Indirect Impacts Technical Report

FM 2642 Widening: From FM 35 to SH 66 Hunt County, Texas

CSJ: 2658-01-013

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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 January 16, 2014, and executed by FHWA and TxDOT.

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1. Introduction

1.1 Purpose of the Technical Report

This technical report summarizes the analysis conducted to assess the potential for indirect impacts associated with the proposed Farm-to-Market Road (FM) 2642 expansion project in Hunt County, Texas. It provides definitions of direct and indirect impacts, and also summarizes the Texas Department of Transportation (TxDOT) guidance utilized to determine the magnitude of potential indirect impacts.

1.2 Project Overview

In cooperation with Hunt County and the City of Royse City, TxDOT proposes to widen Farm-to-Market (FM) 2642 from FM 35 to State Highway (SH) 66. The proposed project consists of widening of the existing two-lane roadway to a four-lane divided roadway with a raised median which varies from 14-foot to 26-foot wide and includes median openings with left-turn deceleration lanes providing access to adjacent properties along the corridor. The proposed curb and gutter type of roadway will feature underground storm sewers and six-foot wide sidewalks along both sides. The total project length is approximately 2.6 miles and includes an approximately 650-foot-long project exception with begin and end termini located on either side of the recently constructed Interstate Highway (IH) 30 interchange improvements.

The intersection of FM 2642 and FM 35 will be reconfigured to provide a north-south thoroughfare per the City of Royse City's Comprehensive Plan. A modern roundabout at the intersection of FM 35 and FM 2642 is also under consideration for which no additional right of way (ROW) would be required.

The proposed project is to be substantially constructed within the existing 100-foot to 120-foot ROW with additional 10-foot to 15-foot of ROW required at two locations along the corridor to provide right-turn deceleration lanes at connections to the IH 30 westbound frontage road, and Verandah Blvd. Additionally, 60-foot to 80-foot wide drainage easements will be required at seven cross drain locations to convey and maintain access to historic outfall locations along Bearpen Creek. Five-foot to fifteen-foot-wide temporary construction easements will also be required to construct tie-in slopes between the back of the proposed sidewalk to existing ground.

The project would require approximately 0.23 acres of proposed right-of-way. The proposed widening of FM 2642 will also be analyzed as a Categorical Exclusion (CE).

2. Definitions and Guidance

2.1 Definitions of Direct and Indirect Impacts

The Council on Environmental Quality (CEQ) defines direct effects as those effects that are "caused by the action and occur at the same time and place" (40 Code of Federal Regulations [CFR] § 1508.8). Direct effects are predictable and are a direct result of the project.

In addition to direct effects, major transportation projects may also have indirect effects on land use and the environment. As defined by the 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 CFR § 1508.8).

2.2 Guidance

The approach for conducting indirect impacts analysis is ultimately guided by the following TxDOT publications, which are available online in the TxDOT Indirect and Cumulative Impacts Toolkit: *Indirect Impacts Analysis Guidance* (TxDOT 2016) and *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (NCHRP 2002).

3. Indirect 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 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 NCHRP Project 25-25 Task 22 report entitled *Forecasting Indirect Land Use Effects of Transportation Projects* (NCHRP 2007).

3.1 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 1 summarizes the steps in the risk assessment checklist and confirms the need to conduct the indirect impacts analysis.

Table 1: Risk Assessment Screening Tool—Induced Development

Does the Purpose and Need include economic development, or is the project proposed to serve a specific development?	Yes
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	Yes
Is the project area experiencing population and/or economic growth?	Yes

Source: Risk Assessment for Indirect Impacts (TxDOT 2014b).

A planning judgment approach, supported by the planning assumptions and land use predictions made by the city of Royse City staff, were utilized to identify anticipated development trends and the probability of the proposed project to influence local land use decisions along the AOI. An essential aspect of scoping the proposed project for potential indirect induced growth is coordination with local government staff who know the characteristics of the community and are familiar with the current plans for addressing socioeconomic issues. Accordingly, City of Royse City officials were consulted in September 2017 to obtain input relevant to defining the AOI. The Executive Director also provided information about current planning documents, proposed development projects, and other data relevant to the analysis of the proposed project's indirect and cumulative impacts. There is no single specific development for which this project is being designed. The purpose of the proposed widening is to accommodate traffic generated by current and planned future developments in the project area.

The discussion of indirect induced growth impacts included information from city staff, planning documents, and various maps made publicly available by the City of Royse City. Information from the city's Community Development Corporation also guided the exercise of planning judgment, which extends throughout the analysis of indirect impacts.

This analysis provides quantified acreages of land uses within the AOI when appropriate; however, given the uncertainty inherent in predicting induced growth, some qualitative assumptions and assessments are necessary.

3.2 Step 2 – Define the Area of Influence and Study Time Frame

The analysis assesses the potential indirect induced growth impacts and the possible geographic range of those impacts. This is done by considering the attributes and context of the proposed project, which leads to a general assessment of the level of impacts anticipated. In addition, the assessment considers the distance from the project construction footprint where those impacts attenuate to a negligible level. This approach helps determine the level of effort and approach needed to complete the analysis and is also vital in achieving the second objective of determining the geographic extent of the indirect impacts study area or AOI.

A majority of the proposed project footprint falls within the City of Royse City's boundaries. The remaining portion of the project is located within the city's extraterritorial jurisdiction (ETJ). Information from the meeting held with the city officials guided the exercise of planning judgment, which necessarily extends throughout the analysis of indirect impacts.

3.2.1 Project Attributes and Context

The City of Royse City is known primarily as a bedroom community from which many residents travel to destinations including the cities of Rockwall, Greenville, as well as Dallas. According to the North Central Texas Council of Governments (NCTCOG) Hunt County Transportation Plan, FM 2642 is

considered a minor arterial road south of IH 30 (NCTCOG 2012). The existing FM 2642 is a continuous north-south corridor east of the City of Royse City. The city's adopted comprehensive plan calls for widening the existing roadway as a potential bypass around downtown. In the study area, the existing land uses along FM 2642 are a mix of single-family residential, public high school, scattered commercial, fallow agricultural land/pasture and undeveloped parcels.

3.2.2 Geographic Boundary of the Area of Influence

The basic objective in creating an AOI is to delineate a study area within which all substantial project-related impacts are expected to occur. The assessment of direct project impacts generally stops at the limits of the construction area within existing and proposed right-of-way/easements (i.e., the project footprint). In contrast, an AOI extends the area of consideration to the point where all impacts are expected to attenuate to a negligible level, or where other infrastructure constitutes a greater impact on development as compared with the proposed project.

The AOI encompasses an area of approximately 1,031 acres. Based on feedback obtained during the meeting with city staff, the AOI was generally defined as parcels either traversed by or adjacent to the proposed project footprint, bounded on the north by SH 66 and on the south by FM 35. The adjacent parcels and dominant local roadways that surround the limits of the proposed project are considered likely to experience potential induced growth resulting from the proposed project because the proposed widening of FM 2642 would either alter existing access or provide new access to these parcels. The meeting with city staff confirmed the provision of altered or new access to these adjacent parcels has strong potential to encourage future land development. The AOI boundary is illustrated on Figure 2 in Appendix A.

3.2.3 Time Frame for Assessing Indirect Impacts

A temporal frame of reference is necessary in addressing 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 (2022) and 2045. This time frame captures the Comprehensive Plan's 2030 planning horizon (City of Royse City 2017) and the 2045 planning horizon for the NCTCOG Mobility 2045: The Metropolitan Transportation Plan for North Central Texas (MTP) (NCTCOG 2018).

3.3 Step 3 – Identify Areas Subject to Induced Growth in the AOI

Table 2 shows the acres in each land use category represented in the 1,031-acre AOI based on the NCTCOG zoning classifications. Based on this information, the predominant land uses within the AOI are vacant land (817.3 acres) and education (114.5 acres) distributed throughout the AOI. The undeveloped land category includes ranch and farm land.

Table 2: Land Uses within the Area of Influence

Land Use Classifications	Acres	Percent of AOI
Commercial	1.6	0.2
Communication	0.4	<0.1
Education	114.5	11.1
Parks/Recreation	<0.1	<0.1
Railroad	4.9	0.5
Residential acreage	25.9	2.5
Single Family	12.9	1.3
Small water bodies	5.8	0.6
Utilities	0.5	<0.1
Vacant	817.3	79.3
Roadway	47.4	4.6
Total	1,031	100%

Source: NCTCOG 2015 Regional Data Center County Landuse

Undeveloped land and potential sites for development are present within the AOI. The land use categories presented in Table 2 are not intended to reflect whether the parcels are developed or undeveloped, but rather provide an idea of existing land uses within the AOI based on current zoning code. Appendix A, Figure 3 illustrates the extent of the undeveloped property within and adjacent to the AOI. Based on the meeting with the City of Royse City officials, undeveloped properties within the AOI should be considered "areas of potential development" for the purposes of this analysis. The combined areas of potential development (minus the proposed project footprint, including the proposed detention ponds) total approximately 817.3 acres, which is approximately 79.3 percent of the 1,031-acre AOI. From this point forward, the approximate 817.3 acres of potential development will be considered commensurate to areas subject to induced growth potential within the AOI.

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

This step presents information on development trends and community goals within the AOI. Following this discussion, areas of potential future development are identified and quantitatively evaluated. As noted in NCHRP Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects, "indirect effects can be linked to direct effects in a causal chain" (NCHRP 2002). Reasonably foreseeable effects are "sufficiently likely to occur that a person of ordinary prudence would take them into account in making a decision" (NCHRP 2002). Reasonably foreseeable events must be probable, not just possible. Probability also helps distinguish indirect

effects from direct effects: direct effects are often inevitable, while indirect effects are simply probable. The NCHRP Report 466 states "effects that can be classified as possible but not probable may be excluded from consideration." Therefore, this section seeks to determine whether development in the AOI induced by the project is probable.

3.4.1 Regional and Local Trend Data

According to the decennial Census, the population of the City of Royse City in 2010 was 9,349, up 216.2 percent from 2,957 in 2000. The NCTCOG develops a Regional Growth Forecast, including population, employment, and land use, for a 16-county area (Collin, Dallas, Denton, Ellis, Erath, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise Counties). According to the NCTCOG projections for households and jobs, Hunt County is anticipated to see strong growth in households and jobs between 2005 and 2045 (Table 3). The Traffic Survey Zones (TSZ), which encompass the AOI, are projected to see strong growth for households and moderate to strong growth for jobs; this indicates residential growth with a combination of mixed use and commercial or industrial growth at the local planning level.

Table 3: 2005–2045 Projected Household and Job Growth

Place	2005 Household Population	2045 Household Population	Percent Growth Households 2005–2045	2005 Jobs	2045 Jobs	Percent Growth Jobs 2005–2045
Hunt County	30,983	134,291	333%	39,06	48,64	25%
TSZ 20051	677	1,967	191%	122	180	48%
TSZ 20054	465	1,634	251%	44	240	446%
TSZ 20058	1,260	2,444	94%	141	233	65%

Source: NCTCOG 2018 Release of Regional Growth Forecast.

Based on discussions with the City of Royse City officials, no specific plans within the proposed project's AOI have been identified as the root cause for expected population growth. Given the largely undeveloped nature of the area and the expected continuation of the City's growth rate, City staff believes that undeveloped parcels in this general area will likely be developed through 2030 as the city continues to develop as a result of increasing urbanization brought forth by forecasted regional population growth. The City's *Thoroughfare Plan* includes improvements to roadways in preparation for future transportation demands. Appendix B contains the City of Royse City Comprehensive Plan which was approved in 2017 and the City's Transportation Plan.

Based on these demographic and land use trends, it can be concluded that there is a strong potential for future residential and commercial growth along the AOI.

3.4.2 Local Plans

A variety of plans exist to promote, guide, and monitor various development activities in the City of Royse City. The proposed project area is also within the jurisdiction of the NCTCOG's 2045 MTP. A brief description of the most influential aspects of local plans in relation to the proposed project and surrounding AOI is presented below.

The *Royse City Comprehensive Plan* (City of Royse City 2017), adopted on April 11, 2017, is an official policy document intended to guide and balance future development, redevelopment, infill development, and community enhancement efforts in the City over the next 13 years through 2030. The City is positioned for continued physical and economic growth; this plan lays out a "big picture" vision regarding the future growth and enhancement of the community. The plan includes a *Future Land Use Plan* map that provides an outlook for the future use of land in the City. The *Future Land Use Plan* describes several forecasted land uses within the AOI through the year 2030, including (generally from south to north): suburban residential, suburban mixed use, an "urban village" at the IH 30/FM 2642 intersection, traditional mixed use, and park/open space near the intersection of SH 66. Appendix B contains the Future Land Use Plan map.

The *Hunt County Transportation Plan* was approved on March 2012 (NCTCOG 2012). It reflects the widening of FM 2642 as a part of a larger investment in the infrastructure of Hunt County for the planned growth along the I-30 corridor. FM 2642 is part of a multitude of planned intermediate corridors. The combination of major and intermediate corridors would help to serve growing residential areas in northern and eastern Royse City (City of Royse City 2017).

The NCTCOG's *2045 MTP* guides transportation planning projects in the 12-county region. One of the goals in the MTP relevant to the proposed project is "Support travel efficiency measures and system enhancements targeted at congestion reduction and management" (NCTCOG 2018). The proposed project would help achieve this goal by increasing connectivity to local roads and the regional highway system. The proposed project is included in the *2045 MTP* and is consistent with this plan.

3.4.3 Potential for Induced Development

The preceding sections have demonstrated the strong potential for growth in the AOI during the analysis period of 2017–2045. 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 the 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. Of the six land use forecasting tools introduced in the report, the "planning judgment" forecasting tool was used as the framework for the analysis. The planning judgment method uses information from a literature review, an assessment of existing and forecast

local conditions, and the opinions and experiences of professionals to make reasonable judgments about potential project-induced impacts. To this end, input from the City of Royse City officials was obtained in an effort to assess the potential for project-induced land use impacts.

The proposed improvements would improve existing north-south travel alternatives by widening the roadway segment between SH 66 and FM 35. The project would provide sufficient roadway for planned development along the AOI and connection to the regional highway system. The FM 2642 widening would link major planned activities to the City center and areas of residential growth in the City of Royse City and provide a boundary to create identifiable residential neighborhoods. Because the project is widening an existing roadway, it has the potential to provide capacity for the projected growth of the residential development and commercial for adjacent parcels.

The City of Royse City officials were asked where development is expected to occur and whether the proposed improvements would induce growth. Specifically, the officials were asked the following questions:

- Are there planned or platted new developments within this area? Areas that are platted but not yet developed?
- Which areas do you think would likely be developed between the present and 2045 as a result of the proposed widening of FM 2642?
- In your opinion, will transportation improvements induce land use development in your jurisdiction, alone or in conjunction with other factors?
- How would the proposed mobility improvements affect existing development and future growth in the project study area?
- Would the proposed construction of these improvements affect the rate of land use development in your jurisdiction?
- If development does occur, would it be consistent with your city's plans?

The City of Royse City officials commented on growth trends in the area and provided information regarding the potential for development within the AOI (City of Royse City 2017). The City of Royse City officials confirmed additional residential and commercial developments have been filed or planned within the AOI at the time of the meeting. There has been recent platting activity within the project's AOI as well as pending building permits or zoning change applications. It is the City of Royse City officials professional opinions that this development activity is likely to continue if the FM 2642 widening is constructed.

The results of the meeting with City of Royse City officials indicate that undeveloped tracts of land within the AOI are likely to develop within the confines of the existing zoning regulations and *Future Land Use Plan*. Digitized boundaries of these areas of potential development are illustrated in Appendix B, Figure 1 . During the meeting, the City of Royse City officials stated the AOI will

experience rapid development in the next decade. This growth will occur with or without the widening of FM 2642. City officials noted that the proposed widening of FM 2642 would likely mitigate the expected traffic congestion associated with growth in the AOI. The general areas of potential induced growth as a result of "increased rate of development" are evenly scattered throughout the AOI surrounding the proposed widening limits. Areas not included in the Future Land Use Plan Map were assumed to be low density residential within the Indirect Impacts area of focus.

As stated previously, the areas of potential development within the AOI total approximately 817.3 acres. The exact type, location, timing, and density of future developments are unknown at this stage of project development; however, it is assumed that future development would comply with the City's Future Land Use Plan (Appendix B, Future Land Use Plan). Table 4 presents the acres and percent of the AOI for each future land use category within the areas of potential development.

Table 4: Future Land Uses within Areas of Potential Development

Future Land Use Category	Acres	Percent of AOI
Low Density Residential	838.2	81.3%
Industrial	6.7	0.6%
Commercial	153.2	14.9%
Public and Semi-Public	33.1	3.2%
Total	1,031	100%

Source: City of Royse City Future Land Use Map (City of Royse City 2017).

3.5 Step 5 — Identify Resources Subject to Induced Growth Impacts

Based on a meeting with City staff and a cartographic assessment, 817.3 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 (Appendix A; Figure 4); Table 5 summarizes the ecological characteristics of the resources present as defined by vegetation type. As previously stated, the connection between construction of the proposed FM 2642 widening and development is most apparent for undeveloped parcels located within the AOI. Land redevelopment has not been further investigated because City staff is not aware of specific redevelopment plans at this time. It is assumed that the provision of increased access and connectivity to local roads and the regional highway system would enhance development potential for the multiple areas of potential development illustrated in Appendix A, Figure 5. Because the proposed project is being designed and constructed to accommodate the ongoing and planned developments in the project area, impacts to the vegetation types listed below are not indirect impacts of the project, but are instead direct impacts of these ongoing and planned developments.

Table 5: Resource Characteristics in Areas of Potential Development

EMST Vegetation Type	Acres	Percent of AOI
Barren	16.5	1.6%
Blackland Prairie: Disturbance or Tame Grassland	315.3	30.8%
Native Invasive: Deciduous Woodland	7.5	0.7%
Native Invasive: Juniper Shrubland	0.6	<0.1%
Native Invasive: Mesquite Shrubland	8.8	0.9%
Open Water	4.4	0.4%
Pineywoods: Bottomland Herbaceous Wetland	23.6	2.3%
Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	7.9	0.8%
Pineywoods: Small Stream and Riparian Deciduous Successional Shrubland	9.3	0.9%
Pineywoods: Small Stream and Riparian Evergreen Successional Shrubland	0.7	<0.1%
Pineywoods: Small Stream and Riparian Herbaceous Wetland	7.9	0.8%
Pineywoods: Small Stream and Riparian Temporarily Flooded Hardwood Forest	9.2	0.9%
Pineywoods: Small Stream and Riparian Wet Prairie	24.6	2.4%
Post Oak Savanna: Post Oak Motte and Woodland	4.9	0.5%
Post Oak Savanna: Savanna Grassland	22.2	2.2%
Row Crops	531.4	52.0%
Urban High Intensity	32.7	3.2%
Urban Low Intensity	4.0	0.4%
Total	1,031	100%

Source: TPWD EMST 2018.

Table 6 includes a description of resources present in the areas of potential development within the AOI. No formal surveys for historic-age properties and archaeological resources have been conducted throughout all the areas of potential development at the time of this report preparation. Preliminary review of TxDOT-developed potential archaeological liability maps (PALM) indicates low to medium potential for archaeological impacts within the areas of potential development.

Table 6: 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. A Desktop delineation could be completed using National Wetland Inventory (NWI) and historic aerials.	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. 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).
Floodplains	Yes; the 100-year floodplain is located within areas of potential development (Appendix A, Figure 6)	No. Future construction within the 100-year floodplain would be required to be in compliance with appropriate City of Royse City permitting and general land use policies.
Vegetation and Wildlife Habitat	No. The impacts to the vegetation types in the project area are not indirect impacts from the roadway but would be direct impacts from the ongoing and planned developments.	No. These are common vegetation types that are not diminishing or in poor health.
Threatened and Endangered Species	Potential impacts to state-listed species could be possible, but the potential for encountering these species during construction is low.	Yes; however, the Endangered Species Act affords protection for federally listed threatened and endangered species and their habitats. The U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) maintain lists of potential occurrence for listed species in each Texas county.
Topography and Soils	Yes; approximately 946 acres of prime farmland soils are documented throughout the AOI and of this total, approximately 31.3 acres of prime farmland soil are located within the area that would be put at risk from the project. Fallow agricultural land and pasture could be disturbed by potential development.	Yes; conversion or development of prime farmland is not protected by the City of Royse City permitting and general land use policies. Projects completed by a federal agency or using federal funds would be subject to Farmland Protection Policy Act (FPPA) requirements.
Air Quality	Yes; vehicular traffic emissions increase as development increases in the area. The area is not within the DFW non-attainment area. Industrial land uses could result from induced development.	Yes; increases in vehicular traffic emissions would potential result in a reduction in air quality. Future industrial activity would be in compliance with appropriate City of Royse City permitting and general land use policies.
Community Resources (includes businesses and residences)	Yes; The project would likely contribute to development and the consequent increase in community resources.	No, the area is largely ranch or farm land. There are presently no community resources that would be put at risk from the project.

Sources: NCTCOG, TPWD, and the City of Royse City 2018.

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 at the time of this report preparation to assess the impacts associated with potential induced growth.

3.6 Step 6 — Identify Mitigation, If Applicable

In summary, the consensus is that the proposed project would influence future land use within the AOI; however, such project-induced land use change is not only accounted for by the City of Royse City's future planning documents and corresponding objectives but is also considered positive for the future of the City of Royse City.

This step of the indirect impacts analysis assesses the consequences of the expected induced growth impacts and considers/develops strategies or mitigation measures available as part of the existing regulation regimes that would apply to potential development projects. Virtually all of the readily identifiable indirect induced growth impacts would result from improvements to access and local roadway connectivity as a result of the FM 2642 widening and project-induced land use change within the AOI. The potential areas of indirect induced growth (approximately 817 acres) account for approximately 79 percent of the AOI (1,031 acres).

Future land development activities would generally be private ventures regulated by the City of Royse City and Community Development Corporation. The City and the Community Development Corporation do not have regulations in their codes that address environmental and social impacts. Any regulations would come from state and federal agencies and programs that would guide any development of a potential project. For example, all development (public or private developers) must comply with flood control regulations under Federal Emergency Management Agency (FEMA) and the local floodplain administration, the Endangered Species Act, the CWA, CWA Section 401 Water Quality Certification requirements, CWA Section 404 permits for projects impacting waters of the U.S., and other regulations requiring mitigation if there are effects on protected resources.

Ultimately, because the proposed project is not anticipated to conflict with study area development goals or cause substantial negative indirect induced growth impacts, the requirement for mitigation of environmental impacts would be limited to mitigating only the direct impacts associated with this proposed project. Any mitigation for project-induced land development impacts that may arise after construction of the proposed project would be the responsibility of the land developer. Mitigation for indirect induced growth impacts would not be required of the proposed project sponsors based on the analysis presented here.

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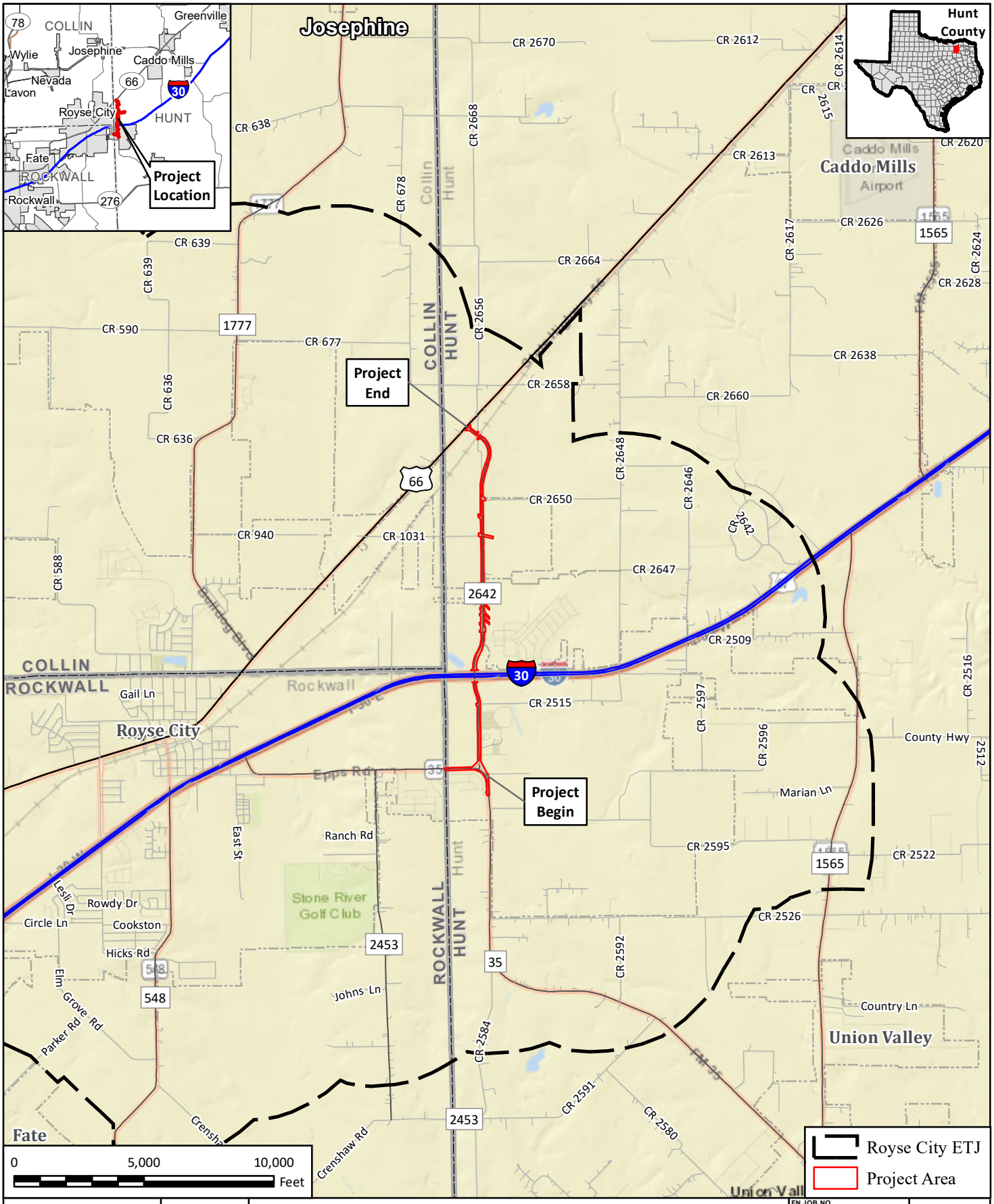
Appendix A

Figures



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HUNT COUNTY

FM 2642 (FM 35 to SH 66)

Overview Map

FN JOB NO	HUC17463
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DATE	12/14/2018
SCALE	1:60,000
DESIGNED	CS
DRAFTED	CS

1

FIGURE

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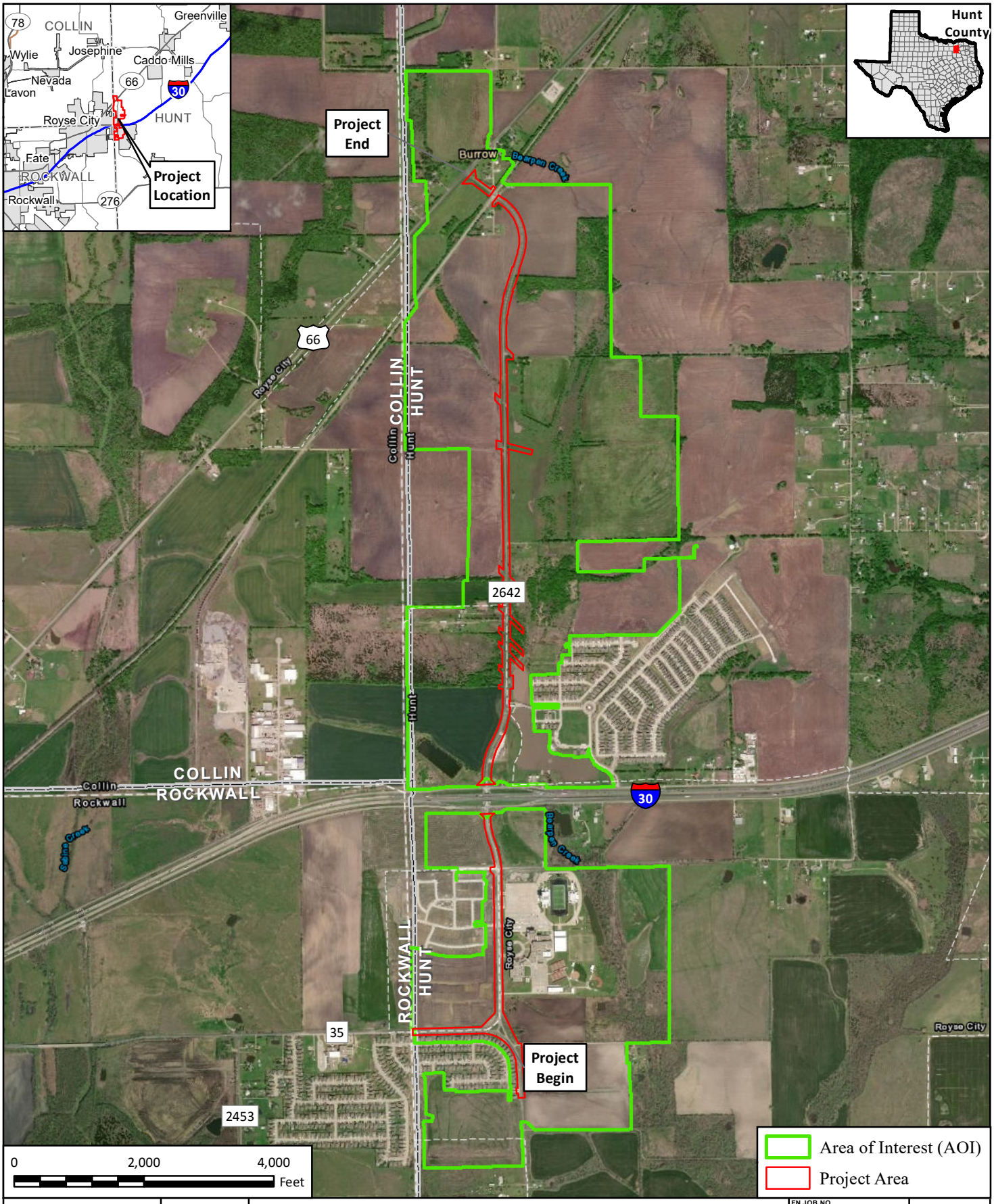

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HUNT COUNTY

FM 2642 (FM 35 to SH 66)

Aerial Map

FN JOB NO	HUC17463
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DATE	12/14/2018
SCALE	1:24,000
DESIGNED	CS
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FIGURE

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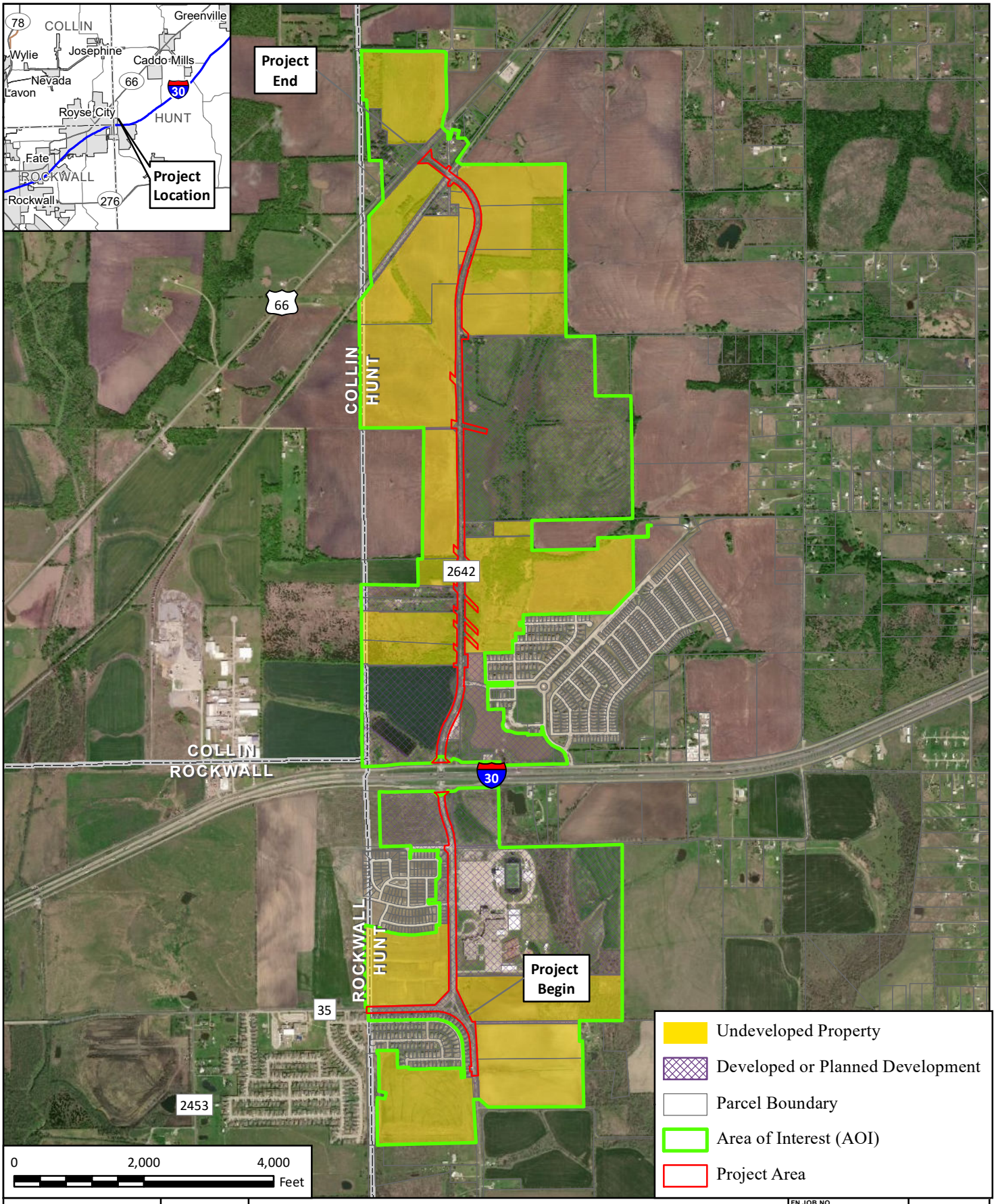

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HUNT COUNTY

FM 2642 (FM 35 to SH 66)

Undeveloped Properties

FN JOB NO	HUC17463
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3

FIGURE

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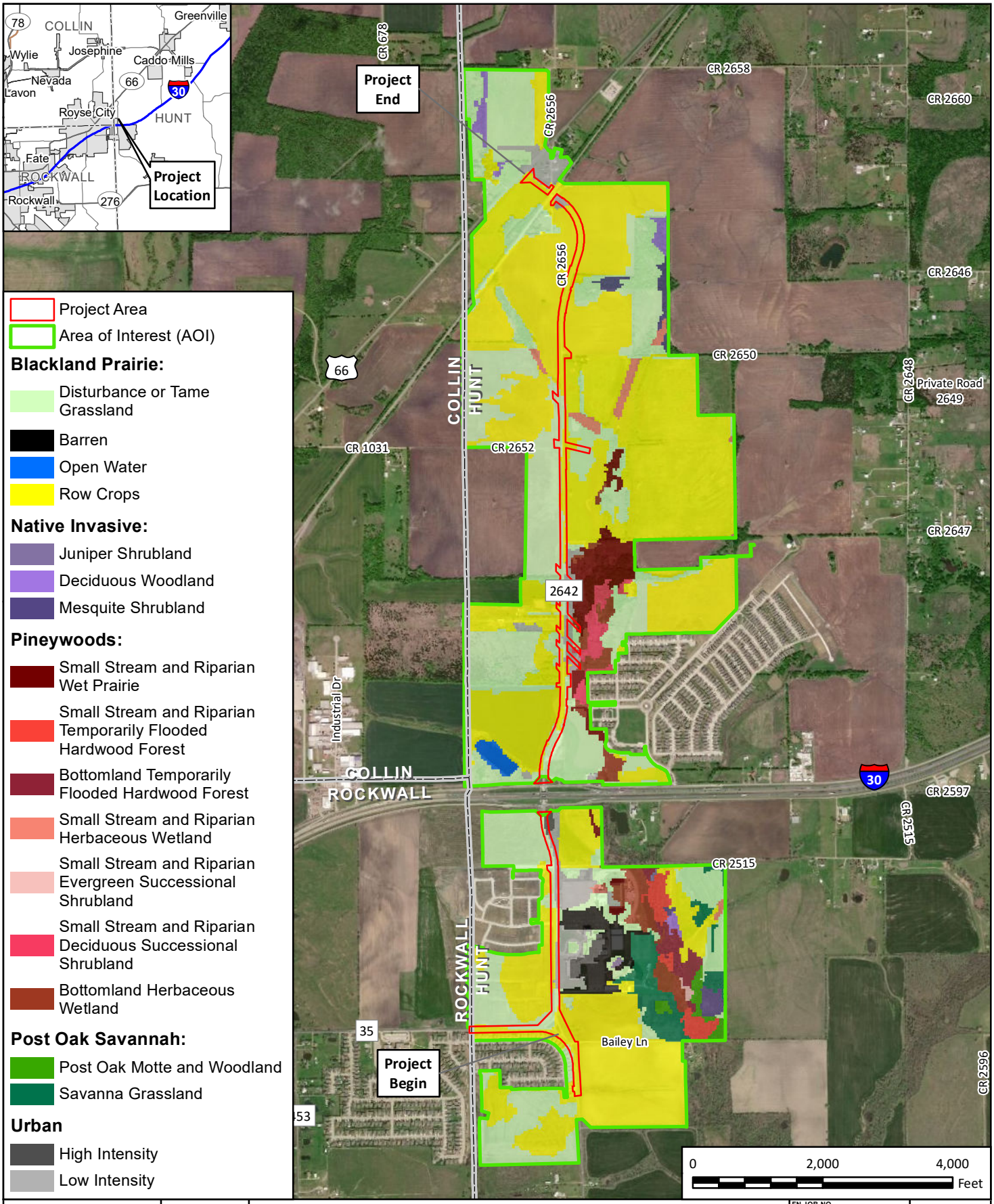

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HUNT COUNTY

FM 2642 (FM 35 to SH 66)

Ecological Mapping System of Texas

FN JOB NO	HUC17463
FILE NAME	3_EMST.mxd
DATE	12/14/2018
SCALE	1:24,000
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4

FIGURE

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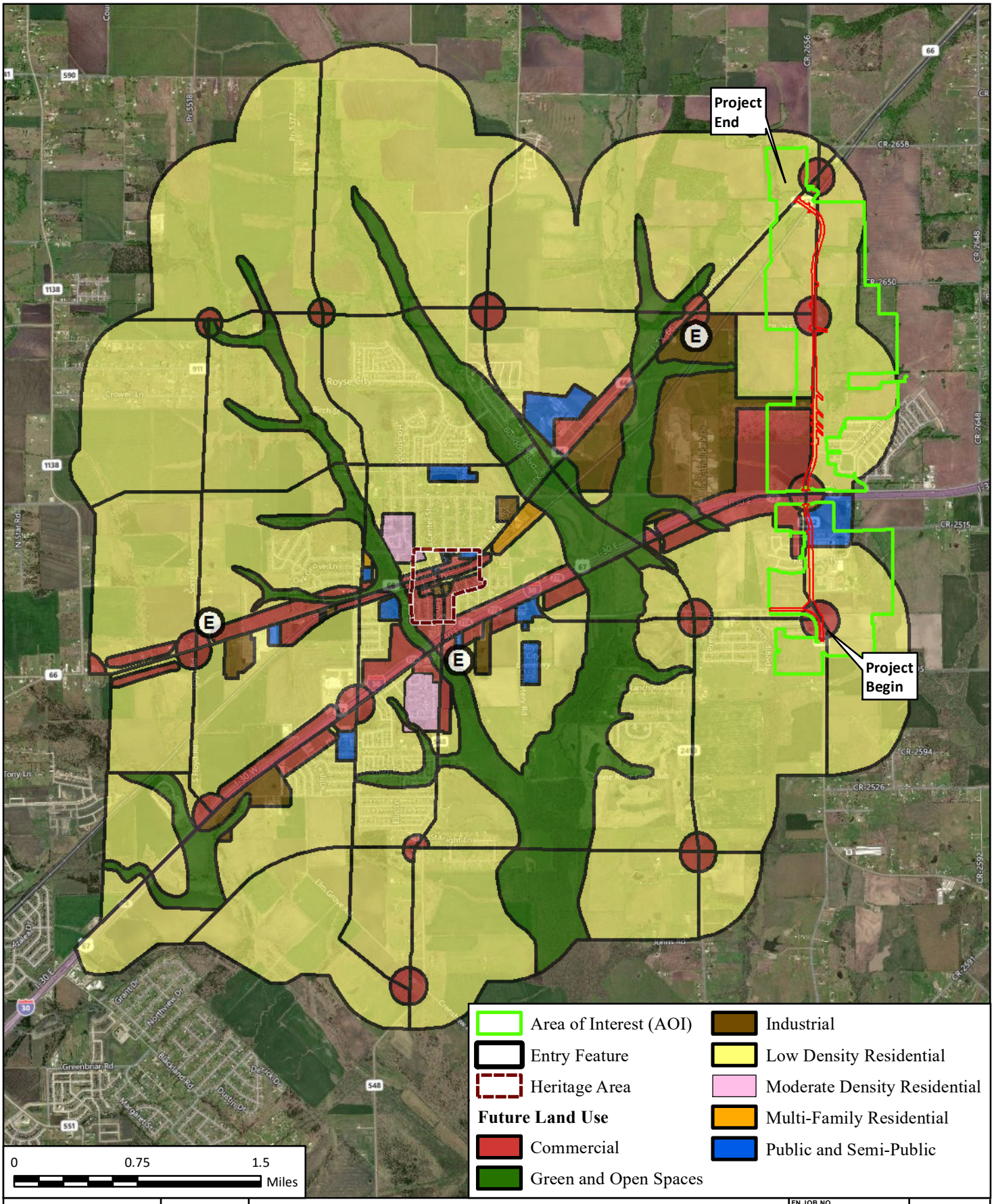

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HUNT COUNTY

FM 2642 (FM 35 to SH 66)

Royse City

Future Land Use Map

FN JOB NO	HUC17463
FILE NAME	8_FUTURE_LAND_USE.mxd
DATE	12/27/2018
SCALE	1:50,000
DESIGNED	CS
DRAFTED	SSJ

5

FIGURE

Path: H:\ENVIRONMENTAL\Working\CJS\8_FUTURE_LAND_USE.mxd

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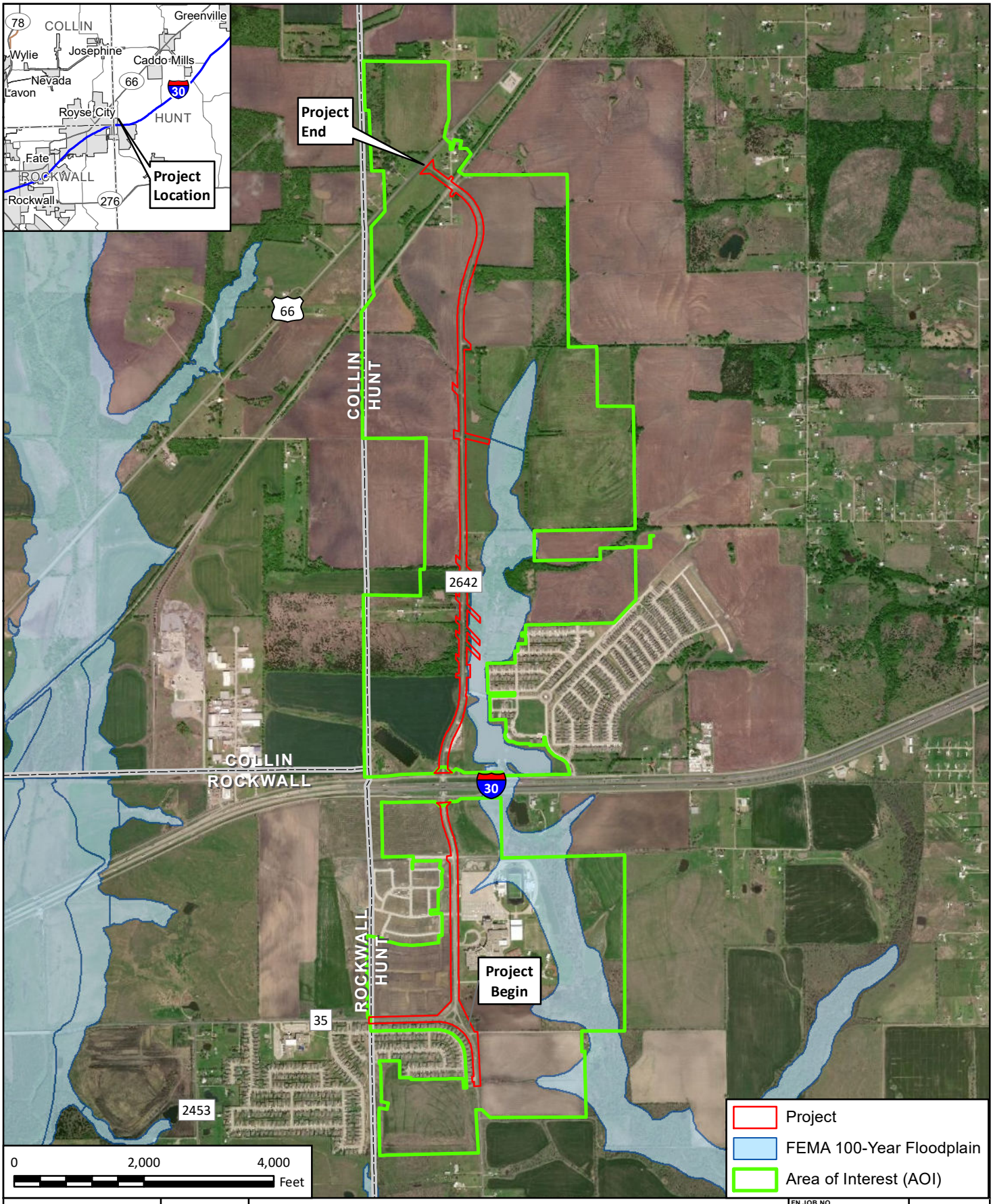

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HUNT COUNTY

FM 2642 (FM 35 to SH 66)

FEMA 100-Year Floodplain

FN JOB NO	HUC17463
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DATE	12/27/2018
SCALE	1:24,000
DESIGNED	MK
DRAFTED	MK

6

FIGURE

Path: H:\ENVIRONMENTAL\Working\CJS\9_Flood.mxd

NAD 1983 StatePlane Texas North Central FIPS 4202 Feet

Appendix B

City of Royse City Planning Documents

Royse City Thoroughfare Plan

Royse City Zoning Map

Royse City Thoroughfare Plan

Legend

- Outer Loop Corridor - 500' ROW
- Freeway (Controlled Access Facility) - Variable ROW*
- Principal Arterial (6-Lane Divided) - 120' ROW*
- Minor Arterial (4-Lane Divided or 5-Lane Undivided) - 100' ROW*
- Minor Arterial (4-Lane Divided or 5-Lane Undivided) - TxDOT Facility - 100' (min.) ROW**
- Collector (2-4 Lane Undivided) - 80' ROW*
- Street (2-Lane Undivided) - 53'-70' ROW
- Nonexistent Roadway
- City of Fate Thoroughfare Plan Road
- Existing Interchange
- Proposed Interchange
- Royse City Limits
- Royse City ETJ Boundary

0 4,500 9,000

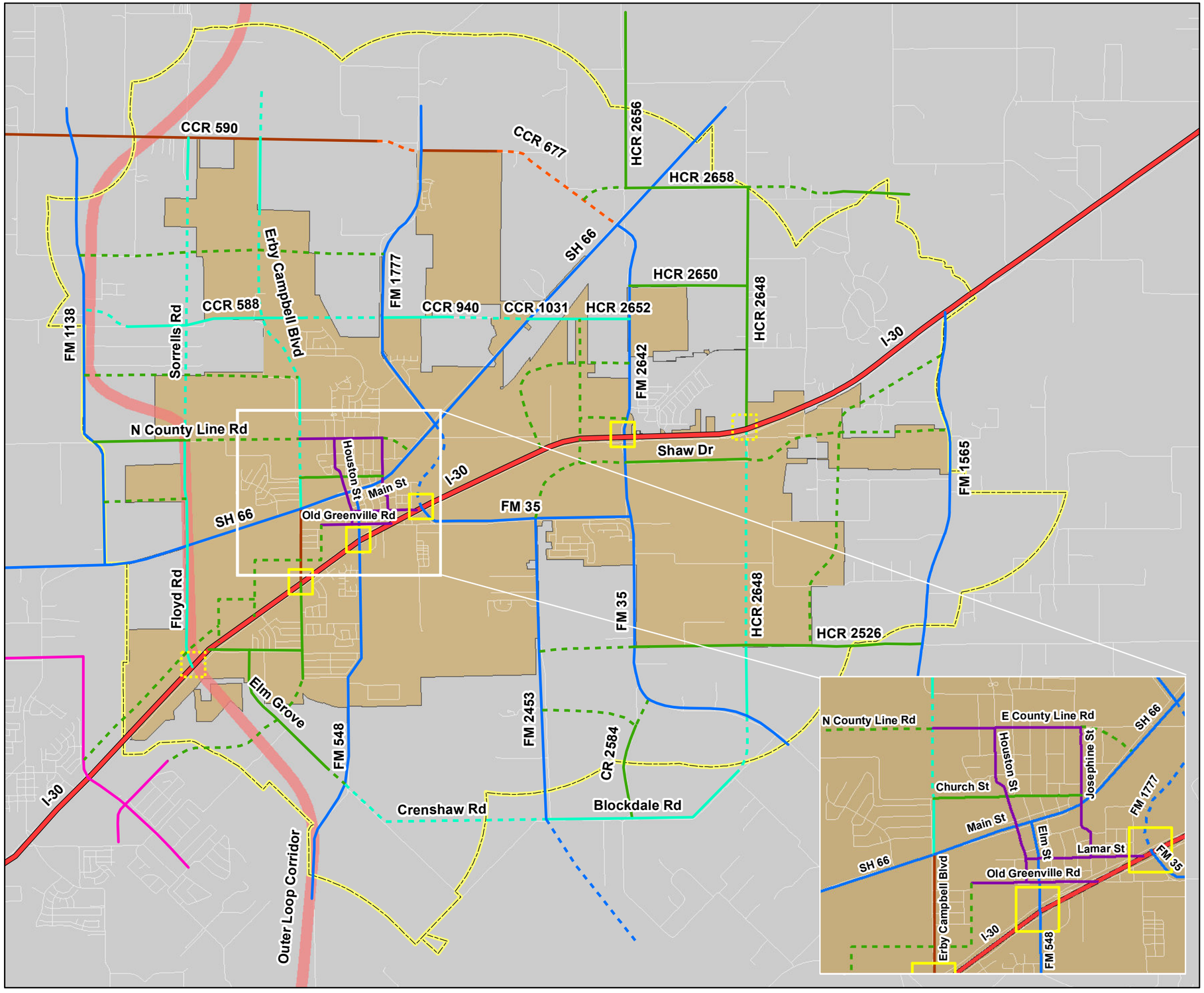
SCALE IN FEET

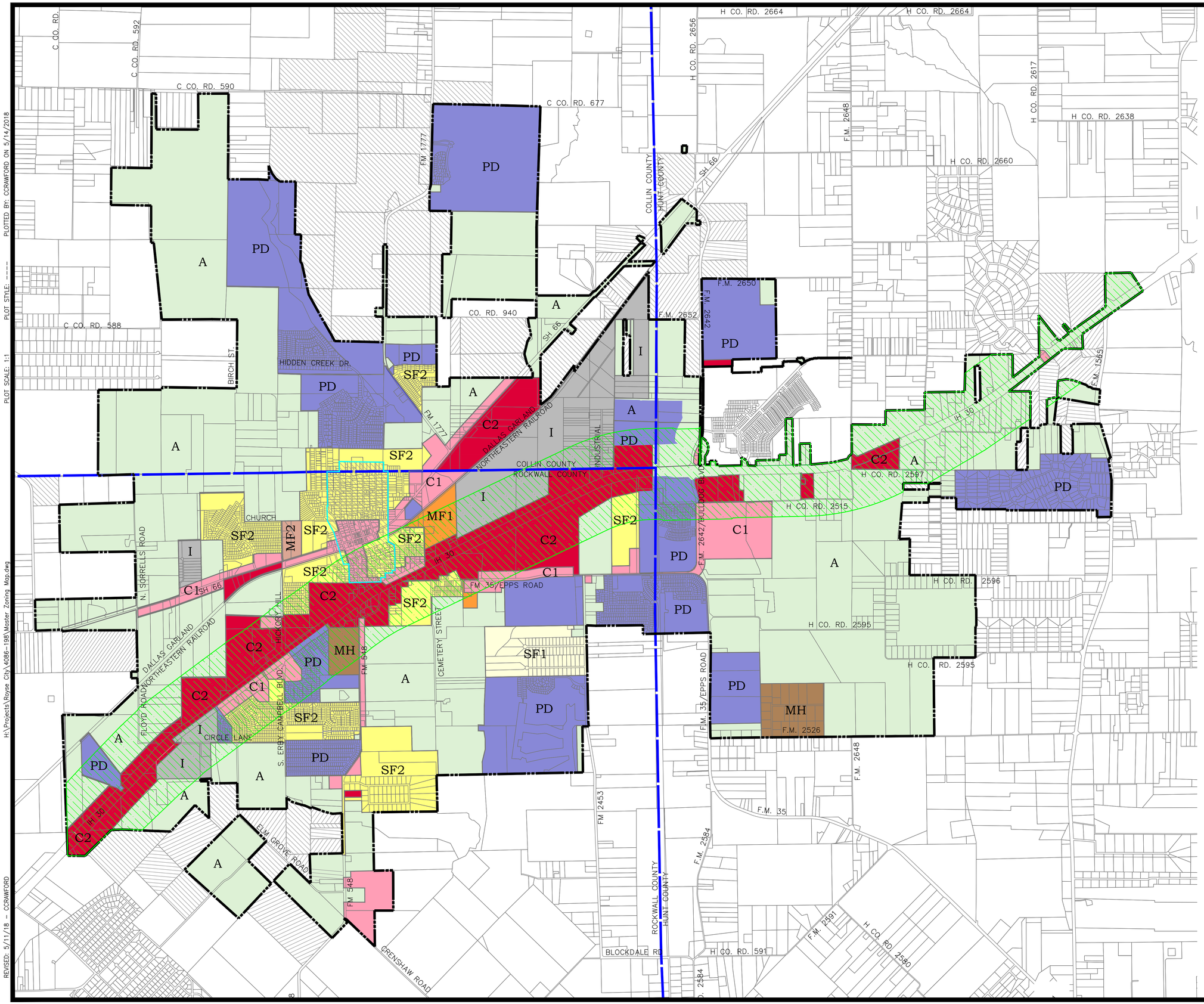
N W E S

Map Updated: Janurary 2018

* Additional ROW may be required at intersections to accommodate additional turn lanes. ROW requirements to be decided on a case by case basis.

** Minimum ROW of 100' on all TxDOT facilities, except SH 66: Erby Campbell to County Line (80' ROW), FM 548: IH 30 to SH 66 (80' ROW).





0 1500 3000 4500

HORIZONTAL SCALE IN FEET

LEGEND

- City Limits
- County Line
- 212 Non-Annexation Agreement Area

ZONING CATEGORIES

- A — Agriculture
- SF1 — Single Family Residential 1
- SF2 — Single Family Residential 2
- MH — Manufactured Home District
- MF1 — Multi-Family (Moderate Density)
- MF2 — Multi-Family (High Density)
- C1 — Commercial (Office, Retail, Neighborhood Services)
- C2 — Commercial General
- I — Industrial (Light/Moderate)
- PD — Planned Development

OVERLAY DISTRICTS

- Heritage Overlay District
- I-30 Corridor Overlay District

Zoning Map

UPDATED: May 2018

Royse City
A Friendly Touch of Texas

PLOTTED BY: CCRAWFORD ON 5/14/2018
PLOT STYLE: ----
PLOT SCALE: 1:1
H:\Projects\Royse City\4086-198\Master Zoning Map.dwg
REVISED: 5/11/18 - CCRAWFORD

Appendix C

USDA-NRCS Farmland Conversion Impact Rating

For Corridor Type Projects

U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

NRCS-CPA-106
(Rev. 1-91)

FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

PART I *(To be completed by Federal Agency)*	3. Date of Land Evaluation Request 12/13/18	4. Sheet 1 of 1
1. Name of Project CSJ: 2658-01-013 FM 2642 Widening From FM	5. Federal Agency Involved FHWA/TxDOT	
2. Type of Project Roadway Project	6. County and State Hunt County, Texas	

PART II *(To be completed by NRCS)*	1. Date Request Received by NRCS 12/13/18	2. Person Completing Form Erin Kelly
3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES ☑ NO ☐		4. Acres Irrigated / Average Farm Size
5. Major Crop(s) Wheat and Hay	6. Farmable Land in Government Jurisdiction Acres: N/A %	7. Amount of Farmland As Defined in FPPA Acres: 45.5 % 100
8. Name Of Land Evaluation System Used N/A	9. Name of Local Site Assessment System N/A	10. Date Land Evaluation Returned by NRCS 4/13/18

PART III *(To be completed by Federal Agency)*	Alternative Corridor For Segment			
	Corridor A	Corridor B	Corridor C	Corridor D
A. Total Acres To Be Converted Directly	31.3			
B. Total Acres To Be Converted Indirectly, Or To Receive Services	1,031.5			
C. Total Acres In Corridor	45.5			
PART IV *(To be completed by NRCS) Land Evaluation Information*				
A. Total Acres Prime And Unique Farmland	45.5			
B. Total Acres Statewide And Local Important Farmland	36,728			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	<0.01%			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	N/A			
PART V *(To be completed by NRCS) Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)*				

PART VI *(To be completed by Federal Agency) Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))*	Maximum Points				
1. Area in Nonurban Use	15	15			
2. Perimeter in Nonurban Use	10	10			
3. Percent Of Corridor Being Farmed	20	15			
4. Protection Provided By State And Local Government	20	0			
5. Size of Present Farm Unit Compared To Average	10	0			
6. Creation Of Nonfarmable Farmland	25	25			
7. Availablility Of Farm Support Services	5	5			
8. On-Farm Investments	20	0			
9. Effects Of Conversion On Farm Support Services	25	0			
10. Compatibility With Existing Agricultural Use	10	5			
TOTAL CORRIDOR ASSESSMENT POINTS	160	75	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland (From Part V)	100	0	0	0	0
Total Corridor Assessment (From Part VI above or a local site assessment)	160	75	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	75	0	0	0

1. Corridor Selected: A	2. Total Acres of Farmlands to be Converted by Project:	3. Date Of Selection: 12/13/18	4. Was A Local Site Assessment Used? YES ☐ NO ☑

5. Reason For Selection:

Road widening for existing minor arterial roadway. Widening will accommodate planned developments on adjacent properties.

Signature of Person Completing this Part: **Erin Kelly**

DATE **12/14/18**

NOTE: Complete a form for each segment with more than one Alternate Corridor

Clear Form

CORRIDOR - TYPE SITE ASSESSMENT CRITERIA

The following criteria are to be used for projects that have a linear or corridor - type site configuration connecting two distant points, and crossing several different tracts of land. These include utility lines, highways, railroads, stream improvements, and flood control systems. Federal agencies are to assess the suitability of each corridor - type site or design alternative for protection as farmland along with the land evaluation information.

(1) How much land is in nonurban use within a radius of 1.0 mile from where the project is intended?
More than 90 percent - 15 points
90 to 20 percent - 14 to 1 point(s)
Less than 20 percent - 0 points

(2) How much of the perimeter of the site borders on land in nonurban use?
More than 90 percent - 10 points
90 to 20 percent - 9 to 1 point(s)
Less than 20 percent - 0 points

(3) How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last 10 years?
More than 90 percent - 20 points
90 to 20 percent - 19 to 1 point(s)
Less than 20 percent - 0 points

(4) Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?
Site is protected - 20 points
Site is not protected - 0 points

(5) Is the farm unit(s) containing the site (before the project) as large as the average - size farming unit in the County ?
(Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage or Farm Units in Operation with $1,000 or more in sales.)
As large or larger - 10 points
Below average - deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more below average - 9 to 0 points

(6) If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?
Acreage equal to more than 25 percent of acres directly converted by the project - 25 points
Acreage equal to between 25 and 5 percent of the acres directly converted by the project - 1 to 24 point(s)
Acreage equal to less than 5 percent of the acres directly converted by the project - 0 points

(7) Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?
All required services are available - 5 points
Some required services are available - 4 to 1 point(s)
No required services are available - 0 points

(8) Does the site have substantial and well-maintained on-farm investments such as barns, other storage building, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?
High amount of on-farm investment - 20 points
Moderate amount of on-farm investment - 19 to 1 point(s)
No on-farm investment - 0 points

(9) Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?
Substantial reduction in demand for support services if the site is converted - 25 points
Some reduction in demand for support services if the site is converted - 1 to 24 point(s)
No significant reduction in demand for support services if the site is converted - 0 points

(10) Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use?
Proposed project is incompatible to existing agricultural use of surrounding farmland - 10 points
Proposed project is tolerable to existing agricultural use of surrounding farmland - 9 to 1 point(s)
Proposed project is fully compatible with existing agricultural use of surrounding farmland - 0 points

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Collin County, Texas, Hunt County, Texas, and Kaufman and Rockwall Counties, Texas

December 27, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

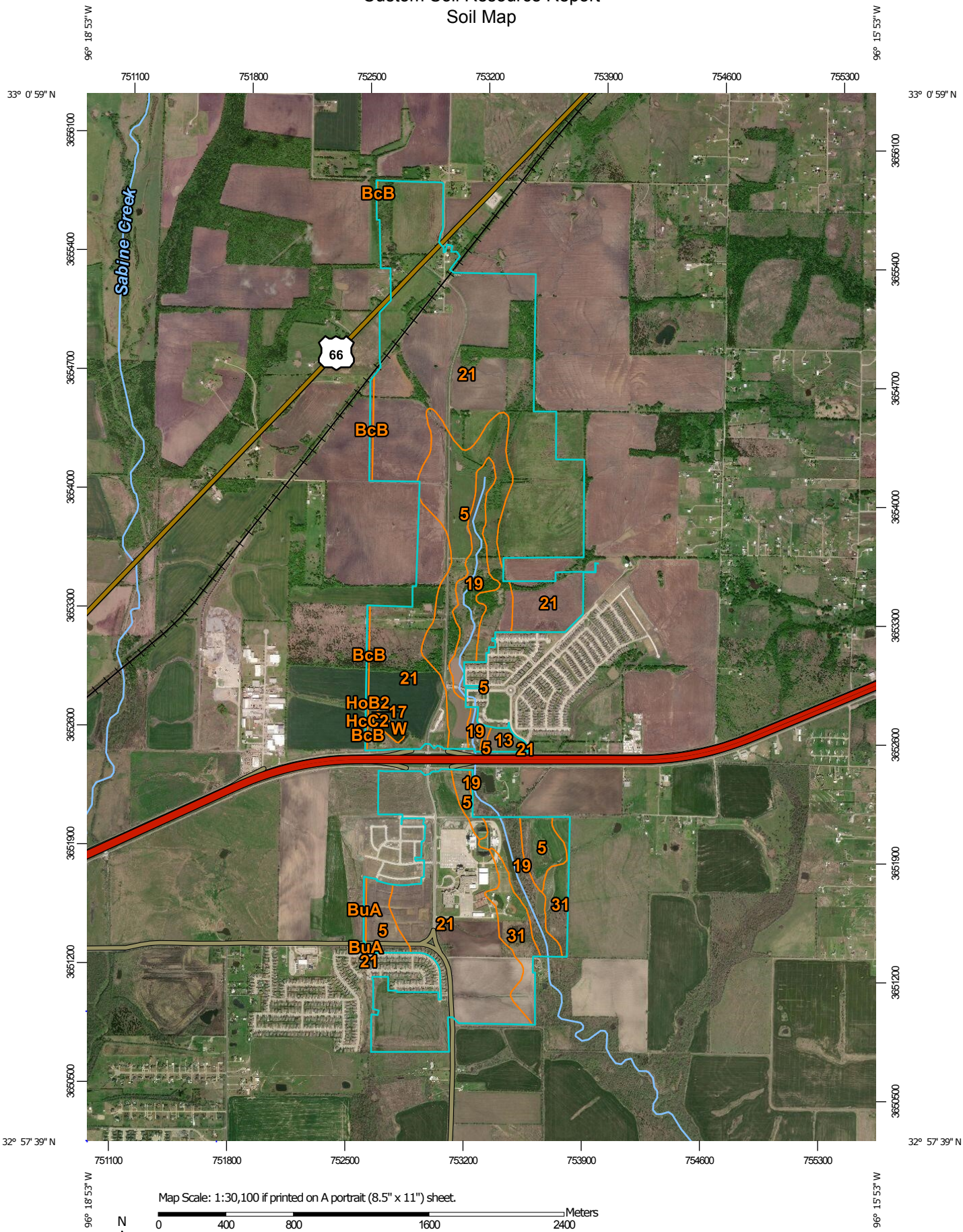
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:30,100 if printed on A portrait (8.5" x 11") sheet.

N

0 400 800 1600 2400 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Collin County, Texas
Survey Area Data: Version 14, Sep 14, 2018

Soil Survey Area: Hunt County, Texas
Survey Area Data: Version 17, Sep 14, 2018

Soil Survey Area: Kaufman and Rockwall Counties, Texas
Survey Area Data: Version 15, Sep 14, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 13, 2014—Nov 18, 2017

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcB	Burleson clay, 1 to 3 percent slopes	5.9	0.6%
HcC2	Heiden clay, 3 to 5 percent slopes, eroded	0.0	0.0%
HoB2	Houston Black clay, 2 to 4 percent slopes, eroded	0.3	0.0%
Subtotals for Soil Survey Area		**6.2**	**0.6%**
Totals for Area of Interest		**1,031.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Burleson clay, 0 to 1 percent slopes	168.9	16.4%
13	Heiden clay, 2 to 5 percent slopes	6.5	0.6%
17	Houston Black clay, 1 to 3 percent slopes	0.8	0.1%
19	Kaufman clay, 0 to 1 percent slopes, frequently flooded	74.6	7.2%
21	Leson clay, 1 to 3 percent slopes	721.1	69.9%
31	Wilson silt loam, 0 to 1 percent slopes	48.6	4.7%
W	Water	3.3	0.3%
Subtotals for Soil Survey Area		**1,023.8**	**99.3%**
Totals for Area of Interest		**1,031.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BuA	Burleson clay, 0 to 1 percent slopes	1.4	0.1%
BuB	Burleson clay, 1 to 3 percent slopes	0.0	0.0%
Subtotals for Soil Survey Area		**1.4**	**0.1%**
Totals for Area of Interest		**1,031.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps.

The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Collin County, Texas

BcB—Burleson clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tbtx
Elevation: 120 to 970 feet
Mean annual precipitation: 34 to 47 inches
Mean annual air temperature: 62 to 69 degrees F
Frost-free period: 228 to 239 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Burleson and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Burleson

Setting

Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium of pleistocene age derived from mudstone

Typical profile

Ap - 0 to 5 inches: clay
Bss - 5 to 20 inches: clay
Bkss - 20 to 43 inches: clay
2Ck - 43 to 60 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Wilson

Percent of map unit: 8 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Southern Claypan Prairie (R086AY004TX)
Hydric soil rating: No

Branyon

Percent of map unit: 7 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

HcC2—Heiden clay, 3 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2v1vb
Elevation: 300 to 1,390 feet
Mean annual precipitation: 33 to 48 inches
Mean annual air temperature: 64 to 68 degrees F
Frost-free period: 233 to 278 days
Farmland classification: Not prime farmland

Map Unit Composition

Heiden, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Heiden, Moderately Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from mudstone

Typical profile

A - 0 to 13 inches: clay
Bss - 13 to 22 inches: clay

Bkss - 22 to 58 inches: clay
CBdk - 58 to 80 inches: clay

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 40 to 65 inches to densic material
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Minor Components

Houston black

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Circular gilgai
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Ferris, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

HoB2—Houston Black clay, 2 to 4 percent slopes, eroded

Map Unit Setting

National map unit symbol: d6vf
Elevation: 400 to 1,000 feet
Mean annual precipitation: 28 to 42 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 220 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Houston black, eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Houston Black, Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Microfeatures of landform position: Circular gilgai
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous shale of taylor marl and eagleford shale

Typical profile

H1 - 0 to 5 inches: clay
H2 - 5 to 48 inches: clay
H3 - 48 to 80 inches: clay

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Northern Blackland (R086AY010TX)

Hydric soil rating: No

Hunt County, Texas

5—Burleson clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2ssg6
Elevation: 300 to 800 feet
Mean annual precipitation: 32 to 45 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 220 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Burleson and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Burleson

Setting

Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium of pleistocene age derived from mixed sources

Typical profile

A - 0 to 23 inches: clay
Bss - 23 to 38 inches: clay
Bkss - 38 to 69 inches: clay
2Ck - 69 to 90 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Wilson

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Claypan Prairie (R086BY002TX)
Hydric soil rating: No

Branyon

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

13—Heiden clay, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sshl
Elevation: 280 to 710 feet
Mean annual precipitation: 35 to 47 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 239 to 260 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Heiden and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Heiden

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, interfluve
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from mudstone

Typical profile

Ap - 0 to 6 inches: clay
Bkss1 - 6 to 18 inches: clay

Bkss2 - 18 to 58 inches: clay
CBdk - 58 to 80 inches: clay

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 40 to 65 inches to densic material
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Houston black

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Microfeatures of landform position: Circular gilgai
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Ferris, moderately eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

17—Houston Black clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2ssh1
Elevation: 310 to 740 feet
Mean annual precipitation: 44 to 47 inches
Mean annual air temperature: 62 to 63 degrees F
Frost-free period: 203 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Houston black and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Houston Black

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Clayey residuum weathered from calcareous mudstone of upper cretaceous age

Typical profile

Ap - 0 to 6 inches: clay
Bkss - 6 to 70 inches: clay
BCkss - 70 to 80 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: Northern Blackland (R086AY010TX)
Hydric soil rating: No

Minor Components

Heiden

Percent of map unit: 15 percent
Landform: Plains
Microfeatures of landform position: Linear gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Northern Blackland (R086AY010TX)
Hydric soil rating: No

Fairlie

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Northern Blackland (R086AY010TX)
Hydric soil rating: No

19—Kaufman clay, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2wg9d
Elevation: 130 to 660 feet
Mean annual precipitation: 38 to 47 inches
Mean annual air temperature: 62 to 68 degrees F
Frost-free period: 218 to 254 days
Farmland classification: Not prime farmland

Map Unit Composition

Kaufman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kaufman

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from mudstone

Typical profile

A - 0 to 6 inches: clay
Bss1 - 6 to 69 inches: clay
Bss2 - 69 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D
Ecological site: Clayey Bottomland (R086AY013TX)
Hydric soil rating: Yes

Minor Components

Trinity

Percent of map unit: 10 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey Bottomland (R086AY013TX)
Hydric soil rating: Yes

Whitesboro

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Loamy Bottomland (R086AY012TX)
Hydric soil rating: No

Gladewater

Percent of map unit: 1 percent
Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Clayey Bottomland (R086AY013TX)
Hydric soil rating: Yes

21—Leson clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: dbt6
Elevation: 350 to 750 feet
Mean annual precipitation: 34 to 44 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 230 to 260 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Leson and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leson

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous shale

Typical profile

H1 - 0 to 6 inches: clay
H2 - 6 to 28 inches: clay
H3 - 28 to 58 inches: clay
H4 - 58 to 72 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Gypsum, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: Northern Blackland (R086AY010TX)

Hydric soil rating: No

31—Wilson silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2wg99
Elevation: 310 to 770 feet
Mean annual precipitation: 45 to 48 inches
Mean annual air temperature: 63 to 64 degrees F
Frost-free period: 224 to 248 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wilson and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wilson

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy and/or clayey alluvium derived from mudstone

Typical profile

Ap - 0 to 7 inches: silt loam
Btss - 7 to 31 inches: clay
Btkss - 31 to 36 inches: clay
Btkssyg - 36 to 42 inches: clay
Btkyg - 42 to 80 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 15 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: Northern Claypan Prairie (R086AY003TX)
Hydric soil rating: No

Minor Components

Burleson

Percent of map unit: 10 percent
Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Northern Blackland (R086AY010TX)
Hydric soil rating: No

Crockett

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Northern Claypan Prairie (R086AY003TX)
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Kaufman and Rockwall Counties, Texas

BuA—Burleson clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2ssg6
Elevation: 300 to 800 feet
Mean annual precipitation: 32 to 45 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 220 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Burleson and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Burleson

Setting

Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium of pleistocene age derived from mixed sources

Typical profile

A - 0 to 23 inches: clay
Bss - 23 to 38 inches: clay
Bkss - 38 to 69 inches: clay
2Ck - 69 to 90 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Wilson

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Claypan Prairie (R086BY002TX)
Hydric soil rating: No

Branyon

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

BuB—Burleson clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tbtx
Elevation: 120 to 970 feet
Mean annual precipitation: 34 to 47 inches
Mean annual air temperature: 62 to 69 degrees F
Frost-free period: 228 to 239 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Burleson and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Burleson

Setting

Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium of pleistocene age derived from mudstone

Typical profile

Ap - 0 to 5 inches: clay
Bss - 5 to 20 inches: clay

Bkss - 20 to 43 inches: clay
2Ck - 43 to 60 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Wilson

Percent of map unit: 8 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Southern Claypan Prairie (R086AY004TX)
Hydric soil rating: No

Branyon

Percent of map unit: 7 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

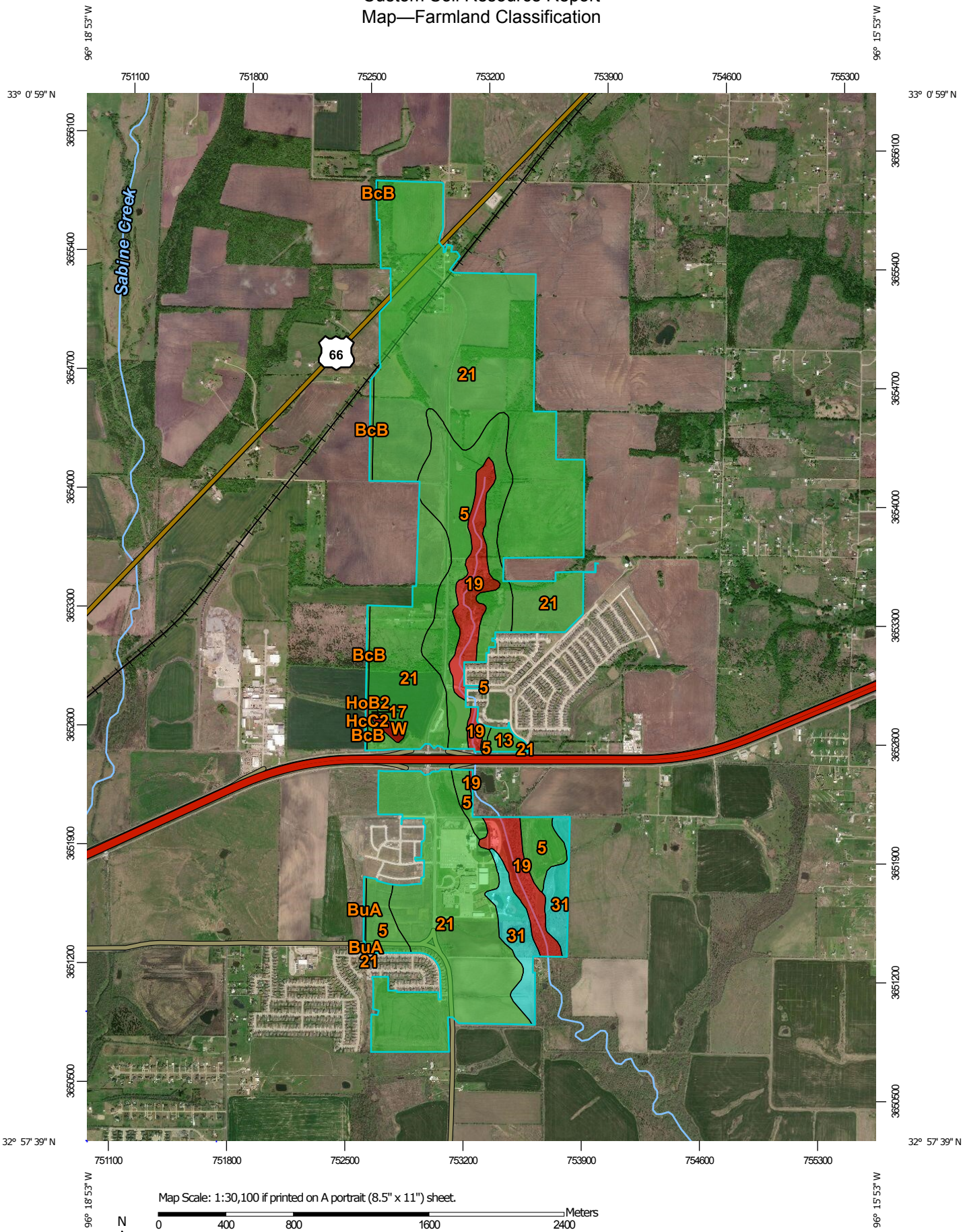
The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.



Map Scale: 1:30,100 if printed on A portrait (8.5" x 11") sheet.

N

0 400 800 1600 2400 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Collin County, Texas
Survey Area Data: Version 14, Sep 14, 2018

Soil Survey Area: Hunt County, Texas
Survey Area Data: Version 17, Sep 14, 2018

Soil Survey Area: Kaufman and Rockwall Counties, Texas
Survey Area Data: Version 15, Sep 14, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 13, 2014—Nov 18, 2017

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BcB	Burleson clay, 1 to 3 percent slopes	All areas are prime farmland	5.9	0.6%
HcC2	Heiden clay, 3 to 5 percent slopes, eroded	Not prime farmland	0.0	0.0%
HoB2	Houston Black clay, 2 to 4 percent slopes, eroded	Not prime farmland	0.3	0.0%
Subtotals for Soil Survey Area			**6.2**	**0.6%**
Totals for Area of Interest			**1,031.5**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5	Burleson clay, 0 to 1 percent slopes	All areas are prime farmland	168.9	16.4%
13	Heiden clay, 2 to 5 percent slopes	All areas are prime farmland	6.5	0.6%
17	Houston Black clay, 1 to 3 percent slopes	All areas are prime farmland	0.8	0.1%
19	Kaufman clay, 0 to 1 percent slopes, frequently flooded	Not prime farmland	74.6	7.2%
21	Leson clay, 1 to 3 percent slopes	All areas are prime farmland	721.1	69.9%
31	Wilson silt loam, 0 to 1 percent slopes	Farmland of statewide importance	48.6	4.7%
W	Water	Not prime farmland	3.3	0.3%
Subtotals for Soil Survey Area			**1,023.8**	**99.3%**
Totals for Area of Interest			**1,031.5**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BuA	Burleson clay, 0 to 1 percent slopes	All areas are prime farmland	1.4	0.1%
BuB	Burleson clay, 1 to 3 percent slopes	All areas are prime farmland	0.0	0.0%
Subtotals for Soil Survey Area			**1.4**	**0.1%**
Totals for Area of Interest			**1,031.5**	**100.0%**

Rating Options—Farmland Classification

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

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