

Appendix A: Environmental Due Diligence (Task 1102 Deliverable)

Appendix A1:
Waters of the United States Desktop Report for Spring
Creek Dam Feasibility Study



Spring Creek Watershed Flood Control Dams Conceptual Engineering Feasibility Study

Waters of the United States Desktop Report for Spring Creek Dam Feasibility Study

Flood Infrastructure Fund Category 1

Project ID 21-0016

Prepared for:

Texas Water Development Board

Prepared by:

Halff

Richard Howard, P.W.S.

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1 Introduction

At the request of the San Jacinto River Authority, Halff conducted a desktop assessment of potential waters of the U.S. for the Spring Creek Dam Feasibility Study (proposed project). The proposed project includes potential construction alternatives for detention basins within the Spring Creek watershed to reduce flooding in the watershed downstream to the confluence of the San Jacinto River (**Figure 1, Appendix A1-1**). The project area contains two potential dam alignments within the sub-watersheds of Walnut Creek and Birch Creek. The dam alignment within the Walnut Creek sub-watershed is situated approximately 800 feet northwest of the intersection of Farm-to-market (FM) 1488 and Woodway Drive. The dam alignment within the Birch Creek sub-watershed is situated between FM 1488, Ranch Crest Drive, and FM 1774. Both potential projects are in the Spring Creek watershed as defined by U.S. Geological Survey (USGS) hydrologic unit code (HUC) 12040102. Halff conducted this desktop assessment to determine the presence, location, and extent of potential waters of the U.S. within the project area and any associated potential environmental permitting requirements.

According to the U.S. Army Corps of Engineers (USACE), waters of the U.S. include territorial seas, tidal waters, traditional navigable waters, interstate waters, and the adjacent, contributing, or impoundments of these waterbodies (e.g., rivers, creeks, streams, lakes, reservoirs). Special aquatic sites associated with these waterbodies are also considered waters of the U.S. and include sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes.

Wetlands are typically the most common special aquatic resource present and are defined by the USACE as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (40 Code of Federal Regulations [CFR] 230.3(t)). Based on this definition, for an area to be considered a wetland it must possess the following three parameters under normal circumstances: 1) a predominance of plants adapted to live in water or saturated soils (i.e., hydrophytic vegetation), 2) soil characteristics of frequent saturation (i.e., hydric soils), and 3) the presence of hydrology showing evidence of regular flooding or ponding (i.e., wetland hydrology).

2 Methods

Halff conducted a resource review using publicly available background information to help identify the portions of the project area most likely to contain wetlands and/or waterbodies. Resources reviewed included historic aerial photography (Google Earth 2024), U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS 2024), U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) data (USGS 2024), USGS topographic quadrangles (USGS 2023), and the most recently available Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) data (FEMA 2019). The project area is defined by the parcels containing the sub-watersheds of Birch Creek and Walnut Creek.

3 Results

3.1 Resource review

Historic topographic maps and aerial imagery show Walnut Creek and Birch Creek with riparian forest surrounded by agriculture and undeveloped lands. From 1995 to the present, the project area became increasingly impacted by human development, including clearing of the surrounding riparian forest and commercial and residential developments.

The most recent USGS topographic map (2023), the project area consists of forests with some urban residential and commercial areas south of the area. Furthermore, the Magnolia West, Texas 7.5-minute topographic quadrangles (**Figure 1, Appendix A1-1**) depicts several wetlands along Walnut Creek and Birch Creek. FEMA FIRM Number 48473C0100E indicates that a substantial portion of the area is located within the floodway, 100-year floodplain and 500-year floodplain (FEMA 2009) (**Figure 1, Appendix A1-1**). Halff also evaluated historic topographic maps and aerial images (**Figures 2a through 2d, Appendix A1-1**), as well as LiDAR data (**Figure 3, Appendix A1-1**) to identify areas that are more likely to contain waterbodies or wetlands. The NWI indicates that the project area includes 42 wetland features, four ponds, and 19 riverine features (USFWS 2023; **Figure 4, Appendix A1-1**). The NHD identifies 35 waterbodies within the assessed area, most of which are consistent with the NWI features (USGS 2024).

3.2 Wetlands

Halff identified 65 NWI features within the project area, four of which intersect the proposed alignment of the Walnut Creek detention basin dam and two of which intersect the alignment of the Birch Creek detention basin dam (**Figure 4, Appendix A1-1**). Table 3-1 summarizes details pertaining to the NWI wetlands within each sub-watershed.

Table 3-1 NWI Wetland Types within Walnut Creek and Birch Creek Sub-watersheds

NWI Wetlands Type	Walnut Creek	Birch Creek
Freshwater Pond	3	1
Freshwater Emergent Wetland	3	9
Riverine	9	10
Freshwater Forested/Shrub Wetland	10	20
Total	25	40

3.2.1 Vegetation communities

From an aerial view, the project area appears to be forested with riparian vegetation along the creeks. Forested and herbaceous uplands dominate the rest of the project area. A field survey would be needed to further determine the vegetation communities within the project area.

3.2.2 Soils

According to the NRCS Soil Survey for Waller County, Texas, there are eight major soil map units present within the project area (**Figure 5, Appendix A1-1**). Table 3-2 and Table 3-3 provide details pertaining to the soil map units associated with the Walnut Creek and Birch Creek sub-watersheds, respectively.

Table 3-2 Soil Map Units within Walnut Creek Sub-watershed

Soil Symbol	Soil Map Unit	Acres	Percent	Hydric Soil
AnC	Annona fine sandy loam, 1 to 5 percent slopes	31.7	2.3%	No
CoC	Conroe loamy fine sand, 1 to 5 percent slopes	114.1	8.2%	No
CpC	Conroe soils, graded, 1 to 5 percent slopes	16.9	1.2%	No
DeC	Depcor loamy fine sand, 1 to 5 percent slopes	722.5	52.2%	No
HatA	Hatliff-Pluck-Kian complex, 0 to 1 percent slopes, frequently flooded	131.1	9.5%	Yes
LdC	Landman loamy fine sand, 1 to 5 percent slopes	28.6	2.1%	No
LIE	Landman-Larue complex, 3 to 12 percent slopes	322.2	23.3%	No
SpB	Splendor fine sandy loam, 0 to 2 percent slopes	16.3	1.2%	No

Table 3-3 Soil Map Units within Birch Creek Sub-watershed

Soil Symbol	Soil Map Unit	Acres	Percent	Hydric Soil
CoC	Conroe loamy fine sand, 1 to 5 percent slopes	165.6	12.1%	No
CpC	Conroe soils, graded, 1 to 5 percent slopes	9.3	0.8%	No
DeC	Depcor loamy fine sand, 1 to 5 percent slopes	385.3	28.2%	No
HatA	Hatliff-Pluck-Kian complex, 0 to 1 percent slopes, frequently flooded	233.5	17.1%	Yes
LdC	Landman loamy fine sand, 1 to 5 percent slopes	340.2	24.9%	No
LIE	Landman-Larue complex, 3 to 12 percent slopes	190.7	14.0%	No
SpB	Splendor fine sandy loam, 0 to 2 percent slopes	39.8	2.9%	No

HatA contains 35% of Pluck hydric component and 25% of Kian hydric component, occurs in dips, is poorly drained, and, therefore, is classified as a hydric soil (NRCS 2024). SpB contains 7% of Waller hydric component, occurs on flatwoods, is somewhat poorly drained, but is largely classified as non-hydric (NRCS 2024). See **Appendix A1-2** for a brief description of each NRCS soil map unit presented within the project area.

Although an NRCS hydric listing alone is generally insufficient to determine if soils within an area are hydric, it does indicate that suitable soil properties or conditions exist that promote the formation of hydric soil conditions. As a result, the portions of the project area depicted as containing hydric soil map units may be subjected to greater scrutiny with respect to the presence of hydric soil indicators.

3.2.3 Walnut Creek

The NWI wetlands that intersect with the dam alignment on Walnut Creek include two PFO1A (temporarily flooded forested wetlands), one PFO1C (seasonally flooded forested wetland), and one PSS1C (seasonally flooded scrub-shrub wetlands). The current dam alignment has a maximum length of 3,373 feet and would require placement of fill over approximately 12.0 acres, including 3.5 acres of wetlands. See **Figure 6a, Appendix A1-1** for the potential impacts to Walnut Creek and its adjacent wetlands.

In addition to the direct construction impacts, the planned flood detention reservoir on Walnut Creek may potentially cause temporary flooding of approximately 49.3 acres of NWI wetlands within the 500-year flood plain upstream of the dam alignment. Flooding these NWI wetlands may increase their hydroperiod but would likely not be considered a loss of these resources under Section 404 of the Clean Water Act (Section 404). Areas downstream of the dam will not be flooded but may experience reduced hydrologic input. See **Figure 6c, Appendix A1-1** for the potential flooding impacts.

3.2.4 Birch Creek

The NWI wetlands that intersect with the dam alignment on Birch Creek include one PFO1A and one PFO1C. The current dam alignment has a maximum length of 3,168 feet and would require placement of fill over approximately 8.7 acres, including 0.9 acre of wetlands. See **Figure 6b, Appendix A1-1** for the potential impacts to Birch Creek and its adjacent wetlands.

In addition to the direct construction impacts, the planned flood detention reservoir on Birch Creek may potentially cause temporary flooding of approximately 50.7 acres of NWI wetlands within the 500-year flood plain upstream of the dam alignment. Flooding these NWI wetlands may increase their hydroperiod but would likely not be considered a loss of these resources under Section 404. Areas downstream will not be flooded but may be reduced due to the lack of hydrology input. See **Figure 6c, Appendix A1-1** for the potential flooding impacts.

3.3 Waterbodies

Based on the USGS topographic maps (**Figure 2b, Appendix A1-1**), Halff identified two named streams (Walnut Creek and Birch Creek) and several tributaries within the project area. According to the NHD and NWI, the proposed alignment for the Walnut Creek detention basin dam may impact Walnut Creek (**Figure 6a, Appendix A1-1**). Collectively, the Walnut Creek detention basin watershed includes approximately 15,296 linear feet of streams within 500-year floodplain upstream of the proposed detention basin.

Similarly, the NHD and NWI identify Birch Creek as the lone waterbody that would be directly impacted by the Birch Creek detention basin's construction (**Figure 6b, Appendix A1-1**). Collectively, the Birch Creek detention basin watershed includes approximately 12,764 linear feet of streams within 500-year floodplain upstream of the proposed detention basin.

The confluence of Birch Creek and Walnut Creek is approximately 800 feet south of the project area and flows into Spring Creek at approximately 10 miles southeast of the project area. In total, Halff identified 35 NHD features within the project area. Table 3-4 summarizes the NHD features associated with each sub-watershed.

Table 3-4 NHD Feature Types within Walnut Creek and Birch Creek Sub-watersheds

NHD Feature Type	Walnut Creek	Birch Creek
Intermittent Stream	14	8
Perennial Stream	6	7
Total	20	15

4 Conclusion

Halff performed a desktop assessment of the proposed Spring Creek Dam Feasibility Study in April 2024. The assessment identified two watersheds (Walnut Creek and Birch Creek), containing approximately 15,296 linear stream feet and 12,764 linear stream feet within 500-year floodplain upstream of the proposed detention basin, respectively. Based on a review of current and historical aerial imagery and topographic maps, Walnut Creek and Birch Creek have been present in the project area since before 1964. Walnut Creek and Birch Creek converge and flow into Spring Creek, which flows directly into West Fork San Jacinto River, a traditional navigable water. Therefore, in Halff's professional opinion, Walnut Creek and Birch Creek would likely be considered jurisdictional under the current USACE pre-2015 regulatory regime and the findings of the *Sackett v. EPA* decision.

The dam alignments may directly impact a total of 3.54 acres of wetlands adjacent to (bearing a direct surface connection with) Walnut Creek and a total of 0.85 acre of wetlands adjacent to Birch Creek. Due to their proximity to Walnut Creek and Birch Creek and their tributaries, these wetlands would likely be considered jurisdictional under Section 404 following USACE's pre-2015 regulatory regime and the findings of the *Sackett v. EPA* decision.

The proposed dam alignments have the potential to impact Walnut Creek and Birch Creek and the adjacent wetlands. To demonstrate avoidance of potentially jurisdictional aquatic resources, USACE will require the consideration of alternative locations that may decrease potential impacts. The impoundment of Walnut Creek and Birch Creek may flood the wetlands located upstream of the dam alignments and potentially sever hydrology for downstream wetlands. Impacts to wetlands and streams may require the purchase of mitigation credits. Available mitigation banks for wetland credits include Mill Creek, Spellbottom, and Tarkington Bayou. Available mitigation banks for stream credits include Houston-Conroe, Katy Prairie Stream, and Tarkington Bayou.

Depending on construction plans, relevant Section 404 permits for these projects may include Nationwide Permits (NWP) 43 (Stormwater Management Facilities) or an Individual Permit (IP); however, the extent of potential wetlands affected by the project would likely trigger an IP. Permitting of the projects under IPs would likely take approximately 18 months after complete permit applications are submitted to USACE. Complete permit applications will require delineations of aquatic features, threatened and endangered species assessments, cultural resource assessments, project plans, and mitigation plans as part of the permit packages. Additionally, preliminary discussions with USACE Galveston District indicate that they may require an environmental assessment (EA) as part of the approval process. The EA may add to the permitting timeline; however, the specifics of this will be determined with USACE.

The results and conclusions contained within this report represent the professional opinion of Halff and are not a verification or jurisdictional determination of waters of the U.S. Only the USACE is authorized to verify the boundaries and jurisdictional determination of waters of the U.S. The information provided in this report may be used to support a request for jurisdictional

determination from the USACE, if needed for Clean Water Act Section 404 permitting compliance. Field delineations are required to identify the type and extent of potentially jurisdictional features in the project areas.

5 Literature cited

Federal Emergency Management Agency (FEMA). 2009. Flood Insurance Rate Map (FIRM): Waller County, Texas and Incorporated Areas. Map Number 48473C0100E. Effective Date: February 18, 2009.

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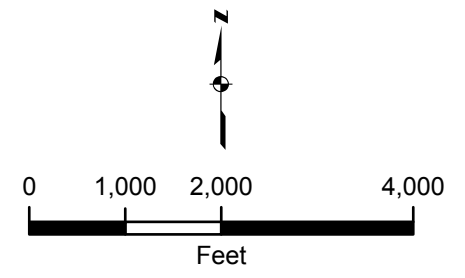
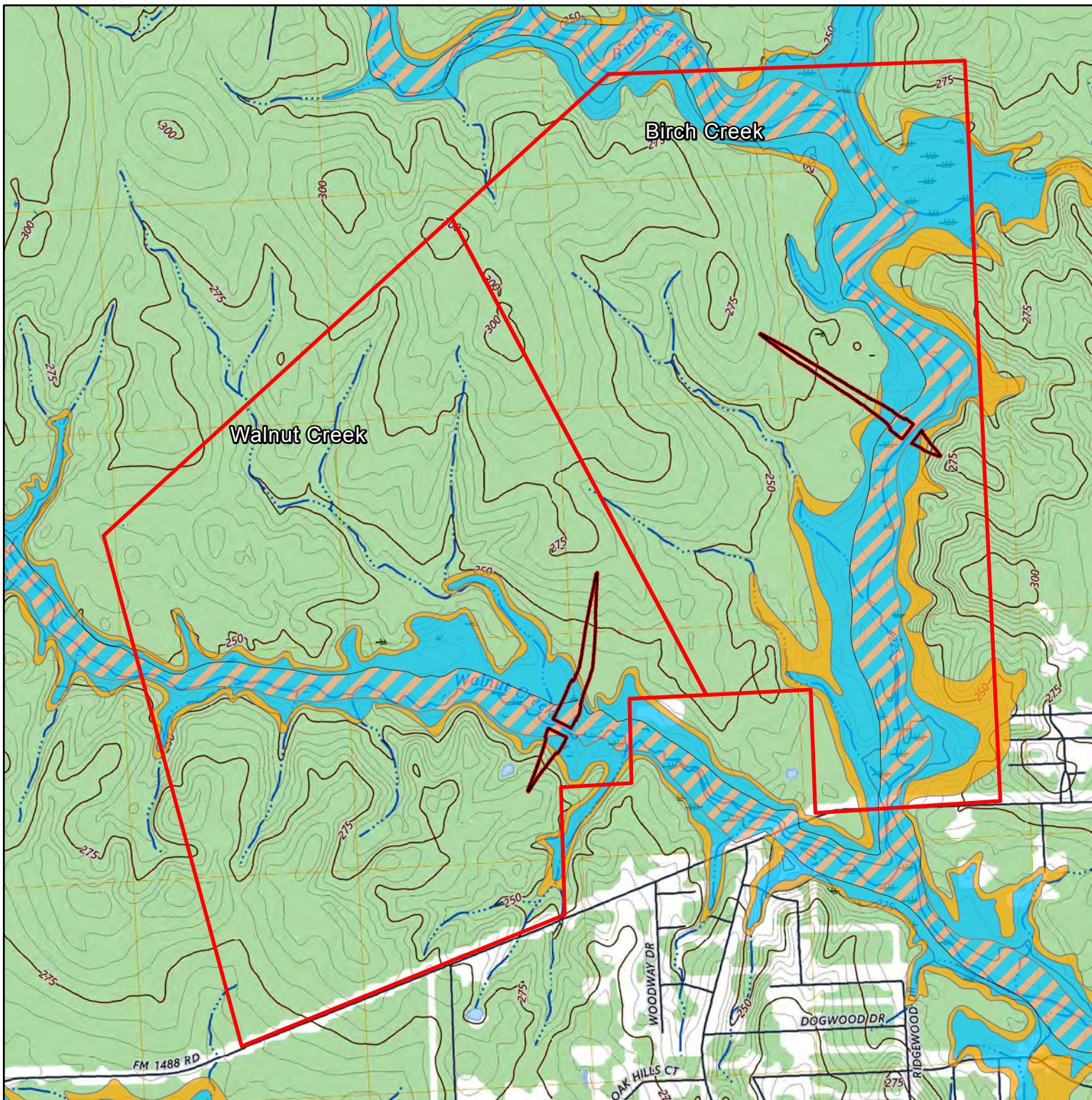
Palmer, W.C. 1965. Meteorological drought. Research Paper No. 45. Washington D.C.: U.S. Weather Bureau, NOAA Library and Information Services Division. Available at: <https://www.ncdc.noaa.gov/temp-and-precip/drought/docs/palmer.pdf>. Accessed April 2024.

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U.S. Geological Survey (USGS). 2023. Magnolia West, TX 7.5-minute Quadrangle Map 1:24,000. United States Department of Interior, Washington D.C.

2024. National Hydrography Dataset (NHD). Available at: <https://www.usgs.gov/core-science-systems/npg/national-hydrography>. Accessed April 2024.

Appendix A1-1: Maps



Legend

- Study Area
- Dam Alignments

Flood Zone Type

- Floodway
- 1% Annual Change Flood Hazard
- 0.2% Annual Change Flood Hazard

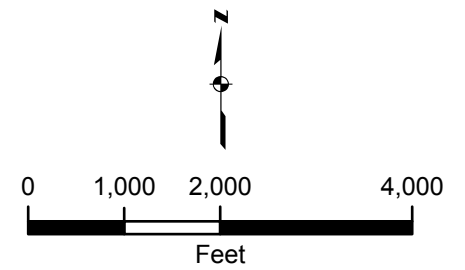
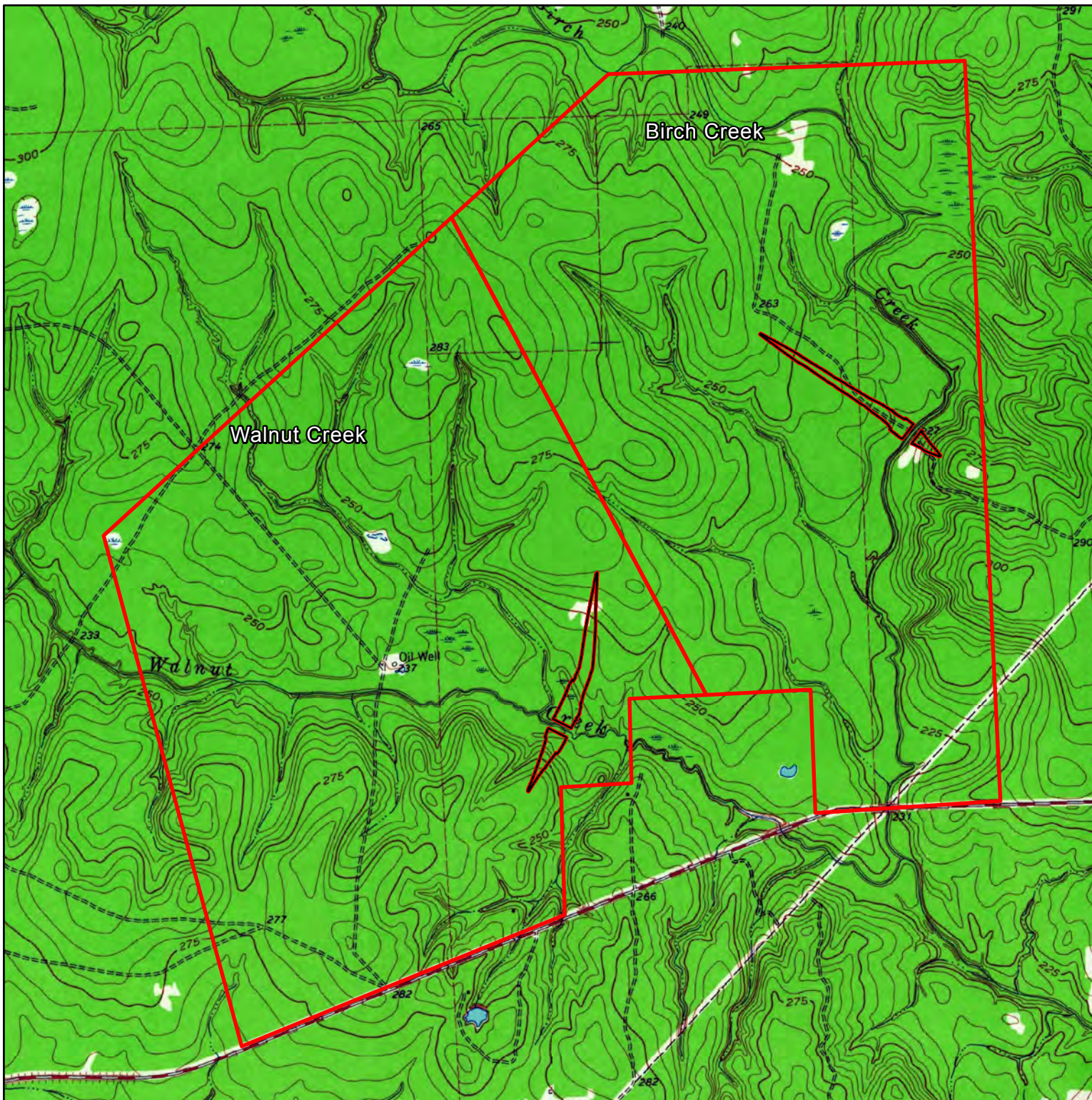
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1. Map Center: 95.83634°W 30.2001°N
2. USGS topoView: "Magnolia West, Texas" 7.5 minute quadrangle, 2023



Spring Creek Dam Feasibility Study
 Magnolia, Waller County, Texas
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Figure 1
USGS Topographic and
FEMA NFHL Map





Legend

-  Study Area
-  Dam Alignments

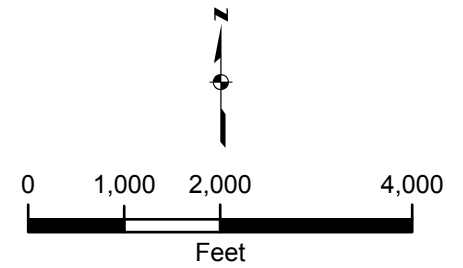
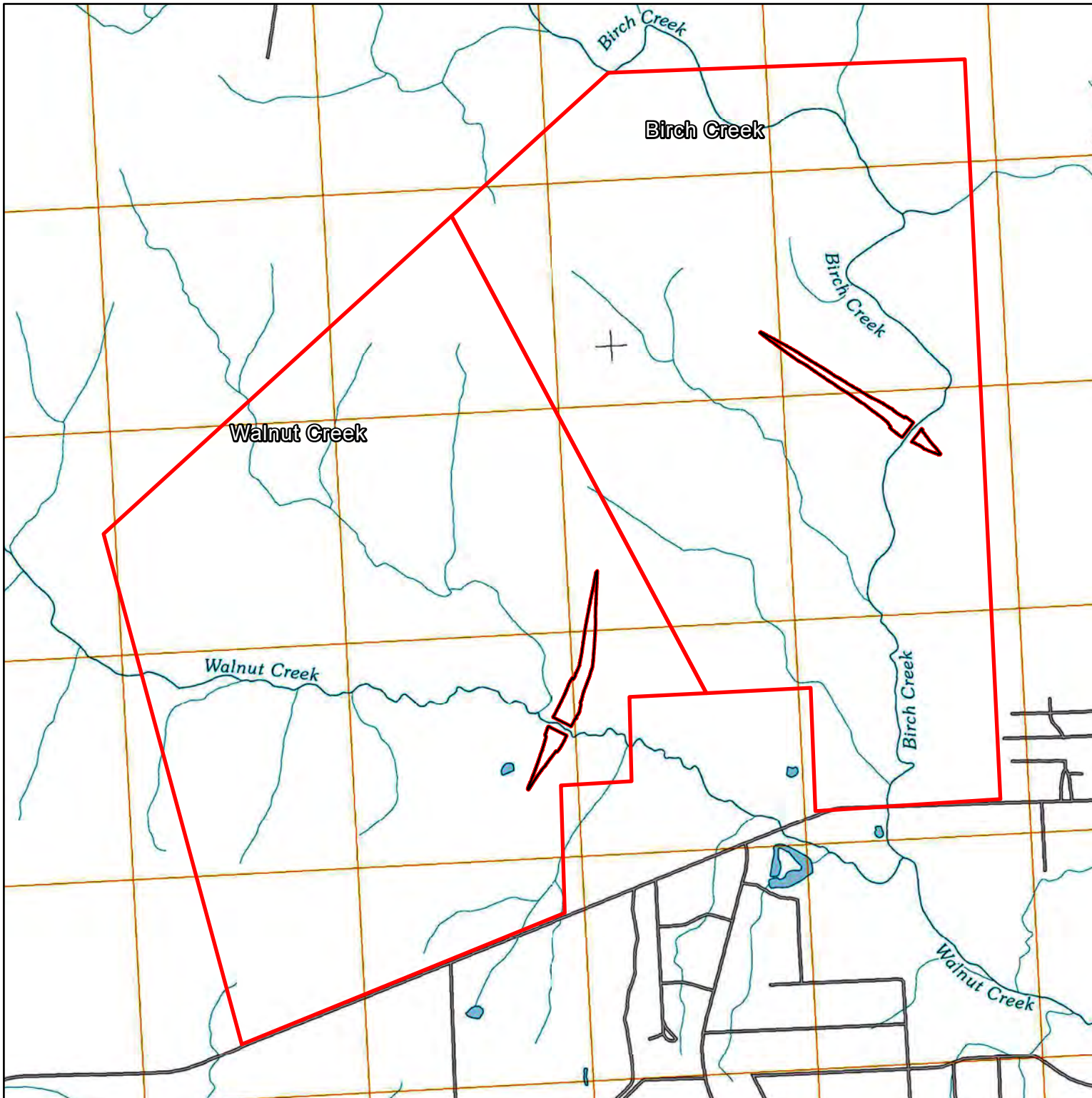
Notes:

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2. USGS topoView: "Magnolia West, Texas" 7.5 minute quadrangle, 1962

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Figure 2a
1962 USGS Topographic Map





Legend

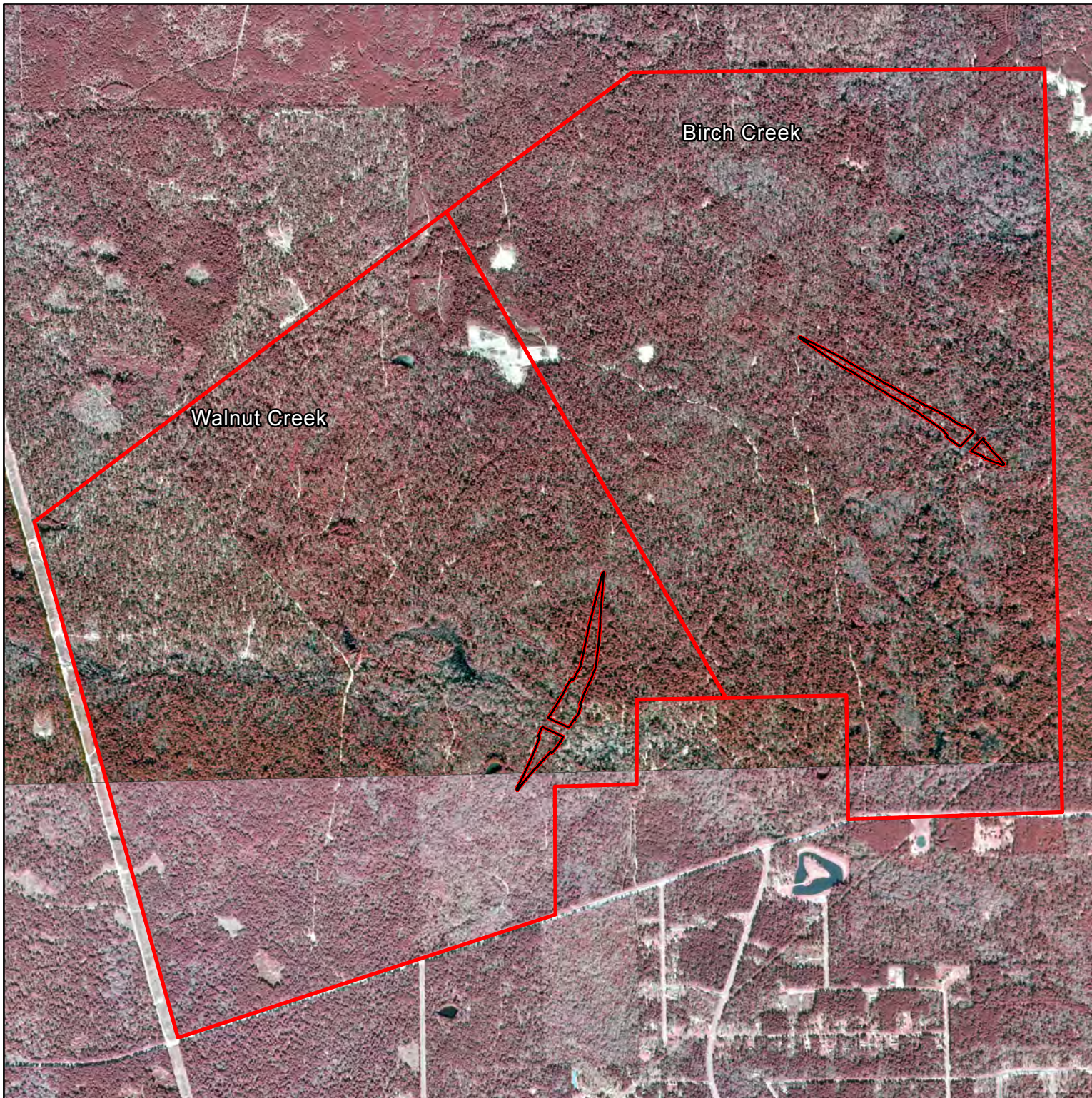
- Study Area
- Dam Alignments

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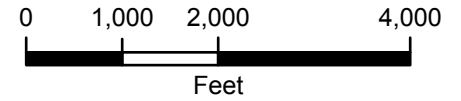
Figure 2b
 2010 USGS Topographic Map







Birch Creek

Walnut Creek



Legend

-  Study Area
-  Dam Alignments

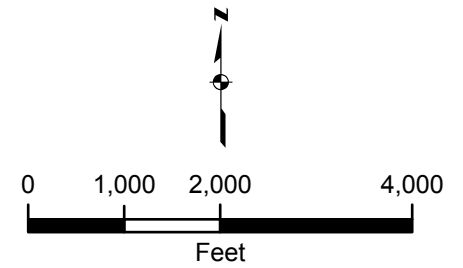
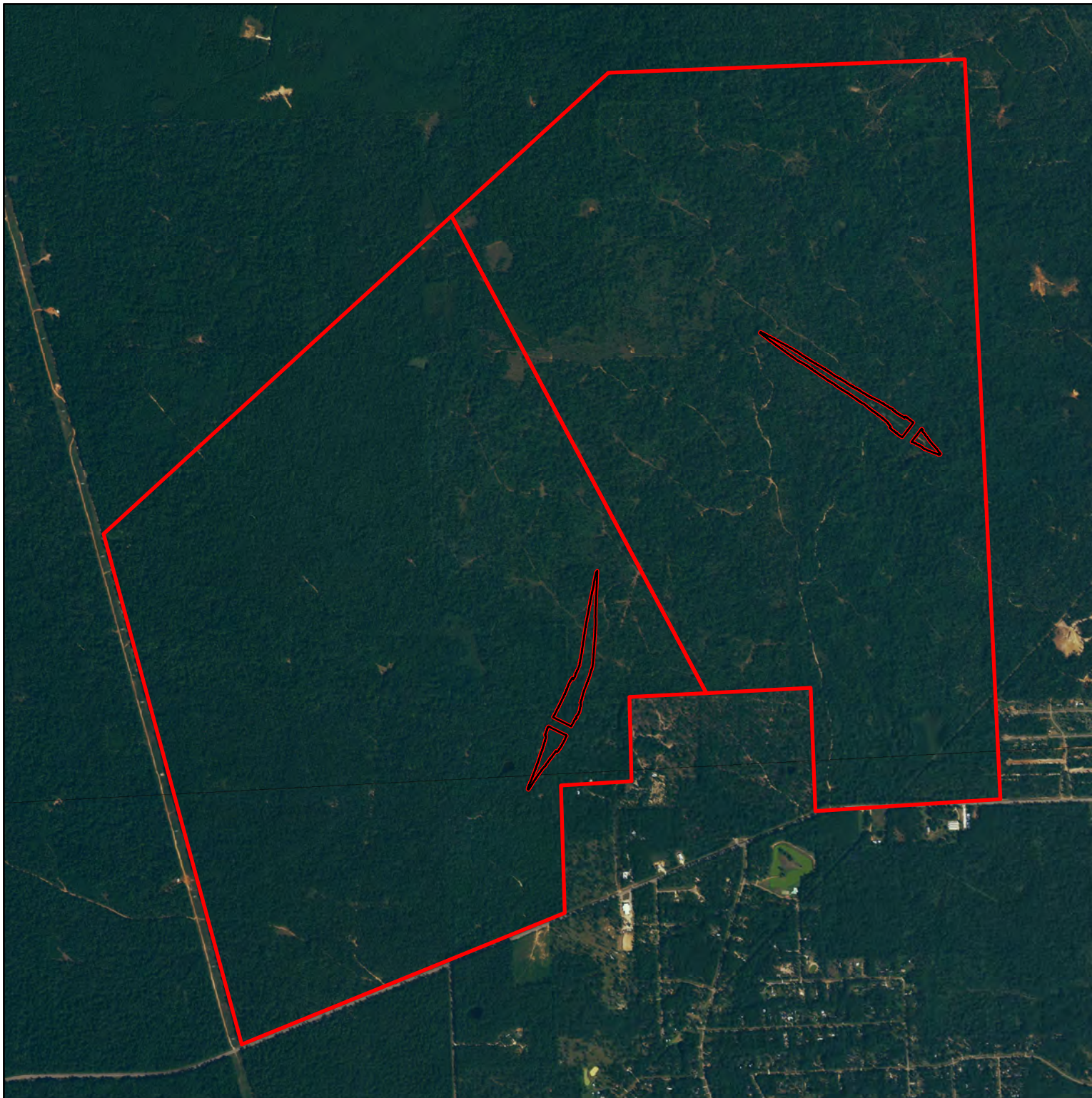
Notes:

1. Map Center: 95.83634°W 30.2001°N
2. TNRIS Aerial Imagery - Magnolia West | NE, NW, SE, SW 1995



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Figure 2c
1995 Aerial Map





Legend

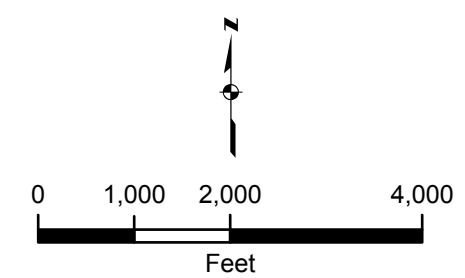
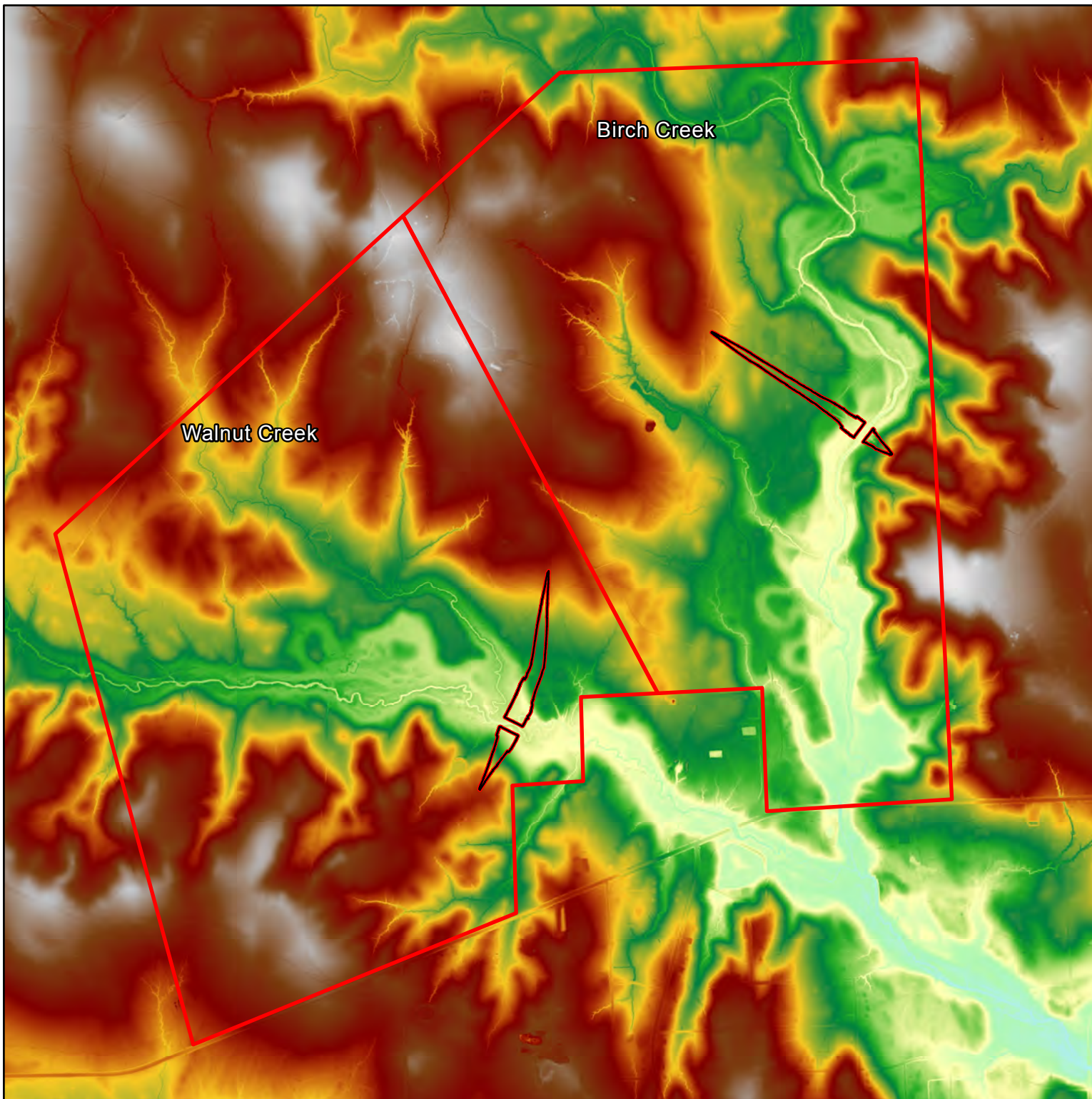
-  Study Area
-  Dam Alignments

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2. TNRIS Aerial Imagery - Magnolia West | NE, NW, SE, SW 2005

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Figure 2d
2005 Aerial Map





Legend

- Study Area
- Dam Alignments

Value (Feet)

	320.285
	202.431

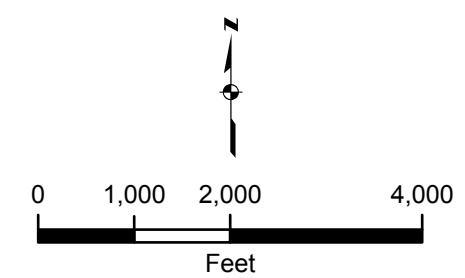
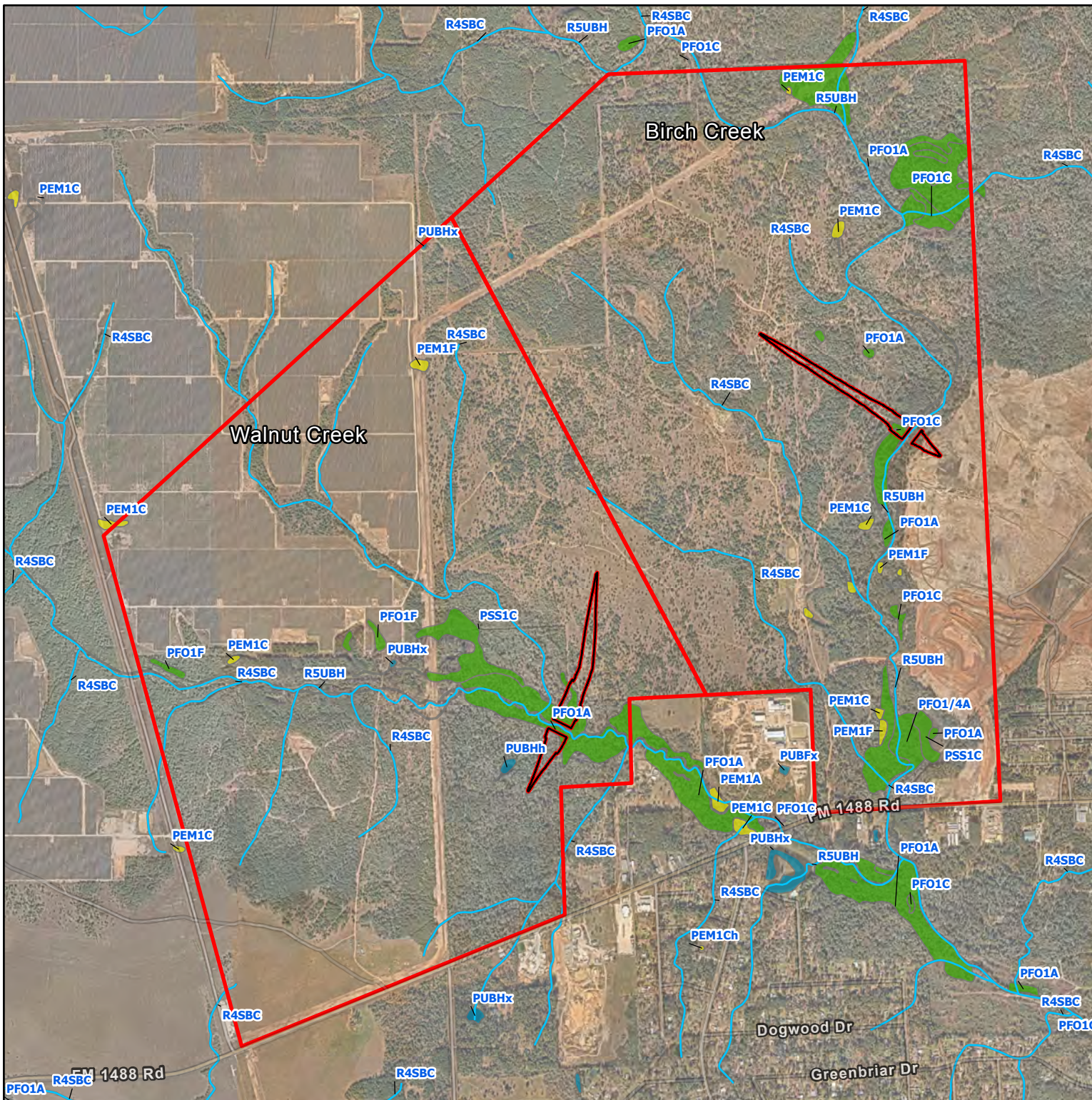
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1. Map Center: 95.8341°W 30.19998°N
2. TXGIO - Upper Coast Lidar, 2018

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Figure 3
LiDAR Map





Legend

- Study Area
- Dam Alignments

NHD Feature Type

- ~ Stream/River

NWI Feature Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Notes:

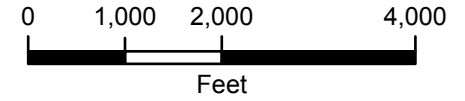
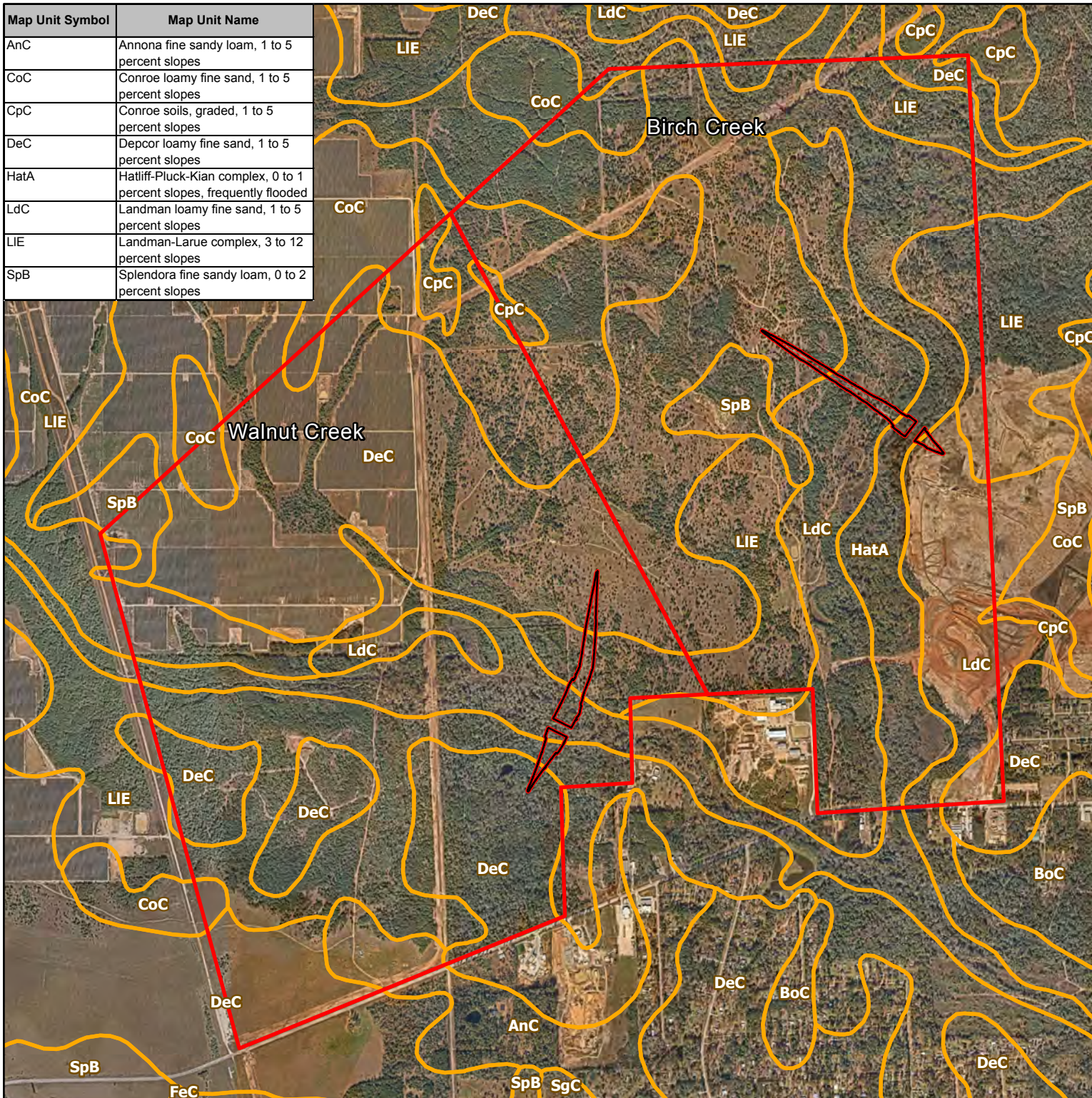
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Nearmap WMS Server: 2023
3. USFWS National Wetlands Inventory
4. USGS National Hydrography Dataset

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Figure 4
 NWI and NHD Map



Map Unit Symbol	Map Unit Name
AnC	Annona fine sandy loam, 1 to 5 percent slopes
CoC	Conroe loamy fine sand, 1 to 5 percent slopes
CpC	Conroe soils, graded, 1 to 5 percent slopes
DeC	Depcor loamy fine sand, 1 to 5 percent slopes
HatA	Hatloff-Pluck-Kian complex, 0 to 1 percent slopes, frequently flooded
LdC	Landman loamy fine sand, 1 to 5 percent slopes
LIE	Landman-Larue complex, 3 to 12 percent slopes
SpB	Splendora fine sandy loam, 0 to 2 percent slopes



Legend

- Study Area
- SSURGO Soil Unit

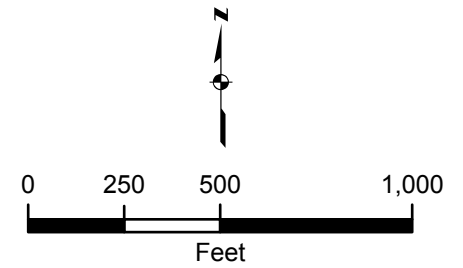
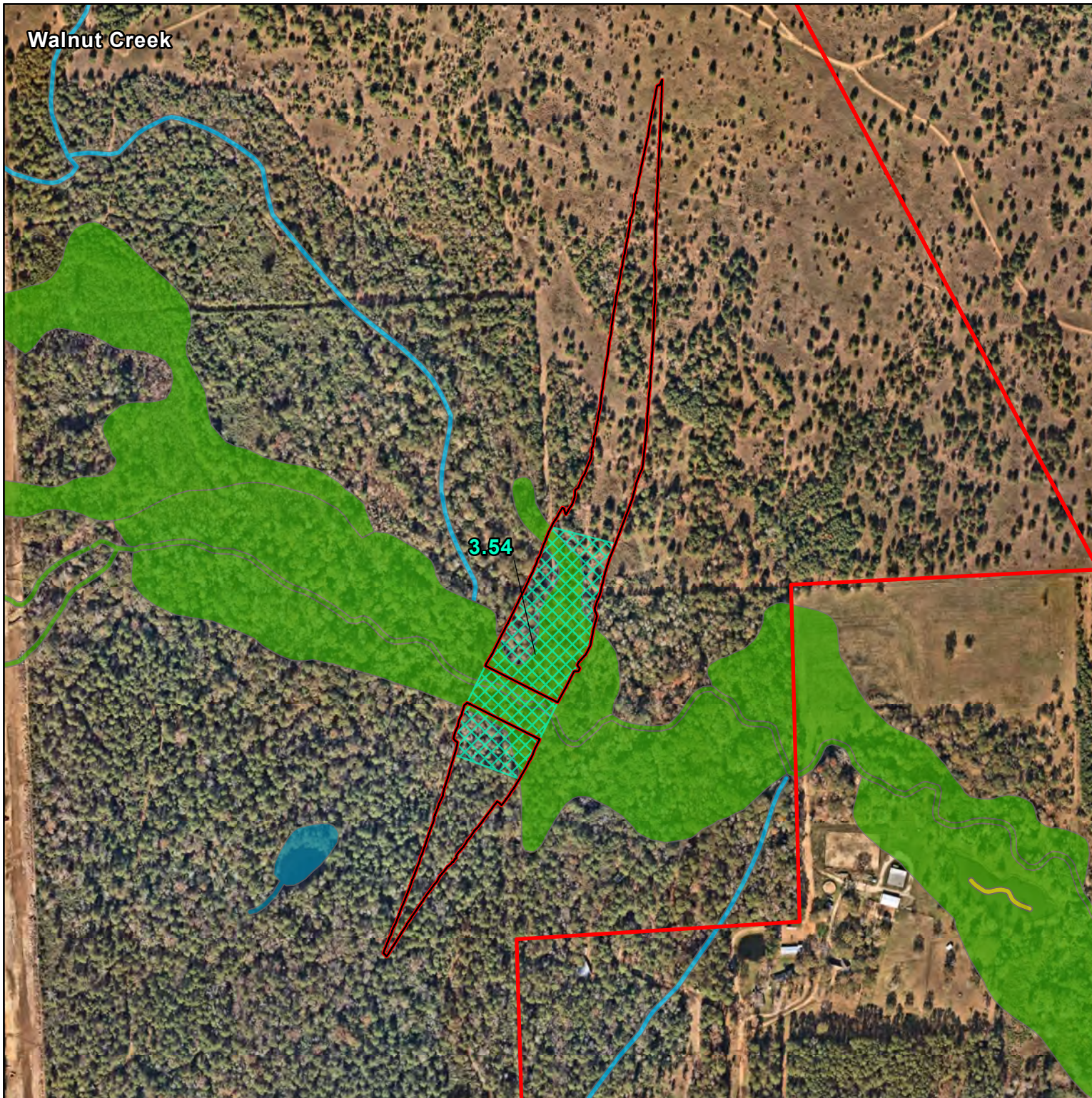
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2. Nearmap WMS Server: 2023
3. USDA NRCS Web Soil Survey

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**Figure 5
 Soil Map**





Legend

- Study Area
- Dam Alignments
- Potential Impacts (Dam)

NWI Feature Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

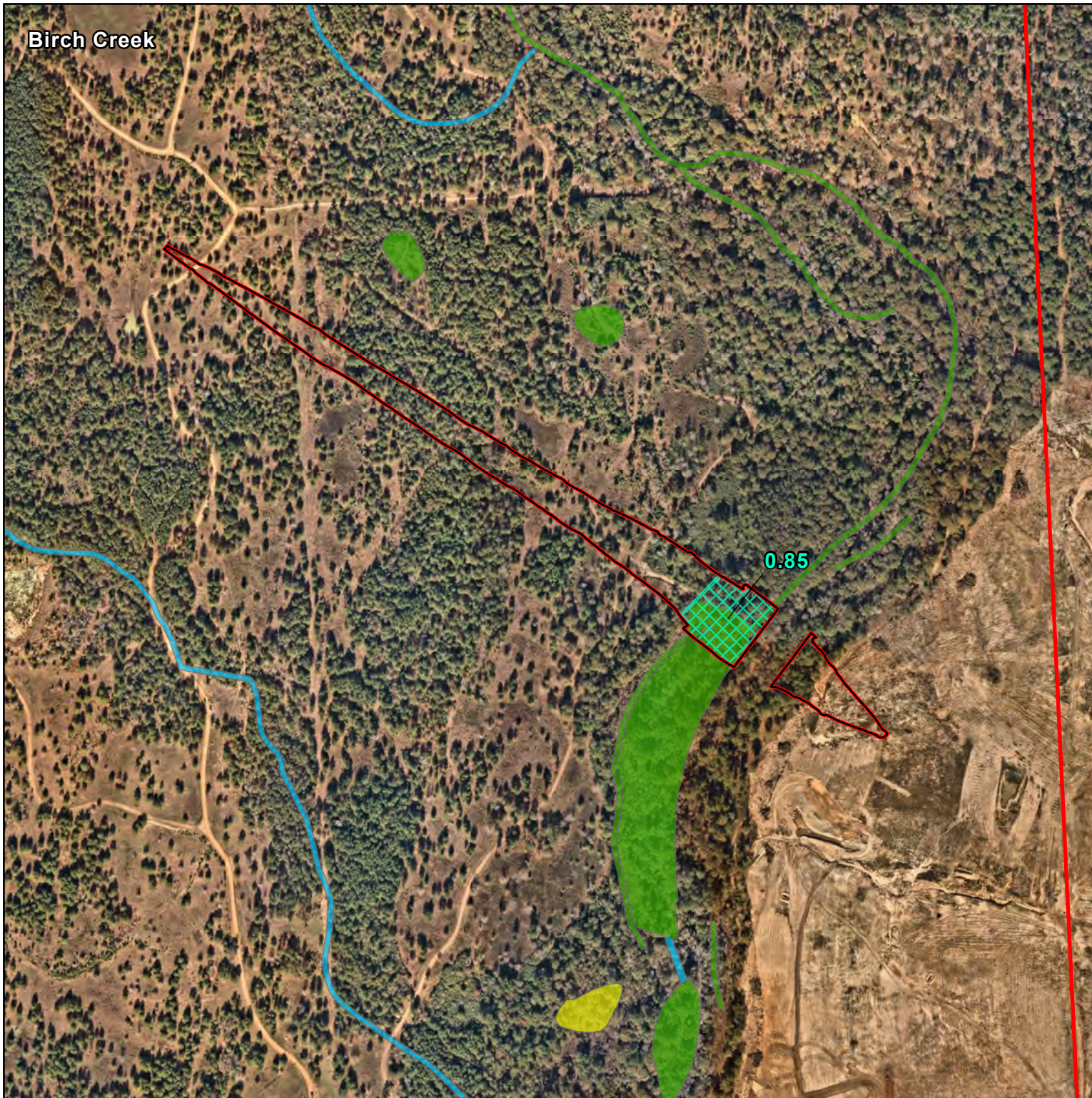
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3. USFWS National Wetlands Inventory

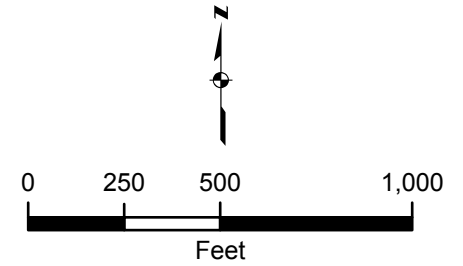
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Figure 6a
Potential Impacts Map





Birch Creek



Legend

- Study Area
- Dam Alignments
- Potential Impacts (Dam)

NWI Feature Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

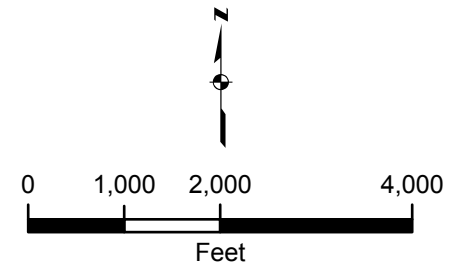
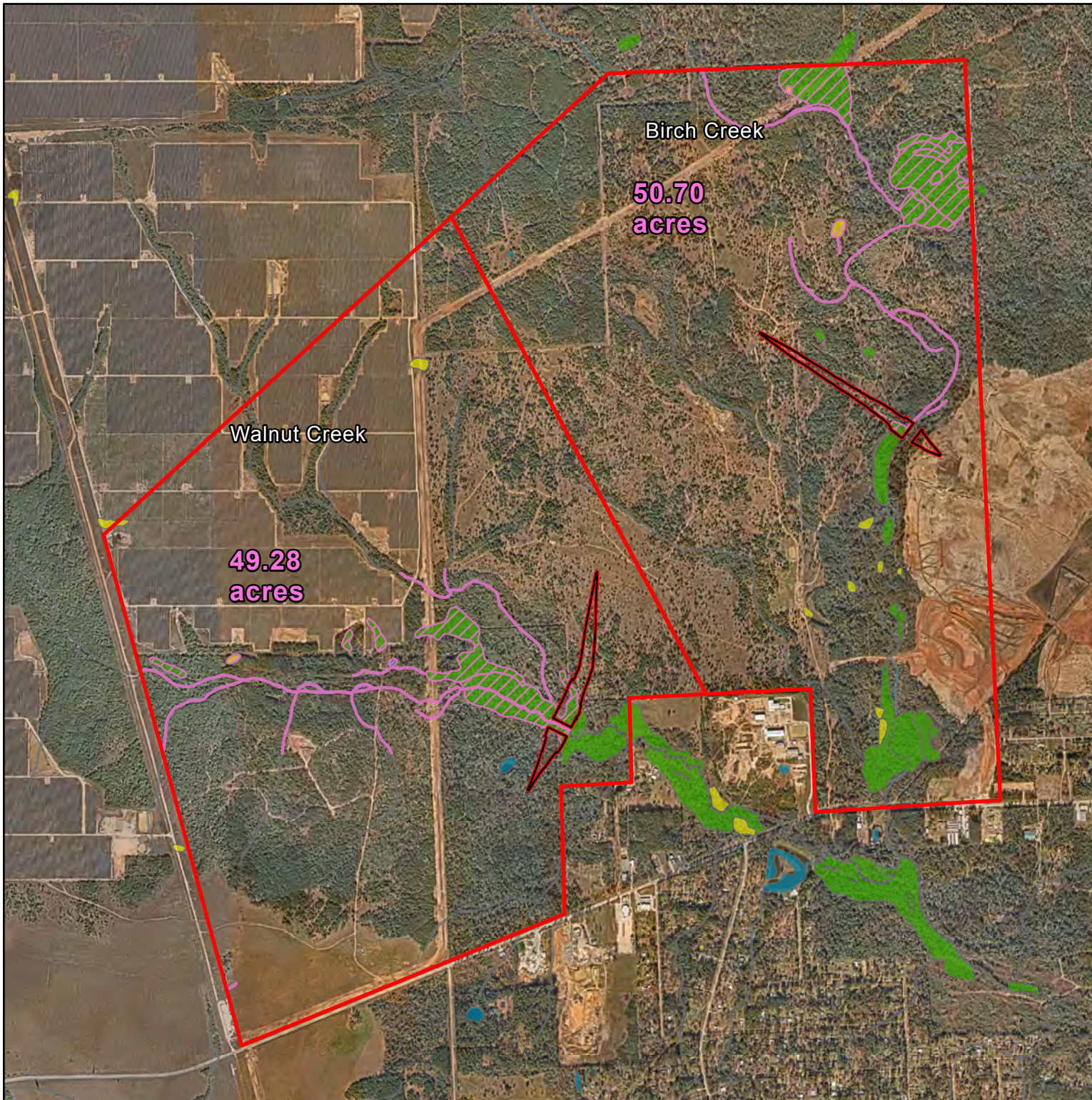
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2. Nearmap WMS Server: 2025
3. USFWS National Wetlands Inventory

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Figure 6b
Potential Impacts Map





Legend

- Study Area
- Dam Alignments
- Potential Flooding

NWI Feature Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Notes:

1. Map Center: 95.83634°W 30.2001°N
2. Nearmap WMS Server: 2025
3. USFWS National Wetlands Inventory

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Figure 6c
Potential Impacts Map



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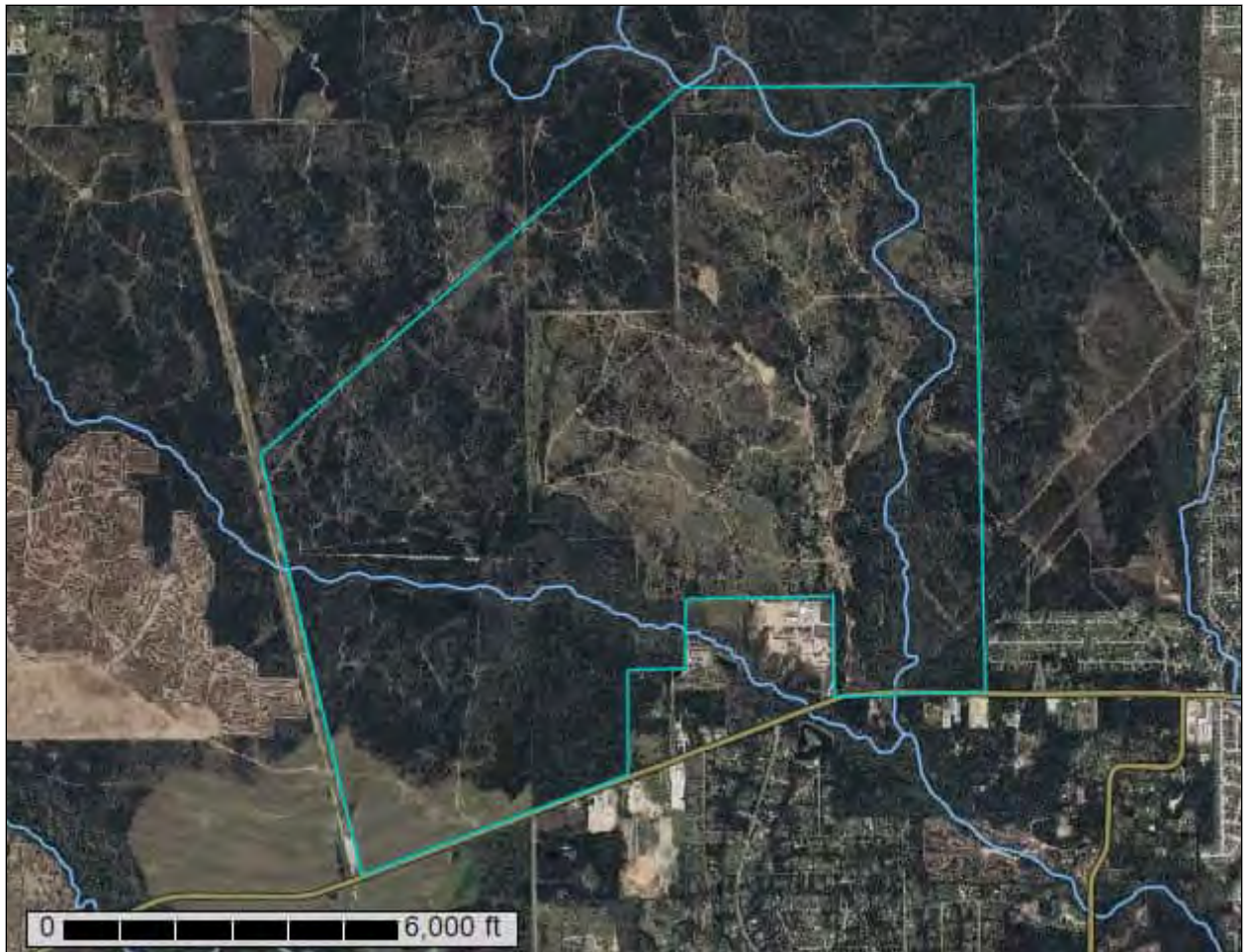
United States
Department of
Agriculture

NRCS

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 **Austin and Waller Counties, Texas**



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

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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

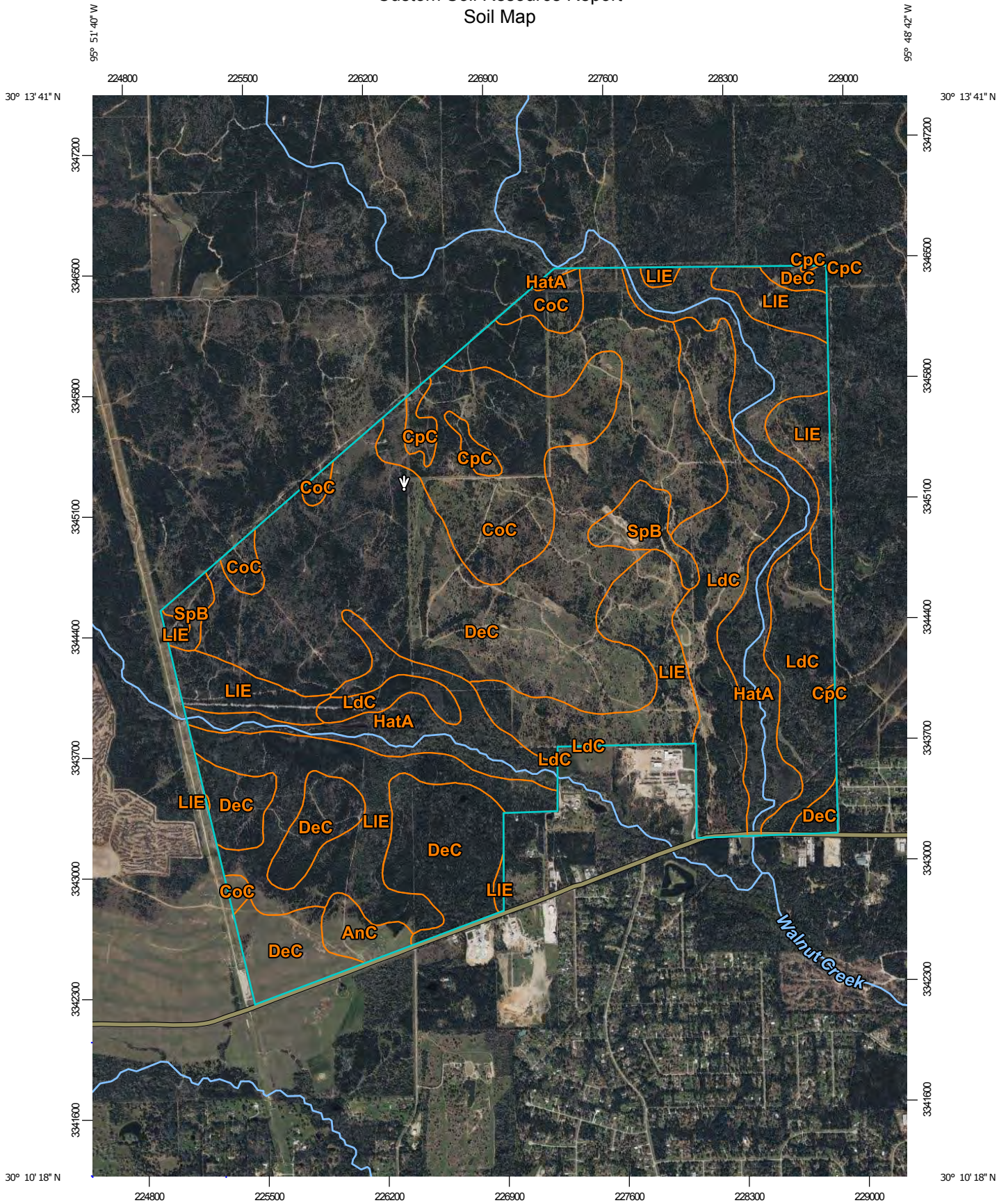
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

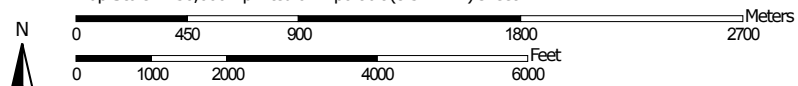
Soil Map

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: 1:30,600 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N 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 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: Austin and Waller Counties, Texas
 Survey Area Data: Version 21, Sep 5, 2023

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

Date(s) aerial images were photographed: Jan 26, 2023—Mar 4, 2023

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
AnC	Annona fine sandy loam, 1 to 5 percent slopes	31.7	1.2%
CoC	Conroe loamy fine sand, 1 to 5 percent slopes	279.6	10.2%
CpC	Conroe soils, graded, 1 to 5 percent slopes	26.1	1.0%
DeC	Depcor loamy fine sand, 1 to 5 percent slopes	1,107.8	40.3%
HatA	Hatliff-Pluck-Kian complex, 0 to 1 percent slopes, frequently flooded	364.6	13.3%
LdC	Landman loamy fine sand, 1 to 5 percent slopes	368.8	13.4%
LIE	Landman-Larue complex, 3 to 12 percent slopes	512.9	18.7%
SpB	Splendora fine sandy loam, 0 to 2 percent slopes	56.1	2.0%
Totals for Area of Interest		2,747.8	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

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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.

Austin and Waller Counties, Texas

AnC—Annona fine sandy loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 30d1j

Elevation: 200 to 500 feet

Mean annual precipitation: 40 to 48 inches

Mean annual air temperature: 64 to 68 degrees F

Frost-free period: 217 to 280 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Annona and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Annona

Setting

Landform: Interfluves

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Interfluve

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: fine sandy loam

Bt - 10 to 18 inches: clay

Btss - 18 to 80 inches: clay

Properties and qualities

Slope: 1 to 5 percent

Depth to restrictive feature: More than 80 inches

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: About 0 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: D

Ecological site: F133BY013TX - Terrace

Hydric soil rating: No

Minor Components

Kullit

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F133BY005TX - Loamy Upland
Hydric soil rating: No

Sacul

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F133BY003TX - Loamy Over Clayey Upland
Hydric soil rating: No

CoC—Conroe loamy fine sand, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 30drv
Elevation: 240 to 420 feet
Mean annual precipitation: 42 to 43 inches
Mean annual air temperature: 67 to 68 degrees F
Frost-free period: 263 to 273 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Conroe

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and clayey fluviomarine deposits

Typical profile

A - 0 to 6 inches: loamy fine sand
E - 6 to 22 inches: gravelly loamy fine sand

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Bt - 22 to 25 inches: sandy clay
Btv - 25 to 70 inches: clay
BCv - 70 to 80 inches: sandy clay

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 23 to 43 inches to plinthite
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 0.7
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F133BY003TX - Loamy Over Clayey Upland
Hydric soil rating: No

Minor Components

Depcor

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F133BY007TX - Southern Sandy Loam Upland
Hydric soil rating: No

Boy

Percent of map unit: 4 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F133BY009TX - Southern Deep Sandy Upland
Hydric soil rating: No

Segno

Percent of map unit: 3 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F133BY005TX - Loamy Upland
Hydric soil rating: No

Splendora

Percent of map unit: 2 percent
Landform: Interfluves
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F133BY002TX - Seasonally Wet Upland
Hydric soil rating: No

Fetzer

Percent of map unit: 1 percent
Landform: Interfluves
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F133BY002TX - Seasonally Wet Upland
Hydric soil rating: No

CpC—Conroe soils, graded, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: djzz
Elevation: 50 to 500 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 260 to 285 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Conroe

Setting

Landform: Interfluves
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 3 inches: gravelly loamy fine sand
H2 - 3 to 65 inches: sandy clay

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches

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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: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F133BY003TX - Loamy Over Clayey Upland
Hydric soil rating: No

Minor Components

Fetzer

Percent of map unit: 5 percent
Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F133BY002TX - Seasonally Wet Upland
Hydric soil rating: No

Depcor

Percent of map unit: 5 percent
Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F133BY007TX - Southern Sandy Loam Upland
Hydric soil rating: No

Waller

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F152BY007TX - Poorly Drained Loamy Upland
Hydric soil rating: Yes

DeC—Depcor loamy fine sand, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 30cqq
Elevation: 200 to 470 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 57 to 77 degrees F

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Frost-free period: 260 to 272 days

Farmland classification: Not prime farmland

Map Unit Composition

Depcor and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Depcor

Setting

Landform: Interfluves

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A/E - 0 to 22 inches: loamy fine sand

Btv1 - 22 to 72 inches: sandy clay loam

Btv2 - 72 to 76 inches: sandy clay loam

Properties and qualities

Slope: 1 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

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: About 24 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Ecological site: F133BY007TX - Southern Sandy Loam Upland

Hydric soil rating: No

Minor Components

Conroe

Percent of map unit: 5 percent

Landform: Interfluves

Landform position (two-dimensional): Summit

Down-slope shape: Convex

Across-slope shape: Convex

Ecological site: F133BY003TX - Loamy Over Clayey Upland

Hydric soil rating: No

Boy

Percent of map unit: 5 percent

Landform: Interfluves

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Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F152BY006TX - Well Drained Loamy Upland
Hydric soil rating: No

Splendor

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F152BY005TX - Seasonally Wet Loamy Upland
Hydric soil rating: No

Fetzer

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F133BY002TX - Seasonally Wet Upland
Hydric soil rating: No

HatA—Hatliff-Pluck-Kian complex, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 1vykn
Elevation: 20 to 150 feet
Mean annual precipitation: 48 to 62 inches
Mean annual air temperature: 67 to 68 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Hatliff and similar soils: 38 percent
Pluck and similar soils: 35 percent
Kian and similar soils: 24 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatliff

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Microfeatures of landform position: Bars

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Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Holocene age clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 12 inches: loam

Bw1 - 12 to 38 inches: fine sandy loam

Bw2 - 38 to 62 inches: fine sandy loam

Bg - 62 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: About 44 to 64 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 0.3 mmhos/cm)

Sodium adsorption ratio, maximum: 2.0

Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 5w

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: A

Ecological site: F152BY012TX - Well Drained Bottomland

Hydric soil rating: No

Description of Pluck

Setting

Landform: Flood plains

Landform position (three-dimensional): Dip

Microfeatures of landform position: Channels

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 6 inches: fine sandy loam

Bg1 - 6 to 34 inches: loam

Bg2 - 34 to 60 inches: loam

Bg3 - 60 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Negligible

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: About 3 to 6 inches

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Frequency of flooding: Frequent
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F152BY013TX - Poorly Drained Loamy Bottomland
Hydric soil rating: Yes

Description of Kian

Setting

Landform: Flood plains
Landform position (three-dimensional): Dip
Microfeatures of landform position: Channels
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 5 inches: fine sandy loam
Bw - 5 to 26 inches: fine sandy loam
Bg1 - 26 to 55 inches: fine sandy loam
Bg2 - 55 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly 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: About 3 to 10 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 8e
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D
Ecological site: F152BY013TX - Poorly Drained Loamy Bottomland
Hydric soil rating: Yes

Minor Components

Simelake

Percent of map unit: 2 percent
Landform: Flats
Landform position (three-dimensional): Talf

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Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F152BY014TX - Poorly Drained Clayey Bottomland
Hydric soil rating: Yes

Cowmarsh

Percent of map unit: 1 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F152BY011TX - Swamp
Hydric soil rating: Yes

LdC—Landman loamy fine sand, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: dk10
Elevation: 170 to 350 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 66 to 70 degrees F
Frost-free period: 240 to 285 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Landman

Setting

Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 65 inches: loamy fine sand
H2 - 65 to 80 inches: sandy clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

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Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F133BY013TX - Terrace
Hydric soil rating: No

Minor Components

Depcor

Percent of map unit: 3 percent
Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F133BY007TX - Southern Sandy Loam Upland
Hydric soil rating: No

Conroe

Percent of map unit: 3 percent
Landform: Interfluves
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F133BY003TX - Loamy Over Clayey Upland
Hydric soil rating: No

Boy

Percent of map unit: 3 percent
Landform: Interfluves
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F152BY006TX - Well Drained Loamy Upland
Hydric soil rating: No

Fetzer

Percent of map unit: 3 percent
Landform: Interfluves
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F133BY002TX - Seasonally Wet Upland
Hydric soil rating: No

Larue

Percent of map unit: 3 percent
Landform: Interfluves
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F133BY006TX - Northern Sandy Loam Upland
Hydric soil rating: No

LIE—Landman-Larue complex, 3 to 12 percent slopes

Map Unit Setting

National map unit symbol: dk11
Elevation: 350 to 650 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 285 days
Farmland classification: Not prime farmland

Map Unit Composition

Larue and similar soils: 40 percent
Landman, affr >30, and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Larue

Setting

Landform: Interfluves
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 28 inches: loamy fine sand
H2 - 28 to 72 inches: sandy clay loam
H3 - 72 to 76 inches: sandy clay loam

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F133BY006TX - Northern Sandy Loam Upland
Hydric soil rating: No

Description of Landman, Affr >30

Setting

Landform: Interfluves

Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 62 inches: loamy fine sand

H2 - 62 to 80 inches: sandy clay loam

Properties and qualities

Slope: 3 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 48 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3s

Hydrologic Soil Group: A

Ecological site: F133BY013TX - Terrace

Hydric soil rating: No

Minor Components

Conroe

Percent of map unit: 10 percent

Landform: Interfluves

Down-slope shape: Convex

Across-slope shape: Convex

Ecological site: F133BY003TX - Loamy Over Clayey Upland

Hydric soil rating: No

Depcor

Percent of map unit: 10 percent

Landform: Interfluves

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: F133BY007TX - Southern Sandy Loam Upland

Hydric soil rating: No

Fetzer

Percent of map unit: 5 percent

Landform: Interfluves

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: F133BY002TX - Seasonally Wet Upland

Hydric soil rating: No

Boy

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F152BY006TX - Well Drained Loamy Upland
Hydric soil rating: No

SpB—Splendora fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: f763
Elevation: 80 to 400 feet
Mean annual precipitation: 48 to 58 inches
Mean annual air temperature: 67 to 68 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Splendora

Setting

Landform: Flatwoods
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Early pleistocene age loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 6 inches: fine sandy loam
E - 6 to 15 inches: fine sandy loam
Bt/E - 15 to 28 inches: loam
Bt - 28 to 70 inches: loam
Btg - 70 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly 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: About 10 to 32 inches
Frequency of flooding: None

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Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 0.2 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F152BY005TX - Seasonally Wet Loamy Upland
Hydric soil rating: No

Minor Components

Waller

Percent of map unit: 7 percent
Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F152BY007TX - Poorly Drained Loamy Upland
Hydric soil rating: Yes

Segno

Percent of map unit: 3 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F152BY006TX - Well Drained Loamy Upland
Hydric soil rating: No

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