265,828.16**	**$308,074.19**	**$308,074.19**	**$288,923.99**	**$298,966.33**	**$313,702.69**
Ellis County Total:	**$259,899.18**	**$233,435.39**	**$233,435.39**	**$408,599.32**	**$382,145.53**	**$382,135.53**
Alternative Total:	**$525,727.34**	**$541,509.58**	**$541,509.58**	**$697,523.31**	**$681,111.86**	**$695,838.22**

Source: DCAD 2022; ECAD 2022.
Notes: ISD = Independent School District; ESD = Emergency Services District.

Table 4-21 Effects to Property Tax Revenue by Alternative Alignment and County – Alternative 4

Tax entity	Estimated tax revenue loss ($)					
	Alternative 4	Alternative 4 Mod A	Alternative 4 Mod A & C	Alternative 4 Mod B	Alternative 4 Mod B & C	Alternative 4 Mod C
	Dallas County jurisdictions					
Cedar Hill	$59,165.07	$59,165.07	$59,165.07	$59,165.07	$59,165.07	$59,165.07
Glenn Heights	$33,442.61	$35,421.21	$31,385.90	$34,790.53	$30,755.22	$29,407.29
Ovilla	$346.84	$255.44	$285.10	$346.84	$285.10	$285.10
Dallas County	$29,374.86	$29,961.16	$28,744.09	$29,774.28	$28,557.21	$28,157.79
Cedar Hill ISD	$75,595.83	$75,595.83	$75,595.83	$75,595.83	$75,595.83	$75,595.83
Desoto ISD	$94,217.19	$97,789.54	$90,373.92	$96,650.85	$89,235.24	$86,801.57
Dallas Co Community College	$15,918.36	$16,236.08	$15,576.55	$16,134.81	$15,475.28	$15,258.83
Parkland Hospital	$32,867.88	$33,523.89	$32,162.10	$33,314.79	$31,953.00	$31,506.09
	Ellis County jurisdictions					
City Of Cedar Hill	$15,626.54	$15,626.54	$15,626.54	$15,626.54	$15,626.54	$15,626.54
City Of Glenn Heights	$90,078.92	$28,446.64	$28,446.64	$44,158.86	$44,158.86	$90,078.92
City Of Midlothian	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
City Of Red Oak	$1701.66	$18.54	$18.54	$321.98	$184.72	$1,701.66
Ellis County	$44,934.61	$19,575.37	$19,575.37	$25,966.02	$25,966.02	$44,934.61
Ellis County Lateral Road	$4,206.41	$1,823.97	$1,823.97	$2,424.36	$2,424.36	$4,206.41
Midlothian ISD	$31,334.74	$31,334.74	$31,334.74	$31,334.74	$31,334.74	$31,334.74
Red Oak ISD	$159,864.70	$52,218.58	$52,218.58	$79,345.94	$79,345.94	$159,864.70
EC ESD #2	$49.24	$49.24	$49.24	$49.24	$49.24	$49.24
EC ESD #4	$321.98	$302.98	$302.98	$321.98	$321.98	$321.98
Dallas County Total:	**$340,928.64**	**$347,948.22**	**$333,288.56**	**$345,773.00**	**$331,021.95**	**$326,177.57**
Ellis County Total:	**$348,118.80**	**$149,396.60**	**$149,396.60**	**$199,549.66**	**$199,412.40**	**$348,118.80**
Alternative Total:	**$689,047.44**	**$497,344.82**	**$482,685.16**	**$545,322.66**	**$530,434.35**	**$674,296.37**

Source: DCAD 2022; ECAD 2022.
Notes: ISD = Independent School District; ESD = Emergency Services District.

4.5.2 Employment and Income

4.5.2.1 Existing Conditions

Employment

As shown in **Table 4-22**, the NCTCOG MPA and Dallas and Ellis Counties have similar large percentages of their working population employed in trade, transportation, and utilities and education and health services sectors. However, the NCTCOG MPA and Dallas County employ comparatively more people in the professional, business, and financial service sectors than Ellis County, which has a higher share of its population employed in manufacturing.

Table 4-22: Area Employment by Industry

Industry Sector	Average Number of Employees (4th Quarter 2021)		
	NCTCOG MPA	Dallas County	Ellis County
Public Administration	92,892 (2.4%)	38,237 (2.1%)	1,667 (2.9%)
Trade, Transportation, and Utilities	883,100 (23.2%)	411,398 (22.8%)	14,802 (25.5%)
Manufacturing	285,378 (7.5%)	119,846 (6.7%)	10,104 (17.4%)
Construction	208,343 (5.5%)	93,052 (5.2%)	4,486 (7.7%)
Leisure and Hospitality	383,805 (10.1%)	154,683 (8.6%)	6,213 (10.7%)
Education and Health Services	747,747 (19.6%)	316,749 (17.6%)	11,961 (20.6%)
Professional and Business Services	677,428 (17.8%)	400,128 (22.2%)	4,521 (7.8%)
Financial Activities	327,787 (8.6%)	170,958 (9.5%)	1,574 (2.7%)
Other Services	95,721 (2.5%)	41,172 (2.3%)	1,439 (2.5%)
Natural Resources and Mining	20,204 (0.5%)	7,099 (0.4%)	284 (0.5%)
Information	80,179 (2.1%)	45,959 (2.6%)	889 (1.5%)
All Industries	**3,805,851 (100%)**	**1,800,669 (100%)**	**57,978 (100%)**

Source: Texas Labor Market Information (TLMI), 2021.

According to NCTCOG employment forecasts, employment in Dallas County is predicted to increase 83% from 2021 levels by 2045 and Ellis County is predicted to increase 77% from 2021 levels by 2045. Between 2016 and 2026, Texas Labor Market Information (TLMI) predicts that the fastest growing employment sectors in Dallas County will be in construction (24% growth), education and health services (25% growth), and professional and business services (23% growth). In the North-Central workforce development area (14 counties surrounding Dallas and Tarrant Counties; including Ellis County) the fastest growing employment sectors between 2016 and 2026 as predicted by TLMI include leisure and hospitality (42% growth), education and health services (31% growth), and professional and business services (30% growth).

Compared to 15 years ago, people in the region are commuting longer distances. Between 2005 and 2019, daily VMT increased approximately 3% (66.4 to 68.1 million) in Dallas County while daily VMT increased approximately 28% in Ellis County (4.9 to 6.3 million). The percentage difference between the two counties is also reflected in the mean travel times and number of workers that travel outside their county of residence for work (**Table 4-23**).

Table 4-23: Area Commute to Work Characteristics

Total Workers and Work Location	Dallas Fort Worth-Arlington Metro Area	Dallas County	Ellis County
Total Workers 16 Years and Over	3,709,605	1,290,633	87,795
Work in Same County as Residence	2,626,429 (71%)	1,061,878 (82%)	47,760 (54%)
Work in Different County as Residence	1,057,658 (29%)	221,796 (17%)	39,725 (45%)
Worked Outside of State of Residence	25,518 (1%)	6,959 (1%)	310 (1%)
Mean Travel Time to Work (Minutes)	28.4	27.6	30.6
Source: 2016-2020 5-year estimates, American Community Survey, Table ID B08007 and S0801.			

Between 2000 and 2019, Texas added more than 3.6 million people to the labor force and saw its unemployment rate shrink 0.8% (note: due to the 2008 recession, unemployment in 2010 was 3.8% higher than in 2000). As seen in **Table 4-24**, Dallas County has the smallest share of labor force and employment growth, while Ellis County has the highest. Labor force and employment growth for the NCTCOG MPA and the state is similar and falls in between that of Dallis and Ellis Counties. Through 2019, all geographies have seen a decrease in the unemployment rate since 2000. Between 2019 and 2021 the unemployment rate in Texas grew by 2.2%.

Table 4-24: Area Civilian Labor Force, Total Employment, and Unemployment Rate

Location	Labor Force			Employment			Unemployment Rate		
	2000	2019	2021	2000	2019	2021	2000	2019	2021
Texas	10,374,053	14,045,312	14,220,446	9,929,387	13,551,791	13,413,036	4.3%	3.5%	5.7%
NCTCOG MPA	2,893,380	3,999,193	4,095,480	2,791,484	3,868,637	3,888,279	3.5%	3.3%	5.1%
Dallas County	1,187,494	1,364,652	1,372,277	1,142,138	1,317,507	1,295,698	3.8%	3.5%	5.6%
Ellis County	60,192	92,694	98,901	58,069	89,823	94,460	3.5%	3.1%	4.5%
Source: TMLI, 2019 and 2021.									

Income

The 2022 DHHS national poverty level for a family of four is $27,750. The 2020 5-year estimates of median household income in census block groups included in the proposed Loop 9, Segment A community impacts study area ranged from $21,982 to $174,861, shown in **Appendix G**. The household income statistics for block groups within the study area are comparable to Ellis County; however, Dallas County as a whole has a larger share of households earning an income less than $25,000 per year and a corresponding lower median household income. **Table 4-25** lists the total number of households, the household income ranges, and the median household income for the area.

Table 4-25: Study Area Household Income and Percent Distribution

Geographic Area	Total Number of Households	Income $24,999 and less	Income $25,000 to $49,999	Income $50,000 to $74,999	Income $75,000 and more	Median Household Income
Dallas Fort Worth-Arlington Metro Area[a]	945,996	162,952 (14%)	217,012 (20%)	177,948 (18%)	388,084 (49%)	$72,882
Dallas County[a]	59,399	7,076 (17%)	9,859 (23%)	10,754 (19%)	31,710 (41%)	$61,870
Ellis County[a]	2,615,579	365,110 (12%)	511,831 (17%)	462,719 (18%)	1,275,919 (53%)	$79,834
Dallas County						
Tract 166.15 Block Group 1	594	40 (7%)	121 (20%)	101 (17%)	332 (56%)	$87,500
Tract 166.16 Block Group 1	661	47 (7%)	160 (24%)	116 (18%)	338 (51%)	$76,875
Tract 166.16 Block Group 2	530	44 (8%)	66 (12%)	58 (11%)	362 (68%)	$94,091
Tract 166.16 Block Group 3	600	124 (21%)	78 (13%)	242 (40%)	156 (26%)	$63,578
Tract 166.21 Block Group 1	631	54 (9%)	31 (5%)	194 (31%)	352 (56%)	$78,713
Tract 166.21 Block Group 2	547	55 (10%)	219 (40%)	85 (16%)	188 (34%)	No Recorded Income Data
Tract 166.21 Block Group 3	219	118 (54%)	66 (30%)	35 (16%)	0 (0%)	$21,982
Tract 166.21 Block Group 4	555	73 (13%)	46 (8%)	129 (23%)	307 (55%)	$84,583
Tract 166.22 Block Group 1	485	102 (21%)	53 (11%)	73 (15%)	257 (53%)	$77,757
Tract 166.22 Block Group 2	447	49 (11%)	57 (13%)	104 (15%)	237 (53%)	$81,534
Tract 166.22 Block Group 3	201	16 (8%)	63 (31%)	50 (23%)	72 (53%)	$69,083
Tract 166.23 Block Group 1	720	63 (9%)	49 (7%)	81 (11%)	527 (73%)	$117,051
Tract 166.23 Block Group 2	738	31 (4%)	229 (31%)	105 (14%)	373 (51%)	$75,625
Tract 166.23 Block Group 3	681	9 (1%)	176 (26%)	158 (23%)	338 (50%)	$74,583
Tract 166.24 Block Group 1 (Dallas)	417	32 (8%)	78 (19%)	112 (27%)	195 (47%)	$66,583

Table 4-25: Study Area Household Income and Percent Distribution (continued)

Geographic Area	Total Number of Households	Income $24,999 and less	Income $25,000 to $49,999	Income $50,000 to $74,999	Income $75,000 and more	Median Household Income
Dallas County (cont.)						
Tract 166.26 Block Group 3	264	13 (5%)	68 (26%)	109 (41%)	74 (28%)	$57,244
Ellis County						
Tract 602.16 Block Group 1	1,219	77 (6%)	278 (23%)	146 (12%)	718 (59%)	$98,575
Tract 602.16 Block Group 2	707	56 (8%)	43 (6%)	141 (20%)	467 (66%)	$90,163
Tract 602.16 Block Group 3	365	10 (3%)	23 (6%)	128 (35%)	204 (56%)	$81,581
Tract 602.21 Block Group 1	796	19 (2%)	16 (2%)	58 (7%)	703 (88%)	$174,861
Tract 607.02 Block Group 2	796	87 (11%)	68 (9%)	80 (10%)	561 (70%)	$96,316

Source: 2016-2020 5-year estimates, American Community Survey, Table B19001, B19013
[a] Number of households in income brackets may not total the number of households due to rounding.

4.5.2.2 Environmental Effects

The construction of the proposed Loop 9, Segment A would potentially generate local, regional, and state economic benefits from construction spending. The benefits would be direct employment and income for the construction industry, indirect effects for industries that supply equipment and materials, and induced effects based on the spending of the new employees. The direct employment effect would involve all people who work on the proposed Loop 9, Segment A, such as construction workers, engineers, and equipment operators. The indirect employment effect would involve others (e.g., truck drivers and steelworkers) that are employed by companies that provide materials, products, and services purchased to support construction. People employed directly and indirectly for the proposed Loop 9, Segment A would have new income to spend on consumer goods and services. The consumer needs of the employees would potentially generate new jobs in the retail, personal services, food services, and the manufacturing of consumer goods.

Employment and Income During Construction

The construction of the proposed project would potentially generate local, regional, and state economic benefits from construction spending. The benefits would be direct employment and income for the construction industry. The direct employment effect would involve all people who work on the proposed roadway, such as construction workers, engineers, and equipment operators. People employed directly and indirectly for the proposed project would have new income to spend on consumer goods and services. The consumer needs of the employees would generate new jobs in the retail, personal services, food services, and the manufacturing of consumer goods.

Long-term Employment Growth

The long-term economic effects of the proposed Loop 9, Segment A would be an increase in regional economic activity because the proposed roadway would improve connections and mobility

throughout the region. The types of long-term growth associated with improved mobility would be expanded customer or supplier markets, expanded labor markets, reduced business operating cost through lower direct costs or increased economies of scale, and/or increased volume, visibility, and access for companies that rely on pass-by traffic.

The proposed Loop 9, Segment A may spur economic development in the study area by attracting businesses that directly benefit from improved access and mobility. In turn, ancillary businesses that provide complementary/support goods and services to those businesses follow and generate additional local economic activity. Economic development would increase property values and improve the tax base. Economic benefits experienced in the study area and across the region may be a continuation of economic trends already occurring. Improved mobility and access are two facets that often drive economic development.

4.5.2.3 Encroachment-Alteration Effects

The construction of the proposed project would potentially create economic benefits in the way of indirect effects to industries that supply equipment and materials, and induced effects based on the spending of the new employees. The indirect employment effect would involve others (e.g., truck drivers and steelworkers) that are employed by companies that provide materials, products, and services purchased to support construction.

4.5.2.4 No-Build Alternative

Under the No-Build Alternative, there would be no effect to property tax revenue or the removal of property from the tax rolls through the acquisition of ROW or because of displacements. However, the community would not experience the benefits of short-term employment, income during construction, and potential long-term growth. The increased traffic congestion and deteriorating mobility resulting from the No-Build Alternative could also limit short and long-term economic growth in the study area and larger region.

4.6 Pedestrians and Bicyclists

4.6.1 Existing Conditions

There are no designated bike lanes and there are limited sidewalks within the vicinity of the Build Alternatives. Sidewalks are present along West Parkerville Road and within the subdivisions located in or near the proposed alternatives. The area within and near the proposed alternatives consists of subdivisions and more widely separated residences located on individual parcels. Pedestrians within the subdivisions may use sidewalks for short trips within the neighborhood; however, commercial businesses are not within walking distance and would be accessed by car. Commercial businesses could be within bicycling distance; however, the lack of designated bike lanes and discontinuous sidewalks within the surrounding area limit the use of bicycles as a mode of transportation.

To access parcels within the vicinity of the Build Alternatives, cars are the primary mode of transportation because homes and businesses are generally not within walking distance and mass transit is limited. However, walking may be feasible within subdivisions located adjacent to the proposed alternatives where the homes are closer together and sidewalks are available.

4.6.2 Environmental Effects

There are no designated bike lanes within the vicinity of the proposed alternatives and no bike lanes are proposed as part of Loop 9, Segment A. The proposed 8-foot outside shoulders along the frontage road system could accommodate bicycle traffic within the rural section of the proposed roadway. Additionally, a 10-foot-wide berm has been preserved on either side of the proposed roadway within the proposed footprint to accommodate a future shared-use path. Construction of this path would take place at a time of TxDOT's discretion and availability of funds. All existing sidewalks within the study area should remain in place. Pedestrians would have the opportunity to cross north/south across the proposed Loop 9, Segment A at designated intersections. No shared-use pathways or sidewalks are proposed along Loop 9, Segment A due to the relatively low-density nature of the surrounding population and an absence of need. The project area is located largely within the Low Demand and partially within the Moderate Demand Zones found in the NCTCOG's Mobility 2045 Update Demand Zones for Walking and Bicycling Travel.

On-street sidewalks or shared use paths for this project are not included in NCTCOG's *Mobility 2045 Update*. NCTCOG's 2045 Regional Veloweb, is a regional network of off-street shared use paths (trails) designed for multi-use trip purposes by bicyclists, pedestrians, and other non-motorized transportation. The Regional Veloweb shows two planned shared use paths crossing the Common Alignment perpendicularly near the BNSF railroad. The Veloweb also shows one shared use path starting from Lake Ridge Parkway, located parallel with the Common Alignment, traveling northeast, and continuing parallel with Bear Creek Road. This path is shown as part of the planned Outer Loop Core Trail in Cedar Hill's Parks, Recreation, Trails & Open Space Master Plan 2019 Update. The proposed project is not anticipated to impact the planned shared use paths identified in the Regional Veloweb. TxDOT will work closely with the city stakeholders to maintain access to any planned shared use paths. In the future, should the NCTCOG's MTP include a bikeway corridor, or if appropriate, during later phases of the Loop 9, Segment A Project, appropriate supplemental studies may be conducted.

4.6.3 Encroachment-Alteration Effects

Because there are no designated bicycle lanes within or adjacent to the proposed project, encroachment-alteration effects are not anticipated for this resource as a result of the proposed project.

4.6.4 No-Build Alternative

The No-Build Alternative would not impact existing sidewalks. The No-Build Alternative may have an indirect effect to existing pedestrian facilities because of increased congestion on existing local roadways, which may cause a decrease in safety and bicyclist/pedestrian mobility along existing roadways.

4.7 Air Quality

4.7.1 Existing Conditions

This project is located within Dallas and Ellis Counties, which are part of the DFW area that has been designated by the U.S. EPA as a severe nonattainment area for the 2008 and a moderate nonattainment area for the 2015 ozone National Ambient Air Quality Standards (NAAQS); therefore,

transportation conformity rules apply. The area is currently designated as attainment or unclassifiable for all other NAAQS.

4.7.2 Environmental Effects

4.7.2.1 Transportation Conformity

The proposed action is consistent with the NCTCOG financially constrained 2045 MTP Update and 2021-2024 TIP, as amended, which were found to conform to the TCEQ State Implementation Plan (SIP) by FHWA and Federal Transit Administration (FTA) on November 21, 2018, and July 22, 2021, respectively. Copies of the MTP and TIP pages are included in **Appendix A**. All projects in the TIP that are proposed for federal or state funds were initiated in a manner consistent with federal guidelines in Section 450, of Title 23 CFR and Section 613.200, Subpart B, of Title 49 CFR.

Although it is included in NCTCOG's fiscally constrained *Mobility 2045 Update,* the plan shows the western connection of proposed Loop 9, Segment A with US 67 approximately 0.22 miles south of the currently proposed connection within all four Reasonable Alternatives (Lake Ridge Parkway at US 67). An official project-level conformity determination will be coordinated on the Recommended Preferred Alternative 60 days prior to the anticipated date of environmental decision.

4.7.2.2 Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System (IRIS). In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority Mobile Source Air Toxics (MSAT), the list is subject to change and may be adjusted in consideration of future EPA rules.

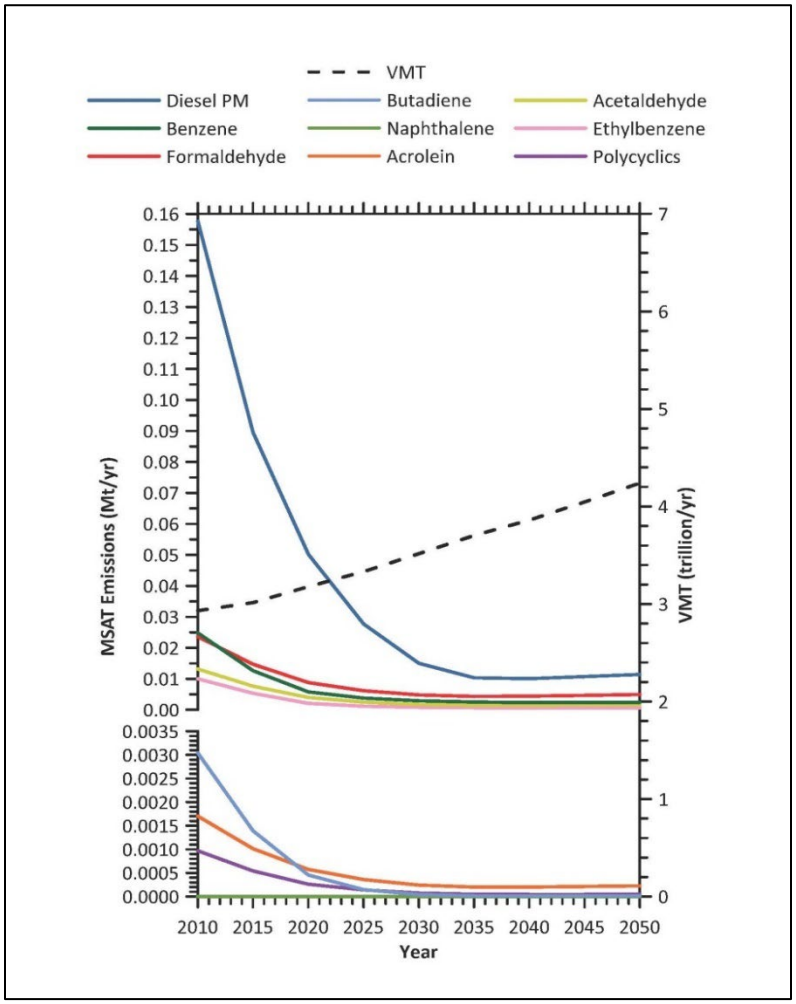
Motor Vehicle Emissions Simulator

According to EPA, MOVES2014 (Motor Vehicle Emissions Simulator) is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and VMT data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to effect MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas (GHG) regulations that phase in during model years (MY) 2014-2018 (79 FR 60344), and the second phase of light duty GHG regulations that phase in during MY2017-2025 (79 FR 60344). Since the release of MOVES2014, EPA released MOVES2014a. In the November 2015 MOVES2014a

Questions and Answers Guide, EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Using EPA's MOVES2014a model, as shown in **Figure 4-1**, FHWA estimates that even if VMT increases by 45% from 2010 to 2050 as forecasted, a combined reduction of 91% in the total annual emissions for the priority MSAT is projected for the same time period.

Figure 4-1: Federal Highway Administration Projected National Mobile Source Air Toxics Emission Trends 2010 – 2050 For Vehicles Operating on Roadways Using Environmental Protection Agency's MOVES2014a Model



Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.
Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorological, and other factors.

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70% of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences

in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

Mobile Source Air Toxics Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA. The FHWA, EPA, the Health Effects Institute (HEI), and others have funded and conducted research studies to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

Project Specific MSAT Information

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by FHWA entitled A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives.

The VMT estimated for each of the Build Alternatives is slightly higher than that for the No-Build Alternative, because the interchange facilitates new development that attracts trips that would not otherwise occur in the area. There could also be localized differences in MSAT from indirect effects of the project such as associated access traffic, emissions of evaporative MSAT (e.g., benzene) from parked cars, and emissions of diesel particulate matter from delivery trucks. The travel lanes contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSAT would be higher under certain Alternatives than others. The localized differences in MSAT concentrations would likely be most pronounced along the new/expanded roadway sections that would be built at the intersections of US 67, IH 35E, S. Joe Wilson Road, S. Duncanville Road, S. Cockrell Hill Road, S. Westmoreland Road, and S. Hampton Road. However, the magnitude and the duration of these potential increases cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health effects. Also, travel to other destinations would be reduced with subsequent decreases in emissions at those locations. For all Alternatives, emissions are virtually certain to be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent from 2010 to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future than they are today.

Incomplete or Unavailable Information for Project-Specific Mobile Source Air Toxics Health Effects Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health effects due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health effects directly attributable to MSAT exposure associated with a proposed action. Consistent with 40 CFR 1502.22 (regarding incomplete and unavailable information) FHWA does not conduct MSAT health effects for the reasons described below.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. It is the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is continually assessing human health effects, exposures, and risks posed by air pollutants. It maintains the IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the HEI. A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals, and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health effects include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health effects – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health effects among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT

compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk" (IRIS Database).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

4.7.2.3 Carbon Monoxide Traffic Air Quality Analysis

Traffic data for the estimated time of completion (ETC) year (2028) and design year (2048) is 17,040 vehicles per day (vpd) and 39,430 vpd, respectively. A prior TxDOT modeling study and previous analyses of similar projects demonstrated that it is unlikely that the carbon monoxide standard would ever be exceeded as a result of any project with an average annual daily traffic (AADT) below 140,000. The AADT projections for the project do not exceed 140,000 vehicles per day; therefore, a Traffic Air Quality Analysis was not required.

4.7.2.4 Congestion Management Process

The congestion management process (CMP) is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The project was developed from the NCTCOG CMP, which meets all requirements of 23 CFR 450.320 and 500.109, as applicable. The CMP was adopted by the NCTCOG in August 2021.

The region commits to operational improvements and travel demand reduction strategies at two levels of implementation: program level and project level. Program level commitments are inventoried in the regional CMP, which was adopted by NCTCOG; they are included in the financially constrained MTP, and future resources are reserved for their implementation.

The CMP element of the plan carries an inventory of all project commitments (including those resulting from major investment studies) that details type of strategy, implementing responsibilities, schedules, and expected costs. At the project's programming stage, travel demand reduction strategies and commitments will be added to the regional TIP or included in the construction plans.

The regional TIP provides for programming of these projects at the appropriate time with respect to the single occupancy vehicle (SOV) facility implementation and project-specific elements.

Committed congestion reduction strategies and operational improvements within the study boundary will consist of the addition of lanes, interchange improvements, and an 8-foot outside shoulder that can accommodate bicycles. Individual projects are listed in **Table 4-26**.

Table 4-26: Congestion Management Process Strategy Operational Improvements in Travel Corridor

	Type	Implementation Date
Loop 9 from IH 35E to Dallas/Ellis County Line	New Facility	2028
US 67 from Lake Ridge Parkway (Dallas County Line) to Loop 9	New Interchange/Operational Improvements/Bottleneck Removal	2025
Cockrell Hill Road from North of Bear Creek Road to Bear Creek Road	Addition of lanes	2028

In an effort to reduce congestion and the need for SOV lanes in the region, TxDOT and NCTCOG will continue to promote appropriate congestion reduction strategies through the Congestion Mitigation and Air Quality Improvement (CMAQ) program, the CMP, and the MTP. The congestion reduction strategies considered for this project would help alleviate congestion in the SOV study boundary but would not eliminate it. Therefore, the proposed project is justified. The CMP analysis for added SOV capacity projects in the TMA is on file and available for review at NCTCOG.

4.7.2.5 Construction Emissions

During the construction phase of this project, temporary increases in PM and MSAT emissions may occur from construction activities. The primary construction-related emissions of PM are fugitive dust from site preparation, and the primary construction-related emissions of MSAT are diesel PM from diesel powered construction equipment and vehicles.

The potential effects of particulate matter emissions will be minimized by using fugitive dust control measures contained in standard specifications, as appropriate. The Texas Emissions Reduction Plan (TERP) provides financial incentives to reduce emissions from vehicles and equipment. TxDOT encourages construction contractors to use this and other local and federal incentive programs to the fullest extent possible to minimize diesel emissions. Information about the TERP program can be found on TCEQ's TERP website.

However, considering the temporary and transient nature of construction-related emissions, the use of fugitive dust control measures, the encouragement of the use of TERP, and compliance with applicable regulatory requirements; it is not anticipated that emissions from construction of this project will have any significant effect on air quality in the area.

4.7.3 Encroachment-Alteration Effects

Base-year and future-year vehicles miles travelled and associated ozone emissions for this and other projects are captured through the regional conformity process, where a regional emissions analysis is conducted to demonstrate that regional emissions from on-road sources do not exceed the established Motor Vehicle Emission Budgets (MVEB) or contribute to violations of the EPA NAAQS, and ensures transportation activities are consistent with air quality goals identified in the SIP. Another important goal of the regional conformity process is to demonstrate the timely implementation of Transportation Control Measures (TCMs), which are specific projects and programs designed to reduce emissions from transportation sources by reducing or relieving congestion.

4.7.4 No-Build Alternative

The No-Build Alternative would not result in an added capacity roadway on new location; therefore, the existing condition of these facilities would remain the same, and the annual average daily traffic on alternate roadways in the regional network would continue to increase over time. The VMT estimated for the Build Alternatives is slightly higher than that for the No-Build Alternative, so it would be expected that the MSAT emissions for the No-Build Alternative would be slightly lower than the Build Alternatives. Under the No-Build Alternative, the current trend of improving air quality in the region is expected to continue for both criteria pollutants and MSAT as a result of EPA regulations for vehicle engines and fuels.

4.8 Noise

The traffic noise analysis was completed in accordance with TxDOT's (FHWA-approved) Traffic Noise Policy (TxDOT, 2019). The DEIS Reasonable Alternatives Traffic Noise Analysis Report (2022), which includes details about the analysis, is available for public review at the TxDOT Dallas District office or at www.txdot.gov/loop9.

4.8.1 Determination of Existing Noise Levels

The proposed project is a new location roadway; therefore, existing noise levels were measured using a Quest Sound Pro DL Type 2 sound level meter rather than calculated using the Traffic Noise Measurement (TNM) model. In consultation with TxDOT-Dallas District and TxDOT Environmental Affairs Division, ten ambient noise monitoring sites were chosen to be geographically distributed and characteristic of the existing noise levels in the vicinity of the proposed alternatives.

Four preliminary Build Alternatives, and four modifications to these alternatives were evaluated for noise effects. At the western and eastern ends of the project, all four alternatives follow a Common Alignment. Four separate models were prepared. The alternatives and modifications are shown in **Appendix K**. Noise measurement locations were selected to represent receiver locations used in the models. A receiver in the model identifies a specific location of an outdoor area where frequent human activity occurs. **Table 4-27** lists the existing traffic noise levels within the study area. The noise measurement locations are shown in **Appendix K**.

Table 4-27: Noise Measurement Data

Site No.	Location	Alignment	Description	Noise Level (dB(A))
M1	Tar Road	Alternative 1, 2, 3, and 4 and Modification D	Single-family residence	48
M2	Juniper Lane	Alternative 1, 2, 3, and 4 and Modification D	Single-family residence	47
M3	Bear Creek Road near South Joe Wilson Road	Alternative 1, 2, 3, and 4 and Modification D	Single-family residence	53
M4	Quail Ridge Drive in the Bear Creek Ranch subdivision east of South Duncanville Road	Alternative 1, 2, 3, and 4 and Modification D	Single-family residence	47
M5	Madison Drive in the Bear Creek Ranch subdivision west of South Duncanville Road	Alternative 1, 2, 3, and 4	Single-family residence	58
M6	Whitaker Way in Kingston Meadows subdivision near West Bear Creek Road and South Cockrell Hill Road	Common Alignment and Modification C	Single-family residence	53
M7	Shady Meadows Lane in Meadow Springs subdivision near S. Westmoreland Road	Common Alignment and Modification C	Single-family residence	45
M8	Pearly Top Road in Top Hill Farms Subdivision near South Hampton Road	Common Alignment and Modification A and B	Single-family residence	44
M9	Near Stone Creek Boulevard in Stone Creek subdivision near South Hampton Road	Common Alignment and Modification A and B	Single-family residence	48
M10	Gatehouse Drive in Harmony subdivision near S. Uhl Road	Common Alignment and Modification A and B	Single-family residence	46

Source: DEIS Reasonable Alternatives Traffic Noise Analysis Report, 2022.

4.8.2 Prediction of Future Noise Levels

Predicted traffic noise levels were modeled at representative land use activity areas (receptors) adjacent to the project that might be impacted by traffic noise and would potentially benefit from feasible and reasonable noise abatement. **Appendix K** marks the location of the 93 receivers and the tables in the report list the existing and predicted traffic noise levels within the study area. The approved traffic data used in this analysis is included in **Appendix B**.

Modeled noise receivers were primarily residential, but also included an equestrian center and a neighborhood playground. The noise analysis determined that out of 93 representative receptors, between 26 and 40 depending on the alternative alignment were predicted to have noise levels that approach or exceed the FHWA noise abatement criteria or that substantially exceed the existing noise abatement criteria; therefore, the proposed project would result in traffic noise effects (see **Appendix K**).

4.8.3 Consideration and Evaluation of Measures to Reduce Noise Effects

Noise abatement measures were considered and analyzed for each impacted receptor location. Abatement measures, typically noise barriers, must provide a minimum noise reduction, or benefit, at or above the threshold of 5 A-weighted decibels (dB(A)). A barrier is not acoustically feasible unless it reduces noise levels by at least 5 dB(A) at greater than 50% of first-row impacted receptors and benefits a minimum of two impacted receptors. To be reasonable, the barrier must not exceed the cost reasonableness allowance of 1,500 square feet per benefitted receptor and must meet the noise reduction design goal of 7 dB(A) for at least one receptor.

Noise barriers would not be feasible and reasonable for any of the following impacted receptors, and therefore, are not proposed for incorporation into the project:

R1 – This receiver represents a single residence located along Edgefield Lane adjacent to the ROW. A barrier must benefit at least two or more receivers. Therefore, a barrier is not proposed at this location.

R4 – This receiver represents one residence located along the north side of Tar Road adjacent to the ROW. R4 is impacted in Alternatives 1, 2, and 3 only. A barrier must benefit at least two or more receivers. Therefore, a barrier is not proposed at this location.

R5 – This receiver represents one residence located along the east side of Tar Road south of Knight Street adjacent to the ROW. R5 is impacted in Alternatives 1, 2, and 3 only. A barrier must benefit at least two or more receivers. Therefore, a barrier is not proposed at this location.

R6 through R8 – These receivers represent three residences located along Knight Street with a driveway connecting to the roadway along the ROW of Modification D. A continuous noise barrier would restrict access to these residences. Gaps in the noise barrier would satisfy access requirements, but the resulting non-continuous wall segments would not be sufficient to achieve the minimum, feasible reduction of 5 dB(A) at impacted receptors or the noise reduction design goal of 7 dB(A).

R9, R10 and R14 – These receivers represent single residences located along Knight Street adjacent to the Alternative 4 ROW. A continuous noise barrier 14 feet in height and approximately 969 feet in length was modeled along the ROW. This barrier would achieve the minimum feasible reduction of 5 dB(A) for two receptors while meeting the 7 dB(A) noise reduction design goal at one of those receptors. However, the square footage of abatement (13,566 square feet or 6,783 square feet per benefited receptor) would exceed the reasonable, cost-reasonableness criterion of 1,500 square feet per benefited receptor.

R16 – This receiver represents one residence located along Hidden Valley Lane adjacent to the Alternative 3 ROW. A barrier must benefit at least two or more receivers. Therefore, a barrier is not proposed at this location.

R22 – This receiver represents a single residence located along S. Joe Wilson Road adjacent to the Alternative 4 ROW. A barrier must benefit at least two or more receivers. Therefore, a barrier is not proposed at this location.

R25 and R27 – These receivers represent two residences located along the Alternative 3 ROW and Modification D at S. Joe Wilson Road with a driveway connecting to the roadway. A continuous noise barrier would restrict access to these residences. Gaps in the noise barrier would satisfy access requirements, but the resulting non-continuous wall segments would not be sufficient to achieve the minimum, feasible reduction of 5 dB(A) at impacted receptors or the noise reduction design goal of 7 dB(A).

R39 and R40 – These receivers represent three residences located along West Bear Creek Road with a driveway connecting to the roadway. A continuous noise barrier would restrict access to these residences. Gaps in the noise barrier would satisfy access requirements, but the resulting noncontinuous wall segments would not be sufficient to achieve the minimum, feasible reduction of 5 dB(A) at impacted receptors or the noise reduction design goal of 7 dB(A).

R41 – This receiver represents a single residence located along Duncanville Road adjacent to the ROW of Alternatives 1-4. A barrier must benefit at least two or more receivers. Therefore, a barrier is not proposed at this location.

R42 through R44 Alternative 1, 2, and 3 - These receivers represent 10 residences in the Bear Creek Ranch subdivision located along Quail Ridge Lane and Madison Drive. Based on preliminary calculations, a noise barrier approximately 1,605 feet in length and 20 feet in height in two segments was modeled along the Alternatives 1, 2, and 3 ROW. A noise barrier up to 20 feet in height, placed along the ROW would not be sufficient to benefit a majority of the impacted receptors or meet the 7 dB(A) noise reduction design goal. Therefore, a noise barrier is not proposed for this location. A brick privacy wall is present surrounding the neighborhood and limits the effectiveness of any proposed noise barrier.

R42 through R44 Alternative 4 - These receivers represent 10 residences in the Bear Creek Ranch subdivision located along Quail Ridge Lane and Madison Drive. Based on preliminary calculations, a noise barrier approximately 1,646 feet in length and 10 feet in height would reduce noise levels by at least 5 dB(A) for eight benefited receptors and meet the noise reduction design goal of 7 dB(A) for four of those receptors. However, the square footage of abatement (16,460 square feet or 2,058 square feet per benefited receptor) would exceed the reasonable, cost-reasonableness criterion of 1,500 square feet per benefited receptor. A brick privacy wall is present surrounding the neighborhood and limits the effectiveness of any proposed noise barrier.
One noise barrier was found to be both reasonable and feasible and is recommended for incorporation into the project, depending on the selected alternative (Table 4-28). A noise barrier is proposed for the following location:

R70 through–R74 – These receivers represent 27 residences in Glenn Heights located along Craddock Drive along all the alternative combinations except those including the ROW of Modifications A or B. Based on preliminary calculations, a noise barrier approximately 1,807 feet in length and 14 feet in height would reduce noise levels by at least 5 dB(A) for 19 benefited receptors and meet the noise reduction design goal of 7 dB(A) for 10 of those receptors. With a total area of abatement of 25,298 square feet or 1,100 square feet per benefited receptor, the barrier would also be cost reasonable.

Table 4-28: Noise Barrier Proposal (Preliminary)

Barrier	Representative Receivers	Total # Benefited	Length (feet)	Height (feet)	Total Sq. Ft.	Sq. Ft. per Benefited Receptor
1	R70 through R74 (Not for Modification A or B)	19	1,807	14	25,298	1,100

Source: DEIS Reasonable Alternatives Traffic Noise Analysis Report, 2022.

Any subsequent project design changes may require a reevaluation of this preliminary noise barrier proposal. The final decision to construct the proposed noise barrier will not be made until completion of the project design, utility evaluation, and polling of all benefited and adjacent property owners and residents.

Once the Recommended Preferred Alternative is selected, the mitigative measures presented above would be considered and the traffic noise models would be updated. Likewise, any necessary additional modeling and analysis would be performed which may incorporate additional project design details with the potential to change the impacts. Results of the traffic noise modeling and analysis performed for the Recommended Preferred Alternative would be presented in the FEIS.

4.8.4 Noise Contours for Land Use Planning

To avoid noise effects that may result from future development of properties adjacent to the project, local officials responsible for land use control programs must ensure, to the maximum extent possible, that no new activities are planned or constructed along or within the following predicted (2045) noise impact contours. A noise contours is a distance from the proposed Loop 9, Segment A ROW where a noise effect will occur for a particular land use activity area.

There is currently land in various locations throughout the proposed Loop 9, Segment A project area that are Category G, undeveloped lands that are not permitted for development. In addition, no new development is currently planned, designed, or programmed for the undeveloped land. There is no NAC for undeveloped land; however, to avoid noise effects that may result from future development of properties adjacent to the proposed Loop 9, Segment A, local officials responsible for land use control programs should ensure, to the maximum extent possible, that no new activities are planned or constructed along or within the following predicted (2045) noise impact contours. Table 4-29 lists the noise impact contours.

Table 4-29: Noise Impact Contours within the Study Area

Land Use	Impact Contour*	Distance From ROW	Alignment
NAC category B&C	66 dB(A)	25 feet	Common Alignment
NAC category E#	71 dB(A)	Within ROW	Common Alignment
NAC category B&C	66 dB(A)	Within ROW	Alt 1, 2, 3, and 4
NAC category E#	71 dB(A)	Within ROW	Alt 1, 2, 3, and 4

Source: DEIS Reasonable Alternatives Traffic Noise Analysis Report, 2022.
* Impact contours are one dB(A) lower than the NAC per category to reflect impacts that would occur as a result of approaching the NAC for the respective contours.
# The undeveloped areas identified above were based on aerial review and field verification conducted in January 2022. Permit research was conducted using the best available online data from the City of Cedar Hill, Ovilla, Glenn Heights, and Red Oak as of January 2022. This research was based on available online permit search and address information from the county appraisal district database.

4.8.5 Construction Noise

Noise associated with the construction of the proposed Loop 9, Segment A is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. However, construction normally occurs during daylight hours when occasional loud noises are more tolerable. None of the receivers are expected to be exposed to construction noise for a long duration. Therefore, any extended disruption of normal activities is not expected. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems.

4.8.6 Local Official Notification

A copy of the traffic noise analysis would be made available to local officials to ensure, to the maximum extent possible, future developments are planned, designed, and programmed in a manner that would avoid traffic noise effects. On the date of approval of the FEIS/ROD (Date of Public Knowledge), FHWA and TxDOT, are no longer responsible for providing noise abatement for new development adjacent to the proposed Loop 9, Segment A.

4.8.7 Encroachment-Alteration Effects

The traffic noise models predict the noise levels at adjacent properties and are considered a direct effect of the proposed project. No project-related encroachment alteration noise effects are anticipated as a result of the proposed project.

4.8.8 No-Build Alternative

Under the No-Build Alternative, the proposed project would not be constructed. If the No-Build Alternative were implemented, traffic noise levels would be similar to existing conditions or would increase with increasing traffic volumes on local arterial roadways.

4.9 Water Resources

This section describes the existing hydrology and water quality conditions in the proposed project area as well as the potential water resources effects that may result from the proposed action. Water Resources identified within the project area are documented in **Section 4.9.1** and can be seen in **Appendix L**.

4.9.1 Surface Water

4.9.1.1 Existing Conditions

Texas has 15 major river basins and the proposed project area is located within Basin 8 – the Trinity River Basin. A basin is defined as the land area where all surface water drains to a certain river. The Trinity River Basin drains approximately 18,000 square miles from the Texas/Oklahoma border north of DFW to the Galveston Bay near Houston. Within the Trinity River Basin, the proposed project is located within the Chambers and the Upper Trinity Subbasins and more specifically in the Waxahachie Creek Watershed and the Red Oak Creek Watershed. **Table 4-30** is a summary of Hydrologic Unit Codes (HUCs) for the proposed project area.

Table 4-30: Hydrologic Unit Codes for the Proposed Project Area

Subbasin (HUC 8)	Watershed (HUC 10)	Sub-Watershed (HUC 12)	Named streams through the Project Area
Chambers (12030109)	Waxahachie Creek (1203010903)	Headwater Waxahachie Creek (120301090301)	North Prong Creek
Upper Trinity (12030105)	Red Oak Creek (1203010503)	Headwater Red Oak Creek (120301050301)	Sanders Branch
			Red Oak Creek
			Little Creek
		Middle Red Oak Creek (120301050305)	No named streams within the project area
Source: TPWD, 2022.			

Within the Chambers Subbasin, the Waxahachie Creek watershed covers a small portion of the western project area. Land use in this watershed is primarily commercial and agricultural. One named stream located within the Waxahachie Creek watershed, North Prong Creek, is crossed by the Common Alignment of the proposed project.

Within the Upper Trinity Subbasin, the Red Oak Creek watershed encompasses much of the project area. Land use in this watershed is generally residential and ranch land or farmland, including agricultural. Three named streams within the Red Oak Creek watershed, Sanders Branch, Red Oak Creek, and Little Creek are crossed by the proposed project. Sanders Branch is crossed by Alternative 3 only, Red Oak Creek is crossed by Alternatives 1-4 and Modification D, and Little Creek is crossed by the Common Alignment and Modification C.

The proposed project crosses four named streams (North Prong Creek, Sanders Branch, Red Oak Creek, and Little Creek) and multiple unnamed tributaries. **Table 4-31** lists the number of streams crossed by Alternative Alignment.

Table 4-31: Stream Crossings by Alternative Alignment

Alternative Alignment	Number of Stream Crossings
Alternative 1	
Alternative 1	23
Alternative 1 Mod A	23
Alternative 1 Mod A & C	22
Alternative 1 Mod B	23
Alternative 1 Mod B & C	22
Alternative 1 Mod C	22
Alternative 2	
Alternative 2	22
Alternative 2 Mod A	22
Alternative 2 Mod A & C	21
Alternative 2 Mod B	22
Alternative 2 Mod B & C	21
Alternative 2 Mod C	21
Alternative 3	
Alternative 3	21
Alternative 3 Mod A	21
Alternative 3 Mod A & C	20
Alternative 3 Mod A & D	20
Alternative 3 Mod A C & D	19
Alternative 3 Mod B	21
Alternative 3 Mod B & C	20
Alternative 3 Mod B & D	20
Alternative 3 Mod B C & D	19
Alternative 3 Mod C	20
Alternative 3 Mod C & D	19
Alternative 3 Mod D	20
Alternative 4	
Alternative 4	21
Alternative 4 Mod A	21
Alternative 4 Mod A & C	20
Alternative 4 Mod B	21
Alternative 4 Mod B & C	20
Alternative 4 Mod C	20

Source: Study team, 2022.
Note: The numbers listed here include areas of overlap with the US 67.

4.9.1.2 Wetlands and Other Waters of the U.S.

Section 404 of the Clean Water Act (CWA) authorizes the USACE, to issue permits for the discharge of dredged or fill materials into WOTUS, including wetlands. "Waters of the U.S." are defined in 33 CFR 328.3 as (1) The territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide; (2) Tributaries; (3) Lakes and ponds, and impoundments of jurisdictional waters; and (4) Adjacent wetlands.

"Wetlands" are defined in 33 CFR 328.3 as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The following information sources were consulted prior to and during field surveys to assist in the identification of potential water features: the USGS Topographic maps, USFWS NWI data, NRCS Soil survey data, aerial photography, FEMA FIRM, and light detection and ranging (LiDAR) data, as well as field surveys.

Waterbodies were delineated according to USACE Regulatory Guidance Letter (RGL) 05-05 Ordinary High Water Mark (OHWM) Identification for non-tidal waters. As required under Section 404 of the CWA, wetlands were delineated using the routine method described in the USACE 1987 Wetlands Delineation Manual and the USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0) – March 2010.

Geospatial data were collected utilizing a Trimble GeoXH 6000 Series Global Positioning System (GPS) on January 28-31, April 2, May 1, October 8, December 23, 2019, and February 9-10, 2022. Field evaluations occurred in discontinuous months as additional access became available. Portions of the project area could not be field surveyed due to lack of ROE permissions. Those areas have been desktop delineated using available resources listed above.

Normal hydrologic and vegetative circumstances were present within the project area at the time of the site visits. **Table 4-32** summarizes the water features, including wetlands, identified within the project area during the field and desktop delineations. Refer to **Appendix L** for a depiction of the boundaries of each waterbody/wetland feature, as well as the location within the project area where sample point data were collected. Refer to **Appendix L** for photographs of features observed within the project area. Refer to **Appendix M** for a table of Water Features by Alternative Alignment. Refer to **Appendix N** for the Surface Water Analysis Form.

Table 4-32: Water Features including Wetlands within the Project Area

Waterbody or Wetland Number	Name	Type	Latitude, Longitude
Wetlands			
Wetland 1	Wetland	PSS	32.54791°, -96.97316°
Wetland 2	Wetland	PEM	32.54777°, -96.97308°
Wetland 3	Wetland	PEM	32.54744°, -96.97214°
Wetland 4*	Wetland	PEM	32.54641°, -96.97113°
Wetland 5*	Wetland	PEM	32.54738°, -96.96384°
Wetland 6*	Wetland	PSS	32.54740°, -96.96338°
Wetland 7	Wetland	PEM	32.54694°, -96.96365°
Wetland 8	Wetland	PEM	32.54695°, -96.96349°
Wetland 9	Wetland	PEM	32.55080°, -96.93919°
Wetland 10	Wetland	PEM	32.54974°, -96.93215°
Wetland 11	Wetland	PEM	32.55731°, -96.9154°
Wetland 12*	Wetland	PEM	32.55759°, -96.91486°
Wetland 13	Wetland	PEM	32.54699°, -96.83889°
Wetland 14	Wetland	PEM	32.54666°, -96.83871°
Wetland 15*	Wetland	PEM	32.56000°, -96.91095°
Open Waters			
Pond 1*	Pond	On-channel Pond	32.54778°, -96.96370°
Pond 2*	Pond	On-channel Pond	32.54601°, -96.94838°
Pond 3*	Pond	On-channel Pond	32.54750°, -96.94257°
Pond 4	Pond	On-channel Pond	32.55098°, -96.93842°
Pond 5	Pond	On-channel Pond	32.55172°, -96.93704°
Pond 6*	Pond	On-channel Pond	32.55365°, -96.92730°
Pond 7*	Pond	On-channel Pond	32.55183°, -96.92871°
Pond 8	Pond	Man-made Pond	32.55498°, -96.92180°
Pond 9	Pond	Man-made Pond	32.54642°, -96.83975°
Pond 11	Pond	Man-made Pond	32.55806°, -96.93547°
Pond 12*	Pond	On-channel Pond	32.56133°, -96.92727°
Pond 13*	Pond	On-channel Pond	32.547258°, -96.845718°
Pond 14*	Pond	On-channel Pond	32.547973°, -96.845447°
Streams			
Stream 1	North Prong Creek	Ephemeral	32.54774°, -96.97269°
Stream 2*#	Un Trib.	Intermittent	32.54731°, -96.96356°
Stream 3	Un Trib.	Ephemeral	32.5470°, -96.96364°
Stream 4*	Sanders Branch	Perennial	32.54621°, -96.93873°
Stream 5#	Un Trib.	Intermittent	32.55084°, -96.93899°
Stream 6	Red Oak Creek	Perennial	32.55342°, -96.93420°
Stream 7	Un Trib.	Intermittent	32.55447°, -96.93362°
Stream 8*	Un Trib.	Intermittent	32.55450°, -96.93228°

Table 4-32: Water Features including Wetlands within the Project Area (continued)

Waterbody or Wetland Number	Name	Type	Latitude, Longitude
Streams (continued)			
Stream 9*	Un Trib.	Intermittent	32.55056°, -96.92931°
Stream 10	Un Trib.	Intermittent	32.5559°, -96.92301°
Stream 11*	Un Trib.	Intermittent	32.55255°, -96.92463°
Stream 12*#	Un Trib.	Intermittent	32.56111°, -96.89916°
Stream 13*	Little Creek	Perennial	32.56069°, -96.89702°
Stream 14*	Little Creek	Perennial	32.55906°, -96.89044°
Stream 15	Un Trib.	Intermittent	32.55252°, -96.88056°
Stream 16	Un Trib.	Intermittent	32.55319°, -96.88028°
Stream 17	Little Creek	Perennial	32.54984°, -96.87577°
Stream 18	Un Trib.	Intermittent	32.55066°, -96.87555°
Stream 19*	Little Creek	Perennial	32.54809°, -96.87377°
Stream 20*	Un Trib.	Intermittent	32.54802°, -96.86747°
Stream 21#	Un Trib.	Ephemeral	32.54516°, -96.85896°
Stream 22	Un Trib.	Intermittent	32.54645°, -96.859°
Stream 23	Un Trib.	Intermittent	32.54546°, -96.8536°
Stream 24*	Un Trib.	Ephemeral	32.54630°, -96.85045°
Stream 25*#	Un Trib.	Intermittent	32.54500°, -96.84655°
Stream 26	Un Trib.	Ephemeral	32.55438°, -96.94105°
Stream 27	Red Oak Creek	Perennial	32.55500°, -96.93771°
Stream 28	Un Trib.	Intermittent	32.55756°, -96.93486°
Stream 29*	Un Trib.	Intermittent	32.56026°, -96.92811°
Stream 30	Red Oak Creek	Perennial	32.55001°, -96.93057°

Un Trib. = Unnamed Tributary
* Portions of the feature were desktop delineated based on lack of field access at the time of the site visit.
# Portions of the stream feature are partially culverted through the project area.
Note: The features listed here include areas of overlap with the US 67 project.
Source: Loop 9, Segment A Water Features Delineation Report, 2022.

Wetland Types

The following feature types were identified within the project area:

- Palustrine Emergent Wetlands (PEM): Most wetlands within the project area contained predominantly emergent vegetation. Common vegetation includes sand spikerush (*Eleocharis montevidensis*), giant ragweed (*Ambrosia trifida*), and Cherokee sedge (*Carex cherokeensis*).
- Palustrine Scrub Shrub (PSS): Wetlands with vegetation less than 20 ft tall. Common vegetation includes black willow (*Salix nigra*) and eastern cottonwood (*Populus deltoides*).
- On-channel Pond: The majority of the open water features (ponds) identified within the project area were located on channel or in line with streams.

- Man-made Pond: The man-made open water features within the project area were excavated in upland areas for the purposes of sand or gravel excavation and agricultural needs.
- Perennial Stream: A stream where water typically flows throughout the year. Most of its water comes from upstream waters or groundwater.
- Intermittent Stream: A stream where the channel contains flowing water for only part of the year. When the water is not flowing, it remains in isolated pools or may be absent.
- Ephemeral Stream: A stream where water flows only briefly following a period of rain.

4.9.1.3 Environmental Effects

The CWA, enacted in 1972, establishes the basic regulations for discharge of pollutants into WOTUS and protecting surface water quality. The Texas Surface Water Quality Standards (Standards), as codified in the Texas Administrative Code (TAC) 307, establish explicit goals for the quality of streams, rivers, lakes, and bays throughout the state. This project and associated activities will be implemented, operated, and maintained using BMPs to control discharges of pollutants from the project site. The surrounding water quality shall be maintained in accordance with all applicable provisions of the Standards.

Clean Water Act Section 404

The Build Alternative would require authorization from the USACE under Section 404 of the CWA prior to discharge of fill materials into WOTUS, including wetlands. As shown in **Appendix M,** Alternative 3 with Modifications B, C, and D has the largest wetland acreage at 4.36 acres and Alternative 1 Modification C has the most linear feet of streams at 15,521 linear feet. Alternative 4 Modification A has the least acres of wetlands and linear feet of streams. Permanent effects to WOTUS, including wetlands would be avoided and minimized to the greatest extent practicable. Actual effects would be less than the delineated features within the project area because of avoidance and minimization measures. The proposed project would cross water bodies using bridges where feasible, thereby minimizing effects to streams. Bridges that span streams and wetlands would minimize disturbances to aquatic and wetlands functions and habitat.

This project is anticipated to involve regulated activity in jurisdictional waters and therefore will require authorization under Section 404. The USACE has final determination on the jurisdiction of all features identified within the project area. A review of USACE requirements would be conducted as design plans are finalized and all appropriate permits would be acquired by TxDOT prior to construction. A Section 404 application would be submitted to the USACE-Fort Worth District and any coordination received by the USACE would be included in this document upon approval. A pre-construction notification (PCN) would be submitted to the USACE prior to commencing the activity if the loss of WOTUS exceeds 1/10 of an acre or if there is a discharge into a special aquatic site, including wetlands. An Approved Jurisdictional Determination form (AJD) would be submitted to the USACE as part of the Section 404 application to determine jurisdiction of all features.

The proposed project, at each single and complete crossing, would likely fall within the effect limits for a Nationwide Permit 14 (Linear Transportation Crossings). However, the USACE has final discretion over which permit would apply and could request that all crossings be grouped; therefore,

requiring an Individual Standard Permit. If it is later determined that an Individual Standard Permit under Section 404 is needed, compliance with EPA's Section 404(b)(1) Guidelines will be confirmed prior to submittal of the Individual Standard Permit application.

Per the USACE Fort Worth District General Conditions, compensatory mitigation would be required for any discharges that result in a loss of wetlands that exceed 1/10 of an acre and for all losses of stream bed that exceed 3/100 of an acre and require a PCN. In accordance with Section 404 of the CWA and USACE guidelines, for wetland losses of 1/10-acre or less and for losses of stream bed of 3/100-acre or less that require a PCN, the district engineer may determine on a case-by-case basis if compensatory mitigation is required. Compensatory mitigation could involve on-site or off-site mitigation, including the purchase of mitigation bank credits. Preference would be given for mitigation within the Trinity River Basin. During the permitting process, if unavoidable effects to water features occur, appropriate mitigation would be obtained to offset any unavoidable functional loss. Mitigation would be in compliance with the 2008 Federal Mitigation Rule and approved by the USACE during project permitting.

Compliance with Section 14 of the RHA (commonly referred to as Section 408 because it is codified in USC Title 33, Chapter 9, Subchapter I, Section 408) applies to any TxDOT activity that involves alterations to, or temporarily or permanently occupies or uses, any USACE federally authorized civil works project (e.g., sea walls, bulkheads, reservoirs, levees, wharfs, or other federal civil works projects, or associated federal land [fee simple] or easements). No USACE federally authorized civil works projects have been identified within the project area; therefore, this project will not affect any Section 408 waters.

Clean Water Act Section 401

For projects that require a NWP under Section 404 that is covered by TCEQ's blanket 401 water quality certification, regardless of whether the NWP is non-reporting, or requires the submission of a PCN, TxDOT complies with Section 401 of the Clean Water Act by implementing TCEQ conditions for NWPs. For projects that require authorization under a NWP under Section 404 that is not covered by TCEQ's blanket 401 water quality certification, or under an Individual Standard Permit, Letter of Permission, or Regional General Permit under Section 404, TxDOT will coordinate the Section 401 water quality certification with TCEQ. TCEQ will either approve or deny the Section 401 water quality certification, or issue a waiver. The TCEQ Section 401 water quality certification decision must be submitted to the USACE before use of the NWP can be confirmed, or an Individual Standard Permit, Letter of Permission, or Regional General Permit decision can be made.

The CWA Section 401 says that a federal agency may not issue a license or permit to discharge into WOTUS without a certification or waiver from the state or authorized tribe where the discharge originates. The proposed project would comply with the Section 401 Water Quality Certification conditions through either a TCEQ Tier 1 (Small Projects) checklist or a TCEQ Tier II (Large Projects) certification questionnaire and alternative analysis checklist.

The proposed project would meet the qualifications of a Tier I project if the project would impact less than 1,500 linear feet of stream and less than 3 acres of WOTUS, including wetlands. The proposed project would meet the qualifications of a Tier II project if the project would impact more than 1,500

linear feet of stream and more than 3 acres of WOTUS, including wetlands. Section 401 certification would be completed as part of the Section 404 permitting process once design is finalized.

The proposed project would incorporate TCEQ's recommended BMPs at appropriate stages during construction to control erosion, sedimentation, and post-construction total suspended soils (TSS). For erosion control, mulch filter berm and socks, temporary vegetation, or erosion control matting and/or sod may be used to stabilize disturbed areas. For sediment control, mulch filter berm and socks, silt fences, and rock berms may be used as appropriate. For control of post-construction TSS, vegetative lined ditches or temporary seeding may be used.

The construction contractor would have a storm water pollution prevention plan (SW3P) in place and posted near the construction area during construction of the proposed project. Long-term water quality effects are not anticipated because TCEQ's recommended BMPs would be implemented to prevent the proposed project from causing any degradation to water quality.

Clean Water Act Section 402

The CWA Section 402 requires construction sites of an acre or greater to obtain permission under the National Pollutant Discharge Elimination System (NPDES). Texas has the authority to administer the NPDES program under the Texas Pollutant Discharge Elimination System (TPDES).

The Build Alternative would disturb more than one acre; therefore, TxDOT would be required to comply with the TCEQ TPDES Construction General Permit (CGP), under provisions of Section 402 of the CWA and Chapter 26 of the Texas Water Code.

The project passes through the cities of Cedar Hill, Ovilla, Glenn Heights, and Red Oak, Texas. These cities are registered with TCEQ as Municipal Separate Storm Sewer System (MS4) Operators. The Build Alternative would disturb more than five acres; therefore, TxDOT shall comply with TCEQ – TPDES CGP as a large construction activity, and a NOI shall be filed with TCEQ stating that a SW3P would be in place during construction of the proposed project. A copy of the NOI would also be submitted to the cities of Cedar Hill, Ovilla, Glenn Heights, and Red Oak MS4 operators. The SW3P will utilize the temporary erosion and sedimentation control measures and BMPs.

Since TPDES CGP authorization and compliance (and the associated documentation) occur outside of the environmental clearance process, compliance is ensured by the policies and procedures that govern the design and construction phases of the project. The Project Development Process Manual and the Plans, Specifications, and Estimates (PS&E) Preparation Manual require a SW3P be included in the plans of all projects that disturb one or more acres. The Construction Contract Administration Manual requires that the appropriate CGP authorization documents (NOI or site notice) be completed, posted, and submitted, when required by the CGP, to TCEQ and the MS4 operator. It also requires that projects be inspected to ensure compliance with the CGP.

The PS&E Preparation Manual requires that all projects include Standard Specification Item 506 (Temporary Erosion, Sedimentation, and Environmental Controls), and the "Required Specification Checklists" require the current version of Special Provision 506 on all projects that need

authorization under the CGP. These documents require the project contractor to comply with the CGP and SWP3, and to complete the appropriate authorization documents.

Clean Water Act Section 303(d)

Under Section 303(d) of the federal CWA, TCEQ identifies waterbodies as "impaired" where effluent limitations are not stringent enough to implement water quality standards, and for which the associated pollutants are suitable for measurement by a total maximum daily load (TMDL). The TCEQ requires specific coordination of projects that are within five linear miles of, are within the watershed of, and drain to, an impaired waterbody. TxDOT adheres to the Memorandum of Understanding (MOU) between TxDOT and the TCEQ concerning the review of the potential environmental effect of transportation projects as required by Transportation Code §201.607 and defined in the TAC 23, part 1, chapter 2, subsection I.

The project area contains one stream segment identified by TCEQ, Stream Segment 0805A (Red Oak Creek), extending from the confluence with Segment 0805 Trinity River 12 miles upstream to I-45. Red Oak Creek is crossed by Alternatives 1 – 4 and Modification D. This segment is not listed as impaired on the 2020 – Texas 303(d) List. Red Oak Creek does not appear to have any water quality data associated with it on TCEQ's Surface Water Quality Web Reporting Tool. None of the Reasonable Alternatives are located within five linear miles of, are within the watershed of, and drain to, an impaired assessment unit under Section 303(d) of the federal CWA.

Executive Order 11990

Executive Order 11990 requires that federally funded projects minimize the 'destruction, loss or degradation' of wetlands and to 'preserve and enhance the natural and beneficial values of wetlands'. This is similar to the CWA Section 404(b)(1), where an applicant must demonstrate that the proposed project has avoided and minimized effects to WOTUS to the greatest extent practicable before compensatory mitigation can be proposed. **Section 4.9.1** discusses the avoidance and minimization of effects to wetlands in the project area, which satisfies the requirements of Executive Order 11990.

4.9.1.4 Encroachment-Alteration Effects

Encroachment-alteration effects to water quality occur primarily due to an increase in impervious surfaces in the project area that could result in increased runoff and decreased water quality downstream. Construction of the proposed improvements would directly contribute to increases in impervious cover. Effects would also occur in areas where vegetation in the proposed project area is cleared during construction, which could accelerate off-site erosion due to runoff. Use of BMPs within the proposed project area would minimize water quality effects downstream.

Encroachment-alteration effects to wetlands and WOTUS primarily occur due to direct effects such the placement of culverts or bridge pilings within stream crossings and fill within wetlands. Unavoidable effects to WOTUS would be accounted for with compensatory mitigation per the USACE Fort Worth District General Conditions under Section 404 of the CWA and described above in **Section 4.9.1.3**.

4.9.1.5 No-Build Alternative

The No-Build Alternative would have no effects to surface water resources.

4.9.2 Groundwater

4.9.2.1 Existing Conditions

The proposed Loop 9, Segment A project is located over the subcrop of the Woodbine Aquifer formation, a minor aquifer overlying the larger Trinity Aquifer in northeast Texas (TWDB, 2020). The outcrop, or surface extent, of the aquifer is the area in which the host formations are exposed at the land surface. The outcrop corresponds to the principal recharge zone. The subcrop area is the area of the aquifer lying below other rock units and is a lesser part of the recharge zone.

The Woodbine Aquifer consists of sandstone interbedded with shale and clay, which have formed three distinct water-bearing zones. Water quality and yield vary with the depth of the aquifer, and the lower zones typically yield the most water. The upper zone tends to be high in iron and yields less water.

The Woodbine Aquifer reaches 600 feet in thickness in subsurface areas, and freshwater saturated thickness averages about 160 feet. Water to a depth of 1,500 feet is generally fresh and increases in salinity at further depths (TWDB, 2020.

Large water level declines, due to heavy municipal and industrial pumping in northern portions of the Woodbine Aquifer, have been moderated in the early 2000's as suppliers have switched to surface water. The Woodbine Aquifer still provides water supplies for municipal, industrial, domestic, livestock, and small irrigation uses.

The outcrop of the Nacatoch Aquifer lies to the east of the Loop 9, Segment A project area, just over the eastern tip of Ellis County. The Nacatoch Aquifer is a minor aquifer that occurs in a narrow band across northeast Texas. The Nacatoch consists of the Nacatoch Sand, composed of sequences of sandstone separated by impermeable layers of mudstone or clay. Water from the aquifer is extensively used for domestic and livestock purposes.

The TWDBs Groundwater Interactive Data Viewer was reviewed for groundwater wells and it was determined that one private well (State Well No: 3325501) was located within the project area. The well is used for domestic purposes and located within the ROW of Alternatives 1-4 however outside of the area of Modification D. The well has a reported depth of 697 feet and is within the Woodbine Aquifer formation.

4.9.2.2 Environmental Effects

Construction and operation of the proposed project would have minimal effects to groundwater throughout the project area.

Potential short-term effects to groundwater could occur from spilling hazardous or toxic materials during construction of the proposed project. Proper maintenance, adherence to BMPs outlined in the CGP, and fast response times to any spills would control such effects. Additional short-term effects due to construction could occur as a result of erosion. Eroded sediments, once transported, have the

potential to enter underground water supplies. North Prong Creek, located within the project area, eventually drains into Chambers Creek within the Chambers subbasin. Chambers Creek lies over the outcrop of the Nacatoch Aquifer and the aquifer could potentially be recharged with water containing transported sediments. However, BMPs described in **Section 4.9.1** would minimize these effects.

Long-term effects to groundwater from the construction of the proposed project is not anticipated. Adherence to BMPs outlined in the CGP means erosion control measures would remain on site during construction activities for temporary stabilization. In accordance with the CGP, BMPs would remain in effect until any required permanent stabilization activities have been initiated and a condition of final stabilization is completed. Long-term effects to groundwater from the operation of the roadway are not expected, and deeper aquifers would not incur substantial effects as a result of the proposed project.

The Build Alternative is not anticipated to have any environmental consequences to the quality of groundwater throughout the project area.

4.9.2.3 Encroachment-Alteration Effects

Encroachment-alteration effects to groundwater quality could occur primarily due to increased impervious cover or removal of vegetation that results in increased runoff and erosion. Due to the use of planned BMPs, the project is not likely to have permanent impacts to groundwater quality. Impervious cover may also increase due to induced changes that result from the proposed project. For impacts outside the ROW, regulations require federal, state, and local jurisdictions to protect water quality. Those creating the direct impact are responsible for adhering to these regulations. The project is not anticipated to have long-term effects to groundwater and deeper aquifers.

4.9.2.4 No-Build Alternative

The No-Build Alternative would have no effects to groundwater quality.

4.9.3 Public Drinking Water Systems

4.9.3.1 Existing Conditions

Well records from the TWDB were reviewed for information on public water supply wells in the project area. According to the TWDB and the Public Water Supply Section of the TCEQ, there are no public water supply wells located within the project area.

A portion of the city of Glenn Heights Public Works facility is located within the Common Alignment. The city of Glenn Heights municipal water tower is located within the alignment of Modification B. However, the water supply for this facility is not located within the project area.

4.9.3.2 Environmental Effects

The water tower would be impacted by the proposed project should Modification B be selected, however the water supply for the tower would not be impacted. TxDOT will coordinate directly with the city of Glenn Heights during the utility relocation process should Modification B be selected. If the municipal water tower is relocated, the relocation process would be timed so that there is minimal interruption to the water supply for city residents. Documentation of Stakeholder Meetings with the city of Glenn Heights are discussed in **Section 7**.

In accordance with TxDOT's Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges (Item 103, Disposal of Wells), any drinking water wells would need to be properly removed and disposed of during construction of the project. If contamination is encountered at any identified well sites, remediation would be conducted prior to construction.

The Build Alternative is not anticipated to have any environmental consequences to public drinking water systems throughout the project area.

4.9.3.3 Encroachment-Alteration Effects

Modification B would impact the Glenn Heights water tower that may result in minimal short-term interruption of service during relocation, however, TxDOT will work with the city of Glenn Heights on the planning and timing of service activities to minimize these interruptions. Long term encroachment-alteration effects are not anticipated for this resource as a result of the proposed project.

4.9.3.4 No-Build Alternative

The No-Build Alternative would have no effects to public drinking water system.

4.10 Vegetation and Wildlife

4.10.1 Vegetation

4.10.1.1 Existing Conditions

The project area is located within the Southwestern Prairies Cotton and Forage Land Resource Region (LRR J) of the Great Plains and is more specifically located in Major Land Resource Area (MLRA) 86A (Texas Blackland Prairie, Northern Part). Most of this MLRA is characterized by a nearly level to gently sloping, dissected plain. Dissected areas with steeper slopes occur along entrenched river and creek valleys. This area supports mixed tall and mid-grass prairies. Areas along the major rivers and streams support savanna vegetation. Nearly all of this MLRA is improved pasture, cropland, or rangeland. Urban development is rapidly increasing adjacent to the major cities. (USDA, 2006).

The proposed project is a new location frontage road system. Currently, the project area consists of disturbed land, areas recovering from previous disturbance, agricultural land, pastures, forests, shrublands and maintained residential lawns. Vegetation within the existing ROW, along multiple municipal roads within the project area, consists primarily of well maintained, regularly mowed, herbaceous roadside vegetation.

To better describe the types of vegetation occurring within the project area and pursuant to a MOU between TxDOT and TPWD, field surveys were conducted by qualified biologists in January, April, May, October, December 2019, and February 2022. Field evaluations occurred in discontinuous months as additional access became available. Habitat Types identified within the project area include agriculture; disturbed prairie; EP savannah, woodland, and shrubland; open water; riparian; and urban.

Agriculture

Agricultural areas within the project area include row crops and hay fields. Dominant taxa include bermuda grass (*Cynodon dactylon*), Bahia grass (*Paspalum notatum*), panic grass (*Panicum repens*), Texas winter grass (*Nassella leucotricha*), and little bluestem (*Schizachyrium scoparium*) in addition to regional row crops.

Disturbed Prairie

Disturbed prairie within the project area is likely the result of previous clearing of woody vegetation or native prairie. Dominant species within disturbed prairie areas include big bluestem (*Andropogon gerardii*), sensitive plant (*Mimosa sp.*), vervain (*Verbena sp.*), Eastern red cedar (*Juniperus virginiana*), perennial ryegrass (*Lolium perenne*), bermuda grass, and little bluestem.

Edwards Plateau Savannah, Woodland, and Shrubland

EP savannah, woodland, and shrubland is a vegetation association typified by a mosaic of evergreen oak and juniper forests, woodlands and savannahs over shallow soils of rolling uplands and adjacent upper slopes within the EP and some adjacent ecoregions where limestone is present. Dominant species in EP savannah, woodland, and shrubland areas include Eastern red cedar, cedar elm (*Ulmus crassifolia*), honey mesquite (*Prosopis glandulosa*), perennial ryegrass, and little bluestem.

Open Water

Open water areas include the surface water within the banks of Red Oak Creek, impoundments on Red Oak Creek and its tributaries, Little Creek, and tributaries to Little Creek. Open water areas within these systems are largely unvegetated.

Riparian

Riparian vegetation associations were identified along stream crossings within the project area, including Red Oak Creek, Little Creek, and their tributaries. Dominant species for these riparian areas include sugar hackberry (*Celtis laevigata*), black hickory (*Carya texana*), Shumard's oak (*Quercus shumardii*), Eastern red cedar, and cedar elm. The understory of riparian areas is typically dense, dominated by roughleaf dogwood (*Cornus drummondii*), rusty blackhaw (*Viburnum rufidulum*), and saw greenbrier (*Smilax bona-nox*).

Urban

Areas of urban vegetation identified within the project area include lawns, landscaping, and well-maintained ROWs. Dominant plant species within urban vegetation in the project area include bermuda grass, perennial ryegrass, Bahia grass, and typical landscaping shrubs and grasses.

4.10.1.2 Environmental Effects

The primary effect to vegetation would be the removal of existing vegetation to accommodate ROW, site preparation, and construction of the proposed project. The Habitat Types, agriculture; disturbed prairie; EP savannah, woodland, and shrubland; open water; riparian; and urban areas would potentially be impacted by all alternative alignments. **Table 4-33** lists the amount of vegetation effects by habitat type and alternative alignment.

Table 4-33: Effects to Habitat Types by Alternative Alignment

	Agricultural (acres)	Disturbed Prairie (acres)	EP Savannah, Woodland, and Shrubland (acres)	Riparian (acres)	Other* (acres)
Alternative 1					
Alternative 1	82.76	191.94	135.46	32.30	155.41
Alternative 1 Mod A	80.66	221.87	132.89	32.30	126.27
Alternative 1 Mod A & C	75.92	220.63	133.51	33.13	124.16
Alternative 1 Mod B	81.13	212.33	133.17	32.30	135.29
Alternative 1 Mod B & C	76.39	211.09	133.80	33.13	133.17
Alternative 1 Mod C	78.02	190.70	136.09	33.13	153.30
Alternative 2					
Alternative 2	82.60	184.01	136.24	38.80	154.60
Alternative 2 Mod A	80.50	213.95	133.66	38.80	125.45
Alternative 2 Mod A & C	75.76	212.71	134.29	39.63	123.34
Alternative 2 Mod B	80.97	204.41	133.95	38.80	134.47
Alternative 2 Mod B & C	76.23	203.17	134.58	39.63	132.36
Alternative 2 Mod C	77.86	182.78	136.86	39.63	152.49
Alternative 3					
Alternative 3	77.00	173.56	151.22	32.24	170.80
Alternative 3 Mod A	74.90	203.48	148.65	32.24	141.65
Alternative 3 Mod A & C	70.16	202.25	149.27	33.07	139.54
Alternative 3 Mod A & D	76.46	228.03	134.97	32.81	130.74
Alternative 3 Mod A C & D	71.72	226.80	135.59	33.63	128.62
Alternative 3 Mod B	75.37	193.94	148.94	32.24	150.67
Alternative 3 Mod B & C	70.63	192.71	149.56	33.07	148.56
Alternative 3 Mod B & D	76.93	218.49	135.25	32.81	139.76
Alternative 3 Mod B C & D	72.19	217.26	135.88	33.63	137.64
Alternative 3 Mod C	72.26	172.32	151.85	33.07	168.69
Alternative 3 Mod C & D	73.81	196.87	138.16	33.63	157.77
Alternative 3 Mod D	78.56	198.10	137.54	32.81	159.88
Alternative 4					
Alternative 4	102.81	182.40	130.30	34.92	154.78
Alternative 4 Mod A	100.71	212.33	127.72	34.92	125.63
Alternative 4 Mod A & C	95.96	211.10	128.35	35.75	123.52
Alternative 4 Mod B	101.17	202.79	128.01	34.92	134.65
Alternative 4 Mod B & C	96.43	201.56	128.64	35.75	132.53
Alternative 4 Mod C	98.06	181.16	130.92	35.75	152.66

Source: Loop 9, Segment A Species Analysis Documentation, 2022. *Combined total acreage for Open Water and Urban vegetation. Note: The areas of overlap with the US 67 and IH 35E project are not included in these calculations.

Disturbed prairie is the most dominant vegetation community within the project area and would be the vegetation type most effected by the alternative alignments. Unmaintained vegetation includes EP savannah, woodland, and shrubland; disturbed prairie; and riparian. Alternative 3 with Modifications A, C, & D would affect the most acreage of unmaintained vegetation (396.02 acres). Alternative 4 will have the most effects to agricultural vegetation (102.81 acres) in the project area.

Under all alternative alignments, the direct effects of construction, operation, and maintenance of the new roadway ROW would add an element of disturbance to the ecosystem, and the effects would potentially alter vegetation, soils, and hydrology. Vegetation may be mowed or removed in preparation for construction. Depending on construction needs, soils would be graded or amended with fill, and heavy equipment would compact soils, which often alters drainage capability. As topography and vegetation are altered, hydrologic conditions associated with runoff and drainage flow would also change. Appropriate design measures would minimize the effects. Disturbed areas are expected to be revegetated.

Expanded upon in **Section 6** of the DEIS, the cumulative impacts of numerous secondary developments resulting from the proposed project could continue to impact vegetation. The vegetation communities occurring alongside each of the alternative alignments and modifications would be directly impacted by construction-related activities that could fragment contiguous habitat. The severance of riparian forest corridors and the potential modifications of hydrologic and nutrient cycling and transfer processes would also likely have some effect on natural communities.

Executive Order 13112 on Invasive Species

Executive Order 13112 was issued on February 3, 1999 to prevent the introduction of, to provide for the control of, and to minimize the economic, ecological and human health effects of invasive species. This project is subject to and will comply with federal Executive Order 13112 on Invasive Species. TxDOT implements this Executive Order on a programmatic basis through its Roadside Vegetation Management Manual and Landscape and Aesthetics Design Manual.

Executive Memorandum on Environmentally and Economically Beneficial Landscaping

This project is subject to and will comply with the federal Executive Memorandum on Environmentally and Economically Beneficial Landscaping, effective April 26, 1994. TxDOT implements this Executive Memorandum on a programmatic basis through its Roadside Vegetation Management Manual and Landscape and Aesthetics Design Manual.

Texas Parks and Wildlife Coordination

The purpose of the MOU between TxDOT and TPWD is to define the process for coordinating transportation projects with the TPWD to facilitate the protection of the natural environment. It is found in Title 43, Part 1, Chapter 2, Subchapter G of the TAC. Early coordination with the TPWD was initiated for Alternatives 1-4 on 12/31/2020 and completed on 03/23/2021. Early coordination with TPWD will be re-initiated on the Recommended Preferred Alternative during the FEIS. **Section 4.11** includes additional information about TPWD coordination for potential effects to threatened and endangered species.

1. The project is within the range of a state threatened or endangered species or species of greatest conservation need (SGCN) and suitable habitat is present.
2. The project may adversely impact remnant vegetation.
3. The project requires a permit issued by the USACE.
4. The project may impact more than 200 linear feet of stream channel for a single and complete crossing.
5. The project may impact at least 0.10 acre of riparian vegetation.

4.10.1.3 Encroachment-Alteration Effects

Due to the nature of this resource and its association with Wildlife Habitat, potential encroachment-alteration effects to both of these resources are discussed together in **Section 4.10.2.3**.

4.10.1.4 No-Build Alternative

The No-Build Alternative would not have any effect on the existing vegetation in the project area. The No-Build Alternative would not require coordination with TPWD.

4.10.2 Wildlife

4.10.2.1 Existing Conditions

Wildlife species within the project area are expected to be typical of both suburban habitats in the North Central Texas region and would include a diverse mix of birds, mammals, reptiles, amphibians, and fish.

Typical bird species in the project area would be expected to include American Crow (*Corvus brachyrhynchos*), American Kestrel (*Falco sparverius*), Barn Swallow (*Hirundo rustica*), Blue Jay (*Cyanocitta cristata*), Canada Goose (*Branta canadensis*), Carolina Chickadee (*Peocile carolinensis*), Cattle Egret (*Bubulcus ibis*), Chimney Swift (*Chaetura pelagica*), Eastern Meadowlark (*Sturnella magna*), European Starling (*Sturnus vulgara*), Great Blue Heron (*Ardea Herodias*), Great-tailed Grackle (*Quiscalus mexicana*), Loggerhead Shrike (*Lanius ludovicianus*), Mallard (*Anas platyrhynchos*), Mourning Dove (*Zenaida macroura*), Northern Cardinal (*Cardinalis cardinalis*), Northern Harrier (*Circus cyaneus*), Northern Mockingbird (*Mimus polyglottos*), Red-tailed Hawk (*Buteo jamaicensis*), Red-winged Blackbird (*Agelaius phoeniceus*), Scissor-tailed Flycatcher (*Tyrannus forficatus*), and Turkey Vulture (*Cathartes aura*).

Reptiles and amphibians generally identified within the area include diamondback water snake (*Nerodia rhombifera*), western ratsnake (*Pantherophis obsoletus*), red-eared slider (*Trachemys scripta elegans*), bullfrog (*Lithobates catesbeiana*), and southern leopard frog (*Lithobates sphenocephala*).

Mammals most likely to occur near the project area include the armadillo (*Dasypus novemcinctus*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), and coyote (*Canis latrans*).

In addition to terrestrial resources listed above, the project area has a variety of aquatic resources, as discussed in **Section 4.9**. In addition to open water, aquatic habitats in North Central Texas include vegetated shallows and mudflats. These aquatic habitats near the project area could include alligator gar (*Lepisosteus spatula*), carp (*Cyprinus carpio*), freshwater drum (*Aplodinotus grunniens*), and largemouth bass (*Micropeterus salmoides*).

4.10.2.2 Environmental Effects

The Build Alternative would result in direct effects to wildlife resulting from the permanent loss of habitat, habitat fragmentation, interaction/avoidance of wildlife with construction machinery.

Construction of the proposed Loop 9, Segment A would directly impact animals that reside within the path of the Recommended Preferred Alternative. As with the vegetation, wildlife communities would be impacted by the permanent loss of habitat. In addition to direct, construction-related mortality or injury, wildlife populations often suffer effects associated with displacement into adjacent habitats, which are often already at carrying capacity for that particular species. Wildlife inhabiting areas within each alternative alignment's ROW would need to relocate to adjacent habitats during vegetation clearing and earth-moving activities in order to survive. Heavy machinery and other construction equipment may cause mortality of wildlife species that are slow moving or species that seek cover in debris and fallen vegetation. Construction-related effects would be short-term and primarily occur during initial ROW clearing activities.

Habitat fragmentation is the partitioning of existing habitats along the corridor. Habitat fragmentation as a result of road and other linear projects has been well documented (Spellerberg, 1998). Habitat fragmentation reduces the value of adjacent habitats in several ways, primarily by creating multiple smaller habitats that are bisected by a dangerous or impassable obstacle. The result is a decrease in carrying capacity of adjacent habitats and an increase in the potential for animal mortality due to collisions with vehicular traffic. Fragmentation can also lead to a disruption of gene flow which can destabilize population dynamics. Numerous bridges would be required for the project, specifically at all major creeks. The majority of wooded areas and riparian areas are near these creeks. The instillation of bridges and culverts would allow for the passage of water under the roadway. These structures could also facilitate animal movement under the roadway as an additional measure to reduce habitat fragmentation.

Wildlife populations adjacent to the proposed Loop 9, Segment A project area would also be impacted by construction noise and activity that could stress or cause wildlife populations to seek refuge away from the project area. Once completed, noise and traffic activity would continue to persist, albeit at a lower level.

Because of increased noise, it is difficult to differentiate the effects of visual disturbance, habitat fragmentation, or increased mortality from the proposed roadway. Species that benefit from edge habitats and tolerate increased noise and visual disturbances would occupy the ROW upon completion of the proposed Loop 9, Segment A. Overall, it is expected that wildlife diversity and composition would be altered because of the proposed roadway. However, no substantial long-term effects to wildlife populations would result from increased noise and visual disturbances beyond the buffered area adjacent to the Recommended Preferred Alternative's ROW.

Roadway pollutants (e.g., heavy metals, salts, organic compounds, oil and grease, and suspended solids) could affect wildlife adjacent to the proposed Loop 9, Segment A. The effects would be minimized utilizing BMPs designed to limit erosion and to filter contaminants before entering aquatic systems.

Migratory Bird Protections

The Migratory Bird Treaty Act (MBTA) established a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for

transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird."

The disturbed prairie, riparian corridors, and general landscape of the project area could provide potential habitat for migratory birds protected under the MBTA. The proposed project will comply with applicable provisions of the MBTA and Texas Parks and Wildlife Code Title 5, Subtitle B, Chapter 64, Birds. It is TxDOT's policy to avoid removal and destruction of active bird nests except through federal or state approved options. In addition, it is TxDOT's policy to, where appropriate and practicable:

- use measures to prevent or discourage birds from building nests on man-made structures within portions of the project area planned for construction, and
- schedule construction activities outside the typical nesting season.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) forbids 'take' of Bald and Golden Eagle parts, nests, or eggs. The proposed project is within range of and contains suitable habitat for Bald or Golden Eagles but will not result in an incidental take. The proposed project will adhere to the National Bald Eagle Management guidelines of 2007. This project is not within 660 feet of an active or inactive Bald or Golden Eagle nest. Therefore, no coordination with USFWS is required.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) of 1958 requires consultation with the USFWS when "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified". The project is anticipated to require a Section 404 permit issued by the USACE. Compliance with the FWCA will be accomplished by complying with the terms and conditions of the nationwide permit, or through the individual standard permit application process.

4.10.2.3 Encroachment-Alteration Effects

Encroachment-alteration effects to vegetation and wildlife would primarily occur due to habitat fragmentation. The project's proposed bridges would reduce encroachment-alteration effects by providing a passage for water and wildlife under the roadway. Roadway pollutants may result in encroachment-alteration effects to wildlife adjacent to the roadway. Effects from the roadway pollutants would be minimized by implementing BMPs.

4.10.2.4 No-Build Alternative

The No-Build Alternative would not result in direct effects to wildlife. However, under the No-Build, traffic conditions on the existing roadways would have a high likelihood of increased current and future traffic congestion, affecting wildlife communities over time.

4.11 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 provided a program for the conservation of threatened and endangered species and the habitats upon which they depend. Section 7 of the ESA directs all federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act.

Under the ESA, TxDOT is required to ensure its actions are not likely to jeopardize the continued existence of listed species or adversely modify or destroy critical habitat. At the federal level, the USFWS has authority to list and monitor the status of species whose populations are considered imperiled. Additionally, at the state level, the TPWD is authorized to formulate lists of, and regulate, threatened and endangered species.

TPWD and USFWS were sent an invitation to be a Participating Agency on May 30, 2019. Participating Agencies are responsible to identify, as early as practicable, any issues of concern regarding the project's potential environmental or socioeconomic impacts that could substantially delay or prevent an agency from granting a permit or other approval that is needed for the project. TPWD accepted the invitation on June 11, 2019. Further coordination would be recorded as it occurs. All letters and responses are found in **Appendix D** of the DEIS.

Information from the TXNDD was received on March 1, 2022, which indexes the natural communities in Texas and records the occurrences of endangered/threatened species within the communities alongside the respective rarity of the communities. Information was requested for the project area and surrounding area.

4.11.1 Existing Conditions

Numerous state-listed threatened and endangered species or SGCN could occur in or near the project area. A Species Analysis Spreadsheet and Species Analysis Form were completed for the proposed project detailing the species habitat requirements and potential impacts of the project and are included as **Appendix J** of the DEIS and are available at the TxDOT Dallas District Office.

4.11.2 Environmental Effects

Field investigations/surveys were conducted in January, April, May, October, and December of 2019 and February of 2022 to determine if the listed species would occur within the project area. Field evaluations occurred in discontinuous months as further access became available. No threatened or endangered species were identified during the field surveys. Descriptions of suitable habitats in TPWD's RTEST lists were reviewed, and field work was completed by qualified biologists. Suitable habitat for six state-listed threatened or endangered species, two federally proposed threatened species, one federally listed candidate species, and 29 SGCN is potentially found in the project area.

Four species were identified on the TXNDD list within a ten-mile buffer of the project area, the Black-capped Vireo (*Vireo atricapilla*), plateau milkvine (*Matelea edwardsensis*), Hall's prairie clover (*Dalea halli*), and western box turtle (*Terrapene ornata*). Additionally, four natural vegetation communities were identified on the TXNDD list, Vertisol-Blackland Prairie, Cedar Elm-Sugar Berry Series, Ashe Juniper-Oak Series, and Little Bluestem-Indiangrass Series. None of the listed vegetation

communities were located within the ROW during a survey by a qualified biologist. The proposed project would have no impact on the vegetation communities listed. While no plateau milkvine or Hall's prairie clover plants were observed within the project area, an area of chalky, eroded soils was located immediately east of S. Joe Wilson Road within Alternatives 1-3 and potentially east of Red Oak Creek in Alternative 4 and may represent appropriate habitat for the two species. TXNDD documentation was completed for the project as part of the biological documentation and is available at the TxDOT Dallas District Office.

Early coordination with the TPWD was initiated for Alternatives 1-4 on 12/31/2020 and completed on 03/23/2021. Early coordination with TPWD will be re-initiated on the Recommended Preferred Alternative during the FEIS.

The U.S. Fish and Wildlife Service (USFWS) Official Species List was reviewed as a list of federally listed species that are within the range of the project area. Descriptions of suitable habitat were evaluated using best available resources, and field work was completed by qualified biologists. Suitable habitat was identified within the project area for two federally proposed threatened species and one federally listed candidate species, however, no suitable habitat for federally listed threatened or endangered species with a full listing status was found in the project area. The current analysis indicates no effect to federally listed species with a full listing status. If federally listed species change, those species would be analyzed and section 7 consultation with USFWS would be initiated as necessary.

4.11.2.1 Amphibians

Habitat is present within all alternatives for two SGCN amphibian species, Strecker's chorus frog and Woodhouse's toad. Suitable habitat is present for these species within the project area; therefore, the proposed project may impact these species. Aquatic Amphibian and Reptile TxDOT Beneficial Management Practices (TxDOT BMP), Terrestrial Amphibian and Reptile TxDOT BMP, Water Quality TxDOT BMP, and Vegetation TxDOT BMP would be used to minimize or avoid impacts to these species.

4.11.2.2 Birds

Habitat is present within all alternatives for two state-listed bird species, the White-faced Ibis and Wood Stork. Habitat is present for two SGCN bird species, the Bald Eagle and Western Burrowing Owl. Suitable habitat is present for these species within the project area; therefore, the proposed project may impact these species. Bird TxDOT BMP and compliance with the BGEPA (as discussed in **Section 4.10.2.2**) would be used to minimize or avoid impacts to these species.

4.11.2.3 Fish

Habitat is present within all alternatives for two SGCN fish species, the American eel and Mississippi silvery minnow. While potential habitat is present for the eel, the watershed is dammed prior to access to the coast. Therefore, impacts from the proposed project are not anticipated. Suitable habitat is present for the minnow within the project area; therefore, the proposed project may impact this species. Fish TxDOT BMP, Water Quality TxDOT BMP, Stream Crossing TxDOT BMP, and Dewatering TxDOT BMP would be used to minimize or avoid impacts to this species.

4.11.2.4 Insects

Habitat is present within all alternatives for one federally listed candidate species, the monarch butterfly. This species is currently a candidate species, and no consultation with USFWS is required at this time. However, as the project is not proposed for letting until (or after as appropriate) FY 2024 when the species is anticipated to be federally listed, additional coordination may be required at that time for the monarch butterfly. Further analysis and any potential coordination needed for this species will be revisited and further analyzed if/when the species becomes federally listed. Insect Pollinator TxDOT BMP would be used to minimize or avoid impacts to this species.

4.11.2.5 Mammals

Habitat is present within all alternatives for nine SGCN mammal species, the big brown bat, cave myotis bat, eastern red bat, eastern spotted skunk, hoary bat, long-tailed weasel, southeastern myotis bat, swamp rabbit, and the tricolored bat. Suitable habitat is present for these species within the project area; therefore, the proposed project may impact these species. Bat TxDOT BMP and General Design and Construction TxDOT BMP would be used to minimize or avoid impacts to these species.

4.11.2.6 Mollusks

Habitat is present within all alternatives for four state-listed mollusks species, the Louisiana pigtoe, sandbank pocketbook, Texas heelsplitter, and Trinity pigtoe and one federally proposed threatened species, the Texas fawnsfoot. Construction activities associated with bridge construction would take place within perennial streams and intermittent streams with perennial pools; however, permanent impacts are expected to be limited to bridge piling. Suitable habitat is present for these species within the project area; therefore, the proposed project may impact these species. Freshwater Mussel TxDOT BMP, Water Quality TxDOT BMP, and Stream Crossings TxDOT BMP would be used to minimize or avoid impacts to these species. The Texas fawnsfoot is currently a proposed threatened species, and no consultation with USFWS is required at this time. However, as the project is not proposed for letting until (or after) FY 2024, additional coordination may be required at that time for the Texas fawnsfoot. Further analysis and any potential coordination needed for this species will be revisited and further analyzed if/when the species becomes federally listed.

4.11.2.7 Reptiles

Habitat is present within all alternatives for one federally proposed threatened reptile species, the alligator snapping turtle, and six SGCN reptile species, the eastern box turtle, pigmy rattlesnake, Texas garter snake, timber rattlesnake, western box turtle and western massasauga. Suitable habitat is present for these species within the project area; therefore, the proposed project may impact these species. The Aquatic Amphibian and Reptile TxDOT BMP, Terrestrial Amphibian and Reptile TxDOT BMP, Vegetation TxDOT BMP, and Water Quality TxDOT BMP would be used to minimize or avoid impacts to these species as well as minimize impacts to wetland and riverine habitats.

4.11.2.8 Plants

Habitat is present within all alternatives for eight SGCN plant species, the Engelmann's bladderpod, Glen Rose yucca, Hall's prairie clover, Osage plains false foxglove, plateau milkvine, Sutherland hawthorn, Texas milk vetch, and tree dodder. Suitable habitat is present for these species within the

project area; therefore, the proposed project may impact these species. Rare Plant TxDOT BMP would be used to minimize or avoid impacts to these species.

4.11.3 Encroachment-Alteration Effects

Threatened and endangered species were reviewed to determine potential indirect effects. The project has the potential to indirectly impact state-listed threatened and endangered species. The following species could exist in smaller tributaries to the Trinity River: Louisiana pigtoe, sandbank pocketbook, Trinity pigtoe, and Texas heelsplitter (all state-listed threatened) and Texas fawnsfoot and alligator snapping turtle (federally proposed threatened). These waterways are expected to persist, even with increased development; however, secondary impacts such as increased sedimentation may occur. These impacts are not expected to be substantial due to erosion and sediment control requirements that will apply to new development. Encroachment-alteration effects to surface water quality is further discussed in **Section 4.9.1.4**. The impacted areas are expected to retain their value as habitat despite urban development in the area because the corridors exist in floodplains and are generally not expected to be developed. The project's direct and potential induced growth impacts to threatened and endangered species are not expected to be substantial; therefore, potential indirect effects because of encroachment-alteration impacts are not anticipated.

4.11.4 No-Build Alternative

The No-Build Alternative would not result in impacts to any listed species.

4.12 Floodplains

4.12.1 Existing Conditions

Floodplains provide important natural resources and values, including natural flood and erosion control, surface water quality maintenance, fish and wildlife habitats, recreational opportunities, and centers of cultural resources such as historic and archeological sites. According to FEMA, a floodplain is defined as a land area that is susceptible to being inundated by water from any source. Natural floodplain resources are put under pressure by increased development and land use changes.

FEMA administers the National Flood Insurance Program (NFIP), of which Dallas and Ellis Counties are participating members. Participating communities of NFIP agree to enact ordinances that meet or exceed the minimum FEMA requirements to reduce the risk of flooding.

Additionally, this project is subject to, and will comply with, federal Executive Order 11988 on Floodplain Management. The Executive Order requires actions by federal agencies to reduce the risk of flooding and effects of floods by preserving the natural and beneficial values of floodplains. This includes avoiding and minimizing development within floodplains.

The 100-year floodplain is the area where a flood has a 1% chance of occurring in any given year. This designation is important for floodplain management, and in helping determine the need for flood insurance. Development within this zone can occur, given the development meets all local and federal floodplain management regulations.

FEMA FIRM for Dallas and Ellis Counties were reviewed and the project area was investigated for encroachments into the 100-year floodplain. Portions of the project area adjacent to Sanders Branch, Red Oak Creek, Little Creek, and tributaries of Little Creek are located within the 100-year floodplain. Additionally, portions of the project area adjacent to Red Oak Creek and Little Creek are within the 500-year floodplain and the regulated floodway. The remainder of the project area is located outside of the floodplain. **Table 4-34** describes the area of the floodplains located within each alternative. The floodplains adjacent to Sanders Branch cross through Alternative 3. The floodplains adjacent to Red Oak Creek cross through Alternatives 1-4 and Modification D. The floodplains adjacent to Little Creek and tributaries of Little Creek cross through the proposed project in the area of the Common Alignment and Modification C, as shown in **Appendix L**.

Table 4-34: Floodplains within the Project Area

Project Area	100-year floodplain (acres)	500-year floodplain (acres)	Regulated floodway (acres)
Alternative 1			
Alternative 1	18.6	6.7	1.4
Alternative 1 Mod A	18.6	6.7	1.4
Alternative 1 Mod A & C	19.0	8.3	1.8
Alternative 1 Mod B	18.6	6.7	1.4
Alternative 1 Mod B & C	19.0	8.3	1.8
Alternative 1 Mod C	19.0	8.3	1.8
Alternative 2			
Alternative 2	17.8	4.3	1.3
Alternative 2 Mod A	17.8	4.3	1.3
Alternative 2 Mod A & C	18.3	5.8	1.7
Alternative 2 Mod B	17.8	4.3	1.3
Alternative 2 Mod B & C	18.3	5.8	1.7
Alternative 2 Mod C	18.3	5.8	1.7
Alternative 3			
Alternative 3	22.3	4.3	1.3
Alternative 3 Mod A	22.3	4.3	1.3
Alternative 3 Mod A & C	22.8	5.8	1.7
Alternative 3 Mod A & D	24.1	4.3	1.3
Alternative 3 Mod A C & D	24.5	5.8	1.7
Alternative 3 Mod B	22.3	4.3	1.3
Alternative 3 Mod B & C	22.8	5.8	1.7
Alternative 3 Mod B & D	24.1	4.3	1.3
Alternative 3 Mod B C & D	24.5	5.8	1.7
Alternative 3 Mod C	22.8	5.8	1.7
Alternative 3 Mod C & D	24.5	5.8	1.7

Table 4-34: Floodplains within the Project Area (continued)

Project Area	100-year floodplain (acres)	500-year floodplain (acres)	Regulated floodway (acres)
Alternative 3 (continued)			
Alternative 3 Mod D	24.1	4.3	1.3
Alternative 4			
Alternative 4	12.2	6.5	1.8
Alternative 4 Mod A	12.2	6.5	1.8
Alternative 4 Mod A & C	12.7	8.1	2.1
Alternative 4 Mod B	12.2	6.5	1.8
Alternative 4 Mod B & C	12.7	8.1	2.1
Alternative 4 Mod C	12.7	8.1	2.1
Source: FEMA, 2014.			

4.12.2 Environmental Effects

This project is federally funded and therefore is subject to Executive Order 11988, Floodplain Management, and will not involve a significant encroachment in the floodplain.

The proposed project could increase the surface water runoff in the area through an increase in impervious cover of the roadway. Complete avoidance of floodplains by the proposed project is not possible due to the location of floodplains in the area. However, the surface water runoff and the effect to floodplains would be minimized by applicable mitigation measures in the design of the roadway. These mitigation measures include the installation of culverts or the construction of bridges, where applicable, which reduces the effects of flooding along those features.

Additional design features to help minimize effects to floodplains, such as detention facilities, would be incorporated into the proposed project based on municipal guidelines in the area. The proposed project would follow local flood damage prevention ordinances for the municipalities of Cedar Hill, Ovilla, Glenn Heights, Red Oak, DeSoto, and Midlothian as defined in the following:

- Cedar Hill: Code of Ordinances, Chapter 7 – Flood Damage Prevention, Ordinance 2021-740, adopted October 26, 2021
- Ovilla: Code of Ordinances, Article 3.04 – Flood Hazard Prevention, Ordinance 2021 – 16, adopted July 19, 2021
- Glenn Heights: Code of Ordinances, Article 3.12 Flood Damage Prevention Regulations, Ordinance O-05-21 adopted November 16, 2021
- Red Oak: Code of Ordinances, Article 3.03 – Flood Damage Prevention, Ordinance 21-013 adopted May 10, 2021

As noted, both Dallas and Ellis Counties participate in the NFIP. The project will be coordinated with the county floodplain administrators. Additionally, design of this project will be conducted in accordance with the standards contained in the TxDOT Hydraulic Design Manual.

4.12.3 Encroachment-Alteration Effects

Each of the proposed project alternatives could result in encroachment within a regulatory floodplain. The proposed project would increase impermeable surfaces and have the potential to indirectly affect sediment and pollutant loading in flood hazard areas as mapped by FEMA. However, floodplain management regulations and design standards would require that the proposed project be designed so as not to alter base flood elevations and not cause adverse flood effects to upstream or downstream properties. The proposed project would include mitigation measures such as placing the roadway on columns instead of embankment, and/or collaborating with county flood administrators on a regional approach to addressing flooding issues in the vicinity of the proposed project. The hydraulic design and analysis conducted during the design phase of the proposed project would address encroachment alteration effects to the regulatory floodplains.

4.12.4 No-Build Alternative

The No-Build Alternative would have no construction within a floodplain, therefore would have no effects to floodplains.

4.13 Cultural Resources

Cultural resources are buildings, structures, objects, sites, and districts. Both state and federal laws mandate the consideration and protection of cultural resources during the project planning stage. At the federal level, NEPA and the NHPA of 1966 (among others) would apply to transportation projects such as the proposed project. At the state level, state laws (e.g., the Antiquities Code of Texas) would apply to transportation projects.

Compliance with all laws often requires consultation with the Texas Historical Commission (THC), the Texas State Historic Preservation Office, and/or federally recognized tribes to determine the proposed roadway's effects on cultural resources. Review and coordination of the proposed project would follow approved procedures for compliance with state and federal laws.

4.13.1 Archeological Resources

4.13.1.1 Existing Conditions

An Archeological Resources Background Study has been prepared for the proposed project in 2020 and is on file at the TxDOT Dallas District office. Background research for this project consisted of an online records search through the THC's Archeological Sites Atlas (Atlas, 2020) and the Potential Archeological Liability Map (PALM) for the Dallas District, as well as a review of historical aerial and geologic maps, and current soil surveys. Research focused on the identification of archeological sites, sites listed as State Antiquities Landmarks (SAL), Recorded Texas Historic Landmarks (RTHL), sites listed on the National Register of Historic Places (NRHP), cemeteries, and previously conducted archeological surveys within one kilometer (0.62 miles) of the area of potential effects (APE).

The APE for the archeological resources is defined as the project footprint of Alternatives 1 – 4, to the maximum depth of effect, including all easements, and project specific locations (**Appendix F**). The vertical APE would extend less than four feet deep throughout the project area, except at new bridge locations where effects will extend more than 25 feet subsurface.

Three archeological surveys were identified within a kilometer of the APE of Alternatives 1 – 4, one of which overlaps with the APE along Red Oak Creek. The survey along Red Oak Creek was conducted by AR Consultants on behalf of the Trinity River Authority in 2011 and no sites were recorded as a result of the study. Additionally, one archeological site (41EL26) was identified within a kilometer of the APE. Site 41EL26 is a prehistoric campsite recorded by Thos. B. Gwin in 1940. Gwin recorded this site as approximately 50 x 40 yards in dimension and heavily eroded. Surface material within the site included scrapers, arrowheads, manos, and limestone fist axes and hoes. No eligibility recommendations for NRHP or a SAL have been made for 41EL26 and the site is located south of the APE in an area that will not be impacted by the proposed project.

Less than 25% of the APE of Alternatives 1 – 4 has been previously surveyed. The PALM for the proposed project depicts moderate to high potential for buried prehistorical cultural deposits along creek banks and adjacent terraces in the APE and low to moderate potential elsewhere in the APE. Previous surveys have not covered a sufficient proportion of the APE or adjacent areas to draw inferences regarding the presence of archeological sites and cemeteries within the APE for the proposed project. Additionally, a review of historic maps and aerial photographs determined that there is potential for historic sites to be present in the project area. The background study found that there is potential to preserve sites present in the APE that potentially qualify for inclusion in the NRHP.

4.13.1.2 Environmental Effects

An Interim Report for Archeological Survey (**Appendix F**) was prepared on the four alternatives in 2020 and is on file at the TxDOT Dallas District Office. Fieldwork for the proposed project was conducted under Antiquities Permit 9195. Fieldwork, including an intensive archeological survey of a portion of the 1,110.63-acre APE, occurred January 8 - 13, 2020. The intensive archeological survey included a pedestrian survey, 588 shovel tests, and five backhoe trenches, supplemented with visual inspection of all visible portions of the APE within and from accessible portions of the APE. Disturbances documented within the APE include rural residential and agricultural development, roadway construction, and utility and drainage installations throughout and adjacent to much of the APE. Of the 1,110.63-acre APE only 602.53 acres were accessible at the time of survey. Approximately 508.1 acres of the APE were not accessible at the time of survey due to lack of ROE.

Two newly recorded sites (41DL556 and 41DL557) were documented during the survey. Both sites are mid-twentieth century homesteads and neither were recommended eligible as SALs or for listing on the NRHP.

No further archeological investigations are warranted within 671.53 acres of the APE prior to construction activities for the proposed project. This includes 602.53 acres that were accessible and intensively surveyed and 69 acres from parcels where ROE was denied. The visual inspection of the 69 acres was completed from accessible portions of the APE, and these areas were recommended for no further work due to existing disturbances. Additional archeological investigation was recommended for the 439.1 acres of the APE once access becomes available.

Additionally, an Archeological Background Study was prepared in March of 2022 as a continuation of the previous investigations to evaluate Modifications A – D is on file at the TxDOT Dallas District

office. The APE is defined to encompass the limits of the existing ROW; proposed, new project ROW; permanent and temporary easement; and any project-specific locations and utility relocations designated by TxDOT.

Site 41DL557 was documented on the initial survey for this project and overlaps with Design Modification D. No other sites have been documented within 150 feet of the Design Modifications, though two sites (41DL556 and 41EL26) have been documented within a kilometer of the Design Modifications.

Previous surveys have not covered a sufficient proportion of the APE or adjacent areas to draw inferences regarding the presence of archeological sites and cemeteries within the APE for the Design Modifications. Additionally, a review of historic maps and aerial photographs determined that there is potential for historic sites to be present in the project area. The background study found that there is potential for intact, potentially NRHP eligible sites to be present in the APE.

Though a survey was conducted for this project under Permit 9195, there were several areas adjacent to the proposed Design Modifications where ROE was not granted and/or the Modifications extend a significant distance away from the original alignments, so survey results cannot confidently be applied to the Design Modification areas. Once a Recommended Preferred Alternative has been approved as part of the DEIS process, all portions of the alternative and modifications within that Recommended Preferred Alternative not previously surveyed, are recommended to be surveyed.

If any unanticipated cultural materials or deposits are found at any stage of clearing, preparation, or construction, the work should cease in that area and TxDOT personnel should be notified immediately. While any unanticipated finds are being evaluated and coordination is ongoing between TxDOT and the THC, clearing, preparation, and/or construction could continue in any other areas along the corridor where no such deposits or materials are observed.

Evaluation of effects to cultural resources has been conducted under Section 106 of the NHPA in accordance with the Programmatic Agreement among FHWA, TXDOT, the Texas State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings. TxDOT concurred with the recommendations and findings of the Intensive Archeological Survey Interim Report for the proposed project on June 1, 2020, and the archeological recommendations provided in the 2022 Archeological Background Study on April 25, 2022. Additional field work will be conducted on the Recommended Preferred Alternative once remaining ROE is obtained.

Native American Concerns

The National Historic Preservation Act (NHPA) was passed in 1966 “in order to protect significant historic resources from destruction, alteration, and neglect.” When considering cultural resources, the tribal consultation process is guided by the NHPA.

The tribal consultation process allows TxDOT “to work with tribes to identify and determine any potential effect the project will have on places of cultural significance to the tribes, including

prehistoric archeological sites and cemeteries. TxDOT works with 27 federally recognized Native American nations with an interest in preserving Texas history."

TxDOT initiated project-specific consultation under Section 106 of the NHPA with the Kiowa Tribe, Mescalero Apache Tribe, Wichita and Affiliated Tribes, Caddo Nation, Cherokee Nation, Tonkawa Tribe of Oklahoma, and Comanche Nation of Oklahoma on June 2, 2020. On July 1, 2020, the Cherokee Nation responded that the project would have no effect on sites of cultural or religious significance to them. No other tribe has objected or otherwise responded. TxDOT also coordinated with the Texas Historical Commission in compliance with the Antiquities Code of Texas and Section 106 of the National Historic Preservation Act. THC concurred with the findings of the survey conducted for this project on October 22, 2020. Coordination with THC and federally recognized tribes will resume once access to the remaining unsurveyed portions of the APE has been obtained and those studies have been completed.

4.13.1.3 Encroachment-Alteration Effects

Areas within the APE where surveys have occurred, and no archeological resources were identified are not anticipated to have encroachment alteration effects. Encroachment-alteration effects will be further evaluated after ROE is obtained and are required additional or surveys for archeological resources

4.13.1.4 No-Build Alternative

The No-Build Alternative would have no effects to archeological resources and would not require additional archeological studies to be performed.

4.13.2 Historical Non-Archeological Properties

4.13.2.1 Existing Conditions

A Project Coordination Request for Historic Studies Project was prepared in May of 2019 and a Historical Resources Survey Report documenting the results of a reconnaissance survey was prepared in June of 2020. The Historical Resources Survey Report is included as **Appendix I.**

The historical resources reconnaissance survey was conducted on October 28 and 29 and April 10, 2020, within the APE of Alternatives 1-4. The survey identified and documented 84 properties with historic-age resources within the project area. None of the properties were listed in the NRHP. Following evaluation of the surveyed properties, project historians recommended that 80 of the properties were not eligible for listing in the NRHP.

A Project Coordination Request for Historical Studies Project was prepared in March of 2022 as a continuation of the previous investigations due to the need for investigations of Modifications A–D and is on file at the TxDOT Dallas District office. Per the previous coordination, the APE for the Design Modifications was recommended to be 300 ft from the proposed ROW. No additional reconnaissance survey was required for the Design Modifications.

4.13.2.2 Environmental Effects

TxDOT historians conducted a review of the remaining four properties that were inaccessible during field surveys and determined project activities have no potential for adverse effects, and individual project coordination with SHPO is not required.

TxDOT historians conducted a review of revised APE due to Modifications A-D and determined there would be no affect to any historic properties.

In compliance with the Section 106 PA, TxDOT historians made a determination of no effect to historic properties under Section 106 on April 7, 2022. In compliance with the Antiquities Code of Texas and the MOU, TxDOT historians determined project activities have no potential for adverse effects.

The proposed project is not anticipated to have a cumulative effect for the reasonably foreseeable future as the existing patterns of change appear to be independent of the roadway's construction. The project area has been subjected to continuous development since the historic period, particularly suburban neighborhood growth.

No related Section 4(f) effects would be anticipated for any of the alternative alignments and modifications. None of the surveyed historic-age resources were in public recreational areas, therefore Section 6(f) of the Land and Water Conversion Fund Act is not applicable.

4.13.2.3 Encroachment-Alteration Effects

Because there are no historic resources within the APE, there would be no encroachment alteration effects to NRHP-listed or eligible historic resources identified for the proposed project alternatives.

4.13.2.4 No-Build Alternative

The No-Build Alternative would have no effect to historic resources.

4.14 Section 4(f)

Section 4(f) of the USDOT Act of 1966 prohibits the use of publicly owned park and recreation lands, wildlife and waterfowl refuges, and historic properties for transportation project unless there are no feasible and prudent alternatives.

There are no publicly owned park and recreation lands, or wildlife and waterfowl refuges present in the project area. As discussed in **Section 4.13** four properties with historic age resources were identified in the Historical Resources Survey Report. The NRHP eligibility for those resources is undetermined; therefore, further study was recommended to determine eligibility and potential Section 4(f) effects. This future analysis will be documented in the FEIS or when additional ROE is granted for these properties.

The No-Build Alternative would have no effects to Section 4(f) resources.

4.15 Hazardous Materials

4.15.1 Hazardous Materials

4.15.1.1 Existing Conditions

A Hazardous Materials Initial Site Assessment (ISA) was conducted in 2020 and a re-evaluation ISA was prepared in 2022 after project area modifications were made. The ISAs were prepared to determine the potential for encountering hazardous substances and/or contamination within the proposed project. The ISA reports are available at the Dallas District Office. The preliminary investigations included a review of federal and state databases, historical aerial photographs and maps, and a visual survey of the project area. Visual observations were made during field reconnaissance in January, April, May, October, and December 2019, and February 2022 to verify the findings of the regulatory database reports and to observe the general environmental conditions at the listed facilities and on properties located immediately adjacent to and within proposed ROW of the proposed project.

A review of regulatory database reports dated February 13, 2020, and December 15, 2021, was performed in general accordance with the American Society for Testing Materials (ASTM) Standard E 1527 and TxDOT guidelines, which defines the environmental record sources to be reviewed and their minimum search distances from the project area. The regulatory database listings include those sites that are regulated facilities, facilities/sites known by the regulatory agencies to be contaminated or facilities that are in the process of evaluation for potential contamination at the time of publication. The regulatory database reports also identify federal and state regulated sites that could be within the standard search area but were unplottable due to insufficient address or other locator information.

The following regulatory database listings were identified on the radius report:

- Affected Property Assessment Report (APAR): An APAR is required when a TCEQ regulated facility is addressing a release of a chemical of concern (COC) and documents all relevant affected property information to identify all release sources, COCs, exposure pathways, etc. under the Texas Risk Reduction Program (TRRP). One APAR was identified within a search radius of 0.5 miles.
- Brownfields Management System (BF and FED Brownfields): Brownfields are properties that have the potential presence of a hazardous substance, pollutant, or contaminant. The database is maintained by the United States EPA. One Brownfields site (listed as FED Brownfields on the database report) was identified within a search radius of 0.5 miles.
- Municipal Solid Waste Landfill Sites (MSWLF): The MSWLF database includes permitted active, inactive, and post closure landfills, where solid waste is treated and/or stored. The database is maintained by the TCEQ. One Permitted Solid Waste Facilities (SWF/LF) was identified within a search radius of 0.5 miles.
- Closed Landfill Inventory (CLI): The database is an inventory of permitted and unauthorized closed or abandoned landfills. The database is maintained by the TCEQ in collaboration with NCTCOG. One CLI site was identified but was confirmed to be outside 0.5 miles of the project.

- Petroleum Storage Tanks (PST): The PST database includes underground storage tanks (UST) and aboveground storage tanks (AST). The database is maintained by the TCEQ. One AST and two UST sites were identified within the database report search radius of 0.25 miles. Additionally, two PST sites were identified on the February 2020 database report search that were not on the 2021 regulatory database report search based on the project area modifications. These two sites are not environmental concerns for the project. For the ISA, the ASTM search radius of "property and adjoining property" is used.
- Voluntary Cleanup Program Sites (VCP): This program encourages the cleanup of contaminated sites in Texas. The program is maintained by the TCEQ. One VCP site was identified within a search radius of 0.5 miles.

The regulatory database searches identified 10 regulatory listings at nine sites (based on addresses) within the ASTM search radii. **Table 4-35** identifies each site with its location relative to the proposed project and a summary of the regulatory database listings at each site. The nine sites identified were determined to pose a low environmental risk or no environmental concern to the proposed project. Locations and corresponding regulatory sites and relative risk levels are shown in **Appendix H.** All sites identified and a complete listing of the federal and state regulated databases searched are located in the radius reports in the Hazardous Materials ISAs which are available for review at the TxDOT Dallas District office or online at www.txdot.gov/loop9.

Table 4-35: Summary of Hazardous Materials Sites

Map ID[1]	Site Name	Location in Reference to Project	Regulatory Database Listing(s)	Environmental Concern
1	Tiger Mart 65	The property is adjacent to the Common Alignment; ROW acquisition proposed from site. However, the tank hold is approximately 70 ft. E of the proposed ROW.	UST	Low Risk
4 & 7	Meadow Springs	Approximately 850 ft N of the Common Alignment and Modification C.	APAR VCP	No Concern
5	City of Glenn Heights	Within the proposed ROW acquisition of the Common Alignment, entire site for Modification B, and a small portion of site for Modification A.	SWF/LF	Low Risk
8*	Richland Towers	Approximately 810 ft S of the Common Alignment.	AST	No Concern
9*	Hanson Concrete Products	Approximately 685 ft S of the Common Alignment at the western end of the project.	UST	No Concern

Table 4-35: Summary of Hazardous Materials Sites (continued)

Map ID[1]	Site Name	Location in Reference to Project	Regulatory Database Listing(s)	Environmental Concern
10*	No Name	Approximate location identified as 4,500 feet N of the project area along Bear Creek Road.	CLI	No Concern
11	Gateway Estates Subdivision	Approximately 740 ft N of Modifications A and B.	FED Brownfields	No Concern
2020 Map ID 3	City of Cedar Hill Public Works	Adjacent NW of Alternative 4; small portion of ROW acquisition proposed from the site.	PST	Low Risk
2020 Map ID 8	JD Abrams Dallas	Adjacent south of the Common Alignment; small portion of ROW acquisition proposed.	PST	Low Risk

[1]Map ID number from the Dec. 2021 regulatory report and corresponds to locations shown in Appendix H.
*Map ID numbers from the Dec. 2021 regulatory report, but not shown in Appendix H.
Source: Loop 9, Segment A Hazardous Materials ISA, 2022.

4.15.1.2 Environmental Effects

The city of Glenn Heights site (Map ID 5) was determined to be a moderate risk to the construction of the proposed project in the 2020 ISA. This site is within the proposed ROW of the Common Alignment and Modifications A and B.

Further investigation was performed on the moderate risk site in Sept 2020 by TxDOT ENV Division Hazardous Materials Management (ENV-HMM). ENV-HMM determined the likelihood of encountering landfill debris and/or contaminants at Map ID 5 would be low based on the site being a transfer station. Any debris and the 55-gallon drums observed onsite would be handled and removed through the District ROW Department after ROW acquisition as well as any necessary sampling. Based on ENV-HMMs determination, the site was given a low environmental risk in the 2022 ISA. All sites identified on the 2020 and 2022 ISAs were determined to pose a low environmental risk or are not considered environmental concerns to the proposed project.

The proposed project includes the demolition and/or relocation of buildings within the proposed ROW. The buildings may contain asbestos or lead paint containing materials. Asbestos and lead paint inspections, specifications, notification, license, accreditation, abatement, and disposal, as applicable, would comply with federal and state regulations. Asbestos issues would be addressed during the ROW acquisition process prior to construction.

The proposed project includes the reconstruction of two bridge structures and one bridge class culvert. Applicable asbestos and lead-based paint inspections, specification, notification, license, accreditation, abatement and disposal, would follow federal, state, and local regulations. Bridge structure asbestos and/or lead-based paint issues would be addressed prior to construction.

During construction, the contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in construction staging areas. The use of construction

equipment within sensitive areas should be minimized or eliminated. All construction materials used for this project should be removed as soon as the work schedule permits. The contractor would initiate early regulatory agency coordination during project development.

Should unanticipated hazardous materials or substances be encountered during construction, TxDOT and/or the contractor would be notified, and steps would be taken to protect personnel and the environment. Any unanticipated hazardous materials encountered during construction would be handled according to applicable federal, state, and local regulations per TxDOT Standard Specifications.

4.15.1.3 Encroachment-Alteration Effects

Encroachment alteration effects are those that affect the functions of the natural or human environmental due to the proposed project features. Hazardous materials are not considered to be a natural or human environment, or a function of the natural or human environment. Therefore, encroachment alteration effects relative to hazardous materials would not occur for the proposed project alternatives.

4.15.1.4 No-Build Alternative

The No-Build Alternative would not have any environmental consequences on potential hazardous materials sites located near the proposed project.

4.15.2 Oil and Gas Well Sites

4.15.2.1 Existing Conditions

A review of the Railroad Commission of Texas (RRC) well bore database indicated there are no oil/gas wells located within the project area or within one mile of the project area; therefore, no effect to oil/gas wells is anticipated from the proposed project.

A review of the RRC database indicated that five active pipelines are located within a 1.0-mile radius of the proposed project. Of these five, one natural gas and two refined liquid petroleum product pipelines transect the project area. The natural gas pipeline transects the project through the common alignment and the two refined liquid petroleum product pipelines transect the project through Alternatives 1-4 west of S. Joe Wilson Road.

4.15.2.2 Environmental Effects

Based on the contents of the natural gas pipeline, this feature is not considered an environmental concern for the proposed ROW. The refined petroleum liquids pipelines are considered an environmental concern based on their contents. Excavations at these pipelines could cause a rupture. Extreme caution should be used when working near all three pipelines. Formal utilities location and advance planning would be required to facilitate pipeline and utilities adjustments and to otherwise avoid associated effects in the proposed design. TxDOT Dallas District Subsurface Utility Engineering Coordinator and ROW will be responsible for the adjustments and displacements. For these existing natural gas and petroleum pipelines to remain in place, TxDOT and its contractor would perform surveys and dig tests to determine exact coordinates and depth of utility lines. The approximate location of the active pipelines crossing the project area are shown in **Appendix H.**

4.15.2.3 Encroachment-Alteration Effects

Encroachment alteration effects are those that affect the functions of the natural or human environmental due to the proposed project features. Hazardous materials are not considered to be a natural or human environment, or a function of the natural or human environment. Therefore, encroachment alteration effects relative to hazardous materials would not occur for the proposed project alternatives.

4.15.2.4 No-Build Alternative

The No-Build Alternative would have no effect oil and gas wells in the area.

4.16 Visual and Aesthetic Qualities

4.16.1 Existing Conditions

Visual and aesthetic qualities of an area include topography, natural areas, vegetation, scenic vistas, water features, recreational parks, historic features, buildings, bridges, businesses, and residences. Existing visual and aesthetic resources in the study area can be viewed by drivers and passengers, pedestrians within subdivisions, and visitors of businesses and residences. The proposed project is a new location roadway. The area that the proposed alternatives and modifications are located within consist of a mix of residential and agriculture land, with commercial properties located along US 67 and IH 35E. Views throughout the study area currently consist of high-density subdivisions, residences on large lots, and open maintained and unmaintained agriculture fields. Views in the vicinity of US 67 and IH 35E also include commercial businesses and highways.

4.16.2 Environmental Effects

The visual effects of the proposed project would vary by location. The proposed Loop 9, Segment A would be constructed at grade, which limits the degree of effects to visual resources. The greatest effects to the viewshed would be at intersections because of the concentration of roadways and traffic lights required at these locations. For all alternatives, intersections are proposed at Tar Road, future Clark Road, South (S.) Joe Wilson Road, S. Duncanville Road, S. Cockrell Hill Road, S. Westmoreland Road, Hampton Road, and Uhl Road. The study area is relatively flat; therefore, the viewsheds from the proposed project would be limited. For Alternatives 1 – 4, the proposed project would require an elevated bridge over the BNSF railroad that would provide the opportunity for elevated views of the area. For Alternatives 1 – 4, the proposed project would include the bridging of Red Oak Creek, Little Creek, and tributaries of Little Creek, allowing for viewing opportunities of the streams from the bridges. Additionally, for Alternative 1, the proposed project would include the bridging of a tributary of Red Oak Creek. For Modification C to the Common Alignment, the proposed project would include the bridging of Little Creek and tributaries of Little Creek. For Modification D to Alternative 3, the proposed project would include the bridging of the floodplain of Red Oak Creek and Red Oak Creek.

The proposed project may include safety lighting which may negatively affect visual and aesthetic qualities. During final design, the design of light fixtures would be completed. Additional lighting, aesthetics, and enhancements will be coordinated through local municipalities. Local, state, and federal requirements would be reviewed during design and designation of additional lighting required for this project.

Where reasonable and feasible, mitigation measures that would result in beneficial visual and aesthetic treatments may be programmed for this project. These measures may include aesthetic enhancements, such as landscaping, lighting, and/or decorative details. Aesthetics treatments would be developed during final design and incorporated into the project design as appropriate.

4.16.3 Encroachment-Alteration Effects

Encroachment-alteration effects are not anticipated because no changes beyond the Recommended Preferred Alternative is anticipated.

4.16.4 No-Build Alternative

Under the No-Build Alternative, there would be no visual or aesthetic impact within the study area because the No-Build Alternative would not directly alter any visual or aesthetic resource.

4.17 Utility Relocation

It has not yet been determined whether the dislocated utilities will be re-installed within the highway right-of-way, or to a location outside the highway ROW. However, the potential effects resulting from re-installation of the displaced utilities within the highway right-of-way have been considered as part of the overall project footprint effects (e.g., construction noise, potential disturbance to archeological resources, and potential effects to species habitat) within this DEIS. To the extent that the owner of any displaced utility determines to re-install the displaced utility at a location outside of highway right-of-way, such location will be determined by the owner of the utility subject to the rules and policies governing the utility relocation process. Additionally, the owner of the utility will be responsible for acquiring any easements outside the highway right-of-way and ensuring that the design and construction meet all regulatory and environmental compliance requirements. See 43 TAC 21.37(a)(9), (g)(1)), and (g)(4); 43 TAC 21.38(e)(2).

4.18 Relationship between Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

Transportation improvements are based on comprehensive planning which considers the need for present and future traffic requirements within the context of present and future land use development. The local short-term effects and use of resources by the proposed action is consistent with the maintenance and enhancement of long-term productivity for the area. Each of the Reasonable Alternatives identified in **Section 3.3** would involve short-term uses of man's environment, as detailed elsewhere in **Section 4**.

Aside from the construction-phase effects discussed throughout **Section 4**, which would be temporary, most of the environmental effects discussed for the Reasonable Alternatives would be, for purposes of this environmental analysis, permanent in the sense that the various build alternatives would be expected to serve the intended transportation function indefinitely. In other words, each of the Reasonable Alternatives would permanently convert the pre-existing natural and man-made resources to a transportation use, and such resources would no longer exist, and therefore would no longer contribute to the maintenance and enhancement of the environment's productivity.

The Reasonable Alternatives would, however, enhance the "productivity" of the transportation system which would have long-term benefits for users of the transportation system. The primary long-term benefits of the proposed project are transportation improvements: increased capacity, mobility, and regional system linkage. These benefits offered by the long-term productivity of this project should offset the short-term adverse effects on the natural, physical, and human environments.

4.18.1 No-Build Alternative

Under the No-Build Alternative, there would be no short-term uses of man's environment, but also no transportation-related benefits, and so the transportation-related problems discussed in **Section 2.1** would persist.

4.19 Irreversible or Irretrievable Commitment of Resources

Construction of each of the Reasonable Alternatives identified in **Section 3.3** would irreversibly and irretrievably commit natural, physical and human resources to transportation use. The commitment of land to project ROW would require between approximately 586 and 607 acres depending on which of the alternative alignments and modifications is selected. Land used for the project would be considered an irreversible commitment during the period that the land is used for a transportation purpose. This land includes residential and commercial properties, natural areas, etc. Additionally, each of the Reasonable Alternatives would irreversibly and irretrievably expend considerable amounts of labor, fuel, and highway construction materials such as aggregate, cement, sand, and iron ore for steel products. These materials are generally not retrievable.

Construction would also require an expenditure of fossil fuels to supply construction equipment and worker vehicles. Although fossil fuel is an irretrievable resource, the amount expended during construction could be offset by the benefits of improved regional mobility that could improve fuel efficiency through a reduction of transportation travel times and traffic congestion.

Any construction will also require a substantial one-time expenditure of both state and federal funds which are not retrievable. The decision to commit these resources for construction of the proposed project would be based on the concept that residents in the area, region, and state would benefit by the improved quality of the regional transportation system. The benefits would include improved mobility and roadway safety, travel time savings by providing a new east-west transportation facility, and a transportation infrastructure designed to support population growth.

4.19.1 No-Build Alternative

Under the No-Build Alternative, there would be no irreversible or irretrievable commitment of resources, but also no transportation-related benefits, and so the transportation-related problems discussed in **Section 2.1** would persist.

4.20 Possible Conflicts between the Proposed Action and the Objectives of Federal, Regional, State, Tribal, and Local Land Use Plans, Policies and Controls for the Area Concerned

None of the Reasonable Alternatives identified in **Section 3.3** would involve known conflicts with the objectives of federal, regional, state, tribal, or local land use plans, policies and controls for the area concerned. Tribal coordination was initiated on June 2, 2020. On July 1, 2020, the Cherokee Nation responded that the project would have no effect on sites of cultural or religious significance to them. No other tribe has objected or otherwise responded. Coordination with THC and federally recognized tribes will resume once access to the remaining unsurveyed portions of the APE has been obtained and those studies have been completed as discussed in **Section 4.13.1.2**.

4.21 Energy Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

Each of the Reasonable Alternatives identified in **Section 3.3** would require the consumption of energy, both in terms of construction and operation of the project.

Energy, in the form of various fossil fuels and electricity, would be necessary during construction, maintenance, and future repair of the project. ROW clearing; road base grading and preparation; construction of bridges; and travel lane ramp installations would require varying levels of energy inputs. Following construction, routine maintenance of the ROW and travel lanes, and roadway repairs conducted on an as-needed basis, would also require energy inputs. Petroleum fuels are currently the primary type of energy required for construction, maintenance, and repair activities. Changing vehicle and fuel technology such as electric or hydrogen fuel options may alter the use of petroleum fuels in the future. Necessary fuel supplies would be expected to be available from fuel storage or vending sources in the area. Electrical demand for each of the Reasonable Alternatives would not affect the electrical supply characteristics of the region.

Regarding operation, roadway traffic would likely be the largest contributor to energy consumption over the lifetime of the facility. Energy consumption related to use of the facility would be dependent on vehicle efficiency, which includes such variables as roadway geometry, surface conditions, weather conditions, and traffic flows. Vehicle and fuel technology will likely reduce the need for future petroleum products in operational energy requirements in ways that cannot be accurately estimated now. However, each Reasonable Alternative would increase energy efficiency over existing conditions by decreasing congestion, decreasing travel times, and increasing system connectivity.

Energy conservation measures that would be considered for the Recommended Preferred Alternative will be discussed in the FEIS; however, full consideration would be given to energy conservation. Several mitigation strategies have been contemplated that could reduce the amount of construction energy consumed, including but not limited to the following:

- The proposed design maximizes balanced earthwork for the corridor. This means that the amount excavated material would be approximately equivalent to embankment fill material, resulting in reduced haulage of material.

- Proposed improvements include 8' wide shoulders allowing bicycles. The proposed typical section also a 10' wide berm within the proposed ROW to facilitate future pedestrian and shared use paths in coordination with Cities and NCTCOG veloweb plan.
- The proposed improvements are for a new location facility, the proposed ROW will accommodate 6 lane frontage road facility and a future controlled access mainlane facility. The ROW preservation for future mainlanes would allow ample space for construction staging and material storage during construction within the proposed ROW. This will minimize material haul travel time.
- The frontage road facility would be constructed in two phases. Phase 1 would include one roadbed and provide a two-way operation. Phase 2 would build the second roadbed, completing the 6-lane frontage road facility. Phase 1 construction would include all of the proposed interchange improvements. Therefore, Phase 2 construction would have minimal disruption to the existing traffic on the corridor.
- Standardized design parameters have been used such as common span lengths for standard beam sizes. This will allow for mass production of material and potentially lower costs. The design also proposes uniform retaining wall type, i.e. MSE wall, throughout the project. The retaining wall finish would be ashlar resulting in standardized formwork.

4.21.1 No-Build Alternative

Under the No-Build Alternative, the proposed Loop 9, Segment A project would not be built, which would not result in any associated energy consumption for construction and operation of the new roadway facility within the proposed project area. Additionally, under the No-Build Alternative, no transportation-related benefits would be realized, and so the transportation-related problems discussed in **Section 2.1** would persist. However, congestion would continue to increase on local arterial roadways, and travelers would not have any additional roadway options to accommodate travel within the study area and larger region. The lack of travel options would lead to increased travel times and energy consumption in and around the study area.

4.22 Natural or Depletable Resource Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

As stated elsewhere in **Section 4** of this DEIS, each of the Reasonable Alternatives identified in **Section 3.3** would reduce natural and depletable resources, including energy resources, such as the fossil fuels that would be consumed by the construction equipment. Natural or depletable resource conservation requirements, or BMPs, that would be implemented are discussed under each natural resource discussed in **Section 4** of the DEIS.

4.22.1 No-Build Alternative

Under the No-Build Alternative, there would be no use of natural or depletable resources for construction, but also no transportation-related benefits, and so the transportation-related problems discussed in **Section 2.1** would persist.

4.23 Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment, including the Reuse and Conservation Potential of Various Alternatives and Mitigation Measures

The proposed project's effects on urban quality, historic and cultural resources, and the design of the built environment are addressed in **Section 4.4** ("Social Characteristics"), **Section 4.13** ("Cultural Resources"), and **Section 4.16** ("Visual and Aesthetic Qualities"). Mitigation measures relating to these areas are also discussed in those sections.

4.24 Greenhouse Gas and Climate Change

TxDOT has prepared a Statewide On-Road Greenhouse Gas Analysis and Climate Change Assessment technical report (TxDOT, 2021). The report discloses: 1) an analysis of available data regarding statewide greenhouse gas (GHG) emissions for on-road GHG emissions, 2) TxDOT actions and funding that support reducing GHG emissions, 3) projected climate change effects for the state of Texas and 4) TxDOT's current strategies and plans for addressing the changing climate. A summary of key issues in this technical report is provided below. Please refer to the technical report for more details.

The Earth has gone through many natural changes in climate over time. However, since the industrial revolution began in the 1700s, atmospheric concentration of GHG emissions have continued to climb, primarily due to humans burning fossil fuel (e.g., coal, natural gas, gasoline, oil and/or diesel) to generate electricity, heat and cool buildings, and power industrial processes, vehicles, and equipment. According to the Intergovernmental Panel on Climate Change (IPCC), this increase in GHG emissions is projected to contribute to future changes in climate (Solomon 2007, Stocker 2013).

4.24.1 Statewide On-road GHG

TxDOT prepared a GHG analysis for the statewide on-road transportation system and associated emissions generated by motor vehicle fuels processing called "fuel-cycle emissions." EPA's Motor Vehicle Emissions Simulator (MOVES2014 version) emissions model was used to estimate emissions. Texas on-road and fuel cycle GHG emissions are estimated to be 186 million metric tons (MMT) in 2050 and reach a minimum in 2032 at 161 MMT. Future on-road GHG emissions may be affected by changes that may alter where people live and work and how they use the transportation system, including but not limited to: 1) the results of federal policy including tailpipe and fuel controls, 2) market forces and economics, 3) individual choice decisions, 4) acts of nature (e.g. pandemic) or societal changes, and 5) other technological advancements. Such changes cannot be accurately predicted due to the inherent uncertainty in future projections related to demographics, social change, technology, and inability to accurately forecast where people work and live.

4.24.2 Mitigation Measures

Strategies that reduce on-road GHG emissions fall under four major categories:

- Federal engine and fuel controls under the Clean Air Act implemented jointly by EPA and USDOT, which includes CAFE standards;
- "Cash for clunker" programs which remove older, higher-emitting vehicles from roads;

- TSM which improves the operational characteristics of the transportation network (e.g., traffic light timing, pre-staged wrecker service to clear accidents faster, or traveler information systems); and
- TDM which provides reductions in VMT (e.g., transit, rideshare, and bicycle and pedestrian facilities) and requires personal choice decisions.

TxDOT has implemented programmatic strategies that reduce GHG emissions including: 1) travel demand management projects and funding to reduce VMT, such as bicycle and pedestrian facilities, 2) traffic system management projects and funding to improve the operation of the transportation system, 3) participation in the national alternative fuels corridor program, 4) clean construction activities, 5) clean fleet activities, 6) CMAQ funding, 7) transit funding, and 8) two statewide campaigns to reduce tailpipe emissions.

4.24.3 TxDOT and a Changing Climate

TxDOT has strategies that address a changing climate in accordance with TxDOT and FHWA design, asset management, maintenance, emergency response, and operational policies and guidance. The flexibility and elasticity in TxDOT transportation planning, design, emergency response, maintenance, asset management, and operation and maintenance of the transportation system are intended to consider any number of changing scenarios over time. Additional detail is in the GHG Analysis Technical Report.

SECTION 5. INDIRECT IMPACT ANALYSIS

Section 5 describes the indirect impact analysis conducted for the proposed Loop 9, Segment A. The analysis was conducted in accordance with CEQ, FHWA, and TxDOT regulations and guidance documents. NEPA defines indirect effects as those that are ". . . caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR §1508.1(g)(1)).

In accordance with TxDOT guidance, the indirect effects analysis is focused on project-induced development effects, which are also called induced growth effects (National Cooperative Highway Research Program (NCHRP), 2002). Induced growth effects are most often related to changes in mobility or accessibility to an area, which in turn affects the area's attractiveness for development. Current TxDOT guidance established the following 6-step process to determine the potential for induced growth and its potential effects (**Table 5-1**):

Table 5-1: Six-Step Approach to Conduct an Indirect Impact Analysis

Step	Guidelines
1	Define the methodology
2	Define the Area of Influence (AOI) and study timeframe
3	Identify areas subject to induced growth in the AOI
4	Determine if growth is likely to occur in the induced growth areas
5	Identify resources subject to induced growth effects
6	Identify mitigation if applicable

Source: TxDOT, 2019.

TxDOT's Indirect Induced Growth Impacts Decision Tree (TxDOT, 2014) was utilized to determine if the proposed project required an indirect impacts analysis. TxDOT's Decision Tree is available on TxDOT's Environmental Compliance Toolkit at https://www.txdot.gov/business/resources/environmental/compliance-toolkits/indirect-cumulative-impacts.html. Because the project would substantially increase access or mobility in an area encompassed by a Municipal Planning Organization (MPO; in this case, NCTCOG), which is experiencing significant population growth (see **Section 5.3**), it was determined that the proposed project would require an indirect impacts analysis.

5.1 Step 1: Define Methodology

Numerous methods of analysis are available for the study of induced growth effects. A Planning Judgment approach was the primary form of analysis used to identify development trends and the potential effect of the proposed project on regional land use patterns. A Planning Judgment approach uses experience, professional literature, data collected from knowledgeable persons, and assessment of local conditions to make judgments about effects. GIS-based Cartographic techniques were also utilized to quantify the amounts of developed land, developable land, and undevelopable land. This Cartographic Technique exercise utilized GIS software to analyze data (i.e., parcel information, aerial mapping) combined with constraints layers (i.e. FEMA floodplain mapping)

and the proposed alignment outline, to determine the amount of currently developed land versus land available for development within the AOI. Detailed information on complex methods can be found in the NCHRP Report 466.

Additionally, Indirect and Cumulative Impacts Analysis questionnaires were sent to city and county stakeholders in support of the Collaborative Judgment methodology in an effort to gain information regarding future developments within their areas of jurisdiction. The Collaborative Judgment methodology emphasizes group process, diverse inputs, and outreach and is useful for gathering a wide range of information on multiple actions and resources.

Land that is not yet developed but is already planned for development was not included in the total amount of developable land as it is assumed that this land will be developed, regardless of whether the project is constructed. It was assumed that the land would be developed regardless of the project's construction because of the continued growth of Dallas and Ellis Counties (see **Section 5.3**) as well as municipalities in the AOI, which leads to increased housing demand. However, the development of vacant, available land is considered possible but not necessarily probable. Land was assumed to be planned for development if: 1) it was identified by the Dallas or Ellis County Appraisal Districts as included in an already existing development or was planned/platted for development (residential, commercial, or industrial data provided by local municipalities within the AOI); and/or 2) the parcel was owned by a land development company/developer. The purpose of this indirect effects analysis is to determine if future development could be causally linked to the proposed roadway project.

5.2 Step 2: Define the Area of Influence and Study Timeframe

Indirect effects associated with a project can occur at a distance in time or space from the project itself (NCHRP, 2002). The area studied for indirect effects will be referred to as the AOI. The AOI encompasses approximately 32.3 square miles (20,688 acres) in Dallas and Ellis Counties, shown on **Exhibit 5-1**. The AOI includes the area in which the proposed project could influence local traffic patterns or land development. The AOI limits are Parkerville Road to the north, IH 35E to the east, and US 67 to the west. The southern study limit runs along FM 664 (Ovilla Road), from IH 35E west until the intersection of Ovilla Road and Shiloh Road. The southern study limit then follows Shiloh Road heading west until the road dead ends; from here, the limits follow along natural barriers and property boundaries until the limits connect with the US 67 project. Because of the similarity of their respective indirect effects, it is reasonable to assume that the indirect effects of one major roadway would largely become eclipsed by those of nearby major roadways as one neared those roadways; therefore, nearby major roadways are a reasonable choice for the AOI boundary.

The temporal boundary for induced growth effects analysis ends in 2045. The year 2045 corresponds with the design year and the horizon dates for long-range planning documents and demographic forecasts available for this study. Performance of the proposed project beyond 2045 cannot yet be reasonably evaluated.

5.3 Step 3: Identify Areas Subject to Induced Growth in the Area of Influence

Induced growth effects can result from changes in traffic, access, and mobility. Transportation projects may provide new or improved access to adjacent land or may induce development on surrounding land by effecting a reduction in the time-cost of travel (NCHRP, 2002). Transportation projects may also affect the rate at which planned development is implemented.

The AOI encompasses parts of two counties, Dallas and Ellis, that are part of the Dallas-Fort Worth-Metropolitan Statistical Area (MSA), which is the fourth largest in the U.S. based on 2018 population estimates generated by the census. **Table 5-2** shows historical and projected population growth in these two counties, which reflect the robust growth rate of the Dallas metropolitan area overall.

Table 5-2: Historic and Projected Population Growth in Dallas and Ellis Counties, 1990-2045

County	1990[a]	2000[a]	2010[a]	2023[b] Projected	2045[b] Projected	Percent Change (1990-2000)	Percent Change (2000-2010)	Percent Change (2010-2023)	Percent Change (2023-2045)
Dallas	1,852,810	2,218,899	2,368,139	2,753,334	3,533,521	19.8%	6.7%	16.3%	28.3%
Ellis	85,167	111,360	149,610	208,313	318,261	30.8%	34.3%	39.2%	52.8%

Source: [a] U.S. Census – 1990, 2000, 2010; [b] NCTCOG *Mobility 2045 Update*, 2022.

There are six communities partially encompassed by the AOI: Cedar Hill, DeSoto, Glenn Heights, Midlothian, Ovilla, and Red Oak. **Table 5-3** shows the historical and projected population distribution of these communities.

Table 5-3: Historic and Projected Population Growth by City within the Area of Influence

Community	1990[a]	2000[a]	2010[a]	2020[a]	2030[b]	2040[b]	2050[b]
Cedar Hill*	19,976	32,093	45,028	49,148	65,133	76,989	83,579
% Population Change	–	1990-2000 61%	2000-2010 40%	2010-2020 9%	2020-2030 22%	2030-2040 18%	2040-2050 9%
DeSoto§	30,544	37,646	49,047	56,145	58,941	64,281	70,078
% Population Change	–	1990-2000 23%	2000-2010 30%	2010-2020 14%	2020-2030 8%	2030-2040 9%	2040-2050 9%
Glenn Heights*	4,564	7,224	11,278	15,819	18,831	23,973	29,555
% Population Change	–	1990-2000 58%	2000-2010 56%	2010-2020 40%	2020-2030 36%	2030-2040 27%	2040-2050 23%
Midlothian+	5,141	7,480	18,037	35,125	30,895	32,500	34,500
% Population Change	–	1990-2000 45%	2000-2010 141%	2010-2020 95%	2020-2030 50%	2030-2040 5%	2040-2050 6%
Ovilla*	2,027	3,405	3,492	4,304	5,713	7,120	9,110
% Population Change	–	1990-2000 68%	2000-2010 3%	2010-2020 23%	2020-2030 27%	2030-2040 25%	2040-2050 28%
Red Oak+	3,124	4,301	10,769	14,222	8,635	11,660	16,615
% Population Change	–	1990-2000 38%	2000-2010 150%	2010-2020 32%	2020-2030 13%	2030-2040 35%	2040-2050 42%

Table 5 3: Historic and Projected Population Growth by City within the Area of Influence (continued)

Source: [a] U.S. Census – 1990, 2000, 2010, 2020; [b] TWDB 2021 Regional Water Plan population projections.
Note: TWDB population projections are based on water utility service areas, which may be the same or very similar to established political boundaries (e.g., city limits), but not in every case.
*Community is in both Dallas and Ellis Counties
+Community is in Ellis County only
§Community is in Dallas County only

Table 5-4 shows the number of homes built in the counties and municipalities in the AOI since 1990 and reflects historical and current levels of population growth. More than 50% of the total number of homes have been built since 1990 in all the municipalities. Much of the population and housing growth in the AOI began in the late 1980's and early 1990's, except for Dallas County, which began in the 1960's and 1970's. However, Dallas County contains the city of Dallas itself and its first ring suburbs, which are outside the AOI and were likely where most of the earlier development occurred.

Table 5-4: Year Structure Built/Percent Built by Decade within Jurisdictions in the Area of Influence, 1990-2014

Geography	Total Homes	Year Structure Built/% Built Within Decade					
		1990-1999		2000-2009		2010 or later	
		#	%	#	%	#	%
Dallas County	1,027,813	118,942	12%	130,864	13%	84,647	8%
Ellis County	63,684	10,657	17%	16,704	26%	10,016	16%
Cedar Hill	16,166	4,221	26%	5,194	32%	918	6%
DeSoto	20,140	3,706	18%	5,212	26%	2,008	10%
Glenn Heights	4,212	727	17%	1,347	32%	873	21%
Midlothian	10,843	1,192	11%	2,871	26%	2,517	23%
Ovilla	1,576	500	32%	170	11%	360	23%
Red Oak	4,311	650	15%	1,457	34%	848	20%

Source: American Community Survey (Table B25034), "Year Structure Built", 2016-2020 5-year estimates.

Land within the AOI was classified as developed or undeveloped based on existing land use using current aerial photos, and publicly available county tax records. 'Developed' land generally had dwellings or other structures and/or improvements, though there are some vacant parcels near Midlothian owned by companies performing aggregate mining that were assumed to be for future resource extraction and were categorized as 'developed'. 'Undeveloped' land was generally vacant or had one or two small outbuildings or other less permanent type structures. It does not include developed parcels that included unimproved areas, as redevelopment potential was not considered in this analysis. A portion of the undeveloped land was considered 'undevelopable' if it was included in one of the following categories: 1) FEMA regulated floodways; 2) publicly owned parks and open space; and 3) utility rights of way. Any land not already developed or classified as undevelopable was considered developable land.

Table 5-5 shows the current breakdown of developed and undeveloped land in the AOI. Once the amount of planned development and undevelopable land is subtracted from the undeveloped land total, 2,246 acres (11%) of the AOI is considered developable, shown on **Exhibit 5-2**. The AOI is about evenly split between Dallas (10,952 acres) and Ellis (9,736 acres) counties and the amount of developable land is roughly the same between the two. The amount of planned development in each is also similar.

Table 5-5: Acres of Land Available for Project-Influenced Development within the Area of Influence

Existing Land Uses		Acres	% of Total AOI (20,688 acres)
Total Developed Land*		16,998	82%
Total Undeveloped Land		3,689	18%
Undeveloped Land Analysis	Planned Development	965	5%
	Undevelopable Land	478	2%
	Total Developable Land	2,246	11%

Source: Study team, June 2022.
*The proposed roadway alignment, including all alternatives and modifications, was counted as part of the developed land total for this analysis. The total developable land will be greater once a Recommended Preferred Alternative alignment is selected. This analysis also includes the Loop 9, Segment A US 67 and IH 35E interchange project areas; even though these projects will be evaluated under separate documents from the Loop 9, Segment A mainlane facility, ROW for these projects will be acquired before or concurrently with that for Loop 9, Segment A.

5.4 Step 4: Determine if Growth is likely to Occur in the Induced Growth Areas

A majority of the AOI (87%) lies within one of six municipalities that will influence the future land use of developable land within their boundaries. The remaining 13% lies within unincorporated areas of Ellis County. All six have comprehensive plans generally completed within the last decade to manage and direct growth. While a comprehensive plan is not legally enforceable, all six municipalities also have zoning ordinances that generally reflect future land use as laid out in their respective comprehensive plans. It is important to note that all Loop 9, Segment A alternatives and modifications fall within the same municipalities and are surrounded by similar land uses; therefore, alternative selection is not expected to have a substantial effect on development patterns.

The proposed Loop 9, Segment A project area runs through the communities of Cedar Hill and Glenn Heights, which, when combined, make up 51% of the AOI and contain 60% of the developable land identified in this analysis (**Table 5-6**). The comprehensive plans of both also specifically address the Loop 9, Segment A roadway as a planning element that would determine future land use. Since Loop 9, Segment A is proposed on new location, including intersections with eight existing roads, project-induced development might be expected to occur along the Loop 9, Segment A corridor first. In Cedar Hill's Comprehensive Plan (2008; **Exhibit 5-3**), the Loop 9, Segment A corridor, which is largely vacant land, is recommended to be a mix of office, office campus, and mixed-use non-residential land uses. Much of the area surrounding the Loop 9, Segment A project area in Cedar Hill is identified as developable; therefore, the development pattern recommended in the Cedar Hill plan should be reasonably expected to occur if Loop 9, Segment A is constructed. Other large areas of developable land farther north along the Bear Creek Road stretch of the Loop 9, Segment A alignment are recommended for low density residential development. While Loop 9, Segment A may

advance this development somewhat, these parcels can already be accessed by a major east-west route (Bear Creek Road) and regional growth will more likely be the driving factor in its conversion to residential uses (see **Section 5.3**). Similarly, developable land in the AOI adjacent to US 67 in Cedar Hill, largely identified for industrial land uses, is more likely to be developed due to its proximity to US 67 than Loop 9, Segment A.

Table 5-6: Developable Land by Community in the Area of Influence

Municipality	Acres in AOI (% Total of AOI)	Amount of Developable Land in AOI (% of Developable Land Total)	Amount of Undevelopable Land in AOI (% of Undevelopable Land Total)*	Amount of Planned Development in AOI (% of Planned Development Total)
Cedar Hill	6,119 (30%)	1,008 (45%)	86 (18%)	201 (21%)
DeSoto	1,733 (8%)	197 (9%)	189 (40%)	30 (3%)
Glenn Heights	4,382 (21%)	334 (15%)	125 (26%)	555 (58%)
Midlothian	2,415 (12%)	118 (5%)	18 (4%)	19 (2%)
Ovilla	2,724 (13%)	338 (15%)	36 (8%)	75 (7%)
Red Oak	534 (3%)	0 (0%)	0 (0%)	86 (9%)
Unincorporated areas	2,781 (13%)	251 (11%)	24 (5%)	0 (0%)

Source: Study team, June 2022.
* Total is greater than 100% due to rounding

The city of Glenn Heights Comprehensive Plan 2023 (2010 update; adopted January 2011; **Exhibit 5-4**) identifies nodes of commercial development adjacent to proposed Loop 9, Segment A, largely concentrated at its planned intersections with Uhl, Hampton, and Westmoreland Roads, as well as IH 35E. There is developable land between Hampton and Westmoreland roads and along IH 35E for these uses, but much of the developable land in Glenn Heights is planned for traditional neighborhood and medium and low-density residential development. Commercial growth along proposed Loop 9, Segment A at smaller road intersections would largely occur due to the project; however, while conversion to residential land uses may occur more rapidly due to the proposed Loop 9, Segment A project, it would likely be more attributable to regional population growth.

The remaining communities in the AOI mention the potential influence of the proposed Loop 9, Segment A project in their comprehensive plans, though only the city of Ovilla (2016) uses it as a planning element since the project area just touches its northern boundary. In the Ovilla plan shown on **Exhibit 5-5**, developable land adjacent to proposed Loop 9, Segment A is recommended for industrial and single-family residential development, which would be aided by the proposed intersection of Cockrell Hill Road with Loop 9, Segment A. However, most of the developable land in Ovilla is concentrated closer to FM 664 (Ovilla Road), which will remain the city's commercial hub and would have a greater influence over development in its vicinity.

DeSoto, Midlothian, and Red Oak combined make up 23% of the AOI and contain 14% of the developable land (**Table 5-6**). Red Oak's portion of the AOI is relatively small and located in the northwest quadrant of the IH 35E and FM 664 (Ovilla Road) intersection extending north to the proposed Loop 9, Segment A, where a large block of developable land was identified. The Red Oak Comprehensive Plan (2010; **Exhibit 5-6**) recommends this area as mixed use, including commercial, and multi- and single-family residential development. Given its proximity to IH 35E, it is likely this area will be developed regardless of the proposed Loop 9, Segment A project, though it may happen at a faster rate.

Red Oak has the smallest share of developable land in this analysis, followed closely by Midlothian and DeSoto (**Table 5-6**). DeSoto included 40% of the undevelopable land identified in this analysis. Red Oak was third behind Glenn Heights and Cedar Hill for the percentage of planned development based on its land area in the AOI (9%). Most of the developable land in DeSoto is largely found along Hampton Road and is recommended in the DeSoto Comprehensive Plan (2015; **Exhibit 5-7**) for commercial uses. While traffic to and from the proposed intersection of Hampton Road with proposed Loop 9, Segment A may speed the conversion of this land to developed uses, the amount of planned development in the area will likely be the proximate cause.

The small amount of developable land identified in Midlothian is largely because much of its land area in the AOI is dominated by a large industrial operation (aggregate mining). Its largest areas of developable land are found along Tar Road and along the city's north-eastern border with Cedar Hill. In Midlothian's Comprehensive Plan (2018; **Exhibit 5-8**), this area is recommended as part of a 'country module', which generally corresponds to low density residential development (1 to 3-acre lot sizes) in a rural setting. This area may be attractive to those who might work in the offices and office parks envisioned by Cedar Hill along proposed Loop 9, Segment A, which is just north of the Midlothian city boundary. Similarly, the largest section of unincorporated land is situated between Midlothian and Ovilla, in the south-central part of the AOI. Developable land in this area is largely found along the boundaries with these two cities, as well as Cedar Hill. The development of land in the north-western corner of this unincorporated section will be influenced by both proposed Loop 9, Segment A and the future S. Clark Road as depicted in the Cedar Hill Thoroughfare Plan (2008; **Exhibit 5-9**). Existing S. Clark Road is being extended south to provide a north-south connection with proposed Loop 9, Segment A between Tar Road and S. Joe Wilson Road. The proposed alignment of future S. Clark Road appears to pass through developable land in this unincorporated area before it reaches its new terminus with S. Joe Wilson Road. Because north-south access will be greatly improved along this corridor due to these road projects, new development may be more likely to occur in this location.

5.5 Step 5: Identify Resources Subject to Induced Growth Effects

Based on the analysis in **Section 5.4**, the areas of greatest potential to be developed primarily due to the construction of Loop 9, Segment A and associated roads are: 1) parcels directly adjacent to the proposed road corridor in Cedar Hill west and south of Bear Creek Road; 2) parcels targeted for commercial and industrial development adjacent and/or near to the road corridor in Glenn Heights and Ovilla; and 3) north-eastern Midlothian and incorporated areas adjacent to Midlothian and Cedar Hill.

However, access and mobility improvements caused by Loop 9, Segment A, coupled with consistent regional population growth, will make development on developable parcels in the AOI generally more likely and occurring over a shorter time horizon than if Loop 9, Segment A were not constructed. This section evaluates resources within undeveloped parcels that may be impacted by this induced growth.

Threatened and Endangered Species and Vegetation/Wildlife Habitat

Loss of vegetation and wildlife habitat, resulting in habitat fragmentation or other ecological effects, could occur as agricultural and wooded areas are cleared as a result of the accelerated development induced by the proposed project. **Table 5-7** shows the types of habitat currently present on the developable land parcels.

Table 5-7: Vegetation/Habitat Types on Developable Land Parcels in the AOI

MOU Habitat Type	Developable Land Acreage
Agriculture	215
Disturbed Prairie	431
EP Savannah, Woodland, and Shrubland	860
Floodplain	142
Riparian	85
Tallgrass Prairie, Grassland	433
Urban (Low Intensity only)*	80
Total	**2,246**

*This type includes areas that are built-up but not entirely covered by impervious cover, and includes most of the area within cities and towns.

Much of the intact riparian woodlands along larger creeks and some of their tributaries in the AOI (North Prong Creek, Red Oak Creek, Little Creek, and Bear Creek) occur within 100-year floodplains and are thus unlikely to be developed. These creeks and any impoundments along them provide habitat for state-listed threatened species including Wood Stork, White-faced Ibis, Louisiana pigtoe, sandbank pocketbook, Texas heelsplitter, and Trinity pigtoe, and federally proposed threatened species including alligator snapping turtle and Texas fawnsfoot. These riparian areas would likely continue to offer woodland habitat, as development within floodplains is minimized where practicable. As trees are desirable for residential properties, it is expected that removal of trees as part of residential development within the AOI will be minimized to the extent possible. For the purposes of this study, areas currently in use as cultivated cropland and low intensity urban development are considered to be vegetation and wildlife habitat, as these land types still offer opportunities for wildlife to travel and forage.

Potential indirect effects to vegetation and threatened and endangered species could occur from additional development within the AOI following completion of the proposed Loop 9, Segment A

project. The effects could include removal of vegetation and conversion of vegetated areas to developed land uses.

Development under either the Recommended Preferred Alternative or the No-Build Alternative would impact vegetation and wildlife habitat through a continued net loss of established woody and herbaceous vegetation, through fragmentation of remaining vegetation resources, and through reduction in habitat connectivity within the AOI. Although approximately 18% of the AOI is considered undeveloped, wildlife habitats have been affected by agricultural/range land practices and urbanization. The proposed Loop 9, Segment A project may indirectly affect undeveloped land or potential wildlife habitat by providing access and a transportation network which may lead to residential and commercial development.

Water Resources

The current and anticipated development within the area could lead to negative indirect effects on water resources in the watersheds of streams in the AOI. **Table 5-8** shows the water resources the NWI map indicates may be present on the developable land parcels in the AOI.

Table 5-8: NWI Water Resources on Developable Land Parcels in the AOI

Water Resource	Acres or Linear Feet
Streams	52,400 linear ft.
Wetlands*	10.4 acres (6.7 acres non-riverine; 3.8 acres open water)
* Does not include stream channels depicted as riverine wetlands, which is represented as linear footage in the stream category	

Totals in **Table 5-8** are a worst-case scenario, which assumes all streams and wetlands on developable land will be filled or otherwise effected. Continued development within watersheds in the AOI could lead to an increase in impervious cover, contributing to larger amounts of direct runoff from roadways, parking lots and driveways. Runoff from these areas could contain traces of motor oil, rubber, windshield fluid, gasoline and other automotive agents. Water quality within the watersheds could be impacted by heightened development due to the proposed project. While development is likely to occur whether the proposed project is implemented or not, with similar effects on water quality in the watersheds in either case, effects may occur sooner or at a faster rate if the proposed improvements are undertaken.

Prime Farmlands

Of the approximately 2,246 acres of developable land in the AOI, 918 acres (41 percent) are composed of soil mapping units (MUs) classified as either prime farmland or farmlands of statewide importance [for the purposes of this indirect effects analysis, the term “prime farmlands” will be used to refer to both classifications collectively]. Based on the land uses projected in the future land use plans of communities in the AOI, development induced by the proposed project could result in the loss of 918 acres of prime farmlands in the AOI, shown on **Exhibit 5-10**. Even if not all areas are developed as an indirect result of the project, encroachment of development could make adjacent farmland more difficult to farm, lower agricultural productivity, or result in reduced demand, and

potential availability, of farm services, any or all of which could ultimately result in reduced farming of these prime farmlands.

5.6 Step 6: Identify Mitigation, if Applicable

An increased rate of development resulting from the project could occur within the indirect effects AOI. Most affected areas are already planned for residential, commercial/industrial, or mixed-use development. Demographic trends outlined in **Section 5.3** suggest that communities in the AOI will likely attract development whether Loop 9, Segment A is constructed or not, although induced growth effects in the AOI may be accelerated somewhat as a result of the proposed project. No specific mitigation for possible indirect effects of the construction of Loop 9, Segment A is proposed. Any mitigation requirements as a result of indirect effects would be the responsibility of those creating the direct impact. Possible mitigative measures that could or presumably will be undertaken by communities in the AOI or developers include the following:

Threatened and Endangered Species and Vegetation/Wildlife Habitat

Compliance with city zoning ordinances on the part of other entities developing properties within the AOI will mitigate against some effects on vegetation and wildlife habitat, as requirements for inclusion of parks and green space dictate. These municipalities also have the power to directly obtain and preserve undeveloped lands for these purposes to further mitigate against vegetation and wildlife habitat loss if they choose.

State and federal regulations are in place to protect state and federally listed species from actions undertaken by both public and private entities. Both the ESA and TPWD regulations apply to public and private entities; however, the procedures for compliance can differ. For example, private or state-funded projects would receive a section 10 permit for incidental take under the ESA, while federal actions would require section 7 consultation and result in a take statement. Any action undertaken that would potentially result in a taking or harming threatened and endangered species, regardless of entity, would require coordination with TPWD and/or USFWS and most likely development of mitigation or minimization measures.

Water Resources

Forecasted development, whether public or private, would have to comply with Section 401 and 404 of the CWA that regulates the filling of and encroachment on water resources. Section 401 of the CWA Water Quality Certification requires the use of BMPs to control erosion, sedimentation, and post-construction total suspended solids. The use of BMPs during construction projects serves to mitigate against sedimentation and siltation of waterways receiving runoff from construction sites. In addition, water quality effects from development would be minimized by implementing a SW3P in compliance with TPDES requirements and a Municipal Separate Storm Sewer System (MS4) in conjunction with city improvements. USACE administers Section 404 of the CWA and operates under a “no net loss” policy for protected wetlands. Any loss of jurisdictional streams and wetlands (WOTUS) are subject to mitigation via mitigation banking or other means as required by Section 404 and Section 401 of the CWA. The TCEQ has the authority to designate uses for any of the waterways in the AOI and subsequently institute a water quality monitoring program for such designated streams, although to date it has not done so.

Prime Farmlands

The Farmland Protection Policy Act does not apply to private development. Private development is the dominant driver of growth; therefore, no mitigation for losses of prime farmlands can be required of these developers. If the cities in the AOI choose to prioritize preservation of prime farmlands, they have the authority to enact city ordinances or offer tax incentives to require or encourage preservation.

5.7 Conclusion

The indirect effects AOI for the proposed project encompasses approximately 20,688 acres (32.3 sq. miles), 2,246 acres of which is currently considered developable. The AOI is part of the greater Dallas-Fort Worth-Arlington MSA, which has been experiencing sustained population growth and associated residential, commercial, and industrial development and is projected to do so into the future. The proposed Loop 9, Segment A project is planned to accommodate this growth but will likely also induce associated development and/or cause it to accelerate. However, this development will be greatly influenced by future land use planning efforts by the cities within the AOI, which comprise 87% of its land area, as most of the developable land identified in this analysis has been reserved for future residential, commercial/industrial, or mixed-use development. These municipalities can also act to mitigate potential effects on threatened and endangered species and vegetation/wildlife habitat, water resources, and prime farmlands in the AOI through zoning and other requirements that prohibit or discourage development in floodplains and other wet areas or require or encourage open space preservation or activities consistent with working farmland or ranch land.

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SECTION 6. CUMULATIVE IMPACTS ANALYSIS

TxDOT prescribes a five-step process to consider the cumulative effects of a proposed project, which is based on both the opinion of the Fifth Circuit in Fritiofson v. Alexander, 772 F.2d 1225 (5th Cir. 1985) and the AASHTO's Practitioners Handbook (**Table 6-1**).

Table 6-1: Five-Step Approach to Conduct a Cumulative Impact Analysis

Step	Topic
1	Resource Study Area, Conditions, and Trends
2	Direct and Indirect Effects on each Resource from the Proposed Project
3	Other Actions—Past, Present, and Reasonably Foreseeable—and their Effect on each Resource
4	The Overall Effects of the Proposed Project Combined with Other Actions
5	Mitigation of Cumulative Effects

Source: TxDOT, 2019.

TxDOT's Cumulative Impacts Decision Tree (TxDOT, 2014) was utilized to determine if the proposed project required a cumulative impacts analysis. Based on the indirect effects analysis in **Section 5**, the Loop 9, Segment A project is expected to have direct and indirect effects on: 1) Threatened and Endangered Species and Vegetation/Wildlife Habitat; 2) Water Resources; and 3) Prime Farmland. Therefore, a cumulative analysis is required.

6.1 Step 1: Resource Study Area, Conditions, and Trends

6.1.1 Threatened and Endangered Species and Vegetation/Wildlife Habitat

It was determined that the Resource Study Area (RSA) for vegetation and wildlife habitat would encompass the four 12-digit USGS HUC to which resources in the indirect effects AOI drain (approximately 171 sq. miles/109,305 acres). Watersheds represent a bounded system wherein natural resources are interconnected and integrated through a common hydrologic network. They offer a suitable frame of reference for examining the availability of biological resources in the surrounding area and for serving as a baseline for cumulative impacts. The defined RSA was also considered appropriate for considering impacts to biological resources as these watersheds also contain the streams, floodplains, and associated vegetative habitat that wildlife depends on for food, water, and shelter.

The condition of vegetation and wildlife habitat resources varies across the RSA. To the north, where the RSA is closer to Dallas, land uses are largely urban/suburban, and natural habitats are fragmented, with narrow forested riparian corridors. This trend generally continues down US 67 through Cedar Hill and Midlothian. However, east of Red Oak in Ellis County, the RSA becomes dominated more by agriculture and ranch land, with wider forested riparian corridors. According to the NCTCOG's 2015 land use mapping, agricultural (including farmland, ranch land, and timber land) is the most common land use in the RSA, followed closely by residential uses (**Table 6-2**; **Exhibit 6-1**). The Ecological Mapping Systems of Texas (EMST), maintained by the TPWD, estimates the extent of wildlife habitats throughout the state, though conditions on the ground often differ due to development since the information was updated. The EMST indicates that the RSA still has pockets

of relatively undisturbed habitat (**Table 6-2; Exhibit 6-2**); much of the Tallgrass Prairie habitat type coincides with ranch land to the east of Red Oak but is also scattered throughout much of the southern half of the RSA. The EP savannah, woodland, and shrubland habitat type is concentrated in and around Midlothian. Based on current aerials, both habitat types have experienced conversion to more urban/suburban land uses to some degree. The loss of potential habitat could impact any threatened and endangered species that may be in the area. **Section 4.10** discusses the existing vegetation and **Section 4.11** discusses the potential threatened and endangered species habitat that may be in the Loop 9, Segment A study area.

Table 6-2: North Central Texas Council of Government Land Uses and Ecological Mapping Systems Habitat Types in the Resource Study Area

NCTCOG Land Use	% of RSA	EMST Habitat Types	% of RSA
Agricultural (farmland, ranch land, timberland)	42%	Agriculture	11%
Commercial (commercial, hotel/motel, office, retail)	3%	Disturbed Prairie	11%
Industrial (airport, industrial, runway)	3%	EP Savannah, Woodland, and Shrubland	18%
Institutional (education, institutional/semi-public)	2%	Floodplain/Riparian	10%
Parks/Recreation	2%	Tallgrass Prairie, Grassland	20%
Residential (group quarters, mobile home, multi-family, residential acreage, single-family)	36%	Urban	30%
Vacant	9%	-	-
Other (cemeteries, communication, improved acreage, landfill, large stadium, parking, railroad, small water bodies, transit, utilities)	2%	-	-

Source: NCTCOG, 2015 and TPWD EMST, 2022.

Based on NCTCOG and TPWD data, the northern half of the RSA in Dallas County is more built out, while the Ellis County section east of Red Oak shows greater opportunities for conversion of wildlife habitat to urban/suburban uses. Population trends suggest (**Table 5-2**) that Ellis County will continue to grow, and more land clearing and habitat fragmentation will occur in this section of the RSA in the future.

6.1.2 Water Resources

The same watersheds used as the RSA for vegetation and wildlife form the RSA for water resources. Watershed boundaries were used as the water resource RSA because the physical features that define a watershed serve to concentrate effects of development on the watershed's drainage and define an area in which mitigation efforts can focus.

Red Oak Creek is the only waterbody in the RSA given a segment ID for tracking water quality concerns by the TCEQ (segment ID 0805A). It is crossed by Alternatives 1 – 4 and Modification D and a lengthy portion runs through the RSA. Red Oak Creek is not included on the final 2020 303(d) impaired waters list, nor is it identified as being in danger of exceeding use attainment or pollutant screening levels.

The nearest impaired stream segment to the RSA is the Upper Trinity River (segment ID 0805), into which Red Oak Creek drains approximately three stream miles from the RSA boundary. The final 2020 303(d) impaired waters list shows that segment 0805 is considered impaired based on the presence of polychlorinated biphenyls (PCB) and dioxins in edible fish tissue. It is much more likely that these impairments are a result of development in the greater DFW Metroplex, through which this stream segment flows, rather than development in the watersheds defining the RSA.

The NWI data shows 756 acres of wetlands (not including riverine or lacustrine habitats) present in the RSA. The most common wetland type is Freshwater Forested/Shrub (448 acres), followed by Freshwater Ponds (250 acres), and Freshwater Emergent (57 acres). The NWI is not an official delineation but provides an indication of what wetland types might be present and a rough estimate of their extent in the RSA. The RSA lies within the EPA's Level III Texas Blackland Prairies ecoregion, which suggests that forested/shrub wetlands are not typical of undisturbed areas of this region.

6.1.3 Prime Farmland

Soil MUs considered to be prime farmland occur throughout the project area, extending well beyond the general vicinity of Loop 9, Segment A in both directions, as well as across much of north-central Texas. In the project area, as in most cases, prime farmlands do not follow easily discernible natural boundaries. For this reason, it is difficult, if not impossible, to define a boundary for a reasonable RSA based on natural features. The selection of natural boundaries for any reasonably-sized RSA that would provide for meaningful analysis would, by necessity, be entirely arbitrary. Instead, the RSA was selected based on political boundaries. It encompasses the combined jurisdictions that fall within the indirect effects AOI: Cedar Hill, DeSoto, Glenn Heights, Midlothian, Ovilla, and Red Oak (**Exhibit 6-3**). The RSA encompasses approximately 90,649 acres, of which 33,275 acres (37%) are considered prime farmland. **Table 6-3** shows the breakdown by county as a comparison.

Table 6-3: Prime Farmland in RSA by County

County	Prime Farmland in RSA (acres)	% of County Prime Farmland
Dallas	12,538	8%
Ellis	20,737	8%

Source: NRCS, 2022

The land within this RSA is, by virtue of being in close proximity to existing development, more likely to be developed than more outlying areas. As such, much of the prime farmland mapped in the RSA has been converted to other uses, except for some scattered undeveloped areas, largely concentrated in southwest Midlothian, eastern Red Oak, and the boundary between Cedar Hill and

DeSoto. This trend reflects the 31% and 35% loss of cropland in Dallas and Ellis Counties, respectively, between 1997 and 2017 as determined by the Texas Land Trends project.

6.2 Step 2: Direct and Indirect Effects on each Resource from the Proposed Project

6.2.1 Threatened and Endangered Species and Vegetation/Wildlife Habitat

Direct Impacts

The 'observed' EMST habitat types that may be directly impacted by project construction are shown in **Table 6-4**, by alternative. The 'urban' habitat type may or may not provide wildlife habitat, depending on development density and degree of impact and use of impervious surfaces, and is therefore not included in the habitat conversion total. The alternatives are largely similar in the amount of habitat conversion.

Table 6-4: Observed Ecological Mapping Systems of Texas Habitat Types Impacted by Project, by Alternative

Observed EMST Habitat Type (acres)	Alternative*			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Agriculture	76-83	76-83	70-79	96-103
Disturbed Prairie	191-222	183-214	172-228	181-212
EP Savannah, Woodland, and Shrubland	133-136	134-137	135-152	128-131
Riparian	32-33	39-40	32-34	35-36
Open Water	3-4	5-6	4-5	4-4
Urban	121-152	118-149	124-167	119-151
Total+	**556-630**	**555-629**	**537-665**	**563-637**
Habitat Conversion Total (without urban) +	**435-478**	**437-480**	**413-498**	**444-486**

Source: Loop 9, Segment A, Species Analysis Documentation, 2022
* Range of impacts are the result of potential modifications and combinations of modifications of each Alternative. It is important to note that no one alternative+modification combination contains all low or all high numbers for each habitat type.
+ Totals are derived from each alternative+modification combination as a whole and do not reflect addition of rows above. Similarly, the habitat conversion total was determined by subtracting the urban EMST habitat type total from each combination total. See the Species Analysis Documentation for the full impact table.

Indirect Impacts

Indirect development may occur as a result of the Build Alternative(s) and could affect ecosystem and socioeconomic resources within the RSA, resulting in long-term land use changes to the landscape. The proposed improvements could enhance land development opportunities that benefit from improved mobility through the project area.

For this proposed project, "induced growth is attributed to changes in accessibility caused by the project, which influences where development occurs" (NCHRP, 2002). The degree to which indirect development may occur is dependent on many variables and is difficult to predict. Based on past

development trends, current zoning, and future land use plans of the municipalities through which the proposed Loop 9, Segment A extends, indirect development would likely include a combination of residential and mixed uses. Short-term construction impacts, including dust, traffic delays, and rerouting of traffic, may result as these developments are built. In the long term, these new developments would provide services, offices, and some housing for residents in the RSA. In addition, indirect effects may include an increase in the density of existing residential areas as well as increases in utility and social service demands and the conversion of range land, cropland, and/or undeveloped land to additional residential or other urban forms of land use.

Indirect effects on vegetation and wildlife habitat (including impacts to threatened and endangered species) could stem from the conversion of undeveloped land to developed land uses at a faster rate than may otherwise occur. Due to the construction of the proposed Loop 9, Segment A, approximately 2,246 acres of undeveloped land (11% of the indirect effects AOI) have the potential to be developed, resulting in decreased habitat value in areas of increased commercial and residential development. The intensity and extent of new development in the AOI will likely be based on local economic conditions, adequate utilities, and supportive local land development regulations and policies.

6.2.2 Water Resources

Direct Impacts

Impacts to streams and wetlands potentially resulting from Loop 9, Segment A construction are shown in **Table 6-5**, by alternative. These findings are documented in a separate Water Features Delineation Report available for review at the Dallas District Office or online at www.txdot.gov/loop9.

Table 6-5: Water Resource Project Impacts by Alternative

Water Resource Type*	Alternative+			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Streams (Linear Feet)	14,760-15,521	14,063-14,825	13,895-14,706	13,278-14,039
Wetlands (Acres)	2.04-2.78	2.12-2.85	3.03-4.36	1.97-2.71
Open Water (Acres)	0.78-1.59	3.39-4.20	2.48-3.31	1.16-1.98

*Includes both potentially jurisdictional and non-jurisdictional resources and total ROW impacts
+ Range of impacts are the result of potential modifications and combinations of modifications of each Alternative
Source: Loop 9, Segment A Water Features Delineation Report, 2022.

Indirect Impacts

The portion of the AOI subject to accelerated development ('developable land') includes approximately 6.7 acres of wetlands (non-riverine only) and 3.8 acres of open water mapped by the NWI, as well as approximately 52,400 linear feet of riverine waters. Induced growth could include wetland loss and potential degradation of wetland quality and function. Development could result in adverse effects to water resources through degradation of surface water through rapid discharge to stormwater and additional pollutant loadings of waterways and increased sedimentation of wetlands. As the topography and hydrology are altered, hydrological conditions associated with runoff and

drainage flow will also change as well as increasing the likelihood of non-point-source pollution of water resources.

6.2.3 Prime Farmlands

Direct Impacts

Impacts to soil MUs considered to be prime farmlands and farmlands of state-wide importance potentially resulting from Loop 9, Segment A construction are shown in **Table 6-6**, by alternative.

Table 6-6: Prime Farmland Project Impacts by Alternative

Soil Type	Alternative*			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Prime Farmland and Farmlands of Statewide Importance (acres)	275-297	282-304	276-299	299-322
Not Prime Farmland (acres)	297-317	288-308	302-324	279-298
* Range of impacts are the result of potential modifications and combinations of modifications of each Alternative				

Indirect Impacts

As previously noted, within the indirect effects AOI, approximately 918 acres of developable land (including areas in active use for agriculture) are classified as prime farmlands. Future land use and zoning maps of municipalities within the AOI indicate that much of the developable prime farmland is included in areas slated for future residential or commercial development. As a result, loss of this acreage would be considered an indirect impact. It should be noted, however, that growth in the area is largely driven by macroeconomic and demographic trends within the larger Dallas-Fort Worth-Arlington MSA. Much of this loss may occur whether the proposed project is implemented or not, although it may occur at a faster rate with construction of the proposed Loop 9, Segment A.

6.3 Step 3: Other Actions—Past, Present, and Reasonably Foreseeable—and their Effect on each Resource

Past actions are largely encapsulated by industrial, commercial, and residential development throughout the RSA that started or accelerated in the late 20th century, along with the major transportation infrastructure associated with it. The National Land Cover Database (NLCD; Multi-Resolution Land Characteristics Consortium, 2019) provides a means to quantify the effect past actions have had on resources considered in this analysis between 2001 and 2016, which coincides with a period of relatively high growth in the RSAs. The NLCD land cover change index shows areas that were converted to urban land uses in the RSAs during this time, including residential and commercial developments, as well as transportation linkages such as the construction of US 287 south of Midlothian. **Table 6-7** shows the estimated effects of this past conversion on resources in the RSAs.

Table 6-7: Estimated Effects of Past Urban Land Use Conversion in the Resource Study Areas (2001-2016)

Resource	Estimated Effect
Vegetation/Wildlife Habitat*	8,400 acres
Water Resources±	138,000 lf stream 8.5 acres wetlands 10.8 acres open water
Prime Farmland	4,012 acres

*Assumes all land converted to urban land uses was vegetated previously (including agriculture)
±Estimated from NWI; assumes entire length of stream was filled or otherwise modified
Source: (2001-2016 NLCD Land Use Change Index)

Reasonably foreseeable actions are those that are likely to occur, or are probable, rather than those that are merely possible. These can include major development or transportation projects, and specific land use plan objectives for a particular area, among others. **Table 6-8** shows planned linear transportation projects in the RSAs and **Table 6-9** shows present and reasonably foreseeable residential or commercial development in the RSAs based on land currently for sale marketed for these types of development on Zillow (April 2022), as well as planned development identified during the developable land analysis (**Section 5.3**; **Exhibit 5-2**). The land for sale is vegetated (including agriculture) and is vacant or largely vacant (may include a few outbuildings). In many cases, the planned development parcels are also vegetated and largely vacant; however, some are already in the process of being developed. These tables also display the potential effects on the resources considered in this analysis in cases where an estimate can be made.

Table 6-8: Estimated Effects of Planned Transportation Projects in the Resource Study Areas

Entity/Action	STIP/Type of Action	RSA	Estimated Effect
TxDOT (CSJ 1051-01-051) FM 664 between IH 35 and IH 45	2021-2024# Widen to 6 lanes, some new location	Vegetation/Wildlife Habitat/Water Resources Prime Farmland (partial)	108 acres vegetation/wildlife habitat 2,118 lf stream; 0.06 acres wetland 3.5 acres prime farmland*
TxDOT (CSJ 1051-01-052) FM 664 between Westmoreland Road and FM 1387	2021-2024 STIP Re-construct and widen to 4 lanes	Vegetation/Wildlife Habitat/Water Resources Prime Farmland (partial)	TBD
TxDOT (CSJ 1394-02-027) FM 1387 from Midlothian Parkway to FM 664	2021-2014 STIP Re-construct and widen to 4 lanes	Vegetation/Wildlife Habitat Water Resources	TBD
TxDOT (CSJ 2964-10-005) Loop 9 Segment B from IH 35 to IH 45	2021-2024# STIP Construct frontage roads (ultimate 6 lane highway)	Vegetation/Wildlife Habitat/Water Resources	514 acres vegetation/wildlife habitat 4,097 lf stream; 1.4 acres open water±
RTC, City of Glenn Heights East Bear Creek Road from IH 35E to South Hampton Road	Widen to four lanes	Both	6.5 acres prime farmland

Table 6-8: Estimated Effects of Planned Transportation Projects in the Resource Study Areas (continued)

Entity/Action	STIP/Type of Action	RSA	Estimated Effect
TxDOT (CSJ 0261-01-041) US 67 at Lake Ridge Parkway	2021-2024 Construct Grade Separation	Both	47.3 acres vegetation/wildlife habitat 843 lf stream; 0.55 acres wetlands 9 acres prime farmland§
TxDOT (CSJ 0261-020-68) US 67 from FM 1382	2021-2024 STIP Construct New Road	Both	TBD
TxDOT (CSJ 0260-02-042) US 67 from US 287	2021-2024 STIP Construct New Road	Both	TBD
TxDOT (CSJ 0442-02-161) IH 35 Intersection Improvement at Bear Creek Road	2021-2024 Intersection Improvements	Both	TBD
		Totals	669 acres vegetation/wildlife habitat 7,058 lf stream; 0.61-acre wetlands; 1.4 acres open water; 19 acres prime farmland

#The current STIP shows a new tracking CSJ.
*Estimates are from the August 2019 EA
±Includes some area outside the RSA; estimates are taken from the September 2017 EA. Stream impact total only includes crossings proposed to be filled.
§ Estimates from work done for draft CE in 2020 and Re-evaluation in 2022; assumes all streams and wetlands identified in the proposed ROW will be filled; only includes prime farmland in project area not already converted to a transportation use.

Table 6-9: Estimated Effects of Present and Reasonably Foreseeable Development in the Resource Study Areas

Land for Sale/Planned Development	RSA	Estimated Effect*
Development Parcels	Both	1,932 vegetation/wildlife habitat 23,756 lf stream; 3.8 acres wetlands; 2.9 acres freshwater ponds 1,271 acres prime farmland
1970 Onward Rd.	Both	158 acres vegetation/wildlife habitat 4,080 lf stream 4.6 acres wetland 5.8 acres open water
Shiloh Rd.	Both	15 acres vegetation/wildlife habitat 675 lf stream 0.7 acre open water

Table 6-9: Estimated Effects of Present and Reasonably Foreseeable Development in the Resource Study Areas (continued)

Land for Sale/Planned Development	RSA	Estimated Effect*
2823 N. Walnut Grove Road	Both	53 acres vegetation/wildlife habitat
465 S. 9th Street	Both	7 acres vegetation/wildlife habitat 300 lf stream
710 E. Reindeer Rd.	Vegetation/Wildlife Habitat Water Resources	14.1 acres vegetation/wildlife habitat
00 Onward Road	Both	22 acres vegetation/wildlife habitat 800 lf stream
872 Ashford Lane	Vegetation/Wildlife Habitat Water Resources	34 acres vegetation/wildlife habitat
1080 FM 983	Vegetation/Wildlife Habitat Water Resources	16 acres vegetation/wildlife habitat 500 lf stream
Totals		2,251 acres veg/wildlife habitat 30,111 lf stream 8.4 acres wetlands; 9.4 acres open water; 1,271 acres prime farmland

*The vegetation/wildlife habitat effect equals the property acreage; stream and wetland impacts are estimated from the NWI and assume all will be filled or otherwise modified. Only the resources potentially impacted are shown for each location.

Potential effects from the reasonably foreseeable actions listed in Tables 6-8 and 6-9 were also qualitatively assessed based on available information. Overall, it was found that effects from the actions could include the following:

- Potential temporary and permanent degradation or loss of water resources from stormwater runoff;

- A change in the economic and social environment due to increased employment and housing opportunities;
- An increase in usage of park and recreational activities related to development; and
- Potential degradation of habitats and wildlife populations from construction and ongoing operation.

6.4 Step 4: The Overall Effects of the Proposed Project Combined with Other Actions

The direct and indirect effects of the proposed project on water and biological resources were addressed in **Section 6.2**. The project continues trends in the RSA towards increased urbanization that leads to the loss or degradation of streams and wetlands, as well as the conversion of natural habitats and agricultural land to residential, commercial, and industrial land uses. **Table 6-10** shows potential cumulative effects of other actions in the RSAs combined with the direct and indirect impacts of the proposed project. It should be noted that the total cumulative impacts on streams is likely an overestimate, given that water courses are rarely completely filled when land is developed, though their function is often impaired due to changes in the surrounding land use (e.g., reduced water quality due to stormwater inputs, increased flow rates off impervious surfaces, etc.).

Table 6-10: Cumulative Impact Summary

Resource Type	Direct Impacts				Indirect Impacts	Impacts of Other Actions*	Total Estimated Cumulative Impacts
	Alt 1	Alt 2	Alt 3	Alt 4			
Vegetation/Wildlife Habitat (Acres)	**435-478**	**437-480**	**413-498**	**444-486**	2,246	11,320	13,979-14,052
Water Resources+							
Streams (lf)	14,760-15,521	14,063-14,825	13,895-14,706	13,278-14,039	52,400	175,169	240,847 – 243,090
Wetlands (acres)	2.04-2.78	2.12-2.85	3.03-4.36	1.97-2.71	6.7	17.5	26.2 – 28.6
Open Water (acres)	0.78-1.59	3.39-4.20	2.48-3.31	1.16-1.98	3.8	21.6	26.2 – 29.6
Prime Farmland (acres)	275-297	282-304	276-299	299-322	918	5,302	6,495 – 6542

*Includes past, present, and reasonably foreseeable actions addressed in Tables 6.7, 6.8, and 6.9
+ Includes both potentially jurisdictional and non-jurisdictional resources

As demonstrated in the table, direct impacts from the project are relatively small in comparison to the cumulative effects of other actions in the RSAs. The potential indirect impacts of the project are greater, but as noted previously, this growth will likely occur whether or not the project is completed, although it may occur at a faster rate.

6.5 Step 5: Mitigation of Cumulative Effects

Estimated cumulative impacts to each resource discussed in **Section 6.4** must be considered in relation to institutional and regulatory requirements and expected mitigating actions that would further shape the nature and quantity of these impacts. Over the past several decades, federal, state, and local lawmaking bodies have enacted statutes, regulations, and ordinances designed to preserve and enhance the abundance and quality of natural resources by requiring project applicants to avoid, minimize, and mitigate the environmental impacts of their projects or actions. The following discussion outlines potential mitigation measures government leaders and agencies can or are required to implement to manage and sustain resources for long-term use.

6.5.1 Threatened and Endangered Species and Vegetation/Wildlife Habitat

As TxDOT does not have the authority to implement zoning or planning regulations, mitigation for cumulative effects on vegetation and wildlife or continued conversion of undeveloped land to developed land would require the collaborative efforts of local, county, and regional planners, the public, and private developers. All local governments in the indirect effects AOI have adopted land use plans that prioritize the creation of parks and preservation of open space and natural areas. In addition, Cedar Hill and DeSoto have separate master plans dedicated to parks and open space (Glenn Heights and Red Oak make mention of parks and recreation master plans in their comprehensive plans; however, these could not be found on-line). These communities could consider codifying additional regulations or strengthening existing codes that would be consistent with parks and open space goals in their plans and which would work to minimize future adverse effects of development. For example, requirements to protect green space in new residential and multi-use developments where some percent of the total development would be dedicated open space.

Certain trust organizations may also be interested in preservation opportunities within the AOI and RSA. Such organizations involve a local, state, or regional non-profit organization directly involved in protecting land for its natural, recreational, scenic, historical, or productive value. Preservation opportunities could involve land donations, fee acquisition, mitigation banks, land leases, or conservation easements.

Impacts to federally protected species within the RSA would be avoided, minimized, or mitigated through compliance with existing federal statutes that apply to private and government interests. The USFWS (under the ESA) has legislative mandates to reduce or avoid significant and adverse impacts to species protected under the ESA on an individual and cumulative basis, including designations of critical habitat. The regulations are intended to minimize adverse effects on protected ecological resources as a cumulative consequence of development. There are no designations of critical habitat for any federally listed species potentially present in the RSA. As no suitable habitat for federally listed threatened or endangered species with a full listing status was found in the project area, the proposed project does not include mitigation options for federally threatened or endangered species within the RSA.

6.5.2 Water Resources

Mitigation for cumulative effects on water quality will generally be achieved through compliance with federal, state, and local stormwater management and sediment and erosion control regulations on development that can aid stabilizing or preventing water quality declines. Compliance with local regulations in watersheds and encouragement of setback standards to prevent increased sedimentation or release of other pollutants into waterbodies could be adopted to preserve this resource. For TxDOT projects within the RSAs, placement and monitoring of erosion control measures at the start of, during, and after construction would be incorporated into project plans according to TxDOT Stormwater Management Program guidelines. Re-vegetation along the existing and proposed ROWs would adhere to TxDOT re-vegetation guidelines. Temporary impacts to jurisdictional waters and wetlands would be returned to pre-construction elevations.

Effects to jurisdictional waters and wetlands, whether direct, indirect, or cumulative, are regulated through the CWA Section 404 permit process as administered by the USACE. Natural resource agencies (including TPWD, USACE, EPA, TCEQ, and the USFWS) would be involved in decisions regarding appropriate mitigation ratios and the location, size, and character of the mitigation. Compensatory mitigation plans would be submitted to the USACE as part of the Section 404 permit review process.

6.5.3 Prime Farmland

No specific mitigation related to prime farmland is proposed. As noted in the induced growth impacts analysis, the Farmland Protection Policy Act does not apply to private development, which is likely to be the dominant driver of growth. If the municipalities in the prime farmland RSA choose to prioritize preservation of prime farmland, they have the authority to enact city ordinances or offer tax incentives to require or encourage preservation.

6.6 Conclusion

Through a cumulative effects analysis, it was determined that the proposed project would contribute to cumulative actions impacting these same resources (threatened and endangered species, vegetation/wildlife habitat, water resources, and prime farmland) within their respective RSAs. Past and reasonably foreseeable actions in the RSAs are an extension of the regional trend towards urbanization and have impacted or will impact resources both directly and indirectly. However, existing governmental regulations, in conjunction with the goals and coordination of community planning efforts, address the many and varied issues that influence local and ecosystem-level conditions. The regulatory powers of state and federal programs, such as the CWA, serve to safeguard resources and avoid or minimize negative impacts that would threaten the general health and sustainability of the region. The proposed project is consistent with the historical growth rates, patterns, and land use changes found in the RSAs. The analysis provided concludes that there are no substantial adverse cumulative impacts to resources in the RSAs, when taken into consideration with other past, present, and reasonably foreseeable actions, and no specific mitigation is proposed by TxDOT based on cumulative impacts to these resources.

SECTION 7. AGENCY AND PUBLIC COORDINATION

As discussed in **Section 3.1** – Previous Studies and Reports, Loop 9 has been identified in transportation plans for the last 40 years. Extensive efforts were made throughout the history of the proposed Loop 9 concept to inform the public, local officials, agencies, and major stakeholders of project activities as well as provide the opportunity to provide comments on the project. This section discusses the elements of the Public Involvement program for the following two stages:

- Loop 9 Southeast Corridor/Feasibility Study (2012-2014)
- Current DEIS (2018-2022)

7.1 Elements of the Feasibility Study Public Involvement Program (2012-2014)

Table 7-1 includes a list of all the Loop 9 Agency and Public Involvement Meetings held during the Corridor/Feasibility Study. A summary of each meeting is presented in the following subsections. The Loop 9 Southeast Corridor/Feasibility Study is available for review at the Dallas District office or online at www.txdot.gov/loop9.

Table 7-1: List of Loop 9 Southeast Agency and Public Meetings

Meeting	Meeting Date	With
Federal/State Agencies	3/27/2013	Federal/State Resource Agencies
Local Interviews	11/5/2012	Wilmer
	11/6/2012	Seagoville
	11/7/2012	Ferris
	11/7/2012	Combine
	11/7/2012	Cedar Hill
	11/8/2012	Kaufman County
	11/9/2012	Ovilla
	11/9/2012	Dallas County
	11/9/2012	Lancaster
	11/13/2012	Glenn Heights
	11/13/2012	Ellis County
	11/20/2012	Balch Springs
	11/20/2012	Red Oak
	11/26/2012	Midlothian
	12/10/2012	Mesquite
	12/10/2012	DeSoto
	12/12/2012	Oak Leaf
Local Official Meetings	9/18/2012	Glenn Heights
	11/27/2012	Midlothian City Council Meeting
	1/7/2013	SEATA Luncheon
	1/17/2013	Trinity River Authority
	3/28/2013	Cedar Hill
	4/18/2013	Best Southwest Luncheon
	4/23/2013	Cedar Hill City Council Briefing
	4/30/2013	Cedar Hill
	5/14/2013	Cedar Hill, Ovilla, Lancaster, etc.
	6/24/2013	Ovilla City Council Briefing
	7/2/2013	Glenn Heights City Council Briefing
	8/6/2013	Glenn Heights City Council Briefing

Table 7-1: List of Loop 9 Southeast Agency and Public Meetings (continued)

Meeting	Meeting Date	With
Local Official Meetings (cont.)	8/15/2013	Ferris
	8/16/2013	Cedar Hill, Dallas County
Task Force Meetings	10/22/2012	Task Force Meeting (Cedar Hill)
	2/25/2013	East Region (Mesquite)
	2/27/2013	Middle Region (Red Oak)
	2/28/2013	West Region (Cedar Hill)
	4/1/2013	Dallas County (Dallas)
	8/28/2013	Seagoville Council Chambers
	8/29/2013	Red Oak Banquet Hall
Major Stakeholders	4/5/2013	Ash Grove Cement Company
	4/10/2013	Holcim Quarry
	4/16/2013	UPRR
	4/17/2013	BNSF
	5/10/2013	IIPOD
	5/16/2013	Waste Management Skyline Landfill
	8/5/2013	Oncor
Public Meetings	5/16/13	Ferris
	5/23/13	Ovilla
	9/24/13	Lancaster
	9/26/13	Glenn Heights

Source: TxDOT, 2014a.

7.1.1 Mailing List

A database of property owners, Loop 9 Task Force members, major stakeholders, local officials, state and federal resource agencies, businesses, and other residents and interested parties was developed and is maintained at the TxDOT Dallas District and in the project files. The database was maintained with routine additions, deletions, and corrections as needed, and was updated after each public meeting to document all attendees of the meetings.

7.1.2 State and Federal Agency Coordination

Resource Agency Webinar

A webinar, which provided the Loop 9 Southeast project goals and status, was held on March 27, 2013. Invitations were sent via email on March 8, 2013, to the following state and federal resource agencies:

- EPA
- USACE
- USFWS
- TCEQ
- THC
- TPWD

EPA, USFWS, THC, and TPWD attended the webinar held on March 27, 2013. The webinar presented the status of the Loop 9 Southeast project and the corridor options including the 2011 DEIS Alternatives with a 350-foot ROW and shift options resulting from comments received during the local official interviews, environmental constraints, and/or design considerations.

7.1.3 Local Government Coordination

2012 Local Interviews

In November and December 2012, interviews were conducted with representatives from cities and counties within the study area to provide additional opportunities to comment on the modified 2011 Preliminary DEIS Alternatives. The interviews helped to elicit suggestions about where shifts could be made to avoid environmental resources and provided a means for both TxDOT and local officials to gain a better understanding of existing and future constraints in each city and county. Local officials who participated in the 17 interviews included mayors, city managers, county judges, county commissioners, and other municipal and county staff. Local governments represented included: Dallas County, Ellis County, Kaufman County, and the cities of Balch Springs, Cedar Hill, Combine, DeSoto, Ferris, Glenn Heights, Lancaster, Mesquite, Midlothian, Oak Leaf, Ovilla, Red Oak, Seagoville, and Wilmer.

A questionnaire was prepared to gain insight from the local government officials regarding the project as well as area constraints. The questionnaire was provided to each city/county prior to the interview to grant the cities/counties the opportunity to prepare responses in advance, if desired. During the interviews each question was presented and responses were provided by the local officials. Summaries of each interview were prepared to include responses to all questionnaire items as discussed during the interview, responses provided either before or after the meeting, and any additional comments received during the interview. Information received during the local interviews (verified by aerial or field visit) was documented on the Environmental Constraints Map for the Feasibility Report. The Loop 9 Southeast Corridor/Feasibility Study is available for review at the Dallas District office or online at www.txdot.gov/loop9.

7.1.4 Regional Task Force Meetings

The Loop 9 Southeast Regional Task Force (Task Force) consisted of staff members from TxDOT Dallas District, TxDOT ENV, NCTCOG, and local officials of cities and counties within the Loop 9 Southeast study area. The following is a summary of the Task Force Meetings that occurred during the Corridor/Feasibility Study.

October 2012 Introductory Meeting

A Loop 9 Southeast Task Force Meeting was conducted on October 22, 2012 where information regarding the corridor study area, the proposed study schedule, an introduction of the program of projects concept, and upcoming action items for the project was presented.

February and April 2013 Regional Task Force Meetings

The February and April 2013 Task Force Meetings were divided into four separate meetings to ensure the project team was available to respond to questions from all Task Force members. These meetings were held in Cedar Hill, Dallas, Mesquite, and Red Oak.

At these meetings, comments received during the local official interviews that related to the corridor location were summarized and provided as a handout. The materials included the 2011 Preliminary DEIS Alternatives, all proposed shift options, and environmental constraints and/or design considerations.

August 2013 Regional Task Force Meetings

The August 2013 Task Force Meetings were held in two locations, Red Oak and Seagoville, to ensure the project team was available to respond to questions from all task force members.

At these meetings, comments received during the May 2013 Public Meetings, and through major stakeholder and local official coordination, were presented and distributed as a handout. Additionally, the draft program of projects, potential phasing options, final alignments, and potential environmental impacts were presented.

7.1.5 Major Stakeholder Coordination

Early in the Corridor/Feasibility Study, several major stakeholders were identified within the study area. These included major utility companies or potential major traffic generators within the study area. To inform them of the proposed project and get feedback on any potential concerns, meetings were held in 2013 with Ash Grove Cement Company, Holcim Quarry, UPRR, BNSF, IIPOD, Waste Management Skyline Landfill, and Oncor.

7.1.6 Public Meetings

Four public meetings occurred as part of the Corridor/Feasibility Study. Notices were published in five newspapers in the area, *The Dallas Morning News, Al Día, The Focus Daily News, The Suburbia News, and The Ellis County Press.*

May 2013

The first round of public meetings was held on May 16, 2013 (Ferris High School) and May 23, 2013 (Ovilla Road Baptist Church) to present the Corridor/Feasibility Study process and status as well as introduce the program of projects concept. The project team solicited public opinion on:

- The Loop 9 Southeast corridor options including the Preliminary DEIS Alternatives and proposed shift options resulting from local official, major stakeholder and resource agency input
- Environmental constraints and design considerations
- Typical section configuration

A total of 460 people attended the meetings, and 125 comments were received.

September 2013

The second round of public meetings was held on September 24, 2013 (Lancaster Elementary School) and September 26, 2013 (Red Oak Intermediate School) to present the study status and results of the analysis. The project team solicited public opinion on:

- The comments received during the May 2013 Public Meetings
- The draft program of projects
- Potential phasing options
- Refined corridor alignment
- Potential environmental impacts

A total of 333 people attended the meetings, and 34 comments were received.

7.1.7 Presentations

Throughout the Corridor/Feasibility Study, the project team conducted nine presentations discussing project information at the request of various entities:

- Glenn Heights City Council briefing
- Midlothian City Council briefing
- SouthEast Area Transportation Alliance (SEATA) luncheon
- Best Southwest Transportation luncheon
- Leadership Southwest Transportation Day
- Cedar Hill City Council briefing
- Ovilla City Council briefing
- Glenn Heights City Council briefing
- SEATA/Best Southwest Transportation luncheon

In those presentations, TxDOT and NCTCOG officials provided a history of the Loop 9 Southeast project, a discussion of the current Corridor/Feasibility Study efforts, the project schedule, and the anticipated outcome of the study. TxDOT and NCTCOG worked to continually engage all residents and officials within the study area regarding the proposed project.

7.1.8 Website

The project website, www.loop9.org, was developed and maintained throughout the Corridor/Feasibility Study process. The website included the following:

- Corridor/Feasibility Study efforts
- Study Area Map
- Goals of the Corridor/Feasibility Study
- Project history
- Project information and corridor maps
- A request form to receive information through the project mailing list
- A public involvement summary, including information presented at the May 2013 and September 2013 public meetings
- Contact information via mail, phone, and email
- Contact information for Spanish speaking individuals
- A list of information resources

A project email address, comments@loop9.org, was also developed to allow the public to submit comments to the project team via email.

7.1.9 Summary of Comments

A total of 434 local government comments, 19 written task force meeting comments, and 183 public comments were received during the Corridor/Feasibility Study. All input received during this effort was documented in a comment matrix with consideration given to each comment. A full copy of the Corridor/Feasibility Study report is on file at the TxDOT Dallas District office or online at www.txdot.gov/loop9.

7.2 Elements of the Current Draft Environmental Impact Statement Public Involvement Program

The development of the Reasonable Alternatives evaluated in this DEIS is discussed in **Section 3.3**. A Public Involvement Plan (PIP) was developed as part of the overall Project Coordination Plan (PCP), and continuously updated throughout the DEIS process to define and guide the public involvement effort based on the TxDOT Public Involvement Policy tenets to:

- Purposefully involve the public
- Provide access to information and decision-making processes (early, continuous, transparent, and effective)
- Use best practices and a range of strategies
- Be reflective of needs

A copy of the PCP with PIP is available on the TxDOT website at www.txdot.gov/loop9.

Table 7-2 includes a list of all the Loop 9, Segment A DEIS Agency and Public Involvement meetings held during the development of this DEIS. A summary of each meeting is presented in the following subsections.

Table 7-2: List of Loop 9, Segment A DEIS Agency and Public Meetings

Meeting	Meeting Date	With
Federal/State Agencies	02/06/2019	USACE
Local Official/Stakeholders	3/7/2017	City of Cedar Hill
	8/14/2017	
	5/8/2018	
	10/9/2018	
	6/27/2019	
	11/12/2019	
	7/30/2020	
	11/17/2020	
	3/4/2021	
	6/16/2021	
	11/17/2021	
	1/28/2022	
	3/1/2017	City of Glenn Heights
	3/25/2017	
	8/14/2017	
	5/8/2018	
	11/5/2018	
	8/11/2020	
	3/1/2021	

Table 7-2: List of Loop 9, Segment A DEIS Agency and Public Meetings (continued)

Meeting	Meeting Date	With
Local Official/Stakeholders (cont.)	10/18/2021	City of Glenn Heights
	11/29/2021	
	06/07/2022	
	3/31/2017	City of Ovilla
	8/17/2017	
	12/6/2021	
	3/20/2017	City of Red Oak
	8/15/2017	
	5/8/2018	
	7/28/2020	
	2/24/2021	
	12/13/2021	
	8/5/2020	City of Midlothian
	2/24/2021	
	12/7/2021	
	11/1/2019	Dallas County
	7/30/2020	
	3/1/2021	Ellis County
	4/12/2019	Value Engineering Study to all Stakeholders
Scoping Meetings	7/ 9 & 11/2019	Public
	8/8/2019	USACE, TPWD, NCTCOG & Ellis County
Public Meetings	2/6 &13/2020	Public
	3/2 & 3/2022	Public
Community Meetings	2/8/2022	Lindell Estates Subdivision
	2/10/2022	Bear Creek Ranch Subdivision

7.2.1 Mailing List

The mailing list from the Corridor/Feasibility Study was updated and expanded during the initial stages of the DEIS process. Names of adjacent property owners, as well as those of local, state, and federal government officials were collected and recorded in a database. This database was updated prior to each public involvement event including, agency and public scoping meetings held in 2019, public meetings held in 2020 and 2022, federal/local elections held in 2020, and community meetings held in 2022. This database will continue to be updated throughout the DEIS and FEIS process after public involvement opportunities, elections, or interest inquiries by the public to be added to the mailing list.

7.2.2 Notice of Intent

On May 20, 2019, a NOI to prepare an EIS for Loop 9, Segment A was published in the *Federal*

Register (Environmental Impact Statement: Dallas and Ellis Counties, Texas, 84 Fed. Reg. 22,928. initiating the formal scoping process for the project in accordance with NEPA. NEPA defines the scoping process in 40 CFR Section 1501.9 as an early and open process to determine the scope for analysis, including identifying the significant issues related to a proposed action. Copies of the NOI are included in **Appendix C**.

7.2.3 Agency Coordination

As part of the development process for the proposed Loop 9, Segment A project, local, federal, and state government agencies were consulted prior to and during preparation of the DEIS. Cooperating and Participating agencies are responsible to identify, as early as practicable, any issues of concern regarding the project's potential environmental or socioeconomic impacts that could substantially delay or prevent an agency from granting a permit or other approval that is needed for the project.

A Cooperating Agency is defined as any Federal agency (and a State, Tribal, or local agency with agreement of the lead agency) other than a lead agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action that may significantly affect the quality of the human environment. A Participating Agency is defined as a Federal, State, Tribal, or local agency participating in an environmental review or authorization of an action. "Cooperating agency" and "participating agency" are defined in 40 CFR § 1508.1.

In accordance with the MOU between TxDOT and TPWD, TPWD has provided a set of recommended TxDOT BMPs in a document titled, "Beneficial Management Practices - Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources," which is available on TxDOT's Natural Resources Toolkit at https://www.txdot.gov/inside-txdot/division/environmental/compliance-toolkits/natural-resources.html. The MOU provides that application of specific TxDOT BMPs to individual projects will be determined by TxDOT at its discretion. The BMPs that will be applied to this project are indicated in the Form - Documentation of Texas Parks and Wildlife Department Best Management Practices prepared for the project as part of the species analysis documentation, which is available at the TxDOT Dallas District Office.

The following agencies were sent a letter requesting they participate in the DEIS process as a Cooperating or Participating Agency.

Table 7-3: Cooperating and Participating Agencies

Agency	Roles		Response
	Cooperating	Participating	
Federal Agencies			
U.S. Army Corps of Engineers	X	X	Cooperating
U.S. Department of the Interior - USFWS	X	X	
Environmental Protection Agency	X	X	Cooperating
Bureau of the Census		X	

Table 7-3: Cooperating and Participating Agencies (continued)

Agency	Roles		Response
	Cooperating	Participating	
Federal Agencies (cont.)			
Federal Aviation Administration		X	
Federal Railroad Administration		X	
Federal Transit Administration		X	
U.S. Coast Guard		X	
U.S. Department of Homeland Security – FEMA		X	
U.S. Department of Agriculture - NRCS		X	
State Agencies			
Public Utility Commission of Texas		X	
Texas Commission on Environmental Quality		X	
Texas Department of Housing and Community Affairs		X	
Texas Historical Commission		X	
Texas Parks and Wildlife Department		X	Participating
Texas State Soil & Water Conservation Board		X	
Texas Railroad Commission		X	
Texas General Land Office		X	
Governor's Office of Planning and Budget		X	
Local Agencies			
City of Ovilla		X	
City of Glenn Heights		X	
City of Red Oak		X	
City of Cedar Hill		X	
City of Midlothian		X	
Dallas Area Rapid Transit		X	
Dallas County Trail and Preserve Program		X	
Dallas County		X	
Ellis County		X	
North Central Texas Council of Governments		X	Participating

Agency Scoping Meeting

An Agency Scoping Meeting was held on Thursday, August 8, 2019, at the TxDOT Dallas District Office. The purpose of the agency meeting was to present the project studies completed to date and identify relevant issues related to the proposed Loop 9, Segment A project as part of the NEPA

process. This meeting provided an opportunity to review and comment on the draft PCP, the project Purpose and Need, and the range of alternatives to be considered and evaluated in the DEIS.

Agency Meetings

- **February 6, 2019**: A meeting with the USACE was held on February 6, 2019, at the USACE Fort Worth Office. The purpose of the meeting was to coordinate and initiate activities for the proposed project.

Upon completion, the DEIS will be circulated to the Participating and Cooperating Agencies for comment.

7.2.4 Stakeholder Meetings

TxDOT has held meetings with the following stakeholders or local public officials as part of the DEIS process:

- City of Cedar Hill
- City of Glenn Heights
- City of Midlothian
- City of Red Oak
- City of Ovilla
- Dallas County
- Ellis County

Given the unique circumstance of the COVID-19 pandemic, along with the department's commitment to protecting public health during this national emergency, TxDOT began conducting virtual stakeholder meetings in 2020 to avoid in-person contact.

In 2020, the first round of virtual meetings was held where project status and schedule were provided, and stakeholders were interviewed on known developments within their jurisdiction. Stakeholders were also given an Indirect and Cumulative Impacts Questionnaire to complete for their area. Although no questionnaires were completed and returned, below is a summary on known developments provided by each stakeholder during the meetings:

- City of Red Oak (July 28, 2020): There are plans for the Meadow Ridge development near IH 35E. The western portion of the plans have a platted section of single family and high-density townhome residences, but the remainder of the plans are conceptual.
- City of Cedar Hill (July 30, 2020): There is a sewer line planned at Cockerill Hill Rd., the Vineyards subdivision, Phase 2B of Bear Creek Ranch subdivision (to the east of the current Phase 2A), and Stonehill subdivision (no plat received as of date of stakeholder meeting).
- Ellis County (July 30, 2020): No known developments discussed.
- City of Midlothian (August 5, 2020): No known developments discussed.
- City of Glenn Heights (August 11, 2020): There is a development planned in the southeast corner of Hampton Rd. and future Loop 9, Segment A called the Palladium; development has not been platted as of the date of the stakeholder meeting.

In early 2021, a second round of virtual stakeholder meetings was conducted to provide an update on the project status and discuss developments within each jurisdiction. Below is a summary of developments discussed at these meetings:

- City of Red Oak (February 24, 2021): No new known developments discussed.
- City of Cedar Hill (March 4, 2021): The Stonehill development is going into final plat and Phase 1 will be on the east side. The Vineyards has been final platted.
- Ellis County (March 1, 2021): No new known developments discussed.
- City of Midlothian (February 24, 2021): No new known developments discussed.
- City of Glenn Heights (March 1, 2021): The Palladium plans are conceptual and the city has issued a formal solicitation to the development community. The city will continue to market this site for development. A single-family development in the southeast quadrant at Westmoreland Rd. and Loop 9, Segment A has been proposed.

Between late 2021 and early 2022, additional virtual stakeholder meetings were conducted as part of the DEIS process. As a result of both stakeholder and public comments received after the earlier 2021 meetings, four additional design modifications (Modifications A-D) were added for evaluation. The purpose of these meetings was again to discuss that status of the project studies, present the four design modifications and gather input from the stakeholders. Below is a summary of these meetings:

- City of Midlothian (February 24, 2021): No new known developments discussed.
- Ellis County (March 1, 2021): No new known developments discussed.
- City of Glenn Heights (October 18, 2021, and June 7, 2022): Two design modifications have been developed north of Lindell Estates to reduce potential displacements to this subdivision (Modifications A and B). When the Loop 9, Segment A project originally kicked off there were around 10 homes in this area; however, new homes have continued to be built in the proposed ROW resulting in almost 30 potential displacements. Given the increase in development and this being a minority community, TxDOT will be considering moving the alignment. Maps were presented on screen to show the 2 modifications for this area. A current count reduces potential displacements to 5, but there will be new properties impacted.
    - One of the modifications will impact the City's Public Works building and water tower. The City also made TxDOT aware that they are currently building a new maintenance facility on this property as well located north of the water tower behind the public works building.
    - Discussion on a moratorium for development in the proposed ROW was revisited and the City stated that they do not meet the threshold to establish one, therefore, all they can do is notify the public that this project is coming.
    - TxDOT requested a letter of support for one of the modifications.
    - Brief discussion on whether a more southern alternative was an option, and it was determined that it was too developed to consider this as an option.
    - The Palladium plans are conceptual, and the city has issued a formal solicitation to the development community. The city will continue to market this site for

development. A single-family development in the southeast quadrant at Westmoreland St. and Loop 9, Segment A has been proposed.
    - Developer status was discussed regarding new subdivisions within Glenn Heights.
- City of Cedar Hill (November 17, 2021): TxDOT discussed Modifications C and D, both of which lie within the city of Cedar Hill's jurisdiction. Modification C on the Common Alignment optimizes the intersection at Westmoreland Rd. to reduce potential displacements, and Modification D is a slight shift north of Alternative 3 to also reduce potential impacts and displacements.
- City of Red Oak (November 29, 2021): After review of the two modifications near the city of Red Oak, Modifications A and B, the city stated they preferred the straighter Modification B due to its geometry and developable frontage. The city would prefer that it follow along the north side of the county/city line to make permitting and building processes easier.

7.2.5 Public Scoping Meetings

Two public scoping meetings have been held as part of the DEIS process and are summarized below. Additionally, a Public Scoping Meeting Summary Report is available for review at the Dallas District Office or online at www.txdot.gov/loop9.

Public Scoping Meeting No. 1 (July 9, 2019)

The initial scoping meeting was held at the Red Oak Municipal Center in Red Oak. The meeting initiated the scoping process, presented the DEIS study process, and solicited public comments regarding the proposed Loop 9, Segment A project, Draft Purpose and Need statement, Draft PCP with PIP, and reasonable alternatives. The scoping meeting was held in an open house format with no formal presentation. The total number of participants in attendance was 74, including three elected officials.

Public Scoping Meeting No. 2 (July 11, 2019)

The second scoping meeting presented the same information as the first but was held at a different location to provide additional accessibility to the public. The scoping meeting was held at the Cedar Hill Recreation Center in Cedar Hill. The total number of participants was 126, including three elected officials.

The comments received at the public scoping meetings related to impacts to property, quality of life, ROW acquisition, and the need for the project. Comments were also received regarding access, noise, aesthetics, pedestrian/bicycle accommodations, and impacts to the natural environment. Based on comments related to the route of the alternatives, an additional alternative (Alternative 4) was added to the study for evaluation in the NEPA process.

7.2.6 Public Meetings

Two rounds of public meetings (four total meetings), in open-house format, have been held as part of the DEIS process and are summarized below. Additionally, a Documentation of Public Meeting Report for each of the meetings is available for review at the Dallas District Office or online at www.txdot.gov/loop9.

7.2.6.1 February 2020 Public Meetings

Public Meeting No. 1 (February 6, 2020)

The first public meeting in 2020 was held at the Red Oak Municipal Center in Red Oak. The purpose of the public meetings was to present the project studies completed to date and identify relevant issues related to the NEPA process. The public meetings provided an opportunity for the public to review and comment on the range of alternatives, alternatives screening process, environmental constraints, and project plans being considered and evaluated in the DEIS. As a result of public comments received during the public scoping meetings, an additional alternative (Alternative 4) was developed and presented at this public meeting. Computer stations were available at the Public Meetings to allow the public to see where the proposed project was located on aerial imagery in relation to specific properties. The total number of participants was 111, including three elected officials.

Public Meeting No. 2 (February 13, 2020)

The second public meeting in 2020 presented the same information as the first but was held at a different location to provide additional accessibility to the public. The meeting was held at the Cedar Hill Recreation Center in Cedar Hill. The total number of participants was 118, including five elected officials.

7.2.6.2 March 2022 Public Meetings

Public Meeting No. 1 (March 2, 2022)

The first public meeting in 2022 was held at the DeSoto High School Academy Cafeteria in DeSoto. The purpose of the public meeting was to present the four design modifications that had been developed as a result of prior public and stakeholder comments. The status of the project studies completed to date was also presented at these meetings. The public meeting provided an opportunity for the public to review and comment on the range of alternatives and modifications, environmental constraints and evaluation matrix, and project plans being considered and evaluated in the DEIS. A pre-recorded presentation with visual and audio components was played offering project details and status. Computer stations were available at the Public Meetings to allow the public to see where the proposed project was located on aerial imagery in relation to specific properties. The total number of participants was 56, including one elected official.

Public Meeting No. 2 (March 3, 2022)

The second public meeting in 2022 presented the same information as the first but was held at a different location to provide additional accessibility to the public. The meeting was held at the Midlothian Conference Center in Midlothian. Due to ongoing COVID-19 restrictions and elections occurring at the time of the meetings, venue options outside the study area had to be considered. Although slightly outside the study area, the meeting was well-attended with the total number of participants at 41, including one elected official.

Virtual Public Meeting (March 2-March 18, 2022)

A pre-recorded presentation was made available online at www.keepitmovingdallas.com/Lp9SegmentA through TxDOT's YouTube page. The virtual presentation was available for viewing, and online comments were made available through the end of the comment period. The English version of the presentation was viewed 229 times and the

Spanish version was viewed 45 times. Electronic copies of the exhibit boards, schematics, handouts and comment forms were also made available online.

The comments received at the public meetings (both in-person meetings and the virtual meeting) related to safety; quality of life; need for the project; impacts to wildlife, noise, and air; and preference of Alternative and Modification.

7.2.7 Community Meetings

Two community meetings have been held as part of the DEIS process and are summarized below. Additionally, a Documentation of Public Meeting Report for each of the meetings is available for review at the Dallas District Office or online at www.txdot.gov/loop9.

7.2.7.1 Lindell Estates Subdivision (February 8, 2022)

As a result of prior public and stakeholder comments, four modifications to the four alternatives were developed and evaluated in the DEIS. Modifications A and B to the Common Alignment were developed to reduce potential impacts at Lindell Estates. The purpose of this community meeting was to present these modifications to the Lindell Estates residents and make sure they were informed on the proposed project. Postcards of the community meeting were mailed in both English and Spanish to all of the residents of Lindell Estates, regardless of whether they lived immediately adjacent to the proposed alternatives/modifications. The meeting was also advertised on yard signs, in English and Spanish, and placed at the subdivision entrances and various intersections throughout the subdivision. The meeting provided an opportunity for the residents to review and comment on the range of alternatives and modifications, and project plans being considered and evaluated in the DEIS. The community meeting was held in an open-house format with no formal presentation. Spanish translators were available and offered translation services to four groups of attendees. The total number of participants in attendance was 24, including three elected/public officials.

7.2.7.2 Bear Creek Ranch Subdivision (February 10, 2022)

At the request of the City of Cedar Hill public officials, a community meeting for the residents of Bear Creek Ranch was conducted. This meeting was requested due to the expansion of this subdivision since the previous public meetings, and many new residents were unaware of the proposed project. The purpose of this community meeting was to inform the residents of the status of the Loop 9, Segment A project. Postcards of the community meeting were mailed in both English and Spanish to all of the residents of Bear Creek Ranch, regardless of whether they lived immediately adjacent to the proposed alternatives/modifications. Additionally, notice of the meeting was provided to the HOA for publication on the subdivision Facebook page. The meeting was also advertised on yard signs, in English and Spanish, and placed at the subdivision entrances and the local park. The meeting provided an opportunity for the residents to review and comment on the range of alternatives and modifications, and project plans being considered and evaluated in the DEIS. The community meeting was held in an open house format with no formal presentation. Spanish translators were available, however, no translation services were needed. The total number of participants in attendance was 19, including one elected/public official.

7.2.8 Notification

Notification of public scoping meetings and public meetings were advertised in the following local newspapers within the study area:

- *Dallas Morning News*
- *Al Dia* (Spanish language)
- *Focus Daily News*
- *Ellis County Press*
- *Waxahachie Daily Light*

TxDOT advertised all meetings in each publication approximately 30 days prior to the meetings, noting that every reasonable effort would be made to accommodate special communication requirements (given two days advance notice prior to each meeting).

7.2.9 Comment Forms

Participants at the public scoping meetings and public meetings were given the opportunity to submit written comments. The comment form asked participants to give their comments on the proposed project. Comment forms at the public scoping meetings and public meetings were available in English and Spanish. A total of 59 written comments, submitted at the public scoping meetings, the public meetings or mailed to the Dallas District, were received during the DEIS process. Handwritten comments received on Comment Forms during the Comment Period are included in the Documentation of Public Meeting reports.

At the Scoping Meetings, the public was given the opportunity to submit comments via an online survey form. The online survey asked participants about their priority issues related to the project, locations where they experience traffic problems in the surrounding area, and to share their general opinion about the project. A total of 51 participants took the online survey, providing 57 remarks. Comments received through the online survey, MetroQuest, are included in the Online Engagement Report: MetroQuest Summary Results.

At the 2020 Public Meetings, the public was given the opportunity to submit electronic comments at the Computer Stations. Computer station comments consisted of questions regarding noise and natural resources impacts as well as access and travel pattern changes. A total of six participants submitted electronic comments and are included as part of the comment response matrix in the Documentation of Public Meeting report.

At the 2022 Public Meetings, the public was given the opportunity to submit electronic comments at the Computer Stations and via an online Comment Form made available during the Virtual Public Meeting at www.keepitmovingdallas.com/Lp9SegmentA. A total of seven participants submitted electronic comments and are included as part of the comment response matrix in the Documentation of Public Meeting report.

7.2.10 Website

In 2022, TxDOT consolidated the various website platforms that had been used over the previous years into a single Loop 9 project website. This website was advertised at the 2022 Public Meetings and business cards with QR codes linking to the new website were made available to the public. The new project website, www.txdot.gov/loop9, was developed and will be maintained throughout the planning and construction phases of all three segments of Loop 9. The website includes the following:

- Corridor/Feasibility Study efforts
- Corridor and Project maps
- Project history
- Project information for each Segment
- Previous and upcoming public involvement
- Contact information via mail, phone, and email for each Segment
- Social media resources

7.2.11 Future Public Involvement

A public hearing is anticipated for late 2022, pending the approval and release of the DEIS. The purpose of the public hearing is to communicate to the public the environmental findings and status of the DEIS, the factors considered in the environmental process, a summary of the public input received, and provide an additional opportunity to comment.

Following public health guidelines, a virtual public hearing may be held in the following two situations: (1) as a supplement to an in-person public hearing, or (2) as a substitute for an in-person public hearing when the Governor and/or President declares a health or other emergency, or TxDOT determines that an in-person public hearing should not be held out of concerns for public health or safety.

The DEIS will be posted for public review at least 30 days prior to the hearing. Notices will be provided to adjacent landowners, local and elected officials, community facilities, and published in local newspapers.

Whether in-person or virtual, participants at the public hearing will be able to obtain informational handouts, see and hear the presentation, and provide comments. Comments are encouraged and accepted, and the comment period end date will be widely publicized. All comments received on the DEIS and the Recommended Preferred Alternative will be considered.

SECTION 8. LIST OF PREPARERS

Table 8-1: List of Preparers for this Draft Environmental Impact Statement

TxDOT (Dallas District)	
Liang Ding, PE	Project Development
Sandra Williams	Project Development
Leslie Mirise	Environmental Specialist – Biologist
Deborah Nixon	Environmental Specialist – Hazardous Materials
Adam Fouts	Environmental Specialist – Water Resources
TxDOT Environmental Affairs Division	
Doug Booher	Division Director of Environmental Affairs
Michelle Lueck	Project Delivery Manager
Nicolle Kord	Community Impacts Specialist
Spencer Ward	Community Impacts Specialist
Stirling Robertson	Natural Resource Specialist
Ray Umscheid	Noise Specialist
Meredith Worthen	Noise Specialist
Susan Shuffield	Water Resources Specialist
North Central Texas Council of Governments	
Jeffrey Neal	Senior Program Manager, Streamlined Project Delivery and Data Management
Berrien Barks	Program Manager, Roadway Corridor and Subarea Studies
Jesse Brown	Transportation Planner III
BGE Engineering	
Hossein Hosseiny, PE	Project Manager
Colton Gill, PE	Project Engineer
Ecosystem Planning and Restoration	
Sonny Kaiser	Environmental Project Manager
Heather Durden	Sr. Environmental Scientist
Rich Starr	Sr. Environmental Scientist
Mark Mickley	Sr. Environmental Manager

Table 8-1: List of Preparers for this Draft Environmental Impact Statement (continued)

Ecosystem Planning and Restoration (Cont.)	
Tina Hendon	Natural Resources Manager
David Wilkins	Environmental Scientist
John Williams	Environmental Scientist
Jillian Sanders	Environmental Scientist
Amy James	Environmental Scientist
Will Saunier	Geospatial Analyst
Noel Hahn	Geospatial Analyst
Matt Koon	Environmental Specialist/CADD
Community Awareness Services	
Jerri Anderson	Public Involvement Specialist
AmaTerra	
Deborah Dobson-Brown	Historic Structures Program Manager, Senior Architectural Historian
Aaron Norment	Archaeology Program Manager, QA/QC Manager (Archeo)
Maura E. Hogan	Archaeology Principal Investigator, Senior Archaeologist, QA/QC Reviewer (Archeo)
Katherine Seikel, PhD	Archaeology Principal Investigator, Senior Archaeologist, QA/QC Reviewer (Archeo)
Sunshine Thomas, PhD	Senior Archaeologist, QA/QC Reviewer (Archeo)
Cherise J. Bell	Senior Architectural Historian
Kurt Korfmacher	Senior Architectural Historian
CP&Y	
Angela Gillmeister	Air Quality Specialist

SECTION 9. REFERENCES

American Association of State Highway and Transportation Officials. 2016. Practitioner's Handbook #12 Assessing Indirect Effects and Cumulative Impacts under the National Environmental Policy Act. https://environment.transportation.org/wp-content/uploads/2021/05/ph12-2.pdf

American Society for Testing and Materials E1527-21, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, ASTM International, West Conshohocken, PA, 2021. www.astm.org.

City of Cedar Hill. Revised 2008. Comprehensive Plan, Chapters 3 (Transportation Plan) and 4 (Future Land Use Plan). https://www.cedarhilltx.com/2005/Comprehensive-Plan. Accessed April 2022.

City of Cedar Hill. 2019 Update. Parks, Recreation, Trails & Open Space Master Plan. https://www.cedarhilltx.com/DocumentCenter/View/33333/Parks-Master-Plan-Update---2019?bidId=.

City of DeSoto. 2015. Comprehensive Plan. https://www.ci.desoto.tx.us/DocumentCenter/View/7419/DES-Comp-Plan-20150928-Final?bidId=. Accessed April 2022.

City of Glenn Heights. 2010. Comprehensive Plan 2023. https://glennheightstx.gov/DocumentCenter/View/197/Comprehensive-Plan-PDF. Accessed April 2022.

City of Midlothian. 2018. Envision Midlothian: A Comprehensive Plan. https://www.midlothian.tx.us/DocumentCenter/View/1179/Adopted-Comprehensive-Plan-2018?bidId=. Accessed April 2022.

City of Ovilla. 2016. Comprehensive Land Use Plan. http://www.cityofovilla.org/DocumentCenter/View/1720/2016-Comprehensive-Land-Use-Plan. Accessed April 2022.

City of Red Oak. 2010. Comprehensive Plan, Ordinance 11-004. https://www.redoaktx.org/738/2010-Comprehensive-Master-Plan. Accessed April 2022.

Conrey, Reesa C. Yale. 2001. "Do Highways Fragment Small Mammal Populations?" Wildlife Biology Program, Montana Cooperative Wildlife Research Unit.

Cowardin, L.M., et al. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service.

Dallas County Appraisal District. Real Estate Property Account Information. http://dallascad.org/. Accessed February 2022.

Dallas Paleontological Society. Geology of Dallas and Tarrant Counties. https://www.dallaspaleo.org/Surfac. Accessed April 2022.

Dallas Area Rapid Transit. 2022. https://www.dart.org/. Accessed April 2022.

Ellis County Appraisal District. Real Estate Property Account Information. https://www.elliscad.com/. Accessed February 2022.

Environmental Risk Information Services. 2021. Database Report Loop 9. Order Number: 21121300501. Accessed December 2021.

_____. 2021. Physical Setting Report, Loop 9. Order Number: 21121300501p. Accessed December 2021.

Executive Order of the President. May 24, 1977. *Executive Order 11988, Floodplain Management*. 42 FR 26951, 3 CFR, 1977 Comp., p. 117.

_____. May 24, 1977. *Executive Order 11990, Protection of Wetlands*. 42 FR 26961, 3 CFR, 1977 Comp., p. 121.

_____. February 11, 1994. *Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Federal Register, Vol. 59. No. 32, February 16, 1994.
_____. February 3, 1999. *Executive Order 13112, Invasive Species*. Federal Register, Vol. 64. No. 25 February 8, 1999.
_____. August 11, 2000. *Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency*. Federal Register, Vol. 65. No. 159, August 16, 2000.
Federal Emergency Management Agency. 2014. *Flood Insurance Rate Maps*, Dallas and Ellis Counties, Texas. Accessed February 2022.
_____. FEMA academic emergency management and related courses for Higher education Program: Floodplain management: principles and current practices. Chapter 8 specifically "floodplain natural resources and functions" https://training.fema.gov/hiedu/docs/fmc/chapter%208%20-%20floodplain%20natural%20resources%20and%20functions.pdf
Federal Highway Administration. 1987. *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. FHWA Technical Advisory T 6640.8A. October 30.
_____. 1996. *Community Impact Assessment, A Quick Reference for Transportation*. https://www.environment.fhwa.dot.gov/nepa/community_impact_assess.aspx.
_____. 2003. *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*. https://www.environment.fhwa.dot.gov/nepa/QAimpact.aspx.
_____. 2010. 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. https://www.fhwa.dot.gov/Environment/noise/regulations_and_guidance/.
_____. 2012. *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. FHWA Order 6640.23A. June 14.
_____. 2016. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*, October. https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/index.cfm.
_____. 2017. A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives. https://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.cfm.
Forman, R. T. T., B. Reineking, and A. M. Hersperger. 2002. "Road Traffic and Nearby Grassland Bird Patterns in a Suburbanizing Landscape." Environmental Management 29: 782-800.
GeoSearch. 2019. Historical Aerial Photographs Target Property LP 9 (I-35E to US 67) Job #277448, 1942-2016. Accessed February 2019.
_____. 2020. Radius Report.
Google Inc. 2021. Google Earth (Version 7.3.3.7699) [Software]. Accessed March 2022.
Health Effects Institute. 2007. Special Report 16. Mobile-Source Air Toxics: A critical Review of the Literature on Exposure and Health Effects. https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects.
Internal Inland Port of Dallas. 2020. http://www.dallasecodev.org/414/International-Inland-Port-of-Dallas.
LoopNet.com. Commercial Property Search Engine. Retrieved from LoopNet.com. Accessed April 2022.
Multi-Resolution Land Characteristics Consortium. 2019. National Land Cover Database, National Land Cover Change Index, 2001-2016. https://www.mrlc.gov/data/nlcd-land-cover-change-index-conus.

National Cooperative Highway Research Program, National Research Council, Transportation Research Board (NCHRP). 2002. The National Cooperative Highway Research Program (NCHRP) Report 466: Desk Reference for Estimating Indirect Effects of Proposed Transportation Projects. The Louis Berger Group, Inc., National Academy Press, Washington D.C. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_466.pdf

National Park Service. August 2004. Rio Grande Wild and Scenic River, Final General Management Plan/Environmental Impact Statement.

National Register of Historic Places online database. https://www.nps.gov/subjects/nationalregister. Accessed March 2022.

Natural Resources Conservation Service (NRCS). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Available online at www.nrcs.usda.gov/Internet/FSE_DOCUMENTS?nrcs142p2-050898.pdf. Accessed February 2022.

North Central Texas Council of Governments. 2018. *Mobility 2045. The Metropolitan Transportation Plan for North Central Texas*.

_____. 2005. NCTCOG land use data

_____. 2015. NCTCOG land use data.

_____. 2020. *Appendix D of the 2021-2024 Transportation Improvement Program.* https://www.nctcog.org/trans/funds/tip/transportation-improvement-program/2021-2024tip. Accessed June 29, 2022.

_____. 2022. Regional Data Center. North Central Texas Major Employers web mapping application. https://data-nctcoggis.opendata.arcgis.com/datasets/employers. Accessed April 2022.

_____. 2022. https://www.nctcog.org/trans/plan/bikeped/veloweb/adopted-2045-regional-veloweb. Accessed July 2022.

_____. 2022. Mobility 2045 Update. The Metropolitan Transportation Plan for North Central Texas.

Omernik, J., and Griffith, G. 2013. Ecoregions of Texas (EPA) – The Encyclopedia of Earth. http://editors.eol.org/eoearth/wiki/Ecoregions_of_Texas_(EPA). Accessed April 2022.

Railroad Commission of Texas. Public GIS Viewer. https://gis.rrc.texas.gov/GISViewer/. Accessed April 2022.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed February 2022.

Solomon, S. D. (2007). Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

Spellerberg, I.F. *2002. Ecological Effects of Roads*. Science Publishers, Inc., Enfield, New Hampshire.

Stocker, T. D.-K. (2013). Summary for Policymakers: Climate Change 2013: The Physical Science Basis. Contribution of Working Group to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

Texas Almanac. Geologic Atlas of Texas 2018.https://texasalmanac.com/topics/environment/geology-texas-0.

Texas Commission on Environmental Quality (TCEQ). 2015. On Road, Mobile Source Trend Emissions Inventories for All 254 Counties in Texas for 1999 - 2050. College Station, TX: Texas A&M Transportation Institute

_____. 2022. Surface Water Assessment Viewer, version 4.2. https://www.tceq.texas.gov/gis/swaview. Accessed April 2022.

_____. 2020. Texas Integrated Report - Index of Water Quality Impairments. https://www.tceq.texas.gov/waterquality/assessment. Accessed April 2022.

_____. 2020. Texas Emissions Reduction Plan. https://www.tceq.texas.gov/airquality/terp.

_____. 2022. Surface Water Quality Web Reporting Tool. https://www80.tceq.texas.gov/SwqmisPublic/index.htm. Accessed April 2022.
Texas Department of Transportation (TxDOT). 2011. Guidelines for Emphasizing Bicycle and Pedestrian Accommodations.
_____. 2011. Loop 9 Southeast Draft Environmental Impact Statement.
_____. 2013. Texas Parks and Wildlife MOU, BMP 2017 Revision.
_____. 2014a. Loop 9 Southeast Corridor/Feasibility Study.
_____. 2014b. *Indirect Induced Growth Impacts Decision Tree.*
_____. 2014c. Cumulative Impacts Decision Tree.
_____. 2017. Final Environmental Assessment Loop 9 I-35E to I-45.
_____. 2019. Final Environmental Assessment FM 664 IH 35 East to IH 45.
_____. 2019. *Cumulative Impacts Analysis Guidance.*
_____. 2019. *Indirect Impact Analysis Guidance.*
_____. 2019. *Guidelines for Analysis and Abatement of Roadway Traffic Noise.*
_____. 2019. Plans for The Vineyards development, Stonehill development, Meadow Ridge development.
_____. 2019. Technical Memorandum (draft). Task Report #6 Technical Assistance in the Environmental Process Traffic Forecast Methodology.
_____. 2020. *Guidance for Preparing Air Quality Statements.*
_____. 2020. *2019-2022 Statewide Transportation Improvement Program. https://apps3.txdot.gov/apps/estip/fileloader.ashx?pg_file_id=2674. Accessed June 29, 2022.*
_____. 2020. Traffic Analysis for Highway Design (Option C), April 3, 2020.
_____. 2022. https://ftp.txdot.gov/pub/txdot-info/env/toolkit/200-02-fig.pdf. Accessed October 19, 2022.
ADD traffic data source
_____. 2021. *Statewide On-Road Greenhouse Gas Emissions Analysis and Climate Change Assessment Technical Report.*
_____.2021. Categorical Exclusion US 67 at Lake Ridge Parkway.
_____.2021. *Environmental Handbook for Air Quality*.
Texas Historical Commission. 2019 Texas Archeological Sites Atlas Online. Retrieved from https://atlas.thc.state.tx.us/. Accessed November 2019.
Texas Historical Commission. 2022 Texas Archeological Sites Atlas Online. Retrieved from https://atlas.thc.texas.gov/. Accessed March 2022.
Texas General Land Office. 2019. *Texas Coastal Management Program, Coastal Zone Boundary Map.*
Texas Labor Market Information. 2019. https://texaslmi.com/. Accessed April 2022.
Texas Land Trends Project. 2017. Texas A&M Institute of Renewable Natural Resources. http://data.txlandtrends.org/. Accessed April 2022.
Texas Parks and Wildlife Department (TPWD). 2021. Beneficial Management Practices. Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources. Accessed July 2022.
_____. 2022. *Ecological Mapping Systems of Texas.* https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/. Accessed March 2022.
_____. 2022. Texas Watershed Viewer. https://tpwd.maps.arcgis.com/apps/Viewer/index.html?appid=2b3604bf9ced441a98c500763b8b1048. Accessed April 2022.
_____. 2022. *Annotated County Lists of Rare Species, Dallas and Ellis Counties*. https://tpwd.texas.gov/gis/rtest/. Accessed June 2022.

_____. 2022. Texas Natural Diversity Database. Element Occurrence data export. Wildlife Diversity Program of Texas Parks & Wildlife Department. Accessed March 2022.
Transportation Research Board (TRB). 2000. *Highway Capacity Manual.*
_____. 2002. NCHRP Report 466: *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects.*
Texas Water Development Board (TWDB). 2018. 2021 Regional Water Plan Population Projections by county and water user group. http://www.twdb.texas.gov/waterplanning/data/projections/2022/popproj.asp
_____. 2020. Major Aquifers of Texas. https://tpwd.texas.gov/publications/pwdpubs/pwd_pl_w7000_1187a/media/27.pdf
_____. 2020. Minor Aquifers of Texas. https://www.twdb.texas.gov/groundwater/aquifer/minor.asp. Accessed April 2022.
_____. Geologic Atlas of Texas, Dallas. 1:250,000 Scanned Map Sheets. https://www.twdb.texas.gov/groundwater/aquifer/GAT/index.asp.
_____. 2022. Water Data Interactive, Groundwater Data Viewer. http://www.twdb.texas.gov/mapping/index.asp. Accessed April 2022.
Texas Workforce Commission. 2021. https://www.twc.texas.gov/news/texas-unemployment-rate-falls-67-percent#:~:text=AUSTIN%20%E2%8E%AF%20In%20April%2C%20the%20seasonally%20adjusted%20Texas,gains%20in%2011%20of%20the%20last%2012%20months. Accessed March 2022.
U.S. Army Corps of Engineers (USACE). 1987. *Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1*. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.
_____. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (2.0)*. U.S. Army Corps of Engineers. Engineer Research and Development Center. Vicksburg, Mississippi.
_____. U.S. Army Corps of Engineers (USACE). Regulatory Guidance Letter: Ordinary High Water Mark Identification. Available online at https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll9/id/1253. Accessed February 2022.
_____. 2020. *Great Plains 2020 Regional Wetland Plant List*. https://cwbi-app.sec.usace.army.mil/nwpl_static/data/DOC/lists_2020/Regions/pdf/reg_GP_2020v1.pdf.
_____. 2020. *National Wetland Plant List*, version 3.5. https://cwbi-app.sec.usace.army.mil/nwpl_static/data/DOC/lists_2020/National/National_2020v1.pdf. Accessed February 2022.
_____. 2020. Antecedent Precipitation Tool (APT). v1.0.13. Released on July 8, 2020. Available online https://github.com/jDeters-USACE/Antecedent-Precipitation-Tool/releases/tag/v1.0.13. Accessed February 2022.
U.S. Census Bureau. 1970. Census of Population.
_____. 1980. Census of Population.
_____. 1990. Census of Population.
_____. 2000. Census of Population, Summary File 1.
_____. 2010. Census of Population, Summary File 1.
_____. 2020. Census of Population, P2.
_____. 2013. 2007-2011. American Community Survey - 5-year estimates.
_____. 2018. 2013-2017. American Community Survey - 5-year estimates.
_____. 2019. 2014-2018. American Community Survey - 5-year estimates.
_____. 2022. 2016-2020. American Community Survey - 5-year estimates.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. *U.S. Department of Agriculture Handbook 296*.

_____. 2022. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/. Accessed March 2022.

U.S. Department of Health and Human Services. 2022. *The 2022 HHS Poverty Guidelines.*

U.S. Department of Transportation, FHWA, and Federal Transit Administration. 2016. Statewide and Nonmetropolitan Transportation Planning; Metropolitan Transportation Planning: Final Rule. 81 FR 34049. June 27.

U.S. Department of Transportation and Federal Highway Administration. 2004. Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

U.S. Environmental Protection Agency. 2001. Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (66 FR 17229, March 29, 2001).2014 National Air Toxics Assessment. https://www.epa.gov/national-air-toxics-assessment. Accessed September 2022.

_____. 2015. EPA Releases MOVES2014a Mobile Source Emissions Model Questions and Answers. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NNR0.txt.

_____. 2015. 2015 Revision to 2008 Ozone National Ambient Air Quality Standards.

_____. 2018. EPA National Air Toxics Data. https://www.epa.gov/national-air-toxics-assessment.

_____. 2022. Integrated Risk Information System. http://www.epa.gov/iris/.

U.S. Fish and Wildlife Service. 2019. Coastal Barrier Resources System Map. https://www.fws.gov/CBRA/Maps/Mapper.html. Accessed April 2022.

_____. 2020. List of Protected Species March 2020. Migratory Bird Treaty Act Protected Species. https://www.fws.gov/law/migratory-bird-treaty-act-1918. Accessed April 2022.

_____. 2022. National Wetlands Inventory Digital Data. https://www.fws.gov/wetlands/data/Mapper.html. Accessed March 2022.

_____. 2022. Information for Planning and Consultation. Official Species List https://ecos.fws.gov/ipac/. Accessed June 2022.

U.S. Geological Survey. 2019. 7.5 Minute Series Quadrangle Map. *Cedar Hill and Lancaster, Texas.*

U.S. Geological Survey, National Geologic Map Database. 2022. topoView, Topographic Map Viewer. https://ngmdb.usgs.gov/topoview/viewer. Accessed March 2022.

World Bank. 2017. CO^2 emissions (kt) Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States.

Zillow.com. https://www.zillow.com/. Accessed February 2022.