
Indirect Impacts Analysis Technical Report



OAK HILL
P A R K W A Y

U.S. Highway 290 (US 290) / State
Highway (SH) 71 West from State Loop 1
(Mopac) to Ranch-to-Market (RM) 1826
and
SH 71 to Silvermine Drive
Travis County, Texas
CSJ # 0113-08-060 and 0700-03-077

June 2017



The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

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1. INTRODUCTION

1.1 Background

The Texas Department of Transportation (TxDOT) and the Central Texas Regional Mobility Authority (CTRMA) are considering mobility improvements to U.S. Highway (US) 290 / State Highway (SH) 71 West through Oak Hill (the Oak Hill Parkway). The project corridor extends along US 290 from State Loop 1 (Loop 1 or Mopac) to Ranch-to-Market Road (RM) 1826 for a distance of approximately 6.15 miles with a transition to the west. The project also includes the interchange on SH 71 from US 290 to Silvermine Drive, a distance of approximately 1.31 miles. The proposed project corridor is within the City of Austin (COA), Travis County, Texas and includes the proposed locations of two water quality detention ponds: the first along SH 71 north of Covered Bridge Drive and the second between SH 71 and Old Bee Caves Road across from Sunset Ridge. The existing bridge over Williamson Creek and several culverts and/or drainage structures would be replaced or rehabilitated to accommodate the additional roadway width and new alignment. The existing right-of-way ranges from 90 to 260 feet wide and the proposed right-of-way would range from approximately 150 to 600 feet wide. The project location is shown on **Figure 1** in **Attachment A**. Refer to the *Project Description Technical Report* for a detailed description of the proposed project.

This technical report summarizes the analysis conducted to assess the potential for indirect impacts associated with the proposed Oak Hill Parkway project. It provides definitions of direct and indirect impacts and also summarizes the TxDOT guidance utilized to determine the magnitude of potential indirect impacts.

1.2 Project History

The proposed project evolved from efforts that began in the mid 1980's. The proposed improvements were originally considered and approved in a Final EIS, Record of Decision (ROD), which covered improvements to US 290/SH 71 from RM 1826 to Farm-to-Market (FM) 973. Since the issuance of the ROD in 1988, partial construction of the original project (between Joe Tanner Lane and Riverside Drive) has been constructed and changes in adjacent land use, State and Federal species listings, funding mechanisms, and public input have resulted in a new proposed design concept for this project. The original Final EIS has been reevaluated four times and a Biological Opinion for effects to federally-listed species within the initial project area was issued by the U.S Fish and Wildlife Service in 2006 (USFWS 2006). Environmental and traffic related studies and reports, as well as public involvement activities have continued since the issuance of the 1988 ROD. In 2012, a notice of intent (NOI) was published

in both the Texas and Federal Registers announcing TxDOT's intent to prepared a new EIS for the US 290/ SH 71 Oak Hill Parkway project.

1.3 Existing Facility

Currently, the US 290/SH 71 facility consists of a six-lane urban freeway section with two- to four-lane frontage roads from Mopac to just west of Old Fredericksburg Road. Direct connector ramps connect US 290/SH 71 to the Mopac main lanes. Between Old Fredericksburg Road and Joe Tanner Lane, US 290/SH 71 transitions from a freeway/frontage road facility to a four- and five-lane urban highway; this urban highway section continues to just east of the SH 71 junction. Between SH 71 and RM 1826, the existing US 290 roadway consists of four 11-foot travel lanes with intermittent 14-foot center turn lanes and shoulders ranging from 2 to 4 feet in width. The existing SH 71 accommodates four 12-foot travel lanes, two 8-foot shoulders, and a 14-foot continuous center turn lane.

Dual left-turn and right-turn lanes exist on US 290 at Convict Hill Road, the Austin Community College Driveway, the Speedy Stop, Oak Hill United Methodist Church, and RM 1826. Innovative improvements called continuous flow intersections (CFI) were constructed on US 290 at William Cannon Drive and SH 71, as well as a median U-turn at Joe Tanner Lane. The CFI was constructed in one direction at SH 71 and in two directions at William Cannon.

1.4 Build Alternatives

Two design alternatives (*Alternatives A & C*) will be advanced through schematic development and environmental analysis as the proposed build options for the Oak Hill Parkway project. The *No Build Alternative* will also be carried forward. For purposes of this report, the physical area covered by the combined alternative alignments is considered the project area since there are only slight modifications between the overall alignments of the build alternatives. The project area includes the location of two water quality detention ponds: the first along SH 71 north of Covered Bridge Drive and the second between SH 71 and Old Bee Caves Road across from Sunset Ridge. Both alternatives would incorporate culverts, vegetative filter strips, and bioretention ponds within the proposed or existing right-of-way. New right-of-way and easements are expected for both design alternatives.

Because the two design alternatives include toll lanes, a project-level toll analysis is currently in progress. The CAMPO 2035 Regional Toll Network Analysis includes the proposed project and considers regional impacts to toll facility users and the potential need for mitigation of the tolled components of CAMPO's proposed 2035 transportation system (CAMPO 2013). The analysis concluded that existing and 2035

travel times for environmental justice and non-environmental justice areas would be similar.

The analysis presented in this technical report considers potential indirect impacts that could result from induced development, and assumes the impacts would be the same for both Build Alternatives.

1.4.1 Alternative A

Alternative A is a conventional controlled-access highway with frontage roads. New construction for roadway improvements would begin just east of Joe Tanner Lane where the existing main lanes transition to an urban highway. With *Alternative A*, the main lanes would be elevated over William Cannon Drive and the westbound main lanes and frontage road would be located north of Williamson Creek. The main lanes would be depressed under SH 71 and direct connectors would be provided, connecting eastbound SH 71 with US 290 and westbound US 290 to SH 71. Main lanes would vary from four lanes in each direction near William Cannon Drive to a two-lane transition near the western project extent. The main lanes of the proposed project would be toll lanes. Grade-separated intersections would be constructed at Convict Hill Road, RM 1826, Scenic Brook Drive, and Circle Drive (S. View Road). Main lanes would generally be 12 feet wide with 10-foot-wide shoulders. Texas turnarounds, which allow vehicles traveling on a frontage road to U-turn onto the opposite frontage road, would be constructed on US 290 frontage roads at Scenic Brook Drive, RM 1826, Convict Hill Drive, and William Cannon Drive.

Along SH 71, the direct connector ramps would extend past Scenic Brook Drive where the main lanes would then transition to a five-lane (three lanes northbound, two lanes southbound) rural highway with Texas turnarounds. Bicycle and pedestrian facilities would be provided via a shared-use path (SUP) and/or sidewalks along the entire project length.

Alternative A would require the acquisition of approximately 74.58 acres of new right-of-way, which would include acreages for the two stormwater detention ponds. Approximately 4.08 acres of temporary construction easements and 0.21 acres of SUP outside of the right-of-way are currently proposed for this build alternative.

1.4.2 Alternative C

Alternative C is a conventional controlled-access highway with frontage roads. Construction of roadway improvements would begin just east of Joe Tanner Lane where the existing main lanes transition to an urban highway. With *Alternative C*, the main lanes would be elevated over William Cannon Drive with eastbound and westbound main lanes located north of Williamson Creek. The frontage roads would

be along the existing highway. The main lanes would remain elevated over the intersection with SH 71. West of SH 71, *Alternatives A* and *C* share the same design and grade-separated intersections would be constructed at Convict Hill Road, RM 1826, Scenic Brook Drive and Circle Drive (S. View Road). The main lanes of the proposed project would be toll lanes. Direct connectors would allow drivers to access westbound SH 71 and eastbound US 290. US 290 would generally consist of two to four 12-foot lanes with 10-foot shoulders in each direction. Texas turnarounds would be constructed on US 290 frontage roads at Scenic Brook Drive, RM 1826, and Convict Hill Road.

Along SH 71, the direct connector ramps would extend past Scenic Brook Drive where the main lanes would transition to a five-lane (three lanes northbound, two lanes southbound) rural highway with Texas turnarounds. Bicycle and pedestrian facilities would be provided via a SUP and/or sidewalks along the entire project length.

Alternative C would require the acquisition of approximately 75.19 acres of new right-of-way, which would include acreages for the two stormwater detention ponds and SUP. Approximately 4.12 acres of temporary construction easements and 0.21 acres of SUP outside of the right-of-way are currently proposed for this build alternative.

1.4.3 No Build Alternative

Consistent with the requirements of the National Environmental Policy Act (NEPA) and Federal Highway Administration (FHWA) guidelines, this analysis considers an alternative that assesses environmental effects if the proposed project were not built. This alternative, called the *No Build Alternative*, includes the routine maintenance improvements of the existing roads in the study area and the currently programmed, committed, and funded roadway projects. While the *No Build Alternative* does not meet the project needs, it provides a baseline condition to compare and measure the effects of all both build alternatives.

2. GUIDANCE

This section was developed using the TxDOT 2016 *Indirect Impacts Analysis Guidance* which is based on the 2002 National Cooperative Highway Research Program (NCHRP) Report entitled *NCHRP Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (NCHRP 2002) and the American Association of State Highway and Transportation Officials (AASHTO) *Practitioner's Handbook 12: Assessing Indirect and Cumulative Impacts Under NEPA* (AASHTO 2011).

The following indirect impact analysis is based on several central definitions. In addition to direct effects, major transportation projects may also have indirect effects on land use and the environment. As defined by the Council on Environmental Quality (CEQ), indirect effects are “caused by an action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (40 Code of Federal Regulations [CFR] §1508.8). It should be noted that guidance documents use different terms, including “indirect effects” (AASHTO guidance) and “indirect impacts” (TxDOT guidance). For the purpose of this analysis, both terms are used and the meanings are the same.

NCHRP Report 466 (2002) identifies three broad categories of indirect effects:

1. **Encroachment-alteration effects:** These effects may result from changes in ecosystems, natural processes, or socioeconomic conditions that are caused by the proposed action but occur later in time or farther removed in distance. One example of this type of effect would be a change in habitat or flow regime downstream resulting from installation of a new culvert.
2. **Project-influenced development effects:** Sometimes called induced growth or the “land use effect.” For transportation projects, induced growth effects are most often related to changes in accessibility of an area, which in turn affects the area’s attractiveness for development. Indirect impacts associated with induced development are also similar to direct impacts but would occur in association with future land use development undertaken by others over the development horizon within a larger study area beyond the direct footprint of the proposed project.
3. **Effects related to project-influenced development:** These are impacts to the natural or human environment that may result from project-influenced changes in land use.

Probability is important in providing a distinction between direct and indirect effects because direct effects are generally inevitable, while indirect effects are merely probable. According to NCHRP Report 466 (2002), the term “reasonably foreseeable” means that effects are “sufficiently likely to occur that a person of ordinary prudence would take them into account in making a decision;” such effects are probable, not just possible. Further, “effects that can be classified as possible but not probable may be excluded from consideration” (NCHRP 2002).

According to TxDOT's *Indirect Impacts Analysis Guidance* (TxDOT 2016), "whether an impact is substantial is a function of the context, the likelihood of the impact, and the reversibility of the impact." TxDOT rules define the term “significant” as it has been interpreted under NEPA and its related regulations. See 43 Texas Administrative Code (TAC) 2.5 (26). That interpretation includes the definition used in 40 CFR 1508.27, which focuses on context and intensity considerations. An agency must examine the context or setting in which the action occurs (e.g. national, regional, affected interests, and locality) and consider short- and long-term effects of the action. An agency must also analyze the intensity or severity of the impact. In doing so, the agency must consider: beneficial and adverse impacts to public health and safety; unique geographical characteristics; controversy related to effects on human environment, uncertainty, or unknown risks involved; precedent that may be set; relatedness of the action to other actions that would collectively create a cumulative impact that may be significant (significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment—and significance cannot be avoided by terming an action temporary or by breaking it down into small component parts); impacts to or loss of scientific or cultural resources; endangered species impacts; and any other violation of any other environmental protection law.

For the current analysis, encroachment-alteration effects are discussed in some of the resource-specific technical reports as well as in the direct impacts sections of the Environmental Impact Statement (EIS), per current TxDOT direction. A summary of anticipated encroachment-alteration effects is provided in **Table 1**.

Table 1: Potential Encroachment-Alteration Effects	
Resource	What encroachment-alteration effects are anticipated if any?
Waters of the U.S., including Wetlands	Anticipated fill impacts to waters of the U.S., including wetlands, would generally be limited to the project footprint. Temporary and permanent impacts to waters of the U.S. would not disrupt any natural processes in the project area. The construction of any of the proposed alternatives would have limited encroachment-alteration effects because of the existing dense urbanization of the proposed project area and the incorporation of water quality best management practices.
Floodplains	The proposed project would result in encroachment-alteration effects within a regulatory floodplain. The proposed project would increase impermeable surfaces and have the potential to indirectly affect sediment and pollutant loading in the flood hazard areas as mapped by Federal Emergency Management Agency (FEMA). However, floodplain management regulations and design standards would require that the project be designed so as not to alter base flood elevations and not cause adverse flood impacts to upstream or downstream properties.
Water Quality	Encroachment-alteration effects to water quality could occur primarily due to increased impervious cover or removal of vegetation that results in increased runoff and altered recharge (flow and quality) to the aquifer. Placement of the roadway could encroach on the surface or subsurface drainage areas of previously unknown adjacent caves/karst features, altering the hydrologic regimes in those features.
Federally Listed Threatened/Endangered Species	Encroachment-alteration effects could occur as a result of habitat loss due to increased development in the area, an increase in edge habitat, or an increase in impervious cover limiting recharge to the Edwards Aquifer. Both the Barton Springs and Austin blind salamanders are entirely dependent on the Edwards Aquifer. Changes to the aquifer as a result of decreased recharge or an increase in pollutants in stormwater runoff (stemming from increased impervious cover in the Recharge Zone) could potentially impact these species.
Vegetation and Wildlife Habitat (including habitat for state-listed species)	Encroachment-alteration effects stemming from the proposed project could result in additional loss and fragmentation of vegetation and habitat types on developable lands within the study area. Development in general encroaches on vegetation, and reductions in vegetation typically equate to reduced wildlife habitat. For this project, however, impacts to habitat would be limited to the area of direct impact which is generally developed and there would be no encroachment-alteration effects .
Air Quality	The Air Quality Analysis is in progress and this discussion will be updated upon completion of that analysis. Encroachment-alteration effects to air quality are anticipated. The potential indirect impacts on air quality and mobile source air toxins (MSAT) are primarily related to any expected development/redevelopment resulting from the project's increased air pollutant emissions resulting from the potential development or redevelopment of the area must meet regulatory emissions limits established by the Texas Commission on

Table 1: Potential Encroachment-Alteration Effects	
Resource	What encroachment-alteration effects are anticipated if any?
	Environmental Quality (TCEQ) and the United States Environmental Protection Agency (EPA), as well as obtain appropriate authorization from the TCEQ. Regulatory emission limits set by TCEQ and EPA are established to attain and maintain the National Ambient Air Quality Standards (NAAQS) by assuring any emissions sources resulting from new development or redevelopment will not cause or contribute to a violation of those standards.
Community Resources (includes businesses and residences)	<p>The proposed project is anticipated to displace one residence and two businesses. Additional right-of-way would be needed from between 80 and 86 parcels, depending on the build alternative selected. The majority of property acquisitions associated with the Oak Hill Parkway project would allow the remaining portions of the impacted parcels to function as their existing use.</p> <p>However, some businesses may be affected that are currently utilizing TxDOT's existing right-of-way for parking and access. The elimination of access and available parking may cause the eventual loss of business in these locations.</p>
Neighborhoods	<p>The proposed project would add capacity to the existing facility. The proposed project would not serve to divide any of the existing neighborhoods or further divide the community. Access to some portions of the facility may change with implementation of the proposed project; however, the construction would be expected to reduce travel times for commuters within the adjacent neighborhoods and reduce cut through traffic along local roadways. It is likely that new neighborhoods will continue to be developed along the corridor and out to points west and north of the Oak Hill Parkway corridor, regardless of whether or not the improvements are constructed. Reduced congestion and improved conditions on US 290 and SH 71 would likely make neighborhoods along this corridor more desirable and could have the effect of increasing property values. Note that many other factors in addition to transportation mobility contribute to a property's value.</p>
Environmental Justice	<p>Encroachment-alteration effects would occur as the proposed project would change access and travel patterns within the project corridor. Based on the analysis of benefits and impacts, the proposed project would provide overall benefits to the socioeconomic resources in the project area including neighborhoods and communities, employment and economic activity, and public facilities. EJ communities are not expected to be subjected to disproportionately high and adverse effects.</p>
Historic-Age Properties	<p>Encroachment-alteration effects could include an increase in existing noise levels, visual impacts, vibration during construction, or loss of access to a historic property, such that the encroachment-alteration effect diminishes the characteristics that cause a resource district to be historic. These indirect effects can alter the integrity of feeling or setting of historic properties.</p> <p>Four historic-age resources within the Area of Potential Effects (APE) are recommended eligible for National Register of Historic Places</p>

Table 1: Potential Encroachment-Alteration Effects	
Resource	What encroachment-alteration effects are anticipated if any?
	(NRHP) listing. Three potential historic districts have also been identified. The proposed project would have no direct effects and no adverse indirect effects on any of the NRHP-eligible resources and historic districts; therefore, there would be no encroachment-alteration effects.
Archeological Resources	Six archeological sites are within the proposed project’s APE. These sites have either not been recommended for State Antiquities Landmark (SAL)/NRHP designation or have been declared ineligible for SAL/NRHP designation. Therefore, there would be no encroachment-alteration effects .

Source: Cox | McLain Environmental Consulting (CMEC), 2016.

Note – Separate technical reports documenting the direct impacts of the proposed project have been or are being prepared for the resources listed in this table. Best available information was used during the preparation of this report to assess the impacts associated with encroachment-alteration effects.

In addition to encroachment-alteration effects, indirect impacts could also occur as a result of induced development associated with the proposed project. Project-influenced development effects are discussed in **Section 4.4**. Effects related to project-influenced development are discussed within the section on indirect effects potentially resulting from induced growth (**Section 4.5**). Planning judgment and cartographic techniques were employed in this analysis. Potential minimization and mitigation measures are a focus of the TxDOT guidance and the AASHTO guidance and are discussed in **Section 4.6**.

As noted in the NCHRP guidance, “[i]ndirect effects can be linked to direct effects in a causal chain” (NCHRP 2002). This analysis operates under the assumption that a proximate cause-effect relationship with the proposed project must be present in order for an indirect effect to occur. In cases where the proposed project would potentially contribute—but not be causally linked—to a potential effect, the contribution of the proposed project to this potential effect, when added to other past, present, and reasonably foreseeable future actions by others, is considered further in the *Cumulative Impacts Analysis Technical Report*.

3. SCOPING

Scoping is a process used to determine the extent of the analysis needed and to define the study area. Scoping should be considered at the earliest stages of project development. The scoping process has two overall goals: (1) determine the level of effort and approach needed to complete the analysis, and (2) determine the location and extent of the indirect impact study area. Scoping for the Oak Hill Parkway project, including indirect impacts, was conducted via the following methods:

- Regular coordination among the study team and the project's sponsors and stakeholders
- Agency stakeholder meetings
- Public involvement through public information meetings
- Distribution of a questionnaire to local agencies and organizations

The public and agency stakeholder meetings were used to introduce the project to the general public and agencies and to solicit comments and input on the project as it progressed. The public and agency stakeholder meetings that have been held to date are shown in **Table 2** on the next page.

These meetings have documented that, from an agency and stakeholder standpoint, there are two key resources for which potential indirect impacts are a concern: water quality and aquifer-dependent threatened and endangered species associated with the Barton Springs portion of the Edwards Aquifer. Past studies have been consulted and extensive data collection has taken place to ascertain connections between the proposed project and currently planned development, in addition to the potential for induced development. These resources and issues are primary considerations in this Technical Report.

Table 2: Public and Agency Stakeholder Meetings	
Meeting Type	Date
Oak Hill Envisioning Mobility Workshop	8/29/2012
Public and Agency Scoping Meeting	11/15/2012
Technical Working Group Meeting	12/17/2012
Environmental Workgroup Meeting	1/31/2013
Design Workgroup Meeting	2/19/2013
Oak Hill Parkway EIS Work Session with City of Austin	3/1/2013
Oak Hill Parkway Bike/Pedestrian Workshop	3/19/2013
Oak Hill Parkway Design Concept Preview Meeting	5/16/2013
Oak Hill Parkway Public Open House	5/23/2013
Evaluation Workgroup Meeting	9/30/2013
Oak Hill Parkway Public Open House	10/22/2013
Finance Workshop	3/22/2014
Oak Hill Parkway Public Open House	6/17/2014
Stakeholder Workgroup Meeting	8/26/2014
Context Sensitive Solutions (CSS) Workshop #1	10/09/2014
Oak Hill Parkway Public Open House	1/20/2015
Bicycle and Pedestrian Workshop	2/17/2015
Oak Hill Parkway City of Austin Coordination Meeting	2/27/2015
Context Sensitive Solutions (CSS) Workshop #2	4/7/2015
Water Quality Workshop	8/25/2015
Oak Hill Parkway Public Open House	10/29/2015
Stakeholder Meeting	4/13/2016
Informational Booths	4/23-4/24 and 4/30/2016
Stakeholder Meeting	6/8/2016
Environmental Workshop	6/23/2016

Source: CMEC, 2016.

4. INDIRECT INDUCED-GROWTH IMPACTS

This section describes the potential indirect induced growth caused by the proposed project, utilizing guidance from TxDOT’s *Indirect Impacts Analysis Guidance* (TxDOT 2016). The following six steps are addressed in the induced growth impact analysis:

1. Define the methodology.
2. Define the Area of Influence (AOI) and study time frame.
3. Identify areas subject to induced growth in the AOI.
4. Determine if growth is likely to occur in the induced growth areas.
5. Identify resources subject to induced growth impacts.
6. Identify mitigation, if applicable.

Additional guidance utilized throughout the analysis includes the 2002 NCHRP report entitled *NCHRP Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (NCHRP 2002) and the NCHRP Project 25-25 Task 22 report entitled *Forecasting Indirect Land Use Effects of Transportation Projects* (NCHRP 2007).

4.1 Step 1—Define the Methodology

The risk assessment checklist for indirect induced growth provided in TxDOT’s Environmental Compliance Toolkit was used to determine whether an indirect induced growth impacts analysis is required for the proposed project. **Table 3** summarizes the steps in the risk assessment checklist and confirms the need to conduct the indirect impacts analysis.

Table 3: Results of Risk Assessment for Indirect Impacts	
Does the Purpose and Need include economic development, or is the project proposed to serve a specific development?	No
Are economic development or new opportunities for growth/development cited as benefits of the project?	No
Is land in the project area available for development and/or redevelopment?	Yes
Does the project add capacity?	Yes
Is the project located in a rural area outside of the MPO boundary?	No
Does the project substantially increase access or mobility in the project area?	Yes
Is the project area experiencing population and/or economic growth?	Yes

Source: CMEC, 2016.

The techniques used for this analysis are primarily Planning Judgment, for which data was acquired by administering questionnaires and conducting phone interviews with

planning professionals in the project vicinity; and Cartographic Techniques, in addition to expert technical analysis consistent with the methods described in NCHRP Report 466 and NCHRP Report 25-25.

4.2 Step 2—Define the AOI and Study Time Frame

The basic objective in creating an AOI is to delineate a study area within which all substantial project-related impacts are expected to occur. NCHRP Report 466 suggests that because indirect effects associated with a project can occur at a distance in time or space from the project itself, the study area for determining indirect effects is often broader than the study area associated with direct effects analysis. In order to distinguish it from the study areas considered for the analysis of direct effects of the project, the study area for the indirect effects analysis will be referred to as the AOI.

In October 2016, the project team held a scoping meeting for the Indirect and Cumulative Impacts analyses. Project team attendees at this meeting included representatives from the TxDOT Austin District, the TxDOT Environmental Division, and consultant representatives. The project team decided to use major roadways and political boundaries to identify the AOI and recommended development of an AOI that would include the cities of Austin, Bee Cave, Dripping Springs, and Sunset Valley. The physical boundaries of the AOI are bordered by Loop 360, RM 2244/Bee Cave Road, SH 71, RM 3238/Hamilton Pool Road, Crumley Ranch Road, FM 101/Fitzhugh Road, RM 12, RM 150, RM 1826, Slaughter Lane, and Brodie Lane. The AOI encompasses an area of approximately 85,281 acres. This AOI was based on the following factors: the neighborhoods and areas best served by the proposed roadway improvements; the areas most likely to be potentially opened for development following construction of the roadway; the natural resources that could be potentially indirectly impacted; and discussions with local planning experts in the municipalities and counties in, adjacent to, and near the project area. The AOI includes some or all of the cities of Austin, Bee Cave, Bear Creek, Dripping Springs, and Sunset Valley. During the investigation process, questionnaires were submitted to these entities; none of those interviewed had questions or raised concerns about the proposed boundaries of the AOI, so no changes were made to the AOI as a result of the interview process. See **Figure 2 in Attachment A** for a map of the AOI.

A temporal frame of reference is necessary when analyzing the range of impacts that may be caused by the proposed project in the future. The discussion below considers indirect induced growth impacts that may occur between the time of project construction (2019) and 2040. This time frame captures the 2037 horizon year for the *Our Bee Cave 2037 Comprehensive Plan*, the 2039 horizon year for the City of Austin's

Imagine Austin Comprehensive Plan, and the 2040 horizon year for the Capital Area Metropolitan Planning Organization’s (CAMPO) 2040 Plan (CAMPO 2015).

4.3 Step 3—Identify Areas Subject to Induced Growth in the AOI

This section includes a discussion of currently developed land within the AOI, land that is planned for or currently under development, and land that has indirect induced growth potential. This Cartographic Technique exercise utilized data collected remotely and in the field combined with an analysis of various constraints layers and the proposed alignment utilizing Geographic Information Systems (GIS) technology. In addition, the results of questionnaires sent to planning experts were incorporated to the extent the information could be mapped. A summary of the interviews conducted is included in **Section 4.4.3** with a summary of key points made by those who participated.

Some changes in land use could occur within the AOI if undeveloped areas are developed; such changes may be, in part, the result of enhanced access to previously undeveloped land. To determine the potential for induced growth, existing land uses within the AOI were quantified (see **Table 4**). **Figure 3** in **Attachment A** shows land within the AOI depicted as developed, available for development, or other lands considered to be undevelopable such as parks, Water Quality Protection Lands (WQPLs), and preserves.

Table 4: Acres of Land Available for Project-Influenced Development within the AOI		
Existing Land Uses	Acres	Percentage of Total (%)
Total Developed Land	49,081	57.6
<i>Transportation (Roads, ROW)</i>	4,408*	5.2
<i>Other Developed Land</i>	44,673	52.4
Undevelopable Land	17,617	20.7
<i>Parks or Open Space</i>	6,924	8.1
<i>Water Quality Protection Lands</i>	9,563	11.2
<i>Floodplains</i>	1,130	1.3
Developable Land within the AOI	18,638	21.9
<i>Planned and Emerging Development Projects within Developable Land within the AOI</i>	8,446	9.9
<i>Developable Land Minus Planned and Emerging Projects within the AOI</i>	10,192	12.0
Total Area within the AOI	85,281	100.0

Source: CMEC, 2016-2017.

*Contains the sum of AOI acres not captured in other categories (i.e. not accounted for in the CAD data, parks/WQPL, proposed development, or floodplains).

Within the 85,281 total acres of the AOI, approximately 49,081 acres (57.6 percent) are already developed (including roadways, state-owned right-of-way, and other

developed land). Approximately 17,617 acres (20.7 percent) are undevelopable including parks, floodplains, and WQPLs. Within the AOI, WQPLs (both those owned outright by the City of Austin and those which have conservation easements placed on them) account for 9,563 acres (11.2 percent). WQPLs have been protected from development in perpetuity and the City of Austin notes that water or wastewater service will not be extended to any lands that belong to the City of Austin or that have conservation easements on them. Floodplains cover 1,130 acres of the vacant land within the AOI and are also considered undevelopable.

There are currently approximately 8,446 acres of land in the AOI that are under construction or are planned or platted for development. This analysis assumes land that is under construction or already planned or platted for development would not be subject to induced development as a result of the proposed project. Development of land that is already planned or platted, regardless of development project status, is considered probable and reasonably foreseeable and not dependent on the proposed project.

Planning experts representing each of the municipalities within the AOI were contacted for information about planned developments within their jurisdictions. Responses from several municipalities were pending as of April 2017. See **Section 4.4.3** and **Table 11** for a full listing of municipalities and agencies contacted and a summary of responses received. Based on information provided by the Cities of Austin, Bee Cave, and Dripping Springs, several projects are in various stages of development, ranging from under review to under construction. Removing these projects from the stock of developable land in the AOI yields approximately 10,192 acres available for future development (12.0 percent of the AOI). A list of developments in progress is included in **Table 5**; a listing of numerous City of Austin emerging projects is provided in **Attachment B**.

Table 5: Planned and Emerging Development Projects on Developable Land within the AOI				
Planned / In Progress Development Project in AOI	Entity	Development Type	Approximate Acres	Project Development Stage
Village Green	Bee Cave	Mixed Use	5.2	Planned
Bee Cave Territory Subdivision at Spanish Oaks			4.4	Planned
Spanish Oaks Hillside		Residential	100.0	Planned
Anarene	Dripping Springs	Residential	1,692.4	Planned
Butler Ranch			152.2	Under construction
Founders Ridge			107.0	Under construction
Belterra			1,536.5	Under construction

Table 5: Planned and Emerging Development Projects on Developable Land within the AOI				
Planned / In Progress Development Project in AOI	Entity	Development Type	Approximate Acres	Project Development Stage
Driftwood			453.3	Partially patted / under construction
Headwaters			1,503.7	Phase 2 under construction
Ledgestone			197.8	Residential constructed. Commercial planned / partially platted.
Parten Ranch			532.6	Phase I platted / under review
Garnett			150.7	Planned
See listing in Appendix B	Austin	Varies	Varies	Emerging

Sources: Data from responses to questionnaires sent to municipalities and agencies within the AOI.

4.4 Step 4—Determine if Growth is Likely to Occur in the Induced Growth Areas

4.4.1 Regional and Local Trend Data for Population, Household, and Employment Growth

This section includes information about historical trends within the AOI. In general, this area of southwest Travis/northwest Hays County has grown considerably during the past three decades. This growth is seen in population change, housing starts, and employment growth over time.

The Austin area has experienced significant and sustained population growth over the last 25 years, with the populations of Hays and Travis counties increasing by 196.8 percent and 104.1 percent, respectively, over the period from 1990 to 2015 (U.S. Census Bureau 1990, 2000, 2010, and 2011-2015). The City of Austin grew by 97.4 percent, the City of Bee Cave grew by more than 25 times its 1990 population, the City of Sunset Valley grew by 113.5 percent, and the City of Dripping Springs grew by 140.4 percent. The Village of Bear Creek grew by 7.8 percent between 2000 (the earliest census data available) and 2014. Population changes for Travis County, Hays County, and the study area communities are shown in **Tables 6 and 7**.

Table 6: Current and Historic Population Growth in the AOI					
City or County	Total Population by Year				% Change from 1990 - 2015
	1990	2000	2010	2015	
City of Austin	472,020	656,562	790,390	931,830	97.4
City of Bee Cave	241	656	3,925	6,292	2,510.8

Table 6: Current and Historic Population Growth in the AOI					
City or County	Total Population by Year				% Change from 1990 - 2015
	1990	2000	2010	2015	
City of Sunset Valley	327	365	749	698	113.5
City of Dripping Springs	1,033	1,548	1,788	2,483	140.4
Village of Bear Creek	Prior to incorporation*	360	382	388	N/A
Travis County	576,407	812,280	1,024,266	1,176,558	104.1
Hays County	65,614	97,589	157,107	194,739	196.8

Sources: Texas State Historical Association (2016); U.S. Census Bureau 1990 Census; U.S. Census Bureau 2000 Census; U.S. Census Bureau 2010 Census; U.S. Census Bureau, American Community Survey 2011-2015.

*Census information is unavailable for unincorporated communities.

The City of Austin and Travis County are expected to grow by 68 percent and 69 percent, respectively, between 2010 and 2040, while Hays County is expected to grow more than 150 percent according to the Texas Water Development Board (TWDB 2016).

Table 7: Projected Population Growth in the AOI					
City or County	Total Population by Year				% Change from 2010 - 2040
	2010	2020	2030	2040	
City of Austin	790,390	976,418	1,153,977	1,330,492	68.3
City of Bee Cave	3,925	4,470	5,473	6,165	57.1
City of Sunset Valley	749	1,134	1,480	1,806	141.1
City of Dripping Springs	1,788	2,031	2,311	2,652	48.3
Village of Bear Creek	382	NA*	NA*	NA*	NA*
Travis County	1,024,266	1,273,260	1,508,642	1,738,860	69.3
Hays County	157,107	238,862	313,792	398,384	153.6

Sources: U.S. Census Bureau 2010 Census; TWDB (2016).

*Note that the Texas Water Development Board does not provide population projections for Bear Creek.

Residential new house construction is another indicator of growth trends. **Table 8** provides information on new house construction by year between 1997 and 2014 for jurisdictions within the AOI.

Table 8: Single-Family New House Construction				
Year	City of Austin	City of Bee Cave	City of Dripping Springs	City of Sunset Valley
1997	2,380	33	N/A	3
1998	3,521	38	N/A	3
1999	3,302	42	N/A	N/A
2000	3,361	40	N/A	31
2001	2,119	9	N/A	13
2002	2,431	10	6	7
2003	3,117	15	13	2
2004	3,533	95	5	4
2005	4,569	110	11	N/A
2006	4,340	113	17	26
2007	3,155	59	9	21
2008	1,928	117	5	13
2009	1,951	108	4	N/A
2010	1,664	153	5	N/A
2011	1,713	135	24	3
2012	2,539	189	12	N/A
2013	2,573	127	49	4
2014	2,800	146	82	1

Source: City-Data.com (2016).

*Total provided for available time period. Data were not available for the community of Bear Creek. Note that only part of Austin, Bee Cave, and Dripping Springs fall within the AOI.

Table 9 includes data from 1970 to the present and shows that the period between 1990 and 1999 was the decade in which the largest portion of development occurred within the AOI. The largest percentage of development in Travis and Hays counties and the City of Austin occurred between 2000 and 2009.

Table 9: Number of Structures Built and Percent Built by Decade for Entities in the AOI Between 1970 and 2010 or Later

Geography	Total Homes	Year Structure Built and Percent of Houses Built in that Decade									
		1970-1979		1980-1989		1990-1999		2000-2009		2010 or later	
		#	%	#	%	#	%	#	%	#	%
Hays Co.	67,463	5,813	8.6%	11,809	17.5%	12,623	18.7%	25,708	38.1%	5,118	7.6%
Travis Co.	464,197	76,476	16.5%	91,474	19.7%	81,858	17.6%	118,018	25.4%	17,084	3.7%
Austin	380,280	70,426	18.5%	79,241	20.8%	62,066	16.3%	82,928	21.8%	12,189	3.2%
AOI*	41,245	4,537	11.0%	8,326	20.2%	12,840	31.1%	12,689	30.8%	1,767	4.3%

Source: U.S. Census Bureau, American Community Survey 2011- 2015 (B25034 - Year Structure Built).

Note: Decade with Highest Percentage in Bold. Travis County data includes some City of Austin data.

*Includes Travis County Census Tracts 17.33, 17.37, 17.38, 17.40, 17.49, 17.50, 17.68, 17.69, 17.76, 17.77, 19.08 19.14, 19.15, 19.16, and 19.17; and Hays County Census Tracts 108.05, 108.06, and 108.09.

Table 10 contains information on employment projections from the CAMPO 2040 Plan. Employment growth in Hays County is predicted to be more than 460 percent between 2010 and 2040, compared to approximately 112 percent over the same time period in Travis County. This is largely due to the fact that more land in Travis County has already been developed, compared to Hays County which continues to develop.

Table 10: CAMPO Projected Employment by County/Percent Growth 2010-2040

County	2010 Employment	Projected Employment			% change 2010 - 2040
		2020	2030	2040	
Hays	48,052	89,505	157,832	270,173	462.3
Travis	564,517	760,518	970,962	1,195,673	111.8

Source: CAMPO (2015), 2040 Regional Transportation Plan

4.4.2 Summary of Local Plans

City of Austin—Imagine Austin

Of the 85,281 acres in the AOI, approximately 54.9 percent (46,841 acres) lies within the City of Austin’s jurisdiction or extra-territorial jurisdiction (ETJ). Approximately 21.0 percent (17,923 acres) of land within the AOI is part of the City’s full and limited purpose jurisdictions, and 33.9 percent (28,918 acres) of the AOI lies within the City of Austin’s two-mile and five-mile ETJs. In the ETJs, the City of Austin has no zoning authority but development is subjected to city subdivision and water/wastewater regulations. Land within a city’s ETJ may be annexed in the future, bringing development in these areas under the city’s zoning and permitting requirements.

The City of Austin has enacted several watershed protection ordinances over the last three decades to protect water quality through land use and development controls (City of Austin 2013a, 2013b, 2013c). To this end, the western Drinking Water Protection Zone (DWPZ)—in which the AOI is located—and the eastern Desired Development Zone (DDZ) were created with the goal of funneling development into the DDZ through the use of development incentives (City of Austin 2012). This goal of directing growth east and south into the DDZ is echoed in the *Imagine Austin Comprehensive Plan*, which was adopted in 2012 to guide growth and development in the City of Austin. The *Imagine Austin Comprehensive Plan* included extensive public outreach and was adopted by the Austin City Council in June 2012 (City of Austin 2012).

City of Austin—Urban Trails Master Plan

The City of Austin adopted the *City of Austin Urban Trails Master Plan* in the fall of 2014 in order to create a streamlined and accessible process for the development of urban trails (City of Austin 2014). The *Urban Trails Master Plan* is consistent with the City of Austin’s 2012 *Imagine Austin Comprehensive Plan*.

Several existing and future planned urban trails cross the AOI. These include the Mopac Bicycle and Pedestrian Bridge which will provide a bicycle and pedestrian bridge over Loop 360 at Mopac; the “Y” at Oak Hill to Barton Creek Urban Trail which would connect the Oak Hill neighborhoods to the Barton Creek area of Austin; and the Violet Crown Trail, a partially-constructed 30-mile urban trail which, upon completion, will connect the Lady Bird Johnson Wildflower Center in southwest Austin to Zilker Metropolitan Park near downtown Austin.

City of Austin—Oak Hill Combined Neighborhood Plan

The Oak Hill Combined Neighborhood Plan, adopted in 2008, presents specific goals for the West of Oak and East Oak Hill neighborhoods in the City of Austin. This

neighborhood plan is the product of extensive stakeholder involvement and identifies specific major goals for the neighborhoods, including the following:

- Preserve and enhance environmental resources including watersheds, air quality, and wildlife corridors.
- Coordinate with appropriate entities to provide safe access across major thoroughfares and alleviate cut-through traffic on already overburdened neighborhood streets.
- Provide inter-connectivity among parks, public services and destinations in and beyond Oak Hill.
- Ensure and create safe pedestrian and bike corridors across major highways and throughout the neighborhood that connect to commercial centers and public parks and resources.
- Provide managed connectivity between various neighborhoods while maintaining the quiet enjoyment of neighborhoods.
- All Oak Hill residents should have readily accessible, quality community and public services. (City of Austin 2008: xiii–xxxii)

City of Bee Cave Comprehensive Plan

A small portion of the AOI falls within the City of Bee Cave (2.2 percent or 1,909 acres). Bee Cave’s ETJ covers approximately 2.9 percent (2,499 acres) of the AOI. The Bee Cave City Council adopted an updated Comprehensive Plan, *Our Bee Cave 2037*, on November 22, 2016 (City of Bee Cave 2016a). The plan calls for the City of Bee Cave to “Work in partnership with surrounding communities and regional government agencies to support the region’s mobility goals, transportation system sustainability, and quality of life” (City of Bee Cave 2016a: 46).

City of Bee Cave Hike and Bike Trail Connectivity Plan

The Bee Cave City Council adopted a Hike and Bike Trail Connectivity Plan on November 22, 2016 (City of Bee Cave 2015). The plan discusses the traffic network, traffic safety conditions, traffic congestion, and public transit in Bee Cave. Goals identified in the plan include providing connections to all the neighborhoods in Bee Cave and reducing traffic congestion by providing an alternative to driving (City of Bee Cave 2015: 5).

City of Dripping Springs

A small portion of the AOI falls within the City of Dripping Springs (1.9 percent, or 1,660 acres). The Dripping Springs ETJ is considerably larger than the full purpose area of

the city and covers approximately 31.2 percent, or 26,606 acres, of the AOI. The City of Dripping Springs Comprehensive Plan was adopted in 2010 (City of Dripping Springs 2010). The Plan is organized around the six values: Dripping Springs is a sustainable community; Dripping Springs is a community that cherishes its unique heritage; Dripping Springs is an active community; Dripping Springs is a community with a vibrant economy; Dripping Springs is a community with high quality infrastructure; and Dripping Springs is a community that welcomes all residents. Within the plan, the City of Dripping Springs established a goal related to the stated value of being a community with high quality infrastructure to “develop an efficient transportation network (City of Dripping Springs 2010: 49 – 50).

City of Sunset Valley

A small portion of the AOI falls within the City of Sunset Valley (1.0 percent or 883 acres). Sunset Valley’s ETJ covers less than 0.1 percent, or 59 acres, of the AOI. The Comprehensive Plan for the City of Sunset Valley was adopted in 2011 and includes the city’s policy toward land use, development and redevelopment, capital improvements, and the provision of services within the incorporated area and its ETJ (City of Sunset Valley 2011). The City of Sunset Valley Comprehensive Plan includes goals to preserve and protect the quality of life and preserve the community’s natural resources, among others (City of Sunset Valley 2011: 4).

Village of Bear Creek

Less than one percent of the AOI is within the Village of Bear Creek (693 acres or 0.8 percent). Bear Creek is a village of approximately 403 people, and no articulated or published goals have been developed.

Hays County

Approximately 701 acres of the AOI lie outside the boundaries of incorporated areas and their associated ETJs in Hays County. Because the City of Austin’s development code and water quality protection incentives seek to manage growth in the environmentally sensitive lands within the AOI, anticipated future population growth and development in the area may migrate to vacant, developable lands within the AOI. Hays County recognizes that this future growth will put pressure on the existing transportation system; the 2013 *Hays County Transportation Plan* (amended in 2016) cites this anticipated future growth and its resultant impacts on traffic congestion as contributing to an increased need for new and improved roadway facilities (Hays County 2016).

Hays County Regional Habitat Conservation Plan

Hays County has a stated goal of providing local solutions for conserving endangered species, open space, and cultural heritage. Adopted by Hays County Commissioners in 2013, the *Hays County Regional Habitat Conservation Plan* (RHCP) “provides a locally controlled approach for compliance with the Federal Endangered Species Act (ESA) by allowing the county to offer mitigation credits for otherwise lawful development on land where there could be ‘incidental takings’ of protected species.” In Hays County, the RHCP could protect numerous species considered rare or threatened. The approved RHCP allows landowners who have qualifying habitat acreage and want to preserve it as open space to voluntarily donate or sell it to Hays County. In turn, Hays County can help streamline public projects and private development in areas where the ESA applies by providing “credits” that offset the “takings” of land where protected species might be impacted. Hays County initially plans to offer the credits for development at “\$7,500 per credit acre” according to Hays County’s website about the RHCP (Hays County 2014).

Travis County

Approximately 3,431 acres of the AOI lie outside the boundaries of incorporated areas and their associated ETJs in Travis County. Travis County’s Department of Transportation and Natural Resources (TNR) is responsible for:

- The engineering, design, construction, and maintenance of Travis County roads, drainage and bridges
- Fleet services for all county vehicles and equipment
- Environmental protection
- Solid waste management and resource conservation
- County parks and natural resource preservation
- Capital improvement projects
- Land development review, permits, and flood plain management regulations in Travis County (Travis County 2016a)

According to the TNR’s *Travis County Capital Improvement Projects* (Travis County 2016b), one bridge replacement or rehabilitation project, one drainage project, and one sidewalk project are proposed within the AOI.

Travis County and City of Austin—Balcones Canyonlands Conservation Plan (BCCP)

In recognition of the common goal of protecting endangered species with habitat located in the City of Austin and in Travis County, these entities undertook creation of a RHCP as a vehicle for compliance with the ESA. The BCCP was a plan written by the City of Austin and Travis County in order to obtain an incidental take permit for Golden-cheeked Warblers, Black-capped Vireos, and six species of federally endangered karst invertebrates under section 10(a)(1)(B) of the ESA. The take covered by the permit would include direct and indirect takes associated with grading, clearing, or other earth-moving activities necessary for residential, commercial, or industrial development and infrastructure projects as well as indirect impacts, such as noise, predation, and harassment from the occupancy and use of these structures.

As part of the BCCP, approximately 30,428 acres of Golden-cheeked Warbler and Black-capped Vireo habitat will be protected within a preserve system called the Balcones Canyonlands Preserve (BCP). The BCCP includes the goal of protecting 62 caves. The habitat protected by the BCP is considered to be some of the highest quality and least fragmented habitat of any county in the Golden-cheeked Warbler's range. Areas covered by the BCCP in the event of incidental take include all of Travis County with the following exceptions: the BCP, portions of the Balcones Canyonlands National Wildlife Refuge (BCNWR) that fall within Travis County, and areas within city limits and planning jurisdictions of municipalities that are not participating in the BCCP. The permit was issued for a period of 30 years and will expire or be eligible for renewal in 2026 (City of Austin & Travis County 1996).

CAMPO

CAMPO is responsible for transportation planning in the six-county Austin metro region, which includes Hays and Travis counties. The vision statement for their 2040 plan is: "Develop a comprehensive, multimodal, regional transportation system that safely and efficiently addresses mobility needs over time, is economically viable, cost-effective and environmentally sustainable, supports regional quality of life, and promotes travel options" (CAMPO 2015:11). The proposed project is included in this regional plan as a six-lane tolled turnpike with frontage roads along US 290 from west of RM 1826 to Loop 1 (Mopac).

4.4.3 Potential for Induced Development: Data from Planning Expert Questionnaires and Interviews

The preceding sections have demonstrated the strong potential for growth and the planning framework within which that growth would occur in the AOI during the analysis period of 2019–2040. This section will evaluate the nature of this growth and attempt to determine whether it can be causally linked to the proposed project. The evaluation

of whether the proposed project is likely to result in project-induced land use change is patterned after the procedures in *NCHRP Project 25-25, Task 22*. Project-induced land use change can include project-induced development, the redevelopment of previously developed land, or a change in the rate of development/redevelopment. In order to make reasonable judgments about potential project-induced impacts, the Planning Judgment forecasting tool incorporated data collected via questionnaires and phone interviews with planning professionals in the project vicinity, and ultimately incorporated data collected from numerous professionals with relevant expertise.

A questionnaire was sent to agencies, organizations, governmental jurisdictions, and water supply corporations within the project's AOI. The questionnaire and AOI map (**Attachment C**) were emailed to each organization listed in **Table 11** on November 8, 2016. Follow up emails were sent to organizations that had not replied on November 18, 2016. Follow-up calls were placed in November and December 2016.

Table 11: Indirect Impacts Questionnaire Respondents		
Organization	Follow-up Phone Calls/Emails	Response Received*
City of Austin	11/18/2016; 12/5/2016; 12/12/2016	1/10/2017
City of Sunset Valley	11/18/2016	
City of Bee Cave	11/18/2016	11/23/2016
City of Dripping Springs		Questionnaire 11/17/2016; Phone interview 12/2/2016
Village of Bear Creek	11/18/2016	
Travis County Transportation & Natural Resources	11/18/2016	
Hays County Development Services Department	11/18/2016	
Austin Independent School District	11/18/2016	
Hays County Independent School District	11/18/2016	
Dripping Springs Independent School District	11/18/2016	
Capital Metropolitan Transportation Authority		
Capital Area Metropolitan Planning Organization	11/18/2016	11/21/2016
Capital Area Council of Governments		11/11/2016
Barton Springs Edwards Aquifer Conservation District	11/18/2016	11/21/2016
Lower Colorado River Authority	11/18/2016	
West Travis County Public Utility Agency		11/9/2016

Source: CMEC, 2016.

*Blank cells indicate pending responses or no response received.

The planning experts were asked where development is expected to occur and whether the proposed project would induce growth. Specifically, the interviewees were asked the following questions:

- Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the areas on the attached map and provide the location, type, and size (e.g. acres, density, number of units) of

any planned developments. Also, please indicate if any of the proposed land developments that you identified on the attached map have been platted.

- Please identify parcels (if any) that you think would likely be developed by 2040 as a result of the proposed project that would not otherwise be developed.
- Would the proposed project affect the rate of land development in your jurisdiction?
- Is the proposed project consistent with local planning efforts (i.e. master or comprehensive plans, growth management plans, zoning or land use policies, etc.)?
- Are there other capital improvement projects—such as water or sewer infrastructure, school, or hospital construction—that are planned for the area which might affect development in the project vicinity?
- Are there any factors that could limit growth in the area, such as floodplains, current development, conservation easements, protected lands, etc.?
- How would the proposed project be expected to impact travel patterns in the area? Which roadways would benefit from the proposed project? How do people in the project area get to Austin now?
- What type of traffic would you anticipate to use this facility (i.e. local traffic, regional commuters, through traffic)?
- Do you have any comments on the proposed AOI or do you think it is a reasonable study area for an assessment of indirect impacts that may result from the proposed project?

Respondents provided information on reasonably foreseeable future developments, which will be discussed in the *Cumulative Impacts Technical Report*. Survey responses had several common threads:

- Respondents do not think the proposed project would specifically affect development, given the existing high rate of growth in the area overall.
- The proposed project is consistent with local planning efforts.
- Several land use and transportation projects are underway or are planned for the area within the AOI.
- Factors limiting growth include the availability of water and sewer service as well as local, state, and federal regulations.

- Respondents anticipate the project to be used most heavily by regional commuters.

Key points made by specific respondents to the questionnaire or during an interview include:

- City of Bee Cave:
 - Respondent was uncertain whether any particular parcels would likely be developed by 2040 as a result of the proposed project that would not otherwise be developed.
 - If the proposed project includes efforts to add/improve bike lines/buffered bike lanes/shared lanes/enhanced crossings, etc., it could work to provide further connectivity to existing areas where shoulders currently serve in this capacity. Also, the technical appendix of the CAMPO 2040 Plan indicates that RR 620 has a bike facility in the form of a designated shoulder.
 - The project is consistent with local planning efforts.
 - The opportunity to provide reliever roadways to major state highways is restricted by topography and three large nature preserves.
 - The project should help to better serve the existing and projected travel needs and would be of value to local circulation and safety.
- City of Dripping Springs
 - Growth in Dripping Springs has been rapid and the city expects growth to continue at a steady pace, barring another major economic downturn. Both Dripping Springs ISD (DSISD) and the charm of the Hill Country are big draws that will continue to drive growth.
 - All new developments will require creation of new utility districts and/or extension of existing service lines.
 - DSISD has planned the addition of new schools in response to the rapid growth they are currently experiencing within their district boundaries.
 - The most important factors limiting growth are water supply, wastewater disposal, and water quality.
 - The Oak Hill Parkway is not expected to affect existing travel patterns. US 290 would greatly benefit from these improvements. The primary arteries to Austin are US 290 and FM 1826.

- Respondent anticipates that local traffic, regional commuters, and through traffic will use the facility.
- Barton Springs Edwards Aquifer Conservation District
 - The proposed Oak Hill project would likely greatly improve the flow of commuter traffic to and from Austin.
- Capital Area Metropolitan Planning Organization
 - The project is currently part of CAMPO's 2040 Plan.
- Capital Area Council of Governments
 - The Capital Area Council of Governments deferred to local governments in the project AOI (Travis and Hays Counties and the Cities of Dripping Springs, Bear Creek, Bee Cave, Sunset Valley, and Austin).
- West Travis County Public Utility Agency (WTCPUA)
 - The proposed project would not affect the rate of land development.
 - The project is needed immediately.
 - Factors that could limit growth in the area include the availability of public water and sewer service and regulatory matters from federal, state, and local bodies.
 - The WTCPUA currently treats approximately 14 million gallons per day (MGD) of surface water for potable drinking water. The WTCPUA Board has adopted a policy that the public utility agency will not expand beyond a treatment and delivery capacity of 32.5 MGD.
 - WTCPUA's contracted demographic studies indicate a total build-out of its retail service area would potentially demand 45 MGD of treatment capacity for domestic drinking water.

4.5 Step 5—Identify Resources Subject to Induced Growth Impacts

4.5.1 Cartographic Analysis

Based on input from planning professionals and a cartographic assessment, approximately 10,192 acres of land have indirect induced growth potential within the AOI. The Ecological Mapping Systems of Texas (EMST) was used to determine which resources are present in the multiple areas identified for potential development; **Table 12** summarizes the characteristics of resources present in developable areas.

Table 12: Resource Characteristics in Areas of Potential Development	
EMST	Acres
Row Crops	7
Barren	10
Native Invasive: Deciduous Woodland	13
Native Invasive: Juniper Shrubland	6
Native Invasive: Juniper Woodland	4
Native Invasive: Mesquite Shrubland	122
Edwards Plateau: Ashe Juniper Slope	271
Edwards Plateau: Live Oak Slope Forest	3
Edwards Plateau: Oak / Ashe Juniper Slope Forest	151
Edwards Plateau: Oak / Hardwood Slope Forest	11
Edwards Plateau: Ashe Juniper Motte and Woodland	2,491
Edwards Plateau: Deciduous Oak / Evergreen Motte and Woodland	1,494
Edwards Plateau: Live Oak Motte and Woodland	919
Edwards Plateau: Oak / Hardwood Motte and Woodland	182
Edwards Plateau: Post Oak Motte and Woodland	14
Edwards Plateau: Savanna Grassland	1,605
Edwards Plateau: Ashe Juniper / Live Oak Shrubland	1,607
Edwards Plateau: Ashe Juniper / Live Oak Slope Shrubland	36
Edwards Plateau: Shin Oak Shrubland	10
Edwards Plateau: Shin Oak Slope Shrubland	5
Edwards Plateau: Floodplain Ashe Juniper Forest	4
Edwards Plateau: Floodplain Ashe Juniper Shrubland	3
Edwards Plateau: Floodplain Hardwood / Ashe Juniper Forest	22
Edwards Plateau: Floodplain Hardwood Forest	4
Edwards Plateau: Floodplain Herbaceous Vegetation	3
Edwards Plateau: Riparian Ashe Juniper Forest	135
Edwards Plateau: Riparian Ashe Juniper Shrubland	53
Edwards Plateau: Riparian Deciduous Shrubland	6
Edwards Plateau: Riparian Hardwood / Ashe Juniper Forest	107
Edwards Plateau: Riparian Hardwood Forest	14
Edwards Plateau: Riparian Herbaceous Vegetation	31
Edwards Plateau: Riparian Live Oak Forest	23
Open Water	3
Blackland Prairie: Disturbance or Tame Grassland	3
Urban High Intensity	38
Urban Low Intensity	782
Total	10,192

Sources: CMEC, 2016-2017; EMST, 2016.

TxDOT (2016) and AASHTO (2011) indirect impact assessment guidance require consideration of potential impacts to sensitive resources. Cartographic analysis was used to determine which resources are present in areas within the AOI that have indirect induced growth potential. The connection between construction of the

proposed Oak Hill Parkway project and development is most apparent for undeveloped parcels located within the AOI. Land redevelopment has not been further investigated because planning professionals interviewed for this analysis are not aware of specific redevelopment plans at this time. Results of the cartographic analysis, including quantifications of resources potentially subject to induced growth impacts, are provided in the next section.

4.5.2 Resource Characteristics in Area of Potential/Induced Development

Table 13 includes a description of resources present in the areas of potential development within the AOI. See **Figure 3** in **Attachment A** for a map showing the 10,192 acres of developable land within the AOI. No formal surveys for historic-age properties and archeological resources have been conducted throughout all of the areas of potential development at the time this report was prepared. Preliminary consultation with TxDOT-developed potential archeological liability maps (PALM) indicates low to moderate potential for archeological impacts within the areas of potential development.

Table 13: Resources Analyzed for Induced Growth Impacts		
Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Waters of the U.S., Including Wetlands	Formal wetland delineations have not been conducted within all of the areas of potential development; however, if it was determined that the wetlands and waters were Waters of the U.S., then they would be protected by Section 404 of the Clean Water Act (CWA).	No. The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into waters of the U.S., including wetlands, under Section 404 of the CWA.
Floodplains	Yes. Approximately 1.3 percent of currently undeveloped land in the AOI (1,148 acres) are within the 100-year floodplain.	No. Future construction within the 100-year floodplain would be in compliance with appropriate permitting and general land use policies.
Water Quality	Yes. Future development within the AOI would cause an increase in impervious cover that could increase pollutants entering receiving waters during storm events.	Yes. Stormwater runoff from the western end of the project area could enter Slaughter Creek, which has been identified by the TCEQ as an impaired assessment unit. During construction, exposed soil could runoff into streams and increase turbidity and sediment loading downstream.

Table 13: Resources Analyzed for Induced Growth Impacts		
Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Federally Listed Threatened/Endangered Species	Yes. The United States Fish and Wildlife Service (USFWS) Information for Planning and Conservation species list identifies a number of threatened or endangered species that could potentially be present within the AOI. The project is located within the Edwards Aquifer Recharge Zone and project runoff could contribute to water quality impacts downstream of the project location. Recharge from lower Williamson Creek has been documented by dye trace studies to flow to the Barton Springs complex, which is occupied habitat for the Barton Springs salamander and Austin blind salamander (BSEACD 2003, 2014; Hauwert, et al., 2004; Hunt et al., 2006).	Yes; however, the ESA affords protection for federally listed threatened and endangered species and their habitats. The USFWS maintains lists of potential occurrence for listed species in each Texas county. All development, whether public or privately funded, is subject to federal regulations.

Table 13: Resources Analyzed for Induced Growth Impacts		
Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Vegetation and Wildlife Habitat (Including Habitat for State-Listed Species)	<p>Yes. The areas of potential development are vegetated to varying degrees and provide wildlife habitat.</p> <p>Yes. The Texas Parks and Wildlife Department (TPWD) maintains lists of potential occurrence for listed species in each Texas county. The TPWD annotated list identifies a number of state-listed species that could potentially be present within the AOI.</p>	<p>No. There has been a trend of conversion of natural areas to development over the recent past. However, the conservation entities charged with protecting endangered species and sensitive resources have plans in place to continue to protect sensitive habitats. For example, the City of Austin has developed regulations regarding buffer zone setbacks to protect critical environmental features as well as impervious cover limits as part of the Land Development Code. The city, in conjunction with Travis County, has also established the Balcones Canyonlands Conservation Plan (BCCP) to protect natural habitat areas. Approximately 20% of the AOI is represented by lands protected in perpetuity specially acquired for that purpose, providing regulatory means by which substantial environmental impacts caused by development would be minimized.</p> <p>No. State regulations prohibit harm to individuals of state-listed species. All development, whether public or privately funded, is subject to state regulations.</p>

Table 13: Resources Analyzed for Induced Growth Impacts		
Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Air Quality	No. Any increased air pollutant or MSAT emissions resulting from the potential development or redevelopment of the area must meet regulatory emissions limits established by the TCEQ and the EPA. In addition, with cleaner fuels, improved emission technologies, alternative modes of transportation, and regional clean air initiatives, the air quality in the area should continue to improve over time.	No
Community Resources (Includes Businesses and Residences)	Yes; property values could be influenced by future development. Additional tax revenue would be generated by potential induced development.	No. Based on the analysis of impacts and benefits, the Oak Hill Parkway project would provide overall benefits to the socioeconomic resources in the project area. There are commercial activity centers, residential neighborhoods, and community facilities, such as emergency service providers, schools, places of worship and parklands within the Oak Hill Parkway corridor. The project would not change access to these resources; Rather, it would generally reduce congestion and improve mobility and travel time such that these resources are more easily accessible.
Neighborhoods	Per CTRMA policy, emergency vehicles, public transport (including Capital Area Rural Transport System [CARTS]) would be allowed to use the toll road free of charge. Changes to access and travel patterns could occur in neighborhoods within the AOI. Planning experts from the jurisdictions within the AOI do not expect the proposed project to influence the amount or rate of development within their jurisdictions, given the area's high rate of growth overall. No substantial impacts to neighborhoods resulting from induced growth associated with the proposed project are anticipated.	No

Table 13: Resources Analyzed for Induced Growth Impacts		
Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Limited English Proficiency	No. Adequate steps have been taken and are planned to assist the limited English proficiency population within the project area throughout the public involvement process for the proposed project.	No
Environmental Justice	The main lanes of the proposed project would be toll lanes. A project-level toll analysis is currently in progress. The CAMPO 2035 <i>Regional Toll Network Analysis</i> includes the proposed project and considers regional impacts to toll facility users and the potential need for mitigation of the tolled components of CAMPO's proposed 2035 transportation system (CAMPO 2013). The analysis concluded that existing and 2035 travel times for EJ and non-EJ areas would be similar. Implementation of the 2035 planned transportation system, including the regional toll network, would benefit the EJ population. The 2035 Plan expands travel options by increasing transit service and adding more bicycle and pedestrian facilities.	No
Historic-Age Properties	No formal surveys have been conducted to date throughout the full extent of the areas of potential development. There appear to be a limited number of standing structures on these parcels, based on a review of aerial imagery.	Resources that are 50 years of age are potentially historic. NRHP-listed or eligible historic resources are protected by state and federal regulations for publicly funded projects. However, no state or federal regulations protect cultural resources for privately funded projects.

Table 13: Resources Analyzed for Induced Growth Impacts		
Resource	Could the resource be indirectly impacted by potential induced growth?	Is this resource at risk?
Archeological Resources	No formal surveys have been conducted to date throughout the full extent of the areas of potential development. Preliminary consultation of TxDOT-developed PALM maps indicates generally low to moderate potential for archeological impacts for these areas.	The Antiquities Code of Texas requires notification (to the Texas Historical Commission) if public agencies sponsor ground-disturbing activity on public land. NRHP-listed or -eligible archeological resources are protected by state and federal regulations for publicly funded projects. However, these state and federal regulations do not apply to privately funded projects.

Source: CMEC, 2016-2017.

Note: Separate technical reports documenting the direct impacts of the proposed project have been or are being prepared for the resources listed in this table. Best available information was used during the preparation of this report to assess the impacts associated with potential induced growth.

4.5.3 Resources Analyzed for Induced Growth Impacts

Within the 10,192 acres available for development in the AOI, various resources could potentially be affected should development be proposed in the future by others. Based on the cartographic analysis and the information presented in **Table 13**, the following resources will be further analyzed for potential substantial indirect impacts from project-related induced development: federally listed threatened and endangered species and surface water.

Because the exact type, location, timing, and density of future developments within the 10,192 acres identified as having development potential are unknown at this stage of project development, the following resource discussions are broad and are focused on potential construction impacts within regulation parameters.

Federally Listed Threatened and Endangered Species—Barton Springs Salamander and Austin Blind Salamander

The proposed project is located over the Recharge Zone of the Edwards Aquifer. The AOI for the proposed project is located primarily over the Contributing Zone of the Edwards Aquifer with portions of the AOI extending into the Recharge Zone and the Contributing Zone within the Transition Zone. **Figure 4** in **Attachment A** shows the extent of the Edwards Aquifer Contributing, Recharge, and Transition Zones with the AOI. Water quality degradation is identified as a threat to both the Austin blind salamander (USFWS, 2013) and the Barton Springs salamander (USFWS, 2005). Due

to the nature of water and the way it travels, the indirect impacts analysis must consider whether the project could cause indirect impacts to water quality in areas some distance away from the project area, and whether impacts could occur later in time than accounted for in the direct impacts analysis.

No springs or caves are known to occur within the project area; any known locations of the Barton Springs salamander or Austin blind salamander are at a considerable distance from the project area. Therefore, direct impacts are extremely unlikely to occur. There are no known locations for the Barton Springs or Austin blind salamanders within the AOI. However, based on the project-related increase in impervious cover, the project's location over the Recharge Zone of the Edwards Aquifer, and the known aquifer flow paths to Barton Springs from the impacted watersheds, this project may impact water quality through increased stormwater contribution. Therefore, this project may contribute to the downstream degradation of water quality parameters that are essential to the Barton Springs salamander and Austin blind salamander at discharge sites within the Barton Springs Complex.

Within the project area, Best Management Practices (BMPs) would be used during the construction and operation of the Oak Hill Parkway project to minimize and avoid direct and indirect impacts to water quality, and thus avoid impacts to the salamander species that rely on the quantity and quality of groundwater in the aquifer. Engineered water quality protection 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.

Once stormwater leaves the project area and infiltrates into the subsurface environment (e.g. groundwater), the flow path and amount of mixing with other subsurface waters are unknown. In the event of a BMP failure within the project area, any change in runoff water quality would be temporary and immeasurable due to the effects of dilution within the aquifer. Therefore, effects to the Barton Springs salamander and Austin blind salamander as a result of indirect water quality impacts are likely to be insignificant or discountable.

The proposed project could allow access into previously inaccessible areas which could in turn result in new development. Based on the cartographic analysis discussed in **Section 4.5.1**, approximately 10,192 acres, or 12.0 percent of the AOI, consist of developable land (not including land where development is currently platted and/or planned).

Land disturbing activities such as grading, construction of bridges and culverts, drainage easement grading and shaping, and other construction activities for a project of this size would require coordination with the TCEQ. A Water Pollution Abatement Plan (WPAP) in compliance with the Edwards Aquifer Rules and a Stormwater Pollution

Prevention Plan (SW3P) in compliance with Texas Pollutant Discharge Elimination System (TPDES) would be submitted for TCEQ review and approval. These documents specify the BMPs to be used to prevent erosion and sedimentation during construction, as well as post-construction Total Suspended Solids (TSS) controls. TCEQ's Edwards Aquifer Rules provide that affected cities, counties, and groundwater conservation districts may review and comment on the WPAP application when it is filed; thus, there will be a public participation opportunity at that time (30 TAC 213.4 (a) (2)).

All development within the Edwards Aquifer in the AOI is subject to the State's Edwards Aquifer Rules, the goal of which is non-degradation of existing groundwater quality (30 TAC 213.1). Moreover, a large portion of the AOI (17,923 acres) lies within the full or limited-purpose jurisdiction of the City of Austin, which has enacted water quality ordinances, further limiting development intensity.

In its final rule to list the Barton Springs salamander as endangered, 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] (USFWS 1997)." The EPA affirmed this finding when it approved Texas' application to administer National Pollutant Discharge Elimination System (NPDES).

In 2007, the TCEQ published a set of voluntary Optional Enhanced Measures (OEMs) as an appendix to their guidance document, *Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices* (TCEQ, 2005; TCEQ, 2007). These measures provide a suite of options that can be used to enhance water quality by committing to construction, post-construction, and maintenance phase BMPs. According to the TCEQ's *Optional Enhanced Measures for the Protection of Water Quality in the Edwards Aquifer Report (Revised) – Appendix A to RG-348* (TCEQ, 2005; TCEQ, 2007) the USFWS concurred with the TCEQ's "no effect" determination for aquifer species for projects that adopt the OEM. Although this document does not address the Austin blind salamander, due to similarities in life history and habitat, it is assumed that the OEMs would be effective for this species as well.

Construction projects in the Edwards Aquifer Recharge Zone within the AOI would be subject to the Edwards Aquifer Rules and TPDES regulations. 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 impacts to the quality and quantity of Edwards Aquifer recharge from development within the AOI would be avoided or minimized.

Surface Water

In general, effects on surface water quality can occur due to: (1) an increase in impervious surface area (which could result in increased runoff, altered recharge (flow and quality) into the aquifer, and decreased water quality downstream); and (2) grading and removal of vegetation during construction (which could accelerate erosion due to stormwater runoff).

The TCEQ's Total Maximum Daily Load (TMDL) Program works to improve water quality in impaired or threatened water bodies in Texas. A TMDL defines an environmental target by determining the extent to which a certain pollutant must be reduced. TMDLs are developed for surface waters that are impaired due to a pollutant or adverse condition. Based on the environmental target in the TMDL, the state develops an implementation plan to mitigate sources of pollution within the watershed and restore impaired uses. The Texas Water Quality Inventory and 303(d) List provide an overview of the status of surface waters of the state, including concerns for public health, fitness for aquatic species and other wildlife, and specific pollutants and their possible sources. The 303(d) List, a subset of the inventory, identifies waters that do not attain one or more standards for their use.

There are no TCEQ-designated impaired streams within the project area, but stormwater runoff from the western end of the project area could enter Slaughter Creek, which has been identified by the TCEQ as an impaired assessment unit. During construction, exposed soil could runoff into streams and increase turbidity and sediment loading downstream.

Several regulations are relevant to the management of surface water quality and quantity throughout the AOI for this project. Sections 401 and 404 requirements under the CWA are generally applicable to public and private developments and would apply to the AOI for this project. Additional protections and permitting requirements apply to projects—such as Oak Hill Parkway and potential future developments—that are located over the Edwards Aquifer Recharge Zone. Local municipalities have their own regulations for local protection of water quality and quantity. Thus, indirect impacts from induced growth to surface water resources are not expected to be substantial.

4.6 Step 6—Identify Mitigation, If Applicable

Numerous mitigation measures are proposed to minimize and mitigate for potential impacts related to construction of the proposed project. In addition, a variety of land development requirements are in place at the municipal and county level that would also apply to any developer that proposed to build in the AOI. These are discussed by resource below.

4.6.1 Threatened and Endangered Species—Barton Springs Salamander and Austin Blind Salamander

The project would use BMPs that would allow for a TSS removal rate of at least 80 percent of the incremental increase in TSS load over the Recharge Zone. During construction, the BMPs would include erosion controls and sediment controls. The completed project would include facilities to collect and treat runoff prior to discharging it off site. The project would comply with the TCEQ’s Edwards Aquifer Rules (including preparation of a WPAP) and would comply with the TPDES standards (through preparation of a SW3P).

Examples of BMPs that could be used during and following project construction include silt fences, temporary seeding, rock checks, erosion control blankets, and bioretention ponds, which are described in detail in the *Biological Resources Technical Report*. A recent report by Dr. Michael Barrett (2016) focused on the effectiveness of various BMPs for stormwater runoff within the Barton Springs Zone. He concluded that, based on the water quality analysis of the constituents that are typically found in stormwater or highway runoff, the TCEQ and City of Austin BMP standards are effective at preventing degradation to water quality by matching or improving on background water quality parameters (Barrett 2016).

Projects moving forward as a result of induced growth from the proposed project would be subject to regulation under the ESA if it is anticipated that they would impact either the Barton Springs salamander or the Austin blind salamander or their habitat. The ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” (ESA 1973). The Barton Springs salamander and the Austin blind salamander are not species listed for coverage under the BCCP. However, land set aside for the BCCP protects groundwater quality in the Barton Springs segment of the Edwards Aquifer, which indirectly benefits the salamanders. Furthermore, the City of Austin has set aside more than 26,000 acres of WQPLs specifically to protect the water quality within the Edwards Aquifer, which will also indirectly benefit and protect the Austin blind salamander and the Barton Springs salamander. These existing protections will help to mitigate future impacts to the listed salamander species.

4.6.2 Surface Water

Numerous regulations are in place to avoid or minimize impacts to water quality. The EPA’s NPDES permit program, authorized by the CWA, controls water pollution by regulating point sources that discharge pollutants into waters of the U.S. In Texas, the NPDES program is administered by the TCEQ, as part of the TPDES. A NPDES permit may be required if wastewater is discharged into the stormwater system. The CWA

established the basic structure for regulating discharges of pollutants into the waters of the U.S. The Municipal Separate Storm Sewer (MS4) program applies to cities and counties and is overseen by TCEQ. As MS4 operators, the City of Austin (City of Austin 2016a) and Travis County (Travis County 2016c) developed Stormwater Management Programs, comprehensive long-range plans to prevent and reduce stormwater pollution.

Section 404 of the CWA gives the USACE authority to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands. Impacts to waters of the U.S. and wetlands could require USACE authorization. Executive Order 11990 Protection of Wetlands (issued in 1977) requires federal agencies to minimize the destruction or modification of wetlands. Any future development project in the AOI would be required to comply with USACE regulations.

Floodplains are lowland areas adjacent to water bodies that are inundated during flood events. Construction within a floodplain reduces its capacity for floodwater storage and infiltration, as well as its value as habitat. Under Executive Order 11988 Floodplain Management, the FEMA requires municipalities that participate in the National Flood Insurance Program to adopt floodplain ordinances that prohibit development in existing 100-year floodplains. Coordination with the local floodplain administrator would be required for developments affecting floodplains.

A variety of regulations are in place to protect the quality of groundwater in the Barton Springs segment of the Edwards Aquifer, as discussed in previous sections.

The City of Austin also has regulations in place for voids and water flow features discovered during construction. According to §1.12.1 of the Environmental Criteria Manual, "all work must stop if a void in the rock substrate is discovered which is one square foot in total area, blows air from within the substrate, and/or consistently receives water during any rain event. At this time it is the responsibility of the Project Manager to immediately contact a City of Austin Environmental Inspector for further investigation." Development in the City of Austin would be required to comply with these standards.

TCEQ lists additional BMPs for construction and post-construction phases that future development projects would be required to consider, as discussed in the *Water Resources Technical Report*. The section also discusses other nontraditional types of BMPs that could be used to reduce runoff and potential pollutants.

4.6.3 Various Municipal Codes Including Land Development Regulations

City of Austin

The City of Austin has environmental protection considerations in the Land Development Portion of the Austin City Code for subdivision development (Title 25-8) including considerations of water quality, erosion, impervious cover, and handling of wastewater (City of Austin 2016b, 2016c, 2016d).

The City of Austin's Save Our Springs ordinance was adopted by popular vote in August 1992. The ordinance limits impervious cover and requires non-degradation levels of stormwater treatment for development of sites in the Barton Springs Zone (City of Austin 1992).

City of Bee Cave

Properties located within Bee Cave City Limits are subject to all city ordinances (City of Bee Cave 2016b). Properties in the Bee Cave ETJ are subject to Non-Point Source Pollution (water quality), Platting/Subdivision, and Signage regulations and nuisance control only. The Bee Cave Code includes development and subdivision regulations including policies for water quality protection.

City of Dripping Springs

Properties within the City of Dripping Springs and its ETJ are subject to the land use and development regulations (e.g., zoning and building codes) included in the Code of Ordinances for the City of Dripping Springs (City of Dripping Springs 2016). Chapter 22 Article 5, also referred to as the water quality protection ordinance, establishes standards and procedures for controlling and managing nonpoint source pollution. The Dripping Springs water quality protection ordinance sets limits on impervious surface cover for developments for which a site development plan is first filed within the Edwards Aquifer recharge zone and the Edwards Aquifer contributing zone.

City of Sunset Valley

The City of Sunset Valley's Land Development Code, approved in September 2009, applies to all properties within the city limits of Sunset Valley and the Sunset Valley ETJ (City of Sunset Valley 2011). The Land Development Code includes subdivision regulations and watershed development standards.

Village of Bear Creek

The Village of Bear Creek's Subdivision Ordinance regulates the subdivision of land within the Village of Bear Creek (Village of Bear Creek 2016).

Travis County

The Travis County Code includes policies and procedures relating to construction standards in Chapter 80, which would make them subject to County Development Regulations. The County Development Regulations (Chapter 82) include provisions relating to the use and preservation of water resources as well as the amount of impervious cover allowable for projects within the county (Travis County 2016d).

Hays County

The *Hays County Subdivision and Development Regulations* document contains environmental protection considerations (Hays County 2013). The *Hays County Subdivision and Development Regulations* (Article 1) also defers to the State of Texas Health and Safety Code, the Texas Water Code, and TCEQ to provide further guidance on environmental issues that may occur in Hays County. Further, Hays County is a voluntary member of the Hill Country Alliance, whose mission statement is “...to bring together an ever-expanding alliance of groups throughout a multi-county region...with the long-term objective of preserving open spaces, water supply, water quality, and the unique character of the Texas Hill Country” (Hill Country Alliance 2016).

5. CONCLUSIONS

This analysis consisted of a discussion regarding regulations and guidance, description of the scoping process and definition of the AOI, identification of areas subject to induced growth, identification of resources subject to induced growth impacts, and detailed analysis of those resources that are potentially at risk of being affected by induced-growth related impacts. The goals of the various communities in the AOI were discussed and trend data for population and housing development were provided. The detailed technical analysis of potential effects resulting from induced growth were presented based on cartographic analysis, technical analysis, and the results of an extensive planner questionnaire. Minimization and mitigation measures were discussed as they pertain to the resources at risk in the AOI, including environmental regulations and land use development regulations in place throughout the AOI.

Based on the amount of developable land available in the AOI, the pace of development being documented in Hays and Travis Counties, and the responses of local planning experts, the proposed project is not anticipated to generate substantial induced development. Factors such as the large amount of land protected from development and local regulations that limit impervious cover would constrain the amount of induced growth possible in the AOI. Several local planning experts maintain that development will continue to occur in the area regardless of whether the proposed project is constructed.

Induced growth could have some effect on water resources because induced development would result in increased impervious cover, which could in turn have an effect on water quality. However, the proposed project would not have a substantial adverse effect on water quality in the AOI because of the high percentage of managed areas and the implementation of regulations and BMPs.

Approximately 10,192 acres of undeveloped land within the AOI could be subject to development in the foreseeable future. Development projects that do occur within the planning horizons of the municipalities contacted (through 2040) would have to comply with the relevant land development code for projects within city limits and ETJ boundaries, where applicable. Areas outside municipal limits would be subject to state and federal laws.

Existing regulatory processes would provide controls to avoid potential adverse water quality related impacts to threatened or endangered species. Impacts to individuals or habitat of federally listed species are subject to federal regulations under the ESA of 1973. The City of Austin and Travis County's BCCP, in addition to the Hays County RHCP, are available to developers to facilitate compliance with the ESA in the AOI. In addition, the Save Our Springs ordinance limits impervious cover and requires non-

degradation levels of stormwater treatment for development of sites in the Barton Springs Zone.

With regard to potential indirect effects on water quality resulting from potential development by others in the AOI, regulations are in place and applicable to proposed developments to minimize impacts to the resource. These include TCEQ regulations requiring preparation of SW3Ps and WPAPs, including use of BMPs in addition to the City of Austin drainage/water quality requirements. USACE Section 404 provisions of the CWA govern activities that would affect waters of the U.S. and wetlands, regardless of who proposes the development activity. Individual developers would be responsible for complying with these regulations.

The indirect effects that have been described in this section do not conflict with the various goals of planning and conservation entities in the AOI; are not expected to substantially worsen the condition of a sensitive resource; would not delay or interfere with habitat conservation planning efforts or species recovery efforts for sensitive species; would not eliminate a valued, unique, or vulnerable feature; and are not inconsistent with applicable laws. Therefore, additional mitigation is not proposed for the anticipated indirect induced-growth effects potentially caused by construction of the Oak Hill Parkway.

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Attachment A

Figures

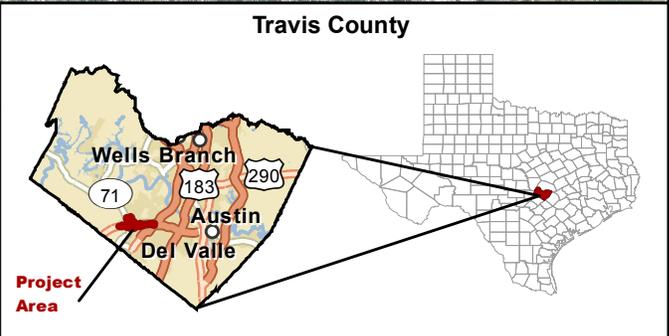
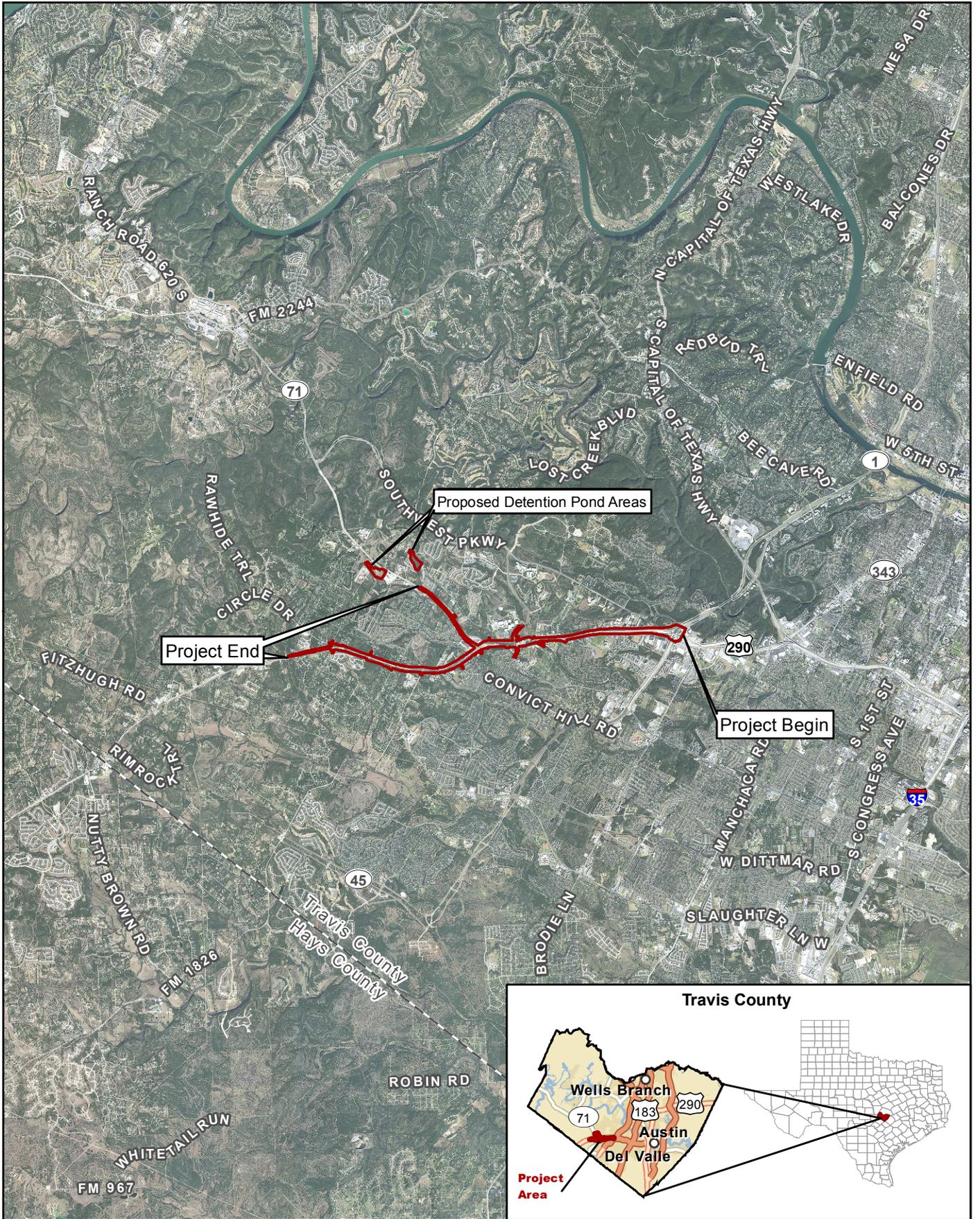


Figure 1. Project Location (Aerial Base)

Oak Hill Parkway: US 290W from Mopac/Loop1 to west of Circle Drive and SH 71 from US 290W to Silvermine Drive

Project Location



0 2 Miles
0 3 Kilometers

Prepared for: TxDOT
Scale: 1:126,720
Date: 12/6/2016

Basemap Source: TNRIS (2015) CSJ: 0013-08-060 and 0700-03-077

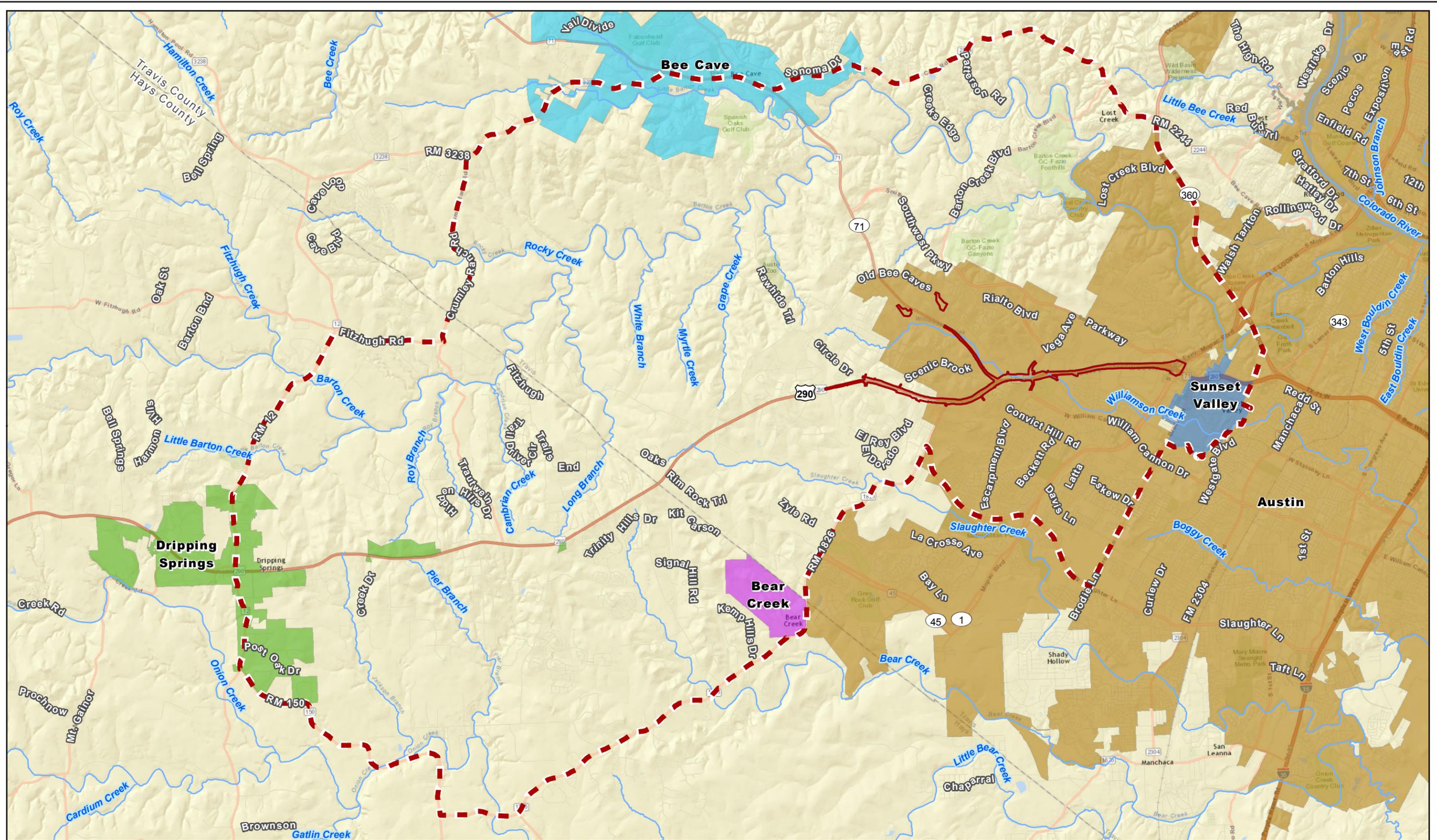


Figure 2. Area of Influence

Oak Hill Parkway: US 290W from Mopac/Loop1 to west of Circle Drive and SH 71 from US 290W to Silvermine Drive

- | | | |
|------------------|---------------------------|-------------------------------|
| Project Location | Jurisdictional Boundaries | BEE CAVE FULL PURPOSE |
| AOI | AUSTIN FULL PURPOSE | DRIPPING SPRINGS FULL PURPOSE |
| NHD Stream | BEAR CREEK FULL PURPOSE | SUNSET VALLEY FULL PURPOSE |

	0	1.5 Mile
	0	2 Kilometers
Data Sources: TNRIS (2016), City of Austin (2016), NHD (2014)	Prepared for: TxDOT	1 in = 1.5 mile
Basemap Source: ESRI (2016)	CSJ: 0013-08-06 and 0700-03-077	Scale: 1:95,040
		Date: 10/28/2016

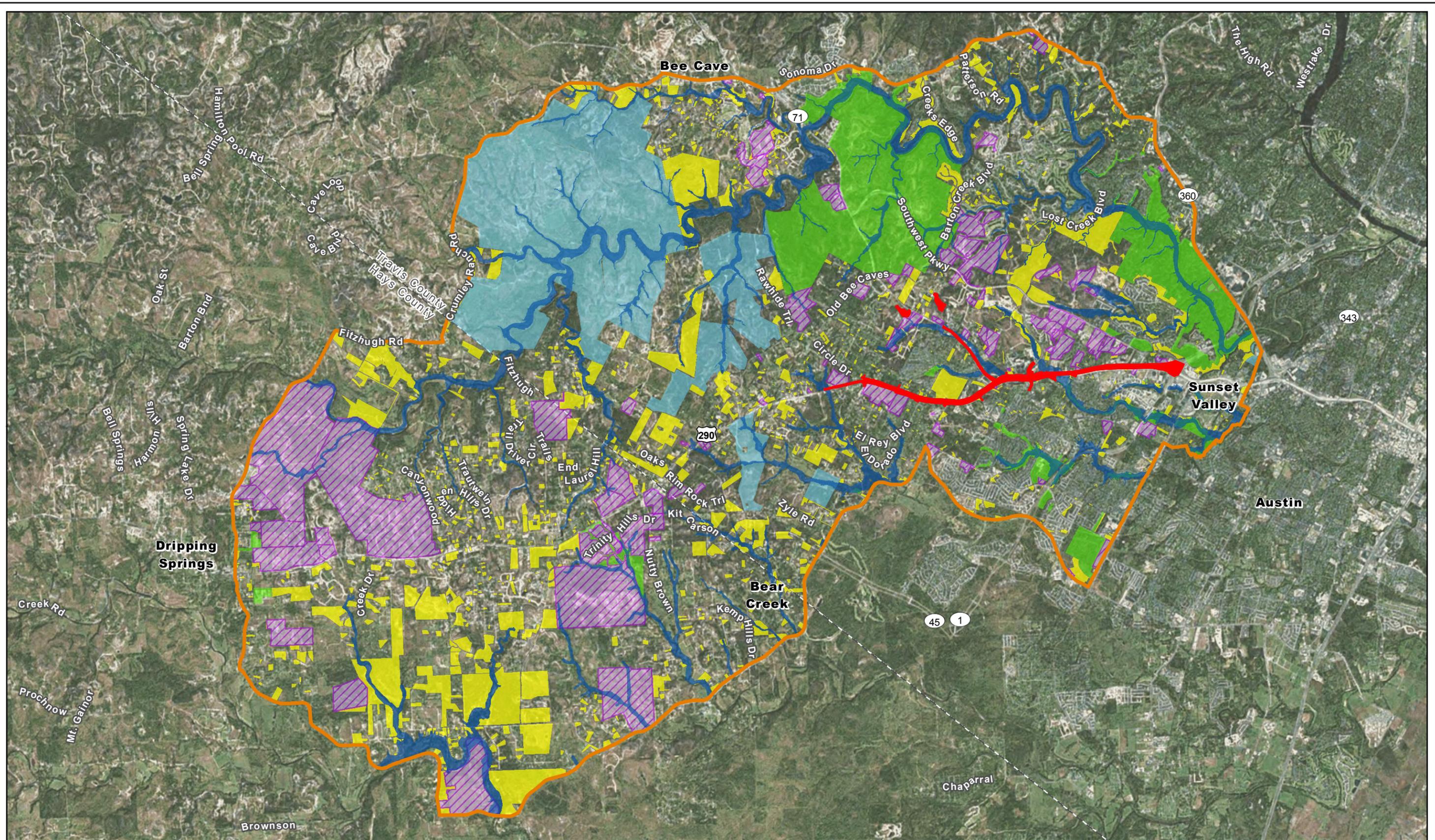


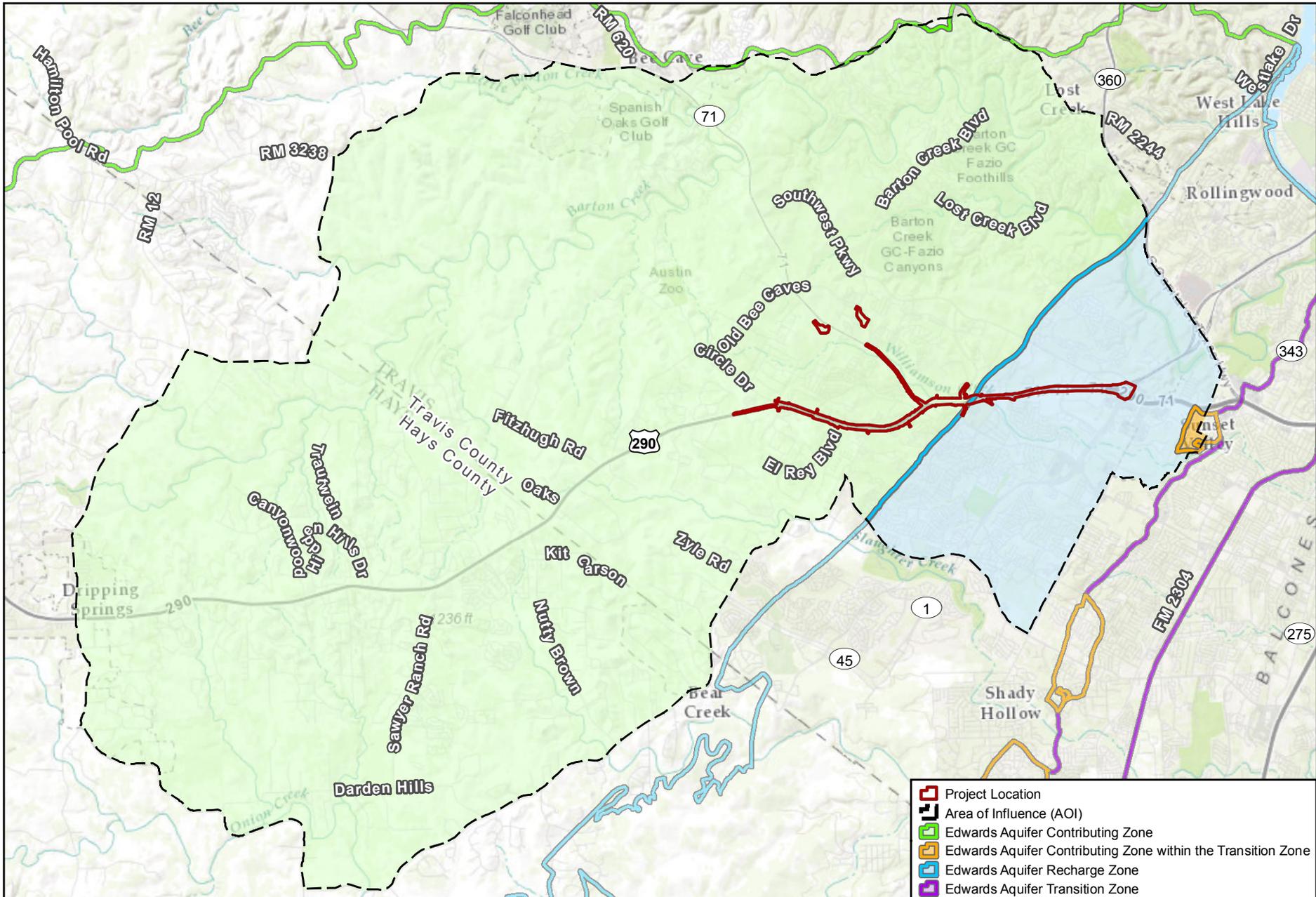
Figure 3. Developable Land within the AOI

Oak Hill Parkway: US 290W from Mopac/Loop1 to west of Circle Drive and SH 71 from US 290W to Silvermine Drive

- Area of Influence (AOI)
- Developed Land
- Water Quality Protection Land
- Project Location
- Planned Development
- 100-Year Floodplain
- Developable Land
- Park

Data Sources: CAPCOG (2016), City of Austin (2013, 2016), City of Bee Cave (2016), City of Dripping Springs (2016), CMEC (2016), FEMA NFHL (2015)
 Basemap Source: ESRI (2015)

	0 1.5 Miles
	0 2 Kilometers
Prepared for: TxDOT	1 in = 1.5 miles
CSJ: 0013-08-060 and 0700-03-077	Scale: 1:95,040
Date: 3/10/2017	



- Project Location
- Area of Influence (AOI)
- Edwards Aquifer Contributing Zone
- Edwards Aquifer Contributing Zone within the Transition Zone
- Edwards Aquifer Recharge Zone
- Edwards Aquifer Transition Zone

Figure 4. Aquifer Zones within the AOI

Oak Hill Parkway: US 290W from Mopac/Loop1 to west of Circle Drive and SH 71 from US 290W to Silvermine Drive

Prepared for: TxDOT	1 in = 2 miles
Data Source: TCEQ (2005)	Scale: 1:126,720
Basemap Source: ESRI (2017)	Date: 3/10/2017
CSJ: 0013-08-060 and 0700-03-077	



Attachment B

City of Austin Emerging Development Projects

CITY OF AUSTIN	
Project Name	Acres
9710 Shallowford	4.4
ACE Hardwood	5.0
Addison Grove	26.1
All Saints Presbyterian Church	6.6
Amarra	365.9
Austin Seventy-One	30.9
Aviara	39.5
Barton Creek Office Park	13.6
Barton Creek Section N Multi-Family	27.5
Blackstone Vineyard	209.3
Bowie High School Practice Fields	4.0
Breakwater Subdivision	26.9
Broadstone Scenic Brook	46.3
Brodie 31 PUD	31.8
Calvert House	6.3
Circle C Apartments	14.5
Circle C Ranch Tract 2B	12.2
Collings Guitars Phase II	2.4
Cottages of Lantana	8.8
Covered Bridge PUD	63.2
CR-163 Subdivision	60.6
Davis Lane Garden Homes	1.4
Edelmon Estates	7.0
Encino Trace	54.1
Escondera Section 4	6.6
Fox Hill Apartments	44.8
Garcia's PP&M Subdivision	3.0
Harper Park	17.8
Harper Park Hotel Tract	3.3
Landmark Conservancy	20.2
Lantana	8.8
Lantana Tract 28	28.2
Lantana Tract 32	46.7
Lantana Tract 33	27.5
Live Oak Trail	8.6
LOCO-Motion Inflatable Play, LLC	1.3
Lone Star Bank	9.9
Lost Creek	1.4
Marx Property Fill and Drainage Improvements Plan	15.6
Nutty Brown Business Park	7.9
Oak Hill Emergency Center	1.0
Oakhill Medical Center	13.3
Old Bee Cave Rd. Subdivision	10.5
Old Bee Caves Office Building	1.0

CITY OF AUSTIN	
Project Name	Acres
Old Bee Caves Road Condos	20.2
Overlook Estates	126.3
Overwatch Phase 2	45.8
Preserve at Thomas Springs Road, The	38.5
Rancho Garza Preliminary Plan	35.7
Regency Park	3.2
Regents West Campus	11.2
Ridgeview	93.0
Seton Southwest Expansion	0.6
Seven Oaks Office Park	28.0
Southwest Parkway Office Building	9.0
Spanish Oaks Sec 7 PP	59.8
Spanish Oaks Sec XI PP	51.2
St. Andrew's School Miller Tract	92.8
St. Gabriel's Catholic School, Building B	31.4
Stoneridge	2.7
Sunset Ridge	9.8
Travis County MUD 4 South Wastewater Treatment Plant	36.3
Travis County MUD No. 4 Barton Creek Section N Regional Stormwater Mgmt. Wet Pond	10.2
Trinity Place Apartments	24.5
Vega Office	4.6
Villas of Barton Ridge Estates Section II	40.4
Waterleaf Medical At Davis Lane- Autumn Leaves of Southwest Austin	6.0
Western Oaks Retail Center	15.4



Attachment C

Indirect Impacts Analysis Questionnaire



Dear Planning Expert:

The Texas Department of Transportation (TxDOT) and the Central Texas Mobility Authority are proposing improvements to U.S. Highway 290 (US 290)/State Highway (SH) 71 West from State Loop 1 (MoPAC) to Ranch-to-Market (RM) 1826 and SH 71 to Silvermine Drive.

The purpose of the proposed project is to improve mobility and operational efficiency, facilitate long-term congestion management in the corridor by accommodating the movement of people and goods for multiple modes of travel, and improve safety and emergency response within the corridor. Under TxDOT guidance, the potential “indirect and cumulative” effects of the project must be addressed. To aid in assessing the potential direct, indirect, and cumulative impacts of the project we are contacting your agency/organization to obtain your insight on how the project may affect your community or the region.

We have attached a map of the project area with the proposed roadway shown along with our proposed Area of Influence (AOI) for indirect effects analysis. Guidance from TxDOT requires that we assess potential indirect and cumulative effects out to the planning horizon, which has been established as 2040 in conjunction with the Capital Area Metropolitan Planning Organization’s Regional Transportation Plan. A key component of this requirement is determining whether or not a project will have indirect effects such as induced growth and land use development. We are seeking to identify any areas where potential development could occur (whether or not it is currently planned) within the planning horizon that could be attributed at least in part to the proposed project.

Please complete the following questionnaire to the best of your knowledge; if you are not the best person to answer the questions, please forward this to the appropriate person or persons within your organization. Please return your answers to the following address (electronic responses are welcomed with legible marked up maps) by **November 18th, 2016**:

US 290 Oak Hill Parkway
Attn: Erin Grushon
Cox|McLain Environmental Consulting
6010 Balcones Drive #210
Austin, TX 78731

We recognize that the people who are most knowledgeable about how projects might affect a community are the local experts. We appreciate your time and input in this process.



Oak Hill Parkway Indirect Impacts Questionnaire

Respondent Information

Name: _____

Email: _____

Title: _____

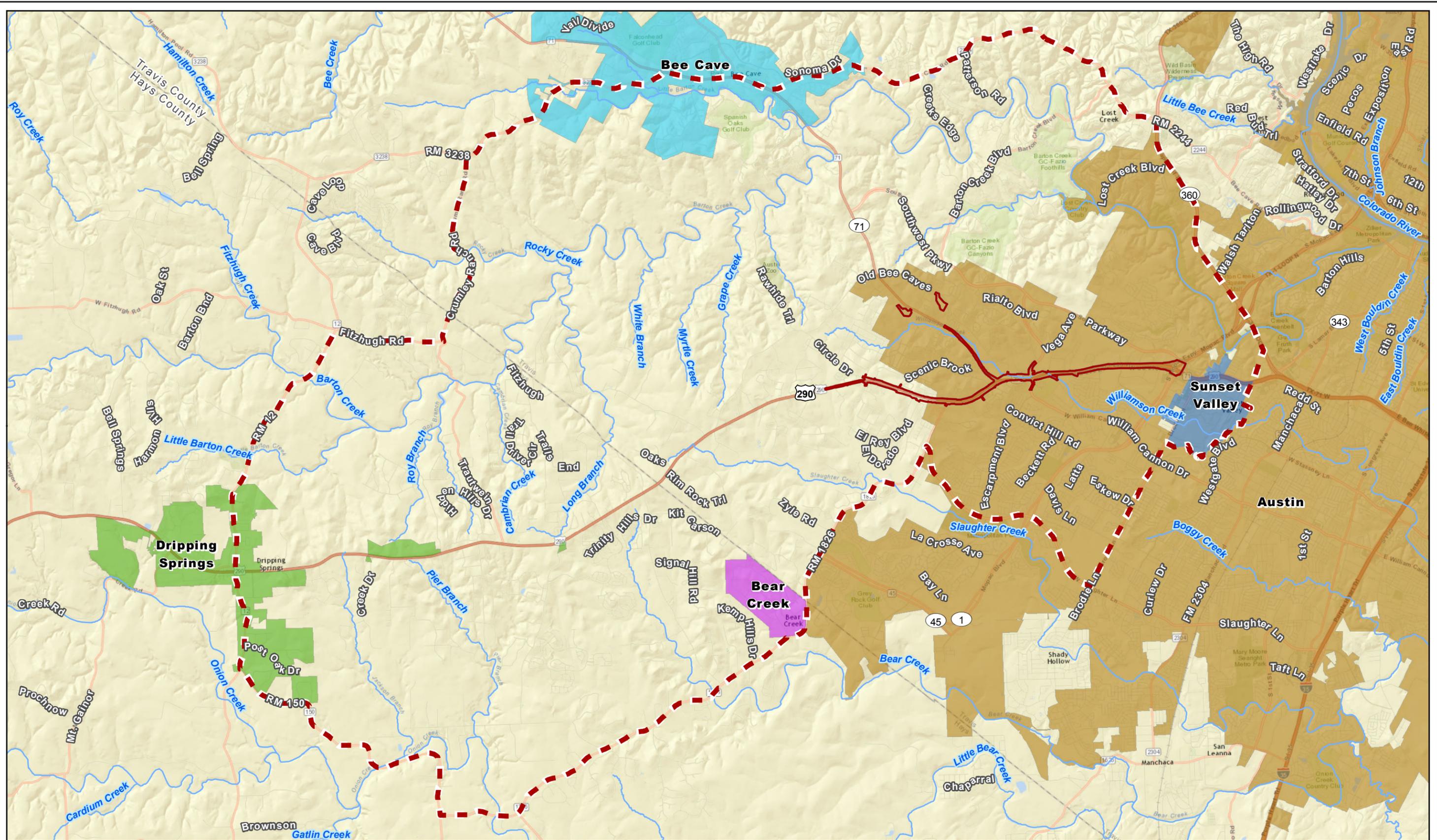
Phone: _____

Agency: _____

Questions

1. Are you aware of any substantial proposed land developments within your jurisdiction or area? If so, please mark the areas on the attached map and provide the location, type, and size (e.g. acres, density, number of units) of any planned developments. Also, please indicate if any of the proposed land developments that you identified on the attached map have been platted.
2. On the attached map, please identify parcels (if any) that you think would likely be developed by 2040¹ as a result of the proposed project that would not otherwise be developed. *(Please distinguish from developments identified in question 1).*
3. Would the proposed project affect the rate of land development in your jurisdiction?
4. Is the proposed project consistent with local planning efforts (i.e. master or comprehensive plans, growth management plans, zoning or land use policies, etc)?

¹ 2040 is the horizon year for the CAMPO 2040 Plan, which is inclusive of the 2039 horizon year for the City of Austin's *Imagine Austin* Comprehensive Plan.



Proposed AOI

Oak Hill Parkway: US 290W from Mopac/Loop1 to west of Circle Drive and SH 71 from US 290W to Silvermine Drive

- | | | |
|------------------|---------------------------|-------------------------------|
| Project Location | JURISDICTIONAL BOUNDARIES | BEE CAVE FULL PURPOSE |
| AOI | AUSTIN FULL PURPOSE | DRIPPING SPRINGS FULL PURPOSE |
| NHD Stream | BEAR CREEK FULL PURPOSE | SUNSET VALLEY FULL PURPOSE |

	0	1.5 Mile
	0	2 Kilometers
Data Sources: TNRIS (2016), City of Austin (2016), NHD (2014), Basemap Source: ESRI (2016)	Prepared for: TxDOT	1 in = 1.5 mile
CSJ: 0013-08-06 and 0700-03-077		Scale: 1:95,040
		Date: 10/28/2016