ENVIRONMENTAL ASSESSMENT

FOR THE

PROPOSED IMPROVEMENTS
TO FRATE BARKER ROAD
FROM BRODIE LANE TO MANCHACA ROAD
TRAVIS COUNTY

CSJ: 0914-04-242

AUGUST 2008
(REVISED APRIL 2010, DECEMBER 2010, JUNE 2011, DECEMBER 2011)

PREPARED BY
TRAVIS COUNTY

FOR

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND THE

TEXAS DEPARTMENT OF TRANSPORTATION

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1. Consistency with Local Transportation Plan 1
2. EXISTING FACILITY 1
3. NEED AND PURPOSE 2
4. ALTERNATIVES ANALYSIS 5
4.1. Preliminary Alternatives 6
4.2. Reasonable Alternatives 7
5. PROPOSED FACILITY 8
6. EXISTING ENVIRONMENT 8
6.1. Soils and Geology 8
6.2. Water Resources 11
6.3. Vegetation 13
6.4. Wildlife 14
6.5. Migratory Birds 15
6.6. Threatened and Endangered Species 15
6.7. Socioeconomics 21
6.7.1. Land Use 21
6.7.2. Demographics 22
6.8. Hazardous Materials 28
6.9. Noise Receivers 28
6.10. Air Quality 28
6.11. Cultural Resources 30
6.11.1. Historic Resources 30
6.11.2. Archeology 31
7. DIRECT EFFECTS OF THE PROPOSED PROJECT 32
7.1. Soils and Geology 32
7.2. Water Resources 33
7.3. Vegetation 34
7.4. Wildlife 37
7.5. Migratory Birds 37
7.6. Threatened and Endangered Species 37
7.7. Community Impact Assessment 40
7.7.1. Land Use 40
7.7.2. Community Cohesion 40
7.7.3. Environmental Justice 40
7.7.4. Noise 41
7.7.5. Air Quality 44
7.8. Hazardous Materials 46
7.9. Cultural Resources 46
7.9.1. Historic Resources 46
8. INDIRECT EFFECTS OF THE PROJECT 47
9. CUMULATIVE EFFECTS OF THE PROJECT 61
10. ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS 77
10.1. Water Resources 77
10.2. Vegetation 78

10.3. Migratory Birds/Endangered Species 78
10.4. Socioeconomics 79
10.4.1. Displacement of People 79
10.4.2. Traffic Management During Construction 80
10.4.3. Public Involvement 80
10.5. Hazardous Materials 80
10.6. Noise 80
10.7. Historic 80
10.8. Air Quality 80
10.9. Archeology 81

11. SUMMARY OF PUBLIC INVOLVEMENT 81

12. CONCLUSION 82

12.1. Identification of the Preferred Alternative 82

TABLES

TABLE 1: CROSS DRAINAGE STRUCTURES 2
TABLE 2: POPULATION GROWTH IN TRAVIS AND HAYS COUNTIES AND THE CITY OF AUSTIN 2
TABLE 3: POPULATION GROWTH IN PROJECT AREA CENSUS BLOCK GROUPS 2
TABLE 4: HISTORIC AVERAGE DAILY TRAFFIC VOLUMES ON FRATE BARKER 3
TABLE 5: CRASHES OCCURRING IN THE PROJECT AREA BETWEEN 2001 AND 2007 5
TABLE 6: SOILS LOCATED WITHIN THE PROJECT AREA 9
TABLE 7: GEOLOGY OF THE PROPOSED PROJECT AREA 9
TABLE 8: FEDERAL AND STATE LISTED THREATENED AND ENDANGERED SPECIES IN TRAVIS COUNTY 15
TABLE 9: FRATE BARKER LAND USE (2008) 22
TABLE 10: POPULATION GROWTH IN TRAVIS AND HAYS COUNTIES AND THE CITY OF AUSTIN 23
TABLE 11: POPULATION GROWTH IN PROJECT AREA CENSUS BLOCK GROUPS 23
TABLE 12: RACIAL AND ETHNIC COMPOSITION OF THE POPULATION 26
TABLE 13: MEDIAN HOUSEHOLD INCOME AND POVERTY STATUS: 1999 27
TABLE 14: VEGETATION IMPACTS (ACRES) 36
TABLE 15: NOISE ABATEMENT CRITERIA 42
TABLE 16: TRAFFIC NOISE LEVELS (DBA LEQ) 43
TABLE 17: EXAMPLES OF INDIRECT EFFECTS 47
TABLE 18: SEVEN-STEP APPROACH TO ESTIMATING INDIRECT EFFECTS 48
TABLE 19: FACTORS AFFECTING DEVELOPMENT 57
TABLE 20: EIGHT-STEP APPROACH FOR THE CUMULATIVE IMPACTS ANALYSIS 62
TABLE 21: WATER QUALITY WITHIN THE RESOURCES STUDY AREA 66
TABLE 22: CURRENT AND FUTURE DEVELOPMENT WITHIN THE RESOURCES STUDY AREA 68
TABLE 23: IMPERVIOUS COVER OF CAMPO ROADWAYS IN RESOURCES STUDY AREA 69
TABLE 24: WATER QUALITY ORDINANCES IN EFFECT WITHIN THE RESOURCES STUDY AREA 72
TABLE 25: POTENTIAL CUMULATIVE EFFECT AREA WITHIN THE RESOURCES STUDY AREA 73
TABLE 26: ALLOWABLE WATERSHED DEVELOPMENT RATES 75

FIGURES

FIGURE 1.1 PROJECT LOCATION MAP
FIGURE 2.1 EXISTING TYPICAL SECTION
FIGURE 3.1 LAND USE AND CENSUS
FIGURE 4.1 PRELIMINARY ALTERNATIVES
FIGURE 4.2(A-C) PROJECT PLAN VIEWS
FIGURE 5.1 PROPOSED TYPICAL SECTION
FIGURE 6.1 USGS TOPOGRAPHIC AND FEMA FLOODPLAIN MAP AND JURISDICTIONAL CHANNEL CROSSINGS
FIGURE 6.2 EDWARDS AQUIFER RECHARGE ZONES
FIGURE 6.3 KARST ZONES
FIGURE 6.4(A-B) NOISE AND AIR RECEIVERS
FIGURE 7.1 PRIME FARMLAND
FIGURE 8.1 INDIRECT EFFECTS STUDY AREA
FIGURE 8.2 LAND USE TREND 1990-2005
FIGURE 9.1 RESOURCES STUDY AREA

CHARTS

CHART 1: DEMOGRAPHIC GROWTH FOR TRAVIS, WILLIAMSON & HAYS COUNTIES
CHART 2: DEMOGRAPHIC GROWTH FOR TRAVIS COUNTY
CHART 3: POTENTIAL CUMULATIVE IMPACTS BY GENERAL LAND USE IN THE WATER RESOURCES RSA

APPENDICES

APPENDIX A: PHOTOGRAPHS OF THE PROJECT AREA
APPENDIX B: MTP AND TIP PLAN
APPENDIX C: MOBILE SOURCE AIR TOXICS ANALYSIS
APPENDIX D: HISTORIC RESOURCE RECONNAISSSANCE SURVEY REPORT
APPENDIX E: USFWS FINAL RULE LISTING THE BARTON SPRINGS SALAMANDER
APPENDIX F: TNRCC LETTER TO USFWS REGARDING LISTING OF THE BARTON SPRINGS SALAMANDER.
APPENDIX G: USFWS CONCURRENCE LETTER
APPENDIX H: SECTION 106 COORDINATION LETTERS

LIST OF ACRONYMS

-- A --	
ACM	asbestos-containing materials
ADT	Average Daily Traffic
AADT	Average Annual Daily Traffic
APE	Area of Potential Effects
ACHP	Advisory Council on Historic Preservation
AMATP	Austin Metropolitan Area Transportation Plan
-- B --	
BG	Block Group
BMP	Best Management Practices
BSEACD	Barton Springs/Edwards Aquifer Conservation District
-- C --	
CAA	Clean Air Act
CAAP	Clean Air Action Plan
CAMPO	Capital Area Metropolitan Planning Organization
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CT	Census Tract
-- D --	
dB	decibels – measurement of sound
dBA	decibels, A weighted
dbh	diameter at breast height
DDZ	Desired Development Zone
DWPZ	Drinking Water Protection Zone
-- E --	
EA	Environmental Assessment
ECS	Endangered Cave Species
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ETJ	Extra-territorial Jurisdiction
-- F --	
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Farm-to-Market
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
--G--	
GA	Geological Assessment
GCW	Golden-cheeked Warbler
-- I --	
IH	Interstate Highway
-- L --	
LEP	Limited English Proficiency
Leq	average or equivalent sound level
-- M --	
MOU	Memorandum of Understanding
MSAT	Mobile Source Air Toxics
MS4	Municipal Separate Sewer System
-- N --	
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NCHRP	National Cooperative Highway Research Program
NDD	Natural Diversity Database
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places

NWI	National Wetland Inventory
NWP	Nationwide Permit
	-- O --
OHWM	Ordinary High Water Mark
OTHM	Official Texas Historical Marker
	-- P --
PA	Programmatic Agreement
PA-TU	First Amended Programmatic Agreement Among the Federal Highway Administration, the Texas Department of Transportation, the Texas State Historic Preservation Officer, the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings
PCN	Preconstruction Notification
PUD	Planned Unit Development
	-- R --
RAP	Relocation Assistance Program
ROW	Right-of-Way
RSA	Resource Study Area
RTHL	Recorded Texas Historic Landmark
RTP	CAMPO 2035 Regional Transportation Plan
	-- S --
SAL	State Archeological Landmark
SIP	State Implementation Plan
SH	State Highway
SHPO	State Historic Preservation Officer
SW3P	Stormwater Pollution Prevention Plan
	-- T --
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TERMs	Transportation Emission Reduction Measures
THC	Texas Historical Commission
TIP	Transportation Improvement Program
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
TxDOT CRM	TxDOT's Cultural Resources Management
TxDOT-ENV	TxDOT's Environmental Affairs Division
	-- U --
US	United States Highway
USACE	United States Army Corps of Engineers
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USCB	U.S. Census Bureau
USGS	U.S. Geological Survey
UT CTR	University of Texas Center for Transportation Research
	-- V --
VMT	Vehicle Miles Traveled
vpd	Vehicles per day
	-- W --
WB	Westbound
WPAP	Water Pollution Prevention Plan

1. INTRODUCTION

Travis County, the Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT) Austin District, are proposing to improve Frate Barker Road (Frate Barker) in southern Travis County. Frate Barker is located in central Texas, entirely in Travis County.

The limits of the proposed improvements assessed in this document extend from Brodie Lane in the city of Austin to Manchaca Road just outside the city limits of Austin – a distance of approximately 1.3 miles. **Figure 1.1** shows the location of Frate Barker in relation to the city of Austin and Travis County.

1.1. Consistency with Local Transportation Plan

The Capital Area Metropolitan Planning Organization (CAMPO), which is the designated metropolitan planning organization for the Austin-area, produces the long-range transportation plan, the CAMPO 2035 Regional Transportation Plan (RTP), for the greater Austin-area. The CAMPO RTP specifies a set of investments and strategies to maintain, manage, and improve the surface transportation system in the three-county region of Travis, Williamson, and Hays Counties in central Texas. The project is consistent with the RTP. Frate Barker is also listed in, and consistent with, the CAMPO 2011-2014 Transportation Improvement Program (TIP)(Appendix B).

2. EXISTING FACILITY

Within the project limits, the existing facility is an undivided rural roadway consisting of two 12-foot travel lanes and no shoulders. The right-of-way width within the limits of the proposed project varies from 50- to 95-feet, with a usual width of 70-feet. **Figure 2.1** shows a typical section of the existing roadway.

Within the project area, two at-grade, signalized intersections are located at Brodie Lane and Manchaca Road.

There are no bridge class structures on Frate Barker within the project limits, however there are two cross drainage structures (culvert class pipe structures) on Frate Barker (**Table 1**).

Table 1: Cross Drainage Structures

Drainage Description	Location	Type
Bear Creek tributary	450' West of Buckingham Gate Drive	Two - 48" Reinforced Concrete Pipes
Drainage ditch to Bear Creek tributary	520' West of Jim Thorpe Lane	One - 24" Corrugated Metal Pipe

3. NEED AND PURPOSE

The purpose of the proposed improvements is to improve mobility and enhance safety within the project area. There is a need to provide additional capacity, to provide refuge for vehicles slowing in the travel lanes to make turns and to separate the directions of travel. The following population, traffic and crash data indicates there is a need for improvements to increase mobility and enhance safety on Frate Barker.

From 1980 to 2005, the population of Travis County increased over 100 percent, the population of Hays County increased over 180%, and the population of the city of Austin increased over 100 percent. As shown in **Table 2**, these trends are expected to continue.

Table 2: Population Growth in Travis and Hays Counties and the City of Austin

	1980	1990	2000	2005	2020
City of Austin	341,665	472,020	656,562	695,772	977,749
Hays County	40,594	65,614	97,589	115,030	242,051
Travis County	419,573	576,407	812,280	882,077	1,185,499

1980, 1990, 2000, and 2005 data obtained from Capital Area Council of Governments website
2020 projections obtained from Texas Water Development Board population estimates for TX Counties

One census tract (CT) with two associated block groups (BG) were identified within the Frate Barker project area and can be seen in **Figure 3.1**; Tract 17.32, BG 1 and Tract 17.32, BG 4. From 1990 to 2000, the population of these census block groups increased from 52-70 percent, as shown in **Table 3**.

Table 3: Population Growth in Project Area Census Block Groups

	1990	2000	% Population Increase
CT 17.32, BG 1	2,035	4,281	52.5%
CT 17.32, BG 4	2,347	7,751	70%

Source: U.S. Census Bureau

The increasing population is reflected in the amount of development occurring within or near the Frate Barker project area, including several residential subdivisions. **Figure 3.1** shows the land uses within and adjacent to the project area.

Frate Barker was constructed before 1970. An aerial photograph of Travis County, taken in 1970, shows the roadway and the land use in the surrounding area[1]. The 1970 aerial photograph shows very little development in the project area. Development is primarily shown along US 290/SH 71 and IH 35. Frate Barker was a primary route for local land owners to access Manchaca Road from Brodie Lane. Between 1990 and 2000, the population in the areas surrounding Frate Barker increased by more than 50 percent and land use within the area was converted from primarily agricultural to residential (**Figure 3.1**). Frate Barker continues to provide a link to Manchaca Road from Brodie Lane and new residential areas along Frate Barker. This transportation corridor provides convenient access to grocery and retail businesses centered at the intersections of Brodie Lane and Slaughter Road, Manchaca Road and Slaughter Road, and the South Park Meadows retail center located along IH-35 between Slaughter Road and FM 1626.

The increased population and associated development has resulted in increased transportation demand and is evidenced by an increase in traffic on Frate Barker and surrounding roadways. Because Frate Barker is an off-system roadway, historic traffic data is not available. Manchaca Road, which borders Frate Barker on the east, and FM 1626, located just south of Frate Barker, is on-system roadways for which there is historic average daily traffic (ADT) data available. Since 1990, ADT on Manchaca Road has increased 64 percent, and ADT on FM 1626 has increased 54 percent (**Table 4**). Given the increase in population growth of Travis County and the areas adjacent to Frate Barker, it is reasonable to assume that Frate Barker has experienced ADT increases comparable to other area roadways.

Table 4: Historic Average Daily Traffic Volumes on Frate Barker

	1990	2000	2007	% Change 1990-2007
Frate Barker Road	N/A	N/A	2,100[1]	N/A
Brodie Lane	N/A	N/A	10,810[2]	N/A
FM 1626	6,000	10,800	13,070	54%
Manchaca Road	9,600	12,700	12,980	64%

Source: TxDOT

[1] Traffic for Frate Barker for 2008

[2]Traffic for Brodie for 2006

While development within the project area has increased over time, it is assumed that this does not account for the entire increase in ADT on Frate Barker. The development of the surrounding area and nearby Hays County has also contributed to an increase of ADT on Frate Barker. From 1980 to 2005 the population of Hays County grew by almost 75,000. By 2020 the county is

[1] United States Department of Agriculture, Soil Conservation Service. 1974. Soil Survey of Travis County, Texas.

expected grow to more than double its current population. Many residents of nearby subdivisions and Hays County use Frate Barker to access FM 1626 and Manchaca Road, increasing the traffic volume on this road. For residents in Shady Hollow and other neighborhoods near Brodie Lane and Frate Barker, Frate Barker provides an alternative access to Manchaca Road, Slaughter Road, FM 1626, and IH-35. Residents of Hays County would similarly utilize Frate Barker when the intersection of FM 1626 and Manchaca Road becomes congested due to the railroad crossing at FM 1626 east of Manchaca Road, the school zone at Manchaca Elementary at the intersection of Manchaca Road and FM 1626, or peak traffic demands during morning and afternoon commutes.

Traffic volumes on Frate Barker are expected to continue to increase and are projected to exceed 3,400 vpd by 2028 (TxDOT, 2008). Frate Barker was built prior to 1970 and is handling traffic volumes for an area that grew 50 percent in just ten years (1990-2000).

As traffic increases, the potential for traffic crashes is expected to increase and safety of the existing roadway would degrade. Traffic crashes within the limits of the proposed project were analyzed for the years 2001 through 2007. The analysis indicates a total of 28 crashes were recorded over this six year period of time. Of the 28 crashes, there were no fatal crashes. **Table 5** provides the crash data for Frate Barker between Brodie Lane and Manchaca Road from 2001 to 2007.

Table 5: Crashes Occurring in the Project Area between 2001 and 2007

Year	Non-injury Crashes	Injury Crashes	Fatal Crashes	Total	Crashes by Major Type of Collision (Data only available for 2005-2007)**†			
					Head On	Side-Swipe	Read End	Right Angle
2001	0	1	0	1	-	-	-	-
2002	1	1	0	2	-	-	-	-
2003*	-	-	-	-	-	-	-	-
2004	0	0	0	0	-	-	-	-
2005	6	2	0	8	0	0	0	1
2006	8	6	0	14	1	1	0	1
2007	3	0	0	3	0	0	1	0

Source: Travis County and Texas Department of Public Safety

**Source for detailed 2005-2007 collisions: TxDOT-maintained Crash Records Information System (CRIS)

* No information available for 2003

† Only reportable motor vehicle traffic crashes were queried for this summary. For crashes occurring between January 1, 2001 and December 31, 2007, a reportable motor vehicle traffic crash is defined as: "Any crash involving a motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of $1,000 and having at least one vehicle towed due to the damage sustained in the crash."

Of the 28 crashes between 2001 and 2007, 10 were injury crashes and 18 were non-injury crashes. Within the project area, detailed information about the type of collision is available for those crashes occurring between 2005 and 2007. Of the five crashes that occurred within this time frame, one was a head on collision, one was a side swipe, one was a rear end collision, and two were right angle collisions.

There is a need for additional travel lanes (added capacity) on Frate Barker that would accommodate increases in traffic volume. A center turn lane and shoulders are needed to provide refuge for vehicles slowing or stopping in a travel lane before turning left or right when approaching a driveway or intersecting roadway, as the crash data supports. The addition of a center turn lane and shoulders would reduce rear-end and fixed object collisions. It is expected that the speed limit would be adhered to more consistently in the travel lanes as drivers are able to use the available turn lane and shoulders and would not need to slow the vehicle in the travel lane in expectation of an approaching intersection or driveway. The proposed improvements would reduce sideswipes, head-on collisions, and right-angle crashes.

4. ALTERNATIVES ANALYSIS

Analysis and development of the improvements to Frate Barker has been ongoing since 2001. Initially, improvements to Frate Barker were proposed from Manchaca Road to State Highway (SH) 45 South. Based on public opposition to a connection to SH 45 South, the project limits were modified. Since this time, new alignments and limits have been considered.

During the course of project development, a range of preliminary alternatives was considered. The field of alternatives was then narrowed to reasonable alternatives; and from the reasonable alternatives, a preferred alternative will be recommended. This section serves to document the alternatives selection process and the rationale for recommendation of a preferred alternative.

4.1. Preliminary Alternatives

Four preliminary alternatives (three build alternatives and a no build alternative) were developed and environmental constraints information was collected for each. The information was presented during an Open House in January 2008.

The three preliminary build alternatives are illustrated in **Figure 4.1**.

Preliminary Alternative 1

Preliminary Alternative 1 proposes the majority of the widening of Frate Barker be to the south of the existing facility. This alternative would eliminate a 30" diameter-at-breast height live oak tree near the intersection of Frate Barker and Marcus Abrams Boulevard. This tree is located within the existing right-of-way and is a constraint in alternative development due to its size and location. At the open house, there were three comments made in support of preserving, transplanting or mitigating for the oak tree that may be removed under this alternative. In addition the tree is a unique feature, due to its size and age, within the project area and was therefore considered in the development of alternatives. This alternative proposes 7.55 acres of new right-of-way (0.25 acres of the 7.55 acres for a water quality facility) and 0.23 acres of drainage easement, and would result in no residential and one commercial displacement. This alternative would satisfy the project's purpose and need by providing sufficient additional capacity to safely and efficiently accommodate existing and projected traffic volumes and by providing safety and mobility benefits.

Preliminary Alternative 2

Preliminary Alternative 2 proposes the roadway widening to the north and south of existing Frate Barker. Alternative 2 would contain a split median around the 30" live oak tree, in an attempt to preserve the existing tree. Alternative 2 would require more right-of-way acquisition that the other build alternatives. This alternative proposes 8.05 acres of new right-of-way (0.25 acres of the 8.05 acres for a water quality facility) and 0.23 acres of drainage easement, and would result in the displacement of 18 residences and 1 commercial property.

Preliminary Alternative 3

Preliminary Alternative 3 is very similar to Alternative 1, but would relocate the proposed roadway to the south of the 30" live oak tree, in an attempt to preserve the tree. This alternative proposes 7.85 acres of new right-of-way (0.25 acres of the 7.85 acres for a water quality facility)

and 0.23 acres of drainage easement. It would result in one commercial and one residential displacements, and would encroach into a new development on the south side of Frate Barker. This alternative would satisfy the project's purpose and need by providing sufficient additional capacity to safely and efficiently accommodate existing and projected traffic volumes and by providing safety and mobility benefits.

Preliminary Alternative 4: No Build Alternative

The No Build Alternative would leave Frate Barker in its current condition, and no funds or energy would be expended for planning or construction. The allocated funds for this project could therefore be used for other projects. The No Build Alternative would not improve safety and mobility on Frate Barker. Under the No Build Alternative, the safety and mobility benefits associated with increasing capacity and separation of travel lanes would not be realized. As traffic volumes continue to increase, safety and mobility would continue to deteriorate. The No Build Alternative does not satisfy the purpose and need for the proposed improvements and is not consistent with the regional transportation plan; however, consistent with NEPA, the no-build alternative is considered a reasonable alternative and will be carried forward for further evaluation.

Summary

A range of possible alternatives were considered and public comments were also taken into consideration before selecting a reasonable alternative. The majority of the comments received from the public provided support to the project. No one alternative alignment was favored by a majority of the public who commented. One individual stated a preference for Alternative Alignment 1; one individual stated a preference for Alternative Alignment 3; and one individual stated a preference for either Alternative Alignment 1 or 3. At the open house, there were three comments made in support of preserving, transplanting or mitigating for the oak tree that may be removed under Alternative 1. The tree is a unique feature, due to its size and age, within the project area and was therefore considered in the development of alternatives.

4.2. Reasonable Alternatives

Based on the evaluation of the preliminary alternatives, three alternatives were identified as reasonable alternatives: the No Build Alternative (no improvements to Frate Barker) and two build alternatives, Alternative 1 and Alternative 3 (**Figure 4.2**). Alternatives 1 and 3 are identical with one exception. In the area near the oak tree, Alternative 3 veers south approximately 50 feet in order to avoid the tree. Alternative 2 was eliminated from consideration because it would result in substantially greater relocation impacts than alternatives 1 or 3.

For both build alternatives, use of the existing Frate Barker corridor is proposed to minimize environmental impacts and displacements that would occur if the project was constructed on new location.

5. PROPOSED FACILITY

The proposed improvements would involve upgrading Frate Barker, within the project limits, from a two-lane rural facility to a four-lane divided facility with a continuous center turn lane. **Figure 4.2** shows a plan view of the proposed project.

Within the proposed project area, the 5-lane section would consist of two 12-foot travel lanes in each direction, with a 14-foot continuous center turn lane separating directions of travel. In addition, 2-foot shoulders, 6-foot sidewalks, and 5-foot bike lanes are also proposed. The usual right-of-way width would be 120-feet within the proposed project limits. The total pavement width would be 72-feet. **Figure 5.1** shows the proposed typical sections.

There are two drainage structures (none of which are bridge class) located within the Frate Barker project area. The culvert class pipe structure at the unnamed Bear Creek tributary, located 450-feet west of Buckingham Gate Drive would be lengthened to accommodate the proposed re-alignment at the western end of the project. The second drainage structure, a drainage ditch to a Bear Creek tributary, would also require lengthening, but does not service a jurisdictional waterway. A 0.23 acre permanent drainage easement will also be required. Grading and disturbance requirements within the drainage easement would be determined during final project design.

Approximately seven to eight acres of additional right-of-way would be required to construct the proposed project. The overall length of the proposed project is approximately 1.3 miles. It is estimated that the proposed improvements to Frate Barker would cost approximately 10.6 million dollars and would be a combination of federal, state and local funds. Photographs of the proposed project are attached at the end of this document in **Appendix A**.

6. EXISTING ENVIRONMENT

6.1. Soils and Geology

Soils within the proposed project area are characteristic of the Edwards Plateau Ecological Area and overlie a topography that ranges from nearly level to gently sloping hills. **Figure 6.1.** delineates the project area on the Oak Hill United States Geological Survey (USGS) 7.5 minute topographic quadrangle map. Within the proposed project area, there are no caves, cliffs, or bluffs. Two soil associations are located within the proposed project area: Speck-Tarrant and

Austin-Eddy. Eight soil units were identified within the proposed project area and are listed in the following table (NRCS, 1974) (**Table 6**).

Table 6: Soils Located within the Project Area

Soil Series	Soil Units
Austin: permeability is moderately slow, available water capacity is high	AsB – Austin silty clay, (1-3)% slope
Crawford: permeability is very slow, available water capacity is low	CrB – Crawford clay, (1-2)% slope
Denton: permeability is slow, available water capacity is high	DeC – Denton silty clay, (3-5) % slope
Frio: permeability is moderately slow, available water capacity is high	Fs – Frio soils, channeled
Heiden: permeability is very slow, available water capacity is high, runoff is rapid	HeB – Heiden clay, (1-3)% slope
	HeC2 – Heiden clay, (3-5)% slope, eroded
Stephen: permeability is moderately slow, available water capacity is low	StB – Stephen silty clay loam, (1-3)% slope
	StC – Stephen silty clay loam, (3-5)% slope

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soil is one of the three indicators necessary to determine the presence of a wetland. Soils must meet the criteria for rating as hydric by the Natural Resources Conservation Service (NRCS) National Technical Committee on Hydric Soils. There are no hydric soils within the project area.
The NRCS has defined prime farmland soils as soils best suited to food, feed, forage, fiber, or oilseed crops. According to the NRCS, AsB, CrB, DeC, and HeB soils are considered potential prime farmland.

The following generalized stratigraphic chart in **Table 7** illustrates the deposition of the four formations underlying the proposed project limits in geologic time.

Table 7: Geology of the Proposed Project Area

Era	Series	Stratigraphy
Quaternary	Pleistocene	Onion Creek Marl (Qo)
Cretaceous	Upper Cretaceous	Austin Chalk (Kau)
		Eagle Ford Group and Buda Limestone, undivided (Keb)
	Upper/Lower Cretaceous	Del Rio Clay and Georgetown Formation, undivided (Kdg)

The following formation descriptions and information regarding overlying soils were taken from the Geologic Atlas of Texas and from NRCS soil surveys:

Onion Creek Marl (Qo) formation is located to the south of the project area along approximately 0.27 miles of the western end. This formation is overlain with CrB, DeC, and Fs soils. The Qo formation is a fluviatile terrace deposit that forms broad terraces in the vicinity of Buda and downstream along Onion Creek. It is comprised of sand, clay, and gravel, and is up to 50 feet thick.

The Austin Chalk (Kau) formation is overlain with AsB and StB soils. This formation is located to the north and south of the project area along approximately 0.46 miles of the eastern end. The Kau formation is comprised of chalk and marl. The chalk is mostly microgranular calcite with minor Foraminifera tests and Inoceramus prisms averaging about 85 percent calcium carbonate. It is grayish white to white and weathers to limonite. The chalk alternates with marl with locally recessive bentonitic seams. The Kau formation is typically 325 to 420 feet thick.

The Eagle Ford Group and Buda Limestone, undivided (Keb) is overlain with CrB, StC, TaD and TcA soils. This formation is located to the north of the proposed project for an approximately 0.3 mile segment near the middle of the project. Undivided indicates that formal subdivisions exist, but were not applied at the time the map was compiled. The Eagle Ford Group formation is comprised of shale and limestone. The upper part of the formation is comprised of compact, silty, shale and contains fossil fish teeth and bones. The upper part of the formation is typically 10 feet or more thick. The middle part of the formation is comprised of medium gray, silty limestone grading to calcareous siltstone. The middle part weathers pale yellowish brown and is typically five feet thick. The lower part of the Kau formation is dark gray, calcareous shale and is typically seven to 50 feet thick. The thickness of Eagle Ford Group is typically between 25 and 65 feet. The Buda Limestone (Kbu) formation is approximately 45 feet thick. The formation is fine grained, bioclastic, commonly glauconitic, pyritiferous, hard, massive, poorly bedded to nodular, and thinner bedded and argillaceous near the upper contact. It is light gray to pale orange and weathers to a dark gray to brown. Burrows are filled with chalky marl and abundant pelecypods.

Del Rio Clay and Georgetown Formation, undivided (Kdg) is overlain with DeC, HeB, HeC2, and StB soils. This formation is located mostly to the north and partially to the south of the project area along approximately 0.47 miles of the western end. The Del Rio Clay portion of the undivided formation is calcareous and gypsiferous and is approximately 40 to 70 feet deep. The Georgetown Formation portion of the undivided formation is comprised of limestone and marl. It is approximately 30 to 80 feet deep and thins southward.

6.2. Water Resources

Jurisdictional waters of the U.S. include all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including their tributaries and adjacent wetlands (USACE, 33 CFR 328). This includes intermittently or perennially flowing streams exhibiting an ordinary high water mark (OHWM), their adjacent wetlands, and other water bodies exhibiting a "significant nexus" with these waters that is, exerting a significant effect on the chemical, physical, and biological integrity of those waters (U.S. Supreme Court, 2005). The U.S. Army Corps of Engineers (USACE) regulates activities within jurisdictional waters of the U.S.

Jurisdictional wetlands are defined in Section 404 of the Clean Water act as "areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support and under circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions." The USACE regulates the fill of wetlands and has established methodology in the determination of jurisdictional wetlands. The USACE methodology utilizes vegetation, soils and hydrology characteristics of a site in the determination of jurisdictional wetlands. Wetlands generally include swamps, marshes, bogs, and similar areas.

Based on the information available from aerial photographs, topographic maps, and field investigations, there is one water body, an unnamed tributary to Bear Creek that qualifies as waters of the U.S. within the proposed project limits (**Figure 6.1**). The proposed drainage structure for the crossing is two 48 inch corrugated metal pipe culverts.

There are no naturally occurring ponds, tanks, seeps or springs within the project area. According to the National Park Service (NPS), there are no wild and scenic rivers in the vicinity of the project area (NPS, 2007).

The tributary of Bear Creek within the project area flows intermittently throughout the year. The unnamed tributary flows southeast to Bear Creek (segment 1427C within the Colorado River Basin) which flows into Onion Creek approximately seven miles east of the confluence of the unnamed tributary and Bear Creek. The Texas Commission on Environmental Quality (TCEQ) designated uses for Segment 1427C as those that support aquatic life, contact recreation, and fish consumption.

According to the TCEQ State of Texas 2004 or 2006 Clean Water Act Section 303(d) List, the Colorado River Basin Segment 1427C is not considered an impaired or threatened stream segment. The proposed project is not within five miles of an impaired stream; therefore, coordination with TCEQ is not required for total maximum daily loads.

According to the National Wetland Inventory (NWI) maps, two stock tanks are identified within the project area, however, upon field investigation it was determined they are no longer present. Field investigations also indicated a potential wetland located at the Bear Creek tributary crossing to the north of the existing road. Wetland vegetation and hydrology were identified at the tributary; however, the size and extent of the potential wetland within the right-of-way would be determined upon a wetland delineation. A delineation will be conducted prior to construction. No other potential wetlands were identified within the project area.

One Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map dated January 19, 2000, encompasses the project area: Number 48453C0260F. The unnamed tributary to Bear Creek is located within the 100-year floodplain. Approximately 1.5 acres of the 100-year floodplain are located within the project area (**Figure 6.1**).

The major aquifers found within Travis County are the Edwards and Trinity aquifers. The Edwards Aquifer is comprised of a porous rock layer between 300 and 700 feet thick. The Edwards Aquifer extends from Bell County south to San Antonio and then west to Kinney County. The Barton Springs Segment of the Edwards Aquifer, located in Travis County, is designated a sole source aquifer by EPA, supplying drinking water for many who have no reasonably available alternative water sources should the aquifer become contaminated. The Trinity aquifer follows the Edwards Aquifer from the eastern side of Uvalde County to Bell County and then extends into north Texas to the Red River. The Edwards and Trinity aquifers are classified as major aquifers in Texas providing groundwater resources to much of central Texas. The proposed project lies entirely within the boundaries of the Barton Springs Segment of the Edwards Aquifer.

TCEQ regulates activities having the potential for polluting the Edwards Aquifer and hydrologically connected surface water in order to protect existing and potential uses of groundwater and maintain Texas Surface Water Quality Standards. Construction activities within the Edwards Aquifer are subject to Edwards Aquifer rules (30 TAC 213). The Edwards Aquifer rules apply to all regulated developments within the recharge zone and to certain activities within the transition zone and to discharges ten miles upstream of the recharge zone within the aquifer's contributory watersheds.

The Barton Springs Segment of the Edwards Aquifer consists generally of three zones: the Recharge Zone, the Transition Zone, and the Contributing Zone. The Recharge Zone is comprised of outcrops of highly faulted and fractured limestone allowing precipitation runoff to easily flow into the aquifer. From the project area, the unnamed tributary of Bear Creek extends south approximately 0.35 mile within the Recharge Zone of the Barton Springs Segment of the

Edwards Aquifer. Approximately, 0.68 acres of the project area is within the Recharge Zone. The Transition Zone is comprised of outcropping confining units of the Barton Springs Segment of the Edwards Aquifer. Fractures and openings in the confining units allow recharge to the Barton Springs Segment of the Edwards Aquifer. The remaining approximately 15.30 acres of the eastern end of the project area lies within the Transition Zone of the Barton Springs Segment of the Edwards Aquifer (**Figure 6.2**). The Contributing Zone is the drainage area (also called catchment area) that "catches" water from rainfall and runs off into streams or infiltrates into the water table aquifer then flows over relatively impermeable limestone until it reaches the recharge zone. The Contributing Zone Within the Transition Zone are located in areas south and southeast of the recharge zone where limestone other than the Edwards crop out at a higher elevation than the Edwards, where water drains to stream courses that overlie the recharge zone. Approximately 9.85 acres located at the western end of the project area lies within the Contributing Zone of the Barton Springs Segment of the Edwards Aquifer.

No sensitive recharge features were located in the project area during karst surveys conducted for the Frate Barker project area (**Section 6.6**).

A search of the Texas Water Development Board (TWDB) well data indicates no water wells are located near or within the proposed project area.

6.3. Vegetation

Vegetation adjacent to the project area consists of undeveloped wooded areas (some of which are maintained and park-like with little to no understory), cultivated croplands, over-grazed pastures, and landscaped yards associated with entrance areas to residential and commercial developments. Within, and adjacent to the project area, the vegetation type is designated as "Live Oak-Ashe Juniper Parks" and "Live Oak-Ashe Juniper Woods" in the Texas Parks and Wildlife Department's (TPWD) *The Vegetation Types of Texas* published in 1984. Vegetation types within and adjacent to the western portion of the project area that are undeveloped are consistent with the "Live Oak-Ashe Juniper Woods" vegetation type. Vegetation types within and adjacent to the eastern portion of project area that are undeveloped are consistent with the "Live Oak-Ashe Juniper Parks" vegetation type. Photographs depicting typical vegetation within the project area are included in **Appendix A**. Approximately 2.98 acres of "Live Oak-Ashe Juniper" Parks and Woods occur within the proposed right-of-way and drainage easement. The vegetation in the remaining existing and proposed right-of-way is consistent with "Other Native or Introduced Grasses".

There is approximately 30 percent tree canopy within and adjacent to the project area. Trees within and adjacent to the project area have a diameter-at-breast height (dbh) ranging from 3 to 8 inches and averaging 4 inches. Tree height ranges from 20 to 50 feet.

Vegetation within the existing right-of-way is mostly mowed and maintained and consists primarily of herbaceous species that include KR bluestem (*Bothriochloa ischaemum*), bermudagrass (*Cynodon dactylon*), silver bluestem (*Bothriochloa laguroides*) and ragweed (*Ambrosia trifida*). There is no unusual vegetation growing along the fencelines within the project area. Within and adjacent to the project area there are no unusual or isolated stands of vegetation, however, there is one tree unusually larger than other trees in the area. The large tree is an isolated live oak (*Quercus virginiana*) located adjacent to a residential development and abutting the existing roadway. The tree is approximately 55 feet in height with an approximate dbh of 30 inches. In addition, there are no bottomland hardwoods, seeps or springs, or snags within the project area.

Woody fenceline vegetation exists along the majority of the existing right-of-way. Live oak and Ashe juniper are the dominant trees found along the fenceline. Other tree and shrub species include hackberry (*Celtis laevigata*), post oak (*Quercus stellata*), mesquite (*Prosopis glandulosa*), cedar elm (*Ulmus crassifolia*), Texas persimmon (*Diospyros texana*), agarita, and deciduous holly (*Ilex decidua*). Based on field observations, woody vegetation is estimated to comprise approximately 75 percent of the existing fenceline vegetation within the project area.

Riparian vegetation is present within the proposed right-of-way and drainage easement at the unnamed tributary to Bear Creek. Riparian vegetation to the south of the road consists primarily of hackberry, ashe juniper (*Juniperus ashei*), cedar elm and live oak trees. Herbaceous vegetation south of the road consists primarily of ragweed, Johnson grass (*Sorghum halapense*), switchgrass (*Panicum virgatum*), and golden rod (*Solidago* sp.). Vegetation in this area is denser with approximately 70 percent canopy cover; range and average height and dbh is consistent with that found near the west end of the project. Riparian vegetation to the north of the existing road consists only of herbaceous vegetation that includes spikerush (*Eleocharis* sp.), flatsedge (*Cyperus* sp.), sedge (*Carex* sp.), annual marshelder (*Iva annua*), and smartweed (*Polygonum* sp.) within and adjacent to the stream bed. Vegetation outside of the stream bed includes switchgrass, ragweed, and goldenrod; and on the banks vegetation includes dewberry (*Rubus* sp.), greenbrier (*Smilax bona-nox*), and ragweed. Within the project area, the total riparian acreage is estimated as approximately 0.42 acres.

6.4. Wildlife

Within the proposed project limits, wildlife is expected to be typical of agricultural and suburban areas. Major wildlife species in Travis County include white-tailed deer (*Odocoileus virginianus*), fox squirrel (*Sciurus niger*), jackrabbit (*Lepus californicus*), cottontail (*Sylvilagus floridanus*), bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*). Mammals such as coyote (*Canis latrans*), nutria (*Myocastor coypus*), opossum (*Didelphis*

virginianus), raccoon (*Procyon lotor*), ring-tailed cat (*Bassariscus astutus)*, and striped skunk (*Mephitis mephitis*) are also present in the county. There are no colonies of bats within the project limits. During field surveys in October 2007, wildlife species observed included northern mockingbird (*Mimus polyglottos*), black vulture (*Coragyps atratus*), bluejay (*Cyanocitta cristata*), northern cardinal (*Cardinalis cardinalis*), great-tailed grackle (*Quiscalus mexicanus*), and red-tailed hawk (*Buteo jamaicensis*).

6.5. Migratory Birds

During the field investigation in October 2007, several species of birds were observed perching in trees, but no nests were identified within the project area.

6.6. Threatened and Endangered Species

The U.S. Fish and Wildlife Service's (USFWS) threatened and endangered species website list for Travis County was accessed on April 1, 2010. The USFWS and TPWD's *Annotated County List of Rare Species* for Travis County was reviewed and **Table 8** incorporates species from these lists. Each of these species and/or their habitat has the potential to occur in Travis County.

Table 8: Federal and State Listed Threatened and Endangered Species in Travis County

Species	USFWS[1]	TPWD[2]	Potential Habitat Present within Project Area
Amphibians			
Austin blind salamander	C	--	No
Barton Springs salamander	LE	E	No
Jollyville Plateau salamander	PL	--	No
Arachnids			
Bone Cave harvestman	LE	--	No
Bee Creek Cave, or Reddell harvestman	LE	--	No
Tooth Cave psuedoscorpion	LE	--	No
Tooth Cave spider	LE	--	No
Warton's cave meshweaver	C	--	No
Birds			
American peregrine falcon	DL	E	No
Arctic peregrine falcon	DL	T	No
Bald eagle	DL	T	No
Black-capped vireo	LE	E	No
Golden-cheeked warbler	LE	E	No
Interior least tern	LE	E	No
Whooping crane	LE	E	No

Species	USFWS[1]	TPWD[2]	Potential Habitat Present within Project Area
Fishes			
Smalleye shiner	C	--	No
Insects			
Kretschmarr Cave mold beetle	LE	--	No
Tooth Cave ground beetle	LE	--	No
Mollusks			
False spike mussel	--	T	No
Smooth pimpleback	--	T	No
Texas fatmucket	--	T	No
Texas fawnsfoot	--	T	No
Texas pimpleback	--	T	No
Reptiles			
Texas horned lizard	--	T	No

[1] U. S. Fish and Wildlife Service (LE=endangered, LT=threatened, DL=delisted, PDL=proposed delisting, PL= petition for listing, C=Candidate for Listing)

[2] Texas Parks and Wildlife Department (E=endangered, T=threatened, -=Rare)

Information from the Texas Natural Diversity Database (NDD) was reviewed to identify known occurrences of rare, threatened, and endangered species within the project area. The NDD review included the *Oak Hill, Buda, Mountain City* and *Signal Hill* USGS 7.5 minute topographical quadrangle maps, which includes the project area. Aerial photographs were also evaluated in GIS to determine if potential habitat that coincided with known occurrences of threatened and endangered species occurred within the project area. The nearest occurrences to the project area included a golden-cheeked warbler occurrence located approximately 2.2 miles northwest of the project, a Texas garter snake (a state- listed species of concern) occurrence located approximately 3.2 miles south of the project, and a black-capped vireo occurrence located approximately 4.5 miles west of the project. A qualified biologist surveyed the areas adjacent to and within the project limits to identify potential habitat. No potential habitat was identified.

The Austin blind salamander (*Eurycea waterlooensis*) and Barton Springs salamander (*E. sosorum*) are entirely aquatic and neotenic, meaning they do not metamorphose into terrestrial adults. The salamanders are restricted to subterranean cavities of the Barton Springs Segment of the Edwards Aquifer. They are only known from the outlets of Barton Springs. There are no springs or caves within or adjacent to the proposed project limits; thus, the project area lacks suitable habitat and the salamanders would not exist within the proposed project limits. Approximately 0.34 acres of the project area lies within the Recharge Zone of the Barton Springs Segment of the Edwards Aquifer and stormwater from the project may flow into the Recharge Zone and eventually into the habitat for the salamanders.

The Jollyville Plateau salamander is also entirely aquatic and neotenic. It inhabits springs, spring runs, and caves in nine watersheds within the Jollyville Plateau area of the Edwards Aquifer in northern Travis and southern Williamson counties all north of the Colorado River. As the known locations of the Jollyville Plateau salamander are limited to the Jollyville Plateau, approximately 18 miles north of the project area, this species is not likely to occur in the project area.

The Arctic peregrine falcon (*Falco peregrinus tundrius*), a state-listed threatened species, is considered to be a potential migrant in central Texas. This sub-species nests in the Arctic island and tundra regions of Alaska, Canada, and Greenland, and winters along the Texas coast south into South America. There is the potential for the falcons to migrate through central Texas in the spring and fall en route to breeding and wintering grounds. Arctic peregrine falcons prefer open areas and often occur near water or wherever smaller birds concentrate. Due to the migratory nature of the peregrine falcon, it is unlikely to occur within the project area.

The bald eagle (*Haliaeetus leucocephalus*) is found year-round in Texas as the state provides nesting and wintering habitat as well as stopover habitat for migrating eagles. The bald eagle was de-listed from federal list of threatened and endangered species effective August 8, 2007, as specified in the Federal Register published July 9, 2007; however, it remains listed as threatened on the state list. In addition, the bald eagle will continue to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Eagles are found primarily near seacoasts, rivers and large lakes where food resources such as fish and waterfowl are readily available. Eagles usually build their nests in 40- to 120-foot tall trees or on cliffs. Although bald eagles are more likely to nest in the southeastern part of the state, eagles are known to nest along the Colorado River in Bastrop County and on the Llano River in Llano County. The bald eagle is known to winter from early November to late March along major river systems of the eastern and central Edwards Plateau. The Colorado River drainage, especially Lake Buchanan in Llano and Burnet counties, is the area most likely to have wintering bald eagles in the Austin area. No habitat exists for the bald eagle within the project area.

The black-capped vireo (*Vireo atricapillus*) is a migratory songbird present in Texas during the breeding season of late March through September. The breeding habitat is found on rocky, limestone soils of the Edwards Plateau, Cross Timbers and Prairies, eastern Trans-Pecos, and the igneous soils of the Chisos Mountains. The plant species, soils, and climatic parameters comprising the habitat of the black-capped vireo is highly variable; however, all habitat types exhibit a distinctive patchy, two-layered aspect that includes a deciduous, broad-leaved shrub and tree layer with open, grassy spaces. Foliage reaching to ground level is used for nesting cover and the birds return to the same territory, or one nearby, year after year. The species composition of the vegetation is less important than the presence of adequate broad-leaved

shrubs, foliage to ground level, and the required structure. Upper canopy cover within vireo habitat is relatively open. Several territories averaging 2 to 4 acres are often clustered in patches of suitable habitat. No habitat for the black-capped vireo exists within the project area.

The golden-cheeked warbler (*Dendroica chrysoparia*) is a migratory songbird present in Texas during the breeding season of early March through early August. The songbirds prefer tall, dense, mature stands of Ashe juniper mixed with oak, Texas ash (*Fraxinus americana*), cedar elm, or hackberry trees. Although sometimes found in dry, upland habitats, the preferred habitat is often found in the moist drainage bottoms along steep-sided canyons and hillsides. The preferred nesting habitat consists of Ashe juniper at least 20 years old and 15 feet tall. The warbler collects the strips of bark shedding from Ashe juniper to construct their nests. Golden-cheeked warblers have been found in patches of habitat smaller than 12 acres. Depending on the quality of the habitat, the warblers will feed and nest in territories from 5 to 20 acres. No habitat for the golden-cheeked warbler exists within the project area.

The interior least tern (*Sterna antillarum athalassos*) is a small, gray, white, and black water bird that is listed only when inland (more than 50 miles from a coastline). It nests along sand and gravel bars within braided streams, rivers and is known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc.). It eats small fish and crustaceans, when breeding forages within a few hundred feet of colony. No habitat for the interior least tern exists within the project area.

The whooping crane (*Grus americana*) nests and rears their young at Woods Buffalo National Park which straddles the border of Alberta and the Northwest Territories in Canada. In the fall, they migrate 2,400 miles south to the Aransas National Wildlife Refuge on the Texas coast. During migration, the cranes typically stop to rest and feed in open bottomlands of large rivers, marshes, and in agricultural areas. In Texas, whooping cranes feed on blue crab (*Callinectus sapidus*), clams, frogs, minnows, rodents, small birds, and berries. As of May, 2006, there were 214 whooping cranes in the wild that migrate and winter in Texas. Another 122 birds are part of an experimental population in Florida encompassing the remaining wild population of Whooping Cranes in the world. The Florida population is divided between non-migratory residents and birds that have been imprinted to migrate between Florida and Wisconsin. Another 134 whooping cranes are kept in captivity at zoos in the U.S. and Canada. No habitat for the whooping crane exists within the project area.

The smalleye shiner (*Notropis buccula*) is endemic to the upper Brazos River system; however, it has apparently been introduced to the adjacent Colorado River drainage above Lake Buchanan. The preferred habitat of the smalleye shiner consists of broad, shallow, sandy channels with a moderate current. Within their preferred habitat, the smalleye shiner is most often found in the

middle of the channel away from the slower moving waters near the water's edge. The smalleye shiner feeds on aquatic invertebrates with Dipterans (flies) making up a large proportion of the diet. The unnamed tributary of Bear Creek within the project area flows intermittently; therefore, there is no potential habitat for the smalleye shiner.

The False spike mussel (*Quadrula mitchelli*) can be found in substrates of cobble and mud where water lilies are present. River basins historically known to have habitat include the Rio Grande, Brazos, Colorado and Guadalupe. The unnamed tributary of Bear Creek within the project area flows intermittently; therefore, there is no potential habitat for the False spike mussel.

Smooth pimpleback (*Quadrula houstonensis*) can be found in small to moderate streams and rivers as well as moderate size reservoirs in areas of mixed mud, sand and fine gravel. It tolerates very slow to moderate flow rates and appears to be intolerant to dramatic fluctuations in water levels, scoured bedrock substrates, or shifting sand bottoms. River basins historically known to have habitat include the Brazos, Colorado and possibly the lower Trinity. The unnamed tributary of Bear Creek within the project area flows intermittently; therefore, there is no potential habitat for the Smooth pimpleback.

The Texas fatmucket (*Lampsilis bracteata*) can be found in streams and rivers on sand, mud, and gravel substrates. It is intolerant of impoundment and prefers broken bedrock and course gravel or sand in moderately flowing water. River basins historically known to have habitat include the Colorado and Guadalupe River basins. The unnamed tributary of Bear Creek within the project area flows intermittently; therefore, there is no potential habitat for the Texas fatmucket.

Little is known about Texas fawnsfoot (*Truncilla macrodon*) habitat. Possible habitat may include rivers and larger streams, flowing rice irrigation canals, sand, gravel, and sandy-mud bottoms in areas of moderate flow. The Texas fawnsfoot is intolerant of impoundment and has been historically found in the Brazos and Colorado River basins. The unnamed tributary of Bear Creek within the project area flows intermittently; therefore, there is no potential habitat for the Texas fawnsfoot.

The Texas pimpleback (*Quadrula petrina*) can be found in mud, gravel and sand substrates, generally in areas with slow flow rates. River basins historically known to have habitat include the Colorado and Guadalupe. The unnamed tributary of Bear Creek within the project area flows intermittently; therefore, there is no potential habitat for the Texas pimpleback.

The Texas horned lizard (*Phrynosoma cornutum*) prefers open habitats in arid and semi-arid regions with sparse ground cover including bunchgrass and cactus growing on sandy/rocky soil types. Harvester ants make up a significant portion of the Texas horned lizard diet. Although the

historic range of the Texas horned lizard includes almost the entire State, over the past years its presence has declined in central Texas. Although reasons for its decline are uncertain, collection for the pet trade, the invasion of the red imported fire ant, changes in land use, and environmental contaminants have commonly been blamed. No harvester ant mounds, a potential food source for the horned lizard, were located within the right-of-way. The NDD does not list any recorded sitings of the Texas horned lizard in the project area, no potential habitat exists within the proposed project right-of-way.

Karst Invertebrates

The Kretschmarr Cave mold beetle (*Texamaurops reddelli*) is a small, cave-adapted beetle found under rocks buried in silt. It is found in small, Edwards Limestone caves of the Jollyville Plateau, which does not occur in the project area. The project area does not overlap with the species' range; therefore no habitat for this species occurs in the project area.

The Tooth Cave ground beetle (*Rhadine persephone*) is a small beetle found in Edwards Limestone caves in Travis and Williamson counties. The caves were formed as a result of dissolution of the limestone formations making up the Edwards Aquifer. This subterranean species prefers areas with consistent humidity and temperature levels and a continual influx of nutrients from the surface. The project area does not overlap with the species' range; therefore no habitat for this species occurs in the project area.

The following karst invertebrates have ranges encompassing the project area:

The Bone Cave harvestman (*Texella reyesi*) is a small long-legged, orange, blind harvestman. The Bone Cave harvestman is endemic to a few caves in Travis and Williamson counties. The preferred habitat of the Bone Cave harvestman is under large rocks and other debris on the cave floor or in the cool and humid sections of the karst formation. This subterranean species prefers areas with consistent humidity and temperature levels and a continual influx of nutrients from the surface.

The Bee Creek Cave or Reddell harvestman (*Texella reddelli*) is a small, blind, cave-adapted harvestman endemic to a few caves in Travis and Williamson counties. The preferred habitat is under rocks in darkness or in dim twilight. This subterranean species prefers areas with consistent humidity and temperature levels and a continual influx of nutrients from the surface.

The Tooth Cave pseudoscorpion (*Tartarocreagris texana*) is a small, cave-adapted pseudoscorpion known from very small, isolated, dry limestone caves of the Edwards Plateau.

The Tooth Cave spider (*Neoleptoneta myopica*) is a very small, cave-adapted sedentary spider known from isolated, dry limestone caves of the Edwards Plateau.

The Warton's Cave meshweaver (*Cicurina wartoni*) is a very small, eyeless, unpigmented, cave-obligate spider. It inhabits small, isolated shallow caves.

The karst topography of Travis County has been mapped and divided into different zones based on the potential of harboring karst dependent species. The potential of endangered karst invertebrates inhabiting features were delineated based on the *Geologic Controls on Cave Development and the Distribution of Cave Fauna in the Austin, Texas, Region*, which was prepared for the U.S. Fish and Wildlife Service by Veni and Associates (Veni, G., 1992). Karst Zone 1 consist of areas known to contain federally endangered cave species, Zone 2 consists of areas having a high probability of suitable habitat for endangered cave species or other endemic invertebrate cave fauna, Zone 3 includes areas that probably do not contain endangered cave species, and Zone 4 includes areas that do not contain endangered cave species. Most of the project area lies in Zone 4 as indicated on the USFWS 1992 Updated Travis and Williamson County Karst maps (USFWS, 2006); however, the western 1.25 miles of the project area is within Karst Zone 3 (**Figure 6.3**). The most current biological survey data suggest that none of the federally listed karst invertebrates listed above range south of Barton Creek. The closest known location of karst invertebrates is over one mile west of the project area.

A geologic assessment was conducted for the Frate Barker project. One non-karst closed depression was identified within the proposed right-of-way for Alternative 3, and adjacent to the drainage easement for all alternatives (**Section 7.2**). Investigation of the feature revealed that it did not contain habitat known to support the karst invertebrates discussed above.

6.7. Socioeconomics

6.7.1. Land Use

Study Area

The proposed Frate Barker improvements are located in southern Travis County. The land use study area, which lies partly within the Austin city limits and partly within the Austin 2-mile extra-territorial jurisdiction (ETJ), covers approximately 1,147 acres and generally encompasses the parcels within a 1-mile radius of the proposed improvements (**Figure 3.1**).

According to 2008 land use estimates from the city of Austin, approximately 19 percent of the land within the study area is identified as undeveloped. Residential uses comprise approximately 42 percent of land use within the study area. Civic, commercial, industrial, and office use comprise approximately 19 percent. Actual data are shown in **Table 9**.

Table 9: Frate Barker Land Use (2008)

Current Land Use	Acres	Percent of Study Area
Civic	53	4.6%
Commercial	39	3.4%
Industrial	103	9.0%
Residential	451	39.3%
Mobile	26	2.3%
Office	18	1.6%
Open Space	56	4.9%
Roadways	188	16.3%
Undeveloped	213	18.6%

Source: City of Austin Land Use (2008) Shape file

Current Development

Development within the corridor was identified through interpretation of aerial photography and land use data from the city of Austin and the Travis County Central Appraisal District. These preliminary assessments were verified through field investigations. Current developed land is identified in **Figure 3.1**.

Single-family residential subdivisions characterize the majority of the development within this area. Limited commercial development (primarily neighborhood retail and services), is generally located along Manchaca Road (FM 3405) and FM 1626.

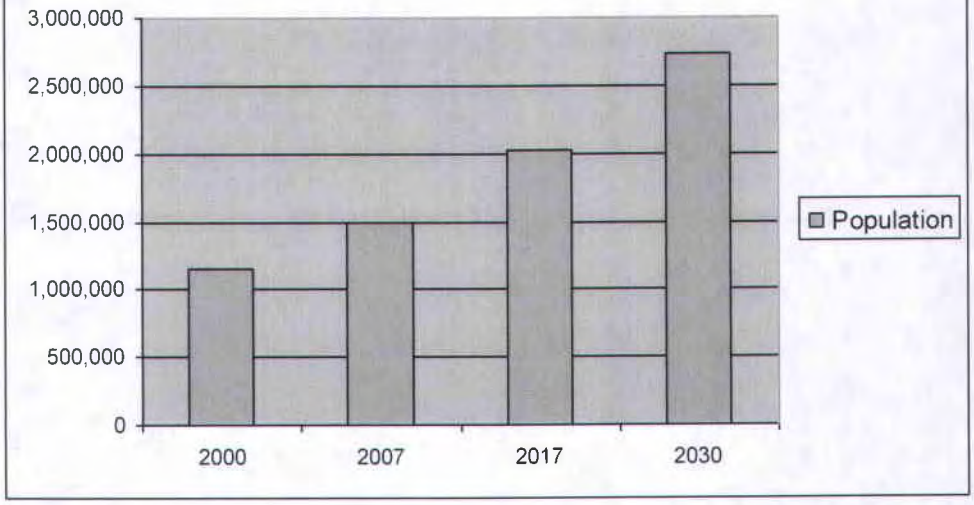
6.7.2. Demographics

The project area for the demographics analysis is comprised of one Census Tract (CT), two associated Block Groups (BGs) and eight census Blocks (for purposes of Environmental Justice analysis) adjacent to the project area. **Figure 3.1** identifies the one CT and two BG's (CT 17.32 BG 1 and BG 4), and the eight census blocks within the Frate Barker project area.

Population

Travis County, together with Hays and Williamson counties, comprise the CAMPO planning area. The population within the CAMPO boundaries was approximately 1.16 million in 2000, and is expected to increase to 2.75 million by 2030. Similarly, employment within the CAMPO boundary is expected to increase from 646,000 to approximately 1.47 million persons in this same period. **Chart 1** summarizes these trends.

Chart 1
Demographic Growth for Travis, Williamson, & Hays Counties



Source: Capital Area Metropolitan Planning Organization. *Mobility 2030 Plan*. June 2005.

From 1980 to 2005, the population of Travis County increased over 100 percent, the population of Hays County increased over 180%, and the population of the city of Austin increased over 100 percent. As shown in **Table 10**, these trends are expected to continue.

Table 10: Population Growth in Travis and Hays Counties and the City of Austin

	1980	1990	2000	2005	2020
City of Austin	341,665	472,020	656,562	695,772	977,749
Hays County	40,594	65,614	97,589	115,030	242,051
Travis County	419,573	576,407	812,280	882,077	1,185,499

1980, 1990, 2000, and 2005 data obtained from Capital Area Council of Governments website
2020 projections obtained from Texas Water Development Board population estimates for TX Counties

One CT with two associated BGs were identified within the Frate Barker project area and can be seen in **Figure 3.1**; Tract 17.32, BG 1 and Tract 17.32, BG 4. From 1990 to 2000, the population of these census block groups increased from 52-70 percent, as shown in **Table 11**.

Table 11: Population Growth in Project Area Census Block Groups

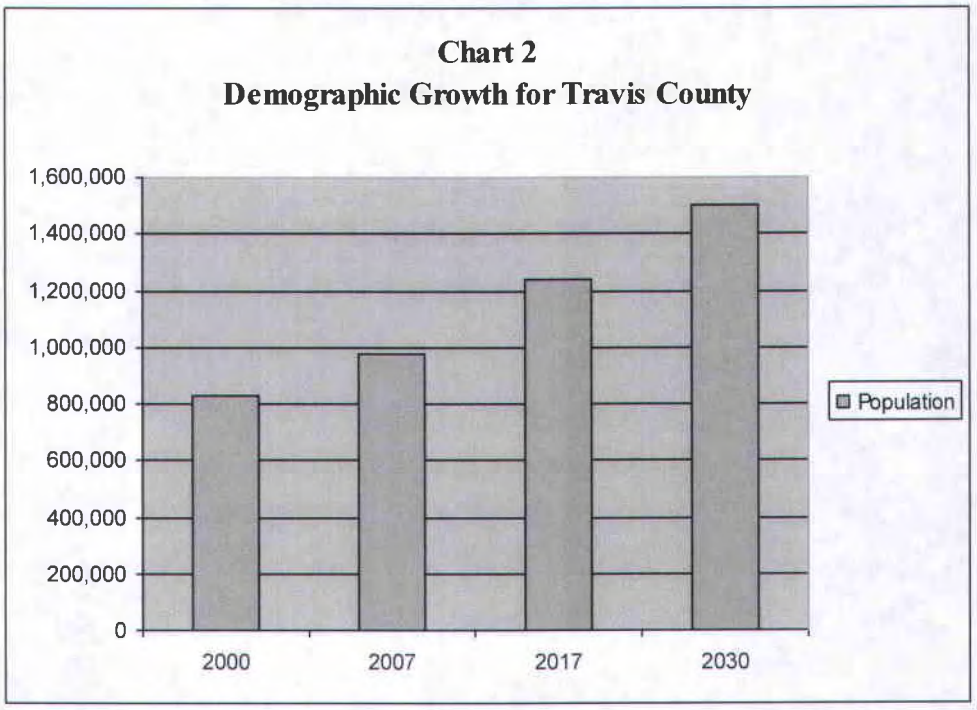
	1990	2000	% Population Increase
CT 17.32, BG 1	2,035	4,281	52.5%
CT 17.32, BG 4	2,347	7,751	70%

Source: U.S. Census Bureau

The increasing population is reflected in the amount of development occurring within or near the Frate Barker project area, including several residential subdivisions. **Figure 3.1** shows the developed land within and adjacent to the project area.

The Travis County population increased from 812,280 to 971,513 between 2000 and 2007, and population in 2030 is projected to be 1,514,000. **Chart 2** summarizes the population growth trends of Travis County.

Chart 2
Demographic Growth for Travis County



Source: Capital Area Metropolitan Planning Organization. *Mobility 2030 Plan.* June 2005.

Environmental Justice Populations

This analysis addresses the requirements of EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, Title VI, Civil Rights Acts of 1964, Civil Restoration Act of 1987 and the Federal Aid Highway Act of 1970. EO 12898 mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects, including social and economic effects, of their programs on minority and low income populations. In response to EO 12898, the U.S. Department of Transportation (USDOT) developed an environmental justice (EJ) strategy that follows within the framework of the National Environmental Policy Act (NEPA) and Title VI which was clarified in the Civil Rights Restoration Act of 1987.

The thresholds used to identify areas with high concentrations of low-income and/or minority populations were set based on the definitions of low-income and minority established in FHWA

Order 6640.23 *FHWA Actions to Address Environmental Justice in Minority and Low-income Populations* and by the Council on Environmental Quality (CEQ) report, *Environmental Justice Guidance Under the National Environmental Policy Act.* A census tract was determined to have a high concentration of low-income persons if it: 1) has a meaningfully greater percentage of people in poverty based on the Census 2000 definition of poverty; and/or 2) at least 50 percent of the residents in the census tract have household incomes of less than 80 percent of the median family income for the county. Similarly, census tracts with high concentrations of minority populations were identified as those tracts where the minority (non-white) populations exceeded 50 percent.

Employment, income, poverty, and race and ethnicity were assessed for the study area. Neither of the two block groups nor the eight census blocks in the study area (area adjacent to project) was identified as containing environmental justice populations.

The term minority is defined by EO 12898 as a person who is Black or African-American, Asian-American, American Indian and Alaska native, or Hispanic or Latino. The Federal government considers race and Hispanic origin to be two separate and distinct concepts, so *Census 2000* uses the Office of Management and Budget definition of Hispanic or Latino to be "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race."

None of the two BG's or the eight census blocks in the study area has a minority population that is greater than 50 percent of the total population. As shown in **Table 12,** minorities account for approximately 44 percent of the Travis County population, 47 percent of the city of Austin population, 26 percent of the block group population and 30 percent of the census block population in the study area.

Table 12: Racial and Ethnic Composition of the Population

Area / Census Tract (CT), Block Group (BG) and Block (B)	Total Population	Population of One Race / Not Hispanic or Latino					Hispanic or Latino of Any Race	Percent Total Minority Population
		White	Black or African American	American Indian/ Alaska native	Asian	Pacific Islander/ Other/ 2 or more		
Travis County	812,280	457,910	72,167	2,409	35,678	15,010	229,106	43.63%
City of Austin	656,302	347,533	63,403	1,779	30,579	11,968	201,040	47.05%
Census Block Groups								
CT 17.32, BG 1	4,283	2,844	236	0	200	0	1,003	33.60%
CT 17.32, BG 4	7,758	6,125	163	8	560	135	767	21.05%
Total	**12,041**	**8,869**	**399**	**8**	**760**	**135**	**1,770**	**25.51%**
Census Blocks								
CT 17.32, BG 1, B 1000	375	219	19	1	5	16	115	41.6%
CT 17.32, BG 1, B 1016	8	6	0	0	2	0	0	25%
CT 17.32, BG 1, B 1030	286	196	6	0	15	0	69	31.47%
CT 17.32, BG 1, B 1038	17	17	0	0	0	0	0	0%
CT 17.32, BG 1, B 1053	148	103	9	1	0	4	31	30.41%
CT 17.32, BG 1, B 1054	99	90	0	0	3	1	5	9.09%
CT 17.32, BG 4, B 4009	352	266	0	0	13	0	73	24.43%
CT 17.32, BG 4, B 4010	0	0	0	0	0	0	0	0
Total	**1285**	**897**	**34**	**2**	**38**	**21**	**293**	**30.19%**

Source: U.S. Census Bureau. Census 2000, Summary File 3 Table P7 for BG; Summary File 1 Table P8 for B

Median household income in 1999 for Travis County was $58,555 and for the city of Austin was $54,091 according to *Census 2000*. Similar data reveal that median household income within the study area ranged from $80,882 to $108,465 in 1999 (**Table 13**).

Table 13: Median Household Income and Poverty Status: 1999

Area / Census Tract (CT), Block Group (BG)	Population	Median Household Income	Persons Below Poverty Level	
			Number	Percent
Travis County	812,280	$58,555	99,388	12.23%
City of Austin	638,175	$54,091	92,011	14.42%
CT 17.32, BG 1	4,260	$80,882	47	1.10%
CT 17.32, BG 4	7,632	$108,465	198	2.59%
Total	**11,892**	**N/A**	**245**	**2.06%**

Source: U.S. Census Bureau. Census 2000, Summary File 3, Table P77 & Table P87

According to the U.S. Department of Health and Human Services, the poverty level for a family of 4 in 2009 is $22,050. Low-income persons do not constitute a large percentage of the population within the Frate Barker study area. As shown in **Table 16**, the percentage of persons living below the poverty level in the project area is approximately two percent, which is less than that of Travis County (approximately 13 percent) and the city of Austin (approximately 14 percent).

Limited English Proficiency

Executive Order (EO) 13166, "Improving Access to Services for Persons with Limited English Proficiency (LEP)," was signed by President Clinton on August 11, 2000. This EO calls for all federal agencies to examine the services they provide and identify any need for services to those with limited English proficiency, and develop and implement a system to provide those services so that LEP persons can have meaningful access to them. In compliance with this EO, this project was assessed to determine if a LEP population is located within the project area.

Within Travis County, approximately 12.5 percent of the population five years of age and over speaks English less than "very well." According to the 2000 Census, the total population of people five years of age and over within the BGs adjacent to the project, is approximately 10,934 persons. Of the project area BG population, 504 people (4.6 percent) speak English less than "very well". Throughout the proposed project limits, the street and business signs are in English and do not display notices in additional languages such as Spanish. There are no indications that a LEP community exists within the limits of the proposed project. If it is determined that an LEP population exists within the project area, every effort will be made to provide project and meeting materials and information to those persons in both English and Spanish.

6.8. Hazardous Materials

A Phase I Environmental Site Assessment (ESA) was conducted for the proposed project area. A search of available information was conducted to identify potentially contaminated sites within 500 feet of the proposed right-of-way, the project area for hazardous materials. The various federal, state, and local agencies maintain databases that contain information on Underground Storage Tank sites, Leaking Underground Storage Tank sites, Resource Conservation and Recovery Information System sites, Comprehensive Environmental Response and Compensation Liabilities Information System sites, National Priority List sites, State Superfund sites, Toxic Release Inventory sites, Solid Waste Municipal Landfill sites, Spill Incident sites, Emergency Response Notification System listings, and Facility Index System listings.

The ESA found no known occurrences of contaminated sites and the project area was found to have a low probability for environmental risk related to significant levels of hazardous substances. The ESA did identify five underground storage tanks (USTs) in use, located .25 miles south of the project area, located at the Manchaca Service Center (11833 Manchaca Road). The ESA also identified one Texas Voluntary Cleanup Program (VCP) at the Tabor Tract Cattle Dipping Vat located at Edwards Hollow Run and Brooke Lane (Horizon, 2008).

6.9. Noise Receivers

The analysis of noise levels within the study area was accomplished in accordance with TxDOT's (FHWA approved) *Guidelines for Analysis and Abatement of Highway Traffic Noise* (2011). A total of 5 noise receivers were analyzed as representatives of other receivers in the project area (**Figure 6.4**). A summary of the analysis is presented in **Section 7.7.4**.

6.10. Air Quality

The proposed action is consistent with the CAMPO 2035 RTP, as adopted on May 24, 2010, and the 2011–2014 TIP (see Appendix B). The proposed project area is located in Travis County which is in an area in attainment or unclassifiable for all National Ambient Air Quality Standards (NAAQS); therefore, the transportation conformity rules do not apply. However, because monitored ozone levels in the Austin area are very close to the 8-hour standard, Travis County, along with Bastrop, Caldwell, Hays, and Williamson counties, local elected officials in the Austin-Round Rock Metropolitan Statistical Area, the EPA and TCEQ entered into an agreement known as the 8-Hour Ozone Flex Program, replacing the region's Early Action Plan. This program is designed to implement measures in the region to improve air quality.

Traffic data for the design year (2027) is estimated to be 10,678 vehicles per day (vpd). A prior TxDOT modeling study and previous analyses of similar projects demonstrated that it is unlikely that a carbon monoxide standard would ever be exceeded as a result of any project with an average annual daily traffic (AADT) below 140,000 vehicles per day. The AADT projections

for the project do not exceed 140,000 vehicles per day; therefore, a Traffic Air Quality Analysis was not required.

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 U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their 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 their Integrated Risk Information System (IRIS) (http://www.epa.gov/ncea/iris/index.html). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

Because the projected AADT for the project area does not exceed 140,000 vpd, a quantitative analysis of MSAT is not required. Although a qualitative assessment cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from various alternatives. The qualitative assessment found in **Appendix C** is derived from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives (*Claggett and Miller, 2006).

There may be localized areas where ambient concentrations of MSATs are slightly higher in any build scenario than in the no build scenario. Dispersion studies have shown that the "roadway" air toxics start to drop off at about 100 meters (328 feet). By 500 meters (1,640 feet), most studies have found it very difficult to distinguish the roadway from background toxic concentrations in any given area. Therefore, the study area for sensitive receptors includes the areas 500 meters from the project area. Sensitive receptors include those facilities most likely to contain large concentrations of the more sensitive population (hospitals, schools, licensed daycare facilities, and elder care facilities). The Department of Family and Protective Services childcare licensing website was searched to identify childcare facilities within 100 and 500 meters of the project area (DPS search, 2010). A field survey was conducted to verify these facilities and identify other potential sensitive receptors located within 500 meters of the project area. Primrose School (12341 Brodie Lane), is located immediately adjacent to the existing right-

of-way, at the corner of Frate Barker and Brodie Lane, Baranoff Elementary School (12009 Buckingham Gate Road) is located approximately 440 meters north of the project area along Buckingham Gate Road, Jackie's Dance and Gymnastics (11530 Manchaca Road) is located north of Frate Barker on Manchaca Road, and The Goddard School (2111 Frate Barker) is located near the intersection of Frate Barker and Rancho Alto Dr. In addition to the schools and childcare facilities an elder care facility was identified during the field survey. South Oaks Rehabilitation and Healthcare (2101 Frate Barker) is located next door to The Goddard School on the south side of Frate Barker (**Figure 6.4A**). No other sensitive receptors were identified in the project area.

6.11. Cultural Resources

6.11.1. Historic Resources

NEPA requires consideration of important historic, cultural, and natural aspects of our national heritage. Important aspects of our national heritage that may be present in the project corridor have been considered under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. This act requires federal agencies to "take into account" the "effect" that an undertaking will have on "historic properties." Historic properties are those included in or are eligible for inclusion in the National Register of Historic Places (NRHP) and may include structures, buildings, districts, objects, and sites. In accordance with the Advisory Council on Historic Preservation (ACHP) regulations pertaining to the protection of historic properties (36 CFR 800.4), federal agencies are required to identify and evaluate historic-age resources for NRHP eligibility and assess the effects that the undertaking would have on historic properties. These steps shall be completed under terms of the First Amended Programmatic Agreement among the Federal Highway Administration, the Texas Department of Transportation, the Texas State Historic Preservation Officer, the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU).

If an effect is determined to be adverse, steps must be taken to avoid, minimize and/or mitigate the adverse effect. If a transportation activity has the potential to adversely affect a historic property and includes the proposed taking or use of the property for a transportation activity, the special provision of Section 4(f) of the United States Department of Transportation (USDOT) Act of 1966 (23 CFR 774) must also be addressed. Considerations must include any feasible and prudent alternatives and planning to minimize harm. The Section 4(f) process also applies to the use of public parks, recreational areas, and wildlife refuges.

The PA-TU cited above outlines a streamlined approach for conducting Section 106 consultation and review with the SHPO. The document provides for (under certain conditions) regulatory authority to TxDOT Cultural Resource Management (CRM) staff to identify and evaluate

cultural resources and, when historic resources are present, assess potential project impacts and/or effects without conducting consultation and review with the SHPO.

The Secretary of the Interior's guidelines for NRHP eligibility prescribes a criterion of 50-year old properties for consideration for inclusion in the NRHP. The PA-TU among the FHWA, the ACHP, the Texas SHPO, and TxDOT also calls for a 50-year cutoff date for historic-age. However, a 45-year cutoff (45 years prior to the letting date) is suggested in the guidelines provided in the September 8, 2006 Draft of *Historic Resources Section 106 Review and NEPA Guide* published by TxDOT in order to allow for unforeseen delays in letting. Accordingly, the term 'historic-age resource', as it is used in this report, refers to any buildings, structures, objects, and potential historic districts that are, or will be, forty-five (45) years of age or older at the time of project letting for construction. Since the projected letting date for this project is 2012, 1967 was the cutoff date used for determining which buildings and structure sites met the historic-age criteria.

For purposes of this report, the area of potential effects (APE) is defined as 150-feet on either side of the proposed right-of-way. The survey study area consists of any resources located within land parcels partially or wholly contained within the APE.

A review of the Texas Historical Commission's *Historic Sites Atlas* revealed no recorded NRHP, Registered Texas Historic Landmarks (RTHL), National Historic Landmarks (NHL), State Archeological Landmarks (SAL), Official Texas Historical Markers (OTHM), historic commemorative markers, or historic cemeteries within the survey study area. The field survey revealed two historic-age resources (a house converted to commercial use and a barn located on the Its About Thyme nursery property) within the survey study area. The historians who prepared the Historic Resource Reconnaissance Survey recommended neither resource as NRHP eligible. TxDOT historians have determined that no historic properties are present within the survey study area (**Appendix D**).

6.11.2. Archeology

The APE for archeological resources is the existing and proposed right-of-way and drainage easement. Prior to initiating survey fieldwork, archival research was conducted at the THC's online *Texas Historic Sites Atlas,* the National Park Service's online *National Register Information System* (NRIS), the Texas Archeological Research Laboratory (TARL), the General Land Office (GLO), and the Texas State Historical Association's *Handbook of Texas Online.* A formal archeological survey was completed by SWCA in December 2007. A survey report is on file at the TxDOT Austin District Office. Since the time of this survey, an additional 0.25 acres of right-of-way for construction of a water quality facility and an adjacent 0.23 acres of drainage easement have been proposed for acquisition (**Figure 4.1** and **Figure 4.2A**). These areas appear

to have a low potential for significant cultural resources. A letter report covering these two areas was prepared and submitted to TxDOT in July 2009. The letter report found the areas to be negative for cultural resources based on previous field investigations, geologic conditions in the area, and historic maps research. The report recommended no further work for the two areas..

The SWCA survey revealed a low potential for significant cultural resources as the majority of the project area is an upland setting and has been completely altered by the mechanical horizontal displacement and truncation of surface sediments associated with years of agricultural practices, more recent residential and commercial construction, road construction, and the installation of overhead and buried utilities. The archaeological survey encountered a stable built during the twentieth century within the proposed new right-of-way. A medicine bottle was observed on the surface near this building that dates between 1906 and 1923. No other cultural resources were encountered within the APE, particularly along the unnamed tributaries of Bear Creek. No archaeological sites were previously recorded at this location and none were identified during the survey.

The National Historic Preservation Act of 1966 and its implementing regulations (Section 106) have been complied with for this project. The required consultation with the Texas State Historic Preservation Officer began on April 17, 2008 and is ongoing according to the stipulations of the PA-TU. Additionally, coordination with the appropriate federally recognized Native American Tribes began on April 16, 2008, according to the PA-TU, and no concerns were expressed within the comment period. Copies of all coordination with the Texas State Historic Preservation Officer and copies of the tribal consultation letters are included in Appendix G.

7. DIRECT EFFECTS OF THE PROPOSED PROJECT

7.1. Soils and Geology

No Build

If no improvements are made to Frate Barker Road, there would be no project-related effects to soils or geology.

Build Alternative

Alternatives 1 and 3 would result in conversion of, respectively, 3.9 and 3.7 acres of farmable land to transportation uses (right-of-way). 2.1 acres of the total 3.9 acres (54%) converted by Alternative 1 are considered prime farmlands; and 1.8 acres of the total 3.7 acres (49%) converted by Alternative 3 are considered prime farmlands (**Figure 7.1**).

The Farmland Protection Policy Act (FPPA) of 1981, P.L. 97-98 and amendments, and 7 USC 4201(b), authorizes the NRCS to develop criteria for identifying the effects of federal programs

on the conversion of farmland (including prime farmland) to non-agricultural uses. Projects considered exempt under the FPPA include those that require no additional right-of-way or projects that require additional right-of-way that is developed, urbanized or zoned for urban use. Although portions of the project area remain farmable or in agricultural use, the project area occurs within the city limits of Austin and its ETJ and land use plans have identified the conversion of these lands to residential, commercial, and other uses. Because the proposed project area is surrounded by land that will be developed under jurisdiction of the city of Austin, it is exempt from the FPPA.

7.2. Water Resources

No Build Alternative

If no improvements are made to Frate Barker Road, there would be no project-related water quality or quantity effects to surface or ground water.

Build Alternatives

Federal Insurance Rate Maps (FIRM) were assessed in order to determine the extent of the floodplains within the project area. 23 CFR 650.113 requires that encroachments on floodplains be the only practicable alternative which shall be supported by the following information: 1) the reasons why the proposed action must be located in the floodplain, 2) the alternatives considered and why they were not practicable, and 3) a statement indicating whether the action conforms to applicable state or local floodplain protection standards. Since the proposed project currently crosses floodplains, the following support information is provided: 1) the proposed project must be located in floodplains because the proposed project would consist of upgrading an existing linear transportation facility that currently crosses floodplains, 2) the alternative considered during the course of project development that would avoid encroachments on floodplains was the No-Build. This alternative was carried forward for further study but does not satisfy the purpose and need for the proposed project, and 3) The proposed project would conform to state floodplain standards. Therefore the Build Alternatives 1 and 3 are the only practicable alternatives that satisfy the purpose and need for the proposed project.

Approximately .85 acres of floodplains would be impacted as a result of the proposed project. Roadway encroachments on floodplains have been analyzed to determine any effects caused by the proposed facility should a 100-year flood occur. Inundation of the roadway and culvert structures, without causing significant damage to the roadway, culvert structures, streams, or other property is considered acceptable. The hydraulic design practices of this project are in accordance with current TxDOT and FHWA design policies and standards.

FEMA administers the National Flood Insurance Program (NFIP), and Travis County is a participating member of the NFIP. Any changes to base flood elevations caused by potential

impacts of this project would be coordinated with the local Floodplain Administrator and designed so that, at a minimum, the accumulative increases to the 100-year floodplain be less than one foot.

Build Alternatives 1 and 3 would require the lengthening of the drainage ditch and the existing two 48 inch corrugated metal pipe culverts at the Bear Creek tributary crossing. See **Figure 6.1** for the location of the jurisdictional channel crossing where potential impacts would occur. Within both alternatives 1 and 3, potential wetlands are associated with the jurisdictional channel crossing. Avoidance and minimization of impacts to potential wetlands has been an objective throughout the planning and preliminary engineering process. Even so, alternatives 1 and 3 would potentially result in wetland impacts at the crossing. Scraping and grading occurring in conjunction with culvert replacement for both alternatives 1 and 3 would each result in impacts of less than 0.1 acre at the channel crossing. This includes impacts to stream channel below the OHWM and to potential wetlands. Based on the acreage of impacts, both alternatives would qualify for a USACE NWP 14 with pre-construction notification PCN to the USACE.

Alternatives 1 and 3 would result in the addition of approximately 0.34 acres of impervious cover within the recharge zone. Recharge within karst occurs primarily where fractures and conduits are present allowing for surface water migration. If a portion of the bedrock that is paved over has no fractures or dissolution conduits, then little or no recharge would be lost. The proposed project would not be anticipated to reduce recharge to the Edwards Aquifer, since no sensitive recharge features such as fractures or dissolution conduits were found in the project area during karst surveys (**Section 6.6**). Alternatives 1 and 3 would also result in the addition of approximately 9.85 acres of impervious cover within the Contributing Zone of the Edwards Aquifer. Because both alternatives 1 and 3 are located within the Recharge Zone, a WPAP would be required.

Alternatives 1 and 3 have been designed and would be constructed in accordance with TCEQ Rules for Edwards Aquifer protection. The Edwards Aquifer Rules is a state regulation stipulating water quality protection for storm water infiltrating into the Edwards Aquifer. According to Section 213.1, paragraph 2 of the Texas Administrative Code, Title 30, Part 1, the Edwards Rules have been determined to be a non-degradation regulation; therefore, by implementing the mitigative measures identified in the Edwards Aquifer Rules, no impacts to the aquifer would be anticipated. No water wells are located within 3 miles of either build alternative; therefore, water wells would not be affected as a result of this project.

7.3. Vegetation

No Build

If no improvements are made to Frate Barker Road, there would be no project-related vegetation effects as conditions would remain unchanged.

Build Alternatives

Within the existing and additional right-of-way, there is habitat consistent with the "Live Oak-Ashe Juniper Woods," "Live Oak-Ashe Juniper Parks," and "Other Native or Introduced Grasses". Habitats within the project area include fenceline vegetation, riparian, and maintained/landscaped vegetation, depending on alternative. Impacts to each vegetation type, by alternative, are summarized in **Table 14**.

Table 14: Vegetation Impacts (acres)

Vegetation Type*	Alternatives	
	1	3
Live Oak-Ashe Juniper Woods	3.17	3.36
Live Oak-Ashe Juniper Parks	0.77	0.49
Fenceline	1.69	1.69
Riparian	0.42*	0.42*
Other Native or Introduced Grasses	7.16	6.57
Total	**13.21**	**12.53**

*maximum potential impacts assuming grading and disturbance. Impacts within proposed drainage easement would be determined during final project design.

The criteria for the appropriateness of compensatory mitigation as stated in the Memorandum of Agreement between TxDOT and TPWD was reviewed. During the field survey, vegetation was observed to be present adjacent to the project area that would not be disturbed and is similar in composition and structure to that which would be removed. Vegetation to be removed during completion of the proposed project would not assist in the prevention of the listing of a federal candidate species, and is not a rare vegetation series or native prairie. However, Alternative 1 would involve the removal of a large live oak tree as described in **Section 6.3**; Alternative 3 would not require removal of the tree. This tree is located within the existing right-of-way and is a constraint in alternative development due to its size and location. At the open house, there were three comments made in support of preserving, transplanting or mitigating for the oak tree that may be removed under this alternative. In addition the tree is a unique feature, due to its size and age, within the project area and was therefore considered in the development of alternatives.

Although a large oak tree would be impacted if Alternative 1 is selected, the tree is not considered locally important. Many oak trees of similar size occur in southwest Travis County and in the immediate vicinity of the project area. Due to the local abundance of similar trees, mitigation for the removal of the single large oak tree, should Alternative 1 be selected, would not be warranted.

With both alternatives, up to 0.42 acres of riparian vegetation would be removed. The 0.42 acres includes 0.23 acres of riparian vegetation which occurs in the drainage easement. Final impacts within the drainage easement would be determined during final design of the proposed drainage easement. Mitigation measures for riparian vegetation impacts may be included in a wetland

mitigation plan, if such a plan is warranted (positive wetland determination made) and subsequently required by the USACE for the proposed project. Furthermore, identification of riparian areas requiring mitigation under NWP General Condition 19(f) would be necessary. With the exception of the wetland and riparian vegetation, it would not be prudent to allocate funds to mitigate the impacts to upland vegetation, when an abundance of this vegetation type is located immediately adjacent to the project area. Likewise, it would not be prudent to allocate funds to mitigate impacts (removal) to the large live oak tree described previously, if removal is required. As a result, no compensatory mitigation for upland vegetation is proposed.

7.4. Wildlife

No Build Alternative

If no improvements are made to Frate Barker Road, there would be no project-related effects on wildlife.

Build Alternatives

Riparian vegetation occurs within the project area in the vicinity of the Bear Creek tributary. This area provides habitat for forest-dwelling plants and animal species to the south, and wetland plant species to the north of the existing road. Impacts would be avoided and minimized as much as possible and would be minimal. As a result, the impact on wildlife species utilizing these habitats would be the same for both alternative 1 and 3, and would be minimal.

7.5. Migratory Birds

No Build Alternative

If no improvements are made to Frate Barker Road, there would be no project-related effects on migratory birds.

Build Alternatives

A field survey of existing culverts potentially affected by alternatives 1 and 3 did not identify any swallow nesting activity. The removal of riparian trees and woody vegetation within the project area would reduce nesting opportunities for neo-tropical migrant bird species. Avoidance measures would be implemented prior to and during construction.

7.6. Threatened and Endangered Species

No Build Alternative

If no improvements are made to Frate Barker Road, there would be no project-related effects on threatened and endangered species.

Build Alternatives

Because of the lack of suitable habitat and no known occurrences near the project area, alternatives 1 and 3 would have no effect on Jollyville Plateau salamander, black-capped vireo, golden-cheeked warbler, interior least tern, whooping crane, smalleye shiner, false spike mussel, smooth pimpleback, Texas fatmucket, Texas fawnsfoot, Texas pimpleback, Kretschmarr Cave mold beetle, or Tooth Cave ground beetle, for any build alternative. Moreover, alternatives 1 and 3 would not impact American peregrine falcon, Arctic peregrine falcon, bald eagle, or Texas horned lizard.

Karst surveys were conducted for the Frate Barker alternatives during which three non-karst features were identified. According to the results of the karst surveys conducted for this project, none of the project area features identified during karst surveys contain habitat known to support listed karst invertebrates (**Section 6.6**). Because of the lack of suitable habitat and no known occurrences near the project area, alternatives 1 and 3 would have no effect on endangered karst invertebrate species Bone Cave harvestman, Bee Creek Cave harvestman, Tooth Cave pseudoscorpion, Tooth Cave spider, or Warton's Cave meshweaver.

The proposed roadway for both alternative 1 and 3 would include a total of approximately 14.4 acres of pavement. Approximately 10.5 acres of newly-paved surface would be added, all of which would result in additional impervious cover that would be primarily over the contributing and transition zones of the Barton Springs Segment of the Edwards Aquifer, with approximately 0.34 acres over the recharge zone.

As stated in **Section 6.6**, the Barton Springs and Austin blind salamanders are known only from the outlets of Barton Springs in Travis County. The springs are fed by flow from the Barton Springs segment of the Edwards Aquifer and they are within the Colorado River Basin. The quantity of water in the springs is dependent upon the recharge of the Edwards Aquifer. Primarily, water flows into the aquifer where the Edwards limestone outcrops. Watersheds contribute to aquifer recharge when runoff from them enters rivers and streams that flow over areas where recharge occurs.

The proposed Frate Barker Road project is subject to the TCEQ Edwards Aquifer Rules, the goal of which is non-degradation of existing groundwater quality[2]. The TCEQ Edwards Aquifer Rules were promulgated to protect the quality of the groundwater in the Edwards Aquifer through the implementation of stringent water quality measures and best management practices. In its final rule to list the Barton Springs salamander as endangered, USFWS identified actions that are unlikely to result in a violation of Section 9 of the Endangered Species Act. [3] Of the

[2] §213.1 Texas Administrative Code
[3] 62 FR 23391

seven types of activities described in the rule, number 5 applies to the proposed project. Rule number 5 states (Appendix E):

> New developments or construction that do not result in an appreciable change in the quality or quantity of water in the Barton Springs watershed above normal background conditions (non-degradation). Generally, new development and construction designed and implemented pursuant to State and local water quality protection regulations in effect as of the date of this rule will not result in a violation of section 9 [of the ESA]."

In accordance with the TCEQ Edwards Aquifer Rules, a Geologic Assessment (GA) was conducted for the project in December of 2007. TCEQ requires protection of some types of sensitive recharge features identified in a GA because these features are considered to provide significant quantities of water to the aquifer. One non-karst closed depression with no evidence of providing recharge to the aquifer was identified during the GA. The feature was further determined to be a non-sensitive recharge feature as defined by TCEQ guidelines. Since there were no soil openings within the project area that warrant protection (sensitive recharge features) under the TCEQ rules, the quantity of the water entering the Barton Springs Segment of the Edwards Aquifer after completion of the proposed Frate Barker roadway would not be changed above normal background conditions.

Additionally, the proposed Frate Barker roadway would result in approximately 10.5 acres of additional impervious cover, where it is believed stormwater runoff carries contaminants to the aquifer. In accordance with the TCEQ Edwards Aquifer Rules, approved BMPs, including the construction of a water quality facility (see Figure 4.1), would be incorporated into the proposed Frate Barker construction plans. Per TCEQ Edwards Aquifer Rules, these water quality control measures would meet or exceed the standard of maintaining the normal background conditions of water quality in the Barton Springs Segment of the Edwards Aquifer resulting in non-degradation. Consequently, water leaving the right-of-way as surface runoff is not likely to affect salamander habitat by way of groundwater contamination. Therefore, alternatives 1 and 3 may affect, but would not likely adversely affect the Barton Springs salamander. The alternatives would not result in a change to the listing of the Austin blind salamander as a candidate for listing. On November 29, 2011, coordination with the USFWS resulted in a concurrence with the conclusion that the project may affect, but is not likely to adversely affect the Barton Springs salamander (Appendix G).

Karst zones 1 and 2 are not present in the study area, so no pavement would be placed in these zones as a result of this project. Approximately 1.3 acres of pavement would be placed in karst zone 3 (low probability of ECS occurrence) for both alternatives. Nevertheless, if any federal or state listed species is encountered during the construction phase of the proposed project, work

will cease in that area and Travis County and TxDOT will be contacted for the appropriate consultation procedures.

7.7. Community Impact Assessment

7.7.1. Land Use

No Build

If no improvements are made to Frate Barker, there would be no project-related effects on land use.

Build

Frate Barker from Brodie Lane to Manchaca Road is a two-lane rural facility within Travis County. The proposed improvements would involve an estimated 7.5 to 7.8 acres of new right-of-way. No displacements of residences and one commercial displacement would result from Alternative 1. One residential displacement and one commercial displacement would result from Alternative 3. The one residential displacement would change the land use from residential to transportation. The one commercial displacement would impact the nursery at the eastern-most end of the project on the south side, at the intersection of Manchaca Road and Frate Barker. The proposed ROW would impact a greenhouse and a portion of the parking lot. Otherwise, no direct change to land use would result from right-of-way acquisitions.

7.7.2. Community Cohesion

No Build

If no improvements are made to Frate Barker, there would be no project-related effects on community cohesion, as conditions would remain unchanged.

Build

Alternatives 1 and 3 would not fragment neighborhoods within the project area and travel patterns and accessibility are not anticipated to be adversely impacted by the proposed project. Consequently, the proposed improvements to Frate Barker would enhance accessibility to residences and businesses within the project area and enable residents to travel between neighborhoods more efficiently and safely. In addition, improvements would facilitate safer vehicular turning movements for drivers and facilities for cyclists and pedestrians would be provided.

7.7.3. Environmental Justice

No Build

If no improvements are made to Frate Barker, there would be no disproportionate and adverse effects to minority or low-income populations.

Build

No environmental justice populations were found to be located within the Frate Barker project area. Existing access to day care facilities on Brodie Lane and Manchaca Road, grocery stores, and educational facilities will not be impacted by alternatives 1 or 3. In addition, the introduction of sidewalks and bicycle lanes would increase transportation opportunities for residents in the surrounding area. Therefore, neither alternative would have disproportionate effects on minority or low-income populations.

7.7.4. Noise

No Build

If no improvements are made to Frate Barker Road, there would be no direct project-related traffic noise impacts.

Build

Sound from roadway traffic is generated primarily from a vehicle's tires, engine and exhaust. It is commonly measured in decibels and is expressed as "dB."

Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by the human ear; therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as "dB(A)."

Also, because traffic sound levels are never constant due to the changing number, type and speed of vehicles, a single value is used to represent the average or equivalent sound level and is expressed as "Leq."

The traffic noise analysis typically includes the following elements:

- Identification of land use activity areas that might be impacted by traffic noise.
- Determination of existing noise levels.
- Prediction of future noise levels.
- Identification of possible noise impacts.
- Consideration and evaluation of measures to reduce noise impacts.

The FHWA has established the following Noise Abatement Criteria (NAC) for various land use activity areas that are used as one of two means to determine when a traffic noise impact would occur.

Table 15: Noise Abatement Criteria

Activity Category	FHWA dB(A) Leq	**TxDOT dB(A) Leq**	Description of Land Use Activity Areas
A	57 (exterior)	**56 (exterior)**	Lands on which serenity and quiet are of extra-ordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	**66 (exterior)**	Residential
C	67 (exterior)	**66 (exterior)**	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools , television studios, trails, and trail crossings
D	52 (interior)	**51 (interior)**	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72 (exterior)	**71 (exterior)**	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F	--	--	Agricultural, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	Undeveloped lands that are not permitted.

NOTE: primary consideration is given to exterior areas (Category A, B, C, or E) where frequent human activity occurs. However, interior areas (Category D) are used if exterior areas are physically shielded from the roadway, or if there is little or no human activity in exterior areas adjacent to the roadway.

A noise impact occurs when either the absolute or relative criterion is met:

Absolute criterion: the predicted noise level at a receiver approaches, equals or exceeds the NAC. "Approach" is defined as one dB(A) below the NAC. For example: a noise impact would occur at a Category B residence if the noise level is predicted to be 66 dB(A) or above.

Relative criterion: the predicted noise level substantially exceeds the existing noise level at a receiver even though the predicted noise level does not approach, equal or exceed the NAC. "Substantially exceeds" is defined as more than 10 dB(A). For example: a noise impact would occur at a Category B residence if the existing level is 54 dB(A) and the predicted level is 65 dB(A).

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area.

The FHWA traffic noise modeling software was used to calculate existing and predicted traffic noise levels. The model primarily considers the number, type and speed of vehicles; roadway alignment and grade; cuts, fills and natural berms; surrounding terrain features; and the locations of activity areas likely to be impacted by the associated traffic noise.

Existing and predicted traffic noise levels were modeled at receiver locations (**Table 17** and **Figure 6.8 A-B**) that represent the land use activity areas adjacent to the proposed project that might be impacted by traffic noise and potentially benefit from feasible and reasonable noise abatement.

Table 16: Traffic Noise Levels (dBA Leq)

Representative Receiver	NAC Category	NAC Level	Existing 2000	Predicted 2020	Change (+/-)	Noise Impact
R1- Day Care	B	67	58	62	4	N
R2- Residence	B	67	59	62	3	N
R3 – Residence	B	67	59	62	3	N
R4 – Residence	B	67	50	54	4	N
R5 – Residence	B	67	52	55	3	N

As indicated in **Table 17**, a build alternative would not result in a traffic noise impact.

Land use activity areas along the southern edge of Frate Barker between Brodie and Hewitt are

currently Category G, undeveloped land, which is not permitted for development. To avoid noise impacts 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, no new activities are planned or constructed along or within the following predicted (2028) noise impact contours.

IMPACT UNDEVELOPED AREA	DISTANCE LAND USE	CONTOUR	from RIGHT-of-WAY
Brodie to Hewitt	Residential	66 dBA	Within ROW

Noise associated with the construction of the project 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 is expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions will 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.

A copy of this traffic noise analysis will be made available to local officials to assist in future land use planning. On the date of approval of this document (Date of Public Knowledge), Travis County, FHWA and TxDOT are no longer responsible for providing noise abatement for new development adjacent to the project.

7.7.5. Air Quality

No Build

If no improvements are made to Frate Barker, there would be no project-related air quality effects.

Build

Alternatives 1 and 3 are located in Travis County, Texas which is in attainment of all NAAQS. The project is in an area where the State Implementation Plan does not contain any transportation control measures. Therefore, the conformity procedures of 23 CFR 770 do not apply. However, because monitored ozone levels in the Austin area are very close to the 8-hour standard, Travis County, along with Bastrop, Caldwell, Hays, and Williamson counties, local elected officials in the Austin-Round Rock Metropolitan Statistical Area, the EPA and TCEQ entered into an agreement known as the 8-Hour Ozone Flex Program, replacing the region's Early Action Plan. This program is designed to implement measures in the region to improve air quality.

MSAT effects at the levels likely to be encountered along a roadway are mostly long term health effects. These long term effects are characterized by long term cancer risk factors. Dispersion modeling of MSAT concentrations has shown that concentrations begin to decrease at about 100 meters and generally are not distinguishable from background concentrations beyond 500 meters. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

For each alternative in this document, the amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Build Alternative is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the preferred action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6.2 emissions model, emissions of all of the priority MSAT except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases would offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models. Because the estimated VMT under each of the Build Alternatives are nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely 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 72 percent between 1999 and 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 in nearly all cases.

Adding travel lanes and shifting the existing roadway centerline (in sections where this would occur) would have the effect of moving traffic closer to some nearby homes and businesses;

therefore, there may be localized areas where ambient concentrations of MSATs could be higher under the Build than the No Build Alternative(s). However, these measures would simultaneously have the effect of moving traffic away from other homes and businesses (**Figure 6.4 A-B**). In these areas, ambient concentrations of MSATs could be lower under the Build than the No Build Alternative(s).

In sum, if Frate Barker is widened and, as a result, traffic is moved closer to receptors, the localized level of MSAT emissions for the Build Alternative(s) could be higher relative to the No Build Alternative. But, this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs would be lower in other locations, when traffic shifts away from them. Finally, on a regional basis, EPA's vehicle and fuel regulations coupled with fleet turnover would cause region-wide MSAT levels to be significantly lower than today in almost all cases. A complete qualitative MSAT analysis can be found in **Appendix C**.

7.8. Hazardous Materials

Field investigations and database searches for hazardous materials, conducted in conjunction with the EA, concluded that no contaminated sites occur within alternatives 1 or 3. No subsequent activity has occurred in the project area that would raise suspicion of hazardous materials concerns originating since these studies. No additional hazardous materials concerns are anticipated.

7.9. Cultural Resources

7.9.1. Historic Resources

No Build

If no improvements are made to Frate Barker, there would be no project-related effects on historic resources.

Build Alternative

A historic resources reconnaissance survey was performed to assess impacts to potential historic-age structures that may result from construction of the proposed Build Alternatives. Pursuant to Stipulation VI, "Undertakings with the Potential to Cause Effects," of the PA-TU, TxDOT has determined that no historic properties are present in either alternative 1 or 3 and therefore individual coordination with SHPO is not required.

8. INDIRECT EFFECTS OF THE PROJECT

Indirect effects, as defined by CEQ regulations, are "caused by the proposed action and occur later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8). Indirect effects can be linked to direct effects in a causal chain (NCHRP 2002). The chain can be extended as indirect effects produce further consequences. Examples of direct and indirect effects of several types of transportation projects are summarized in **Table 18**.

Table 17: Examples of Indirect Effects

Project Action	Direct Effect	Indirect Effect
Bypass Highway	Improved Access	Farmland converted to residential use. New residences produce new labor force attracting new businesses.
New Light Rail	Improved Access	New businesses open producing jobs/taxes. Traditional businesses/residents priced out.
New Highway	Improved Access	Development alters character of historic area. Visitors increase to historic area.

Source: NCHRP Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (2002).

As illustrated in **Table 19**, the indirect effects analysis for the proposed project generally follows a seven-step process (TxDOT, 2009):

Table 18: Seven-Step Approach to Estimating Indirect Effects

Step 1 – Scoping: The basic approach, effort required, and geographical boundaries of the study are determined.
Step 2 – Identify the Study Area's Direction and Trends: Information regarding the study area is compiled with the goal of defining the context for assessment.
Step 3 – Inventory the Study Area's Notable Features: Additional data on environmental features are gathered and synthesized with a goal of identifying specific environmental issues by which to assess the project.
Step 4 – Identify Impact-Causing Activities of Proposed Action and Alternatives: Fully describe the component activities of each project alternative
Step 5 – Identify Potentially Significant Indirect Effects for Analysis: Indirect effects associated with project activities and alternatives are cataloged, and potentially significant effects meriting further analysis are identified.
Step 6 – Analyze Indirect Effects and Evaluate Analysis Results: Qualitative and quantitative techniques are employed to estimate the magnitude of the potentially significant effects identified in Step 5 and describe future conditions with and without the proposed transportation improvement. The uncertainty of the results of the indirect effects analysis is evaluated for its ramification on the overall assessment.
Step 7 – Assess Consequences and Develop Mitigation (when appropriate): The consequences of indirect effects are evaluated in the context of the full range of project effects. Strategies to avoid or lessen any effects found to be unacceptable are developed. Effects are reevaluated in the context of those mitigation strategies.

Step 1: Scoping

Frate Barker is classified as a minor arterial, according to the CAMPO 2035 Regional Transportation Plan[4], connecting Brodie Lane to Manchaca Road in southern Travis County near the Hays County border. The roadway is located within the Austin city and ETJ limits.

Frate-Barker, which serves as a boundary between the Austin city limits and its 2-mile ETJ, is an east-west travel route for local residents in southwest Travis County. The proposed improvements would upgrade the existing two lane facility by adding an additional travel lane in each direction, a continuous left turn lane, sidewalks, and a bike lane. As described in **Section 3: Purpose and Need**, the Frate Barker area is experiencing tremendous growth and with that, increased congestion. The proposed improvements would provide additional travel lanes and shoulders to allow traffic to bypass some congestion-causing situations (e.g., crashes, turning movements, etc.) and would improve ingress and egress at adjoining driveways and cross-streets by provision of a continuous left-turn lane. Frate Barker would continue to function as a minor arterial.

[4] CAMPO 2035Regional Transportation Plan. *People, Planning, and Preparing for the Future.* Adopted May 24, 2010.

The geographical boundaries of the indirect effects study area would include the area in which the proposed improvements to Frate Barker could potentially influence local traffic patterns or land development. Study area boundaries were determined using CAMPO 2030 and CAMPO 2035 Plan maps demonstrating projected roadway congestion in 2007 and 2010 under current conditions and in 2030 and 2035 if all projects included in the respective Plans are built[5].

Areas outside the study area are better served by other roadways. The indirect effects study area would generally be bound by Manchaca Road on the east, Brodie Lane on the west, and FM 1626 on the south. The northern boundary is delineated along the property line for the northern residences on Sunland Drive and Arbor Downs Road and the southern boundary of the Slaughter Creek Greenbelt. See **Figure 8.1** for a map of the indirect effects study area. As illustrated in **Figure 8.1**, the study area is a mixture of urban, suburban, and rural areas. The study area lies partly within the city limits of Austin and partly within the Austin 2-mile ETJ.

The indirect effects study area encompasses approximately 1,147 acres, 745 acres of which (65 percent) lies within the city of Austin. The remaining 402 acres (35 percent) is located in the Austin ETJ, which is primarily within the jurisdiction of Travis County (**Figure 8.1**). According to the 2008 digital orthophoto quarter-quadrangle (DOQQ) data, approximately 980 acres (85 percent) of the study area was developed and according to GIS data regarding development permitting, the land use for all 1,147 acres of the study area has been designated. Approximately 41 acres (4 percent) are currently within CAMPO road right-of-way (Frate Barker, Brodie Lane, Manchaca Road and FM 1626). Approximately 50 acres (4 percent) is dedicated green space – parks, preserves, drainage and water quality protection facilities. See **Figure 8.1** for a layout of these areas.

Step 2: Identify the Study Area's Direction and Goals

Indirect effects are commonly related to changes in land use. When a transportation project is constructed, an indirect effect may occur when land in the study area develops. For example, if a bypass or a relief route is constructed around a town, development may occur in the bypass area in the form of restaurants, gas stations, and other commercial establishments. Land development, in turn, results in the transformation of primarily undeveloped uses within the study area to residential and commercial land uses. Increased development can alter the landscape, increase impervious cover, modify species composition of remaining habitats, and introduce fertilizers and anthropogenic chemicals into the biotic system.

[5] CAMPO Mobility Plan. Map 2.1: "Roadway Congestion in 2007" and Map 2.3: "Roadway Congestion in 2030 If No New Projects Are Built". Adopted June 6, 2005.

Travis and Hays Counties and the city of Austin are rapidly expanding. Population estimates from the Capital Area Council of Governments (CAPCOG) for Travis and Hays County grew nearly 100% and 180%, respectively, from 1990 to 2006. Similarly, CAPCOG data reveals between 1990 and 2006, Austin's population has increased over 100% from 465,622 to 709,893. These population estimates are in line with CAMPO 2035 population projections, which indicate dense population growth in the vicinity of Frate Barker.

A comparison of historic aerial photography, including 1970 imagery from the Soil Survey of Travis County, Texas[6] and 1997 and 2008 aerial photography obtained from CAPCOG[7], indicates that intense development within the study area is a recent phenomenon. Land use within the study area in the 1970s is interpreted as agricultural, large-lot residential, and other undeveloped uses.

The proposed project overlies the city limits and ETJ of Austin. As described above, population growth in the study area has been rapid and recent. This growth has been accompanied by land development serving these new residents. The land in the eastern portion of the study area lies within the Desired Development Zone which is located outside of the contributing and recharge zones of the Edwards Aquifer. The western portion of the study area is located within the Drinking Water Protection Zone and Barton Creek Buffer Area[8] where it overlies the Edwards Aquifer recharge and contributing zones. As a result, large contiguous parcels of undeveloped land west of Frate Barker have been purchased either fee simple or through conservation easements by the City of Austin for Water Quality Protection Lands[9]. Land over the recharge and contributing zones within the jurisdiction of Austin is subject to various water quality ordinances (SOS Ordinance, for example) which limit impervious cover, require non-degradation of stormwater discharge, and have provisions that exclude variances unless a demonstrable improvement in water quality is shown. According to the City of Austin's Watershed Protection Development Review webpage, "subdivision authority has expanded, and can be used to influence the timing and location of new development, and to protect the environment."[10]

Current land use maps from the city of Austin indicate a large amount of single-family residential land use, interspersed with some agricultural, large-lot residential, and other

---

[6] U.S. Department of Agriculture (USDA), Soil Conservation Service. *Soil Survey of Travis County, Texas.* In cooperation with the Texas Agricultural Experiment Station, June 1974.

[7] Capital Area Council of Governments. *Information Clearinghouse – Geospatial Data.* http://www.capcog.org/Information_Clearinghouse/Geospatial_main.asp. Accessed: August 6, 2007.

[8] City of Austin. *Smart Growth Zones* map. August 2004.

[9] City of Austin. *WQPL* map. April 27, 2004.

[10] City of Austin, Watershed Development Review. *Watershed Ordinances.* http://www.ci.austin.tx.us /watershed/. Accessed: August 3, 2007.

undeveloped lands in the indirect effects study area. Commercial development is less common and generally focused around Manchaca Road[11].

North of Frate Barker, the study area is highly developed within the limits while most of the planned development is proposed to the south of Frate Barker between Brodie Lane and Manchaca Road. Commercial and light industrial development generally occurs along either side of Manchaca Road, primarily in the southern portion of the study area. As a result of its recent population growth, residential land use is rapidly expanding, despite the limited capacity of the existing roadway network.

CAMPO's proposed 2035 Regional Growth Concept[12] also reflects development trends observed within the study area. "The growth concept proposes that CAMPO, local governments, and regional partners implement strategies that would encourage the development of 'activity centers' throughout the region. Accommodating a greater percentage of future regional growth in activity centers supports quality of life by providing additional housing options, providing additional employment and retail opportunities closer to where people live, supporting transit and roadway investments, creating areas with a unique sense of place, and using infrastructure efficiently." Consistent with this concept, south Austin is identified as a small activity center.

All data reviewed reveal a high population growth rate within the study area demonstrated by considerable residential development. Land use and zoning plans for the jurisdictions represented in the study area indicate that this residential development, accompanied by the necessary support services (retail, schools, parks, etc.), are the main drivers of land development in the vicinity of the project. While the rate of development has been high over the past decade, Travis County still maintains the potential to continue to develop as long as vacant parcels are available. Consistent with CAMPO's population projections for the year 2035, growth within the project area is expected to be strong and dense within the study area.

Step 3: Inventory of the Indirect Effects Study Area's Notable Features

The baseline of conditions for environmental resources that would exist after project construction is included in **Section 7 - Existing Environment**. The environmental resources include geology and soils, water resources, vegetation, wildlife, threatened and endangered species, socio-economic resources, hazardous materials, air quality, and cultural resources.

---

[11] City of Austin. Unpublished material, parcels landuse. June 2003. http://www.ci.austin.tx.us/landuse/gis.htm. Accessed August 1, 2007.

[12] CAMPO. *Revised Draft CAMPO 2035 Regional Growth Concept: A Guide for integrating Land Use and Transportation in Central Texas*. May 16, 2007.

Based on the environmental studies performed in conjunction with this environmental assessment, as well as a review of community interests, notable features identified within the study area include the Barton Springs Segment of the Edwards Aquifer recharge and contributing zones and associated surface water quality. The indirect effects study area includes recharge features, as well as stream segments known to flow toward recharge features and, thus, contributing to the recharge of the aquifer. The Barton Springs and Austin blind salamanders are listed or candidate species affected by aquifer recharge, and are therefore included in the inventory of the indirect effects study area's notable features. Based on the same criteria, geology and soils, vegetation, wildlife, socio-economic resources, air quality, and cultural resources were not identified as notable features. Although the project is located in an area that was formerly under an EAC (**Section 6.10**) and considered near nonattainment for the 1997 8-hour ozone NAAQS, the EAC successfully kept this area in attainment for the ozone standard and an O3 Flex plan is being developed in coordination with TCEQ and EPA. Vehicle technology and fuels are becoming cleaner and emitting ever lower levels of MSATs. This trend is expected to continue leading to further improvements in air quality over time. As a result, it would not be considered a notable resource.

The indirect effects study area was also evaluated for the presence of terrestrial, avian, and cave-dwelling endangered species. No existing records occur within the indirect effects study area. The nearest record of the endangered golden-cheeked warbler is approximately 2.2 miles northwest of the study area while the nearest record of the endangered black-capped vireo is located approximately 4.5 miles west of the study area. A known occurrence for the Texas garter snake (a state- listed species of concern) is located approximately 3.2 miles south of the study area.[13] No karst invertebrates or other federally or state listed threatened or endangered species are known to exist within the indirect effects study area[14,15]. According to the results of the geologic assessment conducted for this project, no features identified within the right-of-way contain habitat known to support listed karst invertebrates (**Section 6.6**). In summary, terrestrial, avian, and cave-dwelling endangered species would not be considered notable resources.

Step 4: Identify Impact-Causing Activities of Proposed Action and Alternatives

Impact-causing activities are described by type.

Modification of regime effects - Approximately 12.5 to 13.2 acres of live oak-Ashe juniper parks/woods and native/introduced grass vegetation will be removed permanently, approximately

[13] USFWS. Unpublished material, GCWObsPnt_through_03_NAD83UTM14. Provided April 26, 2007.
[14] Natural Diversity Database. Texas Parks and Wildlife Department. Oak Hill, Buda, Mountain City, and Signal Hill topographic quadrangles, last updated August 2007.
[15] Veni, G. Geologic controls on cave development and the distribution of cave fauna in the Austin, Texas, region. Appendix D: Distribution maps of endangered cavernicole fauna in the Austin region. Prepared for FWS. 1992.

0.42 acres of which (maximum) could be riparian vegetation. The estimated length of temporary disturbance is six months. Drainage will not be modified; the current drainage system will be utilized, and the existing open-ditch and storm sewer system outfall locations would not change.

One jurisdictional waters crossing occurs within the project limits, with potential associated wetlands. Minimal disturbance will occur below the OHWM and potential wetlands at this location, covered under NWP 14 with PCN (**Section 7.1.1**).

Alternatives 1 and 3 would add approximately 0.34 acres of pavement within the Edwards Aquifer recharge zone, resulting in additional stormwater run-off and impervious cover over the aquifer.

Land Transformation and Construction – Alternatives 1 and 3 would include acquisition of a maximum of approximately 7.85 acres of right-of-way and 0.23 acres of permanent drainage easement, and widening of the existing roadway from a two-lane rural facility to a four-lane divided facility with a continuous center turn lane. Sidewalks and bike lanes would also be constructed on both sides of the proposed roadway. The existing culverts at the Bear Creek tributary crossing and a second non-jurisdictional channel crossing would be extended to accommodate the proposed roadway.

Resource Extraction – No excavation would be required excepting that required for road base installation for additional travel lane and for bike lanes and sidewalks.

Processing – Storage of materials would occur off-site. It is anticipated, based on usual practices that the contractor, if selected, would negotiate to use a portion of the right-of-way for the contractor's field office and storage site. If the contractor chooses to use undeveloped land or another site for material storage, impacts to natural resources may increase.

Land Alteration – Land alteration as a result of both alternatives would largely be limited to the increase in paved area with associated removal of vegetation.

Resource Renewal – Areas of vegetation disturbed by construction activity would be reestablished following construction.

Changes in Traffic – The proposed project is expected to reduce future traffic congestion. As the project vicinity grows, the proposed improvements would improve the reliability of travel times through the project limits by providing additional travel lanes. The addition of bike lanes would allow new bicycle traffic.

Changes in Pedestrian Traffic – The proposed addition of sidewalks and pedestrian crossings is expected to lead to an increase in pedestrian traffic within project limits.

Waste Emplacement and Treatment – Soil excavated from the project area would likely be stockpiled for use on this or other projects or sold for other uses, depending upon the results of soil testing. The contractor, if selected, may choose to provide portable sanitary facilities for employees at the field office. No other sanitary waste discharge is anticipated. Pavement removed from the existing roadway would be recycled for use as roadway or riprap material, in accordance with local policy. Packing materials would be disposed of in the landfill by a certified contractor.

Chemical Treatment –None of the slopes which would be revegetated are steeper than 3:1 in grade; therefore, no chemical binders would be needed. Periodic applications of herbicide may occur during the maintenance phase of the project.

Access Alteration – Two new driveway accesses would be included, one on the north side of Frate-Barker approximately 1,300 feet west of the east project terminus (Manchaca Rd.) and one on the south side of Frate-Barker approximately 1,500 feet west of Manchaca Road. No existing driveway access would be eliminated.

Step 5: Identify Potentially Substantial Indirect Effects

Potential indirect effects to notable features were identified and assessed for the potential to be substantial. Impact-causing activities can include 1) encroachment-alteration effects – those that affect the functions of the natural environment due to project features; 2) access-alteration effects – those that result from traffic pattern or access changes attributable to the design of the project influencing the location of residential and commercial growth; and 3) induced growth effects – those attributable to induced growth rather than project features[16].

Encroachment-Alteration Effects

Edwards Aquifer Recharge Features and Surface Water Quality

Under the no-build alternative, stormwater runoff from the existing facility would continue to leave the project site unabated because original construction of Frate Barker pre-dated the Edwards Aquifer Rules and engineered water quality controls do not exist on the project site. Therefore, indirect impacts to surface water quality from the no-build could adversely affect Edwards Aquifer recharge where the roadway traverses the recharge and contributing zones.

[16] NCHRP *Report 466*.

For the build alternatives, an unnamed tributary of Bear Creek occurs within the project limits. This tributary lies within the Barton Springs Segment of the Edwards Aquifer recharge zone within the project limits. The existing culvert-class pipe structures at this location would be extended to accommodate the improvements in the roadway. The extended culvert would discharge into a proposed water quality facility via drainage easement proposed for acquisition (**Figure 4.1**). Permanent fill below the OHWM would be limited to less than 0.01 acre within the proposed right-of-way. No fill would occur below the OHWM within the proposed drainage easement; however, grading and shaping activity would occur, impacting less than 0.01 acre. Total impacts to channel below the OHWM would be less than 0.1 acre. As a result, this crossing would be permitted under NWP #14 and would require a PCN to the USACE. By definition, projects that meet the conditions of a NWP are considered to have minimal impacts (33 CFR 330).

Within the recharge and contributing zones, engineered features for water quality improvement, such as vegetated filter strips, would be incorporated into the proposed improvements. In addition, a water quality facility is proposed for inclusion in the project design at the Bear Creek tributary crossing (**Figure 4.1**). These features would be designed in accordance with the Edwards Aquifer Rules to offset the increase in impervious cover and any potential increase of roadway contaminants. Moreover, no recharge features have been identified within the project limits.

Furthermore, land disturbing activities, such as grading, extension of culverts, drainage easement grading and shaping, water quality facility construction, and other construction activities for a project of this size would require coordination with the TCEQ. A WPAP in compliance with the Edwards Aquifer Rules and an SW3P in compliance with TPDES will be submitted for TCEQ review and approval. These documents specify the BMPs incorporated into the project to prevent erosion and sedimentation during construction, as well as post-construction total suspended solid controls.

During construction of the proposed project, there is a potential for leakage of fuels. Accidental spills could occur during operation of the roadway. Potential adverse effects of these actions are minimized by implementation of the WPAP and SW3P. Improvements in the safety of the roadway, including the construction of shoulders, would reduce the potential for crashes and associated spills. For all of the reasons above, substantial effects to Edwards Aquifer recharge and associated water quality are not anticipated to result from encroachment-alteration effects.

Barton Springs and Austin blind salamanders

Potential encroachment-alteration effects to these species include impacts related to reduction of the quality of their habitats (springs) from contaminated stormwater leaving the project roadway

and entering the Edwards Aquifer recharge. However, as discussed previously, engineered features for water quality improvement, such as vegetated filter strips, and a water quality facility would be incorporated into the proposed improvements. Per TCEQ requirements, these would offset the increase in impervious cover and any potential increase of roadway contaminants. Consequently, water leaving the right-of-way as surface runoff may affect but is not likely to adversely affect the Barton Springs salamander by way of groundwater contamination (encroachment-alteration). There would be no change to the habitat conditions for the Austin Blind salamander that would result in the listing of the salamander.

Access-Alteration and Induced Growth Effects

The proposed improvements would cause a slight improvement in the reliability of travel times through the project limits by allowing for traffic to bypass some congestion-causing situations (e.g., crashes, turning movements, etc.) and would provide safer ingress and egress to adjoining driveways and cross-streets by providing a continuous left turn lane through the project limits. Congestion would also be reduced due to the additional lane of capacity in each direction. As discussed in Step 2 above, the degree to which the indirect effects study area is already developed, coupled with proposed land use and zoning plans indicate that the indirect effects study area has been rapidly developing and is planned to continue to do so.

Edwards Aquifer Recharge Features and Surface Water Quality

The study area contains developable lands within the Edwards Aquifer recharge zone. As a result, there is the opportunity for induced growth effects and effects related to induced growth, which will be examined further in Step 6.

Barton Springs and Austin Blind Salamanders

Similarly, the salamander species are subject to induced growth effects and effects related to induced growth, through development effects to surface water quality and aquifer recharge. These will be examined further in Step 6.

Step 6: Analyze Indirect Effects and Evaluate Results

Analysis of Indirect Effects

To investigate the influence that the proposed Frate-Barker improvements could have on potential future development in the indirect effects study area, interviews with nine city and county planners and engineers, as well as Barton Springs Edwards Aquifer Conservation District (BSEACD) staff and two developers were conducted. The interviews followed a multi-step process, whereby the interviewees were first questioned about factors influencing development in the study area. Then the interview subjects were asked to identify lands they would expect to

see developed by 2030[17] with the project in place versus without the improvements completed. Other questions focused on the project's influence on development timing, location, type and amount, as well as knowledge of other existing or future development in the vicinity of the proposed project.

Each interview subject was asked to weight six factors as to how they influence development decisions within the indirect effects study area. Of the ten interview subjects who responded to this question, the average weighting applied to each factor is as shown in **Table 20**.

Table 19: Factors Affecting Development

Factor	Description	Weight
Economy	Growth, strength of regional economy, employment centers nearby, other economic factors	16%
Distance	Employment, services, retail, medical, entertainment, education	17%
Infrastructure	Transportation network, water, wastewater, electric	25%
Development Advantages	Low land cost, good availability, natural amenities	17%
Development Constraints	High land cost, low availability, terrain, soils, floodplains, regulatory constraints, environmental regulations, local ordinances	14%
Social Considerations	Proximity to schools, churches, neighborhoods, parks	9%
	Total	100%

Overall most interview subjects agreed that the study area is located within a desirable driving distance to shopping, education facilities, and employment in Austin, making the area attractive to residential development. Additionally, the cost of land within the indirect effects study area is low relative to similar terrain west of the project. Since the project is generally located along a natural division between the Edwards Aquifer Recharge Zone, development constraints would affect development decisions within the study area to a certain extent.

[17] Survey was conducted prior to approval of the CAMPO Mobility 2035Regional Transportation Plan

Interview subjects were asked to identify areas within the indirect effects study area that would be developed by 2030 with the proposed improvements in place. Subsequently, they were asked to identify areas that would be developed by 2030 if the proposed project was not completed. According to the interview results, all of the undeveloped portion of the study area is forecast for development by 2030 with or without the proposed improvements in place. Although the study horizon is 2030, one developer anticipated the study area would be developed within the next five to ten years. While one interviewee identified potential differences in development with the proposed improvements, all other interviewees stated that the majority of the study area would be developed regardless of whether the proposed improvements are implemented.

According to the interview subjects, the type, timing, and intensity of development would be influenced by the roadway improvements. While most expect that the proposed improvements would accelerate development in the study area, the economy would likely influence timing of development, as well. The interviewees also suggest that development would increase in density, although one points out that the amount of development is dependent on local development restrictions (discussed further in the cumulative effects discussion below).

Considering the indirect effects study area's potential for growth as identified in local and regional projections, as well as analysis of the planner and developer interviews, the proposed project is not expected to influence the *location* of development within the indirect effects study area. However, the *timing* and *intensity* of development may increase to the extent that local ordinances allow with the proposed improvements in place.

Evaluation of Analysis

The purpose of evaluating the analysis results is to consider the inherent uncertainty in estimating indirect effects and the risk that the actual outcome will differ from that forecasted.

The planners and developers interviewed overwhelmingly agreed that localized land development within the indirect effects study area would occur regardless of whether the proposed improvements are constructed, while development intensity and timing may be accelerated by the proposed project. While each of the professionals interviewed is extremely knowledgeable in their field and/or jurisdiction, there is some uncertainty regarding the identification of development location, timing, and amount of development. It becomes necessary to assess whether this uncertainty might lead to risk of the notable environmental features within the study area.

Development Location: The areas depicted in **Figure 8.2** indicate the locations of potential future development within the indirect effects study area (Vacant Land). Since this scenario

represents the "worst case", any modification of development would likely result in less impact on notable features.

Development Intensity: Development intensity, or density, in the indirect effects study area, is closely tied to the power of the local jurisdiction to regulate development. The city of Austin limits development density and intensity through explicit water quality ordinances which limit impervious cover. Moreover, all development in the Barton Springs segment of the Edwards Aquifer Recharge Zone would be subject to the Edwards Aquifer Rules.

The uncertainty of project-related effects on development intensity would not be anticipated to put the study area's notable environmental features at risk. This is because of the ability of the jurisdictions to regulate development in the Edwards Aquifer recharge zone both limit the density and intensity of development within the indirect effects study area.

Timing of Development: As discussed above, the economy in the area is a major driving force in land development. Because of the variability of the economic markets over time, there is a high level of uncertainty in the timing of development. However, because the study area is approximately 80 percent developed and the ability of local jurisdictions to regulate development in the study area, the uncertainty of project-related effects on timing of development would not be anticipated to put the study area's notable environmental features at risk.

Step 7: Assess Consequences and Develop Mitigation and Enhancement Strategies (when appropriate)

Considering the indirect effects study area's potential for growth as identified in local and regional projections, as well as analysis of the planner and developer interviews, the proposed project is not expected to influence the *location* of development within the indirect effects study area. However, the *timing* and *intensity* of development may increase – to the extent that local ordinances allow – with the proposed improvements in place.

All development within the study area is subject to the State's Edwards Aquifer Rules, the goal of which is nondegradation of existing groundwater quality[18]. Moreover, the indirect effects study area lies within the jurisdiction of Austin which has enacted water quality ordinances further limiting development intensity. These rules and ordinances have the corollary effect of protecting the spring habitat of the Barton Springs and Austin blind salamanders.

[18] §213.1 Texas Administrative Code

However, the potential exists for stormwater borne contaminants to enter the Barton Springs segment of the Edwards Aquifer as a result of developments within the indirect effects study area, the timing or intensity of which may be affected by the proposed project.

In its final rule to list the Barton Springs salamander as endangered (Appendix E), USFWS acknowledges that "[g]enerally, new development and construction designed and implemented pursuant to State and local water quality protection regulations in effect as of the date of this rule will not result in a violation of section 9 [of the ESA]."[19] EPA affirmed this finding when it approved Texas' application to administer NPDES. EPA states:

> *"After careful consideration in formal consultation, FWS concluded in a biological opinion that approving the TPDES program is unlikely to jeopardize listed species if applicable water quality standards are fully applied in TPDES permits, despite some loss of federal authority in some situations. With FWS assistance, EPA will use its oversight procedures to assure the standards are in fact applied, particularly in waters on which listed species depend. This effort will result in more attention, particularly of minor state permit actions, than EPA devotes to oversight of any other state NPDES program in Region 6. Both EPA and FWS are additionally committed to seeking even more protection for listed species by continuing to consider their needs in EPA's review of revisions to Texas' water quality standards. Region 6 believes these actions will increase the overall protection CWA affords listed species in Texas."*[20]

Because construction projects in the Edwards Aquifer recharge zone within the indirect effects study area would be subject to the Edwards Aquifer Rules and TPDES, the release of any potential contaminants from the project site would result in insignificant effects and should never reach the scale where take occurs.

As discussed in **Section 7.6**, the quantity of the water entering the Barton Springs Segment of the Edwards Aquifer after completion of the proposed Frate Barker roadway would not be changed above normal background conditions. Moreover, water quality control measures would meet or exceed the TCEQ requirement to maintain the normal background conditions of water quality in the Barton Springs Segment of the Edwards Aquifer, resulting in non-degradation.

For the proposed action, if required, Travis County would prepare a WPAP (in accordance with TCEQ Edwards Aquifer Rules) and an SW3P (in accordance with TPDES). While final TSS estimates are unavailable due to a lack of design details at this stage in project development, the

[19] 62 FR 23391
[20] 63 FR 51163-51201

proposed project would meet or exceed the standards established in the Edwards Aquifer Rules. TSS discharge at the Bear Creek tributary crossing would be further curtailed through construction of a water quality facility (**Figure 4.1**). In addition, Travis County is evaluating the feasibility of constructing hazardous materials traps within the proposed right-of-way in the recharge zone. Assuming appropriate implementation of applicable land use planning regulations and local development ordinances and compliance with local, state, and federal laws and regulations, any substantial effects to the quality of Edwards Aquifer recharge from development within the indirect effects study area would be avoided or minimized.

In summary, indirect effects to surface water quality and Edwards Aquifer recharge (from TSS and roadway contaminants) would not be anticipated from the proposed project. The project may affect but is not likely to adversely affect the Barton Springs salamanders. There would be no change to the habitat conditions for the Austin Blind salamander that would result in the listing of the salamander.

9. CUMULATIVE EFFECTS OF THE PROJECT

Cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

As described above, relatively minor individual impacts may collectively result in substantial cumulative impacts. Proposed action-related direct and indirect impacts must be analyzed in the context of non-related impacts that may affect the same resources. Cumulative impacts are the incremental impacts that the proposed action's direct or indirect effects have on a resource in the context of the myriad of other past, present and future effects on that resource from unrelated activities. This analysis of cumulative impacts relies heavily on the land use changes anticipated to occur in the limits of improvements addressed in this CE and the effects these changes could have on the resources considered in this analysis. Changes in land use from undeveloped uses to developed uses is the primary cause of cumulative impacts to resources; therefore, land use serves as the background for cumulative impacts analysis and would not be considered a resource itself.

In order to have a cumulative impact on a resource, the proposed action must have: 1) a substantial direct or indirect impact on that resource, or 2) impact a resource in poor or declining health, even if the impacts resulting from the action are relatively minor.

Methodology and Screening

The methodology used to evaluate the cumulative effects of the proposed project follows TxDOT's current guidance (TxDOT, 2009). The eight step methodology is depicted in **Table 21.**

Table 20: Eight-Step Approach for the Cumulative Impacts Analysis

Step 1. Identify the resources to consider in the analysis.
Step 2. Definition of the study area for each resource. Cumulative impacts are considered within spatial and temporal boundaries. Each resource has its own resource study area (RSA) to best assess the impacts to that individual resource. Each RSA was defined by professionals experienced in the study and analysis of each resource.
Step 3. Description of the current status/viability (health) and historical context for each resource. The examination of the current health and historical context of each resource is necessary to establish a baseline for determining the effects of the proposed action and other reasonably foreseeable actions on the resource.
Step 4. Identification of the direct and indirect impacts that may contribute to a cumulative impact. The analysis of cumulative impacts must look at the impacts of the proposed action in combination with the impacts of other past, present, or reasonably foreseeable actions within the resource study areas. Identification of the direct and indirect impacts of the proposed action will assist in determining the project's contribution to the cumulative impact on the resource.
Step 5. Identification of other current and reasonably foreseeable actions that may contribute to a cumulative impact.
Step 6. Summary and assessment of potential cumulative impacts to each resource.
Step 7. Report the results.
Step 8. Discussion of mitigation issues for all adverse impacts.

The first step in conducting a Cumulative Impacts analysis according to TxDOT's guidance is to identify impacted environmental resources and determine the stability and health of those resources. A review of the direct and indirect effects sections above was undertaken to identify resources that 1) are substantially impacted by the proposed project or 2) are impacted to some degree but are in poor or declining health or at risk. As described in the guidance, if a project will not cause direct or indirect impacts on a resource, it will not contribute to a cumulative impact on the resource. According to these criteria, and as detailed in **Sections 6 and** 7, soils and geology, wildlife, socioeconomic resources, cultural resources, and air quality are not included in this cumulative impacts analysis. In Step 2, a resource-specific study area is defined for each resource. The geographic study area is described below for each resource considered in the analysis. The temporal study boundary is 30 years in the past, the earliest date documented in the Travis County GIS file, and 20 years in the future, the horizon year of the regional long-range transportation plan. In Step 3, the current status/viability and historical context for each resource is addressed. Step 4 summarizes the direct and indirect effects of the proposed project. Together, these four steps act as a screening tool to identify potential resources to be evaluated in depth in a cumulative impacts analysis.

Vegetation

The proposed project would require approximately 7.5 to 7.8 acres of new right-way. Proposed improvements would directly affect approximately 12.5 to 13.2 acres of vegetation within existing and proposed right-of-way, including up to 6.1 acres of tree canopy (in two places) composed primarily of Ashe juniper, live oak, and hackberry. The study area for this resource would encompass undisturbed woodlands contiguous with the proposed project. This would limit the study area to approximately the western end of the project limits south of Frate Barker. The vegetation within the proposed right-of-way does not have characteristics similar to that used by golden-cheeked warblers in this area. According to Diamond, Riskind, and Orzell, Ashe juniper-oak series has a conservation rank of 4 – secure[21]. Indirect effects from the project would not be anticipated to result in the removal of additional acreage of this vegetation type. Since vegetation removal is not regulated under state or federal regulations and a narrow strip of vegetation would be removed along an existing road corridor, the 5.4 acres of tree canopy removal is not considered substantial. The vegetation proposed for removal is not known to support any protected species, occurs along an existing road corridor, is not a regulated habitat, and the vegetation type is not at risk. As a result, vegetation was not identified for further cumulative impacts analysis.

Waters of the U.S.

The proposed project would cross one USACE jurisdictional water of the U.S. The study area for this resource would encompass the streambed of the tributary of Bear Creek. Overall water quality for Bear Creek is considered "good".[22] While the affected waters drain to a Section 303(d) listed stream segment, Onion Creek (Segment 1427 of the Colorado River Basin), the impaired area is from the end of the stream segment upstream to US 183[23] – more than 5 miles downstream from the proposed project location. According to the 2002 TxDOT Memoranda of Understanding with Natural Resource Agencies, TxDOT coordinates with TCEQ on projects with potential impacts to water quality that occur within 5 miles upstream of impaired stream segments; thus, it is considered that the proposed project would be unlikely to affect the water quality of an impaired area of a stream segment occurring more than 5 miles downstream of the project.

---

[21] Diamond, D.D., D.H. Riskind, and S.L. Orzell. *A Framework for Plant Community Classification and Conservation in Texas.* The Texas Journal of Science, Vol. 39, No. 3, August 1987.

[22] City of Austin. 2008. Austin's Watersheds. Department of Watershed Protection and Development Review. Bear Creek, Little Bear Creek, and Onion Creek watersheds.

[23] TCEQ. *2006 Texas 303(d) List (July 28, 2008).* http://www.tceq.state.tx.us/assets/public/compliance/monops/water/06twqi/06_303d.pdf.

Work at the crossing, including drainage easement and water quality facility construction, would meet the criteria of a NWP and, as such, is considered to have minimal (not substantial) direct and indirect impacts (33 CFR 330). Moreover, the proposed water quality facility would improve the quality of roadway runoff before its eventual discharge downstream. As a result, waters of the U.S. were not identified for further cumulative impacts analysis.

Endangered Species

The proposed project is not anticipated to directly or indirectly (encroachment-alteration) affect the endangered golden cheeked warbler or black-capped vireo; the project may affect, but is not likely to adversely affect, the Barton Springs salamander or Austin blind salamander (**Section 7.6** and **Section 8.0**). The project falls within karst zones 3 and 4 - areas with low probability to contain endangered karst species and areas with no endangered karst species.[24] However, the potential remains for indirect effects (access-alteration and induced development) to the Edwards Aquifer. Since the salamanders are dependent on the quality of discharge from the Edwards Aquifer, further analysis of cumulative effects on the salamanders are considered along with the Edwards Aquifer below.

Edwards Aquifer, Barton Springs salamander, Austin Blind Salamander

The unnamed tributary to Bear Creek traverses a small portion of the recharge zone of the Barton Springs segment of the Edwards Aquifer. The study area for these resources would encompass that portion of Bear, Little Bear and Onion Creek watersheds within the Barton Springs segment of the Edwards Aquifer recharge zone – an area covering approximately 138,000 acres (Figure 9.1).

Potential direct effects from the proposed project include an increase in impervious cover within the resource study area of approximately 3.8 acres, approximately 0.34 acres within the Edwards Aquifer recharge zone. Indirect effects (encroachment-alteration) from contaminated runoff from the project roadway would not be expected due to inclusion of engineered water quality controls in the project design, including a water quality facility at the Bear Creek tributary crossing. The potential remains, however, for access-alteration and induced development effects to the aquifer and salamander species.

An overview of the current health and historical context of the Edwards Aquifer within the study area limits follows.

[24] Veni. 1992.

Portions of the Edwards Aquifer are designated as sole source aquifers as they are the sole source of drinking water for nearly 2 million central Texans[25]. The aquifer itself underlies approximately 4,350 square miles within the state. In addition, the aquifer provides habitat for a number of threatened or endangered aquatic and karst species. Regulations to protect water quality within the Edwards Aquifer began on a limited basis in 1970 and evolved over time to cover all construction-related activities with the potential to pollute the aquifer over an eight-county area.

Originally documented in 1986 by Slade, *et al.*[26], it is widely accepted that the Barton Springs segment of the Edwards Aquifer is fed primarily (85 percent) by recharge occurring within the main channels of six streams. Three of these watersheds, Bear, Little Bear, and Onion Creek, are located within the RSA. Bear, Little Bear, and Onion Creeks are estimated to contribute approximately 54 percent of the recharge attributed to the six stream channels.[27]

These three watersheds have been traced to a groundwater flow path, called the Manchaca flow route. The Manchaca flow route has been linked to discharge at Main, Eliza, and Old Mill Springs of the Barton Springs complex.[28] Barton Springs in south Austin is the most well-known outlet of the Barton Springs segment of the Edwards Aquifer.

As shown in **Table 22**, overall water quality within these three streams is rated "good" to "very good" by the city of Austin. Each of the streams has fair to good water chemistry; very good to excellent sediment quality; and fair habitat quality (although all components of the habitat index are rated good to excellent for Bear and Little Bear Creeks). It is also notable that the benthic macroinvertebrate community found in Onion Creek includes pollution-intolerant diatom species. These microscopic streambed fauna are a good indicator of the health of this stream[29]. Onion Creek, by itself, is believed to contribute up to 34 percent of the Barton Springs recharge attributed to within-stream recharge features[30].

---

[25] TCEQ. *Regulatory history of the Edwards Aquifer.* http://www.tceq.state.tx.us/compliance/field_ops/eapp/history.html. Accessed: April 24, 2008.

[26] • Slade, Jr., R.M., M.E. Dorsey, and S.L. Stewart. 1986. Hydrology and water quality of the Edwards Aquifer associated with Barton Springs in the Austin area, Texas. U.S. Geological Survey, Water Resources Investigations Report 86-4036. Prepared in cooperation with the City of Austin.

[27] *Ibid.*

[28] Barton Springs Edwards Aquifer Conservation District. Summary of groundwater dye tracing studies (1996-2002), Barton Springs segment of the Edwards Aquifer, Texas. April 2003.

[29] City of Austin. 2008. Austin's Watersheds. Department of Watershed Protection and Development Review. Bear Creek, Little Bear Creek, and Onion Creek watersheds. http://www.ci.austin.tx.us/watershed/learn_ws.htm. Accessed: April 10, 2008.

[30] Slade *et al.* 1986.

Table 21: Water Quality within the Resources Study Area

Creek	Overall Water Quality	Water Chemistry	Sediment Quality	Habitat
Little Bear Creek	Good – 13th of 46 Austin-area watersheds	Fair – WQ above avg, ammonia high	Very Good – very low PAH, herbicides, pesticides, metals	Fair – All components of the habitat index are good to excellent
Bear Creek	Good - 6th of 46 Austin-area watersheds	Fair – WQ average, ammonia high	Very Good – very low herbicides, pesticides, metals.	Fair – All components of the habitat index are good to excellent.
Onion Creek	Very Good – 4th of 46 Austin-area watersheds	Good – WQ is above average, ammonia high.	Excellent – low PAH; very low herbicides, pesticides, metals	Fair – some sediment deposition

Source: City of Austin. 2008. Austin's Watersheds. Department of Watershed Protection and Development Review. Bear Creek, Little Bear Creek, and Onion Creek watersheds.

Results of water quality studies of Barton Springs are a good indicator of the health of discharge from the Barton Springs segment of the Edwards Aquifer. In 2005, city of Austin staff analyzed water quality sampling data from 1975 to 1999[31]. These data indicated a statistically significant change in specific conductance, sulfate, turbidity, total organic carbon, and dissolved oxygen – all of which the researchers linked to increased urbanization. However, it should be noted that significant trends were not noted in nutrients or TSS.

Recent studies by USGS provide a current assessment of other potential contaminants (not part of the above dataset) within Barton Springs water quality.[32] Their results indicate the continual presence of low concentrations of three anthropogenic contaminants – atrazine (an herbicide), chloroform (a drinking-water disinfection by-product), and tetrachloroethene (a solvent). Routine sampling also identified the frequent occurrence of three other herbicide compounds – DEA (an atrazine degradate), prometon, and simazine (none of which are active ingredients in herbicides currently used by TxDOT in the project area) – and potassium (associated with fertilizer). However, routine sampling did not reveal insecticide or fungicide compounds. Trace metals associated with both human-derived and natural sources were also detected. All of these constituents were detected well below drinking water standards. It was also determined that nitrate and calcium levels were likely attributable to aquifer rock solute, as their concentrations increased (rather than diluted) during storm events.

[31] City of Austin. 2005. Update of Barton Springs water quality data analysis – Austin, Texas. http://www.ci.austin.tx.us/watershed/downloads/barton03_wq_update.pdf Accessed: April 10, 2008.

[32] Mahler, B.J. B.D. Garner, M. Musgrove, A.L. Guilfoyle, and M.V. Rao. Recent (2003-05) water quality of Barton Springs, Austin, Texas, with emphasis on factors affecting variability. U.S. Geological Survey. Scientific Investigations Report 2006-5299.

In response to concerns following an Austin American Statesman article about the quality of water at Barton Springs, the city of Austin sought a health consultation from the DHHS (followed by U.S. Environmental Protection Agency concurrence with DHHS findings). DHHS evaluated twelve years of data collected by USGS, city of Austin, and the Lower Colorado River Authority and assessed the public health risk associated with human exposure to 27 potential contaminants identified. DHHS concluded that "*We did not find any information to support contention that swimming every day in Barton Springs would result in adverse health effects.* Thus, we have concluded that swimming and playing in Barton Springs Pool poses no apparent public health hazard."[33]

Despite the good overall water quality of Barton Springs, the presence of anthropogenic contaminants (e.g., herbicides) and changes in physicochemical properties of aquifer water detected by researchers over the past few decades signify potential effects of growing regional urbanization on aquifer water quality. Moreover, due to its restricted range in an entirely aquatic environment, the endangered Barton Springs salamander may be more vulnerable to subtle variations in water quantity and quality.[34] As these habitat conditions are the same for the Austin blind salamander, it can be inferred that the blind salamander may be similarly affected. Since the TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk – even if project impacts are minor.

Step 5: Identify other reasonably foreseeable actions that may contribute to a cumulative impact

To identify reasonably foreseeable actions within the RSA, interviews with city and county planners and the BSEACD were referenced, as well as data provided by those jurisdictions, TxDOT, and available on the internet. These data included GIS databases of subdivision and roadway data and future land use plans.

The water RSA is rapidly developing as a bedroom community for Austin, San Marcos, and other area activity centers. Land is rapidly being subdivided for large-lot residential development with some minor supporting commercial development. Approximately 41,230 acres within the RSA has been subdivided, with an average lot size of 4.0 acres. Of that, 7,367 acres within the study area have been recently subdivided (since 1998) for development currently under construction or slotted for the near future. Current and future developments are listed in **Table 23**.

---

[33] DHHS. Health consultation. Barton Springs pool. Austin, Travis County, Texas. FACILITY ID: TXN000605514. April 18, 2003. http://www.ci.austin.tx.us/news/2003/downloads/bartonspringsreport.pdf Accessed April 10, 2008.

Table 22: Current and Future Development within the Resources Study Area

Subdivision Name	No. of Lots	Acreage	Activity Level
ALLEN SUBDIVISION	6	50.9	future
BERDOLL	2	59.3	future
COUNTRY HOME SUBDIVISION	3	14.7	future
CYPRESS FORK RANCH	3	17.8	future
DOUBLE A SUB	4	14.4	future
FAITH RANCH	20	150.7	future
GARLIC CREEK WEST	167	250.6	future
GOLDEN VUE ESTATES	12	30.2	future
HARRIS SUB	2	12.4	future
HOMESTEADS @ GATLIN CREEK	9	33.7	future
HOWARD RANCH	57	138.5	future
INDIAN POINT	2	121.6	future
JOHN LLOYD'S RUTHERFORD RANCH	27	246.6	future
KUYKENDALL SUB	7	25.5	future
OAKS AT GATLIN CREEK	12	28.5	future
OLYMPIC HEIGHTS WEST	85	26.9	future
REUNION RANCH	128	149.9	future
SHADY HOLLOW GARDENS TOWNHOMES	N/A	35.6	future
SL 967	2	4.9	future
THE VINEYARD	35	138.0	future
TRES ARROYOS	4	208.7	future
VINEYARD RIDGE	5	42.0	future
WHITE ADDITION	2	5.3	future
Total Future Developments	594	1806.8	23
BELTERRA	500	707.4	current
DOS LAGOS	38	85.9	current
DRIFTWOOD BAPTIST CHURCH	2	16.9	current
HIGHPOINTE	217	735.0	current
HOMESTEADS AT GATLIN CREEK	9	33.1	current
KEY RANCH AT POLO CLUB	13	582.5	current
LA VENTANA	583	592.9	current
LA VENTANA WEST	19	47.6	current
PRESERVE AT LA VENTANA	49	119.0	current
RIM ROCK	2	1231.6	current
ROGER HANKS PARK	22	46.1	current
RUBY RANCH	177	1097.8	current
RUNNING ROPE ESTATES	20	73.3	current
RUSTIC OAKS ESTATES	10	10.3	current
WHISPERING HOLLOW	128	180.1	current
Total Current Developments Underway	1789	5559.6	15
Total	***2383***	***7366.5***	***38***

Source: Hays County and City of Austin subdivision data 2008
Average lot size future development= 3.0
Average lot size current development= 3.1

Additionally, roadways comprise a substantial amount of construction activity within the study area. Seventeen roadways within the CAMPO 2035 Plan are partially within the RSA. , resulting in a 152 percent increase in pavement over the next 25 years from approximately 289 acres to 729 acres. CAMPO projects are listed in **Table 24**.

Table 23: Impervious Cover of CAMPO Roadways in Resources Study Area

Highway	Length in WSA (mi)	Existing Facility Type[a]	Existing Pavement (ac)	Proposed Facility Type CAMPO 2035[a]	Proposed Pavement (ac)[b]
FM 1626	4.5	MAU 2	16.2	MAD 4	55.3
FM 2770[c]	1.8	MNR 2	4.6	MAD 4	22.2
RM 12[c]	9.3	MNR 2/MAD 2	23.6	MAD 4	112.8
RM 150[c]	16.0	MNR 2	40.5	MNR 2	40.5
RM 967[c]	9.8	MNR 2	35.4	MAD 4	119.3
RM 1826[c]	8.2	MNR 2	28.6	MAD 4	99.9
SH 45 SW	2.5	--	--	Toll Pkwy 6[d]	34.3
US 290W[c]	14.0	MAU 4	83.9	MAD 4	169.2
Darden Hill Rd[c]	4.4	MNR 2	12.7	MNR 2	12.7
Elder Hill Rd[c]	4.2	MNR 2	11.2	MNR 2	11.2
Mount Gainor Rd[c]	4.8	MNR 2	11.5	MNR 2	16.2
Mount Sharp Rd[c]	1.9	MNR 2	5.2	MNR 2	5.2
Nutty Brown Rd[c]	3.6	MNR 2	8.7	MNR 2	17.4
Sawyer Ranch Rd[c]	3.0	MNR 2	7.2	MNR 2	12.9
Total	113.7		289.3		729.1

[a] CAMPO 2030 transportation plan (as amended)
[b] Based on a 100-foot pavement width (typical) for MAD 4.
[c] Not Listed in CAMPO 2035 Plan Priority Project List; however, included in CAMPO 2035 Plan Hays County Requested Priority Project list.
[d] Two toll lanes and one non-toll lane in each direction. Based on 112-foot pavement width (typical).

Step 6: Assess potential cumulative impacts

Edwards Aquifer, Barton Springs Salamander, Austin Blind Salamander

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated. The quality of surface water is correlated to the degree to which an area is developed.

Some researchers estimate that water quality begins to decline when impervious cover exceeds as little as 10 percent of a watershed,[35,36] and severe degradation may occur between 30 to 70 percent imperviousness.[37] Impervious cover estimates for the study area are available for existing and proposed (**Table 21**) roadways. Estimates from non-transportation development, however, are comparatively unavailable, and methods to meaningfully analyze this information have limitations. As a result, this cumulative impact assessment relies heavily on available GIS data, including analysis of aerial photography or other available spatial data. For these reasons, it is important to review relevant local and state regulations governing development within the RSA.

The Edwards Aquifer Rules (TAC Chapter 213) include planning, reporting, construction, and maintenance requirements throughout all phases of project development within the recharge and contributing zones with the express goal of non-degradation, protection of terrestrial and aquatic life and its environment, and economic enhancement. Notably, the rules require that permanent BMPs "must be designed, constructed, operated, and maintained to insure that 80 percent of the incremental increase in the annual mass loading of total suspended solids from the site caused by the regulated activity is removed." These BMPs can be exempted from low density single family residences, multi-family residences, schools, and other small businesses in some cases, if impervious cover is limited to 20 percent or less of the total site area.

The TCEQ assumed the authority to administer the NPDES stormwater permit program in Texas, following the NEPA process, as the TPDES permit program on September 14, 1992. Development that is indirectly influenced by the project may commonly be subject to two TPDES water quality regulations. Future construction activities that disturb one or more acres (or even smaller areas if they are part of a larger common plan of development) would be required to obtain authorization under TPDES general permit TXR150000. This general water quality permit requires controls and best management practices to reduce erosion, suspended solids, and for control of spills. Future commercial development may include certain industrial operations subject to TPDES general permit TXR050000 (public storage facilities and recycling

[35] Klein, R. D. 1979. Urbanization and stream quality impairment. Water Resources Bulletin 15: 948-963.
[36] Leopold, L. B. 1968. Hydrology for urban land use planning-a guidebook on the hydrologic effects of urban land use. U. S. Geological Survey Circular 554.
[37] Klein, 1979.

centers, for example). This general water quality permit requires best management practices to eliminate or reduce contamination of storm water runoff from industrial activities.

The city of Austin has passed a local ordinance that seek to protect the quality and quantity of recharge within the Barton Springs segment of the Edwards Aquifer beyond that required under the Edwards Aquifer Rules. The most salient features of this ordinance include limitations on impervious cover, removal of the net increase of pollutants above the standards set under the Edwards Aquifer Rules, and setbacks or buffer zones at streams and other critical environmental features. This ordinances apply to the city's ETJ as well as their cores.[38,39,40] Their jurisdictions account for just over half (51 percent) of the water quality study area. **Table 25** summarizes water quality ordinances and regulations in place within the study area.

Development within the city of Hays, the Village of Bear Creek, and Hays County are all subject to lot size limitations.[41,42,43] While impervious cover is not regulated within these jurisdictions, minimum lot size requirements of 0.5 acre to 5 acres can have the effect of limiting the density of development within the Edwards Aquifer Recharge and Contributing Zones.[44] These jurisdictions account for approximately 45 percent of the water quality study area.

[38] City of Dripping Springs. Code of Ordinances Volume: 2, Article 15: Development, Chapter 21 Water Quality. http://www.cityofdrippingsprings.com/documents/Water%20Quality%20Prot%20-%20Amdt%20(2-20-07).pdf. Accessed January 17, 2008.
[39] City of Buda. The City of Buda's Unified Development Code. http://www.ci.buda.tx.us/UDC1.htm. Accessed March 27, 2008.
[40] City of Austin. Watershed Ordinances.
[41] Ford, Wayne, Director of Public Works, City of Hays. Interview by Bonnie Lister, TxDOT. January 2008. Appendix C.
[42] Naismith Engineering, Inc. Milestone Report No. 1 On Hays County Development Regulations Update. Draft. Prepared for Hays County. September 21, 2006.
[43] Hays County. Minimum Lot Sizing - Hays County Rules Tables 10.1 (A,B, & C) - Effective 8-29-97. http://co.hays.tx.us/departments/envirohealth/pdf/ossftables.pdf. Accessed: April 3, 2008.
[44] Klein. 1979.

Table 24: Water Quality Ordinances in Effect within the Resources Study Area

Jurisdiction	Water Quality Ordinance	Prominent Water Quality Protection Features	Acreage within Study Area
City of Austin	Save Our Springs Ordinance	15% IC within RZ; 25% IC within CZ; non-degradation of water quality; variances disallowed	10,594
City of Buda	Buda Water Quality Protection Ordinance	15% IC within RZ; 25% IC within CZ; non-degradation of water quality; variances require FWS coordination	2,407
City of Dripping Springs	Water Quality Protection Ordinance	10% IC within RZ; 35% IC within CZ; within urban core remove 80-85% pollutants; in rural areas remove a minimum of 90% of the net increase for pollutants	57,024
City of Hays	Subdivision development criteria	Minimum 1-acre lot size	2,580
City of Kyle	none	N/A	2,068
City of Mountain City	none	N/A	2,779
Village of Bear Creek	Subdivision ordinance	Minimum 2-acre lot size	685
Hays County	Hays County Development Regulations	Minimum 0.75-acre to 5-acre lot size in RZ; minimum 0.5-acre to 3-acre lot size in CZ - each dependent on water supply and wastewater application	58,722
State of Texas	Edwards Aquifer Rules	Removal of 80% of the net increase in total suspended solids	*throughout*
		Total	**136,859**

CZ = Edwards Aquifer Contributing Zone
RZ = Edwards Aquifer Recharge Zone
CZ = Edwards Aquifer Contributing Zone

No ordinances within the cities of Mountain City or Kyle were identified[45,46] that would effectively minimize development effects on water quality or quantity within their jurisdictions beyond that found in the Edwards Aquifer Rules. These jurisdictions account for approximately 4 percent of the water quality study area.

As shown in **Table 26** and **Chart 3**, analysis of subdivision data, [47] roadway information, and aerial photo interpretation indicates that approximately one-quarter of the study area (34,208 acres out of 138,000 acres) has already developed. The majority of this past development is

[45] City of Mountain City. Ordinance # 021306. http://www.mountaincitytx.com/ordinances.pdf. Accessed: April 10, 2008.
[46] Rodgers, S. Director of Planning, City of Kyle. Personal communication with Bonnie Lister.
[47] Hays County. Unpublished material: Subdivisions.

characterized by low density, suburban residential land use. The average lot size of past development was 4.8 acres. Another 9 percent (12,504 acres) of the land was preserved either fee simple or through conservation easements as parks, preserves, or water quality protection lands. These lands are restricted from development or are limited to very low density/low impact residential development in accordance with agreements made with environmental agencies, conservation groups, and/or local entities.

The current action – proposed improvements to Frate Barker – accounts for approximately 0.003% of additional development (6.9 acres) within the RSA – an increase of 0.01% over existing conditions.

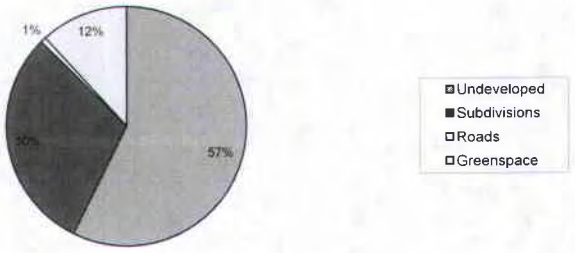
Reasonably foreseeable future actions include developments currently underway, as well as those planned and platted within the RSA. These future actions account for another approximately 7,964 acres, or 6% of the study area, with an average lot size of approximately 3.0 acres. Another 2% (3,058 acres) of the RSA has been recently preserved by the city of Austin. See **Table 26** and **Chart 3** for a summary of the potential cumulative effect area within the water RSA.

Table 25: Potential Cumulative Effect Area within the Resources Study Area

Type of Action	Past Actions	Current Action	Reasonably Foreseeable Actions	Cumulative Effect
Development	33,926 acre subdivisions; 289 ac roads	6.9 acres - Frate Barker	7367 acre subdivisions; 729 ac roads	42,318 acres of development
Conservation	12,504 acre parks, preserves, water quality protection land		3,058 acre water quality protection land	15,562 acres of greenspace
Ratio (D:C)				3:1

Sources: Hays County and City of Austin subdivision data, 2008; City of Austin parks, preserves and water quality protection land GIS layers

Chart 3: Potential Cumulative Effects* by General Land Use in the RSA



*Sum of past, present and reasonably foreseeable actions in the study area.

Step 7: Report the results

Poor quality stormwater runoff from impervious cover would be the most likely cause of water quality degradation within the RSA. Klein estimated that impairment of surface water quality can be prevented if impervious cover is limited to 15 percent, in general, and 10 percent for sensitive aquatic systems.

Recognizing progress of scientific discovery, Klein suggests repeating studies and adjusting these limits as necessary. **Table 27** presents development rates required to achieve this standard.[48]

[48] Klein, 1979.

Table 26: Allowable Watershed Development Rates

Land Use Category	Imperviousness	Maximum Amount of Watershed that can be Developed Based on an Imperviousness of	
		10%	15%
Individual Homes			
0.40 Hectare (1.00 acre) Lot	20%	50%	75%
0.20 Hectare (0.50 acre) Lot	25%	40%	60%
0.13 Hectare (0.33 acre) Lot	30%	33%	50%
0.10 Hectare (0.25 acre) Lot	38%	26%	29%
0.05 Hectare (0.12 acre) Lot	65%	15%	23%
Townhouse/Garden Apartments	44%	22%	33%
High-rise Residential	56%	18%	27%
Industrial Districts	75%	13%	20%
Commercial/Business Area	85%	12%	18%
Shopping Centers	95%	11%	16%

Source: Klein 1979.

In comparison, approximately 31 percent of the RSA has already developed in the past or is planned for development in the foreseeable future (including the current action). Water quality in Bear, Little Bear, and Onion Creek watersheds would be expected to be maintained given that future development within 51 percent of the RSA is subject to impervious cover limitations and another 45 percent is subject to lot size limitations – two measures that have resulted in an average lot size of just over 3 acres in the RSA. Compared with the development rates in **Table 24**, which represent more dense development than that observed in the study area, the water RSA is currently well below the 10 percent impervious threshold and would continue to be in the reasonably foreseeable future. Therefore, the cumulative effect of development is expected to maintain the currently good water quality of the RSA.

Step 8: Assess and discuss mitigation issues for all adverse impacts

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, water quality could degrade over time. Thus, it becomes more crucial that water quality protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss water quality in the region without addressing mitigation measures, as the value of mitigation and the foresight of local planners to improve and maintain water quality in this sensitive ecosystem has been at the forefront of legislation and rulemaking. Above in

Step 6 are descriptions of mitigation measures implemented by local jurisdictions (**Table 13**) as well as a summary of Edwards Aquifer Rules and TPDES requirements. These programs require BMPs to reduce pollution of surface and ground water and are discussed in Section VI, above.

Under Proposition 14 passed in 1998, the city of Austin was authorized to purchase lands within the Barton Springs segment of the Edwards Aquifer recharge zone for the express purpose of improving and maintaining water quality. These lands account for approximately one-tenth of the RSA, including land contributing almost one-third of recharge within the Onion Creek watershed[49]. In all, the city has acquired nearly 25,000 acres through the program.[50]

In addition, a number of regional initiatives have been undertaken within the RSA in an effort to improve water quality within the Barton Springs segment of the Edwards Aquifer. These include the Barton Springs Salamander Recovery Plan, Hill Country Conservancy preserves, Balcones Canyonlands Conservation Plan, LCRA's Highland Lakes Ordinance, and the Regional Water Quality Protection Plan for the Barton Springs Segment of the Edwards Aquifer and its Contributing Zone.

Summary of Cumulative Effects Analysis

In conclusion, efforts to protect water quality within the RSA, and the Edwards Aquifer overall, have been comprehensive and effective. However, it is important that all stakeholders fully comply with all applicable local, state and federal regulations and that BMPs are constructed and maintained effectively.

As mentioned above in the indirect effects analysis, USFWS acknowledges in its final rule (Appendix E) to list the Barton Springs salamander as endangered that "[g]enerally, new development and construction designed and implemented pursuant to State and local water quality protection regulations in effect as of the date of this rule will not result in a violation of section 9 [of the ESA]."[51] Assuming appropriate implementation of applicable land use planning regulations and local development ordinances and compliance with local, state, and federal laws and regulations, any substantial effects to the quality of Edwards Aquifer recharge from development within water RSA would be avoided or minimized. Therefore, because construction projects within the water RSA would be subject to the Edwards Aquifer Rules and TPDES and local water quality requirements, as applicable, the release of any potential contaminants would result in insignificant effects and should never reach the scale where take occurs.

---

[49] City of Austin. Austin's watersheds.
[50] City of Austin. 2008. Water quality protection land. http://www.ci.austin.tx.us/water/wildland/waterqualityprotectionland.htm. Accessed April 25, 2008.
[51] 62 FR 23391

Due to the lack of effects from the proposed improvements and the relative health and stability of the affected environmental resources in the RSA, the proposed project would not contribute to cumulative impacts to surface or ground water quality or the Barton Springs and Austin blind salamanders. In addition, appropriate implementation of applicable land use planning regulations and local development ordinances and compliance with local, state, and federal laws and regulations would offset any potential adverse effects of the region's projected social and economic growth. Furthermore, the no-build alternative would not fulfill the transportation needs of the project area, nor would it result in improved water quality.

10. ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS

10.1. Water Resources

The jurisdictional crossing within the project area would be permitted under the Nationwide Permit (NWP) #14 – Linear Transportation Crossings for culvert placement. Preconstruction notification (PCN) to the USACE would be required in conjunction with NWP #14 for permanent fill in wetlands for the build alternatives. Wetland determination, and if necessary, wetland delineation would occur once the right-of-way acquisition is completed. Impacts to wetlands, if any, would be mitigated in accordance with USACE guidelines and areas temporarily disturbed would be returned to original contours once construction is complete.

A project that requires a USACE permit must use at least one of the BMPs from each category listed on TCEQ Section 401 Water Quality Certification Conditions for Nationwide Permits. The erosion control BMP for this project would be temporary seeding. The sediment control BMP for this project would be silt fence and rock filter dams. The post construction total suspended solid control BMP for this project would be permanent seeding and grass lined ditches and swales and a water quality facility, or sedimentation basin, at the Bear Creek tributary crossing, since the crossing is located within the Edward's Aquifer Recharge Zone.

Because this project will involve soil disturbance within the Recharge Zone a WPAP would be required. Inclusion of a water quality facility, or sedimentation basin, is proposed.

Because this project would disturb more than one acre, Travis County would be required to comply with TCEQ's Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit (CGP). Travis County would prepare and implement a SW3P. This project would also disturb more than five acres; therefore, Travis County would be required to file a Notice of Intent (NOI) with TCEQ. A copy of the NOI would be posted at the construction site before construction begins

The proposed project is not within five miles of an impaired or threatened stream segment; therefore, coordination with TCEQ is not required.

No navigable waters would be associated with this project; therefore, the project would not be subject to Section 9 and 10 of the Rivers and Harbors Act of 1899. This project is not located within a Phase I or Phase II Municipal Separate Storm Sewer System (MS4) area.

Any changes to the 100-year floodplain or floodways resulting from the proposed improvements would be coordinated with the Travis County FEMA floodplain coordinator.

10.2. Vegetation

During construction, efforts would be taken to avoid and minimize disturbance of vegetation and soils. Areas within the existing and proposed right-of-way, but outside the limits of construction would not be disturbed. All areas disturbed during construction, would be revegetated, according to TxDOT specifications, as soon as it becomes practicable. In accordance with EO 133112 on Invasive Species, the Executive Memorandum on Beneficial Landscaping, and the 1999 FHWA guidance on invasive species, only non-invasive species would be planted within the right-of-way.

10.3. Migratory Birds/Endangered Species

Construction activities associated with the proposed project would be scheduled outside nesting season to avoid nesting impacts to migratory birds. In the event that migratory birds are encountered on-site during project construction, every effort would be made to avoid take of protected birds, active nests, eggs, and/or young to the maximum extent practicable. If appropriate, the contractor would remove all old migratory bird nests between September 1 and January 31 from any structure where work will be done. In addition, the contractor would be prepared to prevent migratory birds from building nests between February 1 and August 31. All methods would be approved by the County and Austin District Biologist well in advance of planned use.

Informal consultation with USFWS was completed, resulting in USFWS concurrence with the determination that the project may affect but would likely not adversely affect the Barton Springs salamander (Appendix G). USFWS consultation began after the public hearing to facilitate inclusion of public comments on the proposed alternatives, and was concluded prior to the FHWA finding on the environmental analysis of the proposed project. As required in the concurrence determination, the project would comply with the TCEQ's Edwards Aquifer rules, including construction of a water quality facility (sedimentation basin) at the Bear Creek Crossing.

10.4. Socioeconomics

10.4.1. Displacement of People

The proposed right-of-way acquisition and relocation would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Relocation resources are available to all residential and business relocatees without discrimination. It is the policy of Travis County that no person will be displaced due to right-of-way acquisition until decent, safe and sanitary replacement housing is available in their area of choice. The Travis County relocation office will assist each relocatee in securing replacement housing.

The State's Relocation Assistance Program (RAP) is a comprehensive program of providing financial and advisory assistance to those individuals, families, businesses and nonprofit organizations required to be displaced as a result of highway right-of-way acquisition. In providing this assistance, the individual needs and characteristics of those being displaced are fully considered as it relates to the availability of comparable housing to meet those needs. The displacees will be provided with the financial means to purchase or rent comparable replacement housing, if they so qualify. They will also receive either an actual moving cost payment or payment of the scheduled moving cost. Other payments to which they are entitled include: the costs which are incidental to selling to the State, costs incidental to purchasing a replacement dwelling, and increased interest differential payment. The State's RAP is available to all displacees regardless of race, color, religion, or national origin.

A relocation officer will contact each displacee, provide a booklet explaining the relocation program, and explain all benefits available under this program. The relocation officer will also discuss available relocation housing and, upon request, will provide a list of decent, safe, and sanitary replacement housing. No tenant or owners will be required to move until decent, safe, and sanitary replacement housing within the displacee's financial means is available. The relocation program can be administered to provide orderly, timely, and efficient services to the displacees.

Relocation benefits and assistance are available to all individuals displaced as a result of this Travis County project. In accordance with Travis County policy, no person would be displaced by the proposed project until adequate Decent, Safe, and Sanitary housing is made available as described in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Relocation benefits and assistance are available without regard to race, color, religion, national origin, sex, age, or handicap in accordance with Title VI of the Civil Rights Act of 1964 and Title VIII of the Civil Rights Act of 1968. Additionally, the existing right-of-way

would be retained along most of the proposed project to minimize acquisition of additional right-of-way.

10.4.2. Traffic Management During Construction

During construction, two-way, two lane traffic flow will be maintained to the maximum extent possible. Should detours or lane closures be required, appropriate traffic control would be implemented and the duration minimized so as to minimize inconvenience to the traveling public. Connections to driveways and business entrances would be maintained during construction and re-established upon completion of the project.

10.4.3. Public Involvement

Reasonable steps have been and would continue to be taken to ensure that LEP persons receive adequate access to the programs, services, and information that Travis County provides and that they are able to participate effectively in the process.

10.5. Hazardous Materials

The contractor must take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The contractor would limit construction activities to the area within the existing right-of- way. No use of construction equipment within sensitive areas would occur. All construction materials used for this project would be removed as soon as work schedules permit. Any unanticipated hazardous materials and/or petroleum contamination encountered during construction would be handled according to applicable federal and state regulations per TxDOT's *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* (2004).

10.6. Noise

Provisions will be included in the construction plans and specifications that require the contractor to make every reasonable effort to minimize noise during construction through abatement measures such as work-hour controls and proper maintenance of muffler systems.

10.7. Historic

Pursuant to Stipulation VI "Undertaking with Potential to Cause Effect" of the PA-TU and the MOU, TxDOT historians have determined that there are no historic properties present and individual project coordination with SHPO is not required.

10.8. Air Quality

MSAT

In an effort to maintain compliance with the CAA and EPA's 8-hour ozone standard, Austin entered into an agreement with Bastrop, Caldwell, Hays, Travis, and Williamson counties to

adopt an Early Action Plan. The Early Action Compact (EAC) successfully kept this area in attainment for the ozone standard. Since the use of an EAC expired December 31, 2007, the Austin-Round Rock Metropolitan Statistical Area is developing an O3 Flex plan in coordination with TCEQ and EPA. This CAAP (Clean Air Action Plan) calls for the reduction of regional emissions to ensure that the Austin area is not designated as a nonattainment area by the EPA in the future. Mitigation measures proposed in the CAAP to lessen the effects of MSATs should be considered for Frate Barker where there is potential for construction-related MSAT emissions to occur over an extended building period, and for post-construction scenarios where MSAT levels may increase more than anticipated over time (City of Austin website). These measures include:

- Vehicle inspection and maintenance
- Heavy-duty diesel idling limits
- Low-emission gas can supply
- Low-emission asphalt use
- Degreasing solvent restrictions
- Filling procedures for gas station storage tanks
- Cleaner burning gasoline
- Grant program for cleaner diesel equipment
- TERMs

In this document, Travis County has provided a qualitative assessment of MSAT emissions and has acknowledged that all project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

10.9. Archeology

Section 106 review and consultation will proceed in accordance with the PA-TU among TxDOT, the THC, FHWA, the ACHP, as well as the MOU between THC and TxDOT. In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease, and the SHPO will be contacted to initiate accidental discovery procedures in accordance with the terms of the PA-TU among THC, the FHWA, the ACHP, and TxDOT.

11. SUMMARY OF PUBLIC INVOLVEMENT

The proposed project is open to comments by any person, and all views on the scope of the improvements proposed on Frate Barker, alternative projects, environmental impacts, and any other matter related to the proposed project, have been and will continue to be welcome. In

addition to the local community, public involvement is ongoing with governmental agencies, officials, organizations, and individuals.

To this end, an open house was held on January 24, 2008 in the cafeteria of Bowie High School located at 4103 Slaughter Way in Austin, Texas. There were 45 individuals that signed-in, with 4 giving verbal comments to the available court reporter and 6 others submitting written comments before the end of the open house. An additional 7 individuals either mailed or faxed comments to Travis County on or before the end of the 10-day comment period on February 4, 2008. The comments received ranged from no project support to project support of the various proposed alternative alignments. These comments were considered in development of the proposed preferred alternative.

FHWA approved the draft EA as "Satisfactory for Further Processing" on December 28, 2010, thereby allowing the project partners to conduct a public hearing. The public hearing was held on March 3, 2011, in the cafeteria of Bowie High School located at 4103 Slaughter Way in Austin, Texas. Public notices were published in local newspapers and invitational flyers were sent to the project's mailing list. There were 29 individuals that signed-in, with 2 giving verbal comments during the public comment portion of the hearing. Thirty (30) citizens submitted written comments by mail, fax, or e-mail before the end of the public hearing comment period on March 14, 2011. The majority of the comments received provided support to the project. Twenty-one (21) individuals stated a preference for Alternative 1; five (5) individuals stated a preference for Alternative 3; and four (4) individuals stated a preference for either "no capacity added" improvements or the No Build Alternative. These comments were addressed in the the Public Hearing Summary and Analysis, and Comment and Response, and were considered in the final recommendation of the preferred alternative.

12. CONCLUSION

12.1. Identification of the Preferred Alternative

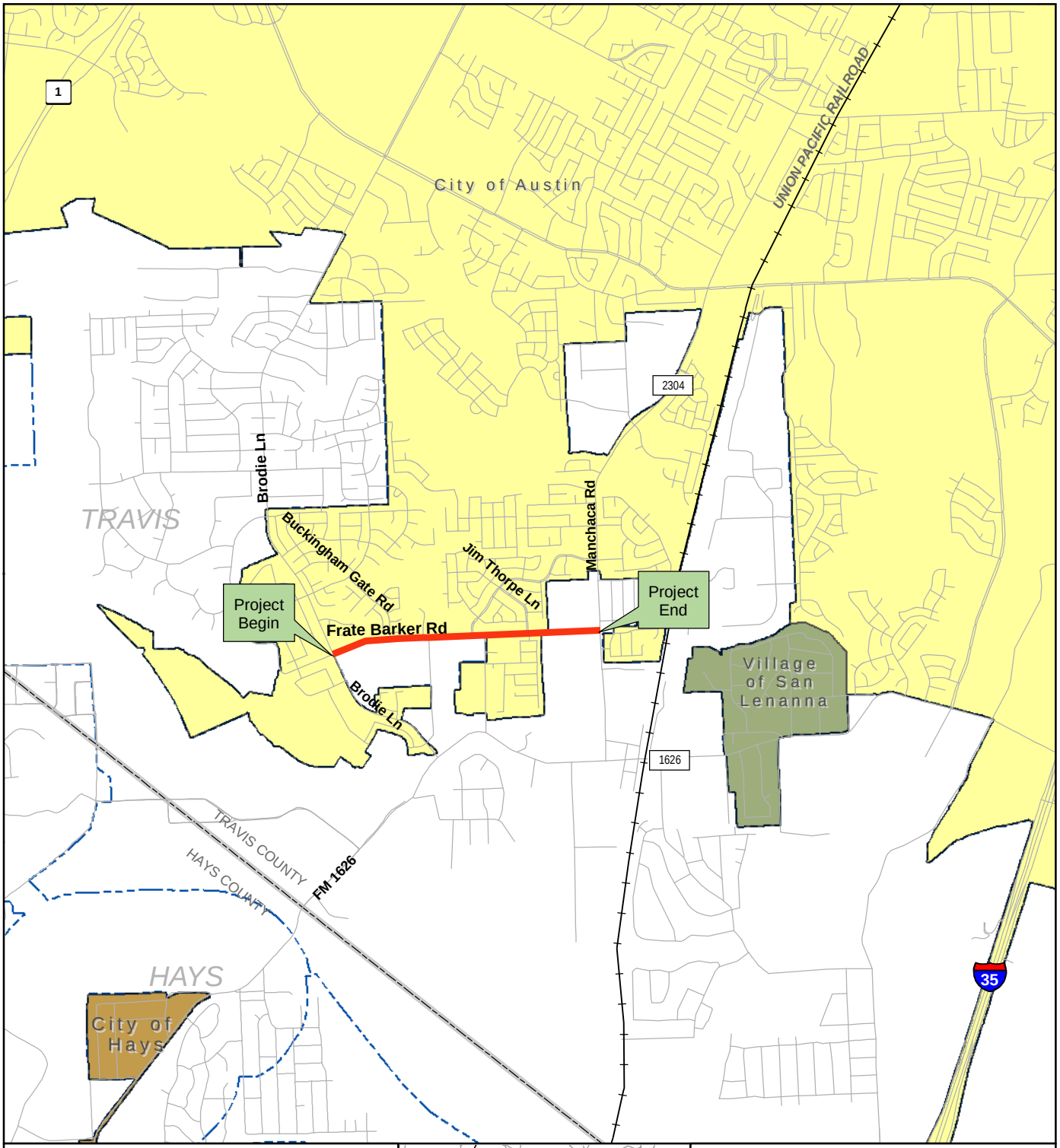
The preferred alternative was identified through a multi-stage process that involved analysis of public safety, mobility, and environmental impacts, as well as consideration of input from resource agencies, local elected and appointed officials and the public. Emphasis was placed on criteria distinguishing which of the reasonable alternatives (Alternatives 1 and 3, and the No Build) best meets the project need and purpose. Both build alternatives meet the need and purpose in regards to public safety and mobility; therefore, environmental impacts and public input provide the basis of this comparison.

The No Build Alternative fails to satisfy the purpose and need as defined in Section 3, and therefore is not the preferred alternative.

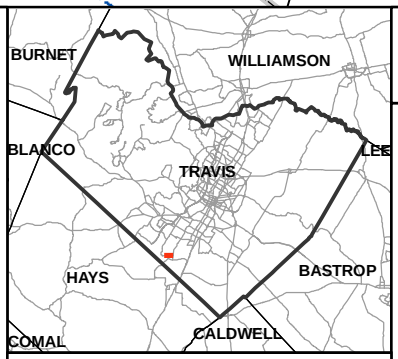
Although the type of impacts that would result from Alternatives 1 and 3 differ, they are comparable in terms of severity and magnitude. Both alternatives satisfy the project's purpose and need, and neither alternative provides a distinct benefit when compared to the other. Selection of a preferred alternative was, therefore, based on evaluation of input received during the public involvement process, including the public hearing held on March 3, 2011. This evaluation resulted in identification of Alternative 1 as the preferred alternative. The Public Hearing Summary and Analysis Report are available to the public both at the Travis County offices and on the Travis County website.

The findings and evaluations performed thus far in project planning indicate that the proposed improvements to Frate Barker would cause no significant social, economic and environmental effects. The proposed project is expected to improve mobility and increase public safety within the proposed project limits. A Finding of No Significant Impact is anticipated.

FIGURES



Railroad
Project Limits
County Line
CITY OF AUSTIN
CITY OF HAYS
VILLAGE OF SAN LEANNA
ETJs



N
W E
S

0.5 0.25 0 0.5 Miles

Source:

City of Austin Base Data

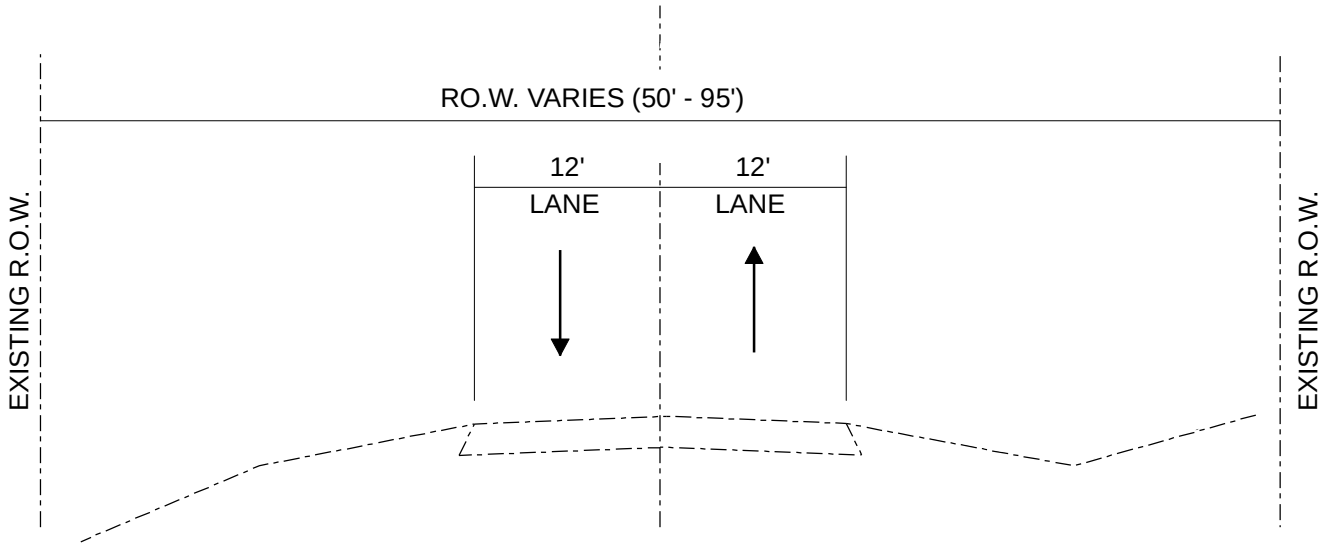
TRAVIS COUNTY

Texas Department of Transportation

Figure 1.1
Project Location Map

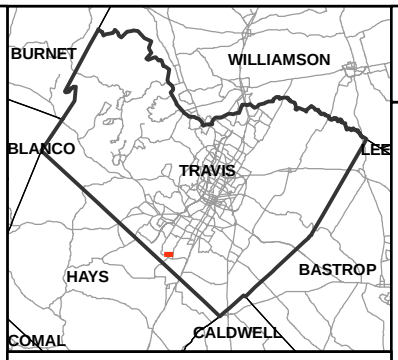
Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



FRATE BARKER ROAD

EXISTING TYPICAL SECTION



TRAVIS COUNTY

Texas Department of Transportation

Figure 2.1
Existing Typical Sections

Frate Barker Road

Brodie Lane to Manchaca Road

Environmental Assessment

CSJ # 0914-04-242

Travis County, Texas

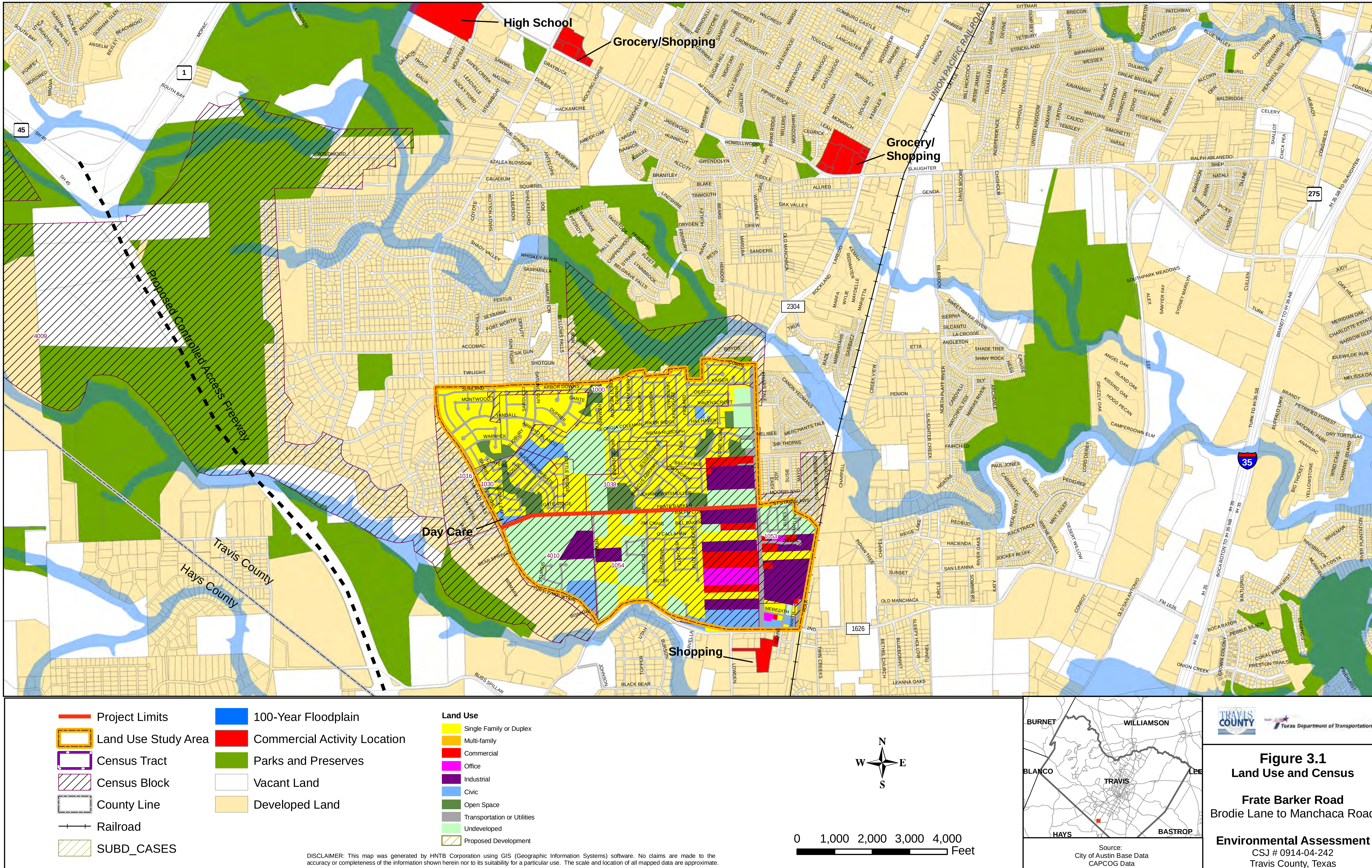
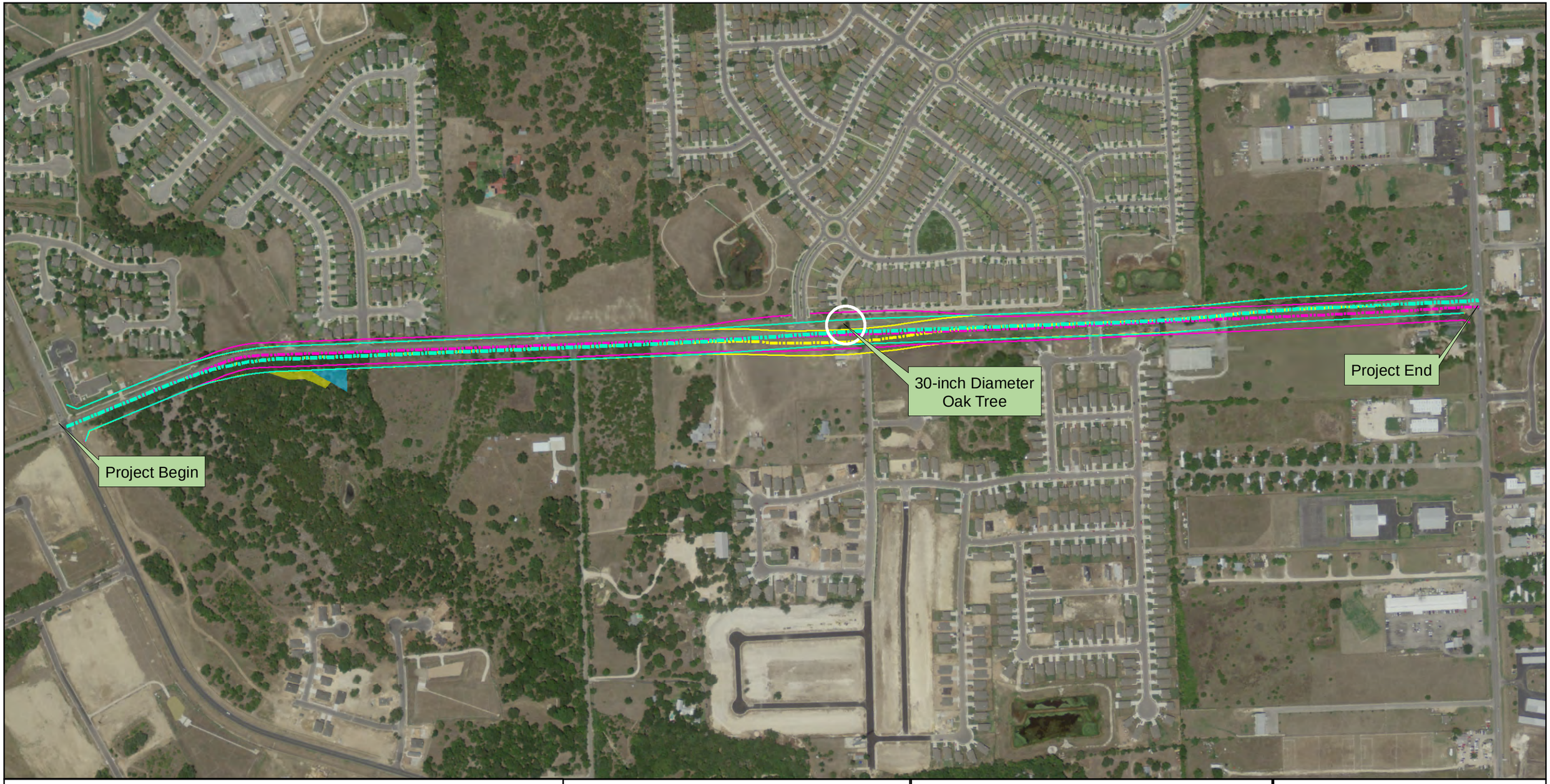


Figure 3.1
Land Use and Census

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



Alternative 1 Base Line
Alternative 2 Base Line
Alternative 3 Base Line
Alternative 1 ROW
Alternative 2 ROW
Alternative 3 ROW
Drainage Easement
ROW for Water Quality Pond

Source:

TNRIS 2008 Aerial Photo

N
W E
S

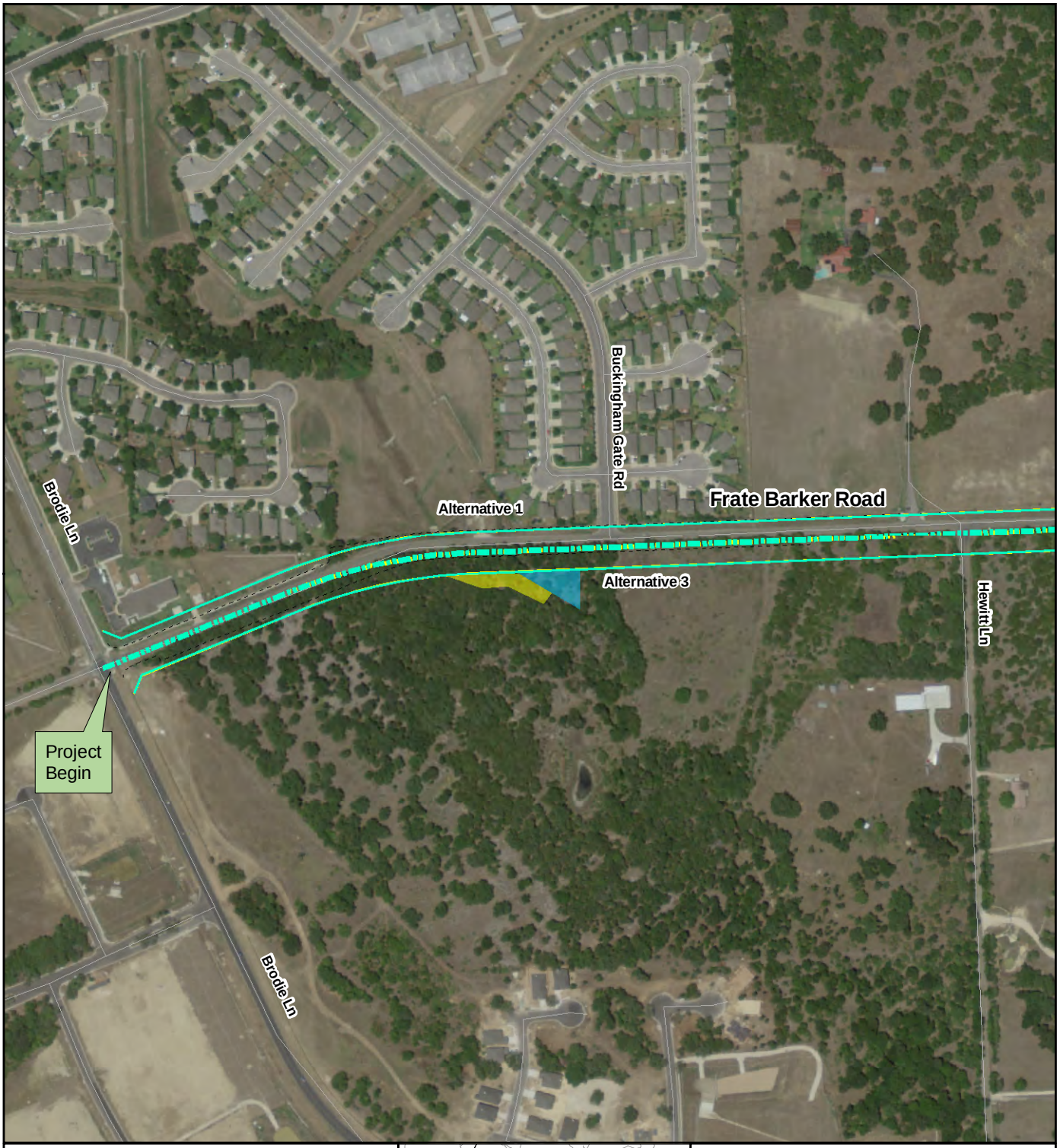
660 330 0 660
Feet

Figure 4.1
Preliminary Alternatives

Frate Barker Road

Brodie Lane to Manchaca Road

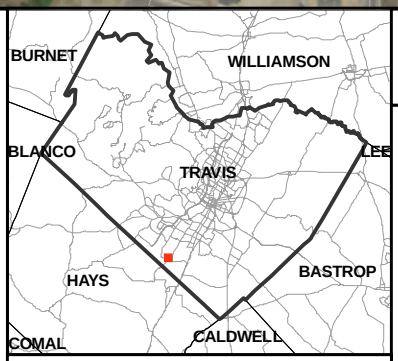
Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



Alternative 1 Base Line
Alternative 1 ROW
Alternative 3 Base Line
Alternative 3 ROW
Existing ROW
Drainage Easement
ROW for Water Quality Pond

N
W E
S

475 237.5 0 475
Feet



Source:

TNRIS 2008 Aerial Photo

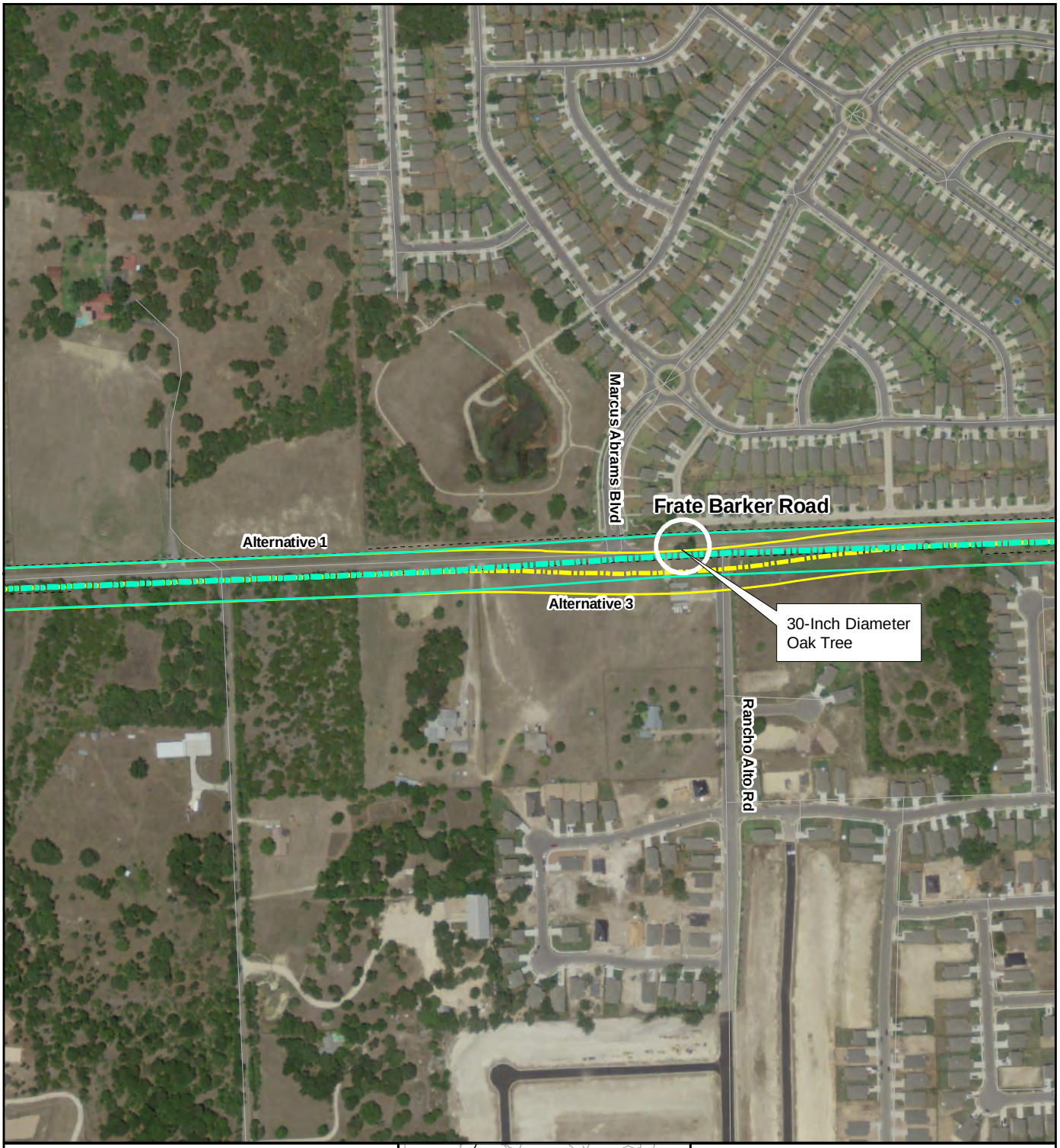
TRAVIS COUNTY

Texas Department of Transportation

Figure 4.2 A
Plan View

Frate Barker Road
Brodie Lane to Manchaca Road

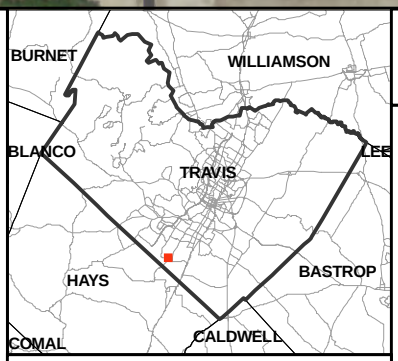
Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



Alternative 1 Base Line
Alternative 1 ROW
Alternative 3 Base Line
Alternative 3 ROW
Existing ROW

N
W E
S

510 255 0 510 Feet



Source:

TNRIS 2008 Aerial Photo

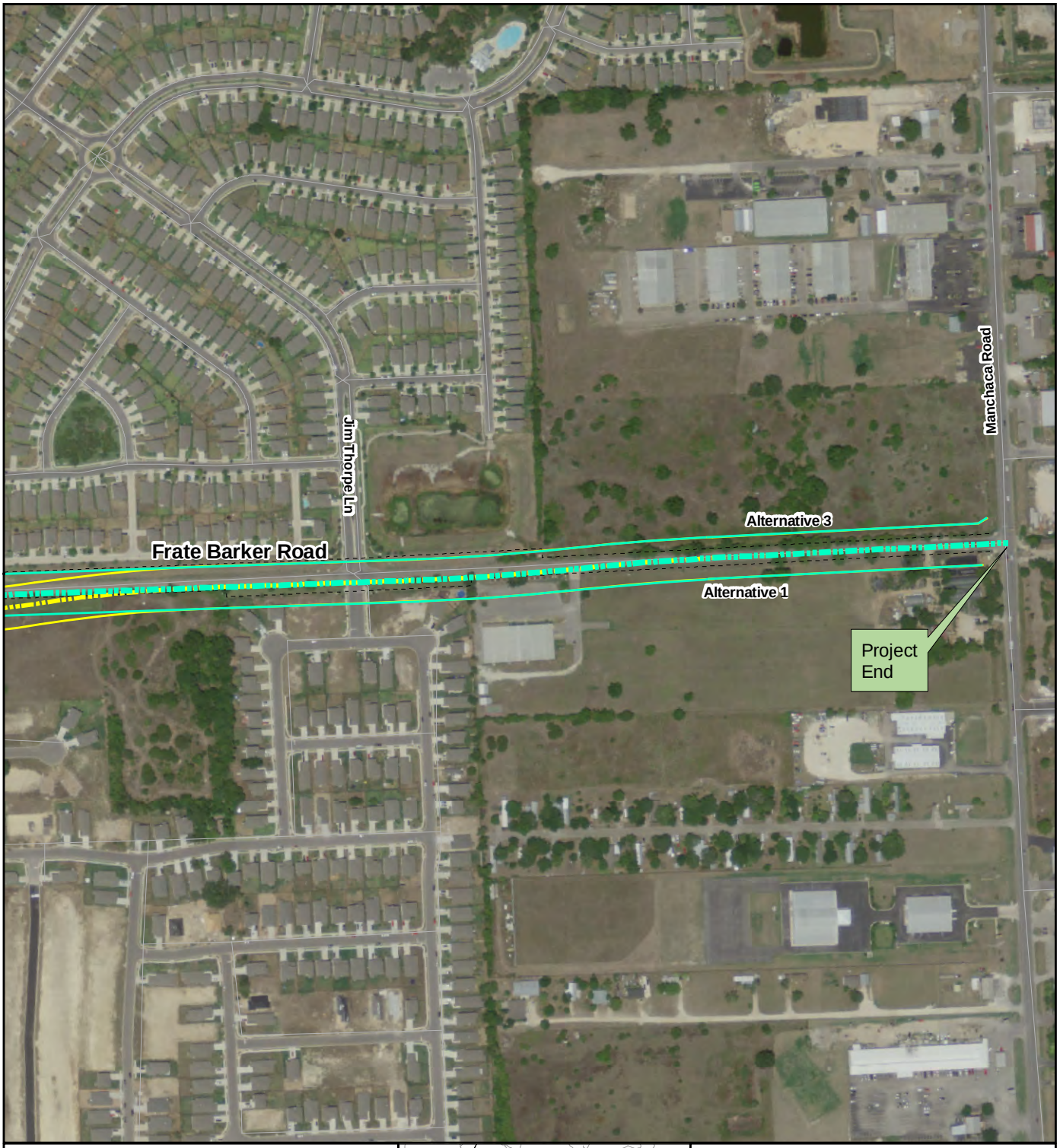
TRAVIS COUNTY

Texas Department of Transportation

Figure 4.2 B
Plan View

Frate Barker Road
Brodie Lane to Manchaca Road

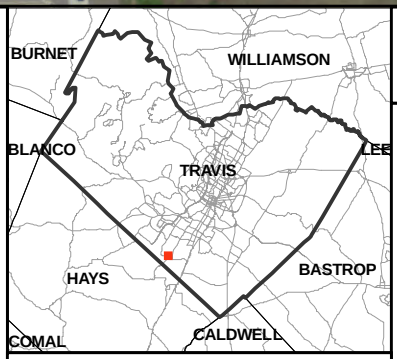
Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



Alternative 1 Base Line
Alternative 1 ROW
Alternative 3 Base Line
Alternative 3 ROW
Existing ROW

N
W E
S

475 237.5 0 475 Feet



Source:

TNRIS 2008 Aerial Photo

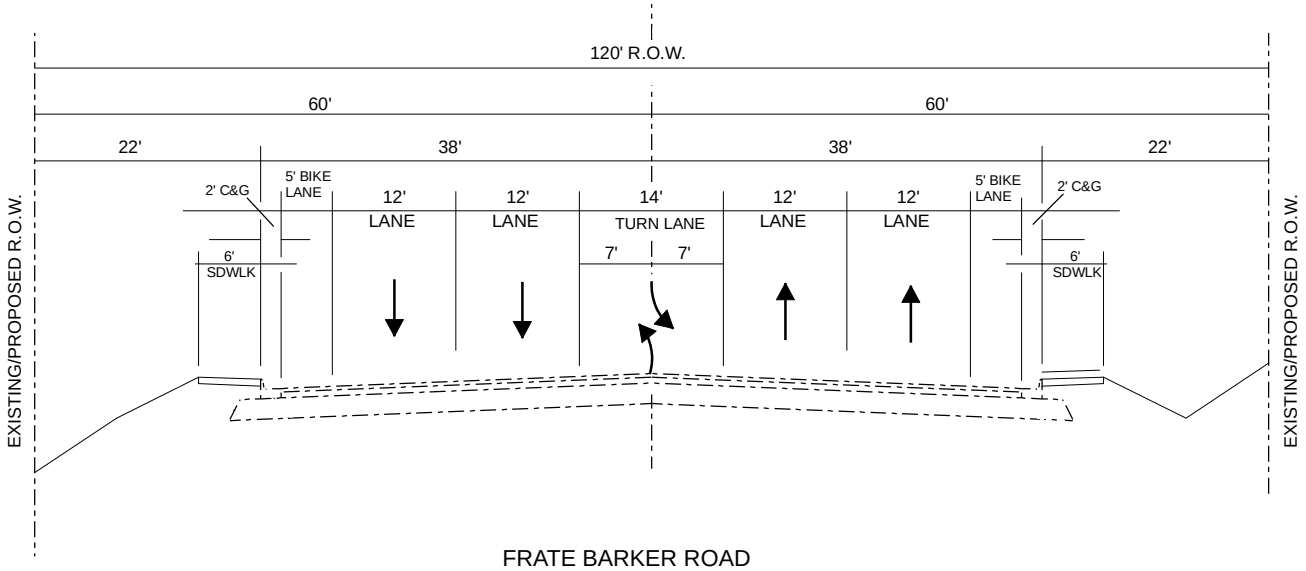
TRAVIS COUNTY

Texas Department of Transportation

Figure 4.2 C
Plan View

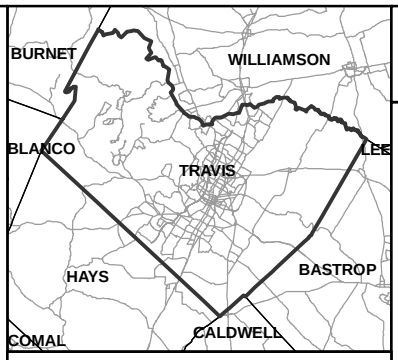
Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



FRATE BARKER ROAD

PROPOSED TYPICAL SECTION



TRAVIS COUNTY

Texas Department of Transportation

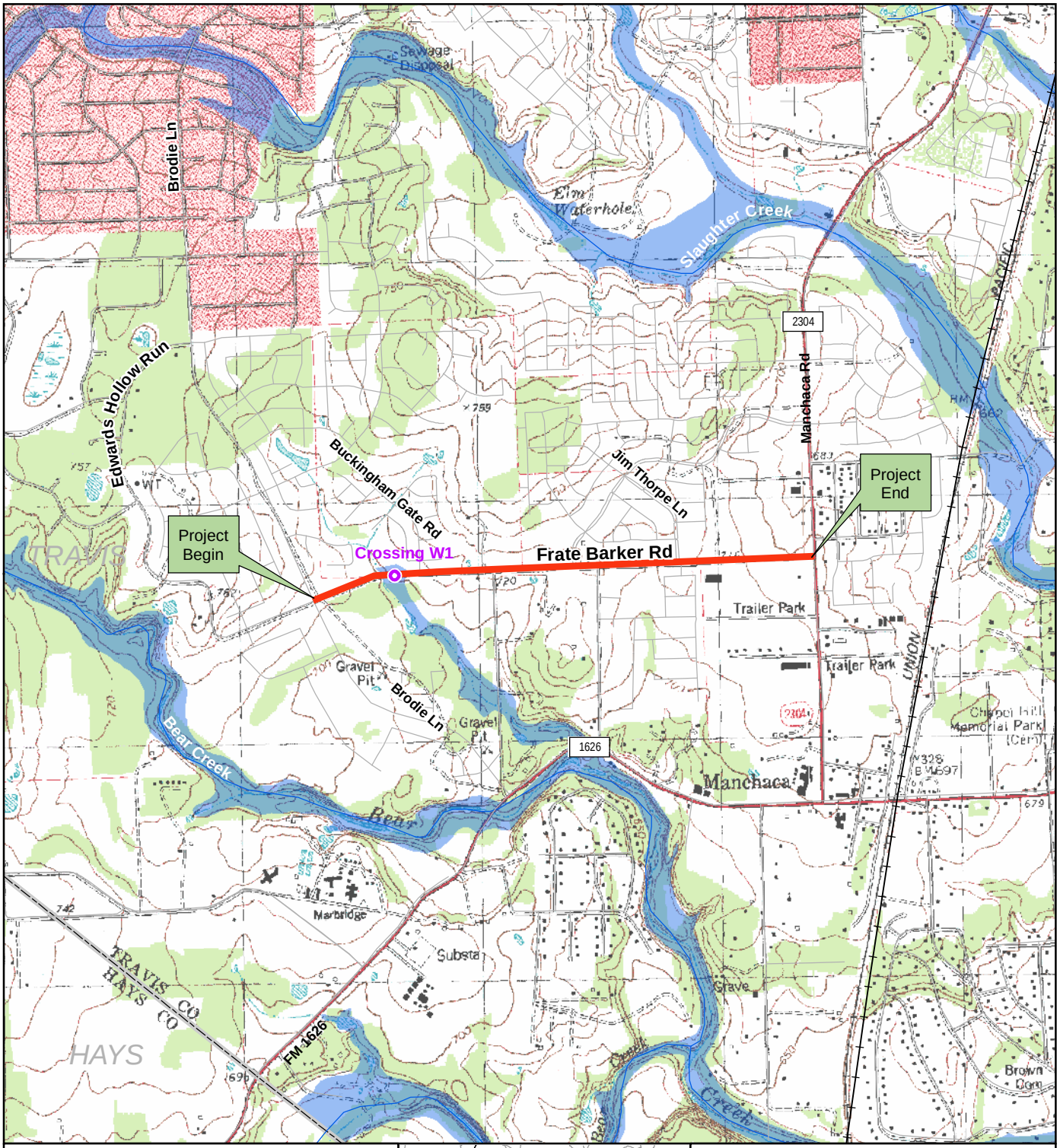
Figure 5.1
Proposed Typical Section

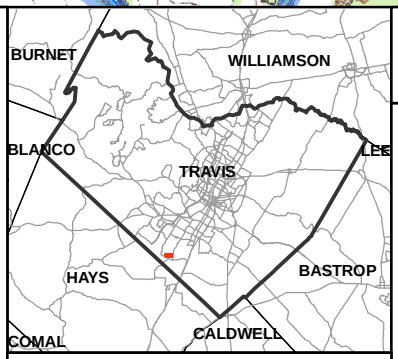
Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment

CSJ # 0914-04-242

Travis County, Texas





Jurisdictional Crossing
Railroad
Project Limits
Stream
100 Year Floodplain
County Line

N
W E
S

2,000 1,000 0 2,000 Feet

Source:

TNRIS USGS Topographic map - Oak Hill Quadrangle

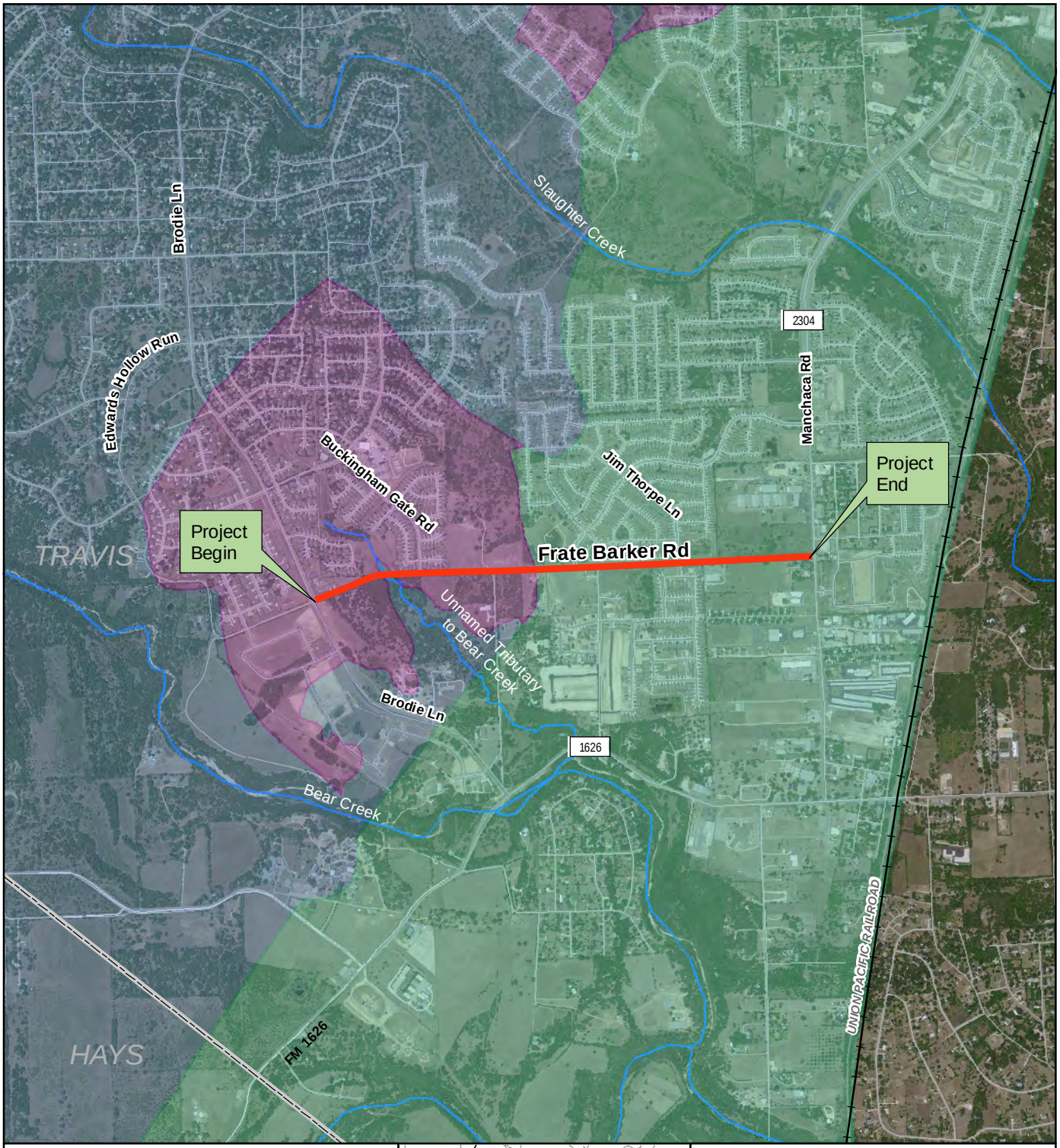
TRAVIS COUNTY

Texas Department of Transportation

Figure 6.1
USGS Topographic, FEMA Floodplain Map, and Jurisdictional Channel Crossings

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



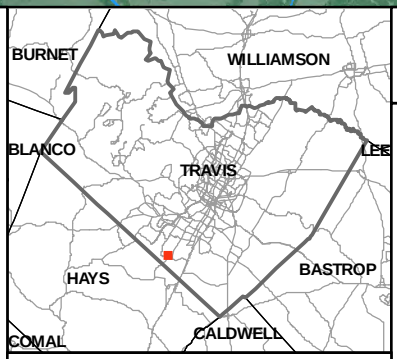
Railroad
Project Limits
Project Limits
County Line

Edwards Aquifer

Contributing Zone within the Transition Zone
Recharge Zone
Transition Zone
Streams

N
W E
S

2,200 1,100 0 2,200 Feet



Source:

TNRIS 2008 Aerial Photo

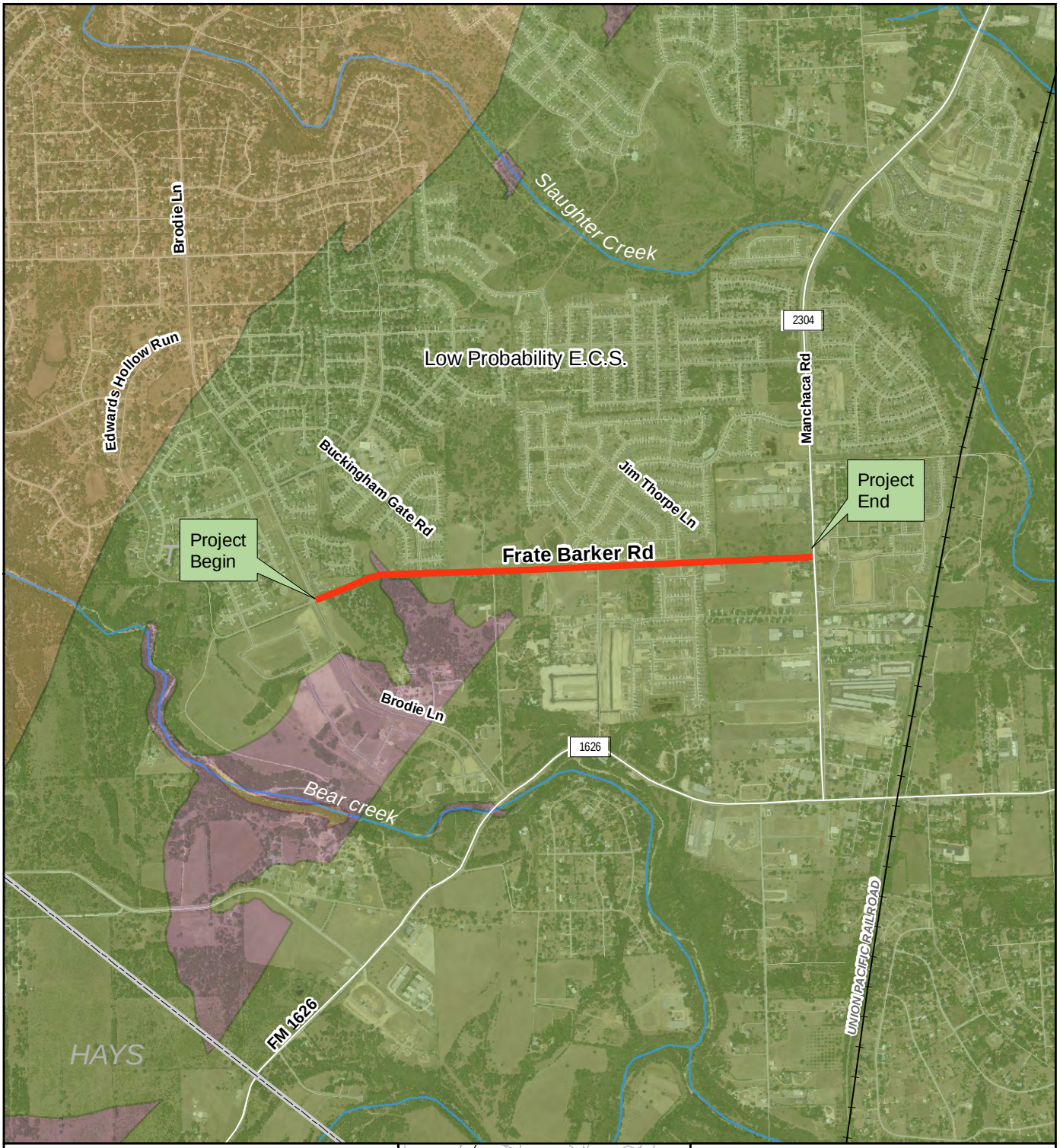
TRAVIS COUNTY

Texas Department of Transportation

Figure 6.2
Edwards Aquifer Recharge Zones

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas

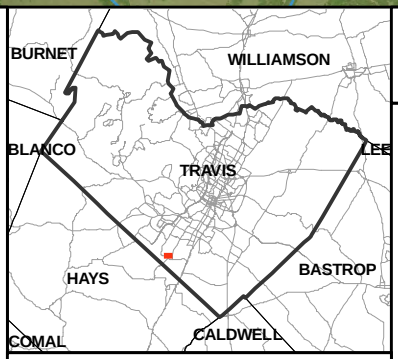


Karst Zones

- High Probability E.C.S. (Zone 2)
- Low Probability E.C.S. (Zone 3)
- No E.C.S. (Zone 4)
- Railroad
- Project Limits
- County Line
- Streams
- Road

N W E S

2,300 1,150 0 2,300 Feet



Source:

TNRIS 2008 Aerial Photo
USFWS

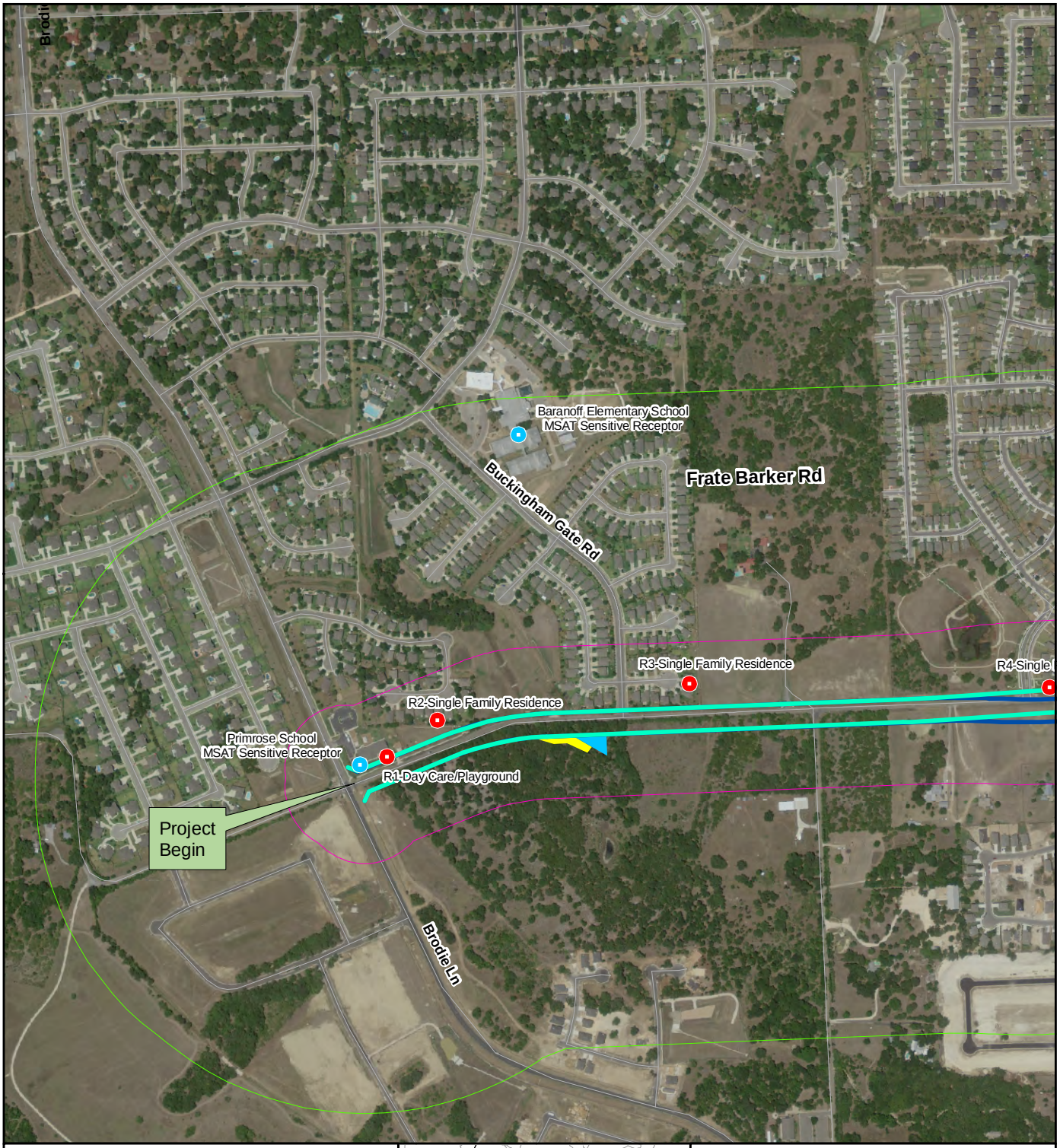
TRAVIS COUNTY

Texas Department of Transportation

Figure 6.3
Karst Zones

Frate Barker Road
Brodie Lane to Manchaca Road

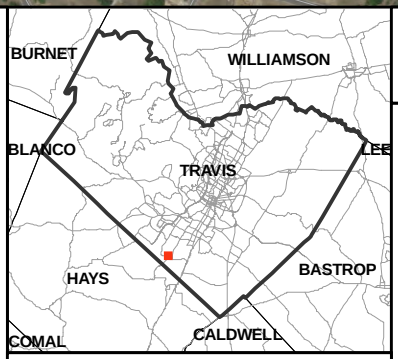
Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



Alternative 1 ROW
Alternative 3 ROW
Drainage Easement
ROW for Water Quality Pond
MSAT Sensitive Receptor
Noise Receivers
100m Sensitive Receptor Boundary
500m Sensitive Receptor Boundary

N
W E
S

1,000 500 0 1,000 Feet



Sources:

City of Austin Base Data
TNRIS 2008 Aerial Photos

TRAVIS COUNTY

Texas Department of Transportation

Figure 6.4 A
Noise and Air Receivers

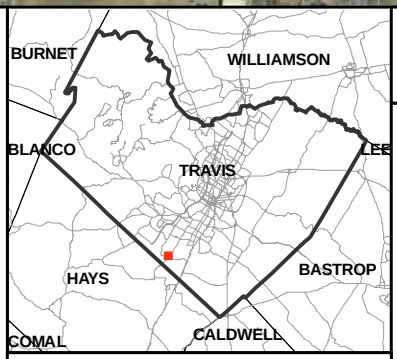
Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas

MSAT Sensitive Receptor
Noise Receivers
Alternative 1 ROW
Alternative 3 ROW
100m Sensitive Receptor Boundary
500m Sensitive Receptor Boundary

N
W E
S

1,000 500 0 1,000 Feet



Sources:

City of Austin Base Data
TNRIS 2008 Aerial Photos

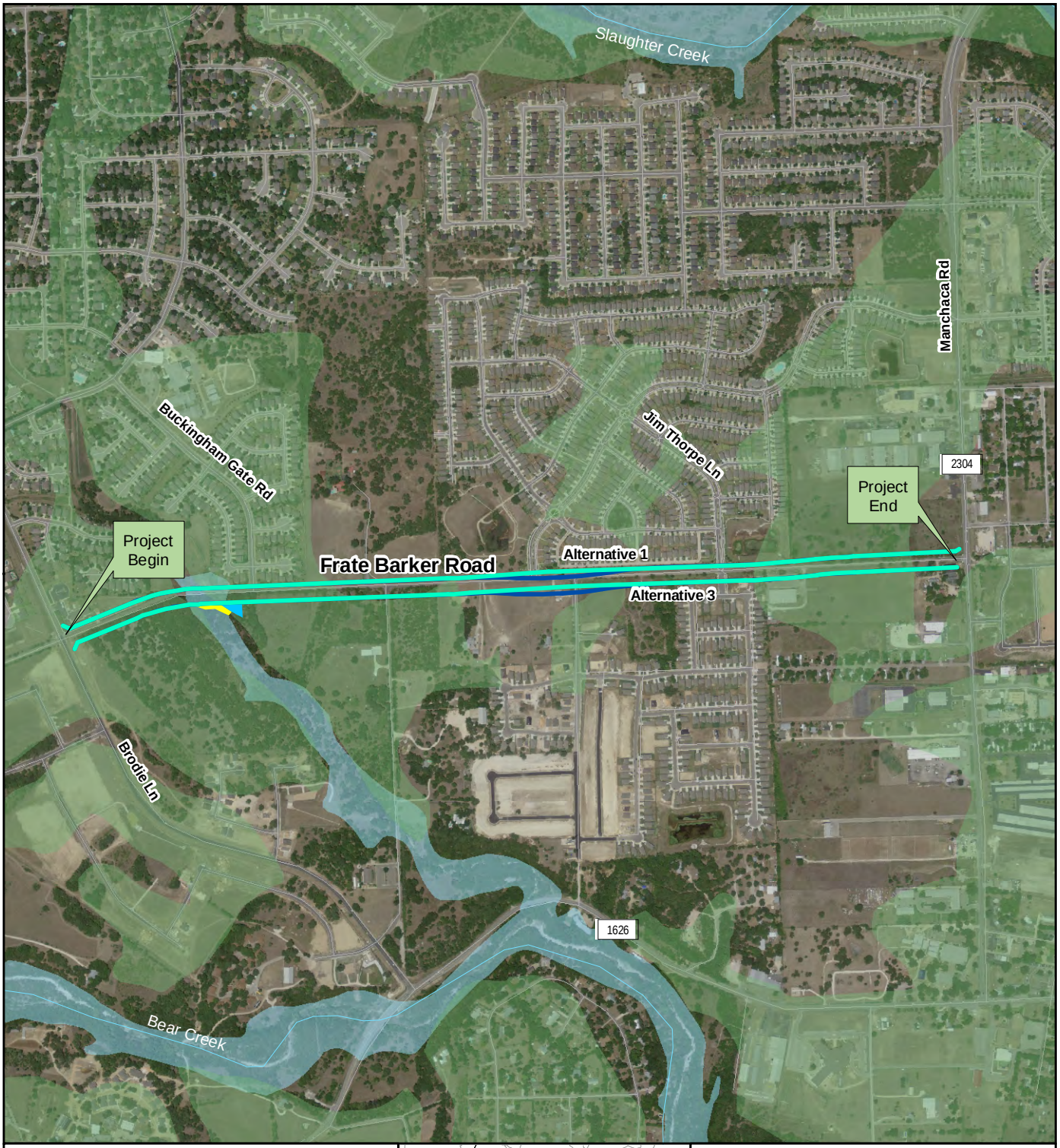
TRAVIS COUNTY

Texas Department of Transportation

Figure 6.4 B
Noise and Air Receivers

Frate Barker Road
Brodie Lane to Manchaca Road

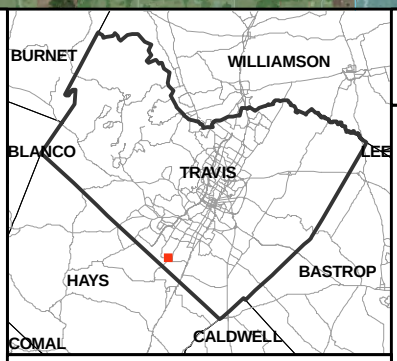
Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



Alternative 1 ROW
Alternative 3 ROW
0.23 ac. Drainage Easement
0.25 ac. ROW for Water Quality Pond
Prime Farmland
100 Year Floodplain

N
W E
S

1,000 500 0 1,000 Feet



Source:
TNRIS 2008 Aerial Photo, City of Austin Base Data, USDA NRCS Travis and Hays Counties

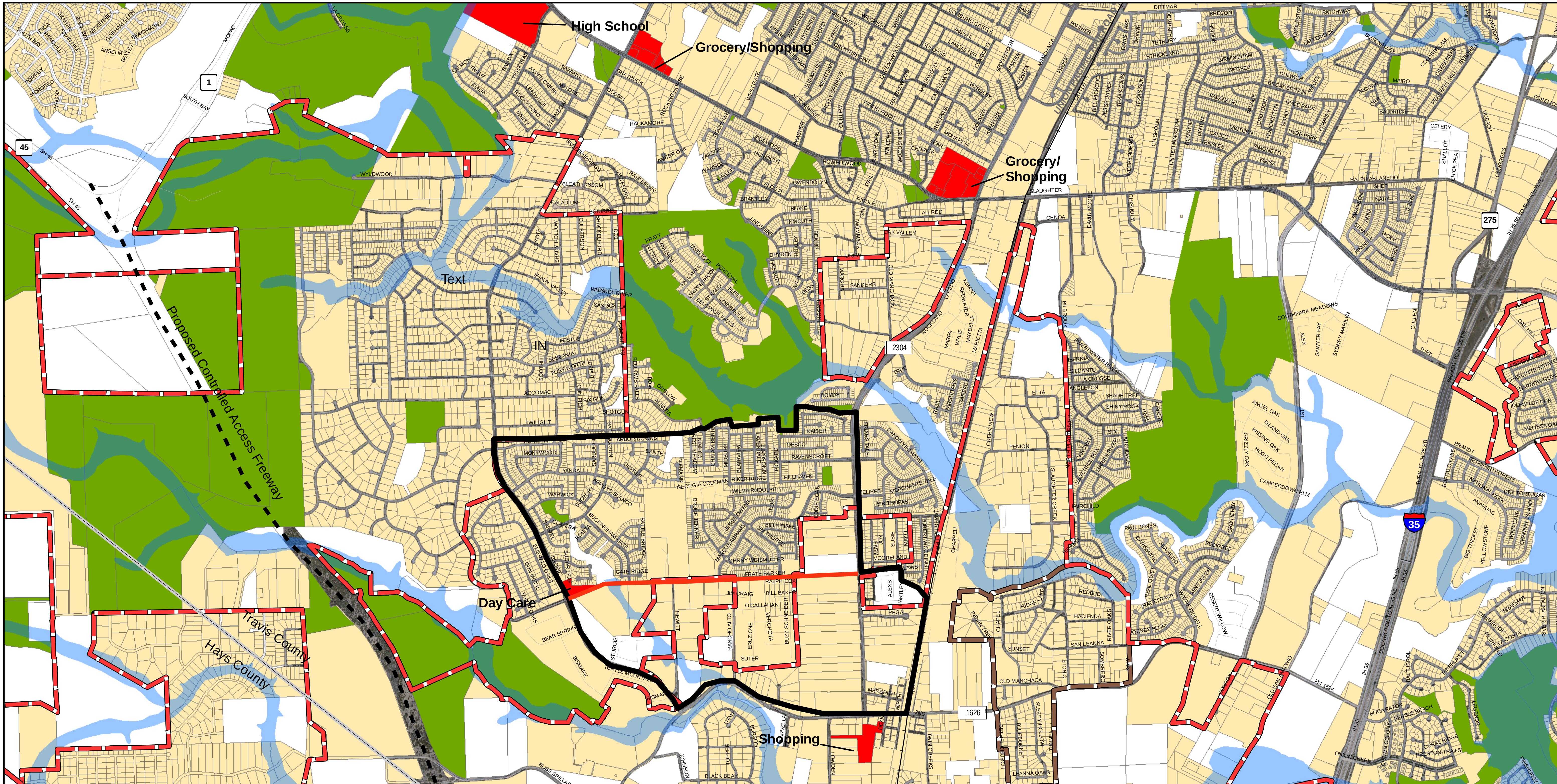
TRAVIS COUNTY

Texas Department of Transportation

Figure 7.1
Prime Farmland

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



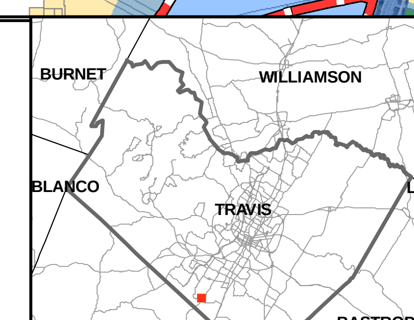
Project Limits	AUSTIN CITY LIMITS / 2-MILE ETJ
Indirect Effects Study Area	VILLAGE OF SAN LEANNA
County Line	Railroad

- 100-Year Floodplain
- Commercial Activity Location
- Parks and Preserves
- Vacant Land
- Developed Land

N / W / E / S

0 1,000 2,000 3,000 4,000 Feet

DISCLAIMER: This map was generated by HNTB Corporation using GIS (Geographic Information Systems) software. No claims are made to the accuracy or completeness of the information shown herein nor to its suitability for a particular use. The scale and location of all mapped data are approximate.



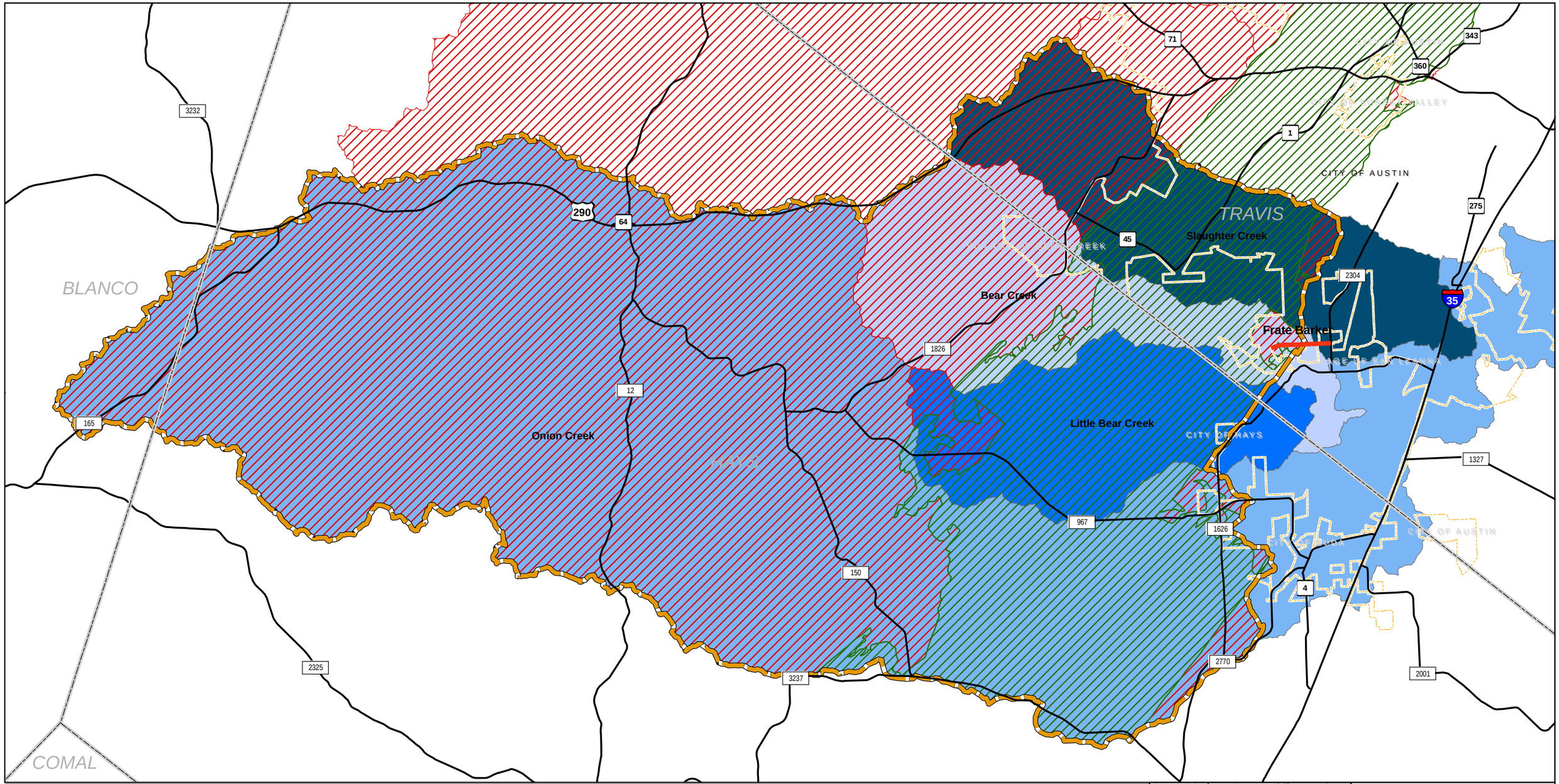
Source:
City of Austin Base Data
CAPCOG Data

TRAVIS COUNTY
Texas Department of Transportation

Figure 8.1
Indirect Effects Study Area

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



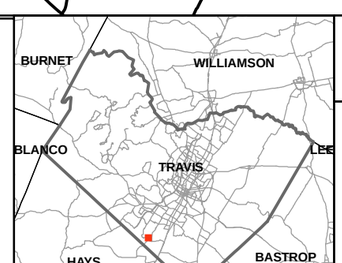
Project Limits
County Line
Major Roads
Water Resource Study Area
City Limits
Recharge zone
Contributing Zone

Watershed

Bear
Little Bear
Onion
Slaughter

N
W E
S

0 1 2 3 4 Miles



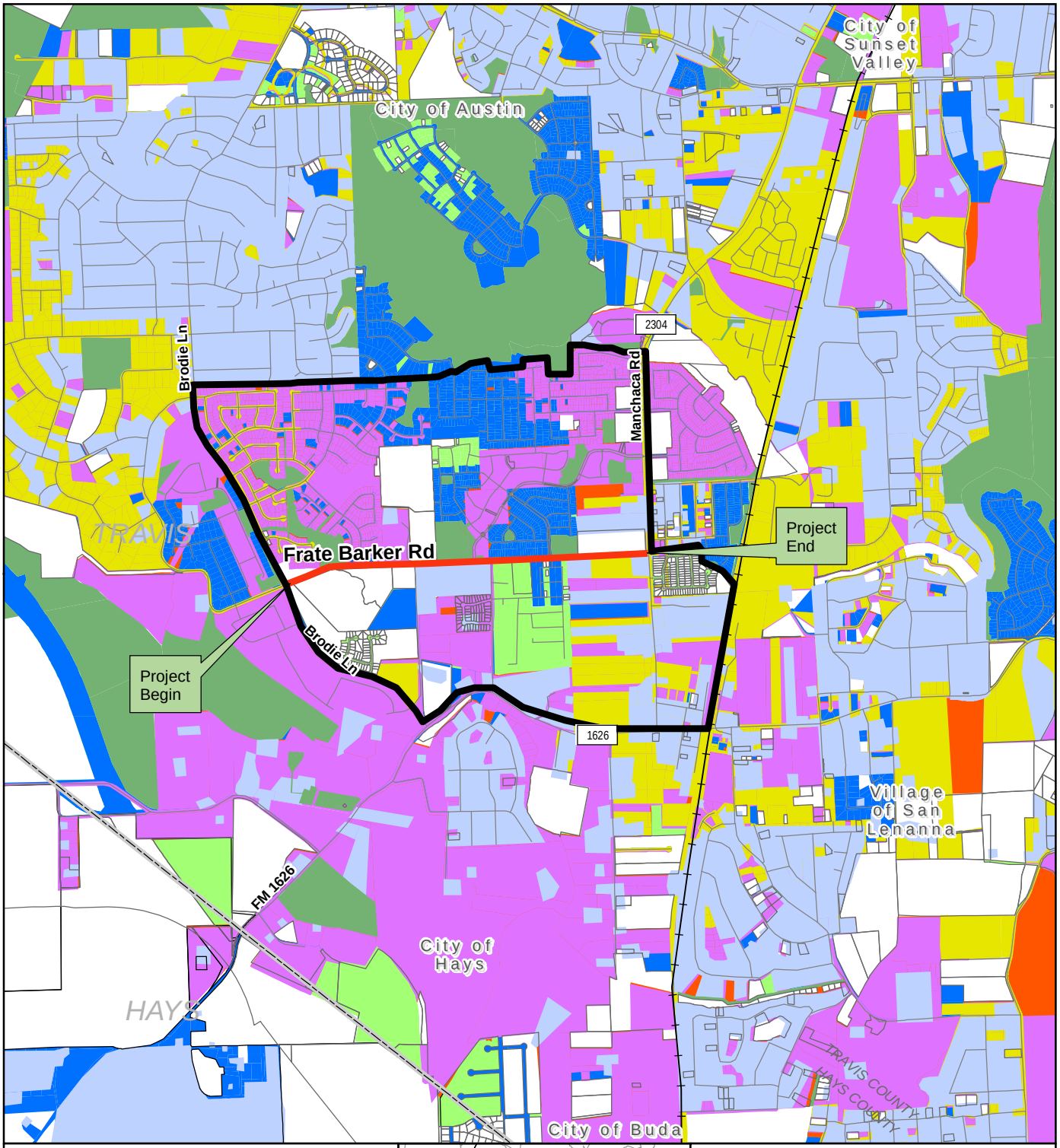
Source:
City of Austin Base Data
CAPCOG Data

TRAVIS COUNTY
Texas Department of Transportation

Figure 9.1

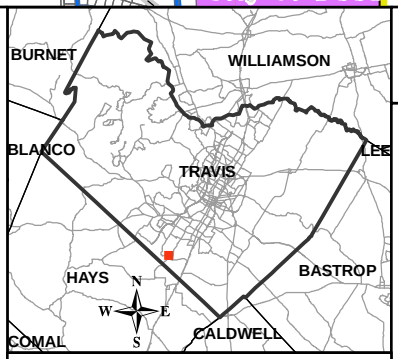
Water Resource Study Area
Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



- Project Limits
- Indirect Effects Study Area
- Vacant Land
- Parks / Greenspace / Preserves
- 2008 Developed Land
- 2006 Developed Land
- 2003 Developed Land
- 2000 Developed Land
- 1995 Developed Land
- 1990 Developed Land
- County Line

0.5 0.25 0 0.5 Miles



Source:

City of Austin Base Data

TRAVIS COUNTY

Texas Department of Transportation

Figure 8.2
Land Use Trend 1990-2008

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas

APPENDIX A: PHOTOGRAPHS OF THE PROJECT AREA

Photograph 1: Frate Barker Road, east view

Photograph 2: Frate Barker Road, west view

Photograph 3: Intersection of Frate Barker Road and Brodie Lane, east view

Photograph 4: Intersection of Frate Barker Road and Brodie Lane, east view

Photograph 5: Frate Barker Road Oak Tree, east view

Photograph 6: Frate Barker Road, east view

Photograph 7: Intersection of Frate Barker Road and Manchaca, east view

APPENDIX B: MTP AND TIP PLAN PROJECT SPECIFIC PAGES

Prirority	ID	Project Type	Sponsor	Project	Limits/Location	Let Year	Open Year	YOE Cost (Millions)	Description
TIP	28	Expand Arterial	Travis County	Frate-Barker Road	Brodie Lane to Manchaca Rd	2012	2014	10.2	Minor Arterial (MNR) 4 with turn lanes, bike lanes and sidewalks
Short Term	137	Expand Arterial	Travis County/Williamson County	Gattis School Rd	CR 122 to Winterfield Dr	2010	2015	8.8	Construct 4 lane section from CR 122 to east of Huntington Trails/Forest Creek Estates Subdivision
Short Term	661	Expand Arterial	Williamson County	Gattis School Rd	Priem Ln - SH 130	2018	2020	4.5	Widen from 2-4 lanes to 4 lanes with median
Short Term	660	Expand Arterial	Williamson County/Round Rock	Gattis School Rd	A.W. Grimes Blvd - Red Bud Ln	2018	2020	13.8	Widen from 2-4 lanes to 4 lanes with median
Long Term	517	Expand Arterial	Williamson County/Round Rock	Gattis School Rd	BR IH 35/Mays St - AW Grimes Blvd	2028	2030	9.1	Widen from 4 lanes to 6 lanes with median
Short Term	518	Expand Arterial	Georgetown/Williamson County	Georgetown Inner Loop (Phase I)	IH 35 N - IH 35 S	2015	2017	29.6	Widen from 2 lanes to 4 lanes with median
Long Term	518	New Freeway	Georgetown/Williamson County	Georgetown Inner Loop (Phase II)	SH 29 - IH 35 S	2033	2035	241.8	Expand to 4 lane expressway with frontage roads
Short Term	417	New Arterial	Williamson County	Great Oaks Dr.	RM 620 - O'Connor Blvd.	2010	2012	42.5	Construct 4-lane road with median on a new location
Long Term	520	Expand Arterial	Williamson County/Round Rock	Greenlawn Blvd	SH 45 - IH 35	2028	2030	7.7	Widen from 4 lanes with median to 6 lanes with median
Long Term	620	Expand Arterial	San Marcos	Guadalupe St Gateway	IH 35 to University	2025	2027	22.7	Construct 80 FT ROW streetscape plan including underground utilities; 2 way conversion; 3/4 lanes, bike/ped streetscape improvements
Short Term	662	New Arterial	Williamson County/Cedar Park	Gupton Way	Park St - Brushy Creek Rd	2018	2020	4.4	Construct 4 lanes with median on a new location
Short Term	163	Expand Arterial	Pflugerville	Heatherwilde Blvd	SH-45 to Wilke Ridge Lane	2010	2011	5.9	MAD4 with bike lane and sidewalk
Short Term	682	New Arterial	Leander/Williamson County	Hero Way	US 183 N - CR 270	2008	2010	17.3	Construct 4-lane road with median on a new location
Medium Term	683	Expand Arterial	Leander/Williamson County	Hero Way	183A - Ronald W. Reagan Blvd	2023	2025	10.3	Widen from 2 lanes to 4 lanes with median
Medium Term	684	Expand Arterial	Leander/Williamson County	Hero Way	Ronald W. Reagan Blvd - RM 2243	2023	2025	8.2	Widen from 2 lanes to 4 lanes with median
Long Term	711	Expand Arterial	Travis County	Hewitt Lane	Frate Barker to FM 1626	2025	2027	6.0	MAD 4 with bike lane and sidewalk.
Short Term	164	New Arterial	Pflugerville	Hidden Lakes Blvd	Kelly Ln to Pflugerville Pkwy	2015	2017	22.5	MAD4 with bike lane and sidewalk
Short Term	174	New Arterial	Pflugerville	Hidden Lakes Blvd	Pflugerville Pkwy to Pecan St	2015	2017	28.6	MAD4 with bike lane and sidewalk
Medium Term	397	Expand Arterial	TxState University/San Marcos	Holland/Academy	Sessom Drive to RR 12	2020	2025	3.2	realign to provide Sessom connection to RM 12
Medium Term	664	New Arterial	Williamson County	Howard Ln	RM 620 - Anderson Mill Rd	2023	2025	10.5	Construct 6 lanes with median on a new location
Medium Term	665	New Arterial	Williamson County	Howard Ln	Anderson Mill Rd - McNeil Rd	2023	2025	9.5	Construct 4 lanes with median on a new location
Short Term	138	Expand Arterial	Travis County	Howard Ln I	Dessau Rd to Cameron Rd	2010	2011	15.9	Widen from a two-lane to a four-lane curb and gutter road from Dessau Road to Cameron
TIP	117	New Arterial	Austin/Travis County	Howard Ln Improvements (Phase 2)	Cameron Rd to SH 130 (1.6 miles)	2012	2014	17.5	Phase 2: Construct a four-lane roadway with bicycle lanes and sidewalks on both sides
Short Term	418	New Arterial	Williamson County	Howard Ln. Ext	O'Connor Blvd. - SH 45	2013	2015	9.0	Construct 4-lane road with median on a new location

Attachment A: Detailed Amendments

Frate Barker Road

Amend Page 81 to correct let date and total project cost:

Priority	ID	Project Type	Sponsor	Project	Limits/Location	Let Year	Open Year	YOE Cost (Millions)	Description
Short Term	28	Expand Arterial	Travis County	Frate-Barker Road	Brodie Lane to Manchaca Rd	~~2012~~ 2013	2014	~~Previously Let~~ 11.5	Widen 2-lane arterial to 4-lane minor arterial with turn lanes, bike lanes and sidewalks

Amend Pages 112-113 and Appendix 2 to adjust financial analysis to offset increase in cost:

- **Revenue: Travis County Local (2013):**
  ~~$20.87~~ $23.17
- **Revenue: Category 7 Surface Transportation Program Metropolitan Mobility (2013):**
  ~~$13.89~~ $23.09*

  *This project received STP-MM funding through CAMPO, and has been programmed for funding in FY 2013 in the CAMPO TIP. CAMPO has received notification that TxDOT intends to return to the region in excess of $50 million in additional STP-MM funding between 2012 and 2014 which will be added to the Plan through a formal plan amendment once the final UTP figures are available. It is reasonable to assume that $9.2 million additional STP-MM funding would be to accommodate the corrected cost of this project.

SH 195

Amend Page 81 to correct total project cost:

Priority	ID	Project Type	Sponsor	Project	Limits/Location	Let Year	Open Year	YOE Cost (Millions)	Description
Short Term	90	Expand Arterial	TxDOT	SH 195	3.4 miles south of SH 138 to 5.254 miles south of SH 138	2010	2012	~~0~~ 10.6	Widen to 4-lane divided roadway

Amend Pages 112-113 and Appendix 2 to adjust financial analysis to offset increase in cost:

- **Revenue: Proposition 14 (2011):**
  ~~$252.10~~ $262.7

DISTRICT	COUNTY	CSJ	HWY	PHASE	CITY	PROJECT SPONSOR	YOE COST
AUSTIN	TRAVIS	0914-04-242	FRATE BARKER ROAD	E,R	OTHER	TRAVIS COUNTY	**$885,000**

PROJECT TYPE: ROADWAY

REV DATE: 07/2010
MPO PROJECT ID: 22
FUNDING CATEGORY: LOCAL
MTP REFERENCE:

LIMITS FROM: BRODIE LANE
LIMITS TO: MANCHACA ROAD

TIP DESCRIPTION: PRELIMINARY ENGINEERING AND PURCHASE RIGHT OF WAY FOR FUTURE UPGRADE OF EXISTING 2 LANE RURAL ROADWAY TO A 4 LANE MINOR ARTERIAL WITH A CONTINUOUS CENTER TURN LANE, BIKE LANES AND SIDEWALKS ON BOTH SIDES

REMARKS:

BICYCLE/PEDESTRIAN: 5' WIDE OUTER BICYCLE LANE ON EACH SIDE OF ROAD; 6' SIDEWALK ON EACH SIDE OF ROAD

Project History: PROJECT AWARDED STP MM FUNDING

Total Project Cost Information:

Preliminary Engineering:	$85,000
Right Of Way:	$800,000
Construction:	$0
Construction Engineering:	$100,000
Contingencies:	$0
Indirects:	
Bond Financing:	$0
Total Project Cost:	**$985,000**

Cost of Approved Phases: **$885,000**

Authorized Funding by Category/Share:

	Federal	State	Regional	Local	Local Contribution	Funding By Category
LOCAL					$885,000	$885,000
Funding by Share:					$885,000	**$885,000**

PHASE: C=CONSTRUCTION, E = ENGINEERING, R = ROW, T = TRANSFER

APPENDIX C: MOBILE SOURCE AIR TOXICS ANALYSIS

Introduction

The purpose of this project is to provide additional capacity to meet future traffic demands, improve existing pavement and deficiencies, and provide conformity with the current design standards, which would improve safety for the public traveling on Frate Barker. The proposed Frate Barker project is located in Travis County which is in attainment of all National Ambient Air Quality Standards (NAAQS); therefore, the transportation conformity rule does not apply. However, because monitored ozone levels in the Austin area are very close to the 8-hour standard, Travis County, along with Bastrop, Caldwell, Hays, and Williamson counties, local elected officials in the Austin-Round Rock Metropolitan Statistical Area, the EPA and TCEQ entered into an agreement known as the 8-Hour Ozone Flex Program, replacing the region's Early Action Plan. This program is designed to implement measures in the region to improve air quality

The proposed action is consistent with the CAMPO 2035 Metropolitan Transportation Plan (MTP) and the 2011-2014 Transportation Improvement Program (TIP). Traffic data for the design year (2027) is 3,400 vehicles per day. These traffic projections do not exceed 140,000 vehicles per day; therefore, this project is exempt from a Traffic Air Quality Analysis because previous analyses of similar projects did not result in a violation of the NAAQS.

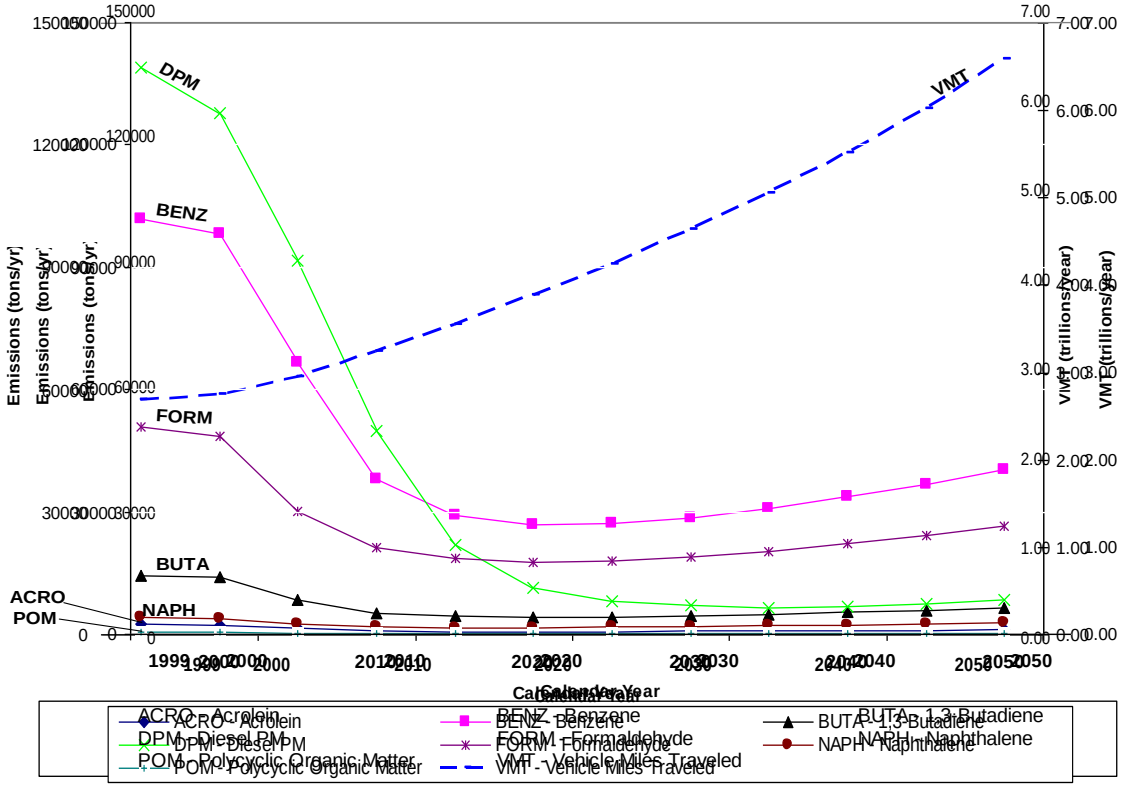
Mobile Source Air Toxics

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 U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their 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 their Integrated Risk Information System (IRIS) (http://www.epa.gov/ncea/iris/index.html). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA Mobile Source Air Toxics (MSAT) rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and

cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in **Graph 1** and **Table 12**.

Graph 1: National MSAT Emission Trends 1999-2050 for Vehicles Operating on Roadways Using EPA's MOBILE6.2 Model



Source: Table 1 below.

Note: (1) Annual emissions of polycyclic organic matter are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.

(2) Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Table 12: Projected National MSAT Emissions and Percent Reduction for 1999-2050 for Vehicles Operating on Roadways Using EPA's MOBILE6.2 Model

Pollutant/VMT	Pollutant Emissions (tons) and Vehicle-Miles Traveled (VMT) by Calendar Year							Reduction
	1999	2000	2010	2020	2030	2040	2050	1999 to 2050
Acrolein	2570	2430	1000	775	824	970	1160	-55%
Benzene	102000	98400	38000	27000	28700	33900	40500	-60%
1,3-Butadiene	14400	14100	5410	4360	4630	5460	6520	-55%
Diesel PM	139000	128000	50000	11400	7080	7070	8440	-94%
Formaldehyde	50900	48800	21400	17800	19000	22400	26800	-47%
Naphthalene	4150	4030	1990	1780	2030	2400	2870	-31%
Polycyclic Organic Matter	561	541	259	233	265	313	373	-33%
Trillions VMT	2.69	2.75	3.24	3.88	4.63	5.51	6.58	145%

Source: U.S. Environmental Protection Agency. MOBILE6.2 Model run 20 August 2009

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 the potential 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, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this emerging 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 the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at:

http://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.pdf

For each alternative in this document, the amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Build Alternative is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of

the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the preferred action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6.2 emissions model, emissions of all of the priority MSAT except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases would offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models. Because the estimated VMT under each of the Build Alternatives are nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely 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 72 percent between 1999 and 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 in nearly all cases.

The additional travel lanes contemplated as part of the Build Alternative will have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the Build Alternative than the No Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded roadway sections that would be built throughout the project area. However, the magnitude and the duration of these potential increases compared to the No Build Alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be lower in the future.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts 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 impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are 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 in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (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/ncea/iris/index.html). 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 Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *2009 Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*, which can be found at the following address: (http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm). This Appendix also discusses a variety of FHWA research initiatives related to air toxics. 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 (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - 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 impacts 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. The results produced by the EPA's MOBILE6.2

model, the California EPA's Emfac2007 model, and the EPA's MOVES model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study:

(http://www.epa.gov/scram001/dispersion_alt.htm#hyroad), which documents poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

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 (http://pubs.healtheffects.org/view.php?id=282). 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 (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI:

(http://wwwcf.fhwa.dot.gov/exit.cfm?link=http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

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 a "safe" or "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 one 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 one 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 safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Sensitive Receptor Assessment

There may be localized areas where ambient concentrations of MSATs are slightly higher in any build scenario than in the no build scenario. Dispersion studies have shown that the "roadway" air toxics start to drop off at about 100 meters (328 feet). By 500 meters (1,640 feet), most studies have found it very difficult to distinguish the roadway from background toxic concentrations in any given area. Therefore, the study area for sensitive receptors includes the areas 500 meters from the project area. Sensitive receptors include those facilities most likely to contain large concentrations of the more sensitive population (hospitals, schools, licensed daycares, and elder care facilities). The Department of Family and Protective Services childcare licensing website was searched to identify childcare facilities within 100 and 500 meters of the project area[1]. No daycare facilities were found to exist within the project area. A field survey was conducted to verify childcare facility locations and to locate other potential sensitive receptors located within 500 meters of the project area. One sensitive receptor was found within the project area (**Table 1**).

[1] Department of Family and Protected Services. Childcare licensing – Search Texas Childcare website: http://www.dfps.state.tx.us/Child_Care/Search_Texas_Child_Care/

TABLE 1:SENSITIVE RECEPTORS

Facility Name	Address	Located within 328 ft (100m) from the right-of-way	Located within 1,640 ft (100-500m) from the right-of-way
Primrose School	12341 Brodie Lane	X	X
The Goddard School	2111 Frate Barker	X	X
South Oaks Rehabilitation and Healthcare	2101 Frate Barker	X	X
Baranoff Elementary School	12009 Buckingham Gate Road		X
Jackie's Dance and Gymnastics	11530 Manchaca Road		X

Conclusion

In this document, a qualitative MSAT assessment has been provided relative to the alternatives of MSAT emissions and has acknowledged that all of the Build Alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

APPENDIX D: HISTORIC RESOURCE RECONNAISSANCE SURVEY REPORT

HISTORIC RESOURCE RECONNAISSANCE SURVEY REPORT

FOR ENVIRONMENTAL ASSESSMENT OF

FRATE BARKER ROAD
FROM MANCHACA ROAD TO BRODIE LANE

TEXAS DEPARTMENT OF TRANSPORTATION
AUSTIN DISTRICT
TRAVIS COUNTY, TEXAS

CSJ NUMBER: 0914-04-242
CONTRACT: AUSTIN DISTRICT ENV
CONTRACT NUMBER: 07AE0019LP
HNTB PROJECT NUMBER: 43508

Prepared By:
Sally S. Victor, Senior Historian
Beth Reed, Architectural Historian
HNTB CORPORATION
301 CONGRESS AVENUE, SUITE 600
AUSTIN, TX 78701

DECEMBER 2007
REVISED JULY 2008

Table of Contents

Table of Contents 2
Introduction 3
Project Description 4
Methodology 5
Results of the File Review 6
History of Project Area 6
Travis County History 6
Settlements Near the Project Area 8
Manchaca, Texas 8
Kincheonville, Texas 8
San Leanna, Texas 8
Historic Contexts 9
Introduction 9
Community Development and Planning in the Manchaca Area from 1850s-1964 9
Agriculture in Southwest Travis County from 1850s-1964 10
Reconnaissance Survey 11
NRHP-Eligibility 13
Conclusion 15
Sources Consulted 16

Appendix A
Figure 1 – Project Location
Figure 2 – Historic Resource Locations

Appendix B
Research Design

Appendix C
Historic Resource Inventory

Appendix D
Property Forms

Introduction

The National Environmental Policy Act (NEPA) requires consideration of important historic, cultural, and natural aspects of our national heritage. Important aspects of our national heritage that may be present in the project corridor have been considered under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. This act requires federal agencies to "take into account" the "effect" that an undertaking will have on "historic properties." Historic properties are those included in or are eligible for inclusion in the National Register of Historic Places (NRHP) and may include structures, buildings, districts, objects, and sites. In accordance with the Advisory Council on Historic Preservation (ACHP) regulations pertaining to the protection of historic properties (36 CFR 800.4), federal agencies are required to identify and evaluate historic-age resources for NRHP eligibility and assess the effects that the undertaking would have on historic properties. These steps were completed under terms of the 2005 Programmatic Agreement for Transportation Undertakings (PA-TU) among the Federal Highway Administration (FHWA), the Texas State Historic Preservation Officer (SHPO), ACHP, and the Texas Department of Transportation (TxDOT).

If an effect is determined to be adverse, the agency must take steps to avoid, minimize, and/or mitigate the adverse effect. The consultation process of identification, evaluation, and assessment used to address the requirements of Section 106 of NHPA is codified in the PA-TU. If a transportation activity has the potential to adversely affect a historic property and includes the proposed taking or use of the property for a transportation activity, the special provision of Section 4(f) of the United States Department of Transportation (USDOT) Act of 1966 must also be addressed. Considerations must include any feasible and prudent alternatives and planning to minimize harm. The Section 4(f) process also applies to the use of public parks, recreational areas, and wildlife refuges.

The PA-TU cited above outlines a streamlined approach for conducting Section 106 consultation and review with the SHPO. The document provides for (under certain

conditions) regulatory authority to TxDOT Cultural Resource Management (CRM) staff to identify and evaluate cultural resources and, when historic resources are present, assess potential project impacts and/or effects without conducting consultation and review with the SHPO.

This report presents NRHP eligibility documentation and assessments for historic-age resources (buildings, sites, structures, objects, districts, etc.) identified within the area of potential effect (APE) for the Environmental Assessment associated with the proposed project on Frate Barker Road from Manchaca Road to Brodie Lane. The survey study area includes the entirety of all parcels even partially contained within the APE. (See **Appendix A Figure 1: Project Location and Figure 2: Historic Resource Locations**).

This report was prepared by individuals who meet the Secretary of the Interior's Professional Qualification Standards (36 CFR 61) and includes a description of the project, research and field methods, evaluation methods, historic contexts, and NRHP evaluations and recommendations. In addition, the report provides detailed support documentation including the Research Design approved by TxDOT ENV (**Appendix B**), Historic Resource Inventory (**Appendix C**), and photo-documentation with individual images and contextual aerial photograph images of surveyed resources (**Appendix D**).

Project Description

Travis County, in cooperation with TxDOT, is proposing to improve Frate Barker Road (Frate Barker) in southern Travis County. Frate Barker is located in central Texas, entirely in Travis County. It extends 1.6 miles from 1,500 feet southwest of Brodie Lane to Manchaca Road within Austin. Frate Barker primarily carries local commuter traffic. The proposed improvements would involve upgrading Frate Barker, within the project limits, from a two-lane rural facility to a four-lane divided facility with a continuous center turn lane with curbs, gutters, bicycle lanes, and 6-foot sidewalks on both sides. The existing right-of-way (ROW) width varies from 50-95 feet with a usual width of 70 feet.

Within the proposed project area, the 5-lane section would consist of two 12-foot travel lanes in each direction, and a 14-foot continuous center turn lane separating directions of travel. In addition, 6-foot sidewalks, and 5-foot bike lanes are also proposed. The usual ROW width would be 120-feet within the proposed project limits. The total pavement width would be 72 feet.

It is anticipated that the proposed improvements would be constructed in phases, with the 5-lane section described above being the ultimate facility. However, the interim phase would consist of improving the existing two-lane rural facility to a three-lane facility with a continuous center turn lane.

The project area contains a combination of residential and commercial properties located west and north of Manchaca, Texas, in southwest Travis County. Two large, recently developed residential subdivisions are located along the north side of Frate Barker Road. The property along the south side of Frate Barker Road is largely undeveloped with one new housing development under construction along Rancho Alto Road. There are a few late 1960s through 1980s single-family homes between the large subdivisions located along Frate Barker Road that appear individually developed (See **Appendix A Figure 1: Project Location** and **Figure 2: Historic Resource Locations**). Alternative 1 proposes 7.3 acres of new ROW, Alternative 2 proposes 7.8 acres, Alternative 3 proposes 7.6 acres, and the No Build proposes no new ROW. Because this proposed project is located on an existing roadway, the APE conforms to the requirements of the PA-TU as 150 feet from the edge of the existing or proposed ROW, whichever is greater.

Methodology

The Secretary of the Interior's guidelines for NRHP eligibility prescribes a criterion of 50-year old properties for consideration for inclusion in the NRHP. The PA-TU among the FHWA, the ACHP, the SHPO, and TxDOT also calls for a 50-year cutoff date for historic-age. However, TxDOT Environmental Affairs Division (ENV) suggests a 45-year cutoff (45 years prior to the letting date) in the guidelines provided in the September 8, 2006 draft of *Historic Resources Section 106 Review and NEPA Guide* to allow for

unforeseen delays in letting. Accordingly, the term "historic-age resource," as it is used in this report, refers to any buildings, structures, objects, and potential historic districts that are, or will be, 45 years of age or older at the time of project letting for construction. Because the projected letting date for this project is 2009, 1964 was the cutoff date used for determining which buildings and structure sites met the historic-age criteria.

In October 2007 the Research Design for this project was approved by TxDOT ENV. A copy of that approved document is in **Appendix B**. Before the field survey, two architectural historians looked for previously designated historic properties within 1300 feet of the project area to foster development of appropriate contextual analysis (see results of the File Review). The actual APE, the study limits, and the historic-age period are described under Project Description (above). In October and November 2007, historians conducted the file review and field survey.

Results of the File Review

A review of the Texas Historical Commission's *Historic Sites Atlas* revealed no recorded NRHP, Registered Texas Historic Landmarks (RTHL), National Historic Landmarks (NHL), State Archeological Landmarks (SAL), Official Texas Historical Markers (OTHM), historic commemorative markers, or historic cemeteries within the Survey Study Area (1300 feet of the proposed project ROW). Multiple Travis County archival sources were consulted for background material within this study area. Two Travis County General Highway maps were consulted to determine settlement patterns. Repositories consulted included the Texas State Library and Archives, the Austin History Center, and the Center for American History. Online sources were also consulted in order to prepare the historic context.

History of Project Area

Travis County History

In early 1840, the Congress of the Republic of Texas established Waterloo as the new capital of Texas and renamed it Austin in honor of Stephen F. Austin. Within days of designating the capital, Congress established Travis County, named in honor of William

Barret Travis. Approximately 40,000 acres originally comprised Travis County and were soon subdivided to form the following new counties: Callahan (1858), Coleman (1858), Comal (1846), Gillespie (1848), Hays (1848), Burnet (1852), Brown (1856), Lampasas (1856), Eastland (1858), Runnels (1858), and Taylor (1858). In 1850, the population of Travis County consisted of 3,138 persons and included 2,336 whites, 791 slaves, and 11 free blacks. The population grew rapidly and by the next census in 1860, the total population was 8,080 and consisted of 4,931 whites, 3,136 slaves, and 13 free blacks.

Many area residents lived in small communities surrounding Austin agriculture was the primary economic force. Small surrounding communities included Manchaca, Pflugerville, and Webberville. Travis County was divided by the Balcones Escarpment so that land west of the escarpment was more arid than land to the east. Agriculture in the more arid areas to the west tended to rely on livestock ranching for income production. Livestock operations were supported by enough farming to raise grain to feed the livestock and vegetables to feed the ranchers.

In the years preceding the Civil War, Travis County citizens' loyalties were divided between Union supporters and Secessionists; however in 1861, the Union sentiment prevailed at the Secession Convention with a vote of 704 to 450. Despite the Travis County vote, Texas became a Confederate state for the duration of the Civil War and suffered economic hardship during Reconstruction. In 1870, just after the war, the black population in Travis County rose by 60 percent to 4,647. During that same year, the white population showed only a 12 percent increase. Former slaves established a number of communities including Clarksville, Kincheonville, Masontown, and Wheatville.

In 1871, the Houston and Texas Central Railroad arrived in Austin facilitating the movement of goods between the Texas coast and Austin and generally aiding the economy. In 1881, the International and Great Northern Railroad completed its track between Austin and Laredo, traveling through Manchaca, southwest of Austin. (Smyrl 2007 – Manchaca; Smyrl 2005 – Travis County).

Settlements Near the Project Area

Manchaca, Texas

Manchaca is located southwest of Austin where suburban communities have grown to surround the small community. Manchaca Springs, where Jose Manchaca once camped, inspired the town's name. The area in the vicinity of Manchaca was settled as early as 1851, when a post office opened two miles south of the city's present location. A second post office, called "Manchac," operated within the city between 1874 and 1875. With the arrival of the International and Great Northern Railroad, a third post office opened with a spelling of "Manchaca," but a pronunciation of "Manshack." Goods shipped on the railroad from Manchaca included grain, cotton, posts, and lumber. Presumably spurred by the railroad, the population grew to 75 by 1884. Development in the 1890s brought a school, hotel, and a Methodist Church. The town's population decreased during the early twentieth century to only 200 residents by 1960. The town's population continued the decline and reached a low of 36 residents in the 1970s. The Austin metroplex development in the 1980s served to boost the local population and by 1990 the census indicated 4,700 persons residing in Manchaca (Smyrl 2007 – Manchaca).

Kincheonville, Texas

Thomas Kincheon, a former slave, established the Kincheonville farming community in 1865. The city was located just north of Davis Lane between Brodie Lane and Longview Road (west of Manchaca Road). Although Kincheonville was predominantly black, there were some Hispanic and Anglo settlers, unlike in the communities of Clarksville or Wheatville located closer to the capitol. In 1952, Kincheon's son, Thomas Kincheon II, began promoting development of the family land and established Kincheon Subdivision No. 1, followed by Kincheon Subdivision No. 2. After development of the subdivisions, the Kincheon family moved to East Austin in the 1960s. Since that time, the city of Austin has absorbed Kincheonville (Smyrl 2007 – Kincheonville).

San Leanna, Texas

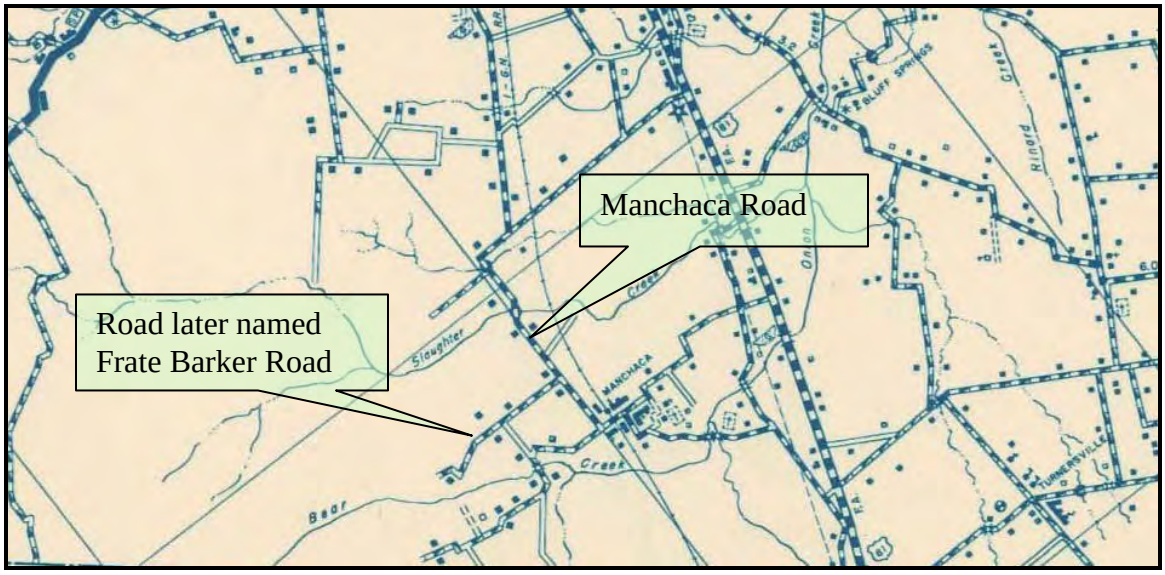
San Leanna is north of Farm to Market (FM) 1626, midway between Manchaca Road and Interstate Highway 35 (IH 35). Developers created San Leanna subdivision in the 1950s

and residents incorporated it as a city in 1970 under a mayor-alderman form of government. In 2000, the population reached 384 residents (Smyrl 2007 – San Leanna).

Historic Contexts

Introduction

Two historic contexts are relevant to the Survey Study Area: Community Development and Planning, and Agriculture. The sections that follow discuss each of these contexts.



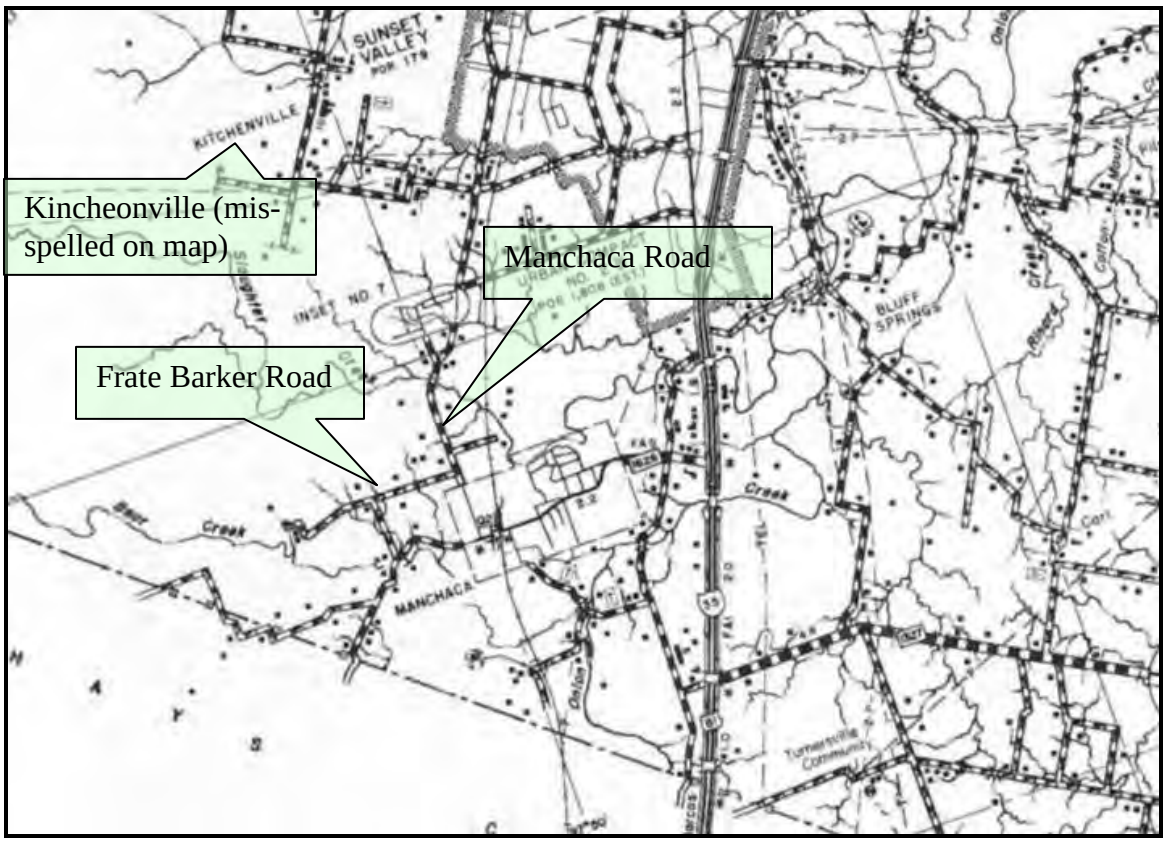
Detail View of Texas General Highway Map (1940) indicating Frate Barker Road

Community Development and Planning in the Manchaca Area from 1850s-1964

On October 25, 2007, the project architectural historian informally interviewed Chris Winslow, the current co-owner of Property 101 (It's About Thyme Garden Center). Mr. Winslow stated that he and his wife purchased the property from a black family who owned the property for a "long time." Therefore, the architectural historian investigated black communities as part of the community development in the area to see if Property 101 might have been part of a larger context of a black community. The Survey investigation revealed no connection between the Property 101 farm house constructed c. 1910 to the predominantly black community of Kincheonville founded in 1865.

Beginning in the 1950s, developers and individuals purchased agricultural land and converted it to suburban housing to meet the expanding population of the Austin metropolis. San Leanna and Kincheon subdivisions were both developed in the 1950s.

One house, constructed in 1969, is located on the north side of Frate Barker Road on a large parcel with an elaborate gate. This property is discussed further in the reconnaissance survey. Along the south side of Frate Barker Road are a few more modest houses dating from the 1970s and 1980s. None of the suburban houses along Frate Barker Road date from the 1950s or the early 1960s. Two newer, large housing developments are located along the north side of Frate Barker Road and one is currently being constructed along the south side of the road.



Detail View of Texas General Highway Map (1961) indicating Frate Barker Road

Agriculture in Southwest Travis County from 1850s-1964

Land in southwest Travis County was more suited to raising livestock rather than cash crops because of the rocky soils and somewhat arid conditions. The agriculture around Manchaca consisted primarily of small farms (100 to 300 acres) that contained cows, chickens, pigs, and/or goats, plus crops to provide feed for livestock, and vegetables for the farm family. An exception to the small farms was the large ranch owned by Frate Barker (Baranoff 2007). The c. 1910 farmhouse (Property 101) was converted to a plant

nursery in recent years; however the house is probably a remnant of one of the small farms of the area and is unrelated to the Frate Barker Ranch. Likewise, Property 102 consists of a barn, another remnant of the agricultural past.

Reconnaissance Survey

During October 2007, a TxDOT pre-certified architectural historian conducted a reconnaissance survey to identify historic-age resources (constructed in 1964 or before) within the Survey Study Area. Utilizing the results of the records review, each historic-age property in the study area was located and mapped onto the most recent available topographic map and digitally photographed. Two historic-age resources were documented in this manner including one agricultural barn and one agricultural dwelling rehabilitated as a commercial property. Each was assigned a unique property number and was documented on a site inventory form that included an architectural description, physical integrity issues, construction date, stylistic influence, and property type or use. The historian preliminarily evaluated each historic-age resource identified in the reconnaissance survey for NRHP eligibility. These preliminary evaluations will be reviewed by the TxDOT ENV Historical Studies staff.

Note that one additional historic-age farmstead was observed within the Survey Study Area, however the primary dwelling appears to be constructed in 1969 and is not contemporaneous with the historic-age outbuildings. In addition, the Travis County Appraisal District shows that the farmstead is divided into three separately taxed parcels. The parcel that contains the historic-age outbuildings is not adjacent to the APE or the Survey Study Area. Therefore, this location was not included in this report. The historian discussed this property with TxDOT ENV and concluded that it should not be included in this report (Personal Communication: Rene Benn).

A TxDOT pre-certified architectural historian conducted research to develop a historic background and context for the study area utilizing many of the resources listed above from the file review. Primary sources such as historic maps proved useful in constructing a chronology of development in the study area. The historic context provided a

framework in which to evaluate NRHP eligibility. Individual eligibility recommendations based on age, significance, and integrity are recorded in **Appendix C Historic Resource Inventory**. **Appendix D Property Forms** provide photographic documentation for review and final eligibility determinations.

Historic-age Resources	Historic-age Resources per Resource Type	No. of Properties Containing Historic-age Resources
Agricultural	2	2
TOTALS	2	2

The reconnaissance survey of the project area identified two historic-age resources (45 years of age or older built prior to c. 1964) associated with agriculture.

NRHP-Eligibility

The study area contains two historic-age resources. This report recommends both as **not eligible** for NRHP. Property 101 is a building that was probably constructed as an agricultural dwelling (farmhouse), but exhibits significant alterations. Property 101 (It's About Thyme Garden Center) is currently used as a retail sales building and therefore the historic use has changed from agricultural to commercial retail sales. The building is no longer recognizable as a component of a c. 1910 farm. Although the location of the property has remained the same, the setting, association, and use have been significantly altered in the following ways: modern intrusions have changed the setting and association (including multiple large and small greenhouses; a parking lot; retail signs; and a modern garage). Therefore, Property 101 does not exhibit an association with Agriculture in Travis County and this report recommends Property 101 as **not eligible** for listing in the NRHP under **Criterion A**. Because the building has no known association with any historically significant people, this report recommends Property 101 as **not eligible** for listing in the NRHP under **Criterion B**. The materials and workmanship have been altered by the replacement of all exterior doors and an architecturally incompatible addition that filled in the rear of the ell. Because of all these integrity issues, Property 101 is recommended as **not eligible** for the NRHP under **Criterion C** for Architecture.

Property 102 is a wood barn sited in the midst of heavy brush and trees. Photography of this property was difficult due to evergreen vegetation. Because the original farmhouse is not extant and the barn appears to be an isolated remnant of a historic farmstead, this report recommends Property 102 as **not eligible** for listing in the NRHP under **Criterion A** for Events (Agriculture). Property 102 has no known association with any historically significant persons and therefore this report recommends Property 102 as **not eligible** for listing in the NRHP under **Criterion B**. Property 102 does not exhibit any distinctive design, materials, or craftsmanship, and is not the work of a master and this report recommends Property 102 as **not eligible** for listing in the NRHP under Criterion C for Architecture or Engineering.

Property Number	Property Type	Subtype	No. of Resources	NRHP Eligibility Recommendation
101	Agricultural	Residence	1	Not Eligible
102	Agricultural	Barn	1	Not Eligible

Conclusion

Pursuant to Stipulation VI, "Undertakings with the Potential to Cause Effects," of PA-TU, TxDOT ENV historians will review the recommendations of this report and determine if any historic properties are present. If the TxDOT ENV historians determine that a historic property is present, they will also determine the effects of the project to the historic property and whether coordination with SHPO is required. This report anticipates that TxDOT ENV historians will determine that no historic properties are present, and therefore the project would have no effect to historic properties, and no individual coordination with SHPO would be required.

Sources Consulted

Baranoff Elementary School Pond Project, Pond History, accessed 11/13/2007:
http://home.earthlink.net/~mrstryker/pond/history.html

Benn, Rene. Personal Conversation at TxDOT ENV dated July 8, 2008.

Marbridge Website, "The Story: A Respected Past, and an Innovative Future," accessed 11/12/2007:
http://marbridge.org/story/

Smyrl, Vivian Elizabeth
2007 *Handbook of Texas Online*, s.v. "Kincheonville, Texas," accessed 11/13/2007:
http://www.tsha.utexas.edu/handbook/online/articles/KK/hrk26.html.
2007 *Handbook of Texas Online*, s.v. "Manchaca, Texas," accessed 10/11/2007:
http://www.tsha.utexas.edu/handbook/online/articles/MM/hnm8.html
2007 *Handbook of Texas Online*, s.v. "San Leanna, Texas," accessed 10/11/2007:
http://www.tsha.utexas.edu/handbook/online/articles/SS/hrsck.html
2005 *Handbook of Texas Online*, s.v. "Travis County, " accessed 11/12/2007:
http://www.tsha.utexas.edu/handbook/online/articles/TT/hct8.html

Texas Historical Commission
2005 *Historic Sites Atlas*. http://atlas.thc.state.tx.us.

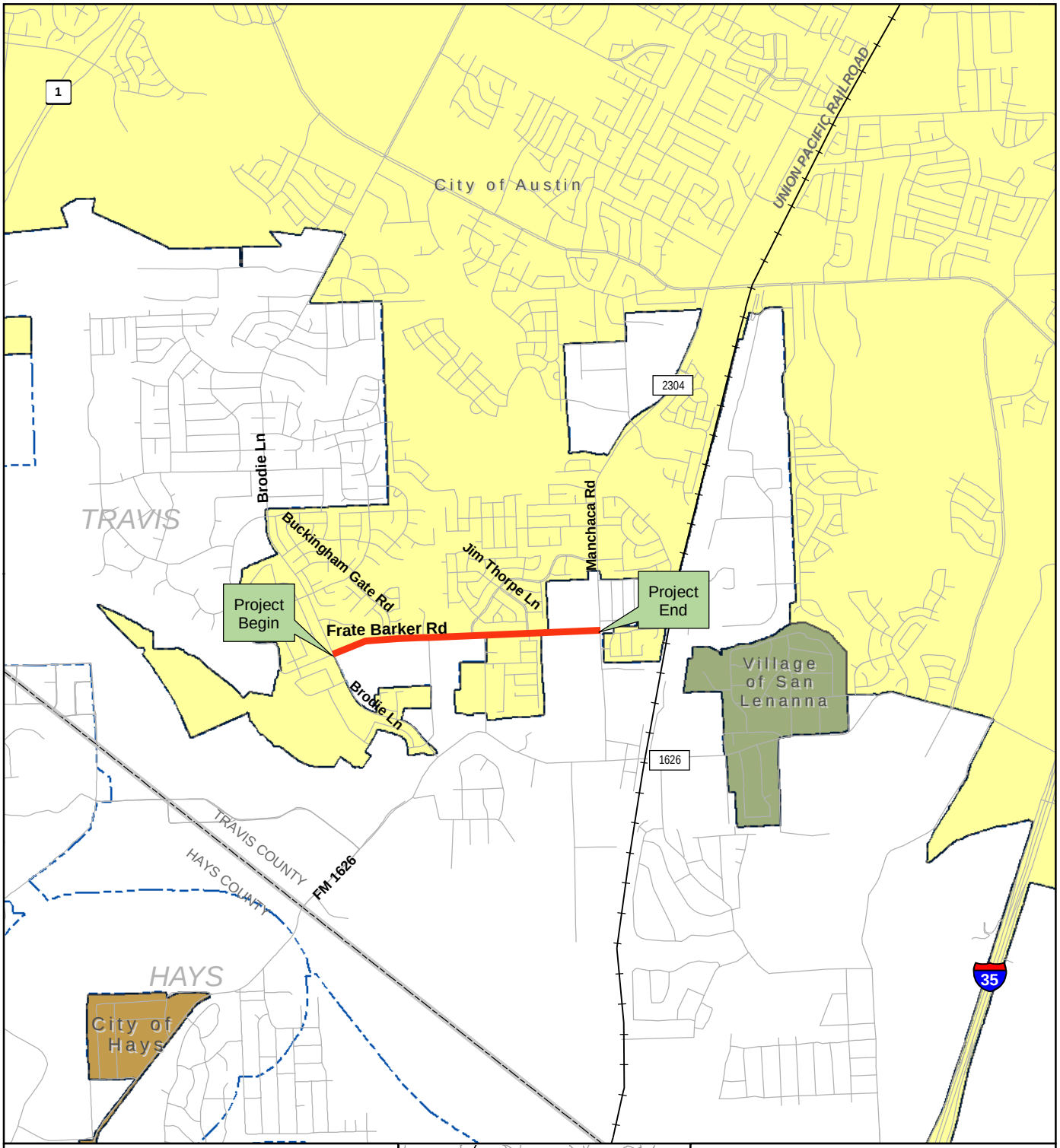
Texas State Highway Department
1940 Travis County, Texas General Highway Map. Available at
http://tsl.state.tx.us/arc/maps/images/map4888.jpeg
1961 Travis County, Texas General Highway Map. Available at
http://tsl.state.tx.us/arc/maps/images/map5169.jpeg

Travis County Appraisal District
2007 Appraisal Roll located at:
http://www.traviscad.org/search1.php

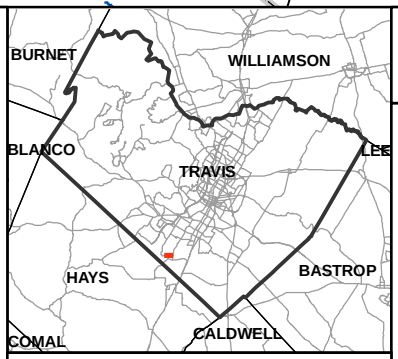
Appendix A

Figure 1: Project Location

Figure 2: Historic Resource Locations



Railroad
Project Limits
County Line
CITY OF AUSTIN
CITY OF HAYS
VILLAGE OF SAN LEANNA
ETJs



N
W E
S

0.5 0.25 0 0.5 Miles

Source:

City of Austin Base Data

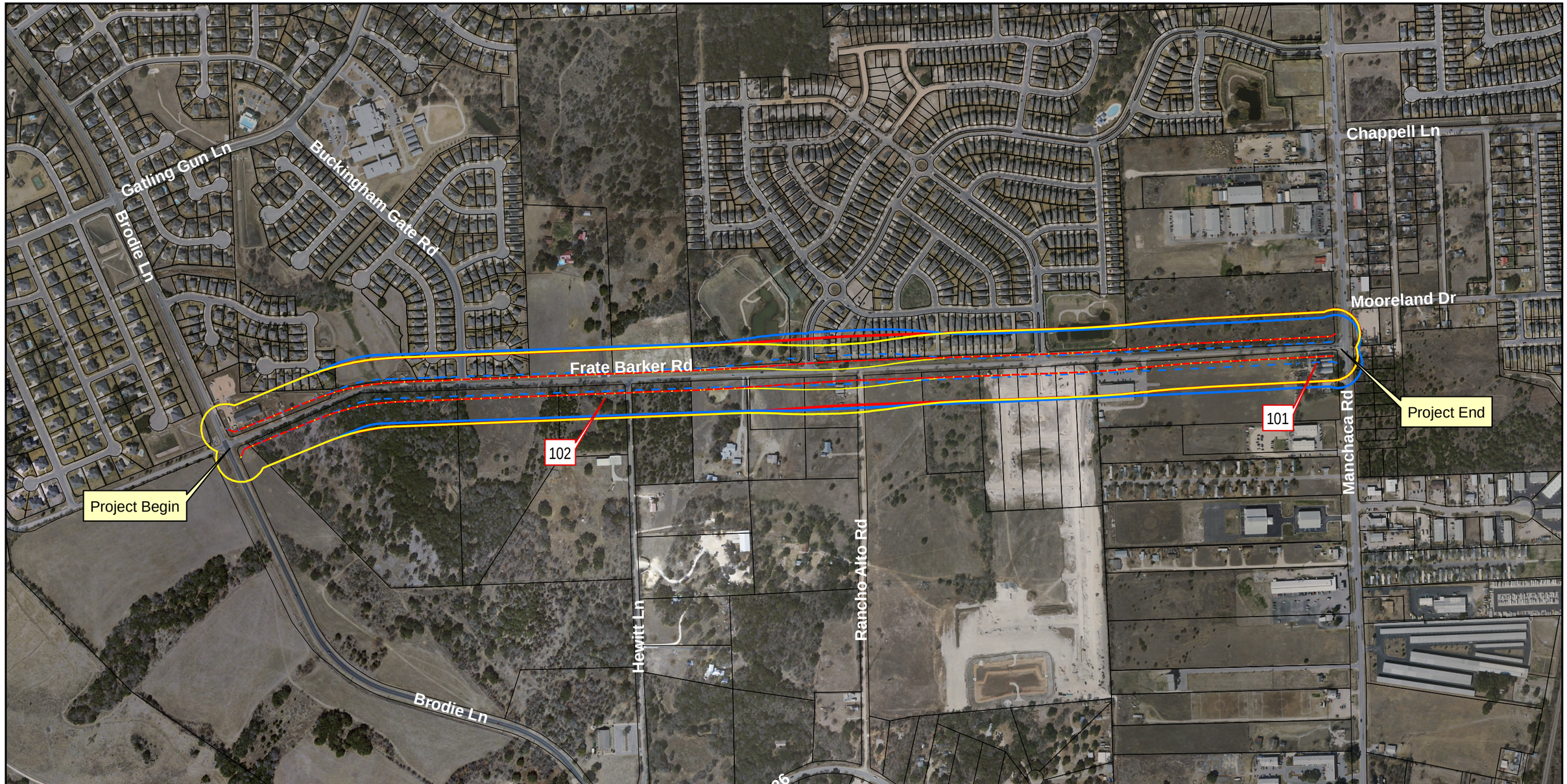
TRAVIS COUNTY

Texas Department of Transportation

Appendix A, Figure 1
Project Location Map

Frate Barker Road
Brodie Lane to Manchaca Road

Environmental Assessment
CSJ # 0914-04-242
Travis County, Texas



2006 CAPCO Aerial Photography

- Alternative 1 ROW
- Alternative 2 ROW
- Alternative 3 ROW
- Alternative 1 Area of Potential Effect (APE)
- Alternative 2 APE
- Alternative 3 APE
- Parcel Boundary

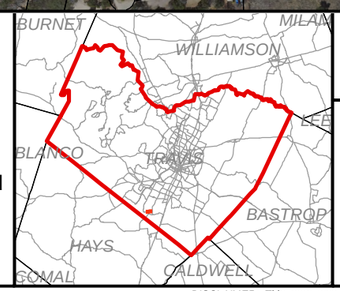
Appendix A, Figure 2

Frate Barker Road

Historic Resource Locations
Brodie Lane to Manchaca Road

CSJ # 0914-04-242

Travis County, Texas



TRAVIS COUNTY

Texas Department of Transportation

N
W E
S

1:7,200

600 300 0 600

Feet

Appendix B

Research Design

HISTORIC-AGE RESOURCES SURVEY
CSJ: 0914-04-242

FRATE-BARKER ROAD: BETWEEN BRODIE LANE AND MANCHACA ROAD

TEXAS DEPARTMENT OF TRANSPORTATION
AUSTIN DISTRICT
TRAVIS COUNTY, TEXAS

Contract: District ENV
Contract Number: 07AE0019LP
HNTB Project: 43508

Prepared by:
Sally Victor, Historian
Beth A. Reed, Historian
HNTB Corporation
301 Congress Avenue, Suite 600
Austin, Texas 78701
(512) 447-5590

October 2007

List of Consulting Partners

Prime Contractor

HNTB Corporation
Sally Victor, Historian
Beth Reed, Historian
301 Congress Avenue
Suite 600
Austin, Texas 78701
(512) 447-5590

Subcontractors

None

Certified Local Governments (CLG)

Travis County CLG
Barry Hutcheson, Chair
Travis County Historical Commission
5803 Burrough Dr
Austin, 78745
512/892-4938
Bhutch1965@aol.com

Local Preservation Contacts

Marker Chair
Anita Howard
1312 Ardenwood Road
Austin, 78722
512/454-1936
nita1312@aol.com

Texas Historical Commission
Earl Broussard, Jr.
TBG Partners
901 South MoPac
Building II, Suite 350
Austin, 78746-5903
512/327-1011 O
512/327-0488 F
earl.broussard@tbg-inc.com

THC/Antiquities Advisory Board
Donna D. Carter
Carter Design Associates
817 West 11th Street
Austin, 78701-2009
512/476-1812 O
512/476-1819 F
ddcarterthc@carterdesign.net

Antiquities Advisory Board
Christopher Jurgens, Ph.D.
Texas Water Development Bd.
1700 North Congress Avenue
Austin, 78701
512/463-8434
Christopher.jurgens@twdb.state.tx.us

Laurie Limbacher, AIA
Limbacher & Godfrey Architects
3406 Glenview Ave, Ste 200
Austin, 78703
512/450-1518
512/302-1580 F
lga@austin.com

Texas Preservation Trust Fund
Doug Boyd
Prewitt & Associates, Inc.
2105 Donley Ave., Ste 400
Austin, 78758
512/459-3349 ext. 204
512/459-3851 F
dboyd@paiarch.com

Suzy Juncker
Avenue One Properties
901 West 9th St., Ste. 110
Austin, 78703
512/472-3336
512/472-4722 F
sjuncker@aveone.com

John Volz
Volz & Associates, Inc.
1105 West 42nd Street
Austin, 78756
512/476-0433
512/476-2198 F
jvolz@volzassociates.com

SBR
Dr. Andŕes Tijerina
Austin Community College
Social Behavior Sciences Dept.
7748 290 West
Austin, 78736
512/223-8137 O
andrest@austincc.edu

Friends
Gay Ratliff
3509 Hampton Rd.
Austin, 78705
512/476-3831
512/476-1299 F
gayratliff@earthlink.net

John Mayfield, AIA
3824 Avenue F
Austin, 78751
512/322-9207 O
512/322-9768 F
jmmayfld@usa.net

Julian O. Read
GCI Read-Poland & Assoc.
327 Congress Ave., Ste 500
Austin, 78701
512/472-4122 ext. 2823 O
512/472-5970 F
jread@gcireadpoland.com

Mary Carroll Foley
1707 Spyglass Drive, #46
Austin, 78746
512/732-0281 H
512/732-7287 F
mcfaustin@sbcglobal.net

Project Description
Travis County, in coordination with the Texas Department of Transportation (TxDOT), is preparing an Environmental Assessment (EA) for the proposed expansion of the existing Frate-Barker Road from a 2-lane rural section arterial roadway to a 4-lane curb and gutter roadway with a continuous turn lane and 5 foot bike lanes and 6 foot wide sidewalks on both sides. The existing right-of-way (ROW) width varies from 50-95 feet with a usual width of 70 feet. The total project length is approximately 1.3 miles and the proposed width is 120 feet.

Proposed APE
Pending approval by the TxDOT Environmental Affairs Division (TxDOT ENV), the proposed area of potential effect (APE) for this project is 150 feet on either side of the proposed ROW. Confirmation by TxDOT ENV, in writing, will be obtained prior to commencement of field survey. All parcels, including partial parcels falling within the APE, will be evaluated for historic-age resources.

Project Area Map
A project area map will be prepared identifying the APE for the study area using the most current design files for the project. With written confirmation from TxDOT ENV, project historians can proceed with the survey of non-archaeological historic-age resources.

Identification of Previously Designated Historic Properties
Project historians have completed a limited review of previously-designated historic properties within 1300 feet of the project area in order to develop a historic context of the project area. The following sources were reviewed:

- The Texas Historical Commission's (THC) *Texas Historic Sites Atlas* (Atlas) for National Register of Historic Places (NRHP), Recorded Texas Historic Landmarks (RTHL) List and Official Texas Historical Markers (OTHM) listed resources, and
- The THC State Archaeological Landmarks Structure (SAL) list

No previously recorded historic resources within the project area were found within the project APE, or within 1300 feet of the APE.

Historic Resources Survey Methodology
Historians will survey the APE for non-archaeological historic-age resources once HNTB has received written confirmation from TxDOT ENV granting approval of the proposed APE. Because of the anticipated resources and the scope of this study, the study limits will be the same as the APE.

According to the National Park Service criteria, a property must be at least fifty (50) years of age to be evaluated for eligibility and/or listing in the National Register of

Historic Places (NRHP). However, to allow for possible project delays, the guideline given by TxDOT in the *Draft Historic Resources Section 106 Review and NEPA Guide* (published on September 8, 2006) is to survey properties constructed 45 years prior to the date of project letting or before. Therefore, to allow for potential delays in letting, resources will be surveyed that are 1964 and older based on the proposed letting date (2009) minus forty-five (45) years.

The objectives of the project historians performing the non-archaeological historic-age resources survey will be:

- To conduct a reconnaissance survey of historic-age resources that are 45 years of age or older (from the proposed letting date) within the established APE and evaluate resources for eligibility for inclusion in the NRHP. TxDOT ENV staff will review and revise eligibility recommendations as needed. No historic-age property reconnaissance survey will be conducted outside the project APE and associated parcels.
- To perform historic resource studies and document historic-age resources at sufficient levels to satisfy the THC requirements for determining the presence of historically significant properties within the APE in accordance with 36 CFR 60 and 13 TAC 26.

Expected Applicable Historical Contexts
Based on limited archival research, the following historic contexts associated with the project area have been identified:

- *Agricultural Development in Southwest Travis County (1870 to1965),* and
- *Residential Community Planning and Development in Southwest Travis County (1870 to1965)*

Additional themes will be evaluated if identified. Identification, evaluation, and documentation tasks will be completed in accordance with the provisions of the Secretary of the Interior's Standards (48 CFR Parts 44715-42). The project area encompasses both rural and suburban settings in Travis County. Property types anticipated include small commercial buildings, rural farmsteads, miscellaneous agricultural outbuildings, and some miscellaneous historic-age buildings, as well as contemporary suburban housing.

Historic Resources Report
HNTB will complete a report that includes survey results that are sufficient for TxDOT ENV to determine eligibility and effects and to coordinate with THC as required. The historic resources report will include the following:

- An evaluation of all historic-age resources within the APE to include a history of the project area, historic contexts, a summary of survey results, and NRHP recommendations for each resource.

- Be approximately five (5) to eight (8) pages in length (excluding figures and tables)
- Hard-copy maps and/or electronic files that will identify areas relevant to the current investigations for inclusion in an EA.
- Photographic documentation of historic-age resources within the APE with brief descriptions. Photographs of each resource will include, at a minimum, an oblique view of the primary façade and a side elevation. All photographs will be 3.5"x 5" color photos on matte finish photo paper or digitally reproduced. Digital copies of the historic resources report will be provided to TxDOT ENV.
- Evaluation of each surveyed resource for NRHP eligibility, in compliance with the *Secretary of the Interior's Standards for the Identification, Evaluation and Documentation (48 CFR Parts 44716-42).* Any potential historic districts will be recorded with an approximate boundary recommendation; specific boundaries for any potential historic districts would be provided as part of an intensive survey.
- Additional archival research on individual resources and any potential historic district as necessary to evaluate resources. Sources for this research may include:
  - Maps and aerial photographs (including USGS maps)
  - Historic maps at the Texas State Library & Archives
  - TxDOT Brinsap Reports and if indicated, TxDOT Historic Bridge Inventory
  - Travis County Appraisal District Records
  - Travis County plat records
  - The List of Consulting Partners for this project (attached)

  Include a table of information for all surveyed properties to include a site identification number, address, date of construction, property type, and subtype, style, preliminary eligibility recommendations, and comments regarding the integrity of the property.
- Include a plot of all resources, including any potential historic districts, on a digital orthophoto quadrangle map (similar to the APE map) that clearly shows the existing ROW, any proposed new ROW, major street names, or other directional landmarks, as well as any OTHM.

Proposed Schedule

- Archival Research: October 2007
- Reconnaissance Survey: October 2007
- Draft Report: February 15, 2007
- Final Report: March 15, 2007

Intensive Historic Resources Survey

If the reconnaissance survey identifies historic-age properties that are potentially eligible for listing in the NRHP, an intensive survey and archival research will be conducted under a separate agreement.

Sources

Kite, Kirk
2005 *Handbook of Texas Online*, s.v. "Highway Development, TX." http://www.tsha.utexas.edu/handbook/online/articles/HH/erh2.html.

National Register Information System
2007 Accessed at http://www.nps.gov/history/nr/research/.

Smyrl, Vivian Elizabeth
2005 *Handbook of Texas Online*, s.v. "Travis County, TX." http://www.tsha.utexas.edu/handbook/online/articles/TT/hct8.html.

State Highway Department
1940 Travis County Texas General Highway Map. Accessed at http://www.tsl.state.ts.us.

1960 Travis County Texas General Highway Map. Accessed at http://www.tsl.state.ts.us.

Texas Historical Commission
2007 *Historic Sites Atlas.* Accessed at http://atlas.thc.state.tx.us.

Appendix C

Historic Resource Inventory

PROPERTY NO.	LOCATION	PROPERTY TYPE/ SUBTYPE	FORM/ PLAN	STYLISTIC INFLUENCES	DATE	ALTERATIONS/ COMMENTS	NRHP ELIGIBILITY RECOMMENDATION
101	11726 Manchaca Road It's About Thyme Garden Center	Agricultural/ Dwelling	Ell with rear addition	Vernacular	c. 1910	A farm house converted to a commercial plant nursery with multiple new barrel-roofed greenhouses on the property. The ell of the house was filled-in with a rear addition that is incompatible with original building. Drop-wood siding and windows appear to be original. All doors replaced with diamond-shaped glazing on the upper half of metal each door. Painted, masonry chimneys on gable-ends of building (south and west). Current owner says house was owned by a black family when he purchased the property.	Not Eligible
102	Southwest corner of Frate Barker and Hewlitt Lane. S. B. Speir Property	Agricultural/ Barn	Rectangular	Vernacular	c. 1940	Vertical board siding; at least two sides open; corrugated metal roof; isolated remnant of an earlier farmstead; deteriorated condition significantly reduces integrity. Photography was difficult due to excessive and dense vegetation surrounding the resources.	Not Eligible

Appendix D

Property Forms

Property No.: 101
Address/Location: 11726 Manchaca Road
Property Type: Commercial/Retail Store and Plant Nursery

View facing west from right-of-way

Property No.: 101

Detail view of front porch

Property No.: 101

View of south facade

Property No.: 101

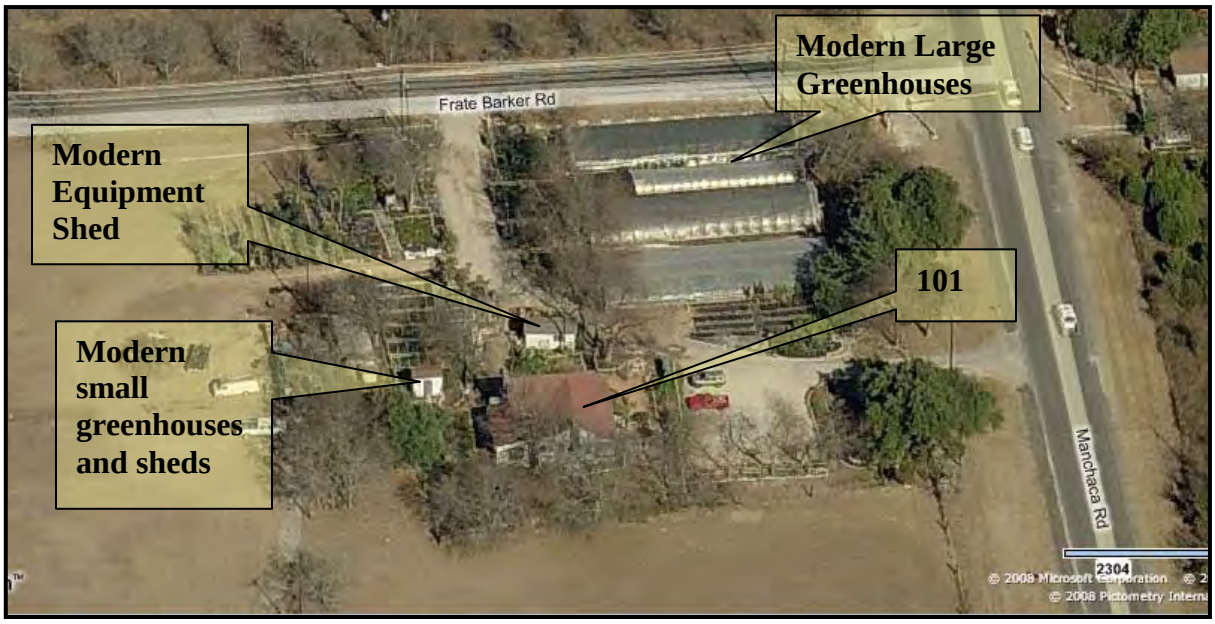
View of west façade with infill addition

Property No.: 101

Detail view of west façade where infill addition meets original building

View of north façade

Property No.: 101 and Context



Aerial view from Maps.live.com

Property No.: 102
Address/Location: Southwest corner of Frate Barker Road and Hewitt Lane
Property Type: Agricultural/ Barn

View isolated outbuilding facing southeast

Property No.: 102

Aerial view from Maps.live.com

APPENDIX E: USFWS FINAL RULE LISTING THE BARTON SPRINGS SALAMANDER

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AC22

Endangered and Threatened Wildlife and Plants; Final Rule To List the Barton Springs Salamander as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Fish and Wildlife Service (Service) determines the Barton Springs salamander (*Eurycea sosorum*) to be an endangered species pursuant to the Endangered Species Act of 1973, as amended (Act). The Barton Springs salamander is known only from Barton Springs in Zilker Park, Austin, Travis County, Texas. The primary threats to this species are degradation of the quality and quantity of water that feeds Barton Springs due to urban expansion over the Barton Springs watershed. Also of concern is disturbance to the salamander's surface habitat in the pools where it occurs. This action implements Federal protection provided by the Act for the Barton Springs salamander.

EFFECTIVE DATE: May 30, 1997.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Ecological Services Field Office, U.S. Fish and Wildlife Service, 10711 Burnet Road, Suite 200, Austin, Texas 78758.

FOR FURTHER INFORMATION CONTACT: Lisa O'Donnell, Fish and Wildlife Biologist (see **ADDRESSES** section) (telephone: 512/490–0057; facsimile (512/490-0974)).

SUPPLEMENTARY INFORMATION:

Background

The Service determines the Barton Springs salamander (*Eurycea sosorum*) to be an endangered species, under the authority of the Endangered Species Act (Act) (16 U.S.C. 1531 *et seq.*). The Barton Springs salamander is entirely aquatic and neotenic (meaning it does not metamorphose into a terrestrial form and retains its bright red external gills throughout life) and depends on a constant supply of clean, flowing water from Barton Springs. Adults attain an average length of 6.35 centimeters (cm) (2.5 inches (in)). This species is slender, with slightly elongate limbs and reduced eyes. Dorsal coloration varies from pale purplish-brown or gray to yellowish-cream. Irregular spacing of dorsal pigments and pigment gaps results in a mottled, "salt and pepper" pattern (Sweet 1978, Chippindale *et al.* 1993a).

The Barton Springs salamander was first collected from Barton Springs Pool in 1946 by Bryce Brown and Alvin Flury (Chippindale *et al.* 1993a,b). Although he did not publish a formal description, Dr. Samuel Sweet (University of California at Santa Barbara) was the first to recognize the Barton Springs salamander as distinct from other central Texas *Eurycea* salamanders based on its restricted distribution and unique morphological and skeletal characteristics (such as its reduced eyes, elongate limbs, dorsal coloration, and reduced number of presacral vertebrae) (Sweet 1978, 1984). Based on Sweet's work and genetic studies conducted by Chippindale *et al.* (1990, 1992, 1993b), the Barton Springs salamander was formally described in June 1993 (Chippindale *et al.* 1993a). An adult male (based on external examination only) collected from Barton Springs Pool in November 1992 was selected to be the holotype (Chippindale *et al.* 1993a).

The water that discharges at Barton Springs originates from the Barton Springs segment of the Edwards aquifer (hereafter referred to as the "Barton Springs segment"). Barton Springs is the fourth largest spring in Texas, exceeded only by Comal, San Marcos, and San Felipe springs (Brune 1981). The Barton Springs salamander is found near three of four hydrologically connected spring outlets that collectively make up Barton Springs. These three spring outlets are known as Parthenia (=Main), Eliza (=Concession, =Elk's), and Sunken Garden (=Old Mill, =Walsh) springs, and they occur in Zilker Park, which is owned and operated by the City of Austin. No salamanders have been found at the fourth spring outlet, which is in Barton Creek immediately above Barton Springs Pool (Chippindale *et al.* 1993a,b; Sweet, pers. comm., 1993; Robert Hansen, City of Austin, *in litt.*, 1995a; William Russell, Texas Speleological Survey, *in litt.* 1995). The area around the main spring outlet (Parthenia Springs) was impounded in the late 1920's to create Barton Springs Pool. Flows from Eliza and Sunken Garden springs are also retained by concrete structures, forming small pools located on either side of Barton Springs Pool. The salamander has been observed at depths of about 0.1 to 5 meters (m) (0.3 to 16 feet (ft)) of water under gravel and small rocks, submerged leaves, and algae; among aquatic vegetation; and buried in organic debris. It is generally not found on exposed limestone surfaces or in silted areas (Sweet 1978; Dr. Charles Sexton, City of Austin, *in litt.*, 1992; Chippindale *et al.* 1993a,b; Jim Collett, Robert Hansen, and Mateo Scoggins, City of Austin, pers. comms., 1994–1995; Lisa O'Donnell, U.S. Fish and Wildlife Service (USFWS), pers. obs., 1996).

"Dozens or hundreds" of individuals were estimated to occur among sunken leaves in Eliza Pool during the 1970's (Chippindale *et al.* 1993a,b), while fewer than 15, and occasionally no individuals, were observed during surveys conducted in Eliza Pool between 1987 and 1992 (Chippindale *et al.* 1993a,b). No salamanders were observed at this location between December 1993 and May 1995 (Paul Chippindale, University of Texas at Arlington, Collett, Hansen, and Scoggins; pers. comms., 1994–1995; Hansen *in litt.* 1995b). Numbers ranged from 0 to 28 between June 1995 and July 1996, and dead salamanders have been found (O'Donnell, unpubl. data, 1995–1996).

The Barton Springs salamander was reportedly abundant among the aquatic vegetation in the deep end of Barton Springs Pool when it was collected in 1946 (Hillis and Chippindale 1992; Chippindale *et al.* 1993a,b). Between 1989 and 1991, Sexton (*in litt.*, 1992) reported finding salamanders under rock rubble immediately adjacent to the main spring outflows on "about one out of four [snorkeling] dives." On July 28, 1992, at least 50 salamanders (David Hillis, University of Texas at Austin, pers. comm., 1993) were found over an area of roughly 400 square (sq) m (4,300 sq ft) near the spring outflows in Barton Springs Pool, about 3 to 5 m (10 to 15 ft) below the water (Chippindale *et al.* 1993a,b). Following reports of a fish kill on September 28, 1992, attributed to the improper application of chlorine to clean Barton Springs Pool, only 10 to 11 salamanders were observed and could only be found in an area of about 5 sq m (54 sq ft) in the immediate vicinity of the Parthenia Spring outflows (Chippindale *et al.* 1993a,b). At least 80 individuals were observed during the first comprehensive survey effort conducted in Barton Springs Pool on November 16, 1992, and about 150 individuals were seen on November 24, 1992 (Chippindale *et al.* 1993a,b). A comprehensive survey conducted immediately following an October 1994 flood event reported a total of 16 salamanders, and a total of 10 salamanders was counted in March 1995 (Hansen, *in litt.* 1995c).

The City of Austin initiated monthly transect surveys in June 1993 to provide

more consistent data concerning the range and size of the Barton Springs salamander population in Barton Springs Pool. Survey counts ranged from 1 to 27 individuals (mean = 13) between July 1993 and March 1995. The highest survey counts (27 individuals) were reported in November 1993 and May 1994. The lowest counts (ranging from 1 to 6 individuals) occurred during a five-month period following the October 1994 flood event (Hansen, *in litt.* 1995c). Survey counts between April 1995 and April 1996 ranged from 3 to 45 salamanders (City of Austin, unpubl. data).

The salamander was first observed at Sunken Garden Springs on January 12, 1993 (Chippindale *et al.* 1993b). Less than 20 individuals have been reported on any given visit to that outlet (Chippindale 1993b; Hansen, pers. comm., 1995). Because it is part of the Barton Springs complex and is hydrologically connected to Parthenia Springs, biologists had speculated that the salamander occurred at Sunken Garden Springs. However, no salamanders were observed during previous surveys conducted at this location between 1987 and 1992. Low water levels and the presence of large rocks and sediment make searching for salamanders difficult at Sunken Garden Springs (Chippindale *et al.* 1993b; O'Donnell, pers. obs., 1995).

No evidence exists that the species' range extends beyond the immediate vicinity of Barton Springs. Despite survey efforts and searches at other spring outlets, caves, and uncased wells in the Barton Springs segment, no other locations of the Barton Springs salamander have been found (Chippindale *et al.* 1993a,b; Russell, *in litt.* 1995; Russell 1996; Hillis; Andy Price, Texas Parks and Wildlife Department; Sweet; pers. comms., 1993; Hansen, *in litt.* 1995a). No other species of *Eurycea* is known to occur in this portion of the aquifer. Although the extent to which the Barton Springs salamander occurs in the aquifer is unknown, it is likely concentrated near the spring openings where food supplies are abundant, water chemistry and temperatures are relatively constant, and where the salamander has immediate access to both surface and subsurface habitats. Barton Springs is also the main discharge point for the entire Barton Springs segment, and is one of the few perennial springs in the area.

The Barton Springs salamander's diet is believed to consist almost entirely of amphipods (*Hyallela azteca*) and other small invertebrates (James Reddell, Texas Memorial Museum, University of Texas at Austin, pers. comm., 1993; Hillis and Chippindale 1992; Chippindale *et al.* 1993a,b). Primary predators of the Barton Springs salamander are believed to be fish and crayfish (Chippindale *et al.* 1993a,b; Collett, Hansen, and Scoggins, pers. comms., 1995). Observations of larvae and females with eggs indicate breeding occurs year-round (Chippindale, pers. comm., 1993; Collett, Hansen, and Scoggins, pers. comms., 1994–1995). The Barton Springs salamander's eggs are white (Lynn Ables and Streett Coale, Dallas Aquarium; Jim Dwyer, Midwest Science Center; pers. comms., 1996) and have never been observed in the wild (Chippindale, Hillis, and Price, pers. comms. 1993; Collett, Hansen, and Scoggins, pers. comms., 1994–1995; O'Donnell, pers. obs., 1995–1996).

The Barton Springs segment covers roughly 400 sq kilometers (km) (155 sq miles (mi)) from southern Travis County to northern Hays County, Texas, and has a storage capacity of over 37,000 hectare-meters (300,000 acre-feet) (Slade *et al.* 1985, 1986). The watersheds of the six creeks upstream (west) of the recharge zone span about 684 sq km (264 sq mi). This area is referred to as the contributing zone and includes portions of Travis, Hays, and Blanco counties. The recharge and contributing zones (hereafter referred to collectively as the "Barton Springs watershed") make up the total area that provides water to the aquifer, which equals about 917 sq km (354 sq mi). A detailed description of the Barton Springs segment of the Edwards aquifer can be found in the Service's February 17, 1994, proposed rule (59 FR 7968). Porous limestone, karst aquifers, such as the Barton springs segment may transport pollutants rapidly once such materials enter the creeks or other recharge features (EPA 1990, TWC 1989, Slade *et al.*1986, Ford and Williams 1994, Notenboom *et al.* 1994)

Because of the characteristics of karst aquifers, Barton Springs is believed to be heavily influenced by the quality and quantity of runoff, particularly in the recharge zone (City of Austin 1991; Slade *et al.* 1986). Thus, increasing urban development over the area supplying recharge waters to the Barton Springs segment can threaten water quality within the aquifer. The Texas Water Commission (now known as the Texas Natural Resource Conservation Commission (TNRCC)) identified the Edwards aquifer as being one of the most sensitive aquifers in Texas to groundwater pollution (TWC 1989; Hart, *in litt.*, 1991; TNRCC 1994).

Previous Federal Action

The Barton Springs salamander was a Category 2 candidate species on the Service's candidate notices of review from December 30, 1982 (47 FR 58454; September 18, 1985: 50 FR 37958; January 6, 1989: 54 FR 554; and November 21, 1991: 56 FR 58804) until publication of the proposed rule to list the species as endangered (59 FR 7968; February 17, 1994). Dr. Mark Kirkpatrick and Ms. Barbara Mahler petitioned the Service to list the Barton Springs salamander on January 22, 1992, and on December 11, 1992 (57 FR 58779), the Service published a notice in the **Federal Register** that the petition presented substantial information that the requested action may be warranted. A proposed rule to list the Barton Springs salamander was published in the **Federal Register** on February 17, 1994 (59 FR 7968). The Service held a public hearing on June 16, 1994, in Austin, Texas (59 FR 27257). On March 10, 1995, the Service published a notice extending the 1-year deadline for final action on the proposed rule until August 17, 1995, and reopened the public comment period (60 FR 13105).

On April 10, 1995, Congress enacted a moratorium prohibiting work on listing actions (Public Law 104–6) and eliminated funding for the Service to conduct final listing actions. On November 27, 1995, in response to a lawsuit from the Save Our Springs Legal Defense Fund (Save Our Springs Legal Defense Fund, Inc., *et al.* v. Bruce Babbitt), a U.S. District Court invalidated the Service's March 10, 1995, notice of extension and ruled that the Service had to make a final determination on whether or not to list the Barton Springs salamander within 14 days of the court order. The court granted a stay pending the Service's appeal of the order, on the grounds that the moratorium and lack of funding prohibited the Service from making a final listing determination. The moratorium was lifted on April 26, 1996, by means of a Presidential waiver, at which time limited funding for listing actions was made available through the Omnibus Appropriations Act (Pub. L. No. 104–134, 100 Stat. 1321, 1996). The Service published guidance for restarting the listing period on May 16, 1996 (61 FR 24722). Due to the potential for new information during the lapse between the reinstatement of the listing program and the close of the last 45-day comment period (May 17, 1995), the Service reopened the public comment period on June 24, 1996, for 30 days. That comment period closed July 10, 1996, by U.S. District Court order.

On September 4, 1996 (61 FR 46608), the Service withdrew the proposed rule to list the Barton Springs salamander as endangered based on a conservation agreement signed by the Service and the TNRCC, Texas Parks and Wildlife Department (TPWD), and Texas Department of Transportation (TxDOT) on August 13, 1996. The goal of the Barton Springs Salamander Conservation Agreement and Strategy (Agreement) is to continue existing and initiate new management actions to protect the Barton Springs ecosystem and its watershed. The Agreement is administered by the Barton Springs Salamander Conservation Team (BSSCT), which includes representatives from each of the four signatory agencies. In deciding to withdraw the proposed listing rule, the Service found that the Agreement, by protecting water quality at Barton Springs and in the Barton Springs segment of the Edwards aquifer and by conserving water quantity, reduces the threats to the species to the point where listing is no longer warranted.

On March 25, 1997, the U.S. District Court for the Western District of Texas found the Service's withdrawal invalid and ordered the Service to make a listing determination within 30 days. The court ordered the Service to ignore the Agreement in making the new decision. On April 8, 1997, the Service requested the court to delay the due date for the new listing decision until July 23, 1997, so that the Service could reopen the comment period and consider information developed since July 10, 1996, when the comment period on the proposed listing closed. The court denied this request on April 15, 1997. The Service is therefore not able to consider the following information in making a final listing determination: (1) The Agreement and the BSSCT's efforts to implement it, including public and technical input given as part of the BSSCT's March 1, 1997 public workshop; (2) updated salamander survey results; (3) the City of Austin's revised pool maintenance procedures designed to reduce salamander mortality; (4) the discovery of a new salamander location upstream from the Barton Springs Pool; (5) two additional ovipositioning events at the Dallas Aquarium; (6) reinstatement of the Save Our Springs (SOS) ordinance; (7) the Barton Creek Watershed Protection Initiative with private landowners and the Nature Conservancy of Texas; and (8) and adoption of TNRCC's chapters 313 and 216 of the Texas Administrative Code (see discussion under Factor D below).

Summary of Comments and Recommendations

In the February 17, 1994, proposed rule (59 FR 7968) and associated **Federal Register** notices, including notification of a public hearing (59 FR 27257; May 26, 1994) and each of the five comment periods (February 17 to April 18, 1994 (59 FR 7968); May 26 to July 1, 1994 (59 FR 27257; May 26, 1994); July 8 to July 29, 1994 (59 FR 35089; July 8, 1994); March 10 to May 17, 1995 (60 FR 13105; March 10, 1995); and June 24 to July 10, 1996 (61 FR 32413; June 24, 1996)), all interested parties were requested to submit factual reports or information to be considered in making a final listing determination. Appropriate Federal and State agencies, local governments, scientific organizations, and other interested parties were contacted and asked to comment. Legal notices of the public hearing, which invited general public comment were published in the Dripping Springs Century News and Austin American Statesman on June 8, 1994, in the Drippings Springs Dispatch on June 9, 1994, and in the Austin Chronicle on June 10, 1994. The Service received 657 written and oral comments, 8 videotapes, 5 petitions, and 2 resolutions from individuals and agencies. Of the 657 comments, 524 supported the proposed action, 123 opposed it, and 10 stated neither support nor opposition. Four petitions totaling over 1,800 signatures and one resolution from the City of Austin supported listing, and one petition containing 29 signatures and one resolution from the City of Dripping Springs opposed the listing.

A public hearing was held in two sessions on June 16, 1994, at the Lyndon Baines Johnson Auditorium at the University of Texas at Austin. Over 160 people attended the public hearing, and 74 provided oral testimony.

The Service solicited formal scientific peer review of the proposal from six individuals during the March 10 to May 17, 1995, comment period and received comments from three reviewers. The major comments from these peer reviewers are: the Barton Springs salamander is a distinct species restricted to Barton Springs; the salamander appears to be primarily a surface-dwelling species that retreats underground during unfavorable conditions (such as drought) and to lay eggs; the salamander is vulnerable to declining water quality and quantity and other forms of habitat modification; regulations are inadequate to protect the Barton Springs salamander; the Service should present more data that show increasing levels of pollutants in the groundwater; the Service should provide further explanation as to why the Barton Springs salamander is restricted to Barton Springs; and increased nutrient levels should not affect dissolved oxygen concentrations in the aquifer. The peer reviewers' comments are reflected in this final rule.

Written and oral comments are incorporated into this final rule where appropriate. Comments not incorporated are addressed in the following summary. Comments of a similar nature or point are grouped and summarized. Where differing viewpoints on an issue were expressed, the Service briefly summarizes the general issue.

1. *Comment*: Several commenters questioned whether information regarding threats to the Barton Springs salamander is adequate to support a listing decision. Some commenters stated that threats to the salamander are greater now than ever before.

Service Response: Section 4(a)(1) of the Act states that species shall be listed as threatened or endangered provided that the continued existence of the species is threatened by one or more of the five factors discussed below in the "Summary of Factors Affecting the Species" section of this rule. Under section 4(b)(1), the Service must make its listing decisions based on the best scientific and commercial data available. The Service has met these requirements in this listing decision.

Over 50 percent of the water used by Texans comes from groundwater. The Barton Springs watershed provides the sole source of drinking water for more than 35,000 people living over the aquifer and contributes a significant supply of water to the Colorado River, which is the primary source of drinking water for the City of Austin. In addition to providing a reliable supply of safe drinking water that requires little or no treatment, many people depend on the Barton Springs watershed for other needs, including agriculture and recreational activities.

Amphibians are known to be very sensitive to environmental contaminants (see Factor E below). Because the Barton Springs salamander lives at the main discharge point for the aquifer and is continuously exposed to the waters emanating from it, it is a primary indicator of the health of this natural resource. As an important indicator species, the Barton Springs salamander serves as an early warning sign of deteriorating water quality and quantity in the Barton Springs watershed, which affects the health and

well-being of the human population that depends on this resource.

2. *Comment*: The Service received comments questioning the sensitivity of the Barton Springs salamander to changes in water quality and quantity, and asserting that since the salamander has survived past impacts, it appears to be hardy and resilient and able to withstand future impacts.

Service Response: Although the Barton Springs salamander has survived past impacts, only 4 to 6 percent of the Barton Springs watershed is currently developed, and development is expected to continue. Furthermore, although the species as a whole has persisted to date, survey information indicates that individual salamanders have not survived certain impacts, and the species and its prey base are vulnerable to changes in water quality and quantity (see Factors A and E below). As discussed in Factor E, the difficulty in maintaining and propagating the Barton Springs salamander in captivity provides further evidence that this species is sensitive to environmental change. Toxicity data for the salamander's primary food source, *Hyallela azteca*, demonstrate the sensitivity of that amphipod to contaminants.

3. *Comment*: Several people commented on the adequacy of the existing rules and regulations in protecting water quality and quantity in the Barton Springs watershed. One commenter specifically mentioned that, because only two oil pipeline spills have been recorded (see Factor A), regulations are apparently adequate to protect water quality.

Service Response: The Act states that species shall be listed based on one or more of the five factors discussed in this final rule. The Service's analysis of the inadequacy of existing regulatory mechanisms (Factor D) demonstrates that additional measures are needed to protect the Barton Springs salamander from extinction. Although certain rules and regulations provide some water quality and quantity benefits, they do not alleviate all of the identified threats to the Barton Springs salamander.

4. *Comment:* Several inquiries were made regarding possible effects of listing the Barton Springs salamander on land use in the Barton Springs watershed and whether listing would infringe on private property rights. Other comments discussed possible economic impacts and benefits from listing.

Service Response: While economic effects, private property rights, and related concerns, cannot be considered in listing decisions, such factors are considered in recovering listed species. By **Federal Register** notice on July 1, 1994 (59 FR 34272), the Secretaries of Interior and Commerce set forth an interagency policy to minimize social and economic impacts consistent with timely recovery of listed species. Thus, it is the Service's desire that any recovery actions associated with the Barton Springs salamander minimize adverse social and economic impacts to the extent practicable.

5. *Comment:* The Service received several comments on the status of the Barton Springs salamander's population size, stating that this information should be considered in making a listing determination.

Service Response: Data from monthly surveys of the Barton Springs salamander are presented in the Background section and Factor A of this final rule. These survey data further support the need for listing. Although it may be an important listing consideration, the absolute population size does not need to be declining to warrant listing under the Act.

6. *Comment:* The Service received several comments regarding whether the Barton Springs salamander is restricted to Barton Springs.

Service Response: Survey information of other springs, caves, and wells in the Barton Springs segment provided since publication of the proposed rule further substantiate that the Barton Springs salamander's range is limited to the immediate vicinity of Barton Springs (see Background). Because Sunken Garden Springs is part of the Barton Springs complex and scientists assumed that the Barton Springs salamander occurred there, the presence of salamanders at this spring outlet does not indicate that the salamander's range has expanded, as some commenters asserted.

7. *Comment:* Many people questioned whether recreational use of Barton Springs Pool is likely to impact the Barton Springs salamander.

Service Response: The Service recognizes that swimming is a compatible activity with conservation of the salamander. The Service has provided additional discussion on recreation related issues in Factor E ("Other natural or manmade factors affecting its continued existence") of this final rule. The Service acknowledges in both the proposed and final rules that certain pool maintenance practices may impact the Barton Springs salamander, and that the City of Austin is continuing to seek solutions that benefit both the recreational aspect of Barton Springs Pool and the Barton Springs salamander (see Factor A).

8. *Comment:* The Service received several comments regarding whether critical habitat should be designated for the Barton Springs salamander.

Service Response: Critical habitat has not been proposed for the Barton Springs salamander (see Critical Habitat section below). The Act requires that critical habitat be designated for a species at the time it is listed unless designation is not prudent or not determinable. Listing regulations at 50 CFR 424.12(a)(1) provide that critical habitat is not prudent if no benefit to the species is derived from its designation. Designation of critical habitat benefits a listed species only when adverse modification or destruction of critical habitat could occur without the survival and recovery of the species also being jeopardized. Because the Barton Springs salamander is restricted to one area that discharges water from the entire Barton Springs watershed, any action that would result in adverse modification or destruction of the salamander's critical habitat would also jeopardize its continued survival and recovery. Designating critical habitat would therefore not provide a benefit to the species beyond the benefits already provided by listing and subsequent evaluation of activities under the jeopardy standard of section 7 of the Act. Because jeopardy to the species and adverse modification of its critical habitat are indistinguishable, the Service has determined that designation of critical habitat for the Barton Springs salamander is not prudent.

9. *Comment:* A few commenters questioned whether the Barton Springs salamander represents a distinct species.

Service Response: The Barton Springs salamander was first recognized as a distinct species in the 1970's (see Background). A formal description of the salamander was peer-reviewed and published in June 1993 (Chippindale *et al.* 1993a). Although the Barton Springs salamander may bear some morphological resemblance to other *Eurycea* salamander species, differences in its morphology, its isolation from other *Eurycea* populations, and genetic research provide sufficient evidence to support its designation as a distinct species.

10. *Comment:* The Service received comments questioning whether a relationship exists between increasing urbanization and declining water quality and quantity.

Service Response: A discussion of the relationship between increasing urbanization and declining water quality and quantity is presented in Factor A of this final rule.

11. *Comment:* Some commenters questioned whether reduced aquifer levels and encroachment of the bad water line constitute threats to the Barton Springs salamander.

Service Response: A discussion of this issue is presented in Factor A. Under the 1996 pumping and drought regime, springflows at Barton Springs reached historically low levels, and both Eliza Pool and Sunken Garden Springs drained completely dry during drawdown of Barton Springs Pool. Barton Springs is located near the bad water line, and encroachment of bad water to the springs has occurred historically under low flow conditions. During periods of low flows, Sunken Garden Springs measures high levels of total dissolved solids, indicating bad water encroachment.

Factor A also presents information on the increasing number of new permitted wells in the Barton Springs segment and a discussion of groundwater pumpage. A substantial increase in groundwater withdrawals (compounded by drought) will increase the frequency, severity, and/or duration of low aquifer levels and springflows and the potential for movement of the bad water line toward Barton Springs. Increased pumpage may also increase leakage from the lower Trinity aquifer, which contains higher levels of total dissolved solids and fluoride than water in the Barton Springs segment, thus further lowering water quality.

12. *Comment:* The Fish and Wildlife Service needs to implement its new directives from the Department of Interior and Commerce, including scientific peer review, minimization of social and economic impacts, greater predictability, the ecosystem approach, and State agency involvement.

Service Response: The Service has followed its policy directives in preparing this final rule. During the reopening of the public comment period following the notice to extend the final listing decision (60 FR 13105; March 10, 1995), the Service formally solicited peer review from six independent specialists to evaluate the information presented in the proposed rule. The beginning of this section ("Summary of Comments and Recommendations") summarizes the opinions of the three individuals who provided peer review. Informal peer review was also solicited during the public hearing and each public comment period, during which the Service received over 650 letters of comment. The Service solicited information and expertise from Federal, State, and local agencies, including the U.S. Geological Survey, Texas Parks and Wildlife Department, Texas Natural Resource Conservation Commission, Barton Springs/Edwards Aquifer Conservation District, and the City of Austin in preparing the proposed and final rules, and provided written notifications to these agencies of the 90-day finding and proposed rule.

The Available Conservation Measures section of this final rule identifies specific activities that will not be affected by section 9 of the Act regarding "take" of the Barton Springs salamander, and provides guidance and recommendations for avoiding impacts to the salamander. The recovery plan will be drafted to minimize social and economic impacts while ensuring the long-term survival and recovery of the Barton Springs salamander. Protecting the ecosystem upon which the salamander and people depend will be an important component in recovery planning.

13. *Comment:* The Service refuses to acknowledge the benefits of existing regulations. The Service's unwillingness to enforce its own limited and inadequate requirements further contributes to the endangered status of the Barton Springs salamander.

Service Response: As stated in the proposed rule, the Service acknowledges that the existing rules and regulations provide some benefits to water quality and quantity. However, the purpose of Factor D is to evaluate the inadequacies of existing regulatory mechanisms. The Service hopes that this evaluation will assist in identifying measures to strengthen efforts to protect water quality and quantity in the Barton Springs watershed and to promote the long-term survival of the Barton Springs salamander.

14. *Comment:* The Service must consider spill response programs designed to remediate the contamination of groundwater resources by hazardous substance and hazardous waste releases.

Service Response: The Service is unaware of any concerted, organized effort among the various Federal, State, and local agencies to implement a contingency plan for emergency spills in the Barton Springs watershed. Also, efforts to restore contaminated groundwater to its original purity may be technologically infeasible and/or cost-prohibitive (see Factor A). Spill remediation is especially problematic for catastrophic spills that occur in proximity to Barton Springs or in areas that are difficult to access. Because remediation is not always effective or possible, prevention is needed to ensure the protection of water resources.

15. *Comment:* Many of the references cited in the proposed rule are not studies or reports specific to Barton Springs, Austin, or even the Edwards aquifer, but instead describe general nationwide or statewide environmental management issues. These are general policy documents, which do not address the circumstances faced by the Barton Springs salamander.

Service Response: Most of the reports and documents cited in this final rule specifically address the effects of urbanization on surface and groundwater, karst aquifers, the Barton Springs watershed, the Barton Springs salamander, and/or the salamander's primary food source, and thus are pertinent to evaluating threats to the Barton Springs salamander. The information presented in these reports is highly consistent with respect to the threat of urbanization on water resources.

16. *Comment:* The Service cites a 1986 study by Slade *et al.* that projected a doubling of water demands from the year 1982 to 2000. Since we are more than halfway through the 18-year time period, are more recent data available?

Service Response: The estimated total pumpage in 1982 was 470 hectare-meters (3,800 acre-feet), at which time discharge from the Barton Springs segment (withdrawal plus springflow) was determined to be roughly equal to recharge. Slade *et al.* (1986) predicted that a substantial increase in groundwater withdrawal (compounded by drought) would cause a decrease in the quantity of water in the aquifer and discharge from Barton Springs. The Barton Springs/Edwards Aquifer Conservation District estimated total pumpage for 1994 at 570 hectare-meters (4,600 acre-feet). However, as stated in Factor A, the exact volume of water that is pumped from the aquifer is difficult to estimate, since meter reports are not required for non-permitted wells. Furthermore, groundwater pumpage varies considerably from year to year, influenced primarily by the amount of rainfall. The volume of pumpage increases and its effects on aquifer levels and springflows become more pronounced during dry spells, whereas periods of high rainfall can mask the effects of increased dependence on groundwater supplies.

17. *Comment:* There appears to be no direct, quantifiable relationship between water quality in Barton Creek and water quality at Barton Springs.

Service Response: The Background section and Factor A of this final rule discuss the hydrologic regime of the Barton Springs watershed. The surface and groundwaters of the Barton Springs watershed are integrally related, and all of the six creeks that cross the recharge

zone of the aquifer affect water quality at Barton Springs. Because of the karst characteristics of the aquifer and because Barton Springs is the main discharge point for the entire watershed, pollutants entering the watershed from any of the recharge sources may eventually reach Barton Springs. The USGS has clearly demonstrated that water quality in Barton Creek has the most immediate impact on water quality at Barton Springs of any recharge source in the Barton Springs watershed because of its recharge contribution and proximity to Barton Springs. Data show that contaminants in Barton Creek can enter the aquifer near Barton Springs and discharge from the springs within hours or days of storm events.

18. *Comment:* The waters from the outlying areas of the contributing zone are not the cause of current degradation and will never significantly contribute to the degradation of the springs compared to the existing development around Barton Springs. Many existing land uses were constructed and operated under less stringent standards. Retrofitting existing development would result in far more improvement of water quality than would further restriction of new development.

Service Response: The Service acknowledges that there is a relationship between current water quality and quantity degradation and existing development and considers retrofitting of these developments to be an important factor in protecting Barton Springs. However, water quality at Barton Springs is also influenced by the quality and quantity of water throughout the entire watershed (see Background and Factor A). Although water quality at Barton Springs responds most rapidly to changes in water quality in Barton Creek, Barton Springs represents a mixture of all of the recharge waters in the Barton Springs watershed. High-quality water in the undeveloped portions of the Barton Springs watershed helps disperse and dilute pollutants from the urbanized areas. Because of the karst characteristics of the aquifer, pollution can originate from anywhere within the Barton Springs watershed, especially pollutants that are relatively stable and mobile in water. Thus, as urbanization expands across the watershed, the ability of the aquifer to dilute and disperse increasing pollutant loads will decrease. While the Service concurs that retrofitting of existing development near Barton Springs may be important to protect water quality, measures are also needed to ensure continued protection of water quality and quantity throughout the remainder of the watershed. A report prepared for the City of Austin (1995) examines options for retrofitting developments to improve stormwater quality in the Barton Springs watershed.

19. *Comment:* The proposed rule did not discuss other sources of water contributing to flows from Barton Springs, including the San Antonio segment of the Edwards aquifer and the Colorado River.

Service Response: Independent studies (Slade et al. 1985, 1986; Stein 1995) conclude that most of the water discharging from Barton Springs originates from within the Barton Springs watershed (see Background section). However, under low flow conditions, the bad water zone of the San Antonio segment appears to flow northward toward Barton Springs. Upward leakage from the lower Trinity aquifer may also infiltrate the Barton Springs segment during low flows. Because these aquifers are high in total dissolved solids, their contribution affects the quality of water in the Barton Springs watershed and at Barton Springs.

The Service is unaware of any reports or data indicating that the Colorado River contributes water to the Barton Springs watershed. However, Barton Springs does supply baseflow to the Colorado River, which may be substantial during dry periods.

20. *Comment:* The Service must comply with the National Environmental Policy Act (NEPA) prior to listing the Barton Springs salamander as endangered. This would require the Service to study the social and environmental impacts of the proposed listing and prepare appropriate environmental documentation.

Service Response: The Service has determined that Environmental Assessments and Environmental Impact Statements, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

21. *Comment:* The statement that "Loop 360 provides a major route for transportation of petroleum and gasoline products to service stations in the Austin area" is unsupported by any data or citation of a study. What is the basis of this statement?

Service Response: This statement was based on the fact that no designated hazardous materials routes exist for the Austin area, and thus all major roadways can be considered to be transportation routes for hazardous materials. Because Loop 360 supports a high volume of traffic, and many service stations exist in this part of the Austin area, it is considered to be a major transportation route. The Service's statement is also supported by the Hazardous Materials Water Contamination Risk study prepared for the City of Austin (1994).

22. *Comment:* Both Hays County and Dripping Springs experienced high rates of growth in the 1980's, yet are still sparsely populated. The Service's statement in the proposed rule suggests these areas will soon be overrun with people at intensely urbanized levels, which is an unrealistic assumption.

Service Response: The Service quoted a study (see Factor A) conducted by the Capital Area Planning Council. Additional information on population growth for the northern portion of Hays County is presented in this final rule.

23. *Comment:* More of the recharge and contributing zones have been developed than the Service states in the proposed rule. Based on an analysis of historical trends in land development for the recharge zone of the Barton Springs segment, approximately 1,200 hectares (ha) (3,050 acres (ac)) in the recharge zone had been developed in 1979. Approximately 3,000 ha (7,500 ac) had been developed by 1993, which represents approximately 13 percent of the entire recharge zone of the Barton Springs segment.

Service Response: Factor A of the proposed rule states that "* * * only about 3 to 4 percent of the recharge and contributing zones is currently developed," which was based on an estimate of impervious cover provided by the USGS. A report prepared for the City of Austin (1995) has estimated impervious cover over the Barton Springs watershed to be 6 percent (see Factor A). Assuming that the commenter's calculations of development are also equal to the amount of impervious cover, the commenter's assertion that about 13 percent of the recharge zone is developed does not appear to be inconsistent with the estimated 3 to 6 percent impervious cover for the entire watershed.

24. *Comment:* What evidence exists that demonstrates that sediments entering the pools where the salamander occurs actually settle in the salamander's habitat?

Service Response: Biologists with the City of Austin have found that silt and sediments that are hosed from the shallow end into the deep end of Barton Springs Pool during cleaning reduce the

amount of available salamander habitat. Increased sediment influxes following major rain events also reduce habitat availability. Sediments cover much of the bottom of Eliza Pool and Sunken Garden Springs, and the Barton Springs salamander is typically found in silt-free areas near the spring outlets.

25. *Comment:* A significant number of references cited in the proposed rule are not peer-reviewed scientific publications and thus should not be given the same level of credibility as those having a more rigorous review and approval process.

Service Response: All official agency reports cited in the proposed rule have undergone extensive internal review, and some have solicited outside peer review. Articles cited from scientific journals have all received formal peer review. Although the Service relies primarily on final documents in making listing decisions, the best available information may also come from other sources such as written correspondence, factual information and data from draft documents, expert opinions, and personal communications. The Service strives to evaluate the accuracy of this "gray literature" before considering it in making a listing decision.

26. *Comment:* Several individuals commented on the methods and results of certain reports used by the Service in the proposed rule, including three USGS reports (Slade *et al.* 1985, 1986; Veenhuis and Slade 1990) and a Barton Springs/Edwards Aquifer Conservation District (BS/EACD) report (Hauwert and Vickers 1994). The Service was also criticized for not making available for public review and comment the raw data upon which these and other reports cited by the Service are based.

Service Response: The reports cited in the proposed rule and in this final rule present sufficient information and data needed to review and assess the methodologies used by the investigators, their study results and data analyses, and conclusions. The Service has reviewed these reports and determined that the data were gathered and analyzed in accordance with sound scientific principles, and accepts these reports as valid and relevant scientific information. Furthermore, the results and conclusions of independent studies consistently show similar trends regarding impacts of urbanization on water quality and quantity. The USGS and BS/EACD have both provided written responses to the criticisms of their reports (Raymond Slade, USGS, *in litt.* 1994; Nico Hauwert, BS/EACD *in litt.* 1995; Bill Couch, BS/EACD, *in litt.* 1996).

27. *Comment:* The occurrence of turbidity, accumulation of sediments, and contaminants in Barton Springs watershed could be due to natural phenomena.

Service Response: The volume of sediments observed in urbanizing portions of the Barton Springs watershed and increased turbidity during periods of major construction indicate that such activities influence these phenomena. As discussed in Factor A, the relationship between urban runoff and increased erosion and sedimentation is well documented. Increases in turbidity tend to coincide with land clearing and construction activities, and discharge of turbid runoff from construction projects has been observed entering receiving waters in the Barton Springs watershed.

Research shows that the contaminants discussed in Factor A (including elevated levels of nutrients, heavy metals, petroleum hydrocarbons, and pesticides) are primarily associated with urban runoff. The Service is unaware of any natural sources in the Barton Springs watershed that could result in significant concentrations (or any detectable concentrations for manmade compounds such as pesticides) of these contaminants in water.

28. *Comment:* A report by T.U. Taylor (*in litt.* 1922) states that elevated levels of fecal coliform bacteria have been documented at Barton Springs since 1922. However, the Service stated in the proposed rule that the City of Austin determined that the method used to measure bacterial counts at the time of the report is different from that used today, and thus "the bacterial counts are not directly comparable to * * * current sampling techniques" (Austin Librach, City of Austin, *in litt.*, 1991). The City of Austin's review of the report does not provide a basis for refuting its conclusions or excluding them from further consideration. The comparison of fecal coliform counts taken in the context of the standards of the time, to counts taken today and in the context of today's standards, is a valid comparison.

Service Response: To date, the Service has only been provided a copy of a cover letter (dated August 28, 1922) to a supplementary report submitted by Mr. Taylor to the City of Austin. The letter states the need to filter Barton Springs water for human consumption due to contamination with "B. coli." Because no report accompanied the letter, and the Service has been unable to obtain a copy of the report, the Service can draw no further conclusions regarding its findings.

29. *Comment:* What is the basis for the Service's statement that "contaminants that adsorb to the surface of sediments may be transported through the aquifer and later be released back into the water column "?

Service Response: The Service based this statement on information presented in Schueler (1987), which states that once deposited, pollutants in "enriched sediments can be remobilized under suitable environmental conditions posing a risk to benthic life" (see Factor A).

30. Comment: The Service received a comment letter that contained a document comparing the findings and conclusions of the proposed rule with those made in a report by the Aquatic Biological Advisory Team (ABAT), which concluded that insufficient information appears to exist to support a listing decision.

Service Response: The City of Austin and Texas Parks and Wildlife Department formed the ABAT, which consisted of five nationally recognized specialists, to make research and management recommendations needed to conserve the Barton Springs and Bull Creek watersheds and their resident salamander populations (the Barton Springs and Jollyville Plateau salamanders). The ABAT members were specifically instructed not to make recommendations regarding listing nor to evaluate specific laws or regulations. The Service believes that substantial evidence exists to support a listing determination for the Barton Springs salamander, but also recognizes that additional research is important to assist in making sound management recommendations. The Service concurs with most of the ABAT's management recommendations, which could be incorporated into a regional management plan for the Barton Springs watershed, as well as a recovery plan for the Barton Springs salamander.

31. Comment: The TNRCC and TxDOT provided information regarding existing and proposed rules and regulations, which they state are adequate to protect the Barton Springs salamander.

Service Response: An evaluation of the existing rules and regulations is provided in Factor D of this final rule. The Service encourages State and local entities to identify proposed regulations and additional protective measures that can serve as a basis for a regional management plan for the Barton Springs watershed.

Summary of Factors Affecting the Species

After thorough review and consideration of all information available, the Service has determined

that the Barton Springs salamander should be classified as an endangered species. Procedures found at section 4 of the Act and regulations implementing the listing provisions of the Act (50 CFR part 424) were followed. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Barton Springs salamander (*Eurycea sosorum* Chippendale, Price, and Hillis) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* The primary threat to the Barton Springs salamander is degradation of the quality and quantity of water that feeds Barton Springs resulting from urban expansion over the Barton Springs watershed (including roadway, residential, commercial, and industrial development). A discussion of some potential effects of contaminants on the salamander and its prey base (amphipods) is provided in this section and under Factor E. Potential factors contributing to declining water quality and quantity in this portion of the Edwards aquifer include chronic degradation, catastrophic hazardous material spills and increased water withdrawals from the aquifer. Also of concern are impacts to the salamander's surface habitat.

Urbanization can dramatically alter the normal hydrologic regime and water quality of an area. As areas are cleared of natural vegetation and topsoil and replaced with impervious cover (paved surfaces), rainfall no longer percolates through the ground but instead is rapidly converted to surface runoff. Creekflow shifts from predominantly baseflow, which is derived from natural filtration processes and discharges from local groundwater supplies, to predominantly stormwater runoff. The amount of stormwater runoff tends to increase in direct proportion to the amount of impervious cover. With increasing stormflows, the amount of baseflow available to sustain water supplies during drought cycles is diminished and the frequency and severity of flooding increases. The increased amount and velocity of runoff increases erosion and streambank destabilization, which in turn leads to increased sediment loadings, channel widening, and changes in the morphology and aquatic ecology of the affected creek (Schueler 1991). Sediment from soil erosion is "by volume the greatest single pollutant of surface waters and is the potential carrier of most pollutants found in water" (Menzer and Nelson 1980).

Urbanization introduces many pollutants into an area, including suspended solids, nutrients, petroleum hydrocarbons, bacteria, heavy metals, volatile organic compounds, fertilizers, and pesticides (TWC 1989; EPA 1990; Schueler 1991; Notenboom *et al.* 1994; Menzer and Nelson 1980). Stormwater runoff is a primary source of water pollution. Pollutant loadings in receiving waters, particularly in areas that have little or no pollution controls, generally increase with increasing impervious cover (Schueler 1991). A report by the USGS on the relationship between urbanization and water quality in streams throughout the Austin area (9 of 18 sample sites were along streams in the Barton Springs segment and its contributing zone) demonstrated statistically significant increases in constituent concentrations with increasing impervious cover (Veenhuis and Slade 1990). Degradation of water quality in the Barton Springs watershed is also evidenced by algal blooms, erosion, trash and debris, and accumulations of sediments and toxics (City of Austin 1995).

Water quality in the aquifer and at Barton Springs is directly affected by the quality of water in the six creeks that cross the recharge zone (see Background section). Of these creeks, water quality at Barton Springs responds most rapidly to changes in water quality in Barton Creek (Slade *et al.* 1986; City of Austin 1991). Data show that contaminants in Barton Creek can enter the aquifer near Barton Springs and discharge from the springs within hours or days of storm events (Slade *et al.* 1986; City of Austin 1991). Because groundwater originating from Barton Creek remains in the aquifer for short periods before discharging at the springs, there is little time for attenuation of pollutants before discharging at Barton Springs (Slade *et al.* 1986; City of Austin 1991). Increases in turbidity (a measure of suspended solids or sediment), algal growth, nutrients, and fecal-group bacteria have been documented along Barton Creek between SH 71 and Loop 360 and at Barton Springs; and have been largely attributed to construction activities and the conveyance and treatment of sewage in this area (Slade *et al.* 1986; Austin Librach, City of Austin *in litt.*, 1990; City of Austin 1991, 1993; Barbara Britton, TWC, *in litt.*, 1992).

Water quality in the more heavily developed areas of the Barton Springs segment and at Barton Springs is also beginning to show signs of degradation (Slade *et al.* 1986; Librach *in litt.*, 1990; City of Austin 1991, 1993; Slade 1992; Hauwert and Vickers 1994; Texas Groundwater Protection Committee (TGPC) 1995). The BS/EACD found elevated levels of sediment, fecal-group bacteria, trace metals, nutrients, and petroleum hydrocarbons in certain springs and wells between Sunset Valley and Barton Springs (Hauwert and Vickers 1994, TGPC 1994). Slade *et al.* (1986) reported that levels of fecal-group bacteria, nitrate nitrogen, and turbidity were highest in wells near creeks draining developed areas. In addition to sediments and bacteria, tetrachloroethene, a commonly used drycleaning solvent, has been detected in water samples from Barton Springs (Slade 1991). Possible sources of groundwater contamination include urban runoff, construction activities, leaking septic tanks and pipelines, and petroleum storage tank releases (Slade *et al.* 1986; TWC 1989; EPA 1990; Hauwert and Vickers 1994).

One of the most immediate threats to the Barton Springs salamander is siltation of its habitat, owing primarily to construction activities in the Barton Creek watershed (Slade *et al.* 1986, City of Austin 1991, Hauwert and Vickers 1994, TGPC 1994). Major highway, subdivision, and other construction projects along Barton Creek increased during the early 1980's and 1990's. While high turbidity has been observed in Barton Springs Pool following major storm events since the early 1980's (Slade *et al.* 1986; Hauwert 1995), the duration and frequency of sediment discharges from Barton Springs increased substantially during the 1990's (Hauwert 1995; TGPC 1994). Barton Springs discharged large amounts of sediments following most major rain events in 1993, 1994 (Hauwert and Vickers 1994; TGPC 1994), and 1995 (Collett, pers. comms., 1994–1995). Sediments have been observed emanating directly from the spring outlets in Barton Springs Pool (Doyle Mosier, Lower Colorado River Authority; Debbie Dorsey, City of Austin; pers. comms., 1993; Collett and Hansen, pers. comms., 1994–1995) about 8 to 12 hours following the start of a heavy rain (Slade *et al.* 1986; City of Austin 1991; Hauwert and Vickers 1994; David Johns, City of Austin, pers. comm. 1996).

Several uncased wells in the Barton Creek watershed, one of which is located 5 km (3 mi) south of Barton Springs near the Loop 360 bridge, have been completely filled with a cream-colored, carbonate silt (up to 45 m (150 ft)) (Hauwert and Vickers 1994). A well in Sunset Valley measured 1 to 1.5 ft accumulations of cream-colored sediment over an eight-month period prior to July 1993, and reportedly

caused the well pump to seize (Hauwert and Vickers 1994). Several well owners, drillers, and operators also reported a significant influx of sediments during 1993, particularly during periods of heavy rainfall and low water-level conditions (Hauwert and Vickers 1994).

Studies have shown that high levels of suspended solids reduce the diversity and density of aquatic fauna (EPA 1986; Barrett *et al.* 1995). In Barton Springs Pool, the lowest recorded population counts of the salamander (ranging from 1 to 6 individuals) occurred over the five-month period following an October 1994 flood event (see Background section). The flood deposited a large amount of silt and debris over the salamander's habitat in the pool, and the area occupied by the salamander during the following months was reduced to the silt-free areas immediately adjacent to the spring outlets (Hansen, *in litt.*, 1995c).

In addition to covering the salamander's habitat, problems resulting from increased sediment loads may include: Clogging of the gills of aquatic species, causing asphyxiation (Garton 1977; Werner 1983; Schueler 1987); smothering their eggs and reducing the availability of spawning sites (EPA 1986; Schueler 1987); filling interstitial spaces and voids, thereby reducing water circulation and oxygen availability (EPA 1986); filling and blocking of recharge features and underground conduits, restricting recharge and groundwater storage volume and movement; reducing light transmission needed for photosynthesis, food production, and the capture of prey by sight-feeding predators (EPA 1986; Schueler 1987); and exposing aquatic life to contaminants that readily bind to sediments (such as petroleum hydrocarbons and heavy metals). Once deposited, pollutants in "enriched sediments can be remobilized under suitable environmental conditions, posing a risk to benthic life" (Schueler 1987).

Research indicates that species in or near contaminated sediments may be adversely affected even if water-quality criteria are not exceeded (Landrum and Robbins 1990; Medine and McCutcheon 1989). Sediments act as a sink for many organic and inorganic contaminants (Menzer and Nelson 1980; Landrum and Robbins 1990; Medine and McCutcheon 1989) and can accumulate these contaminants to levels that may impact aquatic ecosystems (Landrum and Robbins 1990; Medine and McCutcheon 1989). Metal-contaminated sediment toxicity studies have shown *Hyallela azteca*, the primary food item of the Barton Springs salamander, to be the most sensitive organism of those tested (Phipps *et al.* 1995; Burton and Ingersoll 1994). Most polycyclic aromatic hydrocarbons (PAHs), a component of oil, are associated with sediments in aquatic ecosystems, which may be ingested by benthic organisms (Eisler 1987). *Hyallela azteca* has been shown to assimilate PAHs from contaminated sediments (Eisler 1987). Sediments collected from the main stem of Barton Creek on November 21, 1994, about 150 m above Barton Springs Pool, contained several PAHs that were 2.5 to 22 times the levels shown to always have a toxic effect (survival, growth, or maturation) on *Hyallela azteca* (City of Austin, unpubl. data, 1994; Ingersoll *et al.*, in press). Sediments collected from Barton Springs on April 20, 1995, also contained PAHs at levels up to 6.5 times those shown to be toxic to *Hyallela azteca* (City of Austin, unpubl. data, 1995; Ingersoll *et al.*, in press).

In addition to sediment concentrations, high levels of total petroleum hydrocarbons have been detected in water samples from Sunken Garden Springs (Hauwert and Vickers 1994). Petroleum hydrocarbons include both aliphatic hydrocarbons and PAHs (Albers 1995). Normal concentrations of petroleum hydrocarbons in the Edwards aquifer are below the detection limit of 1.0 mg/l. However, levels of total petroleum hydrocarbons measured 1.9 mg/l following a 9-mm (0.35-in) rain event in March 1994, and 1.3 mg/l in April 1994. A well that is hydrologically connected with Barton Springs contained a level of 2.1 mg/l in May 1993 (Hauwert and Vickers 1994; BS/EACD 1994). Petroleum hydrocarbons may enter water supplies through sewage effluents, urban and highway runoff, and chronic leakage or acute spills of petroleum and petroleum products (Eisler 1987; Hauwert and Vickers 1994; Albers 1995).

Water samples from Sunken Garden Springs also contained elevated levels of lead, which are commonly found in petroleum-contaminated waters. Total and dissolved lead levels at Sunken Garden Springs measured 0.024 and 0.015 mg/l, respectively (Hauwert and Vickers 1994; BS/EACD 1994). Typical freshwater concentrations for lead are between 0.001 and 0.01 mg/l (Menzer and Nelson 1980). The EPA drinking water standard for total lead is 0.015 mg/l. In aquatic environments, dissolved lead is the most toxic form, and adverse effects (including reduced survival, impaired reproduction, and reduced growth) on aquatic biota have been reported at concentrations of 0.001 to 0.005 mg/l (Eisler 1988a). Sources of lead in water may include industrial discharges, highway runoff, and sewage effluent (Pain 1995).

Aquatic organisms may absorb lead through skin, gills, intestines, and other organs, and may ingest lead through feeding (Pain 1995). Lead concentrations tend to be highest in benthic organisms, which may assimilate lead directly from sediments (Eisler 1988a). Research indicates that lead is not essential or beneficial to living organisms, and that all known effects are deleterious, including those on survival, growth, reproduction, development, behavior, learning, and metabolism (Eisler 1988a; Pain 1995). Adverse effects increase with elevated water temperatures, reduced pH, younger life stages, and long exposures (Eisler 1988a; Pain 1995). Synergistic and additive effects may also occur when lead is mixed with other metals or toxic chemicals (Eisler 1988a). Studies have shown that lead is highest in urban streams and lowest in rural streams, and that species diversity is also greater in rural streams than urban ones (Eisler 1988a).

Arsenic, which has been used in the manufacture of agricultural pesticides and other products (Eisler 1988b) and may be found in roadway and urban runoff, has been detected in wells in the Barton Springs watershed at levels exceeding EPA drinking water standards (0.05 mg/l) (Hauwert and Vickers 1994) and in other areas of Texas (TWC 1989). Concentrations of arsenic compounds adversely affecting aquatic biota have been reported at 0.019 to 0.048 mg/l (Eisler 1988b). Toxicity of arsenic to aquatic life depends on many factors, including water temperature, pH, suspended solids, organic content, phosphate concentration, presence of other contaminants, arsenic speciation, and duration of exposure. As with many contaminants, early life stages are most sensitive, and large differences in responses exist between species (Eisler 1988b).

Leaking underground storage tanks "are considered to be one of the principal contributing sources of ground-water pollution, placing a significant loading on the State's aquifers, due to their regional distribution and high number which are estimated to be leaking" (TWC 1989). Chronic releases from leaking tanks represent a serious risk of water contamination (City of Austin 1994). The TNRCC (1994) lists leaking underground storage tanks as one of the top three most frequently encountered sources of groundwater contamination in the Edwards aquifer. Common pollutants from leaking underground storage tanks include gasoline, diesel,

and other oil products (TWC 1989). The TNRCC's "Leaking Petroleum Storage Tank Case Report" lists 626 leaking petroleum storage tanks for Hays and Travis counties for the period between October 1984 and April 1995, of which 158 cases resulted in some form of groundwater contamination. Fifteen of the reports specifically identified impacts to the Edwards aquifer, of which only three had been officially closed or were near closure.

The conveyance and treatment of sewage in the watershed, particularly in the recharge zone, may also impair water quality. Sewage effluent may contain organics (including PAHs), metals, nutrients (nitrogen and phosphorus), inorganic acids, and microorganisms (Eisler 1987; Menzer and Nelson 1980; TWC 1989; City of Austin 1991, 1993; Notenboom *et al.* 1994). Sewage contamination has occurred at Barton Springs following major rain events (TWC 1989), and high bacterial counts and algal blooms have been reported (Slade *et al.* 1986; City of Austin 1991). In 1982, high levels of fecal coliform bacteria at Barton Springs were attributed to a sewerline leak upstream from Barton Springs Pool. While fecal coliform bacteria are believed to be harmless, they indicate the presence of other organisms that may be pathogenic to aquatic life (Lager *et al.* 1977), some of which may pose a threat to salamanders and/or their prey base.

Wastewater discharges have been identified as a primary cause of algal blooms, which have been a recurring problem in both Barton Creek and at Barton Springs (City of Austin 1991, 1993). Increased nutrients promote eutrophication of aquatic ecosystems, including the growth of bacteria, algae, and nuisance aquatic plants, and lowered oxygen levels. Menzer and Nelson (1980) note that "changes in nutrient pools must eventually directly affect the productivity of the entire ecosystem, even though the effects may not be measurable in biologic terms until a number of years later." Because most nutrients in urban runoff are present in soluble form and are thus readily consumed by algae, nutrient concentrations present in urban runoff tend to stimulate algal blooms (Schueler 1987). A 5 km-(3-mi) long algal bloom observed along Barton Creek in April 1993 may have been the result of an accidental discharge of 1.6 million liters (440,000 gallons) of effluent and irrigation water from a golf course (City of Austin 1993, 1995).

Based on USGS data (Slade *et al.* 1986), the average level of nitrates at Barton Springs Pool has increased from about 1.0 mg/l (measured as nitrate nitrogen) prior to 1955 to a 1986 level of about 1.5 mg/l. Sunken Garden Springs measured greater than 2.0 mg/l nitrate nitrogen during the BS/EACD study (Hauwert and Vickers 1994). Elevated nitrate concentrations in groundwater are attributed primarily to human activities (TWC 1989). Total nitrogen (as nitrogen) concentrations measured in wells in the more urbanized areas of the Barton Springs watershed are typically two to six times higher than in rural areas (Slade 1992). Elevated levels of total phosphorus and orthophosphorus have also been detected in certain springs and wells in the Barton Springs watershed (Slade 1992; Hauwert and Vickers 1994). In addition to wastewater discharge, other possible sources of nutrients in the Barton Springs watershed include fertilizers, solid wastes, animal waste, and decomposition of natural vegetation (Hauwert and Vickers 1994; Slade *et al.* 1986).

Over 145 km (90 mi) of wastewater lines occur in the recharge zone of the Barton Springs segment (Maureen McReynolds, City of Austin Water and Wastewater Utility, pers. comm., 1993). Most of the creeks contributing recharge to the Barton Springs segment are underlain by wastewater lines, and five wastewater treatment plants are located within the Barton Springs watershed (City of Austin 1991). Leaking septic tanks and inadequate filtering in septic fields have also been identified as a major source of groundwater contamination, particularly for older systems (TWC 1989; EPA 1990; City of Austin 1991; Hauwert and Vickers 1994; TNRCC 1994). The TNRCC (1994) cites septic tanks as the most frequently encountered source of groundwater contamination in the Edwards aquifer. Although the amount of effluent leached from an individual septic system may be small, the cumulative impact over the landscape can be significant, especially for karst aquifers (EPA 1990). An estimated 4,800 septic systems currently exist in the Barton Springs watershed and may contribute as much as 23 percent of the total nitrogen load to the aquifer (City of Austin 1995).

Highways can have major impacts on groundwater quality (TNRCC 1994; Barrett *et al.* 1995). The TNRCC (1994) lists highways and roads as the fifth most common potential source of groundwater contamination in the Edwards aquifer. Elevated concentrations of metals, Kjeldahl nitrogen, and organic compounds have been detected in groundwater near highways and their control structures. Highway construction can also cause large increases in suspended solids to receiving waters (Barrett *et al.* 1995). Several major highways have been built over the recharge zone since the late 1980's, and the expansion of US 290 from SH 71 through Oak Hill to a six-lane freeway is underway. US 290 crosses the Barton Creek watershed and discharges stormwater runoff from detention ponds into tributaries of Barton Creek. Bypass events from a regional water quality pond at the US 290/Loop 360 interchange have resulted in significant sediment deposition along the entire length of an unnamed tributary and a portion of Barton Creek (City of Austin, *in litt.* 1995; City of Austin, unpubl. data, 1996; USFWS, *in litt.* 1996), less than 5 km (3 mi) from Barton Springs.

Organophosphorus pesticides commonly used in urban areas tend to degrade rapidly in the environment, but certain pesticides may remain biologically active for some time (Eisler 1986, Hill 1995). For example, diazinon, which is commonly used in commercial and residential areas, may remain biologically active in soils for up to 6 months under conditions of low temperature, low moisture, high alkalinity, and lack of microbial degraders (Eisler 1986). Diazinon has shown adverse effects on stream insects at concentrations of 0.3 micrograms/l (Eisler 1986). To ensure protection of sensitive aquatic fauna, Eisler (1986) recommends that levels of diazinon in water not exceed 0.08 micrograms/l. Many organophosphorus compounds may result in adverse effects after short-term exposures. Exposure may include contact with or ingestion of contaminated water, sediments, or food items (Hill 1995).

Increasing urbanization also increases the risk of catastrophic spills. Because of the Barton Springs salamander's limited range, a single catastrophic spill has the potential to impact the entire species and its habitat. Catastrophic spills can result from major transportation accidents, underground storage tank leaks, pipeline ruptures, sewage spills, vandalism, and other sources. Because no designated route for hazardous materials exists for the Austin area, potentially hazardous materials may be transported on major roadways crossing the Barton Springs watershed (City of Austin 1994). Expansion of major roadways and increasing volumes of traffic, particularly across the recharge zone near Barton Springs, increases the threat of catastrophic spills.

Oil pipeline ruptures also represent a source of groundwater contamination with potentially catastrophic

consequences. Three oil pipelines run roughly parallel to each other across the Barton Springs watershed and cross Barton Creek near the Hays/Travis county line. Two of these lines have ruptured within the recharge zone about 13 km (8 mi) south of Barton Springs, which constitute the largest spills reported from Hays and Travis counties between 1986 and 1992 (TWC, unpubl. data). The first major spill occurred in 1986, about 270 m (300 yards) from Slaughter Creek, when an oil pipeline was severed during a construction operation and released about 366,000 liters (96,600 gallons) of oil. Although about 91 percent of the spill was reportedly recovered (Rose 1986), petroleum hydrocarbon fumes were detected about six weeks later in caves located up to 2.7 km (1.7 mi) northeast of the spill (Russell 1987). The second pipeline break occurred in 1987 near the first spill site and released over 190,000 liters (49,000 gallons) of oil. According to the TWC database, more than 97 percent of this spill was recovered (TWC, unpubl. data).

Response times to hazardous materials spills vary, depending on several factors including detection capability, location and size of the spill, weather conditions, whether or not the spill is reported, and the party performing the cleanup. In some cases, spills may go undetected and/or unreported. Generally, cleanup is initiated within several hours once the spill has been detected and reported, but many weeks or possibly years may be necessary to complete the cleanup effort. In areas where access is difficult (due to remoteness, steep terrain, or other factors), remediation may not be possible or may be ineffective due to delays in initiating cleanup.

Increased demands on water supplies from the aquifer can also reduce the quality and quantity of water in the Barton Springs segment and at Barton Springs. The volume of springflow is regulated by the level of water in the aquifer. Discharge decreases as water storage in the aquifer drops, which historically has resulted primarily from a lack of recharging rains rather than groundwater withdrawal for public consumption. During these low flow conditions, "bad water" within the San Antonio segment of the Edwards aquifer may move northward and contribute to flows from Barton Springs (Slade *et al.* 1986; Stein 1995). In addition, increased withdrawals could result in upward leakage from the underlying Trinity aquifer, which has higher levels of dissolved solids and fluoride than water in the Barton Springs segment (Slade *et al.* 1986).

Under low flow conditions, Barton Springs and a well near the bad water line (YD–58–50–216) have shown increased dissolved solids concentrations, particularly sodium and chloride, indicating encroachment of bad water (Slade *et al.* 1986). The BS/EACD (Hauwert and Vickers 1994) measured high levels of dissolved solids at Sunken Garden Springs, indicating a significant influence of bad water during low flow conditions. The potential for encroachment of the bad water line and/or recharge from the Trinity aquifer increases with pumpage of the aquifer and extended low recharge or low flow conditions (Slade *et al.* 1986). The encroachment of bad water could have negative impacts on the plants and animals associated with Barton Springs. High sodium and chloride levels have been shown to increase fish mortality by disturbing ion balances (Werner 1983).

Based on water-budget analyses and pumpage estimates for 1982 (Slade *et al.* 1985, 1986), discharge from the Barton Springs segment (withdrawal plus springflow) was determined to be roughly equal to recharge from surface waters. Thus, a substantial increase in groundwater withdrawal would be expected to cause a decrease in the quantity of water in the aquifer and discharge from Barton Springs. The estimated total pumpage in 1982 was 470 hectare-meters (3,800 acre-feet), or about 10 percent of the long-term mean discharge of 1,400 l/s (50 cfs) for Barton Springs (Slade *et al.* 1985, 1986). The BS/EACD estimated total pumpage for 1994 to be about 570 hectare-meters (4,600 acre-feet) (Botto and Rauschuber 1995). The exact volume of water that is pumped from the aquifer is difficult to estimate, since meter reports are only required for municipal, industrial, irrigation, and commercial wells and not for wells that pump less than 38,000 l (10,000 ga) per day, domestic wells, or agricultural wells used for non-commercial livestock and poultry operations (BS/EACD 1994). Groundwater pumpage increases considerably and its effects on aquifer levels and springflows become more pronounced during dry spells (Slade *et al.* 1986; D.G. Rauschuber & Associates and R.J. Brandes Co. 1990; BS/EACD 1994; Nico Hauwert and Ron Fiesler, BS/EACD, pers. comms., 1995).

The number of wells in the Barton Springs segment is growing with the increasing dependence on the Edwards aquifer for drinking water, irrigation, and industrial use (BS/EACD 1994 and 1995; Botto and Rauschuber 1995). In the 235 sq mi area of the Barton Springs segment, a total of 54 new wells were drilled between fiscal year (FY) 1989 (September 1, 1988 to August 31, 1989) and FY 1993, with a maximum of 18 wells drilled during a single year (BS/EACD 1995). During FY 1994, 46 new wells were drilled, which is more than two and a half times the number drilled in FY 1993 (BS/EACD 1994). An additional 45 wells were drilled in FY 1995 (BS/EACD 1995). As urbanization in the outlying areas of Austin expands and reliance on groundwater supplies increases, the number of wells and the total volume of water withdrawal is also expected to continue to increase.

In addition to contributing to declining groundwater supplies, the TWC (1989) cites water wells as a major source of groundwater contamination by providing direct access of pollutants into the aquifer and possibly through inter-aquifer transfer of bad water. Reduced groundwater levels exacerbate the problem through decreased dilution of pollutants.

Under the 1996 pumping and drought regime, flows from Barton Springs approached historically low conditions. Because the flows from Eliza and Sunken Garden springs are considerably less than flows from the main springs in Barton Springs Pool (see Background section), the impacts of increased groundwater withdrawals and drought are realized more quickly for these spring outlets. As of July 1996, the water level in both Eliza Pool and Sunken Garden Springs was less than a foot deep (O'Donnell, pers. obs., 1996). Both springs ceased flowing during the drawdown of Barton Springs Pool (Hansen, pers. comm., 1996; O'Donnell, pers. obs. 1996).

Other potential impacts to the salamander's surface habitat may include the use of high pressure fire hoses in areas where the salamander occurs, hosing silt from the shallow end of Barton Springs Pool into the salamander's habitat, diverting water from Sunken Garden Springs into Barton Creek below Barton Springs, and runoff from the train station above Eliza Pool. Following the 1992 fish kill (see Background section), chlorine is no longer used to clean Barton Springs Pool. The City of Austin has drafted a management plan to avoid, minimize, and mitigate impacts to the salamander from pool cleaning and other park maintenance practices.

Impervious cover over the Barton Springs watershed is currently estimated at 4 to 6 percent (Slade 1992; City of Austin 1995). This area is under increasing pressure from urbanization (Austin Transportation Study (ATS) 1994). The ATS has projected that the Austin metropolitan area will support a

population of over 1.3 million by the year 2020, up from 815,000 in 1994. Southwest Austin, which covers only a portion of the Barton Springs watershed, is projected to almost double in size, from an estimated 32,000 people in 1994 to 58,000 by the year 2020. Likewise, the population in northern Hays County is expected to more than triple in size by the year 2020, from 18,000 in 1994 to 68,000 in 2020 (ATS 1994). According to the Capital Area Planning Council (CAPCO), Hays County has the second highest growth rate in the ten-county CAPCO region. Dripping Springs, which is located in the contributing zone between Onion Creek and Barton Creek, "will likely continue to experience a high rate of growth as development continues along U.S. 290 from the Oak Hill area westward" (CAPCO 1990).

Several major highways, including a segment of State Highway 45, the southern extension of Loop 1 ("MOPAC"), and the Southwest Parkway have been built in the last decade to accommodate the projected population growth, real estate speculation, and traffic demands in this area. Justification for the Highway 290 expansion was largely based on the population growth projected for and already occurring in this area (ATS 1994). In addition to these roadways, the remainder of State Highway 45, an 82-mi loop around Austin, is proposed to be built within the next 20 to 25 years. This highway would cross Barton Creek and several other creeks in the Barton Springs watershed (City of Austin 1994).

Less than 2,400 ha (6,000 ac) of preserve lands currently exist in the Barton Springs watershed (USFWS 1996). Much of the remaining area along Barton Creek and within the City of Austin's Extra-territorial Jurisdiction (ETJ) is slated for development at levels of greater than 30 percent impervious cover (City of Austin unpubl. data).

B. *Overutilization for commercial, recreational, scientific, or educational purposes.* No threat from overutilization of this species is known at this time.

C. *Disease or predation.* No diseases or parasites of the Barton Springs salamander have been reported. Primary predators of the Barton Springs salamander are believed to be predatory fish and crayfish; however, no information exists to indicate that predation poses a major threat to this species.

D. *The inadequacy of existing regulatory mechanisms.* No existing rules or regulations specifically require protection of the Barton Springs salamander or the Barton Springs ecosystem, and no comprehensive plan is in place to protect the Barton Springs watershed from increasing threats to water quality and quantity. The salamander is not included on the TPWD's list of threatened and endangered species, so the species is not protected by that agency.

Since the publication of the proposed rule, the City of Austin's "Save Our Springs" (SOS) ordinance was overturned by a Hays County jury in November 1994 (*Jerry J. Quick, et al.* v. *City of Austin*). Prior to its invalidation, the SOS ordinance was the most stringent water quality protection regulation in the Barton Springs watershed, requiring impervious cover limitations of 15 to 25 percent (based on net site area), buffers along major creeks, no increases in loadings of 13 pollutants, barring of exemptions and variances from the ordinance provisions, and attempts to reduce the risk of accidental contamination (Camille Barnett, City of Austin, *in litt.*, 1993).

In addition to the overturning of the SOS ordinance, several bills passed during the State's 74th (1995) legislative session that curtail the City of Austin's ability to implement water quality protective measures within its five-mile ETJ. Senate Bill 1017 and House Bill 3193 exempt large developments (over 1,000 acres, or 500 acres if approved by the TNRCC) from all City of Austin water quality ordinances and land use regulations. The TNRCC has determined that this legislation conflicts with State and Federal regulations; does not address groundwater quality; is inadequate to ensure protection of surface water quality and would not meet State water quality standards; provides little or no inspection, enforcement, or compliance safeguards; and would allow surface and groundwater quality to degrade (Mark Jordan, TNRCC, *in litt.*, 1995). Other laws passed during the 1995 session that limit the enforcement authority of local governments include Senate Bill 14, which allows landowners to sue local and State governments to invalidate regulations or seek compensation for actions that would decrease property values by 25 percent or more; and Senate Bill 1704, which "grandfathers" developers from updated health and safety ordinances.

Other laws and regulations potentially affecting water quality in the Barton Springs watershed include the Federal Clean Water Act, Safe Drinking Water Act, Resource Conservation and Recovery Act, and Comprehensive Environmental Response, Compensation, and Liability Act; the Edwards Rules and Texas Underground Storage Tanks Act (30 Texas Administrative Code, Chapters 313 and 334), which are promulgated and enforced by the TNRCC; the City of Austin's water quality protective ordinances (Williamson Creek Ordinance (1980), Barton Creek Watershed Ordinance (1981), Lower Watersheds Ordinance (1981), Comprehensive Watersheds Ordinance (1986), "Composite Ordinance" (1991), and the amended Composite Ordinance (1994); and the City of Dripping Springs' Site Development Ordinance 52B. In addition to the inadequacies of these rules and regulations (discussed below), many of the agencies charged with their administration lack adequate resources to carry out their responsibilities (TNRCC 1994).

The purpose of the Clean Water Act is "to restore and maintain the physical, chemical, and biological integrity of the Nation's waters." Section 304 of the Clean Water Act provides the EPA authority to develop water quality criteria to protect water resources, including groundwater. However, the primary focus of the Clean Water Act is on surface water, and the law does not mandate protection of groundwater resources. Furthermore, surface and groundwater tend to be treated as separate and distinct resources rather than interactively, and protection focuses on human use rather than effects on aquatic organisms. Section 302, which provides for a National Pollution Discharge Elimination System (NPDES), primarily addresses point source pollution and not non-point source pollution or groundwater contamination. Efforts are needed to integrate the relationship between surface and groundwater into the regulatory framework and to assess the impact of surface water regulations and management practices on groundwater resources.

Part C of the Safe Drinking Water Act, the Underground Injection Control Program, requires that the injection of fluids underground not endanger drinking water supplies. Section 1427 (Sole Source Aquifer Program) requires that federally funded projects potentially affecting a sole source aquifer ensure that drinking water will not be contaminated. A portion of the Barton Springs watershed has been designated as a Sole Source Aquifer. The Sole Source Aquifer Program applies only to Federal projects and not to State or private projects, unless they receive Federal funds, and no requirements related to aquatic organisms are included.

The Federal Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act focus on remedial actions once groundwater contamination has occurred, rather than on prevention. Under these Acts, monitoring is required to determine when remediative cleanup actions following groundwater contamination by chemical and waste sites is complete. In addition, the RCRA requires that all underground storage tanks installed since 1988 be equipped with spill and overfill protection devices, protected from corrosion that could result in releases, and equipped with devices that would detect any releases that might occur. Previously existing tanks are to be upgraded to these same standards over a ten-year period.

Much of the responsibility for protecting surface and groundwaters is directed to and administered by the states. Section 106 of the Clean Water Act provides funds to the states for water quality programs, including comprehensive groundwater protection programs. Section 303 requires states to set water quality standards for surface waters, employing the criteria established by the EPA under section 304, and to designate uses for each water body. Section 319 provides technical and financial assistance to the states to implement programs to control nonpoint source pollution for both surface water and groundwater. The EPA's policy, "Protecting the Nation's Groundwater: EPA's Strategy for the 1990's" also recognizes states as having the primary role of protecting groundwater. Section 1428 of the Safe Drinking Water Act, the Wellhead Protection Program, directs states to control sources of contaminants near public supply wells used for drinking water. Most of the State of Texas' efforts to protect surface and groundwater resources focus on point sources of pollution, monitoring, and remediative actions (TNRCC 1994). The TNRCC's Tier II Antidegradation Policy applies only to regulatory actions that would exceed fishable/swimmable quality of Barton and Onion creeks, and allows degradation if necessary for important economic or social development.

The Edwards Rules regulate construction-related activities on the recharge zone of the Edwards aquifer that may "alter or disturb the topographic, geologic, or existing recharge characteristics of a site" as well as any other activity "which may pose a potential for contaminating the Edwards aquifer," including sewage collection systems and hazardous materials storage tanks. The Edwards Rules regulate construction activities though review of Water Pollution Abatement Plans (WPAPs). The WPAPs do not require site-specific water quality performance standards for developments over the recharge zone nor do they address land use, impervious cover limitations, nonpoint source pollution, application of fertilizers and pesticides, or retrofitting for developments existing prior to the implementation of the Rules. (Travis County was incorporated into the Rules in March 1990; Hays County was incorporated in 1984.) The WPAPs also do not apply to development activities in the aquifer's contributing zone. To date, the Edwards Rules do not include a comprehensive plan to address the effects of cumulative impacts on water quality in the aquifer or its contributing zone.

The Edwards Rules and the Texas Underground Storage Tanks Act (Title 31, Chapters 313 and 334 of the Texas Administrative Code) require that all tanks installed after September 29, 1989, be equipped with release detection devices, corrosion protection, and spill/overflow protection; that all previously existing tanks be upgraded to the same standards by December 22, 1994; and that tanks located in the Edwards aquifer recharge and transition zones be of double-walled or equivalent construction with continuous monitoring of the space between the tank and piping walls for leak detection. The adequacy of these measures in preventing groundwater contamination, particularly over the long term, has not been demonstrated. Routine testing of tanks to ensure proper functioning is not required until after a leak has been detected, and no routine monitoring or testing by the TNRCC is conducted to determine compliance with the regulations. Formal approval by the TNRCC of construction plans for new tanks is only required for the recharge zone and not the contributing zone. The TNRCC does not maintain a database of the total number of storage tanks that have been upgraded, those that still need to be upgraded, or those that are in violation of the regulations (Jackie Hardee, TNRCC, pers. comm., 1995).

A Section 10(a)(1)(B) permit allowing the incidental taking of two endangered songbirds and six endangered karst invertebrates, known as the Balcones Canyonlands Conservation Plan (BCCP), was issued to Travis County and the City of Austin in May 1996 (USFWS 1996). The BCCP does not allow incidental taking of the Barton Springs salamander, and requires that all permit applicants ensure that their activities do not degrade waters in the Barton Springs watershed. The guidance provided in the Available Conservation Measures section of this final rule is intended to assist landowners in achieving this goal. Acquisition of 4,000 acres in the Barton Creek watershed as BCCP preserve land will provide additional benefits to the salamander by preserving the natural integrity of the landscape and positively contributing to water quality and quantity in Barton Creek and Barton Springs. The BCCP does not apply to development activities in Hays County.

To protect water quantity in the Barton Springs segment, the BS/EACD has developed a Drought Contingency Plan (D.G. Rauschuber & Associates and R.J. Brandes Co. 1990). Barton Springs has always flowed during recorded history, and one of the BS/EACD's goals is to assure that Barton Springs flow "does not fall appreciably below historic low levels" (D.G. Rauschuber & Associates and R.J. Brandes Co. 1990). The BS/EACD regulates about 60 to 80 percent of the total volume that is pumped from the Barton Springs segment and has the ability to limit development of new wells, impose water conservation measures, and curtail pumpage from these wells during drought conditions (Bill Couch, BS/EACD, pers. comm., 1992, and *in litt.* 1994; Botto and Rauschuber 1995). According to the BS/EACD (B. Couch, pers. comm., 1992), water well production in the higher elevations of the Barton Springs segment has been limited during periods of lower aquifer levels in recent years. However, the ability of the BS/EACD to ensure the success of the plan is limited, since it does not regulate 20 to 40 percent of the total volume that is pumped from the Barton Springs segment.

E. *Other natural or manmade factors affecting its continued existence.* The very restricted range of the Barton Springs salamander makes this species especially vulnerable to acute and/or chronic groundwater contamination. Since the salamander is fully aquatic, there is no possibility for escape from contamination or other threats to its habitat. A single incident (such as a contaminant spill) has the potential to eliminate the entire species and/or its prey base. Crustaceans, particularly amphipods, on which the salamander feeds are especially sensitive to water pollution (Mayer and Ellersieck 1986; Phipps *et al.* 1995; Burton and Ingersoll 1994).

Research indicates that amphibians, particularly their eggs and larvae, are sensitive to many pollutants, such as heavy metals; certain insecticides,

particularly cyclodienes (endosulfan, endrin, toxaphene, and dieldrin), and certain organophosphates (parathion, malathion); nitrite; salts; and petroleum hydrocarbons (Harfenist *et al.* 1989). Christine Bishop (Canadian Wildlife Service) states that "the health of amphibians can suffer from exposure to pesticides (Harfenist *et al.* 1989). Because of their semipermeable skin, the development of their eggs and larvae in water, and their position in the food web, amphibians can be exposed to waterborne and airborne pollutants in their breeding and foraging habitats * * *. [Furthermore] pesticides probably change the quality and quantity of amphibian food and habitat (Bishop and Pettit 1992)." Toxic effects to amphibians from pollutants may be either lethal or sublethal, including morphological and developmental aberrations, lowered reproduction and survival, and changes in behavior and certain biochemical processes.

Observations of central Texas *Eurycea* salamanders in captivity indicate that these species, including the Barton Springs salamander, are very sensitive to changes in water quality and are "quite delicate and difficult to keep alive" (Sweet, *in litt.*, 1993). Sweet reported that captive individuals exhibit adverse reactions to plastic containers, aged tapwater, and detergent residues. The water in which these salamanders are kept also requires frequent changing (Sweet, *in litt.*, 1993). Unsuccessful attempts at captive propagation of the San Marcos salamander (Janet Nelson, Southwest Texas State University, pers. comm., 1992) and very limited success at inducing captive spawning in the Barton Springs salamander (Ables, Coale, and Dwyer, pers. comms., 1996) may also be due to these species' sensitivity to environmental stress.

Several citizens have expressed concern over impacts to the salamander from recreational use of Barton Springs Pool for swimming. However, no evidence exists to indicate that swimming in Barton Springs Pool poses a threat to the salamander population, which is located 3 to 5 m (10 to 15 ft) below the water's surface. The survey data show no correlation between recreational use of the pool and salamander abundance. Furthermore, salamander population declines have occurred in Eliza Pool, which is closed to the public. Although certain pool maintenance practices may impact individual salamanders occurring in the pools, they are unlikely to have a major impact on the entire species.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. The best scientific data indicate that listing the Barton Springs salamander as endangered is warranted. Critical habitat is determined to be not prudent for this species for the reasons discussed below.

Critical Habitat

Critical habitat is defined in section 3 of the Act as: (i) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which protection under the Act is no longer necessary.

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. Service regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent when one or both of the following situations exist—(1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species, or (2) such designation of critical habitat would not be beneficial to the species. The Service finds that designation of the springs occupied by the Barton Springs salamander as critical habitat would not be prudent because it would not provide a conservation benefit to the species.

Designation of critical habitat benefits a listed species only when adverse modification or destruction of critical habitat could occur without the survival and recovery of the species also being jeopardized. Because the Barton Springs salamander is restricted to one area that discharges water from the entire Barton Springs watershed, any action that would result in adverse modification or destruction of the salamander's critical habitat would also jeopardize its continued survival and recovery. Designating critical habitat would therefore not provide a benefit to the species beyond the benefits already provided by listing and subsequent evaluation of activities under the jeopardy standard of section 7 of the Act. Because jeopardy to the species and adverse modification of its critical habitat are indistinguishable, the Service has determined that designation of critical habitat for the Barton Springs salamander is not prudent.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in public awareness and conservation actions by Federal, State, and local agencies, private organizations, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

The health of the aquifer and Barton Springs, and the long-term survival of the Barton Springs salamander, can only be ensured through a concerted, organized effort on the part of all affected Federal, State, and local governments and the private citizenry to protect the Barton Springs watershed. Conservation and management of the Barton Springs salamander will entail removing threats to its survival, including—(1) protecting the quality and quantity of springflow from Barton Springs by implementing comprehensive management programs to control and reduce point and nonpoint sources of pollution throughout the Barton Springs watershed; (2) minimizing the risk and likelihood of pollution events that would affect water quality; (3) strengthening efforts to protect groundwater and springflow quantity; (4) continuing to examine and implement pool cleaning practices and other park operations that protect and perpetuate the salamander's surface habitat and population; and (5) public outreach and education. It is also anticipated that listing will encourage continued research on the critical aspects of the Barton Springs salamander's biology (e.g., longevity, natality, sources of mortality, feeding and breeding ecology, and sensitivity to contaminants and other water quality constituents).

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered

or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR Part 402. Section 7(a)(1) requires Federal agencies to use their authorities to further the purposes of the Act by carrying out programs for listed species. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species. If a Federal action may affect a listed species, the responsible Federal agency must enter into consultation with the Service, unless the Service agrees with the agency that the action is not likely to adversely affect the species.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. These prohibitions, codified at 50 CFR 17.21, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect, or to attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies. The Barton Springs salamander is not known to be commercially traded and such permit requests are not expected.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22 and 17.23. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities.

It is the policy of the Service (59 FR 34272; July 1, 1994) to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of listing on proposed and ongoing activities within a species' range, and to assist the public in identifying measures needed to protect the species. Aside from the potential for catastrophic spills, no single development activity or water withdrawal in and of itself is likely to significantly impact water quality and quantity in the Barton Springs watershed. Rather, it is the sum of all of these activities and their associated impacts that threaten this resource and the survival of the Barton Springs salamander. Because most of the threats to the salamander come from diffuse sources that are cumulative in nature, their effects will be observable at the ecosystem and population level rather than at the individual level. Thus, the purpose of this guidance is not only to identify activities that would or would not likely result in "take" of individuals, but activities that in combination will ultimately affect the long-term survival of the Barton Springs salamander. This guidance should not be used to substitute for local efforts to develop and implement comprehensive management programs for the Barton Springs watershed.

Activities that the Service believes are unlikely to result in a violation of section 9 for the Barton Springs salamander are:

(1) Range management and other agricultural practices that promote good vegetative cover and soil conditions (for example, low to moderate stocking rates, rotational and deferred grazing, and maintaining native bunchgrasses);

(2) Swimming in Barton Springs pool;

(3) Buying or selling of property;

(4) Improvements to existing structures, such as renovations, additions, repairs, or replacement;

(5) New developments or construction that do not result in an appreciable change in the quality or quantity of water in the Barton Springs watershed above normal background conditions (non-degradation). Generally, new developments and construction designed and implemented pursuant to State and local water quality protection regulations in effect as of the date of this rule will not result in a violation of section 9;

(6) Routine residential lawn maintenance; and

(7) Upgrading or replacing existing structures (such as bridge crossings, BMPs, septic systems, underground storage tanks) in order to minimize pollutant loadings into receiving waters.

Activities that the Service believes could potentially harm the Barton Springs salamander and result in a violation of section 9 include:

(1) Collecting or handling of the species without appropriate permits;

(2) Alteration or disturbance of the Barton Springs salamander's habitat in the pools where it occurs (including use of chemicals to clean the pools where the salamander occurs; use of high pressure fire hoses in salamander habitat; removal of beneficial aquatic plants; dredging; and frequent and/or prolonged drawdown, particularly during drought);

(3) Illegal discharges or dumping of chemicals, silt, sewage, fertilizers, pesticides, heavy metals, oil, organic wastes, or other pollutants into the Barton Springs watershed;

(4) New developments or construction not designed and/or implemented pursuant to State and local water quality protection regulations in effect as of the date of this rule, that result in an appreciable change in the quality or quantity of water in the Barton Springs watershed above normal background conditions (non-degradation);

(5) Withdrawal of water from the aquifer to the point at which springflows at Barton Springs appreciably diminish;

(6) Withdrawal of water from the contributing zone to the point at which baseflows in the creeks appreciably diminish;

(7) Introduction of non-native aquatic species (fish, plants, other) into Barton Springs or the Barton Springs segment of the Edwards aquifer;

(8) Destruction or alteration of caves, sinkholes, or other significant recharge features (including dumping, vandalism, and/or diverting contaminated water into these features); and

(9) Destruction or alteration of spring orifices that provide water to Barton Springs.

Questions as to whether specific activities will constitute a violation of section 9 should be directed to the Service's Austin Ecological Services Field Office (see **ADDRESSES** section). Requests for copies of the regulations regarding listed wildlife and inquiries regarding prohibitions and permits should be addressed to the U.S. Fish and Wildlife Service, Branch of Endangered Species/Permits, P.O. Box 1306, Albuquerque, New Mexico 87103 (telephone: 505/248–6920; facsimile: 505/248–6922).

National Environmental Policy Act

The Fish and Wildlife Service has determined that Environmental Assessments and Environmental Impact Statements, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

Required Determinations

The Service has examined this regulation under the Paperwork Reduction Act of 1995 and found it to contain no information collection requirements.

References Cited

A complete list of all references cited in this rule is available upon request from the Austin Ecological Services Field Office (see **ADDRESSES** section).

Author: The primary author of this final rule is Lisa O'Donnell, Austin Ecological Services Field Office (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulation Promulgation

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500, unless otherwise noted.

2. Section 17.11(h) is amended by adding the following, in alphabetical order under AMPHIBIANS, to the List of Endangered and Threatened Wildlife, to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
* * *		*	*		*		*
AMPHIBIANS							
* * *		*	*		*		*
Salamander, Barton Springs	*Eurycea sosorum*	U.S.A. (TX)	Entire	E	612	NA	NA
* * *		*	*		*		*

Dated: April 24, 1997.

John G. Rogers,

Acting Director, Fish and Wildlife Service.

[FR Doc. 97–11194 Filed 4–29–97; 8:45 am]

BILLING CODE 4310–55–P

APPENDIX F:

TNRCC LETTER TO USFWS REGARDING LISTING OFTHE BARTON SPRINGS SALAMANDER

AND

TEXAS ADMINISTRATIVE CODE, TITLE 30, PART 1, CHAPTER 307, RULE 307.5 – TEXAS SURFACE WATER QUALITY STANDARDS, ANTIDEGREDATION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

July 9, 1996

Mr. Steve Helfert, Field Supervisor
U. S. Fish and Wildlife Service
10711 Burnet Road, Suite 200
Austin, TX 78758

Re: Proposed Listing of the Barton Springs Salamander

Dear Mr. Helfert:

The purpose of this letter is to provide comment on the proposed listing of the Barton Springs Salamander as an endangered species (*Federal Register* Vol. 59, No. 33, p. 7968, February 17, 1994). The Texas Natural Resource Conservation Commission (TNRCC or commission) appreciates the extension of the public comment period as provided by the notice contained in *Federal Register* Vol. 61, No. 122, pp. 32413-32415 (June 24,1996). In its proposal, the U. S. Fish and Wildlife Service (USFWS) stated that the primary threat to the species was the contamination of the waters that feed Barton Springs by catastrophic events (spills) and chronic degradation resulting from urban activities. The USFWS proposal asserts that existing state and local regulations are insufficient to protect the species.

Commission rules seek to maintain and protect the water quality standards and related aquatic life uses designated for the Barton Creek watershed. A copy and summary of these rules as well as recently proposed amendments to those rules are attached for your consideration. The commission has not been provided any clear information by the USFWS relating to what specific limits would be required to meet necessary water quality standards for the Barton Springs Salamander or how existing state and local water quality measures are failing to maintain such standards. The 1995 report of the Aquatic Biology Advisory Team confirms this lack of sufficient information. Absent this information, the commission presumes that its standards and measures are sufficient.

The Tier II Antidegradation Policy contained in §307.5 of the commission's rules is currently applicable to Barton Creek. This policy provides that no activities subject to regulatory action which would cause degradation of waters which exceed fishable/swimmable quality will be allowed unless it can be shown that the lowering of the water quality is necessary for important economic or social development. Degradation is defined as a lowering of water quality by more than a *de minimis* extent, but not to the extent that an existing use is impaired. Fishable/swimmable waters are defined as waters which have quality sufficient to support propagation of indigenous fish, shellfish, and wildlife and recreation in and on the water. Water quality sufficient to protect existing uses will be maintained.

With respect to the agency's water quality protection measures, the USFWS has expressed the following general concerns:

1) Concern: Commission rules only cover the recharge zone of the Edwards Aquifer and not the contributing watershed area.

Response: This is incorrect. Although many of the provisions contained in Chapter 313 of the commission's rules apply to activities in the recharge and transition zones, these are not the only regulations that apply. They build upon and expand other existing statewide rules under Title 30 of the Texas Administrative Code (TAC) which govern various permitting, licensing, and spill response programs that address surface and groundwater pollution prevention from storage, transportation, and disposal of waste, hazardous substances, and wastewater. Statewide provisions for aboveground and underground storage tanks, on-site sewerage systems, and sewage collection systems contained in Chapters 334, 285, and 317, respectively, apply in the contributing zone. Additionally, there are special requirements contained in Chapter 313 and Chapter 311 for point discharges up to ten miles upstream of the recharge zone, requiring the use of best available technology and providing for the most stringent discharge parameters in the state.

Also, recent legislative action has been taken that is not considered in the 1994 USFWS proposal. With the passage of Senate Bill (SB) 1017 (1995), special water quality protection plans are being developed and implemented in the Barton Creek watershed within the contributing zone of the Edwards Aquifer. This legislation applies to property of 500 acres or more within Austin's extra-territorial jurisdiction where the property owners have elected to designate a water quality protection zone and develop a water quality protection plan subject to review and approval by the agency. The legislation provides a non-degradation water quality goal by providing that development on the property may not result in the exceedence of background water quality. The quality of runoff water must be comparable to those levels that existed prior to new development. Proposed rules under 30 TAC Chapter 216 (relating to Water Quality Protection Zones) that implement this legislation were published on April 4, 1996 for public comment. Adoption of these rules is expected sometime in the late summer or early fall.

Additionally, House Bill (HB) 3193 (1995), codified in §26.177 of the Texas Water Code, requires the newly created Southwest Travis County Water District to develop and implement a Water Pollution Abatement Plan within 4600 acres that contribute recharge to Barton Springs. The statute also requires the district's plan to be designed to achieve state water quality standards and to apply equally and uniformly throughout the district.

2) Concern: The rules do not provide performance standards for development projects.

Response: It is correct that the rules do not prescribe specific numerical performance standards. Rather, the developer must propose in its water pollution abatement plan measures that will prevent pollution of stormwater entering the site, on-site and leaving the site. Pollution is defined in the rule as the alteration of the physical, thermal, chemical, or

biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to public health, safety or welfare, or impairs the usefulness of the public enjoyment of the waters for any lawful or reasonable purpose. The plans must meet this performance goal of water quality protection. Although the rules themselves do not require the use of specified best management practices (BMPs) or performance standards, agency staff evaluate the adequacy of the plans to determine whether they will protect and maintain the applicable water quality performance goal.

In performing this analysis, the TNRCC determines whether the proposed BMPs and other measures are reasonable and necessary to achieve the performance standard of protecting existing and potential uses of ground water and maintaining Texas Surface Water Quality Standards. Such BMPs may be determined by using studies and other information that are generally relied upon by professionals in the environmental engineering field and verified through performance monitoring. This requirement has been clarified in the proposed amendments to Chapter 313, relating to the Edwards Aquifer Protection Program, and will be made applicable to BMPs to control pollution during as well as after construction.

To implement SB 1017, the commission is currently considering adopting rules proposed by agency staff under 30 TAC 216 requiring the use of BMPs that meet a performance standard of either: 1) retaining and disposing of on-site the first 1.5 inches of rainfall from a developed area; or 2) discharge water with average annual constituent loadings, after development, of less than 10% above background. Such standards are currently contained in the Lower Colorado River Authority's ordinance to control non-agriculturally-related non-point sources of pollution, including required setbacks and buffer zones to protect creeks and riparian corridors, recharge features including wetlands, from development and aboveground and underground storage tanks. This initial and primarily technology-based management approach could evolve into more of a water quality/performance requirement program under the 313 program as additional information becomes available. Several EPA-funded studies are currently being performed to determine the effectiveness of BMPs being used in the Barton Creek/Onion Creek watersheds. The results of these studies will be used to revise BMP guidance for the 313 program and related performance standards.

3) Concern: The rules impose no impervious cover limitations.

Response: This is correct *per se*, since there is not a separate category in the 313 rules. Rather, the rules consider the amount of proposed impervious cover for the development project as a factor in approving a water pollution abatement plan. Additionally, the rules encourage impervious cover limitations by providing an exemption from the water pollution abatement plan process for single family residential developments on lots of 5 acres. Finally, impervious cover limitations are just one of many pollution control measures which may meet performance goals. The commission believes that alternatives such as structural BMPs and/or performance standards provide equivalent water quality protection.

Proposed changes to Chapter 313 include the requirement for a description to be contained in the water pollution abatement plan of measures that will be taken to avoid or minimize changes in which water may enter a stream as a result of construction and development that would increase flashing, create stronger flow and stream velocity, or otherwise increase instream erosion and further water quality degradation. A similar requirement has been proposed for Chapter 216 as a part of the implementation of SB 1017. This requirement as well as the requirement of the use of BMPs with demonstrated performance efficiencies sufficient to meet water quality protection goals will significantly strengthen existing requirements for the control of sediment-containing stormwater during and after construction.

4) Concern: The rules have no retrofit requirements.

Response: This is currently correct. However, existing regulations provide for the inspection and maintenance of pollution control structures. Additionally, the commission has proposed for adoption rules under 30 TAC 216 which would require modification to pollution control measures based upon performance monitoring. These proposed rules were published April 4, 1996, for public comment. Commission action on the proposed rules is expected sometime late this summer or early fall.

5) Concern: The rules or the review and approval of an individual water pollution abatement plan does not address cumulative impacts on the creek or the aquifer.

Response: This is correct. A model to perform such an analysis would be very difficult to construct since it would be very complex and contain a large number of variables. Therefore, this cumulative analysis will be a long-term goal in the development of a water quality-based water management program. Until then, performance standards and monitoring will be used in meeting water quality standards as described in the response in number 2 above.

6) Concern: The rules do not provide for the emergency response and cleanup of a hazardous materials spill.

Response: It is correct that the current 313 rules do not specify requirements for emergency response and cleanup of a hazardous material spill. However, as part of the Water pollution abatement plan process, the agency works with the Texas Department of Transportation (TxDOT) to address both potential contamination issues surrounding the construction of highways and the placement of hazardous material traps to capture accidental spills resulting from accidents. State agencies also work with the federal Department of Transportation in identifying highways over sensitive recharge areas such as MoPac in Austin and routing trucks with hazardous cargo away from these areas. In addition, revised 313 rules (being proposed as Chapter 213 rules) require a description of measures that will be taken to contain any spill of hydrocarbons or hazardous substances from temporary storage of 250 gallons or more at a site.

Furthermore, the commission is already authorized by statute to conduct emergency spill response and cleanup activities pursuant to §26.264 of the Texas Water Code for spills occurring on the recharge zone, within the transition zone, and in the contributory watershed of the Edwards Aquifer. The agency currently has staff in the Austin headquarters and field offices dedicated for this purpose. As specified under Chapter 343 (relating to Oil and Hazardous Substances), the agency is the state's lead agency for response to all hazardous substance discharges or spills, and discharges or spills of other substances and certain inland oil discharges or spills which may cause pollution of the aquifer. This authority is derived from §26.039 and §§26.261-26.268 of the Texas Water Code through the Texas Hazardous Substances Spill Prevention and Control Act. Pursuant to §26.039(b), whenever an accidental discharge or spill occurs, the individual operating or responsible for the activity or facility must notify the agency as soon as possible, but not later than 24 hours after the occurrence. In addition, the Texas Railroad Commission has jurisdiction over discharges or spills from crude oil or natural gas pipelines under its jurisdiction. However, discharges or spills from pipelines transporting refined products such as gasoline, diesel, or other fuel oils fall under the jurisdiction of this agency. As specified under the "State of Texas Oil and Hazardous Substances Spill Contingency Plan," the agency serves as the lead in directing and approving the response for the discharge or spill of a harmful quantity of crude oil (defined as five or more barrels discharged or spilled on the ground or any quantity discharged or spilled into water) during highway or rail transportation. Information relating to measures taken by the TxDOT to protect the aquifer during and after road construction is also enclosed.

Thank you for your consideration of these comments. If you have any questions or need for further information, please contact me at (512) 239-5505.

Sincerely,

Barry R. McBee
Chairman

BRM/MA/cl

Enclosures:
1. Interoffice Memo, "Protecting Water Quality of the Edwards Aquifer," dated July 1, 1996
2. Chapter 307. Texas Surface Water Quality Standards
3. Chapter 313. Edwards Aquifer
4. Proposed Chapter 213. Edwards Aquifer
5. Chapter 285. On-site Wastewater Treatment
6. Proposed Chapter 285. On-site Sewage Facilities
7. Chapter 311, Subchapter E. Colorado River Watershed
8. Proposed Chapter 216. Water Quality Protection Zones
9. Chapter 343. Oil and Hazardous Substances
10. Chapter 335. Industrial Solid Waste and Municipal Hazardous Waste, Subchapter G. Location Standards for Hazardous Waste Storage, Processing, or Disposal
11. Rules and Enabling Act of the Barton Springs/Edwards Aquifer Conservation District
12. "Highway Construction," prepared by the Texas Department of Transportation

cc: Mr. John Baker, Commissioner, Texas Natural Resource Conservation Commission
Mr. Ralph Marquez, Commissioner, Texas Natural Resource Conservation Commission

Texas Administrative Code

TITLE 30	ENVIRONMENTAL QUALITY
PART 1	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
CHAPTER 307	TEXAS SURFACE WATER QUALITY STANDARDS
RULE §307.5	**Antidegradation**

(a) Application. The antidegradation policy and implementation procedures set forth in this section apply to actions regulated under state and federal authority that would increase pollution of the water in the state. Such actions include authorized wastewater discharges, total maximum daily loads (TMDLs), waste load evaluations, and any other miscellaneous actions, such as those related to man-induced nonpoint sources of pollution, that may impact the water in the state.
(b) Antidegradation policy. In accordance with the Texas Water Code, §26.003, the following provisions establish the antidegradation policy of the commission.
(1) Tier 1. Existing uses and water quality sufficient to protect those existing uses must be maintained. Categories of existing uses are the same as for designated uses, as defined in §307.7 of this title (relating to Site-Specific Uses and Criteria).
(2) Tier 2. No activities subject to regulatory action that would cause degradation of waters that exceed fishable/swimmable quality are allowed unless it can be shown to the commission's satisfaction that the lowering of water quality is necessary for important economic or social development. Degradation is defined as a lowering of water quality by more than a de minimis extent, but not to the extent that an existing use is impaired. Water quality sufficient to protect existing uses must be maintained. Fishable/swimmable waters are defined as waters that have quality sufficient to support propagation of indigenous fish, shellfish, terrestrial life, and recreation in and on the water.
(3) Tier 3. Outstanding national resource waters are defined as high quality waters within or adjacent to national parks and wildlife refuges, state parks, wild and scenic rivers designated by law, and other designated areas of exceptional recreational or ecological significance. The quality of outstanding national resource waters must be maintained and protected.
(4) Discharges that cause pollution that are authorized by the Texas Water Code, the Federal Clean Water Act, or other applicable laws must not lower water quality to the extent that the Texas Surface Water Quality Standards are not attained.
(5) Anyone discharging wastewater that would constitute a new source of pollution or an increased source of pollution from any industrial, public, or private project or development is required to provide a level of wastewater treatment consistent with the provisions of the Texas Water Code and the Clean Water Act (33 United States Code, §§1251 *et seq.).* As necessary, cost-effective and reasonable best management practices established through the Texas Water Quality Management Program are achieved for nonpoint sources of pollution.
(6) Application of antidegradation provisions does not preclude the commission from establishing modified thermal discharge limitations consistent with the Clean Water Act, §316(a) (33 United States Code, §1326).
(c) Antidegradation implementation procedures.
(1) Implementation for specific regulatory activities.
(A) For TPDES permits for wastewater, the process for the antidegradation review and public

coordination is described in the standards implementation procedures.

(B) For federal permits relating to the discharge of fill or dredged material under Federal Clean Water Act, §404, the antidegradation policy and public coordination is implemented through the evaluation of alternatives and mitigation under Federal Clean Water Act, §404(b)(1). State review of alternatives, mitigation, and requirements to protect water quality may also be conducted for federal permits that are subject to state certification, as authorized by Federal Clean Water Act, §401 and conducted in accordance with Chapter 279 of this title (relating to Water Quality Certification).

(C) Other state and federal permitted and regulated activities that increase pollution of water in the state are also subject to the provisions of the antidegradation policy as established in subsections (a) and (b) of this section.

(2) General provisions for implementing the antidegradation policy.

(A) Tier 1 reviews must ensure that water quality is sufficiently maintained so that existing uses are protected. All pollution that could cause an impairment of water quality is subject to Tier 1 reviews. If the existing uses and criteria of a potentially affected water body have not been previously determined, then the antidegradation review must include a preliminary determination of existing uses and criteria. Existing uses must be maintained and protected.

(B) Tier 2 reviews apply to all pollution that could cause degradation of water quality where water quality exceeds levels necessary to support propagation of fish, shellfish, terrestrial life, and recreation in and on the water (fishable/swimmable quality). Guidance for determining water bodies that exceed fishable/swimmable quality is contained in the standards implementation procedures. For dissolved oxygen, analyses of degradation under Tier 2 must utilize the same critical conditions as are used to protect instream criteria. For other parameters, appropriate conditions may vary. Conditions for determining degradation are commensurate with conditions for determining existing uses. The highest water quality sustained since November 28, 1975 (in accordance with EPA Standards Regulation 40 Code of Federal Regulations Part 131) defines baseline conditions for determinations of degradation.

(C) Tier 3 reviews apply to all pollution that could cause degradation of outstanding national resource waters. Outstanding national resource waters are those specifically designated in this chapter.

(D) When degradation of waters exceeding fishable/swimmable quality is anticipated, a statement that the antidegradation policy is pertinent to the permit action must be included in the public notice for the permit application or amendment. If no degradation is anticipated, the public notice must so state.

(E) Evidence can be introduced in public hearings, or through the public comment process, concerning the determination of existing uses and criteria; the assessment of degradation under Tier 1, Tier 2, and Tier 3; the social and economic justification for lowering water quality; requirements and conditions necessary to preclude degradation; and any other issues that bear upon the implementation of the antidegradation policy.

(F) Interested parties are given the opportunity to provide comments and additional information concerning the determination of existing uses, anticipated impacts of the discharge, baseline conditions, and the necessity of the discharge for important economic or social development if degradation of water quality is expected under Tier 2.

(G) The antidegradation policy and the general provisions for implementing the antidegradation policy apply to the determination of TMDLs and to waste load evaluations that allow an increase in loading. If the TMDL or waste load evaluation indicates that degradation of

waters exceeding fishable/swimmable quality is expected, the public hearing notice must so state. Permits that are consistent with an approved TMDL or waste load evaluation under this antidegradation policy are not subjected to a separate antidegradation review for the specific parameters that are addressed by the TMDL or waste load evaluation.

APPENDIX G:

USFWS Concurrence Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
10711 Burnet Road, Suite 200
Austin, Texas 78758
512 490-0057
FAX 490-0974

NOV 2 9 2011

Stirling Robertson
Environmental Affairs Division
Texas Department of Transportation
125 East 11th Street
Austin, TX 78701-2483

Consultation Number 21450-2012-I-0031

RE: CSJ 0914-04-242

Dear Mr. Robertson:

This responds to the Texas Department of Transportation's (TxDOT) November 4, 2011, letter requesting informal consultation on proposed improvements to Frate Barker Road (CSJ: 0914-04-242), from Brodie Lane to Manchaca Road, in Austin, Travis County, Texas. TxDOT submitted supporting documentation to the U.S. Fish and Wildlife Service (Service) requesting concurrence that the proposed project, may affect, but is not likely to adversely affect, the endangered Barton Springs salamander (*Eurycea sosorum*), a species listed pursuant to the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Section 7 of the Act requires all Federal agencies consult with the Service to ensure that the actions authorized, funded, or carried out by such agencies do not jeopardize the continued existence of any threatened or endangered species or adversely modify or destroy designated critical habitat for such species. The Federal Highway Administration (FHWA) is the Federal Agency associated with this project.

The project proposal is to upgrade the existing two-lane Frate Barker Road to a four-lane divided road, with a continuous center turn lane. The purpose of the project is to increase mobility and improve safety. The total length of the project would be about 1.3 miles and about 7.55 acres of new right-of-way would be acquired. The project would add 10.5 acres of new pavement, increasing impervious cover by that amount. Most of the road widening would occur to the south of the existing Frate Barker Road. A majority of the project would occur over the contributing and transition zones for the Barton Springs segment of the Edwards Aquifer, with about 0.34 acre over the recharge zone. TxDOT's environmental evaluation of the proposed project site identified three non-karst features. Due to a lack of suitable habitat, TxDOT determined the project would have no effect on endangered karst invertebrate species.

Because soil disturbance would occur within the Edwards Aquifer recharge zone, the project must comply with Texas Commission on Environmental Quality (TCEQ) Rules for Edwards Aquifer protection. The purpose of these rules is to protect the groundwater quality in the Edwards Aquifer through the implementation of stringent water quality measures and Best Management Practices (BMPs). In accordance with the Edwards Aquifer Rules, TxDOT will construct a water quality facility (sedimentation basin) and implement several water quality BMPs to remove a minimum of 80 percent of the total suspended solids generated by the project's increased impervious cover. The BMPs include: installation of silt fence, rock filter dams, and the temporary seeding of disturbed soil during construction; and permanent seeding of ditches or swales, and installation of a sediment basin at the Bear Creek crossing post-construction. A U.S. Army Corps of Engineers (USACE) Nationwide 14 permit would also be required in conjunction with this proposed project.

The information you provided about the proposed project documents the steps TxDOT will take to provide effective water quality control and treatment both during and after construction. Based on the avoidance and minimization measures proposed by TxDOT, we concur with your conclusion that the project may affect, but is not likely to adversely affect the Barton Springs salamander pursuant to section 7 of the Act. Therefore, no further endangered species consultation will be required unless: 1) the identified action is subsequently modified in a manner that causes an effect on a listed species or designated critical habitat; 2) new information reveals the identified action may affect federally protected species or designated critical habitat in a manner or to an extent not previously considered; or 3) a new species is listed or a critical habitat is designated under the Act that may be affected by the identified action. If new effects are identified in the future, the project proposal should be resubmitted to our office for further consideration.

We appreciate your efforts to conserve sensitive resources. If you have any questions, comments, or need additional information, please contact Mr. Darren LeBlanc at (512) 490-0057, ext. 247.

Sincerely,

Gary Mowad
Texas State Coordinator

cc: Clarence Rumancik, FHWA, Austin, TX
Cal Newnam, TxDOT, Austin District, Austin, TX

APPENDIX H:

Section 106 Coordination Letters

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

April 15, 2008

RE: Section 106 Consultation: Frate Barker Road Improvement Project in Travis County: Austin District:
SWCA Survey Report: 0914-04-242
Texas Antiquities Permit No. 4721

James E. Bruseth, Ph.D.
Division of Archeology, Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711

Dear Dr. Bruseth:

In accord with the First Amended Programmatic Agreement (PA) among TxDOT, the Federal Highway Administration, the Advisory Council on Historic Preservation, and the Texas State Historic Preservation Officer, and the Memorandum of Understanding (MOU) between TxDOT and Texas State Historic Preservation Officer, we are initiating Section 106 and Antiquities Code of Texas consultation for the proposed undertaking.

This undertaking entails widening Frate Barker Road located in Travis County. The existing roadway consisting of two travel lanes within a 50 foot wide right-of-way would be widened to four 12 foot wide travel lanes, one 14 foot wide continuous turn lane, two 5 foot wide bike lanes, two 6 foot wide sidewalks, and curbs and gutters. The proposed right-of-way would be widened to 120 feet. All cross drainage structures would be lengthened to match the wider roadway. The undertaking includes 8 acres of existing right-of-way currently owned by Travis County and 11 acres of new right-of-way that is currently privately owned.

The undertaking's area of potential effects (APE) is defined as an area 1.3 miles long by 120 feet wide paralleling Frate Barker Road beginning at Brodie Lane and extending to east to Manchaca Road. According to typical roadway design, the depth of impacts is estimated to be no more than 4 foot below the current ground surface. Due to the APE being located near natural water sources that may have attracted historic and prehistoric occupation, an archeological investigation was recommended to confirm the absence of significant archeological remains.

Staff from SWCA consulting archeologists recently completed an intensive archeological survey of the APE under Texas Antiquities Permit No. 4721. This investigation included 100% pedestrian inspection of the APE and the installation of 3 shovel tests. Due to the expectation of the lack of sediments in excess of 1 meter in depth, backhoe trenching was deemed as unwarranted.

No archeological sites were identified during the SWCA investigation. An isolated find consisting of one historical medicine bottle with a maker's mark dating from 1906 to 1923 was observed. In addition, one stable was also observed. However, since the wire nails were visible in the wood (commonly dated to post 1900), this stable was deemed to also be an isolated find. Based upon the observed lack of archeological deposits, the investigators have recommended that no further work is warranted for the undertaking. A copy of the report is attached for your review.

Based upon their findings, TxDOT agrees with the SWCA conclusions and seeks Texas State Historic Preservation Officer concurrence that the inventory of the undertaking is complete, for a finding of "no historic properties affected" for the undertaking, and no further work or consultation is required. Please signify your concurrence by signing on the signature line provided below.

In the event that archeological materials are discovered during construction, construction in the immediate area shall cease, and the Texas State Historic Preservation Officer will be contacted to initiate accidental discovery procedures in accordance of the terms of the Programmatic Agreement among the Texas State Historic Preservation Officer, the Federal Highway Administration and the Texas Department of Transportation. Thank you for your consideration in this matter. If you have any questions, please contact me at (512) 416-2640.

Sincerely,
Jon Budd, TxDOT Staff Archeologist

Concurrence by; _____ Date: 4-17-08
For F. Lawerence Oaks, State Historic Preservation Officer and Executive Director

Attachment
cc w/o attachment: Austin District, ATTN: M. Walker, ENV-JAR, JHB

AN INTENSIVE CULTURAL RESOURCES SURVEY OF THE FRATE BARKER ROAD IMPROVEMENT PROJECT IN TRAVIS COUNTY TEXAS

Prepared for

HNTB
301 Congress Avenue, Suite 600
Austin, Texas 78701

on behalf of
TRAVIS COUNTY
P.O. Box 1748
Austin, Texas 78767
0914-04-242

Prepared by

Mary Jo Galindo and Mercedes C. Cody

SWCA ENVIRONMENTAL CONSULTANTS
4407 Monterey Oaks Blvd.
Building 1, Suite 110
Austin, Texas 78749
www.swca.com

Principal Investigator

Kevin A. Miller

Texas Antiquities Permit 4721

SWCA Project Number 13472-324-AUS
SWCA Cultural Resources Report No. 2007-XXX

December 7. 2007

AN INTENSIVE CULTURAL RESOURCES SURVEY OF THE FRATE BARKER ROAD IMPROVEMENT PROJECT IN TRAVIS COUNTY TEXAS

Prepared for

HNTB
301 Congress Avenue, Suite 600
Austin, Texas 78701

on behalf of
TRAVIS COUNTY
P.O. Box 1748
Austin, Texas 78767

0914-04-242

Prepared by

Mary Jo Galindo and Mercedes C. Cody

SWCA ENVIRONMENTAL CONSULTANTS
4407 Monterey Oaks Blvd.
Building 1, Suite 110
Austin, Texas 78749
www.swca.com

Principal Investigator

Kevin A. Miller

DRAFT REPORT
ACCEPTABLE
Please submit 20 final report copies
by
for F. Lawerence Oaks
State Historic Preservation Officer
Date 4-17-08
Track#

Texas Antiquities Permit 4721

SWCA Project Number 13472-324-AUS
SWCA Cultural Resources Report No. 2007-XXX

December 7, 2007

U.S. Department
of Transportation
Federal Highway Administration

FEDERAL HIGHWAY ADMINISTRATION
300 EAST 8TH STREET, RM 826
AUSTIN, TEXAS 78701

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION
125 E. 11th STREET
AUSTIN, TEXAS 78701-2483

April 16, 2008

Mr. Alonzo Chalepah, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

RE: CSJ: 0914-04-~~042~~ 242; Frate Barker Road Improvement Project in Travis County, Austin District

Dear Mr. Chalepah:

The above referenced transportation project is being considered for construction by the Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT). Environmental studies are in the process of being conducted for this project. The purpose of this letter is to contact you in order to initiate Section 106 consultation with your community pursuant to stipulations of the First Amended Programmatic Agreement among the Federal Highway Administration, the Texas Department of Transportation, the Texas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU). The project is located in an area that may be of interest to your tribe.

The proposed project would widen approximately 1.3 miles of Frate Barker Road located between Brodie Lane and Manchaca Road in the southern portion of the City of Austin, Travis County. The existing roadway that consists of two travel lanes within a 50-foot-wide right of way would be widened to four 12-foot-wide travel lanes, one 14-foot-wide continuous turn lane, two 5-foot-wide bike lanes, two 6-foot-wide sidewalks, and curbs and gutters. The proposed right of way would be widened to 120 feet. All cross drainage structures would be lengthened to match the wider roadway. The undertaking includes 8 acres of existing right of way currently owned by Travis County and 11 acres of new right of way that is currently privately owned.

The proposed project area of potential effects (APE) is defined as an area 1.3 miles long by 120 feet wide paralleling Frate Barker Road beginning at Brodie Lane and extending east to Manchaca Road. According to typical roadway design, the depth of impacts is estimated to be no more than 4 feet below the current ground surface. Due to the APE being located near natural water sources that may have attracted historic and prehistoric occupation, an archeological investigation was recommended to confirm the presence or absence of archeological deposits.

Re: Section 106 Consultation, National Historic Preservation Act;
Proposed Texas Department of Transportation Project, Austin District
CSJ: 0914-04-042; Frate Barker Road Improvement Project in Travis County

SWCA Environmental Consultants (SWCA) recently completed an intensive archeological survey of the APE. This investigation included 100 percent pedestrian survey of the APE and the completion of 3 shovel tests. Due to the anticipated lack of sediments in excess of one meter (3.280 feet) in depth, backhoe trenching was deemed unwarranted. No archeological sites were identified during the SWCA investigation. Based upon the lack of archeological deposits, SWCA recommended that no further work is warranted for the project APE. A copy of the report is enclosed for your review. Based upon the information provided by the SWCA investigation, TxDOT finds that no archeological historic properties (36 CFR 800.16(l)(1)) would be affected by the proposed project and recommends that no further archeological investigation is warranted.

According to our procedures and at the request of the FHWA under Section 106 of the National Historic Preservation Act, we are writing to request your comments on historic properties of cultural or religious significance to your tribe that may be affected by the proposed undertaking. Any comments you may have on the TxDOT recommendation should also be provided. Please provide your comments within 30 days of receipt of this letter. Any comments provided after that time will be addressed to the fullest extent possible. If you do not object with a recommendation "no historic properties affected," please sign below to indicate your concurrence. In the event that further investigations by our office disclose the presence of archeological deposits, we will contact your tribe to continue consultation.

Thank you for your attention to this matter. If you have questions, please contact Jon Budd (TxDOT Archeologist) at 512/416-2640 (email: jbudd@dot.state.tx.us) or me at 512/416-2631 (email: spletka@dot.state.tx.us).

Sincerely,

Scott Pletka, Ph.D., RPA, Supervisor
Archeological Studies Branch
Environmental Affairs Division

Concurrence by: _____ Date: _____

Attachments

cc w/attachments: Barbara Maley, Environmental Coordinator FHWA; Mike Walker, TxDOT Austin District Environmental Coordinator; Julia Ragsdale, ENV-PM TxDOT; Jon Budd, ENV-ARCH TxDOT; ENV-ARCH Project File

cc w/o attachments: ETS Scan

The attached letter was sent to the following tribes on April 16, 2008:

Mr. Alonzo Chalepah, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

Mr. Gary McAdams, President
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

MEMORANDUM

Texas Department of Transportation

TO: 850 File, CRM Project file

District: **Austin**
County: **Travis**
CSJ#: **0914-04-242**
Highway: **Frate Barker Road**
Project Limits: **From Brodie Ln to Manchaca Rd**
Let: **8/2010**
Project Description: **Stipulation VI, widen road from 2 lane to 5 lane, approximately 7.5 acres new ROW, no historic properties in APE**

FROM: Renee Benn **DATE:** August 25, 2008

SUBJECT: Internal review under the First Amended Programmatic Agreement for Transportation Undertakings (PATU) among the Federal Highway Administration, Texas State Historic Preservation Officer, Advisory Council on Historic Preservation, and the Texas Department of Transportation; and the Memorandum of Understanding (MOU) between the Texas Historical Commission and the Texas Department of Transportation

---

The TxDOT Austin District in association with the City of Austin, proposes to widen Frate Barker Road from current two lanes with no shoulders to five lanes (two lanes in each direction and continuous center turn lane) with shoulders, bike lanes, and sidewalks. New right-of-way (ROW) of approximately 7.5 acres would be required for the improvements.

A review of the National Register of Historic Places (NRHP) the list of State Archeological Landmarks (SAL), and the list of Recorded Texas Historic Landmarks (RTHL) indicated that no historically significant resources have been previously documented within the area of potential effects (APE). It has been determined through consultation with the State Historic Preservation Officer (SHPO) that the APE for the proposed project is 150' from the current right-of-way. A historic resources reconnaissance survey conducted by TxDOT personnel revealed that there are two properties (built prior to 1964) within the project APE.

The two properties consist of a ca. 1910 farmhouse (Site 101) which has been converted to a commercial property, and experienced alterations, especially a large incompatible addition. Site 102 is a lone barn in a state of disrepair. These properties do not embody the distinctive characteristics of a type, period, or method of construction. They are all of a common type and do not represent the work of a master or represent high artistic value. These properties are not known to be associated with a significant historical event, nor are they associated with a person of transcendent importance. As such, TxDOT historians have determined them **not eligible** for listing on the NRHP under Criteria A, B or C. In addition, these properties lack the integrity to form an historic district. For further information about the properties, please refer to the attached historic resources report.

Pursuant to Stipulation VI "Undertakings with Potential to Affect Historic Resources" of the PA-TU between the Federal Highway Administration (FHWA), the Texas State Historic Preservation

Officer (SHPO), the Advisory Council on Historic Preservation, and the Texas Department of Transportation (TxDOT) and the Memorandum of Understanding (MOU), TxDOT Historians have determined that no historic properties are present and that individual project coordination with SHPO is not required.

Approved by _____ for TxDOT 8-27-08
Bruce Jensen Date

Lead Reviewer MLS for TxDOT 8/26/08
M.L.S. Date

cc: Mike Walker, Austin District;
Julia Ragsdale, ENV-PM
Adrienne Campbell, THC

U.S. Department
of Transportation
Federal Highway Administration

FEDERAL HIGHWAY ADMINISTRATION
300 EAST 8TH STREET, RM 826
AUSTIN, TEXAS 78701

Texas Department of Transportation

TEXAS DEPARTMENT OF TRANSPORTATION
125 E. 11th STREET
AUSTIN, TEXAS 78701-2483

July 10, 2009

Mr. Alonzo Chalepah, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

RE: CSJ: 0914-04-242; Frate Barker Road, From Brodie Lane to Manchaca Road, Roadway Upgrade With Right of Way and Easement Areas Added; Section 106 Continuing Consultation; Travis County, Austin District

Dear Mr. Chalepah:

The above referenced transportation project is being considered for construction by the Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT). Environmental studies are in the process of being conducted for this project. The project is located in an area that may be of interest to your tribe. The purpose of this letter is to contact you in order to continue Section 106 consultation with your community pursuant to stipulations of the First Amended Programmatic Agreement among the Federal Highway Administration, the Texas Department of Transportation, the Texas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU). Section 106 consultation for this project was initiated by correspondence dated April 16, 2008. Since that time, new right of way and easement areas have been added to the project.

The proposed project,as provided in the initial consultation, would widen approximately 1.3 miles of Frate Barker Road located between Brodie Lane and Manchaca Road in the southern portion of the City of Austin, Travis County. The existing roadway that consists of two travel lanes within a 50-foot-wide right of way would be widened to four 12-foot-wide travel lanes, one 14-foot-wide continuous turn lane, two 5-foot-wide bike lanes, two 6-foot-wide sidewalks, and curbs and gutters. The proposed right of way would be widened to 120 feet. All cross drainage structures would be lengthened to match the wider roadway. The undertaking includes 8 acres

of existing right of way currently owned by Travis County and 11 acres of new right of way that is currently privately owned. The proposed project area of potential effects (APE) was defined as an area 1.3 miles long by 120 feet wide paralleling Frate Barker Road beginning at Brodie Lane and extending east to Manchaca Road. Since the initial consultation letter, the project design has changed to incorporate a minor amount of additional right of way (ROW) and temporary easement areas into the undertaking's area of potential effects (APE). This additional APE is defined as one single area encompassing approximately 1 acre and is illustrated on the attached project map. Based upon typical roadway design, the depth of impacts is estimated to be no more than 12 feet below the current ground surface.

According to the Texas Archeological Sites Atlas, there are six archeological sites (41TV199, 41TV1054, 41TV1055, 41TV1307, 41TV1308, and 41TV1333) previously recorded within one kilometer (0.621 mile) of the APE. However, all of these sites are located more than 100 meters (328 feet) beyond the additional APE and would not be impacted.

According to the 1981 Austin Sheet of the Geologic Atlas of Texas, the underlying geology of the APE is comprised of Pre-Holocene age formations. These formed prior to human occupation. Therefore, these formations have historically demonstrated minimal potential for the presence of naturally buried intact archeological deposits. Holocene age geologic formations, including alluvium which has demonstrated potential for the presence of buried intact archeological deposits, were not noted on the Geologic Atlas within one mile of the additional APE.

There have been no archeological sites previously recorded in or near the additional APE. The geologic formations and the sediments within the additional APE possess minimal potential for the presence of naturally buried intact archeological deposits. Any archeological remains located within the APE would most likely be in confined to the surface and therefore lacking the requisite levels of stratigraphic integrity in regard to location, design, materials, and association to qualify for listing in the National Register of Historic Places (36 CFR 60.4) or warranting status as a State Archeological Landmark (13 TAC 26.8). Therefore, TxDOT recommends that the previous finding of no archeological historic properties (36 CFR 800.16(l)) affected is still appropriate and recommends that the changes to the project design, as described above, do not warrant any additional archeological investigation.

According to our procedures and at the request of the FHWA under Section 106 of the National Historic Preservation Act, we are writing to request your comments on historic properties of cultural or religious significance to your tribe that may be affected by the proposed undertaking. Any comments you may have on the TxDOT recommendation should also be provided. Please provide your comments within 30 days of receipt of this letter. Any comments provided after that time will be addressed to the fullest extent possible. If you do not object with a recommendation "no historic properties affected," please sign below to indicate your concurrence. In the event that further investigations by our office disclose the presence of archeological deposits, we will contact your tribe to continue consultation.

Thank you for your attention to this matter. If you have questions, please contact Jon Budd (TxDOT Archeologist) at 512/416-2640 (email: jbudd@dot.state.tx.us) or me at 512/416-2631 (email: spletka@dot.state.tx.us). When replying to this correspondence, please ensure that the envelope address includes reference to the Archeological Studies Branch, Environmental Affairs Division.

Sincerely,

Scott Pletka, Ph.D., Supervisor
Archeological Studies Branch
Environmental Affairs Division

Concurrence by: _____ Date: _____

Attachments

cc w/attachments: Theresa Claxton, Environmental Coordinator FHWA; Mike Walker, TxDOT Austin District Environmental Coordinator; Julia Ragsdale, ENV-PM TxDOT; Jon Budd, ENV-ARCH TxDOT; ENV-ARCH Project File

cc w/o attachments: ETS Scan

The attached letter was sent to the following tribes on July 10, 2009 :

Mr. Alonzo Chalepah, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

Mr. Leslie Standing, President
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

MEMORANDUM

Texas Department of Transportation

TO: 850 File, Various Road Projects, Various CSJs, Various Districts

FROM: Scott Pletka, Ph.D. **DATE:** July 22, 2009

SUBJECT: Internal review under the First Amended Programmatic Agreement Among the Federal Highway Administration, the Texas Department of Transportation, the Texas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU), and internal review under the Memorandum of Understanding (MOU) Between the Texas Historical Commission and the Texas Department of Transportation

---

Attached are the lists of projects reviewed internally by qualified TxDOT archeologists from 7/16/09 to 7/22/09. These projects either do not warrant survey as a result of a low probability of encountering archeological historic properties and State Archeological Landmarks, or the projects were inspected by survey or impact evaluation and do not warrant further work. As provided under the PA-TU, consultation with the Texas State Historic Preservation Officer is not necessary for these undertakings. As provided under the MOU, the proposed projects do not require individual coordination with the Texas Historical Commission.

Signature Scott Pletka Date July 23, 2009
For FHWA and TxDOT

Attachment

cc: ETS Data Entry; PM; ENV_ARC; PA File;

ETS

ARCHEOLOGICAL COORDINATION

Projects that do not warrant Archeological Survey

(Section 106 and ANTIQUITIES CODE OF TEXAS)

From : 7/16/2009 To: 7/22/2009

COUNTY	DISTRICT	PROJECT	CSJ	*F30/T20 Concur, no further work	*F10/T10 Unable to Concur
Brazoria	Houston	East Adoue Street	0912-31-201		
Brazoria	Houston	CR 146	0912-31-203		
Brazoria	Houston	Old Galveston Road	0912-31-205		
Brazoria	Houston	East South Street	0912-31-206		
Travis	Austin	Frate Barker Road	0914-04-242		

Number of Projects: 6

Signature _____ Date July 23, 2009

For FHWA and TxDOT

ETS

ARCHEOLOGICAL COORDINATION

Impact Evaluations, No Further Work Recommended

(Section 106 and ANTIQUITIES CODE OF TEXAS)

From : 7/16/2009 To: 7/22/2009

COUNTY	DISTRICT	PROJECT	CSJ	*F30/T20 Concur, no further work	*F10/T10 Unable to Concur
Red River	Paris	CR 137-2 (RRCR 1245)	0901-27-036		
Red River	Paris	CR 137-1 (RRCR 1245)	0901-27-037		

Number of Projects: 2

Signature _____ Date July 23, 2009
For FHWA and TxDOT

ETS

ARCHEOLOGICAL COORDINATION

Archeological Surveys, No Further Work Recommended

(Section 106 and ANTIQUITIES CODE OF TEXAS)

From : 7/16/2009 To: 7/22/2009

COUNTY	DISTRICT	PROJECT	CSJ	*F30/T20 Concur, no further work	*F10/T10 Unable to Concur
Red River	Paris	CR 164-1 (RRCR 1249)	0901-27-038		

Number of Projects: 1

Signature _____ Date July 23, 2009
For FHWA and TxDOT

ETS

ARCHEOLOGICAL COORDINATION

Archeological Surveys, No Further Work Recommended

(Section 106 and ANTIQUITIES CODE OF TEXAS)

From : 7/9/2009 To: 7/15/2009

COUNTY	DISTRICT	PROJECT	CSJ	*F30/T20 Concur, no further work	*F10/T10 Unable to Concur
Culberson	El Paso	US 62/180	0374-08-019	✓	
Harris	Houston	Preston Road	0912-72-063	✓	
Harris	Houston	SH 99 (SEGMENT F-2)	3510-06-003	✓	
Montgomery	Houston	SH 75	0110-04-129		

Number of Projects: 4

Signature _____ Date July 15, 2009
For FHWA and TxDOT