DELTA LAND SERVICES

BIG COW CREEK

MITIGATION BANK PROSPECTUS

SWG-2020-00374

Newton County

Prepared by: Delta Land Services, LLC

Restore & Revitalize

BIG COW CREEK MITIGATION BANK

PROSPECTUS

SWG-2020-00374

NEWTON COUNTY, TEXAS

SPONSORED BY

DELTA LAND SERVICES, LLC
1090 CINCLARE DRIVE
PORT ALLEN, LOUISIANA 70767

November 17, 2021

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1.0 INTRODUCTION

Delta Land Services, LLC (DLS) has prepared this Prospectus in accordance with 33 CFR § 332.8(d)(2)[1] to establish, operate, and maintain the proposed 219.8-acre Big Cow Creek Mitigation Bank (Bank) (**Appendix A, Figures 1 and 2**). DLS is the Bank Sponsor (Sponsor) and Ironwood Holdings, LLC is the Property Owner (**Table 1**). The Bank will provide riverine forested wetland restoration, stream restoration, and forested riparian stream buffer restoration for compensatory mitigation for unavoidable, permitted impacts to "Waters of the United States" [2] per 33 CFR § 332.3 (a)(1) and 33 CFR § 332.3 (b)(1)[3]. The Bank mitigation types will be riverine forest preservation, riverine forest rehabilitation, riverine forest re-establishment, riparian buffer re-establishment, perennial stream enhancement, and perennial stream restoration/re-establishment (**Appendix A, Figure 3**).

Table 1: Bank Sponsorship / Ownership, Big Cow Creek Mitigation Bank

Name of Sponsor	Winship Songy Delta land Services, LLC	Point of Contact	Chad Butler Delta Land Services, LLC	Property Owner	Winship Songy Ironwood Holdings, LLC
Mailing Address	1090 Cinclare Dr. Port Allen, LA 70767	Mailing Address	6750 W. Loop S. Freeway, Suite 780, Bellaire, TX 77401	Mailing Address	1090 Cinclare Dr. Port Allen, LA 70767
Phone Number	225.388.5187	Phone Number	281.899.5596	Phone Number	225.388.5187
Fax Number	225.343.3200	Fax Number	225.343.3200	Fax Number	225.343.3200
Email Address	Winship@deltaland-services.com	Email Address	Chad@deltaland-services.com	Email Address	Winship@deltaland-services.com

[1] 33 CFR § 332.8 (d) (2) summarizes the information regarding a proposed mitigation bank at a sufficient level of detail to support informed public and IRT comment. Information included (but not limited too) in a prospectus are the objectives, establishment, operation, service area, general need, technical feasibility, ownership, long-term management, sponsor qualifications, ecological suitability, and water rights.

[2] 33 CFR § 328 defines waters of the United States as it applies to the jurisdictional limits of the authority of the Corps of Engineers under the Clean Water Act. Waters of the United States include those waters listed in 33 CFR § 328(a). The lateral limits of jurisdiction in those waters may be divided into three categories (i.e., territorial seas, tidal waters, and non-tidal waters, which are further described in 33 CFR § 328.4 (a), (b), and (c).

[3] 33 CFR § 332.3 (a)(1) and 33 CFR § 332.3 (b)(1) described general compensatory mitigation requirements; resource types and location of compensatory mitigation; and watershed approach.

1.1 SUPPORTING DOCUMENTATION

Supporting documentation is included with this Prospectus as appendices to the document. **Appendix A** includes maps and figures. **Appendix B** includes the verified wetland delineation and approved jurisdictional determination dated July 15, 2021. **Appendix C** includes initial stream geomorphic table, preliminary cross sections, and reference stream/reach data. **Appendix D** presents a Phase I Cultural Survey.

2.0 GOALS AND OBJECTIVES

The primary goals are long-term sustainability and conservation protection of the Bank. The primary objectives are to implement the restoration, construction and establishment phases of the Bank to meet long-term goals and performance standards. Once the long-term performance standards are met, the Sponsor will serve as the long-term steward.

As a conservation area, the Bank will be protected by a perpetual conservation easement described in **Section 11.0** and by implementing specific management strategies such as:

- developing applicable mitigation work plans;
- utilizing predetermined monitoring schedules;
- executing prompt adaptive management practices;
- executing a perpetual-term conservation easement for long-term protection;
- establishing financial assurances for completing the construction and establishment phases; and
- establishing a secured long-term funding mechanism for annual expenditures associated with long-term monitoring, management, maintenance, and invasive species control.

The objectives are to restore (re-establish or rehabilitate), enhance, or preserve (preservation) the physical, chemical, and biological functions of riverine hardwood forested wetlands along with in-stream channel and forested riparian stream buffer restoration (**Appendix A, Figure 3**). **Table 2** summarizes the number of acres by each restoration type. Once the construction and establishment tasks are completed, the wetland and stream functions and values will mature through time and will be self-sustaining. The Bank will provide floodwater storage, improve downstream water quality, provide wildlife habitat (native and migratory), and outdoor recreation. Although not currently included as a part of the mitigation bank credit assessment, 99.7 acres of upland buffer habitats will be restored and protected and a 0.9-acre pond and 0.3-acre of a non-restored stream will be protected.

Table 2: Summary of Restoration and Preservation Goals for the Big Cow Creek Mitigation Bank, Newton County, Texas				
Resource Type	**Rehabilitate**	**Enhance**	**Re-establish**	**Preserve**
Riverine Wetland Forested (Acres)	28.2	--	51.3	14.8
Riparian Stream Buffer (Acres)	--	--	24.6	--
Upland Buffer (Acres)	--	--	99.7	--
Streams (linear feet[lf])	--	4,406	3,431	0.3 ac
Upland Pond (Acres)				0.9
Total (lf:acres):		**7,837 lf**		**219.8 acres**

3.0 PROJECT LOCATION

The Bank is located approximately 2.5 miles west of the city of Newton, Texas (**Appendix A**, **Figure 4**). The Property is located within the South Central Plains (35) Level 3 Ecoregion (Omernik 1995) and is situated within the LRR P-South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region and in MLRA 133B-Western Coastal Plain (NRCS 2006). The approximate site center is located at Latitude 30.843714° North and Longitude -93.799292° West (World Geodetic Survey of 1984 ["WGS"] Datum). The corresponding Universal Transverse Mercator (UTM) coordinates are 423,569 meters north and 3,412,555 meters east (Zone 15R, North American Datum of 1983 [NAD83]).

3.1 DRIVING DIRECTIONS

The Bank is accessed from Newton, Texas by driving west on US Highway 190 approximately 2.5 miles to County Road (CR) 3004 turning south then west, and then south on CR 3005; CR 3005 terminates at the property boundary.

4.0 BASELINE CONDITIONS

The Bank is in the South Central Plains (35) Level 3 Ecoregion and the Southern Tertiary Uplands (35e) Level 4 Ecoregion (Omernik 1995). The northeastern, eastern and southeastern portions of AOI are entirely included in FEMA's 2018 designated flood zone A or 100-year floodplain of Big Cow Creek, which is depicted in **Appendix A, Figures 5** and **6**.

Newton County has a humid subtropical climate with hot, humid summers and mild to cool winters. The average annual precipitation of 57.5 inches. The growing season is year-round, as soil temperatures never drop below freezing and Newton County's average annual temperature is

65.8 degrees (NOAA 2020). Newton County is primarily rural in nature with timber and agricultural (cattle) being the dominant land uses (**Appendix A**, **Figure 7**). The site was forested through the 1970's and then cleared sometime circa 1980. The Bank has been maintained as open land and used for cattle or hay production over the last 40 years (**Appendix A**, **Figures 8 – 14**).

4.1 TOPOGRAPHY

Natural topography within most of the Bank is slightly undulating and bisected with small streams and drainages. Typical slopes range from 0 to 5%. Water flows across the site generally from the west and northwest and drains toward Big Cow Creek. Natural elevation ranges from about 160 feet to above 200 feet North American Vertical Datum (USGS 2019) above sea level. The Bank is depicted on the USGS topographic and LIDAR maps in **Appendix A, Figures 2** and **5**.

4.2 SOILS

The western portions of the Bank are excessively to well drained with highly permeable sandy soils. The eastern portions of the Bank are somewhat poorly drained to poorly drained and exhibits soils with high permeability, a water table within 12 to 18 inches of the surface, and frequently receives overbank floodwaters from Big Cow Creek. This area also receives run off from adjacent uplands and groundwater seeps at the upland edge of the floodplain. Of the 20 soil profiles examined during the wetland delineation, 10 exhibited hydric soil indicators. The two most common hydric soil indicators observed onsite were Depleted Matrix (F3) and Stripped Matrix (S6).

The Bank is mapped as Bienville-Alaga association, gently undulating (BIB), Doucette-Boykin association, undulating (DUB), and Mantachie and Bleakwood soils, frequently flooded (Mn). The Mantachie and Bleakwood soils are rated as hydric and occupy the eastern half of the Bank in the floodplain of Big Cow Creek. Soil map units identified within the Bank are based on SSURGO data (NRCS 2020) and are presented in **Figure 15** of **Appendix A**.

4.3 HYDROLOGY

The Bank is partially located in the floodplain of Big Cow Creek. The eastern and northeast portions are entirely included in FEMA designated flood zone A or 100-year floodplain of Big Cow Creek, which is depicted in **Appendix A**; **Figure 6**. The primary hydrological influences are overbank flooding from Big Cow Creek, shallow groundwater, rainfall, and overland sheet flow. The average annual rainfall in Newton County is approximately 57.5 inches (NOAA 2020). The tributary streams on the Bank have been impaired and degraded. The streams possess degraded riparian buffers and lack in-stream wetlands as well as floodplain wetlands. Livestock have unimpeded access to the streams, which is causing the following: erosion, poor water quality, and severely limiting aquatic organism productivity. Existing forested riparian areas are subject to uncontrolled grazing by livestock creating a denuded understory and midstory.

Portions of the Bank remain inundated or saturated to sufficiently support wetland hydrology. Of the 20 sample points, 10 points exhibited wetland hydrology indicators, sample points located in the wetland re-establishment areas that did not meet the wetland hydrology criterion were typically within the upper elevations of the site. The most common primary indicators were Surface Water (A1), High Water Table (A2), Saturation (A3), and Oxidized-rhizospheres on Living Roots (C3), while the FAC-Neutral Test (D5) was the only secondary indicator.

4.4 VEGETATION

The Bank consists of agricultural land (cattle grazing) with wetland and upland hardwood forests and wetland and upland herbaceous communities. Vegetation community descriptions are provided below (**Sections 4.4.1 and 4.4.2**). The open, herbaceous areas of the Bank have been heavily grazed and managed for forage production, which has reduced the presence of native wetland vegetation. During the wetland delineation, the vegetation criterion was typically the only wetland criteria that did not meet in the wetland re-establishment areas. Vegetative conditions are a product of range management practices, deep well drained soils, overbank flooding, and ground water influence. Of the 20 wetland delineation sample locations, 17 met the requirement for hydrophytic vegetation and these conditions will likely persist for the foreseeable future with further development of hydrophytic vegetation communities being possible with hydrologic restoration treatments. Vegetation nomenclature follows USDA, "*The PLANTS Database"* and the *2018 National Wetland Plant List* (USDA 2020 and USACE 2018).

4.4.1 WETLAND HABITATS

Riverine forested wetlands occur within the Bank and are contiguous with adjacent bottomland hardwood forests along Big Cow Creek. The Bank is primarily open with remnant forested areas along drainages and side slope seeps. Tree assemblages and densities vary in different areas of the Bank and are likely dependent upon hydrology, soil type, and landscape position. **Figure 16** in **Appendix A** presents the National Wetland Inventory Map for the Bank.

Wetland herbaceous/shrub vegetation communities are present along the central north/south stream corridor and within the hillside seep wetland just west of this stream corridor on the slope grading into the floodplain. Dominant shrubs in this vegetation community include hazel alder (*Alnus serrulata*), wax myrtle (*Morella cerifera*) and Sweetgum (*Liquidambar styraciflua*). Chinese Tallow (*Triadica sebifera*) is also present in this vegetation community. Herbaceous species include southern water grass (*Luziola fruitans*), smartweeds (*Polygonum* spp.), soft rush (*Juncus effusus*), weak rush (*Juncus debilis*) and prim-rose willows (*Ludwigia* spp.), among others.

Wetland forests occur along Big Cow Creek and the tributaries along the southern boundary of the Bank. Deeper depressional floodplain forests with longer hydroperiods are dominated by bald cypress (*Taxodium distichum*), swamp tupelo (*Nyssa biflora*), sweetgum (*Liquidambar styraciflua*), black willow (*Salix nigra*), and water oak (*Quercus nigra*), among others. Shrubs include seedling and sapling individuals of bald cypress and swamp tupelo along with the exotic

Chinese tallow (*Triadica sebifera*) and Chinese privet (*Ligustrum sinense*). The herbaceous layer is sparse, but reasonably diverse in this swampy vegetation community. Common herbaceous species include horned beaksedge (*Rhynchospora corniculata*), lizard's tail (*Saururus cernuus*) Virginia sweetspire (*Itea virginica*), swamp smartweed (*Polygonum hydropiperoides*), and weak rush (*Juncus debilis*), among others.

The mitigation features map is based on wetland delineation (**Appendix B**), which categorized six (6) surface features (e.g., forested wetlands, scrub/shrub wetlands, herbaceous wetlands, upland cattle pasture, Big Cow Creek, and tributaries). **Table 3** below lists each wetland and aquatic resource type and linear footage or acreage below.

Table 3. Existing Wetland Resource Types within the Big Cow Creek Mitigation Bank, Newton County, Texas

Resource Type	Linear feet in Project Area	Acres in Project Area
Forested Wetland	-	16.7
Emergent Wetland	-	28.9
Scrub/shrub Wetland		7.9
Perennial Stream	7,552	3.8
Pond		0.9
Totals:	7,552	58.2

4.4.2 NON-WETLAND HABITATS/EXISTING RIPARIAN BUFFER

The non-wetland habitats within the Bank consists of upland pasture utilized for grazing, which are bisected and lined by forested and herbaceous/shrub floodplains and stream management zones. The upland and wetland pastures are largely dominated by big carpet grass (*Axonopus fissifolius*). Along with big carpet grass, wetland pasture vegetation includes rushes (*Juncus* spp.), sedges (*Cyperus* spp.), *Rhynchospora* spp. and *Carex* spp.), smartweeds, and erect spadeleaf (*Centella erecta*) among others.

The upland pasture area exhibits a larger portion of Bahia grass (*Paspalum notatum*), along with other facultative upland and upland vegetation like dog fennel (*Eupatorium capillifolium*), sneezeweed (*Helenium amarum*), creeping lespedeza (*Lespedeza repens*), smut grass (*Sporobolus indicus*), and southern dewberry (*Rubus trivialis*), among others.

Non-wetland floodplain forests are situated on deep well drained sandy soils. These areas experience short duration flooding events; however, floodwaters are not present long enough to develop hydric soils. Common trees in this vegetation community include river birch (*Betula nigra*), American beech (*Fagus grandifolia*), blackgum (*Nyssa sylvatica*), water oak, willow oak (*Quercus phellos*), American hornbeam (*Carpinus caroliniana*), and sweetgum, among others. Common shrubs include yaupon holy (*Ilex vomitoria*), Hercules club (*Zanthoxylum clava-*

herculis), and Chinese privet. Ground cover is generally sparse. Common herbaceous species include slender woodoats (*Chasmanthium laxum*), rosette grass (*Dichanthelium* spp.), Carolina elephantsfoot (*Elephantopus caroliniana*), littlehead nutrush (*Scleria oligantha*), and American beautyberry (*Callicarpa americana*).

4.5 CULTURAL RESOURCES

A Phase I Cultural Resources survey was conducted for the Bank in January of 2020. The Phase I field surveys were conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA), and in accordance with the Texas Historical Commission (THC) survey standards and guidelines. The objectives of the Phase I cultural resources survey were to locate cultural resources within the Bank area, delineate the vertical and horizontal extent where possible, provide a preliminary evaluation of the National Register of Historic Places (NRHP)-eligibility of each resource, and assess potential for the Bank to directly or indirectly affect historic properties or other sensitive cultural resources.

The comprehensive surveys included the excavation of 102 shovel tests. These investigations resulted in the revisit of one previously recorded site (41NW11), and the documentation of a single Archaic-age dart point in isolated contexts. The dart point was classified as an isolated find (IF) and was not formally recorded as an archeological site. Site 41NW11 is located on the western banks of Big Cow Creek and was recorded in 1959 as an Archaic-age artifact scatter. No evidence of the site was identified during the current investigation, and it is likely that the site has been destroyed in the past decades due to episodic flooding of Big Cow Creek. Based on these factors, site 41NW11 is recommended as ineligible for listing in the NRHP. To date, the cultural resources survey investigations have been completed, and no further work is recommended for the Bank.

A copy of the Phase I report is provided in **Appendix D;** DLS will provide the USACE with any future correspondence from the THC, once received.

5.0 ESTABLISHMENT AND OPERATION

5.1 PRESERVATION

Approximately 16.7 acres of forested wetlands will be preserved within the Bank (**Appendix A, Figure 3** and **Table 3**). Preservation includes forested wetlands located along Big Cow Creek and small drainages that traverse the Bank (**Appendix A**, **Figure 3**). The forest is a mid-successional plant community consisting of several hardwood species including oaks, gums, and sweetgum as described in **Section 4.4.1** of this Prospectus.

As a part of a larger stream corridor, forested wetlands are of high ecological value. These habitats provide physical, biological, and chemical wetland functions and added value for aquatic and terrestrial wildlife resources. Placing these forested wetlands under a perpetual conservation

servitude ensures the permanent presence of this resource and eliminates the threat of development or further clearing for cattle grazing. Furthermore, preservation includes long-term management and invasive species control**.** Long-term viability and sustainability of the forested wetlands will be ensured through active and adaptive management including, but not limited to, invasive species control, appropriate monitoring, and long-term maintenance. Regarding hydrology, the forested wetlands are supported by stream overbank flooding, surface sheet flow, and precipitation. As such, long-term hydrology maintenance is self-sustaining.

5.2 RESTORATION PLAN

Wetland restoration (i.e., re-establishment and rehabilitation) will be accomplished through the cessation of all agricultural practices (e.g., livestock production), returning the soil surface to natural topography by removing drainage ditch spoil deposits, site planting preparation (e.g., controlling introduced species, deep ripping, and surface disking), and the afforestation[4] of native wetland species. Additionally, stream restoration will return the natural riverine hydrology to the wetland restoration areas. Hydrologic restoration will increase surface water retention, soil saturation, reduce nonpoint source runoff, and improve water quality through nutrient immobilization (uptake) by vegetation. The plant community will be restored as riverine forested wetlands.

5.3 HYDROLOGY RESTORATION

Unimproved farm access roads and adjacent borrow areas (drainage ditches) will be degraded or filled to natural elevations. Hydrology restoration will primarily focus on site preparation and stream restoration. Compaction has occurred throughout the site due to decades of cattle grazing. Cessation of the cattle operation and site preparation will improve water infiltration and allow the groundwater table to move to the surface through below ground saturation and capillary flow. The perennial stream has been heavily degraded and plowed to promote the growth of pasture grasses. These disturbances have created a deeper than normal depressional wetland feature, which collects and concentrates water from adjacent areas. Restoring the stream channel will restore the natural floodplain and allow for overbank flooding across the entire stream bottom and wetland restoration areas, particularly when combined with Big Cow Creek overbank flooding.

[4] The Society of American Foresters Dictionary of Forestry (http://dictionaryofforestry.org) defines afforestation as *the establishment of a forest or stand in an area where the preceding vegetation or land use was not forest —see deforestation, reforestation, regeneration, stand establishment.*

5.4 SITE PREPARATION AND PLANTING

The forested wetland community and upland buffer will be re-established or re-habilitated through heavy planting of native hardwood seedlings (i.e., 436 stems per acre of hard and soft mast). The preservation areas (wetland) will be chemically spot-treated for invasive species.

5.4.1 RIVERINE WETLAND FOREST PRESERVATION

Site preparation for preservation areas will consist of initializing the applicable, long-term management tasks including removal of cattle, boundary maintenance, and invasive species control in wetland and non-wetland forested areas.

5.4.2 RIVERINE WETLAND FOREST REHABILITATION AND RE-ESTABLISHMENT

Site preparation will consist of exotic / nuisance species removal and afforesting[5] the open areas created by this treatment. Exotic / nuisance species will be removed / controlled with herbicide (e.g., broadcast and spot spraying). Once the initial control treatment is completed, any remaining, sprouting, or germinating stems will be spot treated again.

Table 4: Native Tree / Shrub Species with a Wetland Indicator Status of FAC or Wetter Referenced on the Big Cow Creek Mitigation Bank

Common Name	Scientific Name	Wetland Indicator Status	Common Name	Scientific Name	Wetland Indicator Status
Water oak	*Quercus nigra*	FAC	Blackgum	*Nyssa sylvatica*	FAC
Willow oak	*Quercus phellos*	FACW	Sweetgum	*Liquidambar styraciflua*	FAC
Swamp Chestnut oak	*Quercus michauxii*	FACW	Sweetbay	*Magnolia virginiana*	FACW
Bald cypress	*Taxodium distichum*	OBL	American hornbeam	*Carpinus caroliniana*	FAC
River birch	*Betula nigra*	FACW	Hazel alder	*Alnus serrulata*	FACW
Swamp tupelo	*Nyssa biflora*	OBL	Yaupon	*Ilex vomitoria*	FAC
Hercules' club	*Zanthoxylum clava-herculis*	FAC			

To restore the native forest and provide added exotic / nuisance species control, rehabilitation and re-establishment areas will be afforested with native species referenced on site and with wetland indicator statuses of FAC or wetter listed in **Table 4**. The proposed planting species list is comprised of the tree species identified from the forested, wetland data points (DLS 2020). Planting will occur from January through February at a rate of 436 stems per acre on approximately 10-foot centers. The soil surface will be subsoiled to a depth of 14 to 16 inches to create a seedling planting bed (Allen et al. 2001). Prior to subsoiling, restoration areas will be disked and a pre-emergent herbicide will be applied to control invading grasses and broadleaf species. Seedlings will be pre-mixed at an off-site location to ensure species distribution during planting. The planting ratio of hard to soft mast will be approximately 65:35, which will consist of at least nine (9) of the 13 reference species (**Table 4**).

Due to the number of hardwood stems required to plant the Bank, tree and shrub seedlings will be provided by commercial nurseries using source seed collected within similar temperature regimes and plant hardiness zones within the South Central Plains Level III Ecoregion. (USEPA 2003). However, the availability of tree seedlings for afforesting is often a limiting factor and is determined by seedling availability and cost.

5.4.5 UPLAND BUFFER RESTORATION

Site preparation for non-wetland buffer will mimic the wetland rehabilitation and re-establishment areas. To restore the native forest and provide added exotic / nuisance species control, upland buffer areas will be afforested with native species referenced on site and with wetland indicator statuses of FAC and facultative upland (FACU) and upland (UPL) species referenced at the site. Additional trees that could be used in the upland buffer include white oak (*Quercus alba*), southern red oak (*Quercus falcata*), post oak (*Quercus stellata*), shagbark hickory (*Carya ovata*), black gum (*Nyssa sylvatica*), pecan (*Carya illinoensis*), and slippery elm (*Ulmus rubra*). Planting will occur from January through February. Seedlings will be pre-mixed on an off-site location to ensure mixed species distribution during planting.

5.5 STREAM RESTORATION

Objectives of the stream mitigation work plan (Stream MWP) are to restore, enhance, and maintain the natural dimension, pattern, and profile of approximately 7,837 lf of degraded and/or impaired stream resource, as well as re-establish 24.6 acres of riparian buffer (**Appendix A**, **Figure 3** and **Appendix C**).

According to the Stream SOP, re-establishment credits are achieved through the manipulation of the physical, chemical, and/or biological characteristics of the site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in the rebuilding of a former aquatic resource and results in a gain of aquatic resource area and functions (e.g., stabilizing dimension, pattern, and profile through in-channel work). Enhancement credits are

achieved through the manipulation of the physical, chemical, and/or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may not result in a gain in aquatic resource area(s) (e.g. channel stabilization and buffer work).

For the restoration/re-establishment and enhancement of perennial streams, the Sponsor will employ the Natural Channel Design approach as developed by Dave Rosgen for stream restoration activities typical to the three stream priority levels. The priority levels are priority one (P1)[6], priority two (P2)[7], and priority three (P3)[8] (Doll 2003). An integral part of this method involves the use of local and/or regionalized reference reach data to develop geomorphic design criteria for stable restored channels. As a result, the Sponsor has identified streams adjacent to the restoration site as suitable reference reaches (**Appendix C**). Reference reach selections were based on stream type and valley type of the proposed restored streams. Key components for reference reach selection included a desktop review of the watershed and observable field indicators of stream stability at each reference location. The selected stream reference reaches for this Stream MWP indicated no observable alterations to the watershed, provided valuable information regarding natural stability and equilibrium, and apply to multiple proposed restoration reaches within the Bank. It should be noted that reference reaches identified were applicable to streams from which they were surveyed and provided information that was scaled and utilized for restored reaches of the same stream type. This is accomplished by analyzing fluvial geomorphic measurements of the reference streams and using that data to generate multiple dimensionless ratios that accurately characterize relationships between contributing drainage areas and restoration reach design criteria for dimension, pattern, and profile.

Various types of woody structures will be used to achieve stability in restored streams as well as contribute to grade control, habitat development, and water quality. These structures will also serve to direct water flow downstream while dissipating lateral and vertical energy and allow flood waters into the riparian wetlands. The structures will be constructed solely of native materials and will include but not be limited to log cross-vanes, log j-hooks, rootwads, and toewood. A plan view drawing of proposed restoration/re-establishment reaches along with typical structure designs are included in **Appendix A**, **Figure 3** and **Appendix C**. Along with in-channel restoration activities, a 100-foot riparian buffer along the right and left descending banks of the stream will be re-established. Enhancement activities will include removal of cattle and cessation of grazing

[6] Priority 1 Restoration – to replace an incised channel with a new, stable stream at a higher elevation (Doll 2003).
[7] Priority 2 Restoration – to create a new, stable stream and floodplain at the existing channel-bed elevation (Doll 2003).
[8] Priority 3 Restoration – to widen the floodplain at the existing channel elevation to reduce shear stress (Doll 2003).

activities, heavy buffer plantings, restoration of proper width/depth ratio, and stream bank stabilization through adjustments to the channel pattern and installation of woody structures.

The existing and proposed channels have been subdivided into distinct reaches based on valley type, site topography, drainage, and treatment application. Separate morphological criteria have been developed for each distinct reach. Selected morphological characteristics and a brief description of the channel work along with the associated structures for each of the distinct restoration types is included below in **Section 5.5.1-5.5.2**.

5.5.1 PERENNIAL STREAM ENHANCEMENT

PER-01 and PER-04 are perennial stream reaches with drainage areas of 0.26 square mile and 0.46 square mile, respectively. The initial 1,611.58 feet of perennial stream (PER-01) is in a valley type VIII and has an existing channel slope of 0.0053 vertical foot per linear foot (0.5%). The current condition of PER-01 is an E5 stream with a sinuosity of 1.45 and a low bank height ratio of approximately 1.0. However, cattle have unimpeded access to the creek for watering, resulting in areas of over-widening, severe bank erosion, and bank failure. PER-01 will be further stabilized by laying back the stream banks in areas of severe bank erosion, extending or re-establishing point bar features at meander bends, reducing the width/depth ratio of over-widened areas, increasing the radius of curvature of tortuous meanders, and installation of bank and grade control woody structures. These activities will result in better floodplain access, more efficient sediment transport, and a reduction of near bank stress resulting in overall greater channel stability with drastically reduced bed and bank erosion rates. PER-04 also exists in a valley type VIII and is currently classified as a G5 stream type. Although this is the stable form for this reach, some indicators of instability are present due to livestock access and direct impacts to upstream reaches. Stream characteristics resulting from these impacts include bank instability and stream bed downcutting. In-stream enhancement work within PER-04 will include the removal of excessive debris jams, re-establishment of point bar features, laying back banks and installation of woody structures for bank stabilization and grade control. The result of enhancement work will be a stable channel capable of transporting its sediment load downstream and resisting head cutting that could result from changes in the base level of Big Cow Creek.

PER-05 is a perennial stream with a drainage area of approximately 1.60 square miles upon entering the Bank. The channel, as it exists within the project area, is in a fairly stable condition and transitions from an E5 stream type to a G5 stream type near its confluence with Big Cow Creek. Impacts to this reach include excessive foreign debris, outer bank instability, over widening at cattle crossings, and areas of potential avulsion. These issues will be resolved through the recontouring of stream banks to reduce width to depth ratio at livestock crossings, installation of woody structures to arrest erosion at unstable banks, and removal of flow-altering debris.

Other impacts resulting from cattle access to the aforementioned reaches include a lack of desirable buffer vegetation. Buffer plantings in these areas will enhance reaches PER-01, PER-04, and PER-

05 by returning the native bottomland hardwood vegetation to its proper condition. Please refer to **Section 5.5.2** for a more detailed description of the vegetative restoration plan.

Several types of wooden structures will be used to further stabilize the enhancement reaches; these proposed structures may include but are not limited to the following: log J-hook vanes, toe-wood, scour logs, and root wads. Use of the log-n-roll structure will also be employed specifically at PER-04 and PER-05 to establish reliable grade control while achieving the proper slope to maintain the streams' confluence with Big Cow Creek. These structures will introduce stable and beneficial woody material into the channel, reduce near bank stress, maintain pool depth, and provide grade control. As a result, habitat will be improved, and stream bed/bank erosion will be stopped.

5.5.2 PERENNIAL STREAM RESTORATION / RE-ESTABLISHMENT

PER-02 and PER-03 are restoration reaches of the same perennial stream channel within the Bank. They have drainage areas of 0.31 square mile and 0.44 square mile, respectively. The reaches are in a broad, flat valley best classified as a Rosgen valley type VIII. The existing channels associated with PER-02 and PER-03 within the project area have been channelized and/or backfilled to generate additional land for agricultural use. The restoration of PER-02 and PER-03 will include the re-establishment of 3,602.7 lf of historic stream channel to reflect the pattern that can be seen on aerial photographs and derived from reference reach data. The wide flood plain will be utilized to re-create the highly sinuous E5 stream type that previously existed. Specific design criteria vary slightly between the two reaches strictly due to the marginal difference in contributing drainage area. The design criteria are indicative of E5 stream types with a very flat valley slopes, 0.0034 and 0.0029 vertical foot change per linear foot. Design width/depth ratios will range from the 7.0 to 11.0 with a bank height ratio of 1.0 (**Appendix C**).

Several different structures may be used to restore and stabilize the channel and may include but are not limited to log J-hook vanes, toe-wood, scour logs, log cross-vanes and flow-thru vanes. These structures will introduce woody material into the channel, reduce near bank stress, maintain pool depth, and provide grade control. As a result, suitable aquatic habitat will increase, and sediment transport competency will be restored.

5.5.2 RIPARIAN BUFFER RESTORATION

Site preparation for stream buffer will mimic the wetland rehabilitation and re-establishment areas described in **Section 5.4.2**. The riparian buffer community will be re-established or enhanced through a heavy planting of native bottomland hardwood seedlings (i.e., minimum of 436 stems per acre of hard and soft mast species). Species selection will be similar to the wetland restoration tree species selected from the list shown in **Table 4**.

5.6 MONITORING AND MANAGEMENT

Through the initial, interim, and long-term Bank phases, the Sponsor will monitor and manage all aspects of the Bank. The Sponsor will use prudent efforts, (i.e., physical, chemical, or mechanical) to eliminate existing noxious and/or invasive vegetation currently listed by the Texas Department of Agriculture Noxious and Invasive Plant List (Title 4, Part 1, Chapter 19, Subchapter T, §19.300 of the Texas Administrative Code) (TDA 2007). In addition to invasive plants species, the Sponsor will implement techniques / methods to control nuisance, invasive wildlife species (e.g., feral hogs; *Sus scrofa*).

Following completion of construction activities, the Bank will be monitored and inspected annually for invasive species colonization and abiotic / biotic factors affecting tree or herbaceous-shrub establishment and growth. Wetland hydrology will be monitored through the placement of water-level recorders. Monitoring will determine if adaptive management measures, such as replanting, need consideration. The Sponsor anticipates that invasive species control will be implemented annually over the first five (5) years following construction and as-needed following Year 5. The Sponsor will continue to monitor the Bank through annual inspections to document the following:

- the effectiveness of control efforts;
- the extent and degree of exotic / nuisance species present;
- the extent and degree of any herbivory or insect damage;
- the extent and degree of adverse climate impacts (i.e., drought);
- boundary maintenance (e.g., gates, signage, fencing, boundary marking, etc.); and
- the condition and functionality of any earthen structures (i.e., *in situ* earthen fill or plugs).

Following such monitoring, exotic / nuisance species control will be implemented as necessary, and boundary maintenance will likely occur at five-year intervals.

5.6.1 STREAM MONITORING

Following stream restoration construction, the Sponsor will collect post-restoration stream assessment data on the restored reaches within the Bank. The restored streams will be monitored until criteria for successful restoration have been met. A Stream Monitoring Reach (SMR) is defined as two meander wavelengths of restored stream channel. The Sponsor will establish a minimum of one SMR for every mile of stream channel restoration and at least one SMR within each of the proposed reaches. Additional SMRs may be established on the restored streams to evaluate changes related to the size of contributing watersheds and confluence with other waterways. In addition, a photographic monitoring point will be placed at the point of curvature (POC) looking downstream at all meander bends contained within an established SMR.

Monitoring of the enhancement reaches will be limited to qualitative assessments consisting of structure inspections, permanent photographic stations, and a general description of the reach condition. This information, coupled with data collected from the restored and/or enhanced riparian buffer vegetative monitoring plots, is sufficient to demonstrate stream stability. Monitoring data associated with the enhancement reaches will be collected and submitted at the same intervals as the restoration reaches.

6.0 PROPOSED SERVICE AREA

The primary and secondary service areas[9] are shown in **Appendix A** on **Figure 17**. The primary service area consists of the Lower Sabine HUC (12010005), and the secondary service will consist of the portion of the Toledo Bend Reservoir HUC (12010004) that occurs within the CESWG (**Appendix A, Figure 17**).

Unavoidable impacts to wetland and stream function within the primary service area will be replaced at a 1:1 ratio while those impacts within the secondary service area will be debited at a 1.5:1 ratio. Any out-of-kind or use beyond the service area will be considered by the CESWG, in consultation with the Interagency Review Team, on a case-by-case basis.

6.1 CREDIT DETERMINATION

Credit determination for wetlands within the bank will utilize the riverine forested iHGM model [USACE 2021]. According to USACE Galveston guidance, non-jurisdictional wetlands will receive a baseline score of zero (0) for the purpose of credit determination[10]. The 2013 Galveston District Stream Tool (Stream Tool) will be used for assessing stream restoration [USACE 2013]. According to 33 CFR § 332.3(h), forested wetland preservation must meet certain requirements to generate credit and/or for use as mitigation offsets. The wetland preservation meets the required preservation criteria outlined in the 33 CFR § 332.3 for the following reasons:

- The Bank offers high functioning forested wetland system that contributes to the watershed via floodplain storage, habitat diversity, forested habitat for wildlife, and filters stormwater runoff from grazing pastures.
- The forested preservation area is ecological sustainable and offer high quality wetlands.
- The property was historically cleared for cattle production and the preservation acres were avoided during clearing activities. Merchantable hardwood timber is also present

[9] The Service Area is defined in 33 CFR § 332.2 as the *geographic area within which impacts can be mitigated at a specific mitigation bank or in-lieu fee program, as designated in its instrument.*

[10] Per the AJD dated July 15, 2021, all wetland areas within the bank have been determined as non-jurisdictional and will therefore receive a baseline score of 0.0 for the purpose of credit determination.

within the preservation areas, which provides a timber harvesting threat. Land clearing for additional cattle grazing and the threat of selective timber harvest demonstrate a threat of destruction or adverse modification to the wetland preservation areas.

- Preservation within the Bank is consistent with the watershed approach. Downstream the Sabine River is classified as a an ecologically significant stream segment by Texas Parks and Wildlife Department (TPWD). The Preservation areas are located along Big Cow Creek or its tributaries. Big Cow Creek is a perennial stream that flows directly into the Sabine River with significant stream flow. The preservation areas aid in providing erosion protection and water filtration of a direct tributary the Sabine River.
- Lastly, the site will be protected through a conservation easement, and it will be managed long-term (invasive species control).

6.2 CREDIT USE

The riverine forested habitats (preservation, re-establishment, and rehabilitation) will provide credits for non-tidal, forested impacts, and the stream restoration and buffer re-establishment will provide credits for stream impacts.

7.0 GENERAL NEED AND TECHNICAL FEASIBILITY

7.1 GENERAL NEED

The Bank is situated within the Lower Sabine River watershed, upstream of Sabine Lake and downstream Toledo Bend Reservoir. The Bank's eastern boundary is Big Cow Creek, which is a tributary to the Sabine River, classified as TPWD's ecologically significant stream segment.

Southeast Texas has experienced industrial and residential growth in recent years due to the close proximity to the Beaumont/Port Arthur, Texas, metropolitan areas. Additionally, this watershed is located in an important energy corridor which is traversed by numerous pipelines. The Bank will provide stream and riparian habitat for wildlife and plant species. In addition, stream restoration will enhance water quality, stormwater retention, and downstream fish habitat within the Lower Sabine River watershed.

Restoring these tributaries to Big Cow Creek will improve the inherent functions of viable perennial streams and riparian buffers (i.e., biological, physiochemical, geomorphological, hydraulic, and hydrologic) [U.S. Fish and Wildlife Service 2011]. Generally stated, stream and buffer restoration will improve the following stream functions:

a. *Biological (maintenance of plant and animal communities)*: improve perennial stream and riparian habitats.

b. *Physiochemical (temperature and oxygen regulation and the processing of organic matter)*: improve water quality by increasing dissolved oxygen, regulating temperature extremes, and recycling nutrients.
c. *Geomorphological (transport of wood and sediment to create diverse bed forms and dynamic equilibrium)*: improve channel stability to reduce stream bank erosion.
d. *Hydraulic (transport of water in the channel on the floodplain)*: moderate stream velocity, shear stress, and entrenchment.
e. *Hydrology (transport of water from the watershed to the channel*): maintain a balance between rainfall and runoff, natural flooding frequency, and flow duration.

The Bank will preserve, re-establish, and rehabilitate riverine forested wetlands and restore streams that drain to Big Cow Creek. These preservation and restoration efforts will return natural sheet flow from the Bank to Big Cow Creek and over bank flooding from the perennial tributary to Big Cow Creek to the entirety of wetlands within the Bank.

7.2 TECHNICAL FEASIBILITY AND ECOLOGICAL SUITABILITY

The primary factors considered during site selection included stream suitable for restoration combined with wetland restoration. The Bank is suitable and restorable as perennial stream, riparian habitat, wetland habitat, and upland buffer. The nature and juxtaposed landscape of the impaired stream provides a high degree of confidence for the successful restoration as functional wetlands, perennial streams, and riparian habitat. Furthermore, these impaired stream reaches are located in the Big Cow Creek floodplain, which eventually flows into the lower Sabine River, Sabine Lake, and then into the Gulf of Mexico.

The biological, physiochemical, geomorphological, hydraulic, and hydrologic properties of the wetlands, impaired stream and riparian habitat are conducive to restoration. Forested wetland and riparian vegetation is mostly absent or only located in areas where overstory exists, the understory and midstory strata are non-existent due to influence of livestock grazing. Once the cattle and pasture grass production are removed and the perennial stream channel and wetland/riparian vegetation are restored, the Bank will be ecologically self-sustaining.

The sustainability of the restored stream and wetlands are primarily driven by rainfall and watershed runoff, including overbank flooding. Therefore, this site was selected because hydrologic restoration can utilize natural processes and will not rely on active water management (e.g., pumping, diversion, impoundment or removal of water through artificial means from a river, stream or reservoir).

8.0 EASEMENTS AND ENCUMBRANCES

8.1 MORTGAGES, EASEMENTS AND ENCUMBRANCES

A Summary of Title Matters and a survey plat will be provided during submittal of the full prospectus. There are no known recorded liens, encumbrances, easements, servitudes or other surface restrictions applicable to the Bank.

8.2 CURRENT SITE RISKS

The Sponsor does not foresee any adjacent land encumbrances or hindrances on the Bank. Due to similar land use practices and management on adjacent land(s), the construction, establishment, and long-term phases of the Bank will not be affected by adjacent land uses. Therefore, adverse impacts are unlikely to result from the continued existence and operation of the neighboring land uses.

8.3 LONG-TERM SUSTAINABILITY

Long-term wetland hydrology, plants, and hydric soils surface hydrology will be sustained by localized rainfall, sheet flow, backwater flooding, and shallow, seasonally perched high-water tables. The long-term conditions are attainable as indicated by the baseline site conditions described in the wetland delineation (**Appendix B**). Furthermore, long-term viability and sustainability of the Bank is founded on proven construction and establishment practices / techniques discussed in this prospectus. Prior to entering the long-term phase, the initial, interim, and long-term performance standards will be met as prescribed in the draft MBI. To sustain the long-term standards through management, monitoring and adaptive management (if necessary) will be implemented to manage the Bank. A long-term management plan will be provided with the draft MBI and included in the approved MBI.

9.0 QUALIFICATIONS OF THE SPONSOR

Per 33 CFR § 332.8(d)(2) (vi.), this section describes the Sponsor's qualifications to successfully complete the proposed Bank. DLS will serve as the Sponsor. DLS has developed and implemented mitigation banks in the following USACE Districts: CESWG, Fort Worth (CESWF), New Orleans (CEMVN), and Vicksburg (CEMVK).

DLS is a land management and restoration company whose technical staff includes Certified Wildlife Biologists, Ecological Restoration Practitioners, Foresters, and Professional Wetland Scientists. In addition, DLS has construction specialists who are well-versed in wetland construction activities such as contractor management, earth work, heavy equipment operation, herbicide application, safety, and vegetation restoration. DLS currently operates twenty-four (24) approved wetland mitigation banks and five (5) approved amendments within four (4) USACE

Districts totaling 17,337.4 mitigation credit acres which include 43,044.9 linear feet of in-channel stream restoration. These Districts include New Orleans, Vicksburg, Fort Worth and CESWG. In addition to the mitigation banks referenced above, DLS serves as the Responsible Party for the establishment and maintenance of 3,548.1 mitigation credit acres and 8,251.0 linear feet of in-channel stream restoration on thirty-seven (37) approved permittee responsible mitigation areas within the three Districts, including CESWG.

The Sponsor will comply with all conditions required by the CESWG. The Bank will be established and operated through mitigation bank procedures outlined in 33 CFR § 332.8. This includes, but is not limited to, review process, modifications, permit coordination, project implementation, financial assurance determination and mechanisms, credit determination, accounting procedures, credit withdrawals, and the use of credits. Details on the operation of the Bank will be further described in the Draft MBI per 33 CFR § 332.8 (d)(6).

10.0 ASSURANCE OF WATER RIGHTS

Per review of the Texas Commission on Environmental Quality's (TCEQ) water rights database, water use is not listed for the Bank (TCEQ 2020) and water use data recorded from 2000 through 2014[11] did not indicate any water purchases. Furthermore, as restored functional riverine forested wetlands habitats the Bank will not require the use of public water or a TCEQ Water Use Permit since the restored wetlands will not create a reservoir or off-channel reservoirs that artificially store, hold, retain, or divert water from state water sources (i.e., surface or subsurface). Additionally, stream restoration will utilize natural process and will not restrict or retain water flow. There will not be any construction features on the Bank that direct, divert, or cause the retention of flood waters beyond the ordinary function of floodplain forested wetland systems (i.e., all berms, dikes, ditches, will be removed). The hydrologic restoration of the Bank includes filling and leveling of internal agricultural, natural stream design, and road features to natural elevation. Any water that may naturally flow onto or through the flood plain will not be diverted or retained by any constructed surface features. As such, long-term hydrology maintenance will not depend on the utilization of water captured from irrigation wells or a Texas public water system; therefore, water rights will not be required.

11.0 SITE PROTECTION

The Landowner will grant a perpetual Conservation Easement covering the Bank to a Conservation Easement Holder (Holder) in accordance with Chapter 183, Subchapter A of the Texas Natural

[11] The Water Use data from 2000 through 2014 is accessible from the URL: https://www.tceq.texas.gov/permitting/water_rights/wr-permitting/wrwud (accessed August 28, 2020).

Resources Code. Pursuant to 33 CFR § 332.7(a)(5). Upon Bank approval, the Landowner will record the Conservation Easement in the real property records of Newton County.

As contemplated in 33 CFR § 332.7(a)(1), the Conservation Easement instrument will establish the right of the Holder to enforce site protections and provide the resources necessary to monitor and enforce these site protections to the extent practicable. In addition, pursuant to 33 CFR § 332.7(a)(2), to the extent appropriate and practicable, the Conservation Easement instrument will prohibit incompatible uses that might otherwise jeopardize the objectives of the Bank. Furthermore, in accordance with 33 CFR § 332.7(a)(3), the Conservation Easement instrument will contain a provision requiring 60-day advance notification to the CESWG district engineer before any action is taken to void or modify the easement, including the transfer of title to another party.

Texas Land Conservancy has been identified as the Holder for the Conservation Easement. Texas Land Conservancy is a non-profit conservation organization that is accredited by the National Land Trust Alliance and is a member of the Texas Land Trust Council. Texas Land Conservancy will conduct annual inspections to verify that there are no activities occurring on the Bank which are inconsistent with the purpose of preserving the conservation values of the restored area.

11.1 LONG-TERM STRATEGY

A long-term management plan will be included with the draft MBI and will detail long-term management needs, costs and identify a funding mechanism in accordance with 33 CFR § 332.7 (d). The Sponsor (or Long-term Steward) and the Owner (or its heirs, assigns or purchasers) shall be responsible for protecting lands contained within the Bank in perpetuity. The Sponsor will establish the “Long-term Land Management and Maintenance” (LTMM) endowment to ensure adequate funding is available to cover future LTMM costs. The Sponsor will enter into a Mitigation Bank Endowment Agreement with the National Fish and Wildlife Foundation (NFWF) to ensure sufficient long-term funding is available for perpetual maintenance and protection of the Bank. Long-term management will consist of monitoring, vegetation management, invasive species control, boundary maintenance (approximately 2.6 miles), site protection, and the funding of such activities.

12.0 CONCLUSION

In summary, the Bank has a high potential for successfully preserving 14.8 acres of riverine forest wetland, rehabilitating 28.2 acres of riverine forested wetlands, re-establishing 51.3 acres of riverine forested wetlands, restoring 24.6 acres of riparian buffer, enhancing 4,406 lf of perennial stream, and re-stablishing/restoring 3,431 lf of perennial stream. Additionally, the Sponsor will restore 99.7 acres of upland buffer and preserve 1.2 acres of ponds and other streams. The cessation of agricultural land use, restoration of natural hydrology, preservation and restoration of native habitats, and the restoration of riverine forested wetland and perennial stream habitats will improve

watershed quality by reducing non-point source runoff, increasing ecosystem plant diversity, and increasing habitat for native and migratory wildlife species.

13.0 REFERENCES

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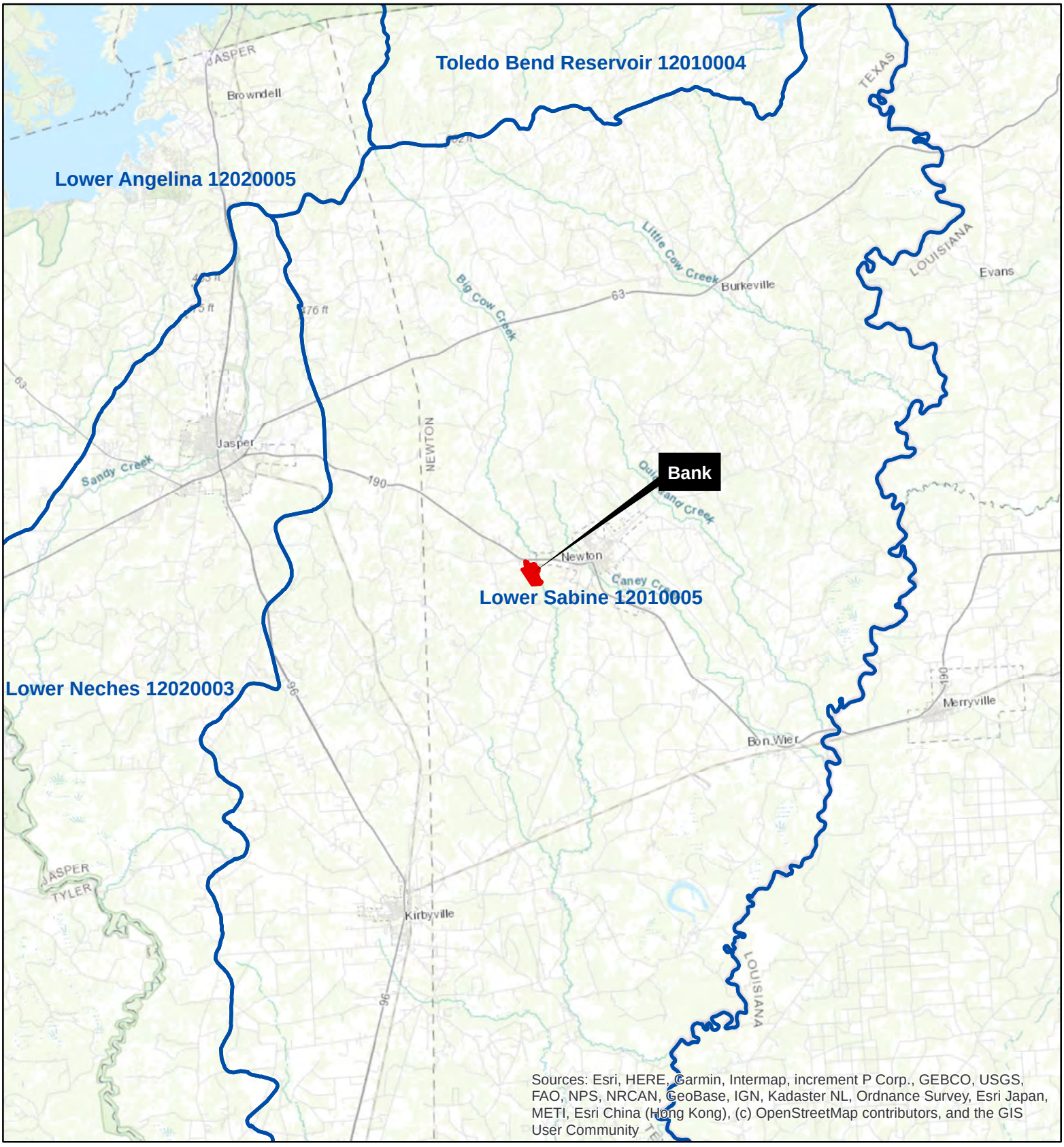
Appendix A

Figures



Project Boundary (219.8 ac)

8 Digit HUC

5 2.5 0 5

Miles

Big Cow Creek Mitigation Bank

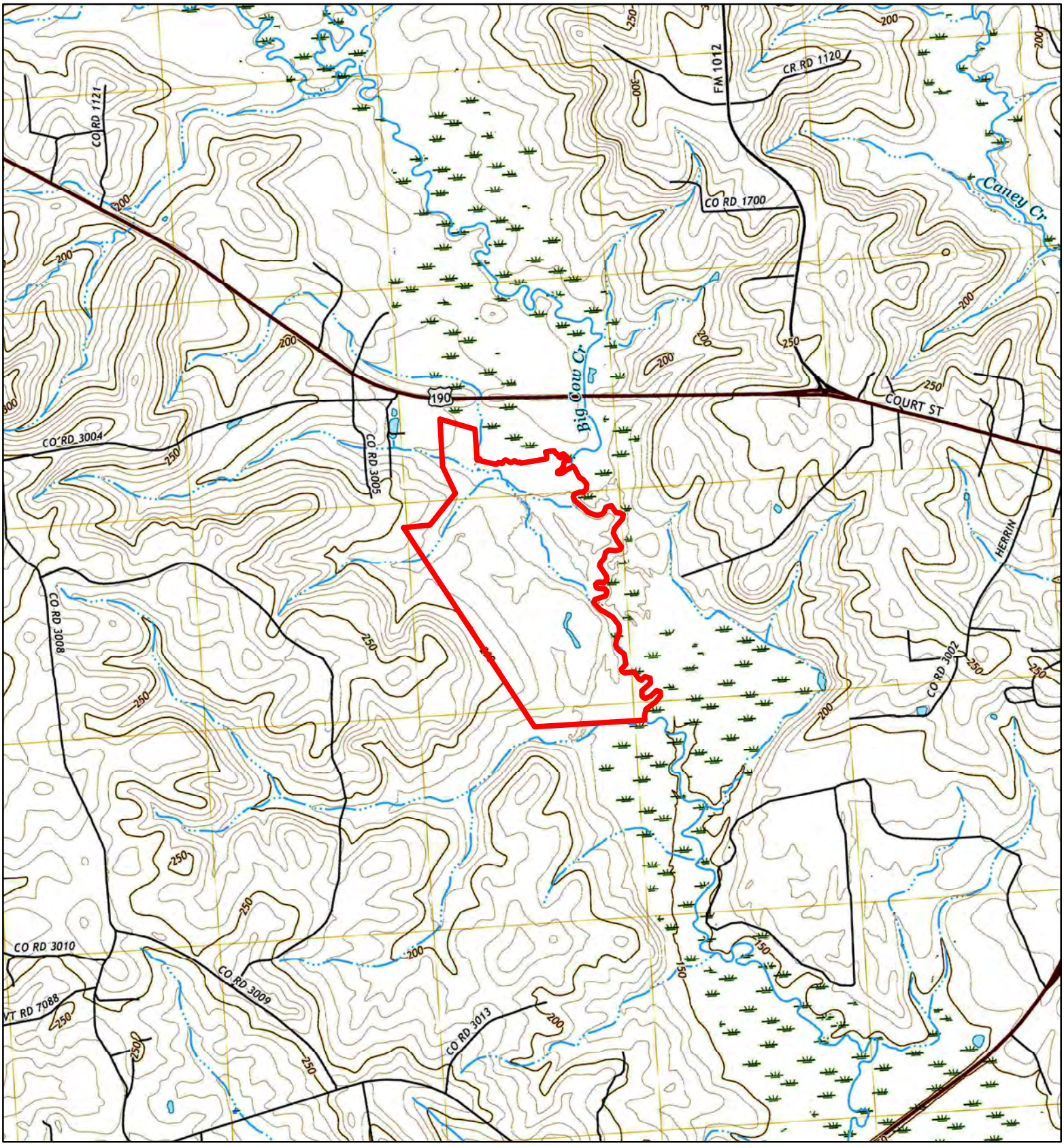
VICINITY MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	8/31/2020
Map # :	F01_Vicinity.mxd

DELTA LAND SERVICES

FIGURE 1



Project Boundary (219.8 ac)

2,000 1,000 0 2,000

Feet

Big Cow Creek Mitigation Bank

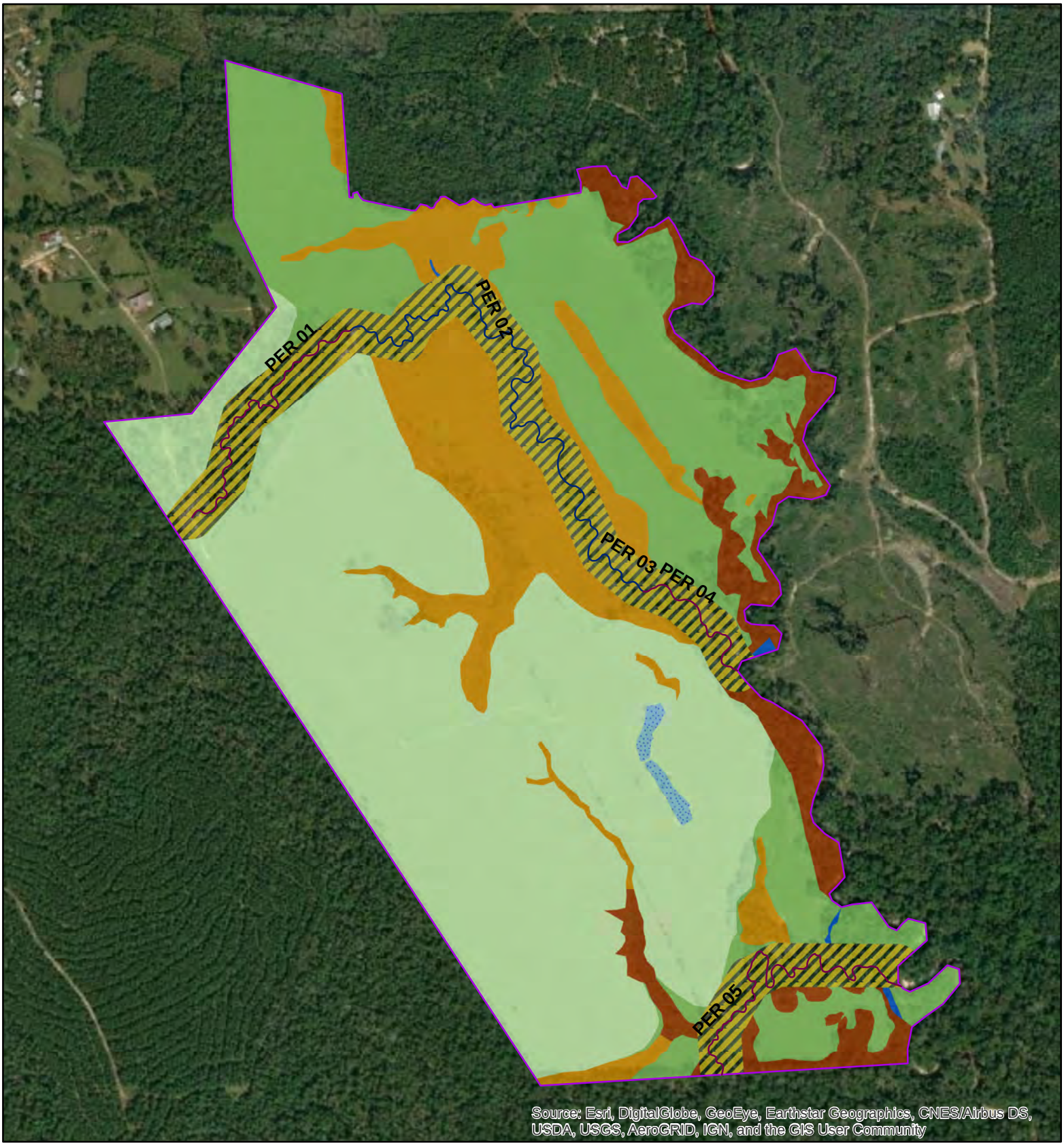
2019 USGS
7.5' QUADRANGLE MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F02_Quad.mxd

DELTA LAND SERVICES

FIGURE 2



- Project Boundary (219.8 ac)
- Re-establishment (51.3 ac)
- Preservation (14.8 ac)
- Rehabilitation (28.2 ac)
- Stream (0.3 ac)
- Upland (99.7 ac)
- Buffer (24.6 ac)
- Pond (0.9 ac)
- Perennial, Enhancement (4,406 LF)
- Perennial, Restoration (3,431 LF)

N

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

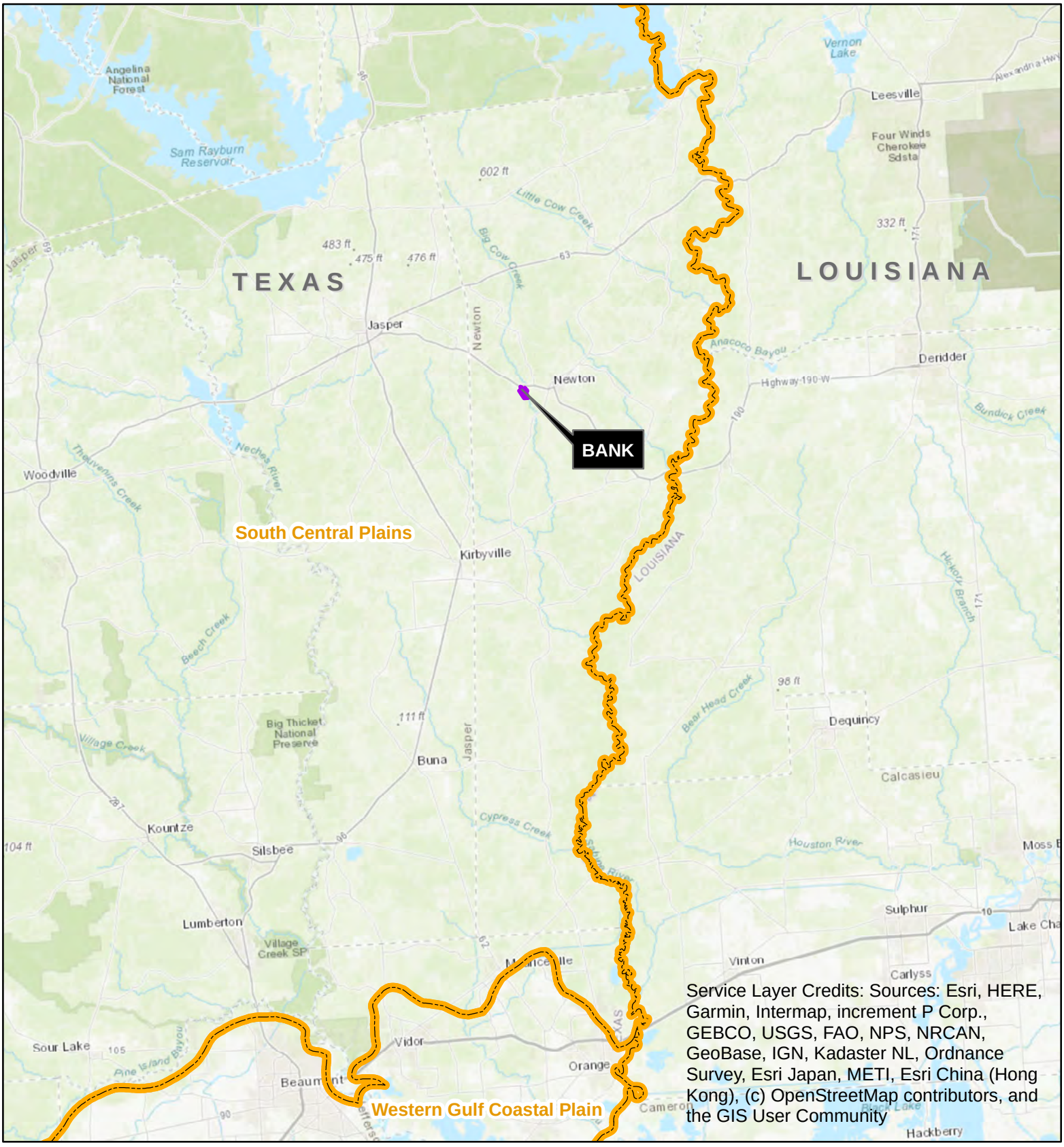
MITIGATION FEATURES

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F03_MitigationFeatures.r

DELTA LAND SERVICES

FIGURE 3



Project Boundary (219.8 ac)

Level III Ecoregion

10 5 0 10

Miles

Big Cow Creek Mitigation Bank

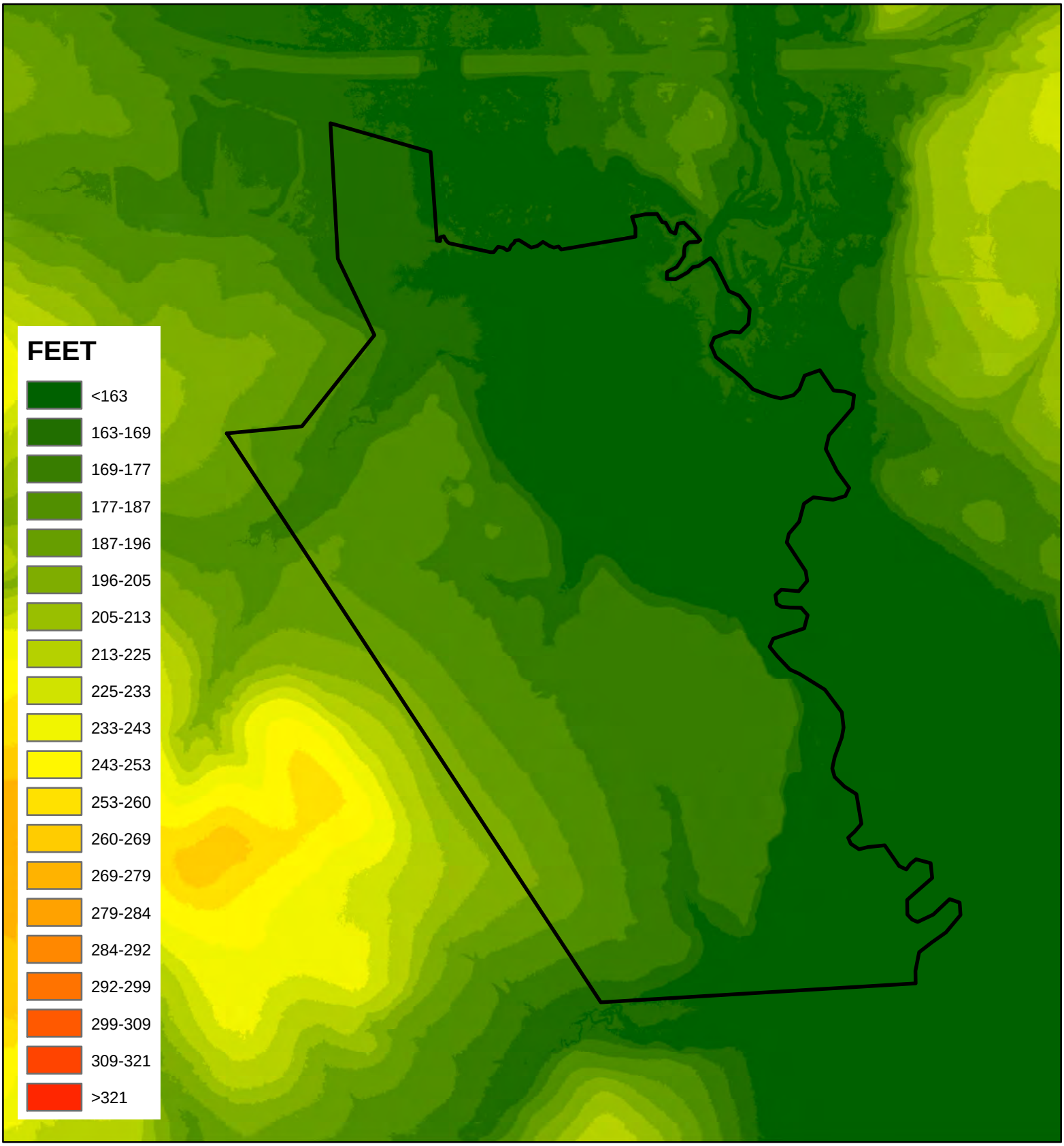
LEVEL III ECOREGION MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F04_Ecoregion

DELTA LAND SERVICES

FIGURE 4



Project Boundary (219.8 ac)

700 350 0 700

Feet

Big Cow Creek Mitigation Bank

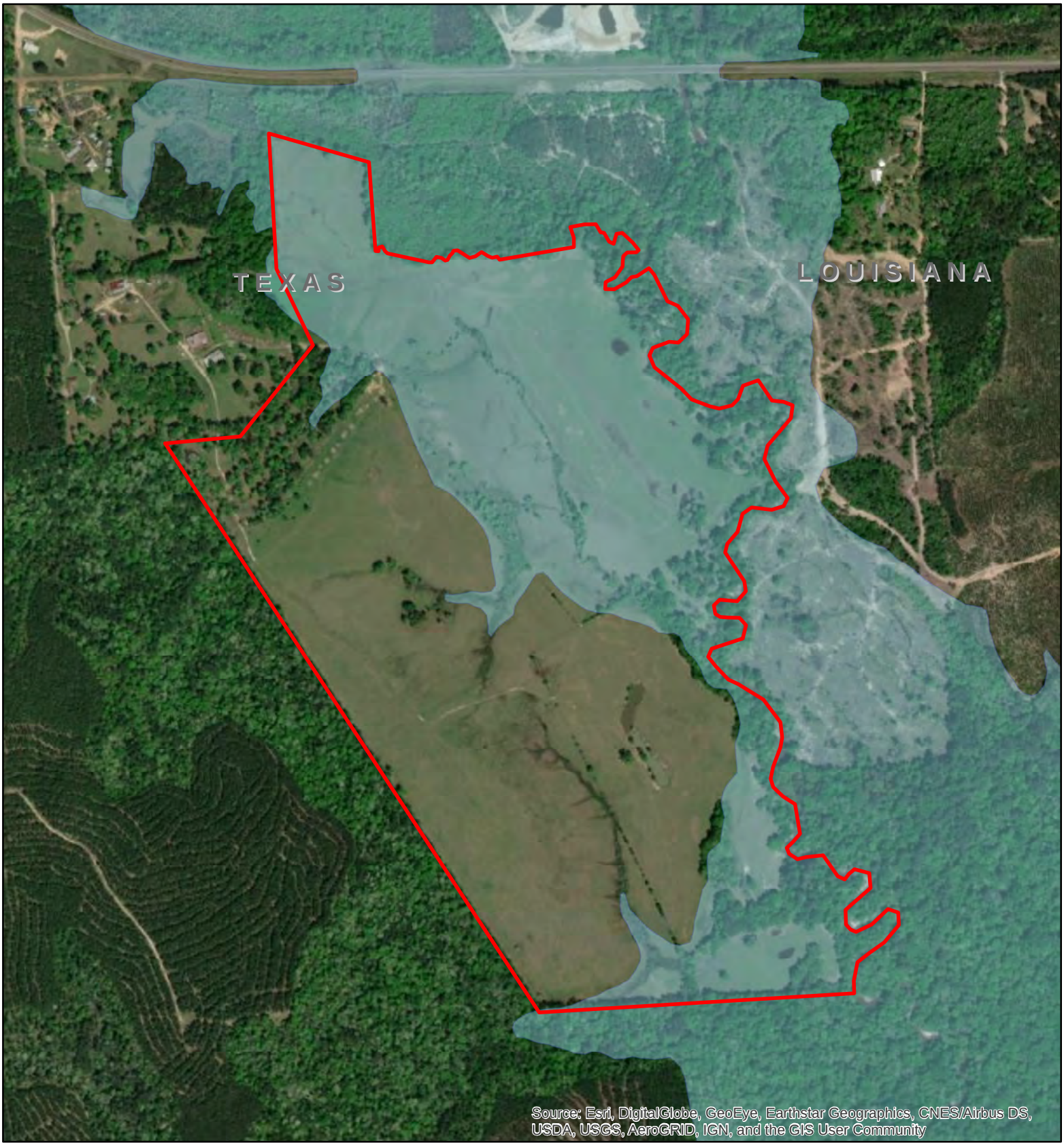
LIDAR DIGITAL ELEVATION MODEL

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F5_LIDAR

DELTA LAND SERVICES

FIGURE 5



Project Boundary (219.8 ac)

FEMA Flood Zone A

700 350 0 700

Feet

Big Cow Creek Mitigation Bank

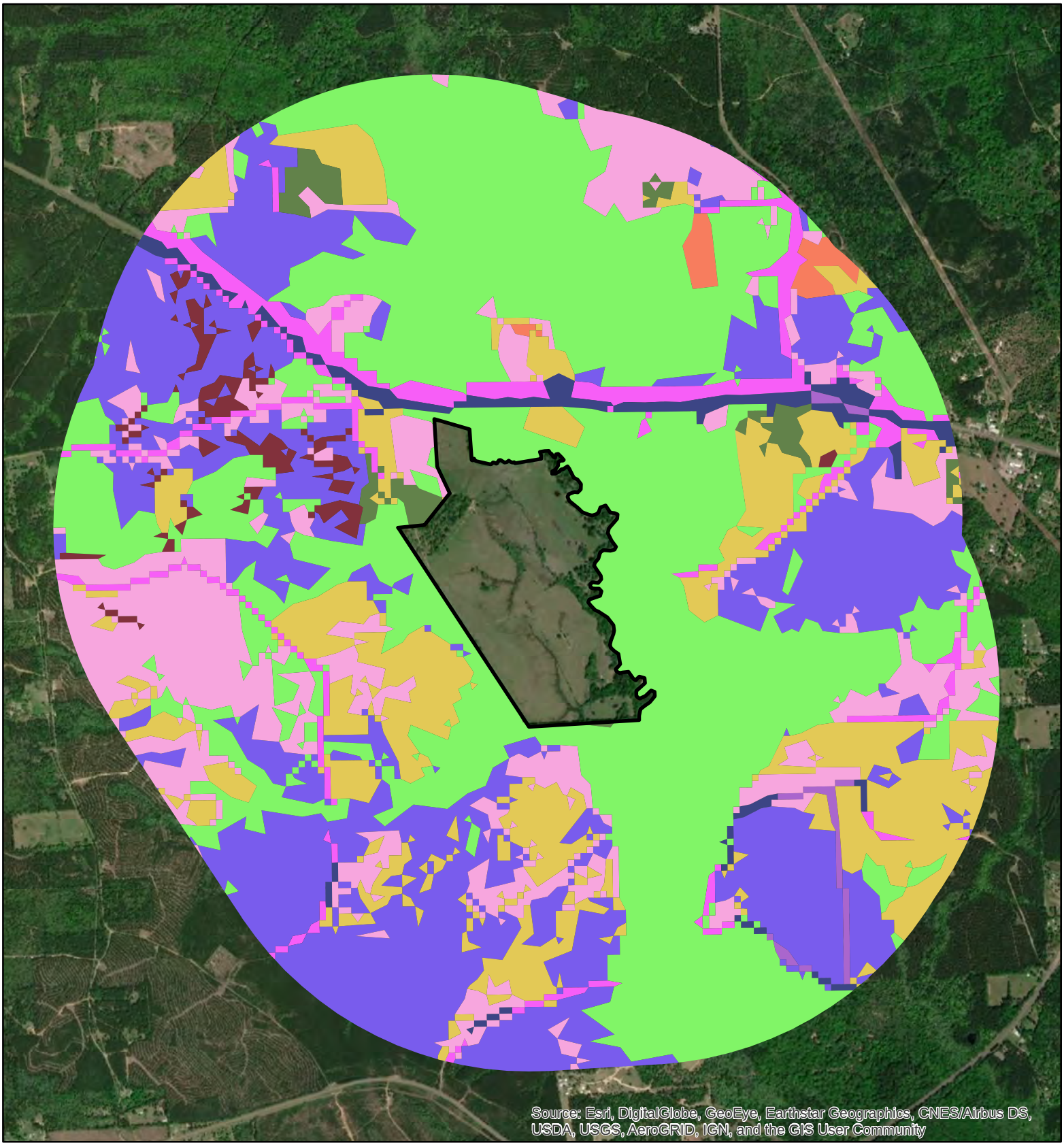
FLOOD ZONE MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F06_FloodZone

DELTA LAND SERVICES

FIGURE 6



- Project Boundary (219.8 ac)
- Barren Land (0.6%)
- Developed, Low Intensity (1.8%)
- Developed, Medium Intensity (0.4%)
- Developed, Open Space (4.0%)
- Evergreen Forest (24.9%)
- Grassland/Herbaceous (13.0%)
- Mixed Forest (1.3%)
- Pasture/Hay (1.2%)
- Shrub/Scrub (13.5%)
- Woody Wetlands (39.3%)

2,000 1,000 0 2,000

Feet

Big Cow Creek Mitigation Bank

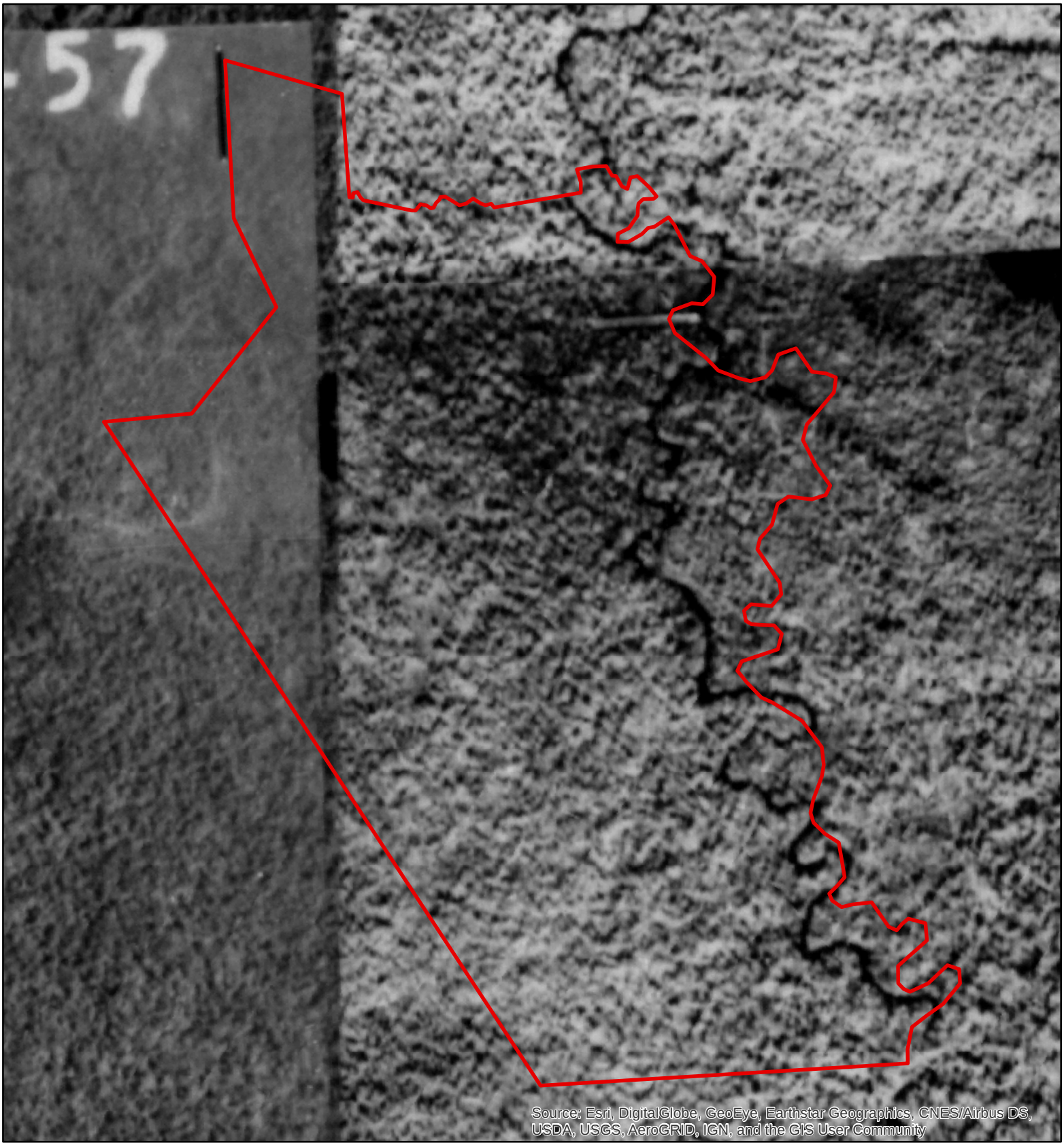
LAND USE WITHIN A ONE-MILE BUFFER

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F7_LULC

DELTA LAND SERVICES

FIGURE 7



Project Boundary (219.8 ac)

N

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

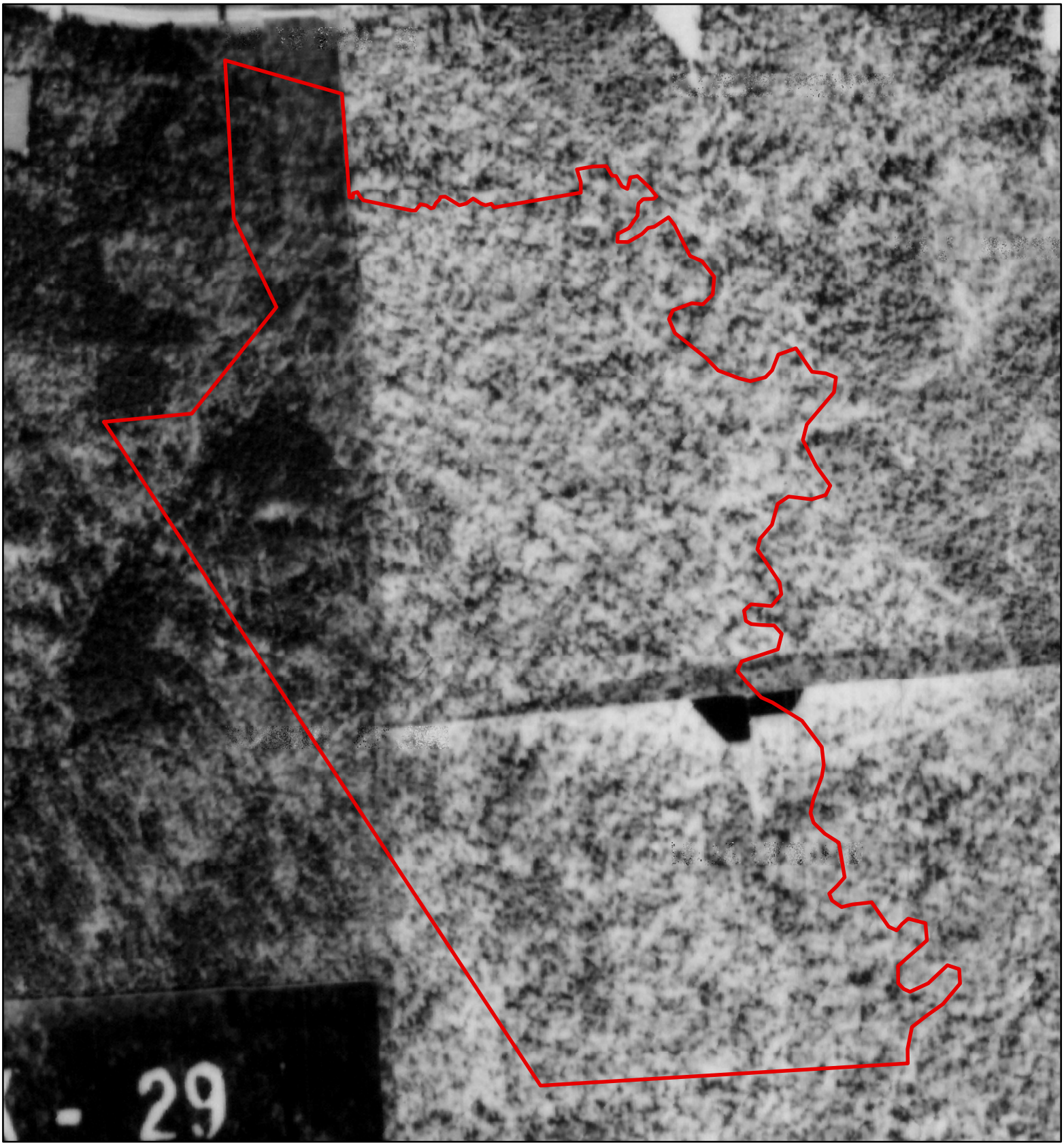
1952 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F03_MitigationFeatures.r

DELTA LAND SERVICES

FIGURE 3



Project Boundary (219.8 ac)

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

1968 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F09_1968AERIAL

DELTA LAND SERVICES

FIGURE 9

Project Boundary (219.8 ac)

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

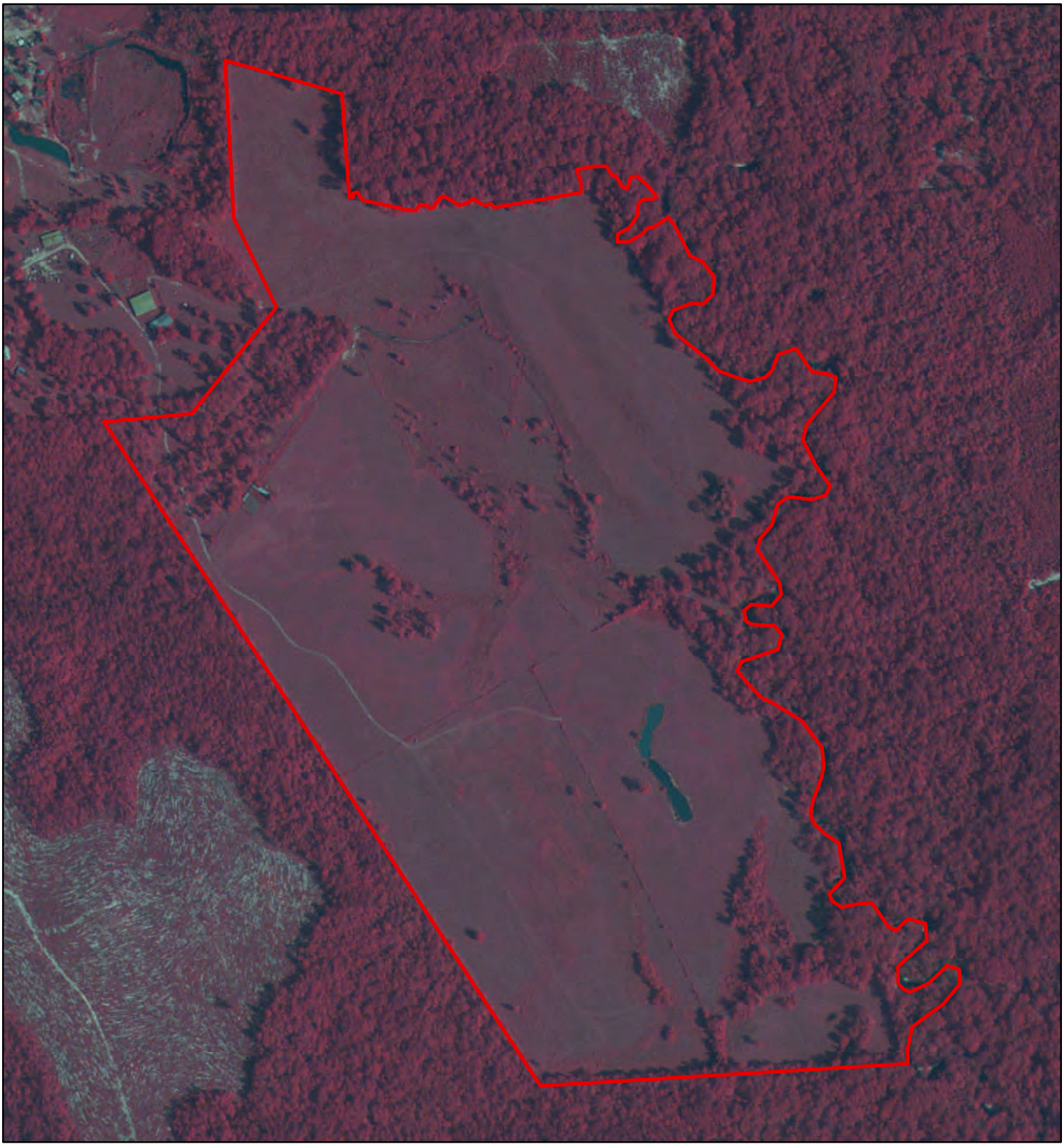
1996 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F10_1996AERIAL

DELTA LAND SERVICES

FIGURE 10



Project Boundary (219.8 ac)

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

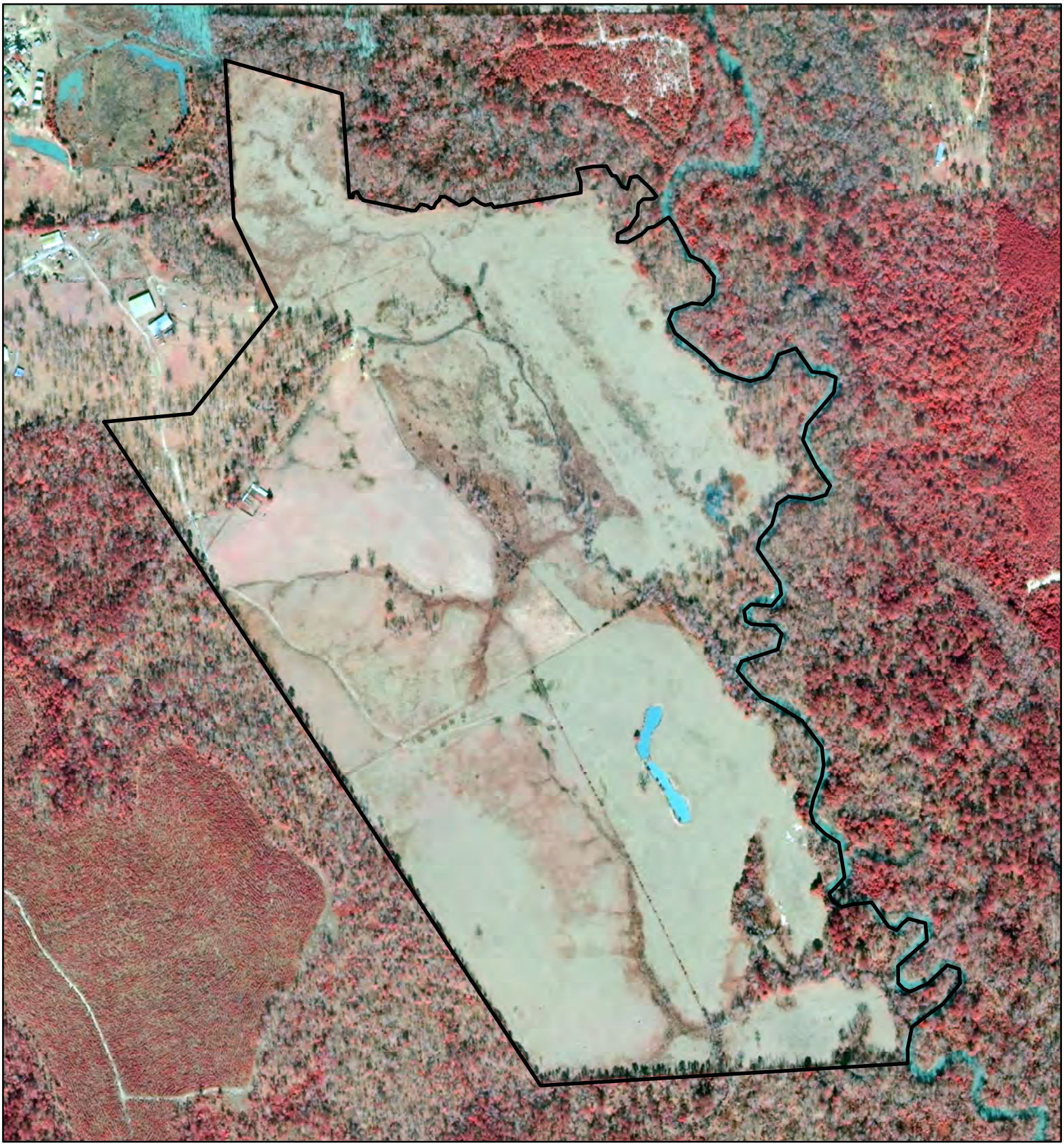
2004 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F11_2004AERIAL

DELTA LAND SERVICES

FIGURE 11



Project Boundary (219.8 ac)

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

2008 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F12_2008AERIAL

DELTA LAND SERVICES

FIGURE 12

Project Boundary (219.8 ac)

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

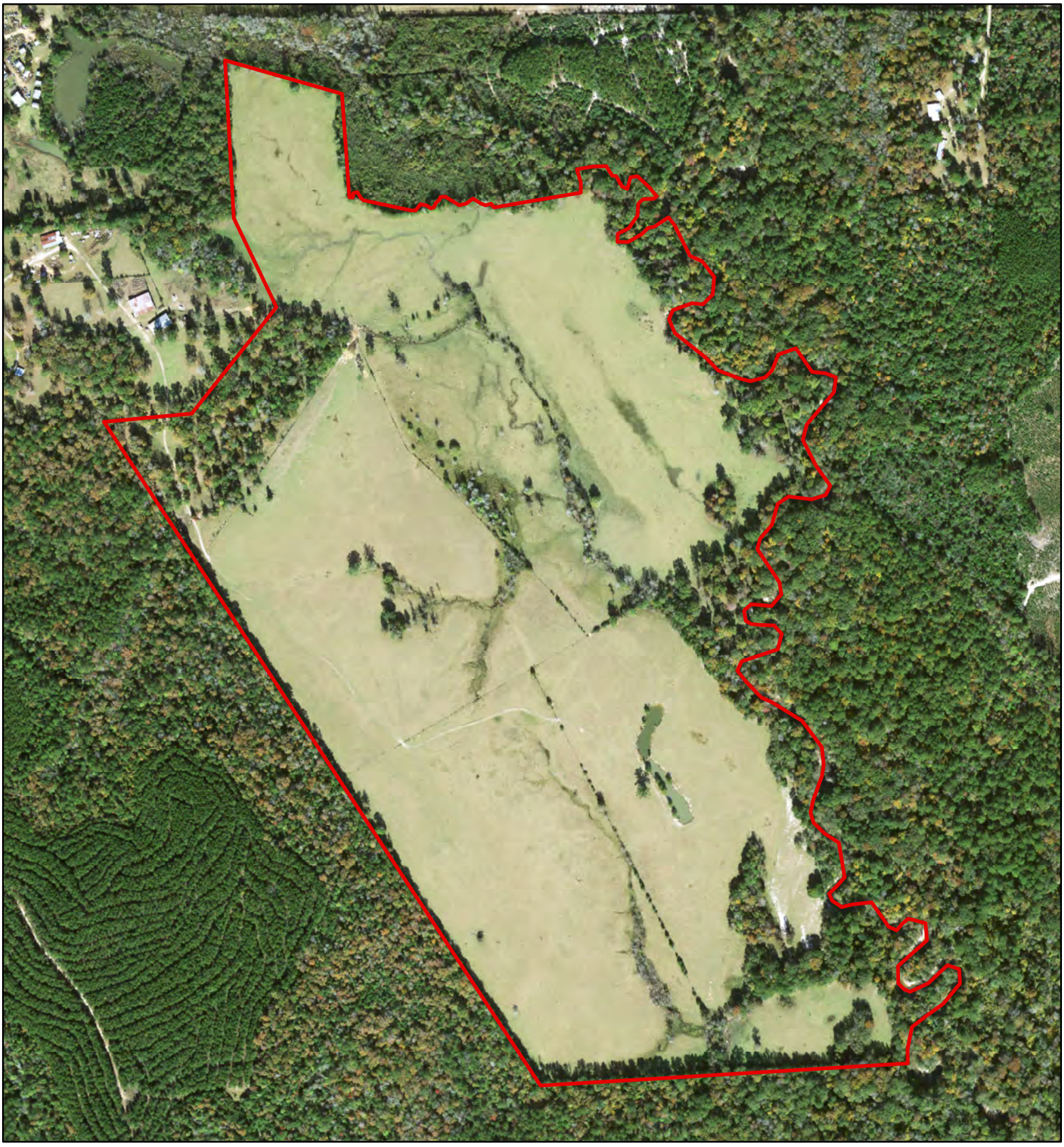
2014 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F13_2014AERIAL

DELTA LAND SERVICES

FIGURE 13



Project Boundary (219.8 ac)

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

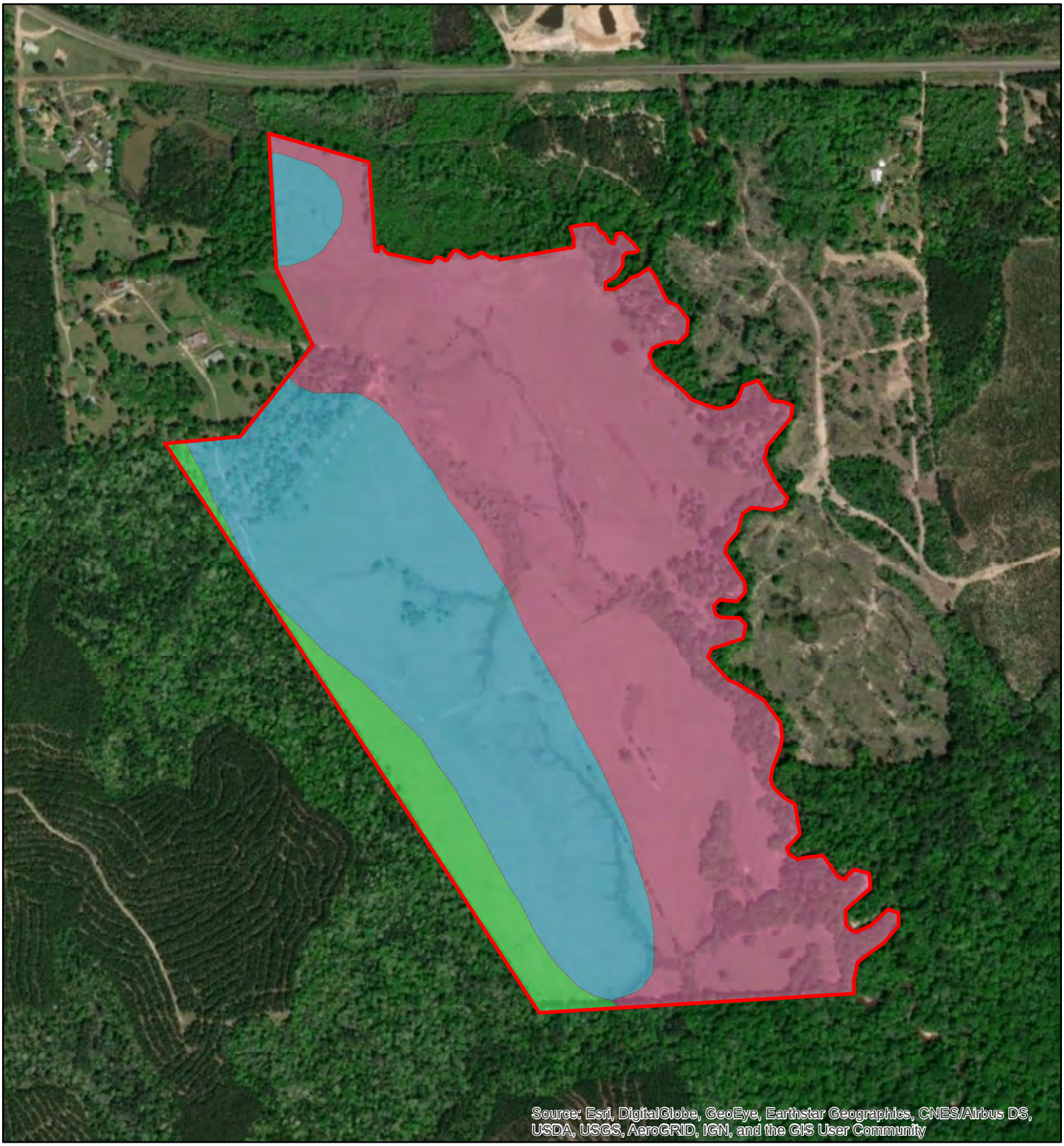
2018 AERIAL PHOTOGRAPH

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F14_2018AERIAL

DELTA LAND SERVICES

FIGURE 14



Project Boundary (219.8 ac)
BIB: Bienville-Alaga association, gently undulating
DUB: Doucette-Boykin association, undulating
Mn: Mantachie and Bleakwood soils, frequently flooded

N

700 350 0 700

Feet

Big Cow Creek Mitigation Bank

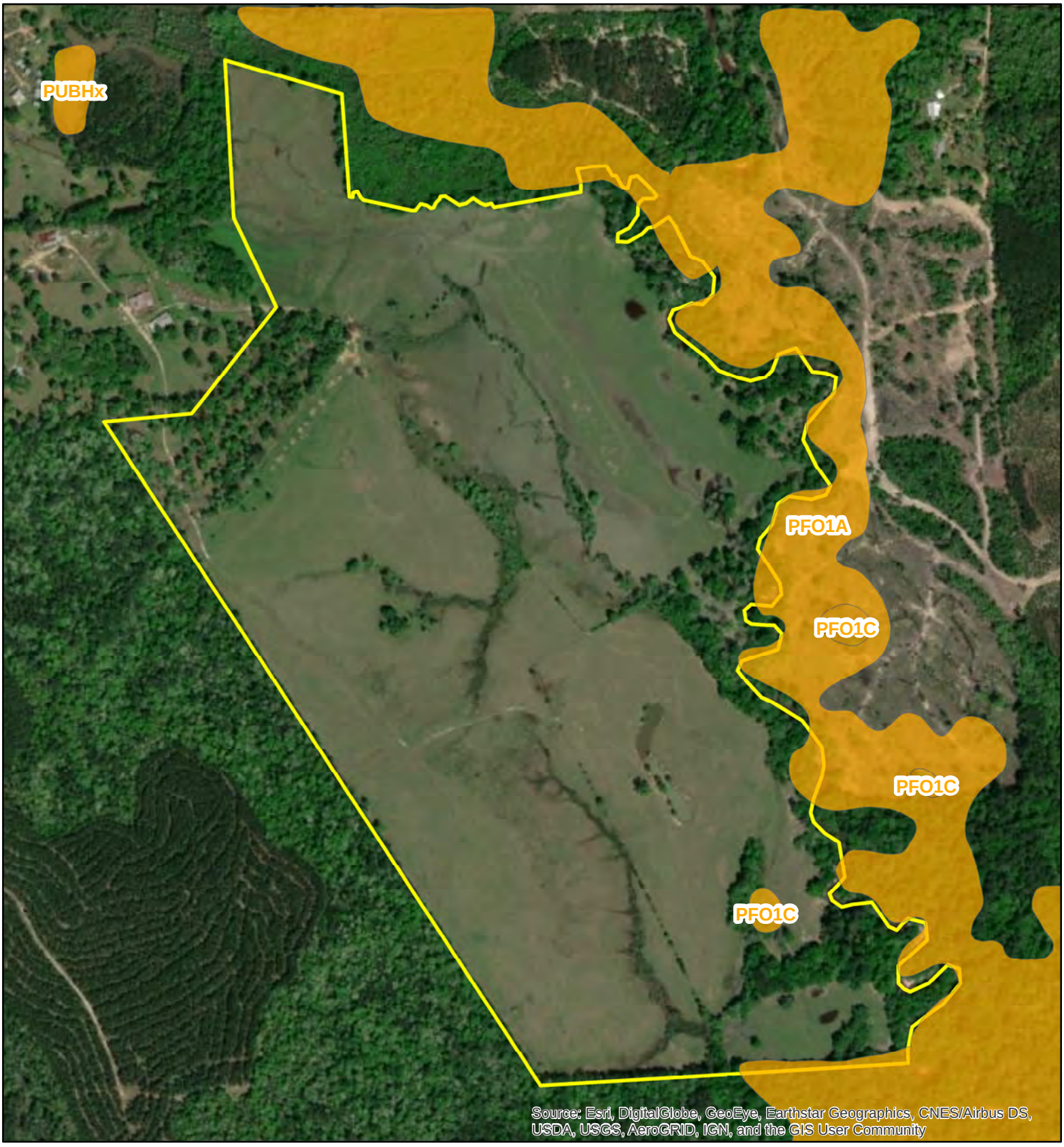
SSURGO SOILS MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F15_Soils

DELTA LAND SERVICES

FIGURE 15



Project Boundary (219.8 ac)

National Wetland Inventory

600 300 0 600

Feet

Big Cow Creek Mitigation Bank

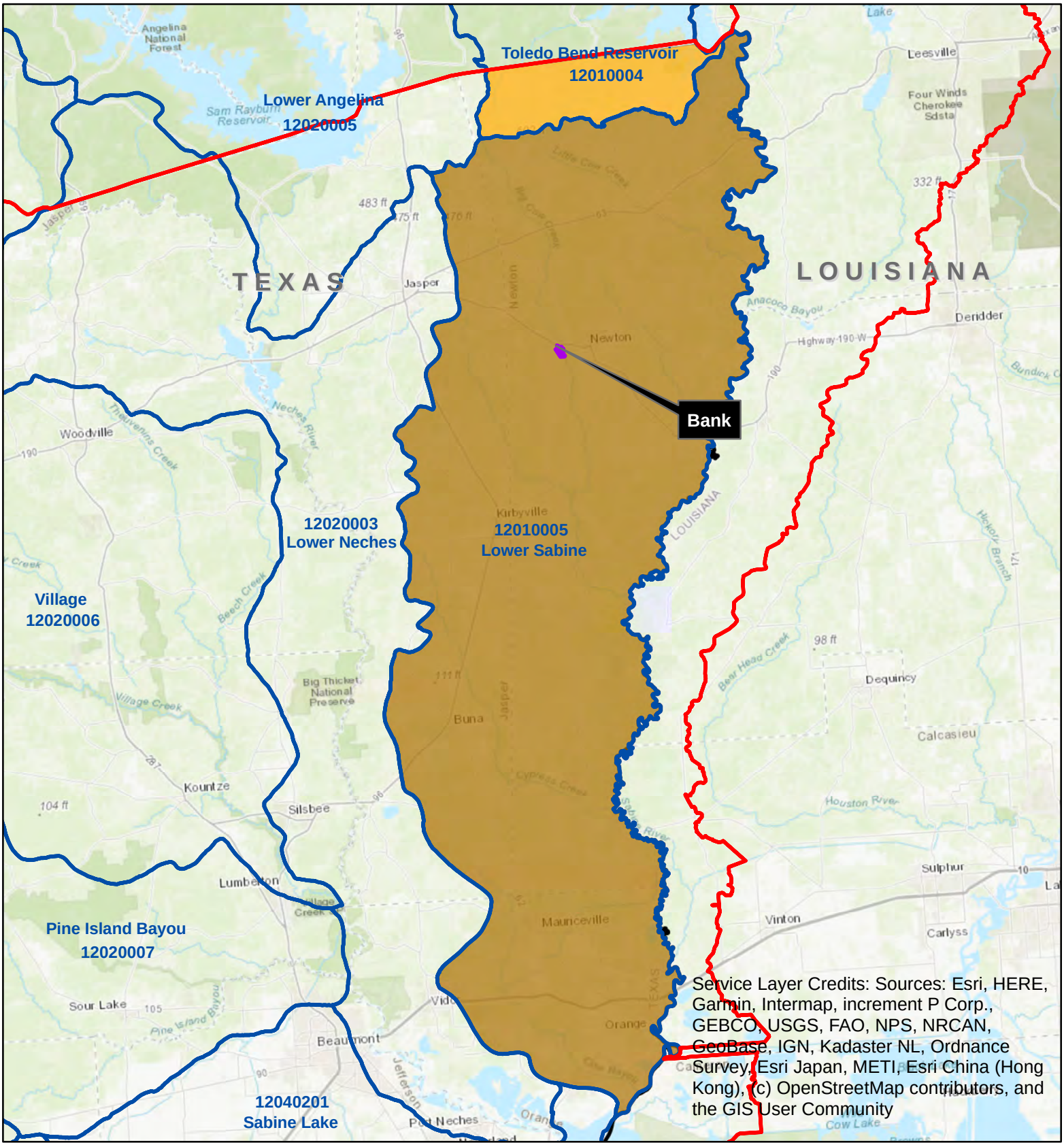
NATIONAL WETLAND INVENTORY

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F16_NWI

DELTA LAND SERVICES

FIGURE 16



Project Boundary (219.8 ac)
8 Digit HUC
Primary Service Area
Secondary Service Area
USACE District Boundary

10 5 0 10
Miles

Big Cow Creek Mitigation Bank

SERVICE AREA MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	SR
Date :	10/14/2020
Map # :	F17_ServiceArea

DELTA LAND SERVICES

FIGURE 17

Appendix B

Wetland Delineation and AJD

DELTA LAND SERVICES

May 12, 2020

US Army Corps of Engineers, Galveston District
Regulatory Branch
2000 Fort Point Dr.
Galveston, Texas 77553
Attn: Mr. Kenny Jaynes

Subject: **Wetland Delineation Report Big Cow Creek Tract in Newton County, Texas.**

Dear Mr. Jaynes:

Delta Land Services, LLC (DLS) is submitting the above-referenced wetland delineation report for the proposed Big Cow Creek restoration site located in Newton County, Texas. DLS requests issuance of an Approved Jurisdictional Determination as it is our understanding that it is required for development of the site as a compensatory mitigation area. If you have any questions regarding the delineation, please feel free to contact me, Stephen Ross at 346-888-2776 (office), 361-522-8989 (mobile) or stephen@deltaland-services.com.

Sincerely,

Stephen Ross
Project Manager
Delta Land Services, LLC

Attached: Wetland Delineation Report Big Cow Creek Tract Newton, TX.

WETLAND DELINEATION REPORT
BIG COW CREEK TRACT
NEWTON COUNTY, TX

NOVEMBER 2019

PREPARED BY:

DELTA LAND SERVICES, LLC
1090 CINCLARE DRIVE
PORT ALLEN, LOUISIANA 70767

TABLE OF CONTENTS

LIST OF APPENDICES

WETLAND DELINEATION REPORT
BIG COW CREEK
NEWTON COUNTY, TEXAS

1.0 INTRODUCTION

The following report summarizes a wetland delineation on a 219.8-acre project area of interest (AOI). The approximate site center is located at Latitude 30.843714° North and Longitude -93.799292° West. The AOI is within the Lower Sabine River Basin (USGS Hydrologic Unit Code [HUC] 12010005). The AOI location along with the USGS hydrologic units are depicted in **Appendix A**, **Figure 1**. The purpose of this report is to identify areas within the AOI that may potentially be jurisdictional "waters of the United States, including wetlands" as defined in 33 CFR 328.3(a).

Jurisdictional waters and wetlands are regulated by the United States Army Corps of Engineers (USACE). Those wetlands are defined as "areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987). Jurisdictional wetlands as defined by the USACE (1987) are referred to as "wetlands" throughout this report.

Three mandatory technical criteria for determining the presence of a wetland are, with exceptions, (1) hydric soils, (2) hydrophytic vegetation, and (3) wetland hydrology. A hydric soil is defined as one that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile (Natural Resources Conservation Service [NRCS] 2010). Hydrophytic vegetation is defined herein as the sum total of macrophytic plant life growing in water or on a substrate that is at least periodically deficient of oxygen as a result of excessive water content. When hydrophytic vegetation comprises a community where indicators of hydric soils and wetland hydrology also occur, the area has wetland vegetation. The term "wetland hydrology" encompasses the sum total of wetness characteristics in areas that are inundated or have saturated soils (USACE 1987).

Deepwater aquatic habitats are "areas that are permanently inundated at mean annual water depths greater than 6.6 feet or permanently inundated areas, less than or equal to 6.6 feet in depth that do not support rooted-emergent or woody plant species" (USACE 1987). These areas are referred to as "other waters of the United States" in this report. Navigable waters are "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 CFR 329.4). Any area below the ordinary high water mark [33 CFR 328.3(e)] may fall under federal jurisdiction as a navigable water.

2.0 PHYSIOGRAPHY, CLIMATE, AND SITE DESCRIPTION

The AOI is in the South Central Plains (35) Level 3 Ecoregion and the Southern Tertiary Uplands (35e) Level 4 Ecoregion (Omernik 1995). As well, the AOI is situated in the LRR P-South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region and in MLRA 133B-Western Coastal Plain (NRCS 2006). Natural topography within most of the AOI is slightly undulating and bisected with small streams and drainages. Typical slopes range from 0 to 5%. Typical drainage patterns for the area to the east and southeast toward Big Cow Creek. The Western portions of the AOI is excessively to well drained with highly permeable sandy soils. The eastern portions of the AOI is somewhat poorly drained to poorly drained and exhibits soils with high permeability, water table within 12 to 18 inches of the surface, and frequently receives overbank floodwaters from Big Cow Creek. This area also receives run off from adjacent uplands and groundwater seeps at the upland edge of the floodplain. Natural elevation ranges from about 160 feet to above 200 feet North American Vertical Datum (USGS, 2019) above sea level. The AOI is depicted on the USGS topographic map in **Appendix A, Figure 2**. The eastern and northeast portions of AOI is entirely included in FEMA designated flood zone A or 100-year floodplain of Big Cow Creek, which is depicted in **Appendix A, Figure 3**.

Newton County has a humid subtropical climate with hot, humid summers and mild to cool winters. The average annual precipitation of 57.5 inches. The growing season is year round, as soil temperatures never drop below freezing and Newton County's average annual temperature is 65.8 degrees (Weatherbase 2019).

The surrounding land use is primarily timberland and oil and gas production with some rural development. A noticeable portion of the surrounding land use is the bottomland hardwood floodplain of Big Cow Creek.

A historic aerial photography analysis was conducted for the AOI. Google's historic aerial photography only goes back to 1996. The aerial photography shows that the AOI was cleared and has been used for cattle production since 1996 (Google Earth 2019). The current landowner's son indicated that the property was cleared and developed into a cattle ranch in the late 1960s and early 1970s. Much of the surrounding land use is in timber production and the natural bottomland hardwood floodplain of Big Cow Creek since 1996. The drainages and other wetlands on the property appear much the same as they did in 1996.

The US Fish and Wildlife Service's National Wetland Inventory (USFWS 2019) identifies portions of the property and much of the Big Cow Creek floodplain east of the property as Palustrine Forested, Broadleaf Deciduous, Temporarily Flooded (PFO1A) wetlands as per the Cowardin classification system (Cowardin et al. 1979). The National Wetland Inventory polygons are show in **Appendix A, Figure 4**. However, there are other palustrine forested, herbaceous/shrub, and herbaceous wetlands on the property along with the perennial streams.

3.0 METHODS

The wetland delineation followed *on-site routine* field procedures as outlined by the USACE (1987) and subsequent Regulatory Guidance Letters (RGL). Delta Land Services, LLC (DLS) biologists conducted field investigations on October 15th,16th, and 17th, 2019 that consisted of a total site survey for identification and data collection regarding potential jurisdictional wetlands and waters of the US. Three transects were established for ecological data collection, which were oriented along the hydrologic gradient of the AOI.

Twenty (20) data points were evaluated within the AOI. These data points were established with the intent of capturing changes in plant community, hydrologic condition, and/or soil type following sampling procedures outlined in the USACE Delineation Manual. Observations of soils, vegetation, and hydrology were made at each data point and recorded on routine wetland determination data sheets per the Atlantic and Gulf Coastal Plain (AGCP) Regional Supplement (USACE 2010). The Aquatic Resources Map, **Figure 5** in **Appendix A** shows the location of each of the 20 data points.

Soil samples were obtained by excavating an approximate 16 to 20-inch soil pit. Soil color was determined by matching soil samples to color chips contained in a Munsell soil color chart. These samples were examined in the field for the presence of hydric soil indicators which are described in the *NTCHS Field Indicators of Hydric Soils in the United States Version 8.0* (NRCS 2016) and in the AGCP Regional Supplement (USACE 2010). Soils on the western uplands of the property are deep well drained sandy soils with a clay hard pan that allows groundwater to flow east toward the floodplain of Big Cow Creek. The ground water seeps to the surface at the slope grading into the floodplain, providing additional hydrology for hillside seep wetlands.

Vegetation species present in each data plot were recorded for each of the following vertical strata: canopy, saplings and shrubs, and herbaceous layer. Percent cover for each dominant species was determined by ocular estimation. Dominant species were determined using the 50/20 rule found in the 1987 Delineation Manual (USACE 1987). Plant communities met hydrophytic vegetation criteria if the dominant species from all strata were classified as obligatory (OBL), facultative-wet (FACW) or facultative (FAC) species within the AGCP Region (Lichvar et al. 2016). In areas where hydric soils and hydrology were present but hydrophytic communities were not dominant, the prevalence index was used to determine if the wetland vegetation criteria were met (USACE 2010). Vegetation species nomenclature follows the 2016 National Wetland Plant List (Lichvar et al. 2016) and the Biota of North America Program (Kartesz, 2015).

Hydrology criteria were assessed based on observation of primary and/or secondary field indicators as described in USACE (2010). The hydrology criteria were met if one primary field indicator was observed or at least two secondary indicators were observed.

Data points and wetland areas/other waters were mapped and surveyed utilizing a mapping grade differential global positioning system (DGPS) with real time correction. Acreage was calculated by using a geographic information system (GIS) to process the DGPS data.

Digital photographs were taken of the plant community and soil profiles at each data collection site. These photos are included with the individual data point Wetland Determination Datasheets in **Appendix B**.

4.0 RESULTS

4.1 Soils

The AOI is mapped as Bienville-Alaga association, gently undulating (BIB), Doucette-Boykin association, undulating (DUB), and Mantachie and Bleakwood soils, frequently flooded (Mn). The Mantachie and Bleakwood soils are rated as hydric and occupy the eastern half of the AOI in the floodplain of Big Cow Creek. Soil map units identified within the AOI are based on SSURGO data (NRCS[b]). Soil mapping units on the AOI are shown in **Appendix A, Figure 6**.

Of the 20 soil profiles examined, 10 contained hydric soil indicators. Common hydric soil indicators observed onsite were Depleted Matrix (F3) and Stripped Matrix (S6).

4.2 Vegetation

The AOI consists of upland and wetland pasture utilized for grazing, which are bisected and lined by forested and herbaceous/shrub floodplains and stream management zones. The upland and wetlands pastures are largely dominated by big carpet grass (*Axonopus fissifolius*). Along with big carpet grass wetland pasture vegetation include rushes (*Juncus* spp.), sedges (*Cyperus* spp., *Rhynchospora* spp. and *Carex* spp.), smartweeds (*Persicaria* spp.) and erect spadeleaf (*Centella erecta*), along with others.

The upland pasture area exhibits a larger portion of Bahia grass (*Paspalum notatum*) along with other facultative upland and upland vegetation like dog fennel (*Eupatorium capillifolium*), sneezeweed (*Helenium amarum*), creeping lespedeza (*Lespedeza repens*), smut grass (*Sporobolus indicus*), and southern dewberry (*Rubus trivialis*), among others.

Wetland herbaceous/shrub vegetation communities are present along the central north/south stream corridor and within the hillside seep wetland just west of this stream corridor on the slope grading into the floodplain. Dominant shrubs in this vegetation community include hazel alder (*Alnus serrulata*), wax myrtle (*Morella cerifera*) and Sweetgum (*Liquidambar styraciflua*). Chinese Tallow (*Triadica sebifera*) is also present in this vegetation community. Herbaceous species include southern water grass (*Luziola fruitans*), smartweeds, soft rush (*Juncus effusus*), weak rush (*Juncus debilis*) and prim-rose willows (*Ludwigia* spp.), among others.

Wetland Forest occur along Big Cow Creek and the tributaries along the southern boundary of the AOI. Deeper depressional floodplain forests with longer hydroperiods are dominated by bald cypress (*Taxodium distichum*), swamp tupelo (*Nyssa biflora*), sweetgum (*Liquidambar styraciflua*), black willow (*Salix nigra*), and water oak (*Quercus nigra*), among others. Shrubs include seedling and sapling individuals of bald cypress and swamp tupelo along with the exotic Chinese tallow (*Triadica sebifera*) and Chinese privet

(*Ligustrum sinense*). The herbaceous layer is sparse, but reasonably diverse in this swampy vegetation community. Common herbaceous species include horned beaksedge (*Rhynchospora corniculata*), lizard's tail (*Saururus cernuus*) Virginia sweetspire (*Itea virginca*), swamp smartweed (*Polygonum hydropiperoides*), and weak rush (*Juncus debilis*), among others.

Non wetland floodplain forests are situated on deep well drained sandy soils. These areas experience short duration flooding events however, floodwaters are not present long enough to develop hydric soils. Common trees in this vegetation community include river birch (*Betula nigra*), beech (*Fagus grandifolia*), blackgum (*Nyssa sylvatica*), water oak, willow oak (*Quercus phellos*), American hornbeam (*Carpinus caroliniana*), and sweetgum, among others. Common shrubs include yaupon holy (Ilex vomitoria), Hercules club (*Zanthoxylum clava-herculis*) and Chinese privet. Ground cover is generally sparse. Common herbaceous species include slender woodoats (*Chasmanthium laxum*), rosette grass (*Dichanthelium* spp.), Carolina elephantsfoot (*Elephantopus caroliniana*), littlehead nutrush (*Scleria oligantha*), and American beautyberry (*Callicarpa americana*).

Vegetative conditions are a product of range management practices, deep well drained soils, overbank flooding, and ground water influence. Of the 20 sample locations, 9 met the requirement for hydrophytic vegetation.

4.3 Hydrology

Natural hydrology sources on the property are precipitation, ground water, and overbank flooding from Big Cow Creek.

Within the AOI, natural flat topography creates localized ponding with sheet flow drainage from north to south and east toward Big Cow Creek. Soil characteristics throughout most of the property impedes the downward movement of water and produces periods of saturation and inundation in the upper parts of the soil surface, especially in areas of concave microtopography.

As shown by the presence of obligate wetland vegetation and hydric soils, the property does remain saturated for periods sufficient to support wetland hydrology and vegetation. Of the 47 data points, 38 points had wetland hydrology indicators. The most common primary indicators were Algal Mat or Crust (B4), Sediment Deposits (B2), and Aquatic Fauna (B13), while common secondary indicators were Surface Soil Cracks (B6), Crawfish Burrows (C8), and the FAC-Neutral Test (D5).

5.0 CONCLUSION

Based on the field investigation and analysis of aerial imagery, soil data, and light detection and ranging (LIDAR) data, DLS biologists observed approximately 53.5 acres of potentially jurisdictional wetlands and 3.8 acres of stream channels. These areas exist as a combination of emergent wetlands and perennial stream channels. These features and the wetlands on site are regulated by Section 404 of the Clean Water Act. Non-

jurisdictional features within the AOI consisted of non-wetland grazing pastures and woodlands. These aquatic resources are summarized in **Table 1** below. Additionally, these resources are depicted on **Appendix A, Figure 5**.

Table 1: Aquatic Resources Present within the 219.8-acre Big Cow Creek Mitigation Area (AOI), Newton County, Texas	
Resource Type	**Acres**
Perennial Stream	3.8
Herbaceous Wetland (PEM)	28.9
Forested Wetland (PFO)	16.7
Shrub/Herbaceous Wetlands (PSS)	7.9
Ponds	0.9
Uplands/Non wetlands	161.7

The USACE under the authority of the Clean Water Act, Section 404 and the Rivers and Harbor Act, Section 10 has the responsibility to make the final determination of the location and extent of jurisdictional wetlands and navigable waters on this property, respectively. This report represents the opinion of the investigators and should be considered preliminary until final concurrence is obtained from the U. S. Army Corps of Engineers Galveston District.

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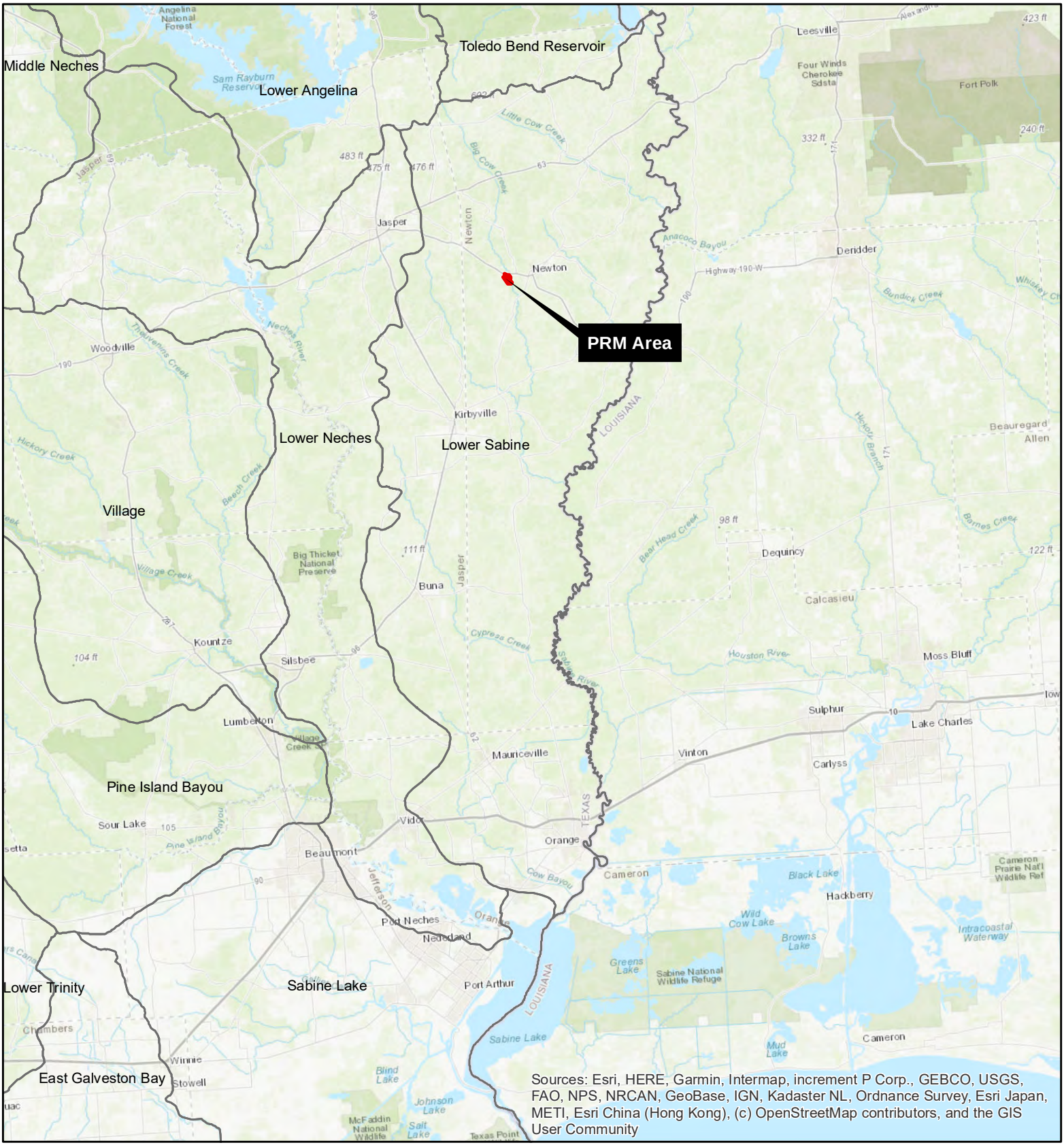
APPENDIX A
FIGURES



Project Boundary (219.8 ac)

8 Digit HUC

12 6 0 12

Miles

Big Cow Creek Mitigation Area

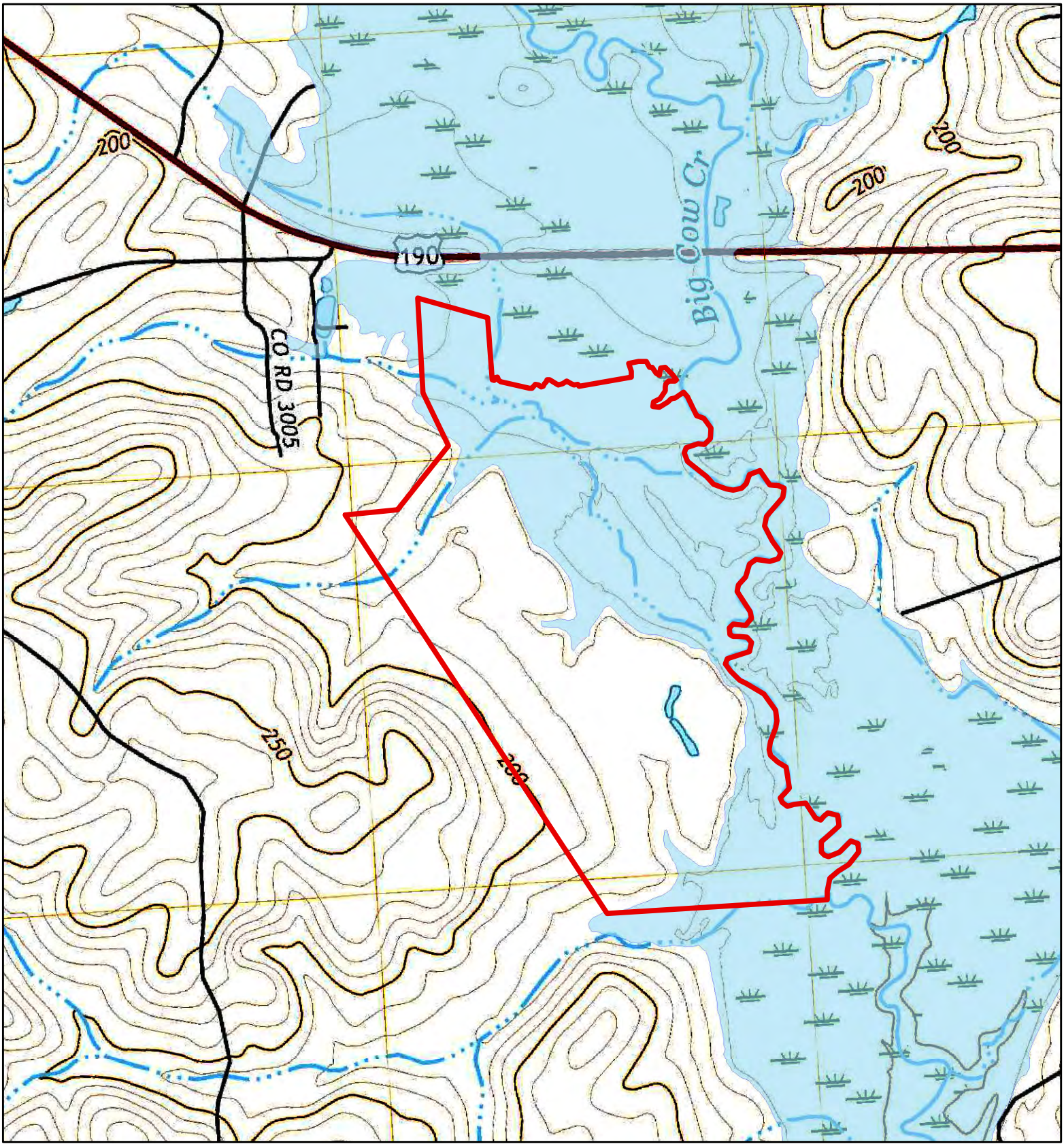
VICINITY MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	CB
Date :	01/07/2020
Map # :	F01_Vicinity.mxd

DELTA LAND SERVICES

FIGURE 1



Project Boundary (219.8 ac)

FEMA 100-Year Floodplain

1,000 500 0 1,000

Feet

Big Cow Creek Mitigation Area

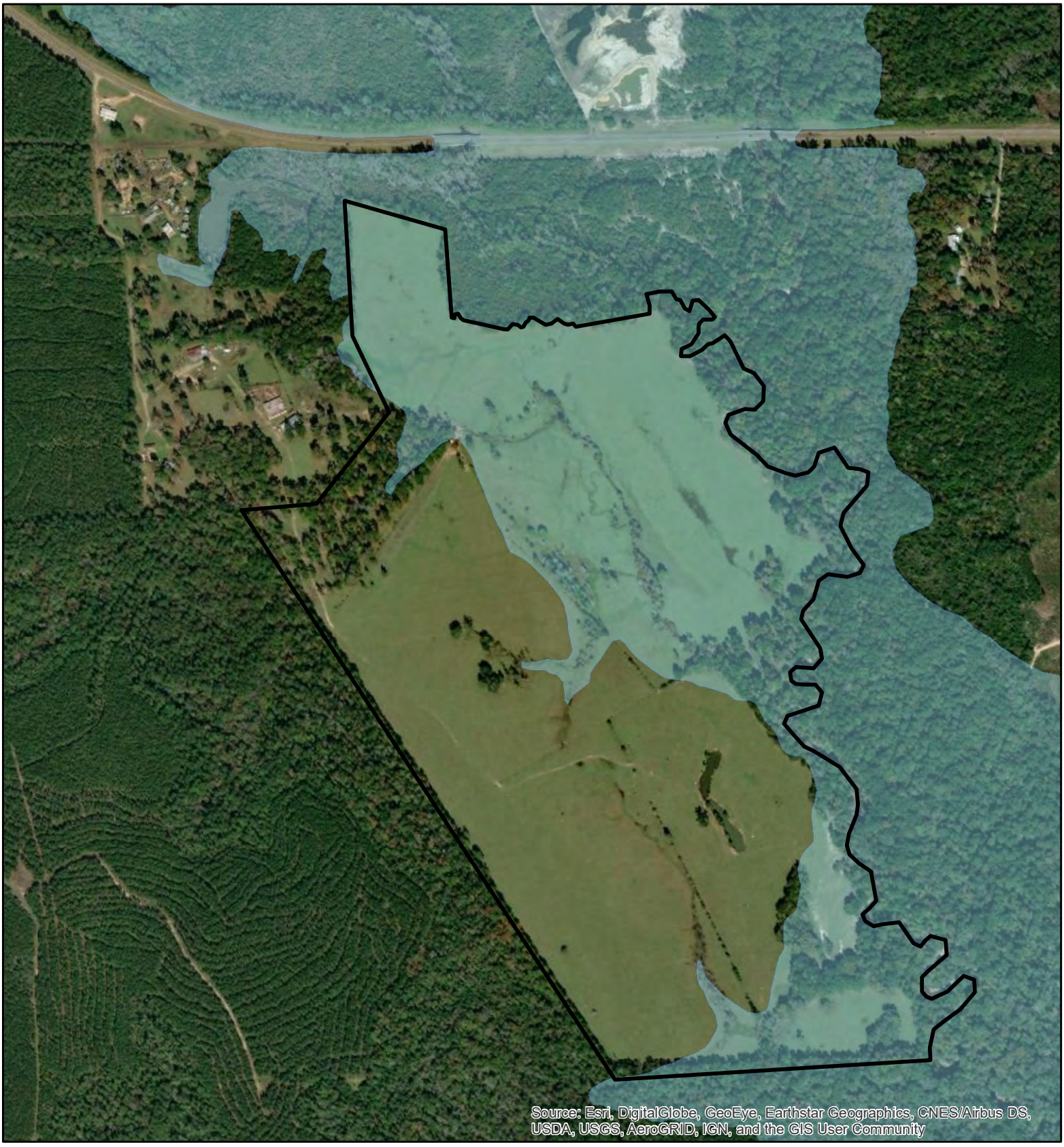
2019 TOPOGRAPHIC MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	CB
Date :	01/07/2020
Map # :	F02_2019Topo.mxd

DELTA LAND SERVICES

FIGURE 2



Project Area (219.8 ac)

FEMA Flood Zone A

N

700 350 0 700

Feet

Big Cow Creek Mitigation Area

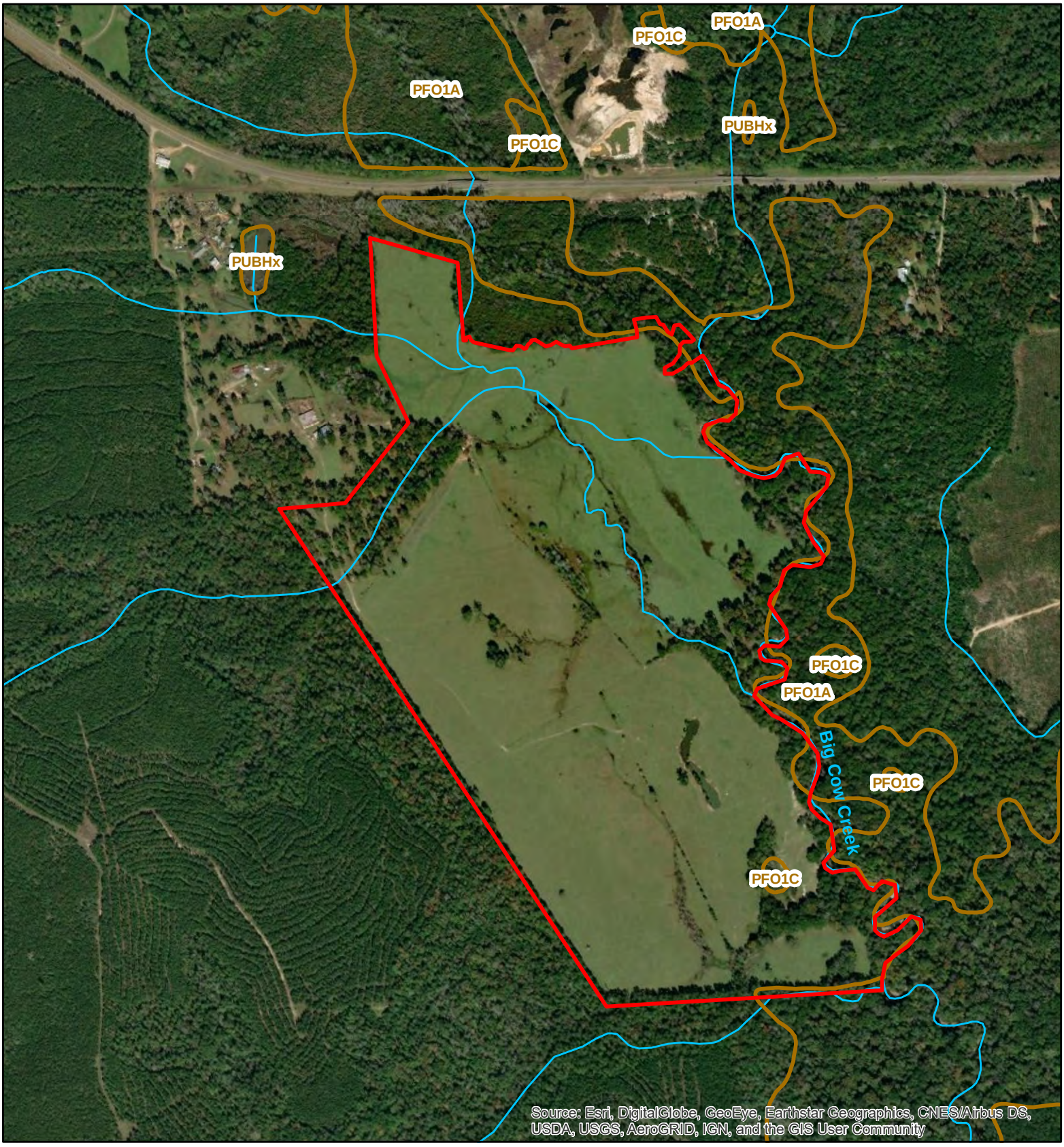
FEMA FLOODPLAIN MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	AP
Date :	01/02/2020
Map # :	F03_FEMA.mxd

DELTA LAND SERVICES

FIGURE 3



Project Area (219.8 ac)

National Wetland Inventory

National Hydrography Dataset

N

700 350 0 700

Feet

Big Cow Creek Mitigation Area

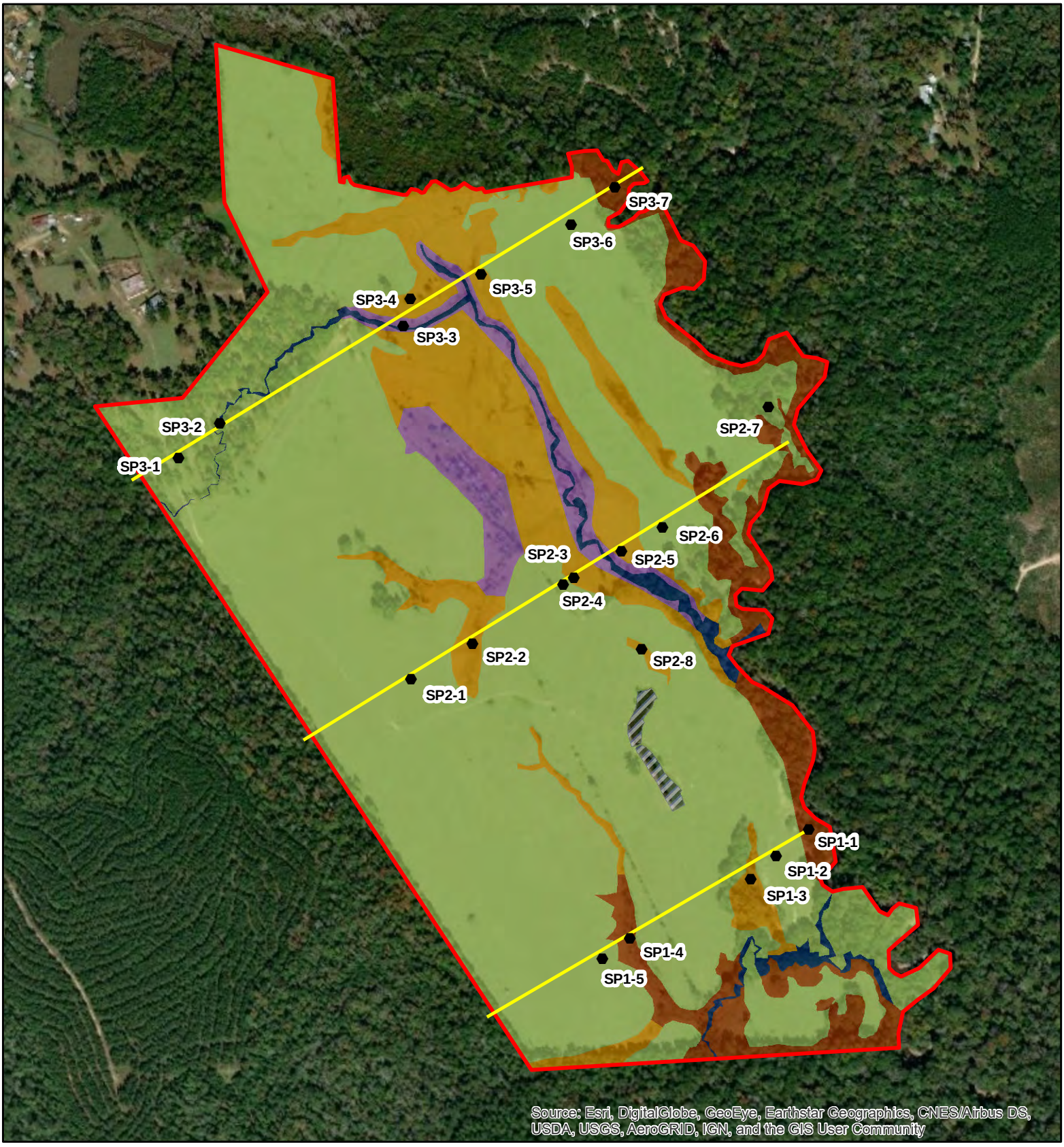
NATIONAL WETLAND INVENTORY

Newton County, TX

Created :	TSC/ArcView10
Approved :	AP
Date :	01/02/2020
Map # :	F04_NWI.mxd

DELTA LAND SERVICES

FIGURE 4



Project Area (219.8 ac)
Data Points
Transects
PEM (28.9 ac)
PFO (16.7 ac)
PSS (7.9 ac)
STREAM (3.8 ac)
UPLAND (161.7 ac)
POND (0.9 ac)

N

600 300 0 600

Feet

Big Cow Creek Mitigation Area

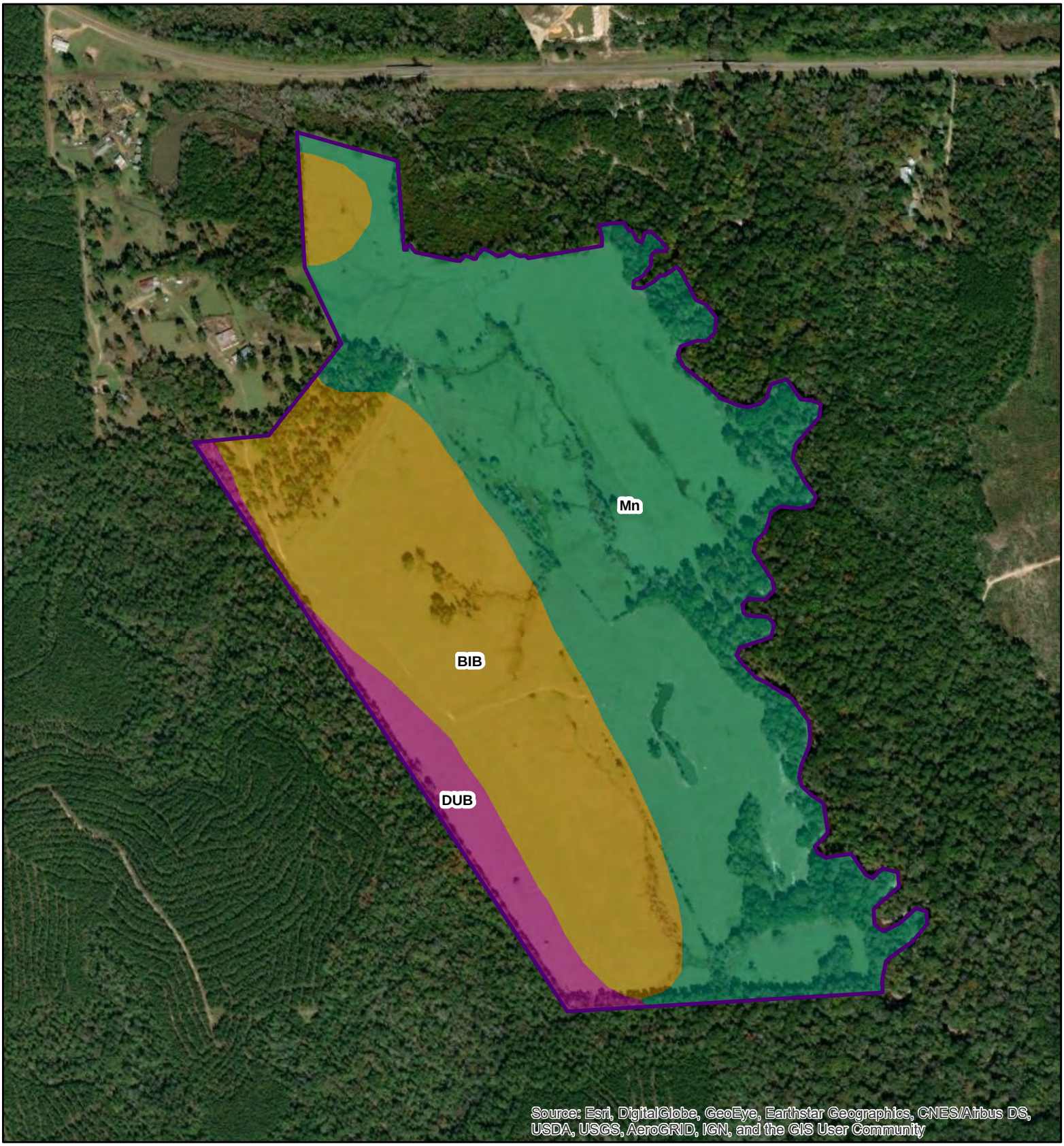
AQUATIC RESOURCES MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	AP
Date :	01/02/2020
Map # :	F05_AquaticResources.m

DELTA LAND SERVICES

FIGURE 5



Project Area (219.8 ac)
BIB: Bienville-Alaga association, gently undulating
DUB: Doucette-Boykin association, undulating
Mn: Mantachie and Bleakwood soils, frequently flooded

N

700 350 0 700

Feet

Big Cow Creek Mitigation Area

NRCS SOILS MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	AP
Date :	01/02/2020
Map # :	F06_Soils

DELTA LAND SERVICES

FIGURE 6

APPENDIX B

WETLAND DELINEATION DATA SHEETS

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP1-1
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave | Slope (%): 05-10
Subregion (LRR or MLRA): LRR T | Lat: 30.840809 | Long: -93.795373 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes No **X**
Hydric Soil Present?	Yes	No **X**	
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- **X** Water Marks (B1)
- **X** Sediment Deposits (B2)
- **X** Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- **X** Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants. Sampling Point: **SP1-1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Betula nigra*	20	Yes	FACW
2. *Taxodium distichum*	5	No	OBL
3. *Triadica sebifera*	5	No	FAC
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		
50% of total cover: 15.00		20% of total cover: 6.00	

Sapling/Shrub Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carpinus caroliniana*	30	Yes	FAC
2. *Taxodium distichum*	20	Yes	OBL
3. *Ligustrum sinense*	10	No	FAC
4. *Salix nigra*	5	No	OBL
5. *Juniperus virginiana*	3	No	FACU
6. *Zanthoxylum clava-herculis*	20	Yes	FAC
7. *Callicarpa americana*	1	No	FACU
8.			
	89 = Total Cover		
50% of total cover: 44.50		20% of total cover: 17.80	

Herb Stratum (Plot size: 5 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Smilax bona-nox*	3	Yes	FAC
2. *Carpinus caroliniana*	3	Yes	FAC
3. *Quercus phellos*	1	No	FACW
4. *Brunnichia ovata*	2	No	FACW
5. *Elephantopus carolinianus*	4	Yes	FACU
6. *Juniperus virginiana*	2	No	FACU
7. *Ampelopsis arborea*	4	Yes	FAC
8. *Ligustrum sinense*	5	Yes	FAC
9. *Dichanthelium commutatum*	3	Yes	FAC
10. *Parthenocissus quinquefolia*	1	No	FACU
11.			
12.			
	28 = Total Cover		
50% of total cover: 14.00		20% of total cover: 5.60	

Woody Vine Stratum (Plot size: 15 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **9** (A)

Total Number of Dominant Species Across All Strata: **10** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **90%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**30**	x 1 =	**30**
FACW species	**23**	x 2 =	**46**
FAC species	**83**	x 3 =	**249**
FACU species	**11**	x 4 =	**44**
UPL species	**0**	x 5 =	**0**
Column Totals:	**147** (A)		**369** (B)

Prevalence Index = B/A = **2.51**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP1-1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 5/3	100	None	—	—	—	Sand	
2-11	10yr6/3	100	None	—	—	—	Sand	
11-18	10yr 7/3	100	None	—	—	—	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Organic Bodies (A6) **(LRR P, T, U)**
- ____ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ____ Muck Presence (A8) **(LRR U)**
- ____ 1 cm Muck (A9) **(LRR P, T)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Coast Prairie Redox (A16) **(MLRA 150A)**
- ____ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR P, S, T, U)**
- ____ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ____ Thin Dark Surface (S9) **(LRR S, T, U)**
- ____ Loamy Mucky Mineral (F1) **(LRR O)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Marl (F10) **(LRR U)**
- ____ Depleted Ochric (F11) **(MLRA 151)**
- ____ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ____ Umbric Surface (F13) **(LRR P, T, U)**
- ____ Delta Ochric (F17) **(MLRA 151)**
- ____ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ____ 1 cm Muck (A9) **(LRR O)**
- ____ 2 cm Muck (A10) **(LRR S)**
- ____ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ____ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ____ Red Parent Material **(TF2)**
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 1-1 Soil profile.

SP1-1 facing South.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP1-2
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Convex | Slope (%): 05-10
Subregion (LRR or MLRA): LRR T | Lat: 30.840491 | Long: -93.795875 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No **X**	**Is the Sampled Area within a Wetland?** Yes No **X**
Hydric Soil Present?	Yes	No **X**	
Wetland Hydrology Present?	Yes	No **X**	

Remarks:
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? Yes No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP1-2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Paspalum notatum*	87	Yes	FACU
2. *Eupatorium capillifolium*	10	No	FACU
3. *Triadica sebifera*	3	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
50% of total cover: 50.00		20% of total cover: 20.00	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**0**	x 2 =	**0**
FAC species	**3**	x 3 =	**9**
FACU species	**97**	x 4 =	**388**
UPL species	**0**	x 5 =	**0**
Column Totals:	**100** (A)		**397** (B)

Prevalence Index = B/A = **3.97**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (If observed, list morphological adaptations below).

No positive indication of hydrophytic vegetation was observed.

SOIL

Sampling Point: **SP1-2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10yr 6-4	100	None	—	—	—	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 1-2 Soil profile.

SP 1-2 Facing east.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP1-3
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Swamp | Local relief (concave, convex, none): Concave | Slope (%): 05-10
Subregion (LRR or MLRA): LRR T | Lat: 30.840224 | Long: -93.796266 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	
Hydric Soil Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- **X** Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- **X** Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15) **(LRR U)**
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes **X** No	Depth (inches):	**2-3**
Water Table Present?	Yes **X** No	Depth (inches):	**2-3**
Saturation Present? (includes capillary fringe)	Yes **X** No	Depth (inches):	**0**

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants. Sampling Point: **SP1-3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Taxodium distichum*	20	Yes	OBL
2. *Quercus nigra*	20	Yes	FAC
3. *Liquidambar styraciflua*	20	Yes	FAC
4. *Nyssa biflora*	30	Yes	OBL
5.			
6.			
7.			
8.			
	90	= Total Cover	
50% of total cover: 45.00		20% of total cover: 18.00	
Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Taxodium distichum*	10	Yes	OBL
2. *Nyssa biflora*	10	Yes	OBL
3. *Triadica sebifera*	10	Yes	FAC
4. *Ligustrum sinense*	1	No	FAC
5.			
6.			
7.			
8.			
	31	= Total Cover	
50% of total cover: 15.50		20% of total cover: 6.20	
Herb Stratum (Plot size: 5 feet)			
1. *Rhynchospora corniculata*	5	Yes	OBL
2. *Saururus cernuus*	5	Yes	OBL
3. *Juncus debilis*	2	No	OBL
4. *Itea virginica*	2	No	FACW
5. *Persicaria hydropiperoides*	2	No	OBL
6. *Boehmeria cylindrica*	3	Yes	FACW
7. *Carex atlantica*	1	No	FACW
8. *Taxodium distichum*	1	No	OBL
9. *Ligustrum sinense*	1	No	FAC
10. *Triadica sebifera*	1	No	FAC
11. *Carex caroliniana*	1	No	FACW
12. *Liquidambar styraciflua*	1	No	FAC
	25	= Total Cover	
50% of total cover: 12.50		20% of total cover: 5.00	
Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **10** (A)

Total Number of Dominant Species Across All Strata: **10** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**85**	x 1 =	**85**
FACW species	**7**	x 2 =	**14**
FAC species	**54**	x 3 =	**162**
FACU species	**0**	x 4 =	**0**
UPL species	**0**	x 5 =	**0**
Column Totals:	**146** (A)		**261** (B)

Prevalence Index = B/A = **1.79**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP1-3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10yr 3/2	95	10yr 6/6	5	C	M	Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- **X** Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

A positive indication of hydric soil was observed.

SP 1-3 Soil profile.

SP 1-3 Facing south.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP1-4
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Stream | Local relief (concave, convex, none): Concave | Slope (%): 05-10
Subregion (LRR or MLRA): LRR T | Lat: 30.839568 | Long: -93.798078 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No ____
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No ____	
Hydric Soil Present?	Yes **X**	No ____	**Is the Sampled Area within a Wetland?** Yes **X** No ____
Wetland Hydrology Present?	Yes **X**	No ____	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **x** Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- **X** Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres along Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ____ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes **X**	No ____	Depth (inches): **6**	
Water Table Present?	Yes ____	No **X**	Depth (inches): ____	
Saturation Present? (includes capillary fringe)	Yes ____	No **X**	Depth (inches): ____	**Wetland Hydrology Present?** Yes **X** No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP1-4**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Triadica sebifera*	15	Yes	FAC
2. *Salix nigra*	10	Yes	OBL
3. *Quercus nigra*	10	Yes	FAC
4. *Liquidambar styraciflua*	5	No	FAC
5.			
6.			
7.			
8.			
	40	= Total Cover	
50% of total cover: 20.00		20% of total cover: 8.00	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Triadica sebifera*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10	= Total Cover	
50% of total cover: 5.00		20% of total cover: 2.00	

Herb Stratum (Plot size: 5 feet)			
1. *Juncus effusus*	3	No	OBL
2. *Juncus debilis*	2	No	OBL
3. *Paspalum urvillei*	2	No	FAC
4. *Paspalum notatum*	10	No	FACU
5. *Panicum virgatum*	20	Yes	FAC
6. *Axonopus fissifolius*	20	Yes	FACW
7. *Ligustrum sinense*	5	No	FAC
8. *Juncus brachycarpus*	1	No	FACW
9. *Persicaria hydropiperoides*	10	No	OBL
10. *Boehmeria cylindrica*	2	No	FACW
11. *Persicaria punctata*	1	No	OBL
12.			
	76	= Total Cover	
50% of total cover: 38.00		20% of total cover: 15.20	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**26**	x 1 =	**26**
FACW species	**23**	x 2 =	**46**
FAC species	**67**	x 3 =	**201**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**126** (A)		**313** (B)

Prevalence Index = B/A = **2.48**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP1-4**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10yr 4/2	96	10yr 6/6	4	C	M	Sand	
3-18	10yr 6/1	100	None	—	—	—	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- X Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

A positive indication of hydric soil was observed.

SP 1-4 Soil profile.

SP 1-4 Facing West.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek City/County: Newton Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services State: Texas Sampling Point: SP1-5
Investigator(s): A. Perkins and B. Delaney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 00-05
Subregion (LRR or MLRA): LRR T Lat: 30.839327 Long: -93.798494 Datum: WGS 1984
Soil Map Unit Name: NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	
Hydric Soil Present?	Yes	No X	**Is the Sampled Area within a Wetland?** Yes No X
Wetland Hydrology Present?	Yes	No X	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):	
Water Table Present?	Yes	No X	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):	**Wetland Hydrology Present?** Yes No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP1-5**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	67	Yes	FACW
2. *Paspalum notatum*	24	Yes	FACU
3. *Helenium amarum*	1	No	FACU
4. *Eupatorium capillifolium*	1	No	FACU
5. *Schizachyrium scoparium*	1	No	FACU
6. *Persicaria hydropiperoides*	1	No	OBL
7. *Allium canadense*	1	No	FACU
8. *Chamaesyce nutans*	1	No	UPL
9. *Dichondra carolinensis*	1	No	FAC
10.			
11.			
12.			
	98 = Total Cover		
50% of total cover:	49.00	20% of total cover:	19.60

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**1**	x 1 =	**1**
FACW species	**67**	x 2 =	**134**
FAC species	**1**	x 3 =	**3**
FACU species	**28**	x 4 =	**112**
UPL species	**1**	x 5 =	**5**
Column Totals:	**98** (A)		**255** (B)

Prevalence Index = B/A = **2.60**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP1-5**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10yr 5/4	100	None	—	—	—	Sand	
5-18	10yr 6/4	80	10yr 6/6	20	C	M	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Organic Bodies (A6) **(LRR P, T, U)**
- ____ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ____ Muck Presence (A8) **(LRR U)**
- ____ 1 cm Muck (A9) **(LRR P, T)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Coast Prairie Redox (A16) **(MLRA 150A)**
- ____ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR P, S, T, U)**
- ____ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ____ Thin Dark Surface (S9) **(LRR S, T, U)**
- ____ Loamy Mucky Mineral (F1) **(LRR O)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Marl (F10) **(LRR U)**
- ____ Depleted Ochric (F11) **(MLRA 151)**
- ____ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ____ Umbric Surface (F13) **(LRR P, T, U)**
- ____ Delta Ochric (F17) **(MLRA 151)**
- ____ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ____ 1 cm Muck (A9) **(LRR O)**
- ____ 2 cm Muck (A10) **(LRR S)**
- ____ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ____ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ____ Red Parent Material **(TF2)**
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 1-5 Soil profile.

SP 1-5 Facing East.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek City/County: Newton Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services State: Texas Sampling Point: SP2-1
Investigator(s): A. Perkins and B. Delaney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 00-05
Subregion (LRR or MLRA): LRR T Lat: 30.842995 Long: -93.801054 Datum: WGS 1984
Soil Map Unit Name: NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (If no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No **X**	
Hydric Soil Present?	Yes _____	No **X**	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Wetland Hydrology Present?	Yes _____	No **X**	

Remarks:
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres along Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ FAC-Neutral Test (D5)
- ____ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	48	Yes	FACW
2. *Paspalum notatum*	20	Yes	FACU
3. *Lespedeza repens*	20	Yes	UPL
4. *Helenium amarum*	5	No	FACU
5. *Eupatorium capillifolium*	5	No	FACU
6. *Croton capitatus*	1	No	UPL
7. *Triadica sebifera*	1	No	FAC
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
50% of total cover: 50.00		20% of total cover: 20.00	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**48**	x 2 =	**96**
FAC species	**1**	x 3 =	**3**
FACU species	**30**	x 4 =	**120**
UPL species	**21**	x 5 =	**105**
Column Totals:	**100** (A)		**324** (B)

Prevalence Index = B/A = **3.24**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (If observed, list morphological adaptations below).

No positive indication of hydrophytic vegetation was observed.

SOIL

Sampling Point: **SP2-1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 5/3	100	None	—	—	—	Sandy loam	
2-18	10yr 6/3	80	10ry 6/6	10	C	M	Sand	
			10yr 5/8	10	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 2-1 Soil profile.

SP 2-1 Facing East.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP2-2
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.843393 | Long: -93.800123 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Hydric Soil Present?	Yes **X**	No	
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes **X** No	Depth (inches):	**2**
Water Table Present?	Yes **X** No	Depth (inches):	**3**
Saturation Present? (includes capillary fringe)	Yes **X** No	Depth (inches):	**8**

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	45	Yes	FACW
2. *Juncus effusus*	45	Yes	OBL
3. *Paspalum urvillei*	1	No	FAC
4. *Ludwigia octovalvis*	1	No	OBL
5. *Centella erecta*	1	No	FACW
6. *Luziola fluitans*	1	No	OBL
7. *Eupatorium capillifolium*	1	No	FACU
8. *Persicaria hydropiperoides*	1	No	OBL
9. *Mikania scandens*	1	No	FACW
10. *Ludwigia repens*	1	No	OBL
11. *Hydrocotyle umbellata*	1	No	OBL
12. *Xyris ambigua*	1	No	OBL
	100 = Total Cover		
50% of total cover:	50.00	20% of total cover:	20.00

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**51**	x 1 =	**51**
FACW species	**47**	x 2 =	**94**
FAC species	**1**	x 3 =	**3**
FACU species	**1**	x 4 =	**4**
UPL species	**0**	x 5 =	**0**
Column Totals:	**100** (A)		**152** (B)

Prevalence Index = B/A = **1.52**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP2-2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 4/2	98	10yr 5/8	2	C	M	Sand	
2-10	10yr 6/2	90	10yr 5/8	5	C	M	Sand	
			10yr 6/6	5	C	M		
10-18	10yr 6/1	95	10yr 5/8	5	C	M	Sand	Some buried organic material

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 2-2 Soil profile

SP 2-2 Facing West.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek City/County: Newton Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services State: Texas Sampling Point: SP2-3
Investigator(s): A. Perkins and B. Delaney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 00-05
Subregion (LRR or MLRA): LRR T Lat: 30.844077 Long: -93.798745 Datum: WGS 1984
Soil Map Unit Name: NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	
Hydric Soil Present?	Yes	No X	**Is the Sampled Area within a Wetland?** Yes No X
Wetland Hydrology Present?	Yes	No X	

Remarks:
This point was determined not to be within a wetland due to the lack of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):	
Water Table Present?	Yes	No X	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):	**Wetland Hydrology Present?** Yes No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	45	Yes	FACW
2. *Paspalum notatum*	44	Yes	FACU
3. *Helenium amarum*	2	No	FACU
4. *Eupatorium capillifolium*	1	No	FACU
5. *Triadica sebifera*	1	No	FAC
6. *Rubus trivialis*	1	No	FACU
7. *Sporobolus indicus*	1	No	FACU
8.			
9.			
10.			
11.			
12.			
	95 = Total Cover		
50% of total cover: 47.50		20% of total cover: 19.00	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**45**	x 2 =	**90**
FAC species	**1**	x 3 =	**3**
FACU species	**49**	x 4 =	**196**
UPL species	**0**	x 5 =	**0**
Column Totals:	**95** (A)		**289** (B)

Prevalence Index = B/A = **3.04**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤ 3.0[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: (If observed, list morphological adaptations below).

No positive indication of hydrophytic vegetation was observed.

SOIL

Sampling Point: **SP2-3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 5/3	100	None	—	—	—	Sandy loam	
4-8	10yr 6/4	90	10yr 6/6	10	C	M	Sandy loam	
8-16	10yr 6/6	100	None	—	—	—	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 2-3 Soil profile.

SP 2-3 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP2-4
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.844165 | Long: -93.798593 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Hydric Soil Present?	Yes **X**	No	
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes **X**	No	Depth (inches): **8**
Saturation Present? (includes capillary fringe)	Yes **X**	No	Depth (inches): **10**

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

This wetland has hydrologic influence from and is in a hillside seep.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-4**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	83	Yes	FACW
2. *Eleocharis montevidensis*	3	No	FACW
3. *Triadica sebifera*	3	No	FAC
4. *Cyperus erythrorhizos*	1	No	OBL
5. *Centella erecta*	1	No	FACW
6. *Ludwigia octovalvis*	1	No	OBL
7. *Carex complanata*	1	No	FAC
8. *Persicaria punctata*	1	No	OBL
9. *Juncus brachycarpus*	1	No	FACW
10. *Eupatorium capillifolium*	1	No	FACU
11. *Xyris ambigua*	1	No	OBL
12.			
	97 = Total Cover		
50% of total cover: 48.50		20% of total cover: 19.40	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**4**	x 1 =	**4**
FACW species	**88**	x 2 =	**176**
FAC species	**4**	x 3 =	**12**
FACU species	**1**	x 4 =	**4**
UPL species	**0**	x 5 =	**0**
Column Totals:	**97** (A)		**196** (B)

Prevalence Index = B/A = **2.02**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP2-4**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 3/1	100	None	—	—	—	Sandy loam	
2-16	10yr 6/1	98	10yr 6/6	2	C	M	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 2-4 Soil profile.

SP 2-4 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/16/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP2-5
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.844457 | Long: -93.797872 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	
Hydric Soil Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-5**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	95	Yes	FACW
2. *Lespedeza repens*	1	No	UPL
3. *Triadica sebifera*	1	No	FAC
4. *Dichondra carolinensis*	1	No	FAC
5. *Phyla nodiflora*	1	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	99 = Total Cover		
50% of total cover:	49.50	20% of total cover:	19.80

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**95**	x 2 =	**190**
FAC species	**3**	x 3 =	**9**
FACU species	**0**	x 4 =	**0**
UPL species	**1**	x 5 =	**5**
Column Totals:	**99** (A)		**204** (B)

Prevalence Index = B/A = **2.06**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP2-5**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10yr 4/2	98	10yr 6/6	2	C	M	Sandy loam	
7-18	10yr 6/1	75	10yr 6/6	20	C	M	Sand	
			10yr 5/8	5	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 2-5 Soil profile.

SP 2-5 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/16/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP2-6
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Convex | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.844729 | Long: -93.797244 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: SELECT ONE
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	
Hydric Soil Present?	Yes	No X	**Is the Sampled Area within a Wetland?** Yes No X
Wetland Hydrology Present?	Yes	No X	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? Yes No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-6**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	86	Yes	FACW
2. *Paspalum notatum*	10	No	FACU
3. *Triadica sebifera*	2	No	FAC
4. *Lespedeza repens*	2	No	UPL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
50% of total cover:	50.00	20% of total cover:	20.00

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**86**	x 2 =	**172**
FAC species	**2**	x 3 =	**6**
FACU species	**10**	x 4 =	**40**
UPL species	**2**	x 5 =	**10**
Column Totals:	**100** (A)		**228** (B)

Prevalence Index = B/A = **2.28**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP2-6**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10yr 4/3	100	None	—	—	—	Sand	
7-16	10yr 5/6	100	None	—	—	—	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Organic Bodies (A6) **(LRR P, T, U)**
- ____ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ____ Muck Presence (A8) **(LRR U)**
- ____ 1 cm Muck (A9) **(LRR P, T)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Coast Prairie Redox (A16) **(MLRA 150A)**
- ____ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR P, S, T, U)**
- ____ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ____ Thin Dark Surface (S9) **(LRR S, T, U)**
- ____ Loamy Mucky Mineral (F1) **(LRR O)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Marl (F10) **(LRR U)**
- ____ Depleted Ochric (F11) **(MLRA 151)**
- ____ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ____ Umbric Surface (F13) **(LRR P, T, U)**
- ____ Delta Ochric (F17) **(MLRA 151)**
- ____ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ____ 1 cm Muck (A9) **(LRR O)**
- ____ 2 cm Muck (A10) **(LRR S)**
- ____ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ____ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ____ Red Parent Material **(TF2)**
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 2-6 Soil profile.

SP 2-6 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek City/County: Newton Sampling Date: 10/16/2019
Applicant/Owner: Delta Land Services State: Texas Sampling Point: SP2-7
Investigator(s): A. Perkins and B. Delaney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 00-05
Subregion (LRR or MLRA): LRR T Lat: 30.846166 Long: -93.795603 Datum: WGS 1984
Soil Map Unit Name: NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	
Hydric Soil Present?	Yes	No X	**Is the Sampled Area within a Wetland?** Yes No X
Wetland Hydrology Present?	Yes	No X	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? Yes No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-7**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Carpinus caroliniana*	50	Yes	FAC
2. *Nyssa sylvatica*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	70 = Total Cover		
50% of total cover: 35.00		20% of total cover: 14.00	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Triadica sebifera*	10	Yes	FAC
2. *Ligustrum sinense*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10.00		20% of total cover: 4.00	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	25	Yes	FACW
2. *Arundinaria gigantea*	15	Yes	FACW
3. *Chasmanthium laxum*	5	No	FACW
4. *Elephantopus carolinianus*	5	No	FACU
5. *Ligustrum sinense*	5	No	FAC
6. *Verbena bracteata*	3	No	FACU
7. *Carex caroliniana*	1	No	FACW
8. *Bignonia capreolata*	2	No	FAC
9. *Smilax bona-nox*	1	No	FAC
10. *Quercus nigra*	1	No	FAC
11. *Rubus trivialis*	2	No	FACU
12.			
	65 = Total Cover		
50% of total cover: 32.50		20% of total cover: 13.00	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**46**	x 2 =	**92**
FAC species	**99**	x 3 =	**297**
FACU species	**10**	x 4 =	**40**
UPL species	**0**	x 5 =	**0**
Column Totals:	**155** (A)		**429** (B)

Prevalence Index = B/A = **2.77**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP2-7**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 4/3	80					Sand	
	10yr 6/3	20						
4-18	10yr 5/4	100	None	—	—	—	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Organic Bodies (A6) **(LRR P, T, U)**
- ____ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ____ Muck Presence (A8) **(LRR U)**
- ____ 1 cm Muck (A9) **(LRR P, T)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Coast Prairie Redox (A16) **(MLRA 150A)**
- ____ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR P, S, T, U)**
- ____ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ____ Thin Dark Surface (S9) **(LRR S, T, U)**
- ____ Loamy Mucky Mineral (F1) **(LRR O)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Marl (F10) **(LRR U)**
- ____ Depleted Ochric (F11) **(MLRA 151)**
- ____ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ____ Umbric Surface (F13) **(LRR P, T, U)**
- ____ Delta Ochric (F17) **(MLRA 151)**
- ____ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ____ 1 cm Muck (A9) **(LRR O)**
- ____ 2 cm Muck (A10) **(LRR S)**
- ____ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ____ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ____ Red Parent Material **(TF2)**
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 2-7 Soil profile.

SP 2-7 Facing West.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: #N/A City/County: #N/A Sampling Date: #N/A
Applicant/Owner: #N/A State: #N/A Sampling Point: SP2-8
Investigator(s): #N/A Section, Township, Range: #N/A
Landform (hillslope, terrace, etc.): #N/A Local relief (concave, convex, none): #N/A Slope (%): #N/A
Subregion (LRR or MLRA): #N/A Lat: #N/A Long: #N/A Datum: #N/A
Soil Map Unit Name: #N/A NWI Classification: #N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (If no, explain in Remarks.)
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No** ,Soil **No** ,or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?**	**Yes X**	**No** _____
Hydric Soil Present?	Yes **X**	No _____			
Wetland Hydrology Present?	Yes **X**	No _____			

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- ____ High Water Table (A2)
- **X** Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres along Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ____ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes **X**	No _____	Depth (inches): **3**	
Water Table Present?	Yes _____	No **X**	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes **X**	No _____	Depth (inches): **0**	**Wetland Hydrology Present? Yes X No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP2-8**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	95	Yes	FACW
2. *Juncus brachycarpus*	1	No	FACW
3. *Persicaria hydropiperoides*	1	No	OBL
4. *Kyllinga brevifolia*	1	No	FACW
5. *Schizachyrium scoparium*	1	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	99 = Total Cover		
50% of total cover: 49.50		20% of total cover: 19.80	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**1**	x 1 =	**1**
FACW species	**97**	x 2 =	**194**
FAC species	**0**	x 3 =	**0**
FACU species	**1**	x 4 =	**4**
UPL species	**0**	x 5 =	**0**
Column Totals:	**99** (A)		**199** (B)

Prevalence Index = B/A = **2.01**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP2-8**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10yr 4/1	100	None	—	—	—	Sandy laom	
1-12	10yr 5/2	70	10yr 5/6	30	C	M, PL	Sandy laom	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 2-8 Soil profile.

SP 2-8 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek City/County: Newton Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services State: Texas Sampling Point: SP3-1
Investigator(s): A. Perkins and B. Delaney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 00-05
Subregion (LRR or MLRA): LRR T Lat: 30.845957 Long: -93.804258 Datum: WGS 1984
Soil Map Unit Name: NWI Classification: Forested Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation No ,Soil No ,or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No ,Soil No ,or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	
Hydric Soil Present?	Yes	No X	**Is the Sampled Area within a Wetland?** Yes No X
Wetland Hydrology Present?	Yes	No X	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):	
Water Table Present?	Yes	No X	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):	**Wetland Hydrology Present?** Yes No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-1**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Quercus alba*	40	Yes	FACU
2. *Quercus falcata*	10	No	FACU
3. *Quercus nigra*	10	No	FAC
4.			
5.			
6.			
7.			
8.			
	60	= Total Cover	
50% of total cover: 30.00		20% of total cover: 12.00	
Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Ilex vomitoria*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	5	= Total Cover	
50% of total cover: 2.50		20% of total cover: 1.00	
Herb Stratum (Plot size: 5 feet)			
1. *Chasmanthium laxum*	3	Yes	FACW
2. *Dichanthelium laxiflorum*	3	Yes	FAC
3. *Callicarpa americana*	3	Yes	FACU
4. *Bignonia capreolata*	2	Yes	FAC
5. *Ilex vomitoria*	1	No	FAC
6. *Elephantopus carolinianus*	1	No	FACU
7. *Triadica sebifera*	1	No	FAC
8. *Oxalis dillenii*	1	No	FACU
9. *Ampelopsis arborea*	1	No	FAC
10. *Quercus nigra*	1	No	FAC
11. *Quercus alba*	1	No	FACU
12. *Scleria oligantha*	1	No	FAC
	19	= Total Cover	
50% of total cover: 9.50		20% of total cover: 3.80	
Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**3**	x 2 =	**6**
FAC species	**25**	x 3 =	**75**
FACU species	**56**	x 4 =	**224**
UPL species	**0**	x 5 =	**0**
Column Totals:	**84** (A)		**305** (B)

Prevalence Index = B/A = **3.63**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

SOIL

Sampling Point: **SP3-1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-3	10yr 4/2	100	None	—	—	—	Sandy loam	
3-7	10yr 4/4	100	None	—	—	—	Sandy loam	
7-16	10yr 5-6	30					Sand	
	10yr 4/6	70					Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 3-1 Soil profile.

SP 3-1 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP3-2
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Stream | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.846366 | Long: -93.803633 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Hydric Soil Present?	Yes **X**	No	
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-2**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *Magnolia virginiana*	15	Yes	FACW
2. *Nyssa sylvatica*	25	Yes	FAC
3. *Fagus grandifolia*	10	Yes	FACU
4.			
5.			
6.			
7.			
8.			
	50	= Total Cover	
50% of total cover: 25.00		20% of total cover: 10.00	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Fagus grandifolia*	15	Yes	FACU
2. *Liquidambar styraciflua*	5	No	FAC
3. *Carpinus caroliniana*	20	Yes	FAC
4. *Triadica sebifera*	5	No	FAC
5. *Ilex vomitoria*	5	No	FAC
6. *Rhododendron canescens*	3	No	FACW
7.			
8.			
	53	= Total Cover	
50% of total cover: 26.50		20% of total cover: 10.60	

Herb Stratum (Plot size: 5 feet)			
1. *Arundinaria gigantea*	20	Yes	FACW
2. *Elephantopus carolinianus*	5	No	FACU
3. *Chasmanthium laxum*	3	No	FACW
4. *Carpinus caroliniana*	2	No	FAC
5. *Ligustrum sinense*	1	No	FAC
6. *Rhododendron canescens*	3	No	FACW
7. *Smilax bona-nox*	1	No	FAC
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
50% of total cover: 17.50		20% of total cover: 7.00	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **67%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**44**	x 2 =	**88**
FAC species	**64**	x 3 =	**192**
FACU species	**30**	x 4 =	**120**
UPL species	**0**	x 5 =	**0**
Column Totals:	**138** (A)		**400** (B)

Prevalence Index = B/A = **2.90**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP3-2**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10yr 4//2	90	10yr 5/8	10	C	M	Sandy loam	
5/16	10yr 6/2	88	10yr 6/6	10	C	M	Sand	
			10yr 5/8	2	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 3-2 Soil profile.

SP 3-2 Facing West.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP3-3
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Stream | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.847457 | Long: -93.800862 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PSS
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	
Hydric Soil Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- **X** Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes **X** No	Depth (inches):	**3**
Water Table Present?	Yes **X** No	Depth (inches):	**8**
Saturation Present? (includes capillary fringe)	Yes **X** No	Depth (inches):	**5**

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-3**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	
Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Triadica sebifera*	20	Yes	FAC
2. *Alnus serrulata*	15	Yes	FACW
3. *Liquidambar styraciflua*	3	No	FAC
4.			
5.			
6.			
7.			
8.			
	38 = Total Cover		
50% of total cover: 19.00		20% of total cover: 7.60	
Herb Stratum (Plot size: 5 feet)			
1. *Luziola fluitans*	25	Yes	OBL
2. *Persicaria hydropiperoides*	15	Yes	OBL
3. *Juncus effusus*	10	No	OBL
4. *Paspalum urvillei*	5	No	FAC
5. *Juncus debilis*	5	No	OBL
6. *Eupatorium capillifolium*	2	No	FACU
7. *Persicaria punctata*	2	No	OBL
8. *Persicaria virginiana*	1	No	FAC
9. *Ludwigia repens*	3	No	OBL
10. *Ludwigia octovalvis*	2	No	OBL
11. *Mikania scandens*	3	No	FACW
12. *Galium tinctorium*	1	No	FACW
	74 = Total Cover		
50% of total cover: 37.00		20% of total cover: 14.80	
Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**62**	x 1 =	**62**
FACW species	**19**	x 2 =	**38**
FAC species	**29**	x 3 =	**87**
FACU species	**2**	x 4 =	**8**
UPL species	**0**	x 5 =	**0**
Column Totals:	**112** (A)		**195** (B)

Prevalence Index = B/A = **1.74**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP3-3**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10yr 4/2	100	None	—	—	—		
3-9	10yr 4/2	70						Organic material
	10yr 3/2	30						
9-15	10yr 6/2	80						Organic material
	10yr 3/2	20						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- X Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 3-3 Soil profile.

SP 3-3 Facing South.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek City/County: Newton Sampling Date: 10/15/2019
Applicant/Owner: Delta Land Services State: Texas Sampling Point: SP3-4
Investigator(s): A. Perkins and B. Delaney Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Stream Local relief (concave, convex, none): Convex Slope (%): 00-05
Subregion (LRR or MLRA): LRR T Lat: 30.847797 Long: -93.800735 Datum: WGS 1984
Soil Map Unit Name: NWI Classification: Herbaceous Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No _____	
Hydric Soil Present?	Yes **X**	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No **X**
Wetland Hydrology Present?	Yes _____	No **X**	

Remarks:
This point was determined not to be within a wetland due to the lack of wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres along Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ FAC-Neutral Test (D5)
- ____ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No **X**	Depth (inches): _____
Water Table Present?	Yes _____	No **X**	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No **X**	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-4**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	75	Yes	FACW
2. *Paspalum notatum*	20	Yes	FACU
3. *Croton capitatus*	1	No	UPL
4. *Triadica sebifera*	3	No	FAC
5. *Helenium amarum*	1	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
50% of total cover: 50.00		20% of total cover: 20.00	

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **2** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**75**	x 2 =	**150**
FAC species	**3**	x 3 =	**9**
FACU species	**21**	x 4 =	**84**
UPL species	**1**	x 5 =	**5**
Column Totals:	**100** (A)		**248** (B)

Prevalence Index = B/A = **2.48**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10yr 5/2	90	10yr 5/8	10	C	M	Sandy loam	
6-16	10yr 6/1	75	10yr 6/6	20	C	M	Loamy sand	
			10yr 5/8	5	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 3-4 Soil profile.

SP 3-4 Facing North.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/16/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP3-5
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.848051 | Long: -93.799687 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	
Hydric Soil Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes **X** No
Wetland Hydrology Present?	Yes **X**	No	

Remarks:
This point was determined to be within a wetland due to the presence of all three wetland criteria.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- **X** High Water Table (A2)
- **X** Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- **X** Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):	
Water Table Present?	Yes **X**	No	Depth (inches):	**4**
Saturation Present? (includes capillary fringe)	Yes **X**	No	Depth (inches):	**4**

Wetland Hydrology Present? Yes **X** No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

Area was inundated 10/15. The day before data was collected.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-5**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	93	Yes	FACW
2. *Lespedeza repens*	3	No	UPL
3. *Rubus trivialis*	2	No	FACU
4. *Eupatorium capillifolium*	1	No	FACU
5. *Triadica sebifera*	1	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
50% of total cover:	50.00	20% of total cover:	20.00

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**93**	x 2 =	**186**
FAC species	**1**	x 3 =	**3**
FACU species	**3**	x 4 =	**12**
UPL species	**3**	x 5 =	**15**
Column Totals:	**100** (A)		**216** (B)

Prevalence Index = B/A = **2.16**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP3-5**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10yr 4/2	90	10yr 5/8	10	C	M	Sandy loam	
8-16	10yr 6/1	75	10yr 6/6	10	C	M	Sand	
			10yr 5/8	15	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- **X** Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** **X** **No** _____

Remarks:

A positive indication of hydric soil was observed.

SP 3-5 Soil profile.

SP 3-5 Facing East.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/16/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP3-6
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Convex | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.848606 | Long: -93.798322 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	
Hydric Soil Present?	Yes	No **X**	**Is the Sampled Area within a Wetland?** Yes No **X**
Wetland Hydrology Present?	Yes	No **X**	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? Yes No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-6**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5 feet)			
1. *Axonopus fissifolius*	87	Yes	FACW
2. *Paspalum notatum*	10	No	FACU
3. *Dichondra carolinensis*	1	No	FAC
4. *Sporobolus indicus*	1	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	99 = Total Cover		
50% of total cover:	49.50	20% of total cover:	19.80

Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **1** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**87**	x 2 =	**174**
FAC species	**1**	x 3 =	**3**
FACU species	**11**	x 4 =	**44**
UPL species	**0**	x 5 =	**0**
Column Totals:	**99** (A)		**221** (B)

Prevalence Index = B/A = **2.23**

Hydrophytic Vegetation Indicators:

- **X** 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP3-6**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10yr 5/4	100	None	—	—	—	Loam	
6-16	10yr 5/4	70	10yr 6/6	5	c	M	Sandy Loam	
	10yr 6/3	25						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ Organic Bodies (A6) **(LRR P, T, U)**
- ____ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ____ Muck Presence (A8) **(LRR U)**
- ____ 1 cm Muck (A9) **(LRR P, T)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Coast Prairie Redox (A16) **(MLRA 150A)**
- ____ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7) **(LRR P, S, T, U)**
- ____ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ____ Thin Dark Surface (S9) **(LRR S, T, U)**
- ____ Loamy Mucky Mineral (F1) **(LRR O)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Marl (F10) **(LRR U)**
- ____ Depleted Ochric (F11) **(MLRA 151)**
- ____ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ____ Umbric Surface (F13) **(LRR P, T, U)**
- ____ Delta Ochric (F17) **(MLRA 151)**
- ____ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ____ 1 cm Muck (A9) **(LRR O)**
- ____ 2 cm Muck (A10) **(LRR S)**
- ____ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ____ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ____ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ____ Red Parent Material **(TF2)**
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 3-6 Soil profile.

SP 3-6 Facing South.

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Big Cow Creek | City/County: Newton | Sampling Date: 10/16/2019
Applicant/Owner: Delta Land Services | State: Texas | Sampling Point: SP3-7
Investigator(s): A. Perkins and B. Delaney | Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Stream | Local relief (concave, convex, none): Concave | Slope (%): 00-05
Subregion (LRR or MLRA): LRR T | Lat: 30.849046 | Long: -93.797658 | Datum: WGS 1984
Soil Map Unit Name: | NWI Classification: PFO
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation **No**, Soil **No**, or Hydrology **No** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No
Are Vegetation **No**, Soil **No**, or Hydrology **No** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No	**Is the Sampled Area within a Wetland?** Yes No **X**
Hydric Soil Present?	Yes	No **X**	
Wetland Hydrology Present?	Yes	No **X**	

Remarks:
This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- **X** FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):
Water Table Present?	Yes	No **X**	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):

Wetland Hydrology Present? Yes No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: **SP3-7**

Tree Stratum (Plot size: 30 feet)	Absolute % cover	Dominant Species?	Indicator Status
1. **Quercus michauxii**	10	No	**FACW**
2. *Quercus phellos*	10	No	FACW
3. *Liquidambar styraciflua*	20	Yes	FAC
4. *Carpinus caroliniana*	25	Yes	FAC
5.			
6.			
7.			
8.			
	65	= Total Cover	
50% of total cover: 32.50		20% of total cover: 13.00	
Sapling/Shrub Stratum (Plot size: 15 feet)			
1. *Triadica sebifera*	1	Yes	FAC
2. *Ilex vomitoria*	1	Yes	FAC
3. *Callicarpa americana*	3	Yes	FACU
4.			
5.			
6.			
7.			
8.			
	5	= Total Cover	
50% of total cover: 2.50		20% of total cover: 1.00	
Herb Stratum (Plot size: 5 feet)			
1. *Chasmanthium laxum*	10	Yes	FACW
2. *Arundinaria gigantea*	15	Yes	FACW
3. *Elephantopus carolinianus*	10	Yes	FACU
4. *Scleria oligantha*	7	No	FAC
5. *Callicarpa americana*	5	No	FACU
6. *Bignonia capreolata*	5	No	FAC
7. *Rubus trivialis*	3	No	FACU
8. *Oplismenus hirtellus*	3	No	FAC
9. *Triadica sebifera*	1	No	FAC
10. *Quercus phellos*	1	No	FACW
11. *Dichanthelium commutatum*	1	No	FAC
12. *Smilax bona-nox*	1	No	FAC
	62	= Total Cover	
50% of total cover: 31.00		20% of total cover: 12.40	
Woody Vine Stratum (Plot size: 15 feet)			
1. *None Observed*			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **6** (A)

Total Number of Dominant Species Across All Strata: **8** (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: **75%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x 1 =	**0**
FACW species	**46**	x 2 =	**92**
FAC species	**65**	x 3 =	**195**
FACU species	**21**	x 4 =	**84**
UPL species	**0**	x 5 =	**0**
Column Totals:	**132** (A)		**371** (B)

Prevalence Index = B/A = **2.81**

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- **X** 2 - Dominance Test is >50%
- **X** 3 - Prevalence Index is ≤ 3.0[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks: (If observed, list morphological adaptations below).

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: **SP3-7**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 4/2	100	None	—	—	—	Sandy Clay Loam	
4-16	10yr 5/4	100	None	—	—	—	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material **(TF2)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** **X**

Remarks:

No positive indication of hydric soils was observed.

SP 3-7 Soil profile.

SP 3-7 Facing West.

DEPARTMENT OF THE ARMY
U. S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

July 15, 2021

Compliance Branch

SUBJECT: **SWG-2020-00374**; Delta Land Services, LLC., Approved Jurisdictional Determination (AJD), Approximate 220-Acre Tract in Newton, Newton County, Texas

Mr. Stephan Ross
Delta Land Services, LLC.
6750 West Loop South #780
Bellaire, Texas 77401

Dear Mr. Ross:

This letter is in response to your May 12, 2020 request for an approved jurisdictional determination (AJD) on an approximate 220-acre tract. The tract is located approximately 2.15 miles west of the intersection of State Highway 87 and Highway 190, Newton, Newton County, Texas.

Based on a review of the available information, current federal regulations and our January 21, 2021 site visit, we determined that the approximate 220-acre tract contains four (4) wetlands comprising approximately 53.5-acres, two (2) artificial ponds comprising approximately 0.9-acre, and four (4) perennial tributaries comprising approximately 7,581.6 linear feet. The wetlands on the tract was identified using the Atlantic and Gulf Coastal Plain Region Supplement (Version 2.0) to the 1987 Corps of Engineers Wetland Delineation Manual, which requires under normal circumstances a predominance of hydrophytic vegetation, sufficient wetland hydrology, and hydric soils. The four site wetlands meet the 33 CFR 328.3(b)(6) prior converted cropland exclusion and the two site ponds meet the 33 CFR 328.3(b)(8) artificial pond exclusion. Therefore, the identified wetlands and ponds are not waters of the United States (U.S.). The four perennial tributaries meet the 33 CFR 328.3(a)(2) tributary definition and are waters of the U.S. subject to Section 404 of the Clean Water Act (CWA). The discharge of dredged and/or fill material within the four identified tributaries requires a Department of the Army (DA) permit.

Areas of Federal Interests (federal projects, and/or work areas) may be located within this proposed project area. Any activities in these federal interest areas would also be subject to federal regulations under the authority of Section 14 of the Rivers and Harbors Act (aka Section 408). Section 408 makes it unlawful for anyone to alter in any manner, in whole or in part, any work (ship channel, flood control channels, seawalls, bulkhead, jetty, piers, etc.) built by the United States unless it is authorized by the Corps of Engineers (i.e., Navigation and Operations Division).

This delineation and/or jurisdictional determination included herein has been conducted to identify the location and extend of the aquatic resource boundaries and/or the jurisdictional status of aquatic resources for the purpose of the Clean Water Act for the particular site identified in this request. This delineation and/or determination may not be valid for the Wetland Conservation Provisions of the Food Security Act of 1985 as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should discuss the applicability of a certified wetland determination with the local USDA service center, prior to starting work.

This letter constitutes an approved jurisdictional determination (AJD) for this subject site and is valid for 5 years from the date of this letter unless new information warrants a revision prior to the expiration date. If you object to this AJD, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeals Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination, you must submit a completed RFA form to the Southwestern Division Office at the following address:

Administrative Appeals Review Officer (CESWD-PD-O)
U.S. Army Corps of Engineers, Southwest Division
1100 Commerce Street, Room 831
Dallas, Texas 75242-1731
Telephone: 469-487-7061; FAX: 469-487-7199

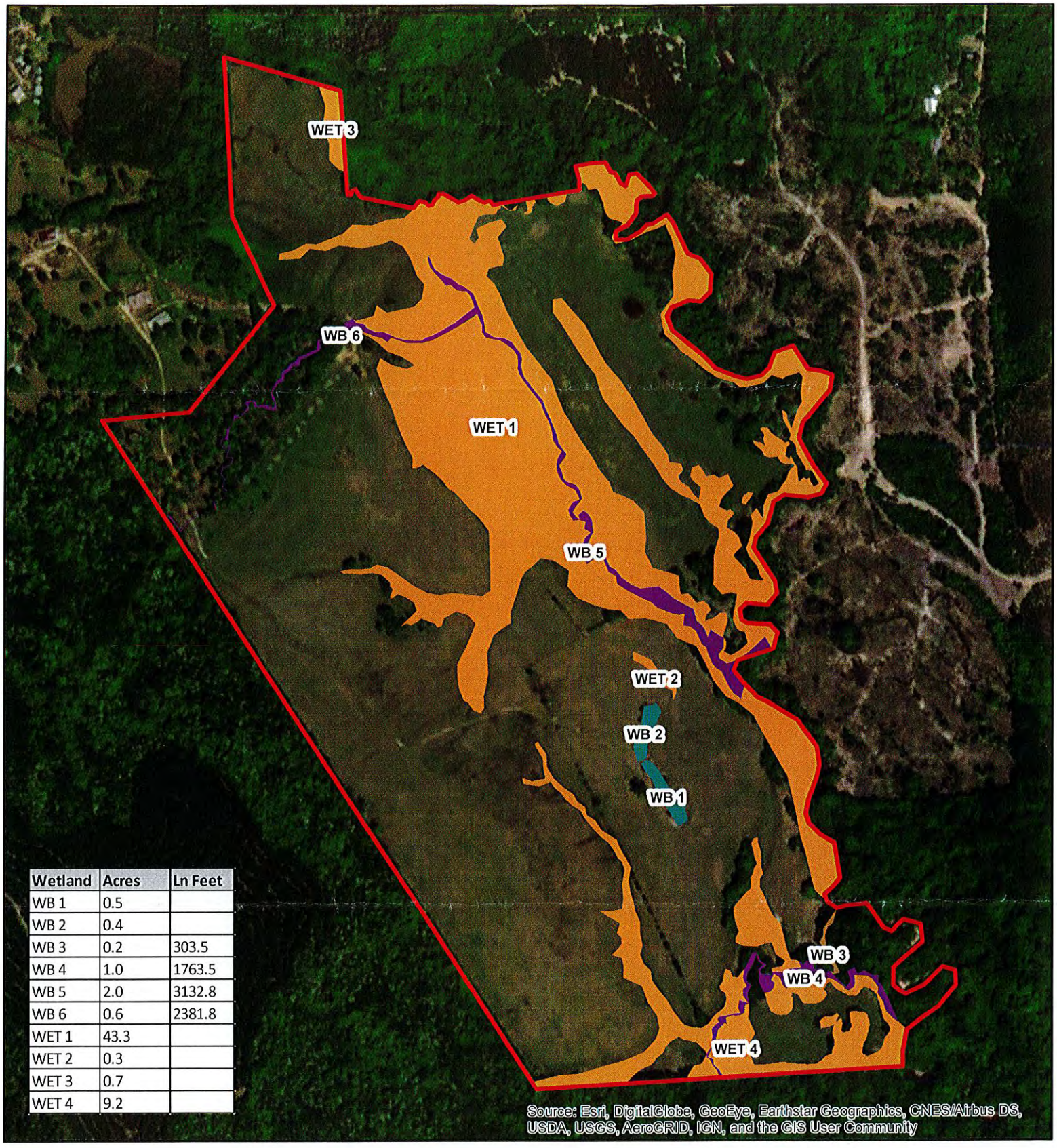
In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete; that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within **60 days** of the date of the NAP, noting the letter date is considered day 1. It is not necessary to submit an RFA form to the Division office if you do not object to the determination in this letter.

If you have any questions concerning this jurisdictional determination, please reference file number **SWG-2020-00374** and contact me at the letterhead address, by email at Kevin.S.Mannie@usace.army.mil, or by telephone at 409-766-3016. To assist us in improving our service to you, please complete the survey found at https://regulatory.ops.usace.army.mil/customer-service-survey/ and/or if you would prefer a hard copy of the survey form, please let us know, and one will be mailed to you.

Sincerely,

Kevin Mannie
Acting Team Lead
Compliance Branch

Enclosures



Wetland	Acres	Ln Feet
WB 1	0.5	
WB 2	0.4	
WB 3	0.2	303.5
WB 4	1.0	1763.5
WB 5	2.0	3132.8
WB 6	0.6	2381.8
WET 1	43.3	
WET 2	0.3	
WET 3	0.7	
WET 4	9.2	

- Project Area (219.8 ac)
- A(2) Jurisdictional, Intermittent (3.8 ac) (7278.03 ln ft)
- B(3) Non-Jurisdictional, Ephemeral (0.2 ac) (303.5 ln ft)
- B(6) Prior Converted Cropland (53.4 ac)
- B(8) Non-Jurisdictional (0.9 ac)

N

600 300 0 600

Feet

Big Cow Creek Mitigation Bank
SWG-2020-00374

JURISIDICITIONAL DETERMINATION MAP

Newton County, TX

Created :	TSC/ArcView10
Approved :	AP
Date :	11/10/2020
Map # :	F05_AquaticResources.n

DELTA LAND SERVICES

FIGURE 1

Appendix C

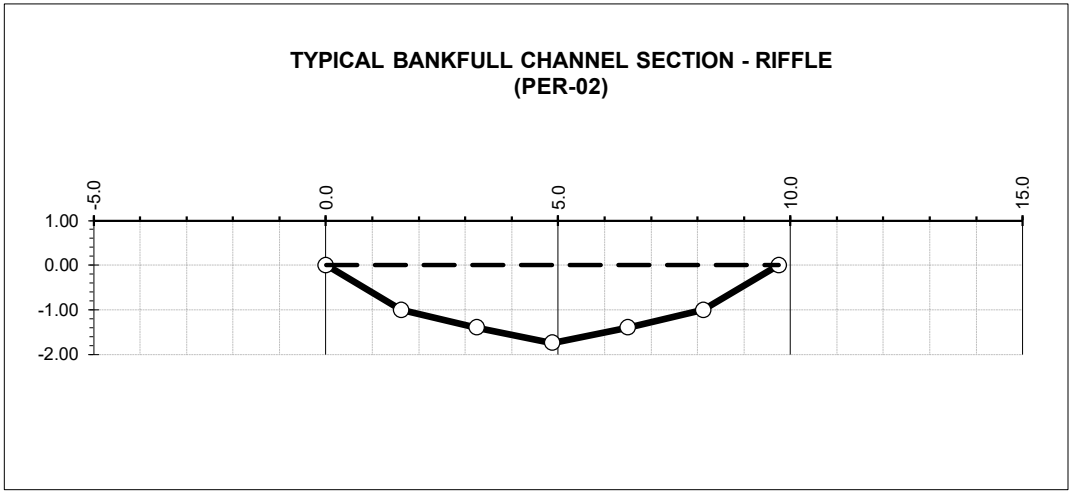
Initial Stream Design, Geomorphic Tables, and Reference Stream Data

Table 01. Perennial Stream Restoration Design Geomorphology Tables

Variable	Reference Reach 1			Reference Reach 2			Reference Reach 3			PER-02			PER-03		
	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
Rosgen Stream Type	C5			C5			E5			E5			E5		
Drainage Area (sq. mi.)	0.21			0.05			1.54			0.31			0.44		
Dimension (Riffle)	**Reference**			**Reference**			**Reference**			**Design**			**Design**		
W_{bkf}	12.72	12.91	12.48	8.43	10.31	9.37	13.06	13.42	13.24	7.83	11.75	9.79	8.50	12.75	10.63
D_{bkf}	0.73	0.92	0.87	0.61	0.62	0.62	1.67	1.72	1.70	0.87	1.31	1.09	0.94	1.42	1.18
A_{bkf}	8.85	11.78	10.81	5.11	6.42	5.77	22.41	22.49	22.45	8.52	12.78	10.65	10.04	15.06	12.55
W_{fpa}	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	39.17	58.75	48.96	42.51	63.77	53.14
W/D Ratio (W_{bkf}/D_{bkf})	13.20	16.63	14.92	13.82	16.63	15.23	7.59	8.04	7.82	7.00	11.00	9.00	7.00	11.00	9.00
Entrenchment Ratio (W_{fpa}/W_{bkf})	7.86	7.75	7.80	9.70	11.86	10.78	7.45	7.66	7.56	2.20	N/A	5.00	2.20	N/A	5.00
D_{max}	1.62	1.75	1.67	1.38	1.71	1.55	2.61	2.79	2.70	1.39	2.09	1.74	1.51	2.27	1.89
D_{tob}	1.51	1.85	1.68	1.30	1.35	1.33	2.96	3.13	3.05	1.39	2.09	1.74	1.51	2.27	1.89
Bank Height Ratio (D_{tob}/D_{max})	0.93	1.06	0.99	0.94	0.79	0.87	1.13	1.12	1.13	0.80	N/A	1.00	0.80	N/A	1.00
Dimension (Pool)															
W_{pool}	12.90	13.40	13.15	6.80	8.50	7.65	14.20	15.37	14.79	8.81	12.73	10.77	9.57	13.82	11.69
$D_{maxpool}$	2.16	2.20	2.18	1.74	2.10	1.92	3.23	3.99	3.61	1.63	3.81	2.72	1.77	4.13	2.95
Pool Depth Ratio ($D_{maxpool}/D_{bkf}$)	2.96	2.39	2.51	2.85	3.39	3.12	1.93	2.32	2.13	1.50	3.50	2.50	1.50	3.50	2.50
Pool Width Ratio (W_{pool}/W_{bkf})	1.01	1.04	1.05	0.81	0.82	0.82	1.09	1.15	1.12	0.90	1.30	1.10	0.90	1.30	1.10
Pattern (Reach)															
Meander Length (L_m)	33.68	76.30	49.06	29.72	78.70	63.94	53.63	129.96	87.30	48.96	107.71	78.34	53.14	116.91	85.02
Linear Wave Length (L_w)	24.43	24.43	33.36	23.52	66.86	51.68	44.28	86.59	61.34	34.27	93.03	63.65	37.20	100.97	69.08
Radius of Curvature (R_c)	7.39	14.46	11.87	4.57	11.07	7.19	10.84	25.77	17.38	14.69	117.51	24.48	15.94	127.54	26.57
Arc Length (L_{arc})	13.10	33.30	24.13	8.77	25.28	15.02	24.50	55.16	39.41	19.58	68.55	44.06	21.26	74.40	47.83
Belt Width (W_{blt})	40.00	55.00	48.33	17.00	23.00	20.67	41.00	68.00	55.50	19.58	78.34	48.96	21.26	85.02	53.14
Sinuosity (K)	1.77	1.77	1.77	1.26	1.26	1.26	1.81	1.81	1.81	1.50	2.10	1.80	1.50	2.10	1.80
Lm Ratio (L_m/W_{bkf})	2.65	5.91	3.93	3.53	7.63	6.82	4.11	9.68	6.59	5.00	11.00	8.00	5.00	11.00	8.00
Lw Ratio (L_w/W_{bkf})	1.92	1.89	2.67	2.79	6.48	5.52	3.39	6.45	4.63	3.50	9.50	6.50	3.50	9.50	6.50
Rc Ratio (R_c/W_{bkf})	0.58	1.12	0.95	0.54	1.07	0.77	0.83	1.92	1.31	1.50	12.00	2.50	1.50	12.00	2.50
Larc Ratio (L_{arc}/W_{bkf})	1.03	2.58	1.93	1.04	2.45	1.60	1.88	4.11	2.98	2.00	7.00	4.50	2.00	7.00	4.50
Meander Width Ratio (W_{blt}/W_{bkf})	3.14	4.26	3.87	2.02	2.23	2.21	3.14	5.07	4.19	2.00	8.00	5.00	2.00	8.00	5.00
Profile (Reach)															
Valley Slope (ft/ft)	0.0064	0.0064	0.0064	0.0181	0.0181	0.0181	0.0032	0.0032	0.0032	N/A	N/A	0.00341	N/A	N/A	0.00294
Channel Slope (ft/ft)	0.0034	0.0037	0.0035	0.0139	0.0144	0.0142	0.0018	0.0018	0.0026	N/A	N/A	0.00204	N/A	N/A	0.00195
Riffle Slope (S_{rif})	0.0050	0.0143	0.0090	0.0052	0.0325	0.0166	0.0020	0.0098	0.0069	0.00306	N/A	0.00510	0.00293	N/A	0.00488
Pool Slope (S_{pool})	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000	0.00082	0.00041	0.00000	0.00078	0.00039
Riffle Slope Ratio (S_{rif}/S_{chan})	1.4490	3.8989	2.5444	0.3697	2.2557	1.3127	1.1080	5.5480	3.3280	1.50	N/A	2.50	1.50	N/A	2.50
Pool Slope Ratio (S_{pool}/S_{chan})	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.40	0.20	0.00	0.40	0.20
Length of Riffle (L_{rif})	5.75	11.07	8.0900	5.22	14.80	7.21	5.83	24.01	13.37	2.94	16.65	9.79	3.19	18.07	10.63
Length of Pool (L_{pool})	7.24	15.54	11.6700	4.79	11.92	6.71	9.00	22.24	13.85	9.79	24.48	17.14	10.63	26.57	18.60
Length of Glide (L_{glide})	0.00	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	2.94	N/A	7.83	3.19	N/A	8.50
Pool to Pool Spacing (L_{ps})	8.09	39.81	21.2900	7.03	24.91	14.57	9.18	33.19	18.36	29.38	78.34	53.86	31.88	85.02	58.45
Riffle Length Ratio (L_{rif}/W_{bkf})	0.45	0.86	0.65	0.62	1.44	0.77	0.45	1.79	1.01	0.30	1.70	1.00	0.30	1.70	1.00
Pool Length Ratio (L_{pool}/W_{bkf})	0.57	1.20	0.94	0.57	1.16	0.72	0.69	1.66	1.05	1.00	2.50	1.75	1.00	2.50	1.75
Glide Length Ratio (L_{glide}/W_{bkf})	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	N/A	0.80	0.30	N/A	0.80
Pool Spacing Ratio (L_{ps}/W_{bkf})	0.64	3.08	1.71	0.83	2.42	1.55	0.70	2.47	1.39	3.00	8.00	5.50	3.00	8.00	5.50

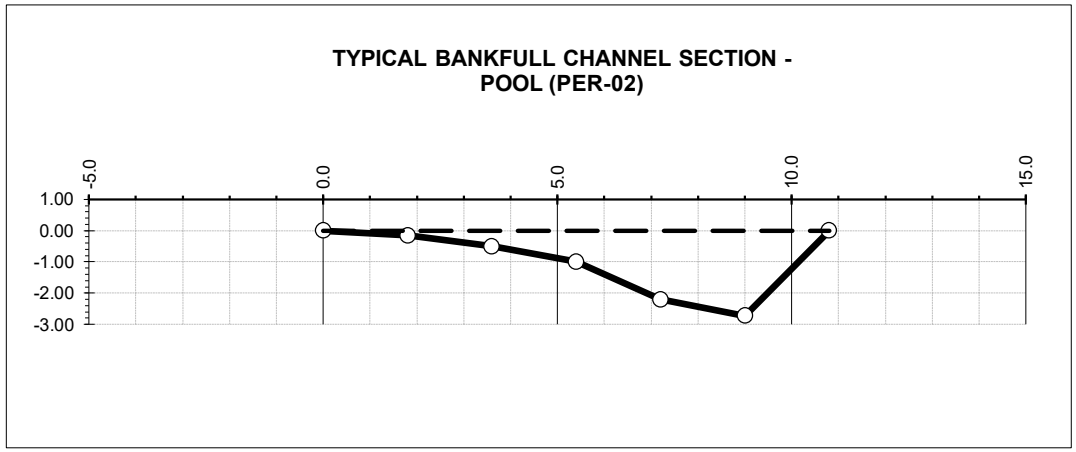
Project Name:	Big Cow Creek Mitigation Area
Reach:	PER-02
Designer:	HJS

Bankfull Cross-Sectional Area [A_{BKF}]	10.6	FT^2
Bankfull Width [W_{BKF}]	9.8	FT
Mean Bankfull Depth [D_{BKF}]	1.09	FT
Maximum Bankfull Depth [D_{MAX}]	1.74	FT
W/D	8.9	--
D_{MAX}/D_{BKF}	1.60	--
Wetted Perimeter [P_w]	10.48	FT
Hydraulic Radius [R_H]	1.01	FT
Average Bankfull Slope [S_{BKF}]	0.002	FT/FT
Manning's n	0.050	--
Mean Bankfull Shear Stress [τ_{BKF}]	0.13	lb/FT^2
Mean Velocity [v_{BKF}]	1.38	FT/s
Discharge [Q_{BKF}]	14.7	FT^3/s



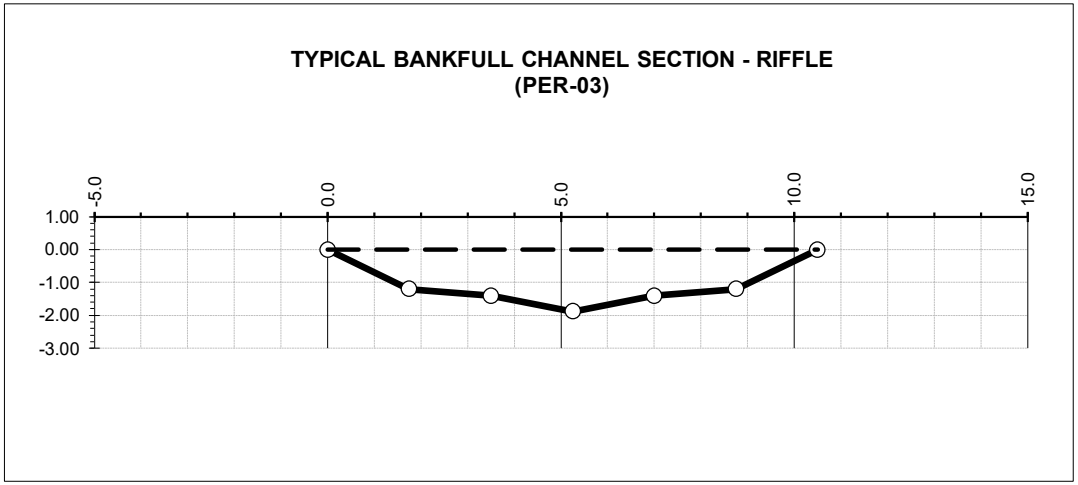
Project Name:	Big Cow Creek Mitigation Area
Reach:	PER-02
Designer:	HJS

Bankfull Cross-Sectional Area [A_{BKF}]	11.8	FT^2
Bankfull Width [W_{BKF}]	10.8	FT
Mean Bankfull Depth [D_{BKF}]	1.1	FT
Maximum Bankfull Depth [D_{MAX}]	2.72	FT
W/D	9.8	--
D_{MAX}/D_{BKF}	2.47	--
Wetted Perimeter [P_w]	12.81	FT
Hydraulic Radius [R_H]	0.92	FT
Average Bankfull Slope [S_{BKF}]	[N/A]	FT/FT
Manning's n	[N/A]	--
Mean Velocity [v_{BKF}]	[N/A]	FT/s
Discharge [Q_{BKF}]	[N/A]	FT^3/s



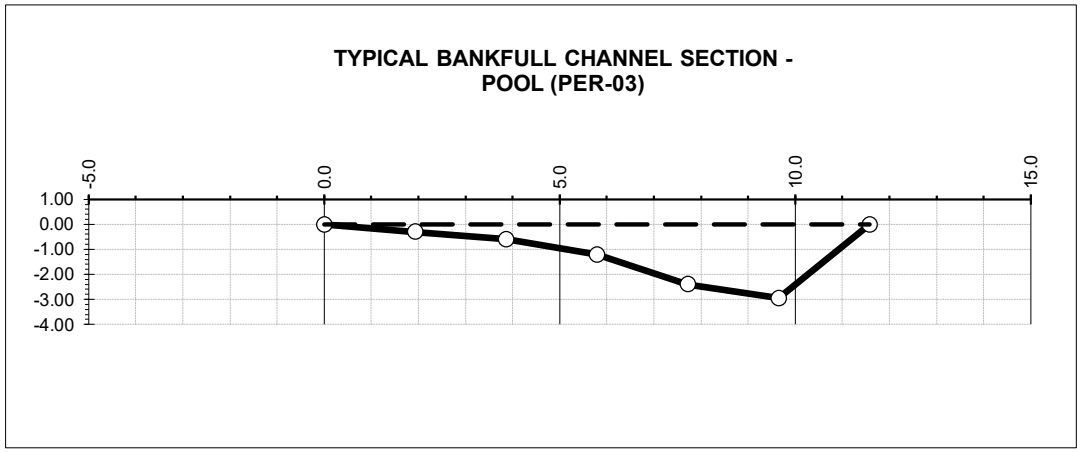
Project Name:	Big Cow Creek Mitigation Area
Reach:	PER-03
Designer:	HJS

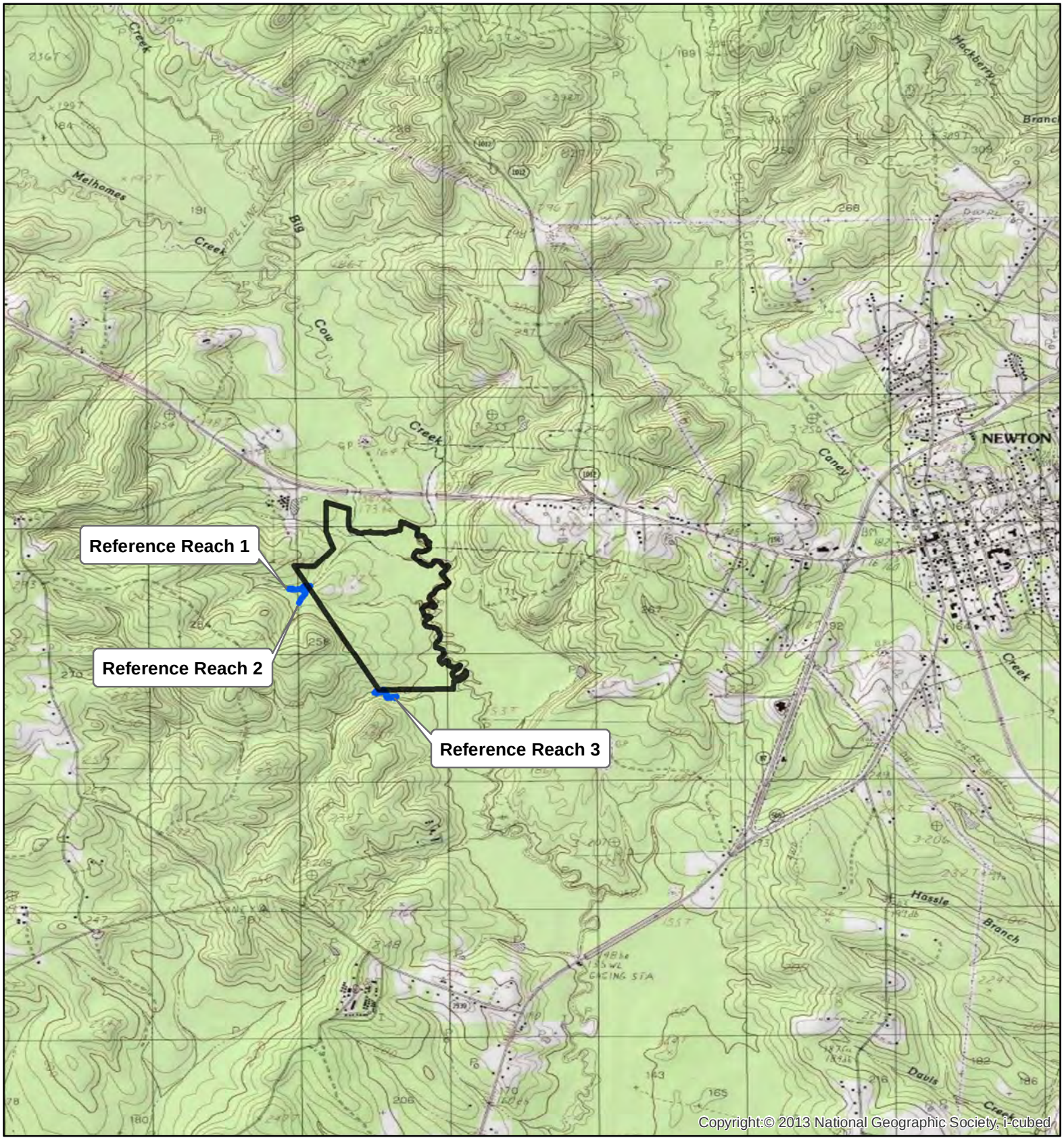
Bankfull Cross-Sectional Area [A_{BKF}]	12.4	FT^2
Bankfull Width [W_{BKF}]	10.5	FT
Mean Bankfull Depth [D_{BKF}]	1.18	FT
Maximum Bankfull Depth [D_{MAX}]	1.88	FT
W/D	8.9	--
D_{MAX}/D_{BKF}	1.59	--
Wetted Perimeter [P_w]	11.4	FT
Hydraulic Radius [R_H]	1.09	FT
Average Bankfull Slope [S_{BKF}]	0.002	FT/FT
Manning's n	0.050	--
Mean Bankfull Shear Stress [τ_{BKF}]	0.14	lb/FT^2
Mean Velocity [v_{BKF}]	1.45	FT/s
Discharge [Q_{BKF}]	18.0	FT^3/s



Project Name:	Big Cow Creek Mitigation Area
Reach:	PER-03
Designer:	HJS

Bankfull Cross-Sectional Area [A_{BKF}]	14.4	FT^2
Bankfull Width [W_{BKF}]	11.6	FT
Mean Bankfull Depth [D_{BKF}]	1.24	FT
Maximum Bankfull Depth [D_{MAX}]	2.94	FT
W/D	9.3	--
D_{MAX}/D_{BKF}	2.37	--
Wetted Perimeter [P_w]	13.72	FT
Hydraulic Radius [R_H]	1.05	FT
Average Bankfull Slope [S_{BKF}]	[N/A]	FT/FT
Manning's n	[N/A]	--
Mean Velocity [v_{BKF}]	[N/A]	FT/s
Discharge [Q_{BKF}]	[N/A]	FT^3/s





Big Cow Creek Mitigation Area

Reference Reaches

N

2,400 1,200 0 2,400

Feet

Big Cow Creek Mitigation Area

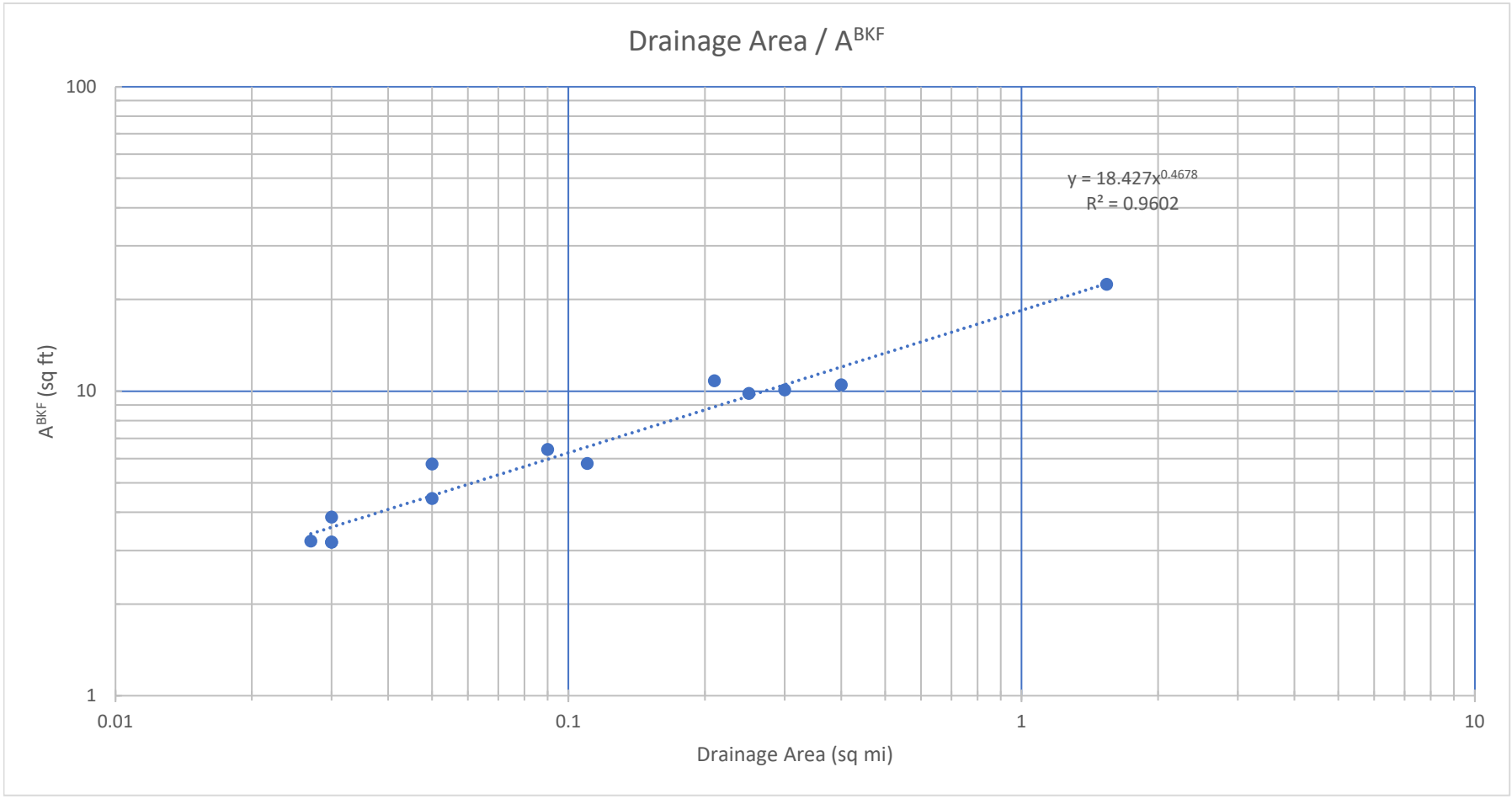
REFERENCE REACH LOCATION MAP

Newton County, TX

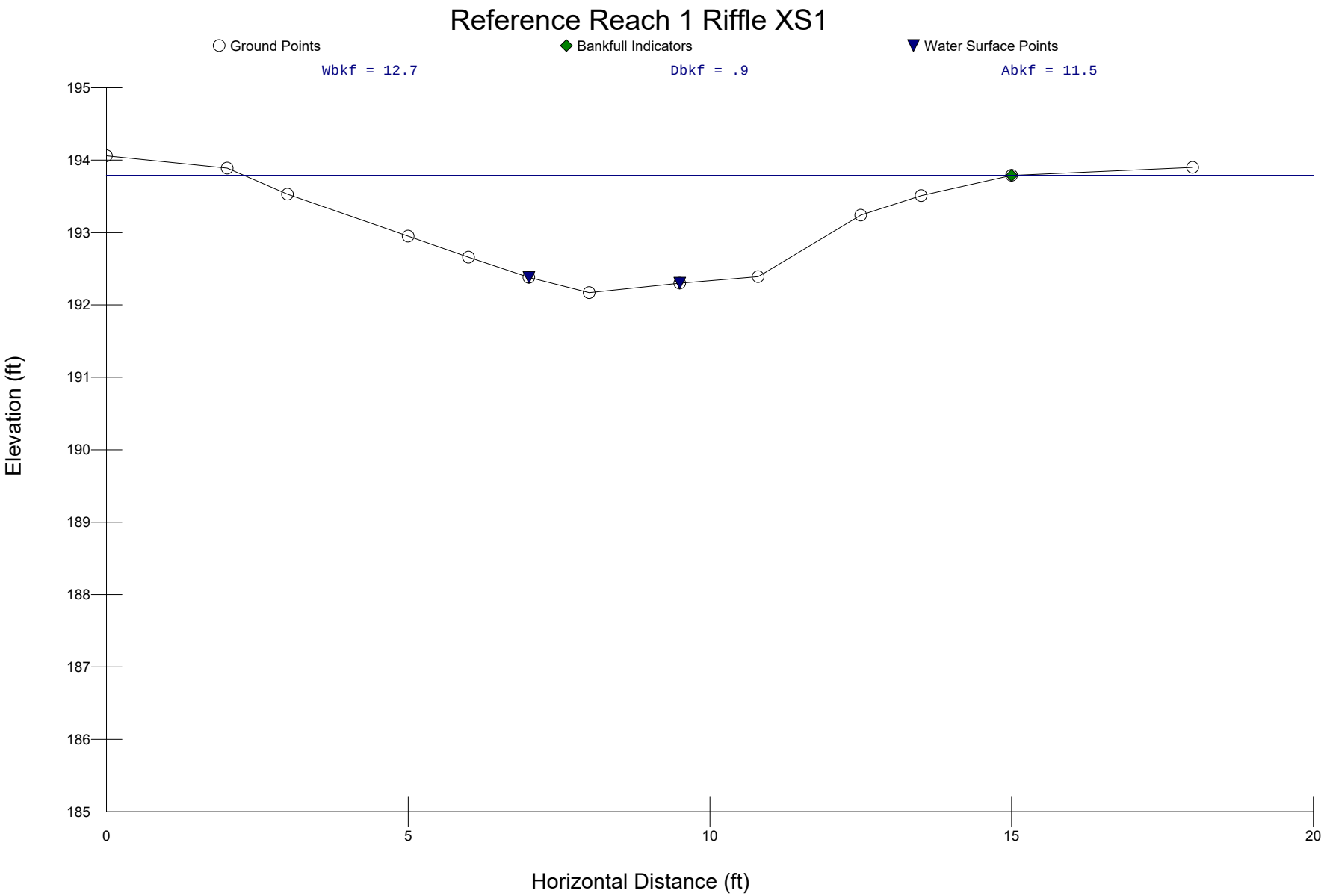
Created :	TSC/ArcView10
Approved :	JMJ
Date :	11/04/2019
Map # :	F01_VicinityMap.mxd

DELTA LAND SERVICES

FIGURE 1


Drainage Area / A^BKF
100
10
1
A^BKF (sq ft)
y = 18.427x^0.4678
R² = 0.9602
0.01
0.1
1
10
Drainage Area (sq mi)

Reference Reach 1, North Fork of West Tributary to BCCMA			
Variable	**Reference**		
	Min.	**Max.**	**Mean**
Rosgen Stream Type	C5		
Drainage Area (sq. mi.)	0.21		
Dimension (Riffle)			
W_{bkf}	12.72	12.91	12.48
D_{bkf}	0.73	0.92	0.87
A_{bkf}	8.85	11.78	10.81
W_{fpa}	100.00	100.00	100.00
W/D Ratio (W_{bkf}/D_{bkf})	13.20	16.63	14.92
Entrenchment Ratio (W_{fpa}/W_{bkf})	7.86	7.75	7.80
D_{max}	1.62	1.75	1.67
D_{tob}	1.51	1.85	1.68
Bank Height Ratio (D_{tob}/D_{max})	0.93	1.06	0.99
Dimension (Pool)			
W_{pool}	12.90	13.40	13.15
$D_{maxpool}$	2.16	2.20	2.18
Pool Depth Ratio ($D_{maxpool}/D_{bkf}$)	2.96	2.39	2.51
Pool Width Ratio (W_{pool}/W_{bkf})	1.01	1.04	1.05
Pattern (Reach)			
Meander Length (L_m)	33.68	76.30	49.06
Linear Wave Length (L_w)	24.43	24.43	33.36
Radius of Curvature (R_c)	7.39	14.46	11.87
Arc Length (L_{arc})	13.10	33.30	24.13
Belt Width (W_{blt})	40.00	55.00	48.33
Sinuosity (K)	1.77	1.77	1.77
Lm Ratio (L_m/W_{bkf})	2.65	5.91	3.93
Lw Ratio (L_w/W_{bkf})	1.92	1.89	2.67
Rc Ratio (R_c/W_{bkf})	0.58	1.12	0.95
Larc Ratio (L_{arc}/W_{bkf})	1.03	2.58	1.93
Meander Width Ratio (W_{blt}/W_{bkf})	3.14	4.26	3.87
Profile (Reach)			
Valley Slope (ft/ft)	0.0064	0.0064	0.0064
Channel Slope (ft/ft)	0.0034	0.0037	0.0035
Riffle Slope (S_{rif})	0.0050	0.0143	0.0090
Pool Slope (S_{pool})	0.0000	0.0000	0.0000
Riffle Slope Ratio (S_{rif}/S_{chan})	1.4490	3.8989	2.5444
Pool Slope Ratio (S_{pool}/S_{chan})	0.0000	0.0000	0.0000
Length of Riffle (L_{rif})	5.75	11.07	8.0900
Length of Pool (L_{pool})	7.24	15.54	11.6700
Length of Glide (L_{glide})	0.00	0.00	0.0000
Pool to Pool Spacing (L_{ps})	8.09	39.81	21.2900
Riffle Length Ratio (L_{rif}/W_{bkf})	0.45	0.86	0.65
Pool Length Ratio (L_{pool}/W_{bkf})	0.57	1.20	0.94
Glide Length Ratio (L_{glide}/W_{bkf})	0.00	0.00	0.00
Pool Spacing Ratio (L_{ps}/W_{bkf})	0.64	3.08	1.71

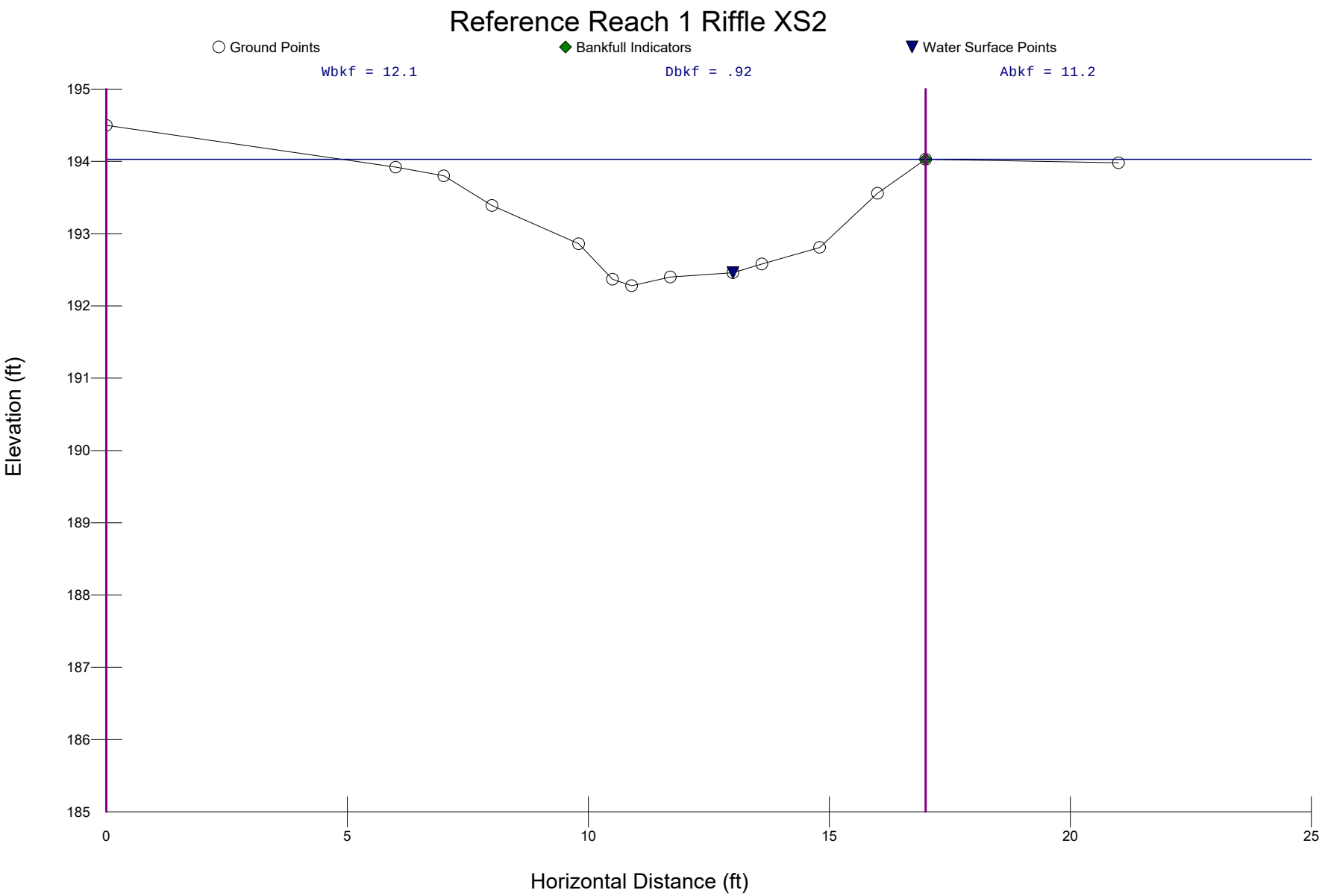

Reference Reach 1 Riffle XS1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 12.7
Dbkf = .9
Abkf = 11.5
195
194
193
192
191
190
189
188
187
186
185
Elevation (ft)
0
5
10
15
20
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 1 Riffle XS1**					
Basin:	**Lower Sabine**	Drainage Area:	**136**	acres	**0.2125**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/07/19**	
Observers:	**JMJ, HJS**			Valley Type:	U-AL-FD	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**12.72**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**0.9**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**11.46**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**14.13**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**1.62**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**7.86**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.0036**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.77**	

Stream Type **C 5** (See **Figure 2-14**)

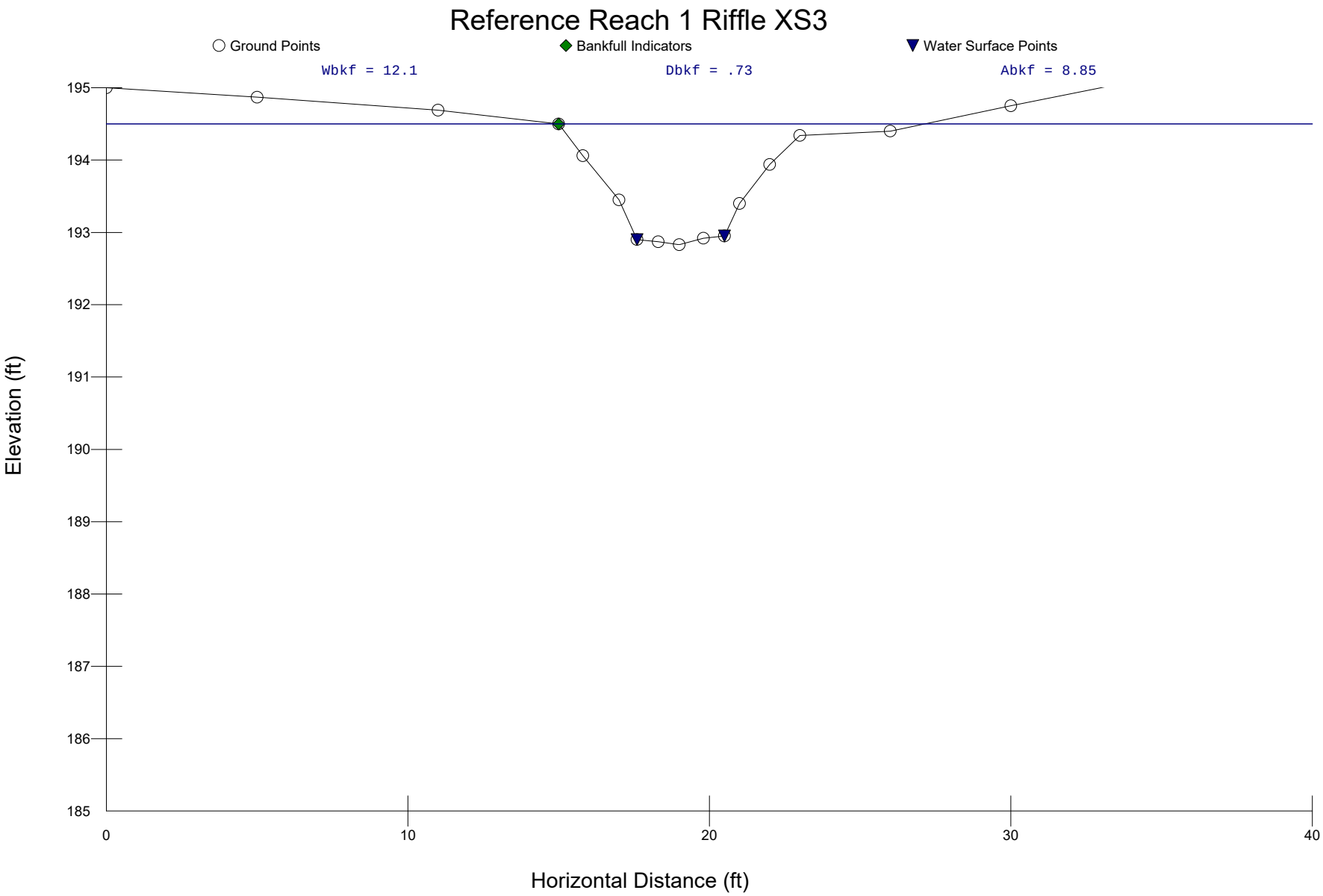

Reference Reach 1 Riffle XS2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 12.1
Dbkf = .92
Abkf = 11.2
195
194
193
192
191
190
189
188
187
186
185
Elevation (ft)
0
5
10
15
20
25
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 1 Riffle XS2**					
Basin:	**Lower Sabine**	Drainage Area:	**136**	acres	**0.2125**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/07/19**	
Observers:	**JMJ, HJS**			Valley Type:	U-AL-FD	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**12.14**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**0.92**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**11.16**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**13.2**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**1.75**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**8.24**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.0036**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.77**	

Stream Type **C 5** (See **Figure 2-14**)

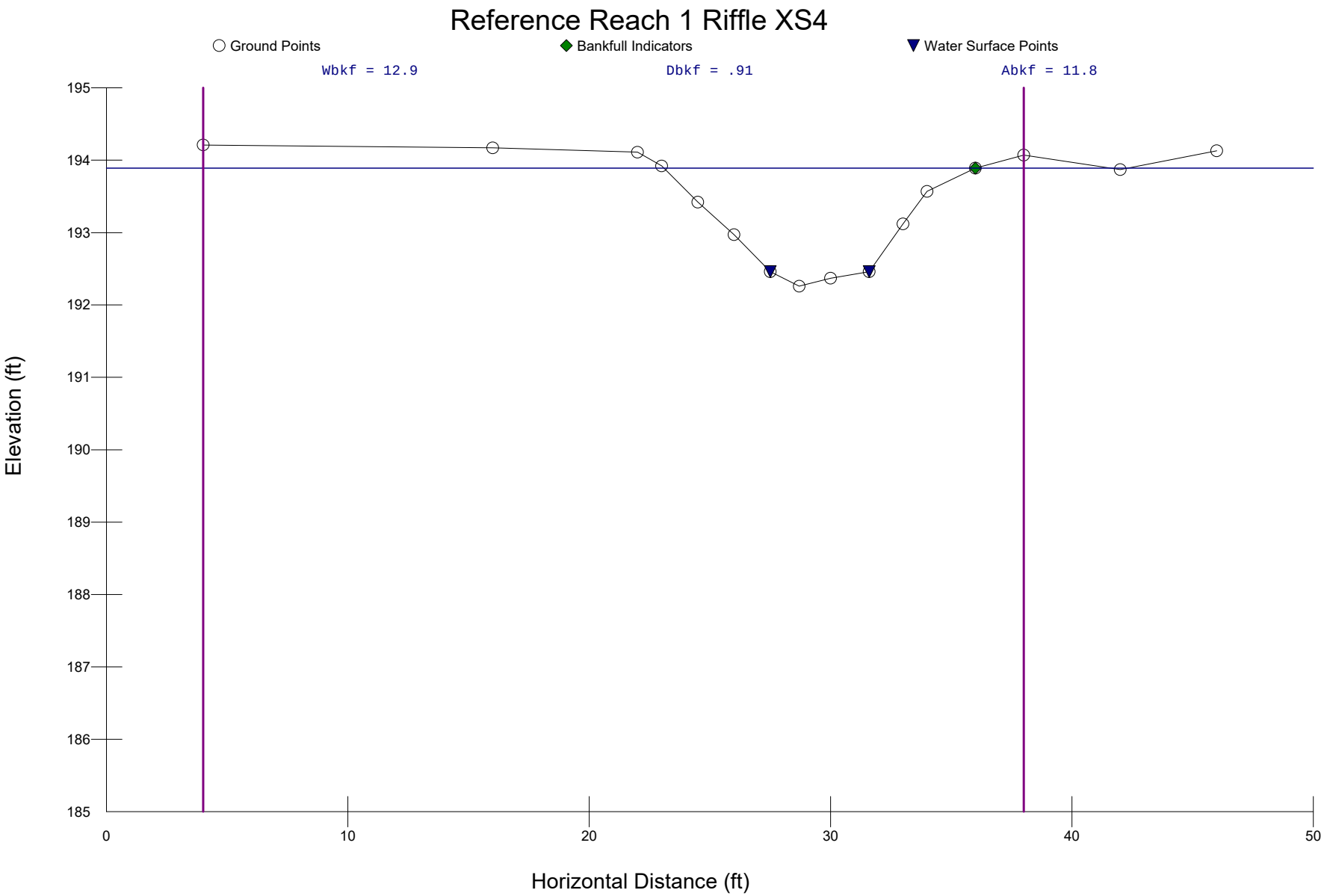

Reference Reach 1 Riffle XS3
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 12.1
Dbkf = .73
Abkf = 8.85
195
194
193
192
191
190
189
188
187
186
185
Elevation (ft)
0
10
20
30
40
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 1 Riffle XS3**					
Basin:	**Lower Sabine**	Drainage Area:	**136**	acres	**0.2125**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/07/19**	
Observers:	**JMJ, HJS**			Valley Type:	U-AL-FD	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**12.14**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**0.73**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**8.85**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**16.63**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**1.67**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**39**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**3.21**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.0036**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.77**	

Stream Type **C 5** (See **Figure 2-14**)

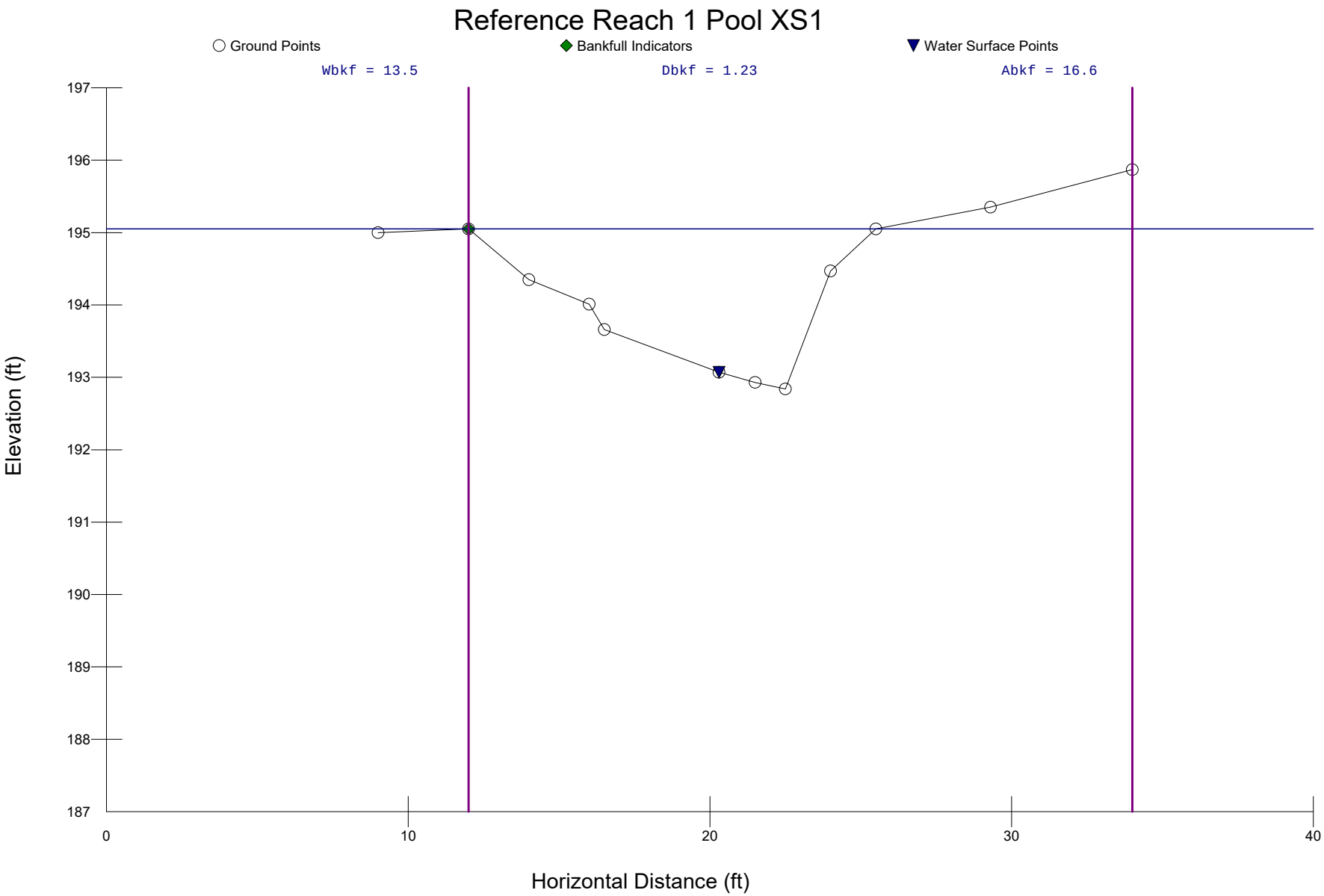

Reference Reach 1 Riffle XS4
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 12.9
Dbkf = .91
Abkf = 11.8
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
10
20
30
40
50
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 1 Riffle XS4**					
Basin:	**Lower Sabine**	Drainage Area:	**136**	acres	**0.2125**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/07/19**	
Observers:	**JMJ, HJS**			Valley Type:	U-AL-FD	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**12.91**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**0.91**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**11.78**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**14.19**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**1.63**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**42**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**3.25**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.0036**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.77**	

Stream Type **C 5** (See **Figure 2-14**)

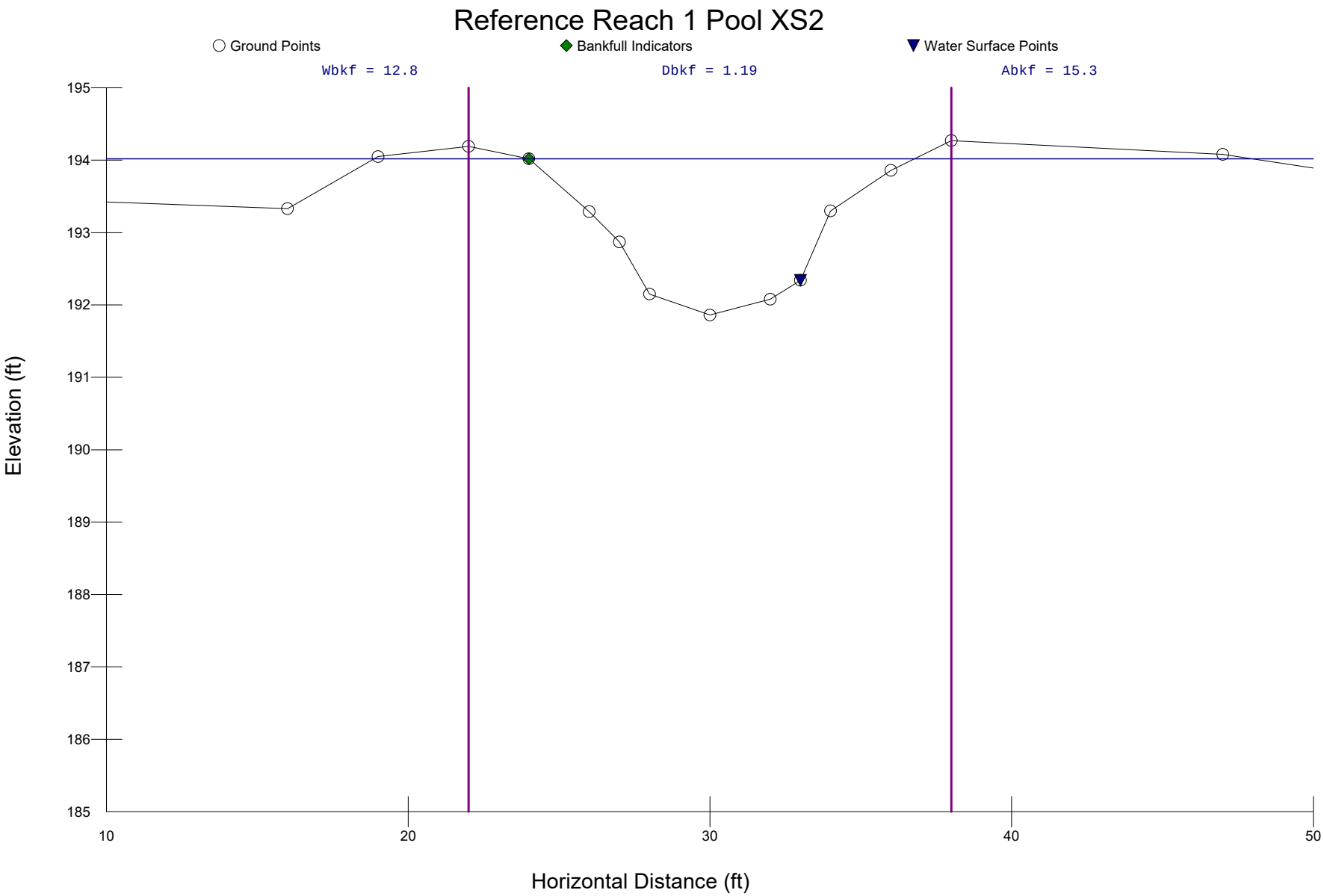

Reference Reach 1 Pool XS1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 13.5
Dbkf = 1.23
Abkf = 16.6
Elevation (ft)
197
196
195
194
193
192
191
190
189
188
187
0
10
20
30
40
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 1 Pool XS1**					
Basin:	**Lower Sabine**	Drainage Area:	**136**	acres	**0.2125**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**				Date:	**11/07/19**
Observers:	**JMJ, HJS**				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation.	**13.5**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation (d_{bkf} = A / W_{bkf}).	**1.23**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation.	**16.6**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH.	**10.98**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations.	**2.21**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}).	**7.41**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.0036**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.77**	

Stream Type **C 5** (See **Figure 2-14**)


Reference Reach 1 Pool XS2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 12.8
Dbkf = 1.19
Abkf = 15.3
195
194
193
192
191
190
189
188
187
186
185
Elevation (ft)
10
20
30
40
50
Horizontal Distance (ft)

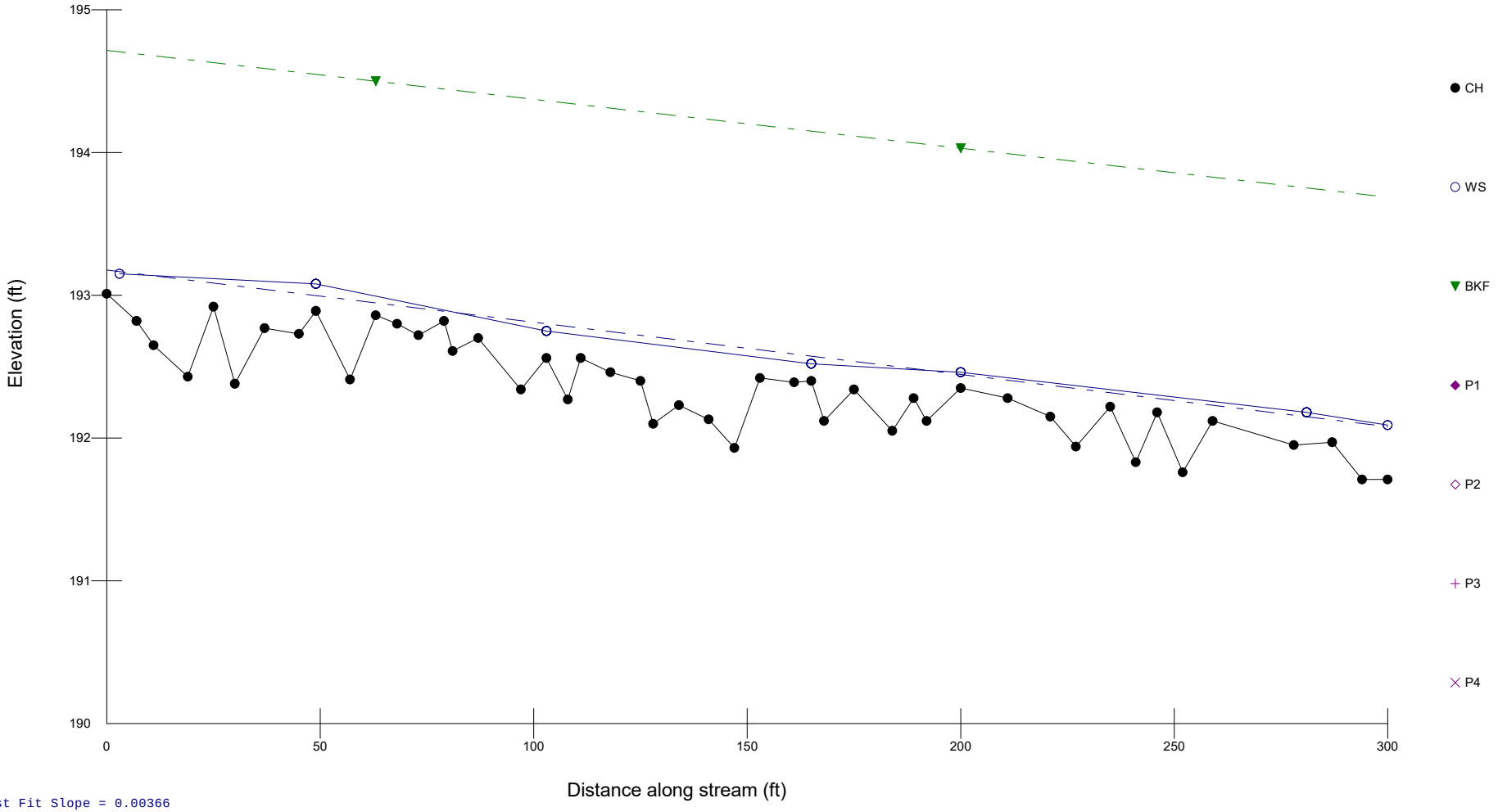
Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 1 Pool XS2**					
Basin:	**Lower Sabine**	Drainage Area:	**136**	acres	**0.2125**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**				Date:	**11/07/19**
Observers:	**JMJ, HJS**				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation.	**12.78**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, (d_{bkf} = A / W_{bkf}).	**1.19**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation.	**15.26**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH.	**10.74**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations.	**2.16**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined.	**65**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}).	**5.09**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.0036**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.77**	

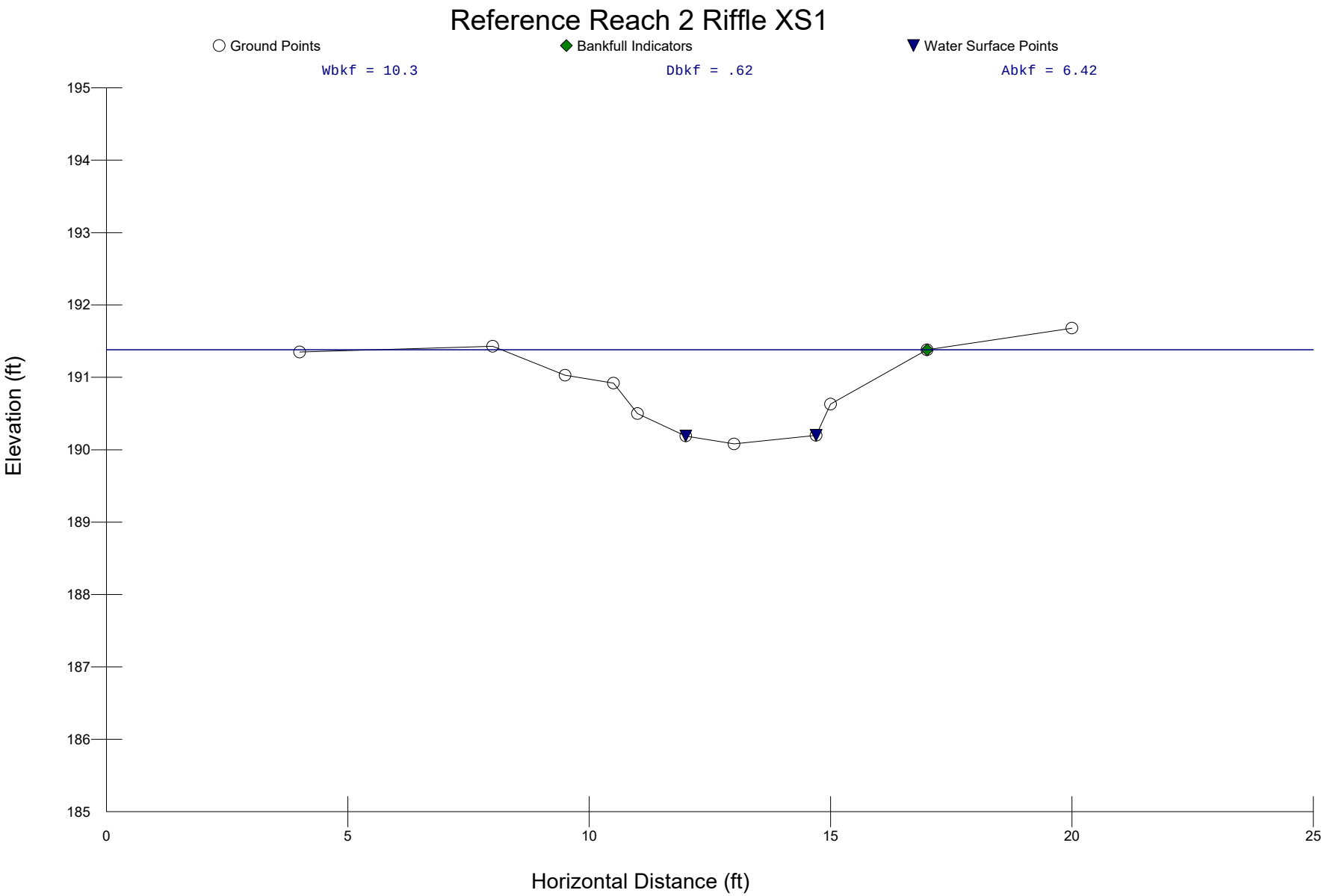
Stream Type **C 5** (See **Figure 2-14**)

Reference Reach 1 Long Pro



WS Best Fit Slope = 0.00366
BKF Best Fit Slope = 0.00343

Reference Reach 2, South Fork of West Tributary to BCCMA			
Variable	**Reference**		
	Min.	**Max.**	**Mean**
Rosgen Stream Type	C5		
Drainage Area (sq. mi.)	0.05		
Dimension (Riffle)			
W_{bkf}	8.43	10.31	9.37
D_{bkf}	0.61	0.62	0.62
A_{bkf}	5.11	6.42	5.77
W_{fpa}	100.00	100.00	100.00
W/D Ratio (W_{bkf}/D_{bkf})	13.82	16.63	15.23
Entrenchment Ratio (W_{fpa}/W_{bkf})	9.70	11.86	10.78
D_{max}	1.38	1.71	1.55
D_{tob}	1.30	1.35	1.33
Bank Height Ratio (D_{tob}/D_{max})	0.94	0.79	0.87
Dimension (Pool)			
W_{pool}	6.80	8.50	7.65
$D_{maxpool}$	1.74	2.10	1.92
Pool Depth Ratio ($D_{maxpool}/D_{bkf}$)	2.85	3.39	3.12
Pool Width Ratio (W_{pool}/W_{bkf})	0.81	0.82	0.82
Pattern (Reach)			
Meander Length (L_m)	29.72	78.70	63.94
Linear Wave Length (L_w)	23.52	66.86	51.68
Radius of Curvature (R_c)	4.57	11.07	7.19
Arc Length (L_{arc})	8.77	25.28	15.02
Belt Width (W_{blt})	17.00	23.00	20.67
Sinuosity (K)	1.26	1.26	1.26
Lm Ratio (L_m/W_{bkf})	3.53	7.63	6.82
Lw Ratio (L_w/W_{bkf})	2.79	6.48	5.52
Rc Ratio (R_c/W_{bkf})	0.54	1.07	0.77
Larc Ratio (L_{arc}/W_{bkf})	1.04	2.45	1.60
Meander Width Ratio (W_{blt}/W_{bkf})	2.02	2.23	2.21
Profile (Reach)			
Valley Slope (ft/ft)	0.0181	0.0181	0.0181
Channel Slope (ft/ft)	0.0139	0.0144	0.0142
Riffle Slope (S_{rif})	0.0052	0.0325	0.0166
Pool Slope (S_{pool})	0.0000	0.0000	0.0000
Riffle Slope Ratio (S_{rif}/S_{chan})	0.3697	2.2557	1.3127
Pool Slope Ratio (S_{pool}/S_{chan})	0.0000	0.0000	0.0000
Length of Riffle (L_{rif})	5.22	14.80	7.21
Length of Pool (L_{pool})	4.79	11.92	6.71
Length of Glide (L_{glide})	0.00	0.00	0.00
Pool to Pool Spacing (L_{ps})	7.03	24.91	14.57
Riffle Length Ratio (L_{rif}/W_{bkf})	0.62	1.44	0.77
Pool Length Ratio (L_{pool}/W_{bkf})	0.57	1.16	0.72
Glide Length Ratio (L_{glide}/W_{bkf})	0.00	0.00	0.00
Pool Spacing Ratio (L_{ps}/W_{bkf})	0.83	2.42	1.55

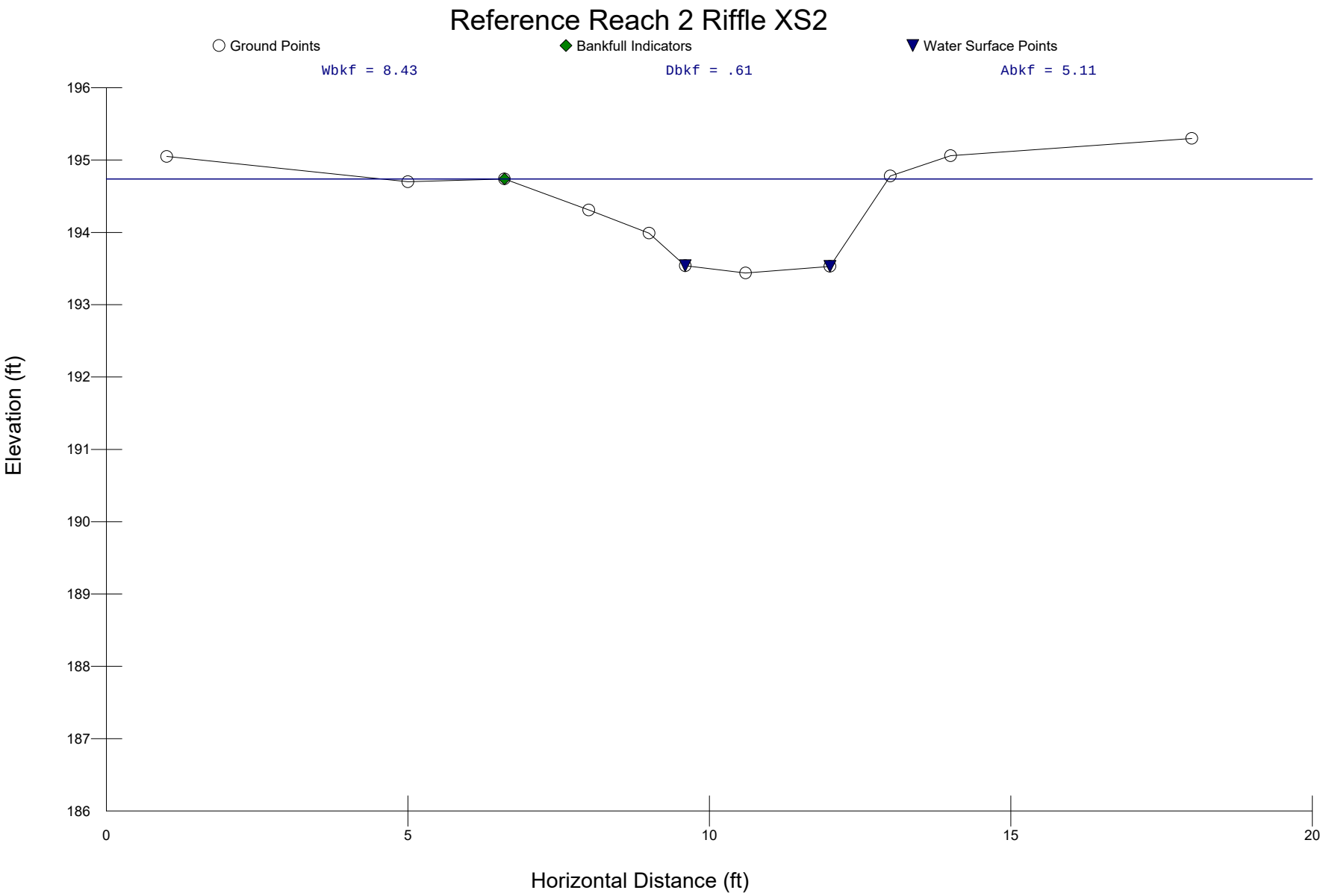

Reference Reach 2 Riffle XS1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 10.3
Dbkf = .62
Abkf = 6.42
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
5
10
15
20
25
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 2 Riffle XS1**					
Basin:	**Lower Sabine**	Drainage Area:	**32**	acres	**0.05**	mi^2
Location:	**Newton, Texas**					
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**			
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**12/05/19**	
Observers:				Valley Type:	U-AL-FD	

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**10.31**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**0.62**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**6.42**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**16.63**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**1.3**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**9.7**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.01439**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.26**	

Stream Type **C 5** (See **Figure 2-14**)

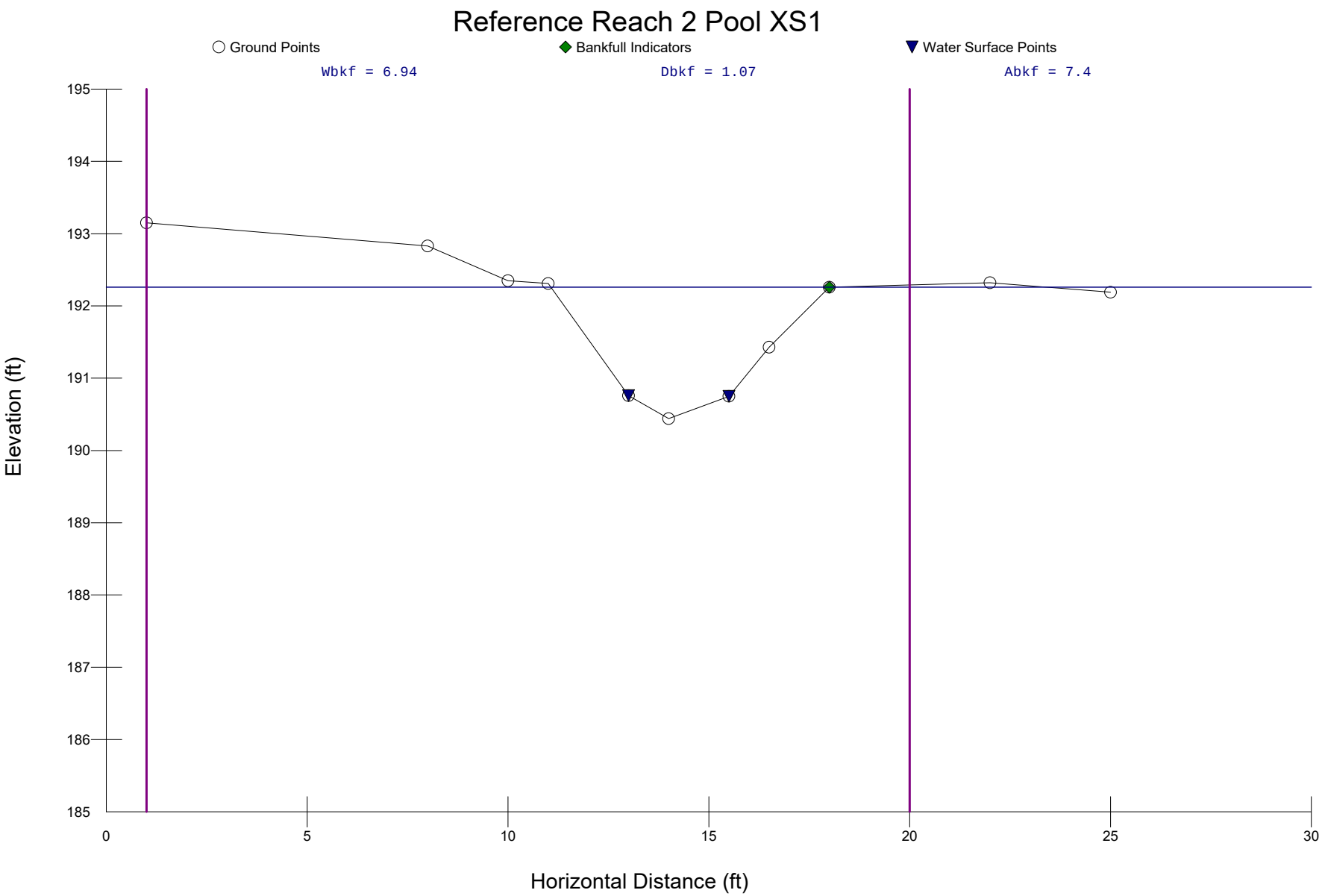

Reference Reach 2 Riffle XS2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 8.43
Dbkf = .61
Abkf = 5.11
196
195
194
193
192
191
190
189
188
187
186
Elevation (ft)
0
5
10
15
20
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 2 Riffle XS2**				
Basin:	**Lower Sabine**	Drainage Area:	**32** acres	**0.05**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**12/05/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**8.43**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**0.61**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**5.11**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**13.82**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**1.3**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**11.86**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.01439**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.26**	

Stream Type **C 5** (See **Figure 2-14**)

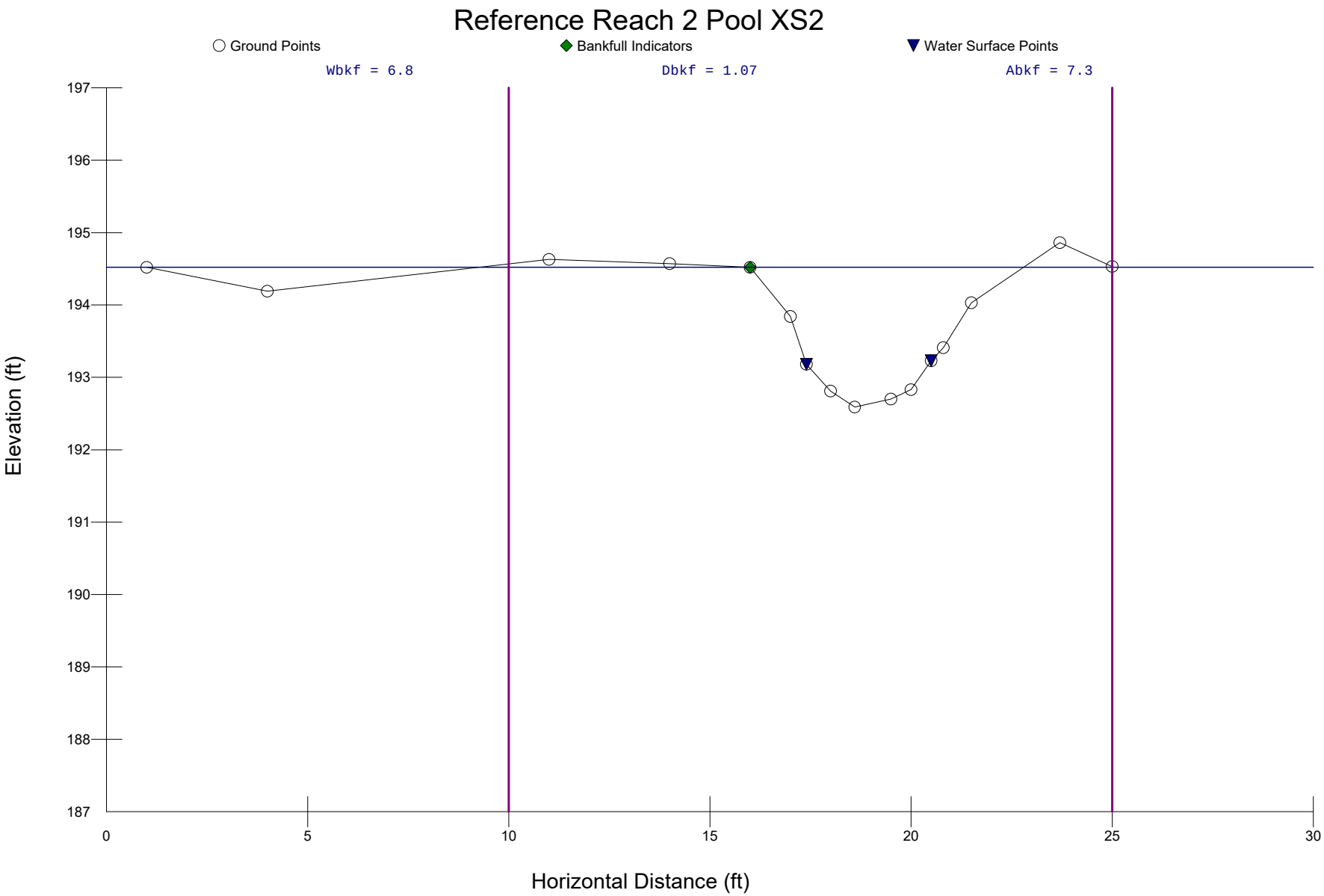

Reference Reach 2 Pool XS1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 6.94
Dbkf = 1.07
Abkf = 7.4
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
5
10
15
20
25
30
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 2 Pool XS1**				
Basin:	**Lower Sabine**	Drainage Area:	**32** acres	**0.05**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**12/05/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation.	**6.94**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation (d_{bkf} = A / W_{bkf}).	**1.07**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation.	**7.4**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH.	**6.49**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations.	**1.82**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}).	**14.41**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.01439**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.26**	

Stream Type **C 5** (See **Figure 2-14**)


Reference Reach 2 Pool XS2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 6.8
Dbkf = 1.07
Abkf = 7.3
Elevation (ft)
197
196
195
194
193
192
191
190
189
188
187
0
5
10
15
20
25
30
Horizontal Distance (ft)

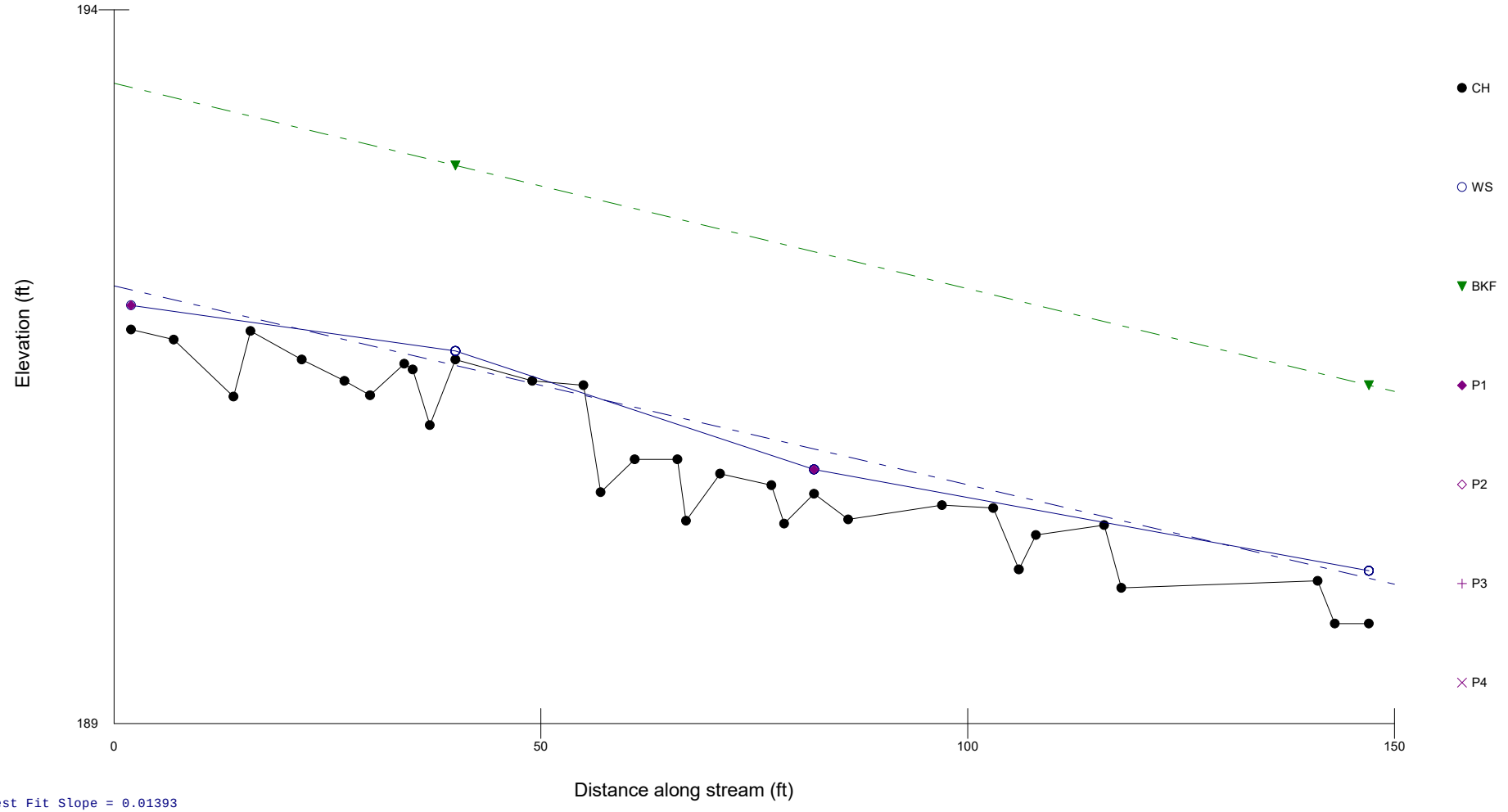
Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 2 Pool XS2**				
Basin:	**Lower Sabine**	Drainage Area:	**32** acres	**0.05**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**12/05/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation.	**6.8**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation (d_{bkf} = A / W_{bkf}).	**1.07**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation.	**7.3**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH.	**6.36**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations.	**1.93**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}).	**14.71**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.01439**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.26**	

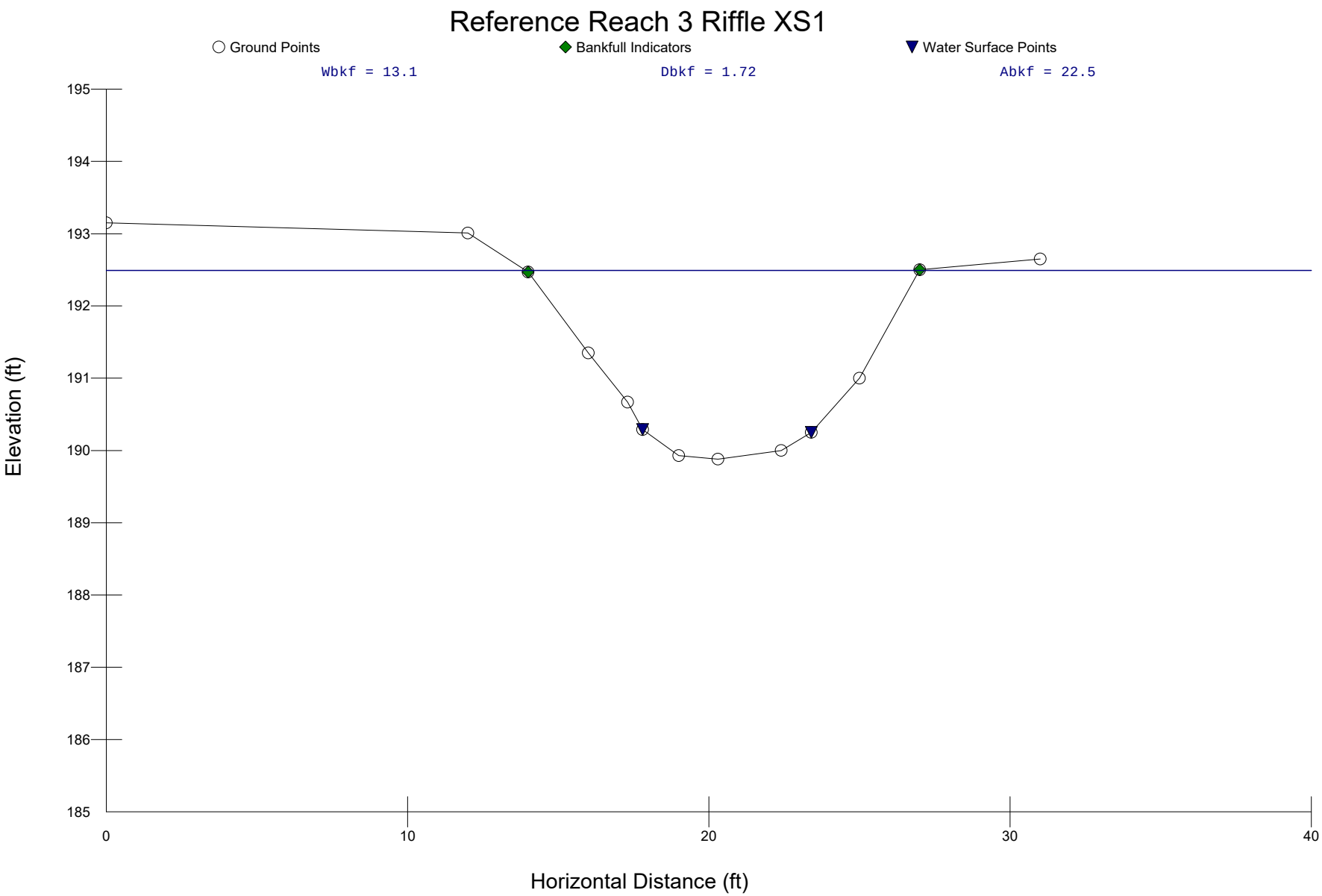
Stream Type **C 5** (See **Figure 2-14**)

Reference Reach 2 Long Pro



WS Best Fit Slope = 0.01393
BKF Best Fit Slope = 0.01439

Reference Reach 3, South Tributary to BCCMA			
Variable	**Reference**		
	Min.	**Max.**	**Mean**
Rosgen Stream Type	E5		
Drainage Area (sq. mi.)	1.54		
Dimension (Riffle)			
W_{bkf}	13.06	13.42	13.24
D_{bkf}	1.67	1.72	1.70
A_{bkf}	22.41	22.49	22.45
W_{fpa}	100.00	100.00	100.00
W/D Ratio (W_{bkf}/D_{bkf})	7.59	8.04	7.82
Entrenchment Ratio (W_{fpa}/W_{bkf})	7.45	7.66	7.56
D_{max}	2.61	2.79	2.70
D_{tob}	2.96	3.13	3.05
Bank Height Ratio (D_{tob}/D_{max})	1.13	1.12	1.13
Dimension (Pool)			
W_{pool}	14.20	15.37	14.79
$D_{maxpool}$	3.23	3.99	3.61
Pool Depth Ratio ($D_{maxpool}/D_{bkf}$)	1.93	2.32	2.13
Pool Width Ratio (W_{pool}/W_{bkf})	1.09	1.15	1.12
Pattern (Reach)			
Meander Length (L_m)	53.63	129.96	87.30
Linear Wave Length (L_w)	44.28	86.59	61.34
Radius of Curvature (R_c)	10.84	25.77	17.38
Arc Length (L_{arc})	24.50	55.16	39.41
Belt Width (W_{blt})	41.00	68.00	55.50
Sinuosity (K)	1.81	1.81	1.81
Lm Ratio (L_m/W_{bkf})	4.11	9.68	6.59
Lw Ratio (L_w/W_{bkf})	3.39	6.45	4.63
Rc Ratio (R_c/W_{bkf})	0.83	1.92	1.31
Larc Ratio (L_{arc}/W_{bkf})	1.88	4.11	2.98
Meander Width Ratio (W_{blt}/W_{bkf})	3.14	5.07	4.19
Profile (Reach)			
Valley Slope (ft/ft)	0.0032	0.0032	0.0032
Channel Slope (ft/ft)	0.0018	0.0018	0.0026
Riffle Slope (S_{rif})	0.0020	0.0098	0.0069
Pool Slope (S_{pool})	0.0000	0.0000	0.0000
Riffle Slope Ratio (S_{rif}/S_{chan})	1.1080	5.5480	3.3280
Pool Slope Ratio (S_{pool}/S_{chan})	0.0000	0.0000	0.0000
Length of Riffle (L_{rif})	5.83	24.01	13.37
Length of Pool (L_{pool})	9.00	22.24	13.85
Length of Glide (L_{glide})	0.00	0.00	0.00
Pool to Pool Spacing (L_{ps})	9.18	33.19	18.36
Riffle Length Ratio (L_{rif}/W_{bkf})	0.45	1.79	1.01
Pool Length Ratio (L_{pool}/W_{bkf})	0.69	1.66	1.05
Glide Length Ratio (L_{glide}/W_{bkf})	0.00	0.00	0.00
Pool Spacing Ratio (L_{ps}/W_{bkf})	0.70	2.47	1.39

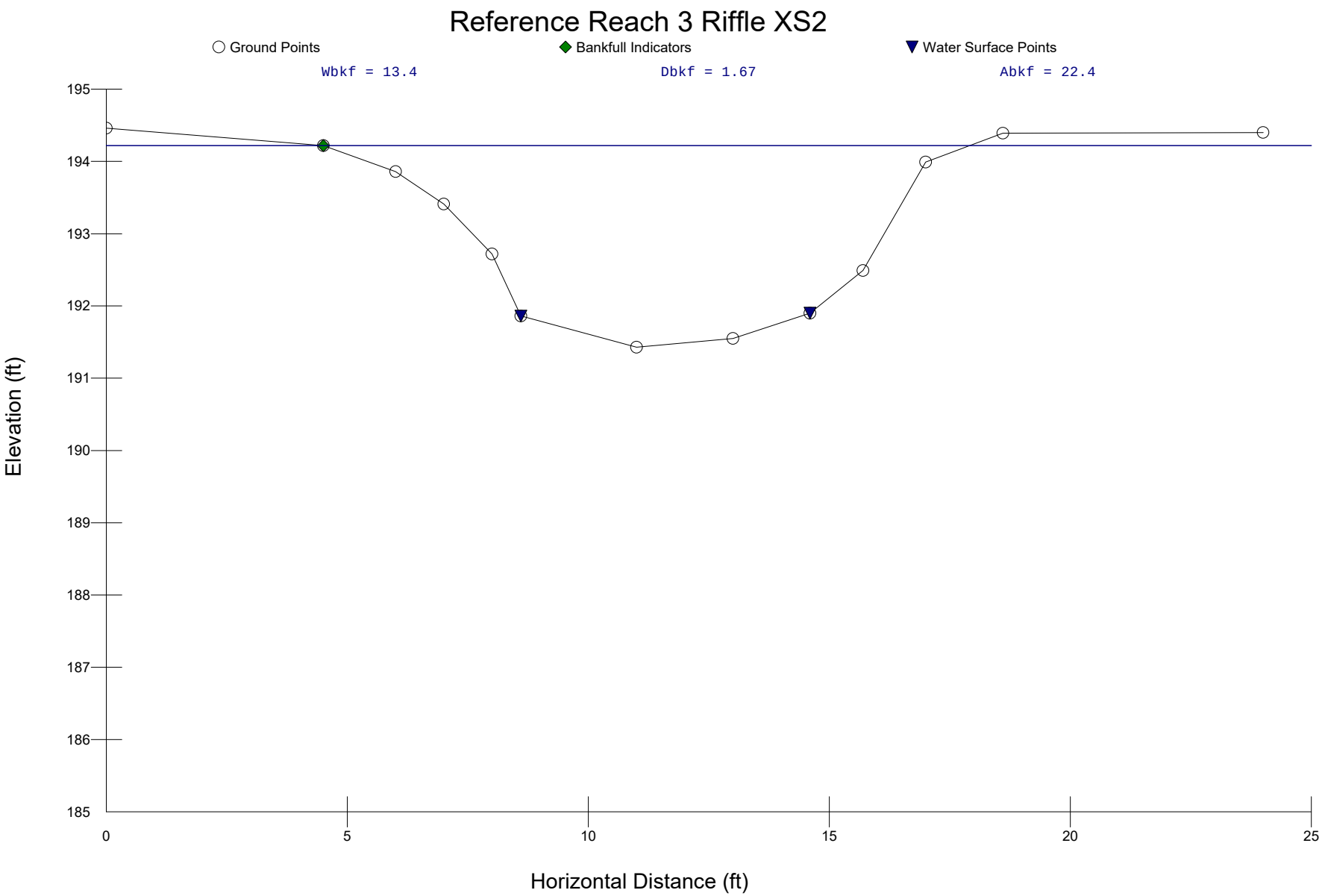

Reference Reach 3 Riffle XS1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 13.1
Dbkf = 1.72
Abkf = 22.5
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
10
20
30
40
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 3 Riffle XS1**				
Basin:	**Lower Sabine**	Drainage Area:	**985.6** acres	**1.54**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/19/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**13.06**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**1.72**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**22.49**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**7.59**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**2.61**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**7.66**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.00178**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.81**	

Stream Type **E 5** (See **Figure 2-14**)

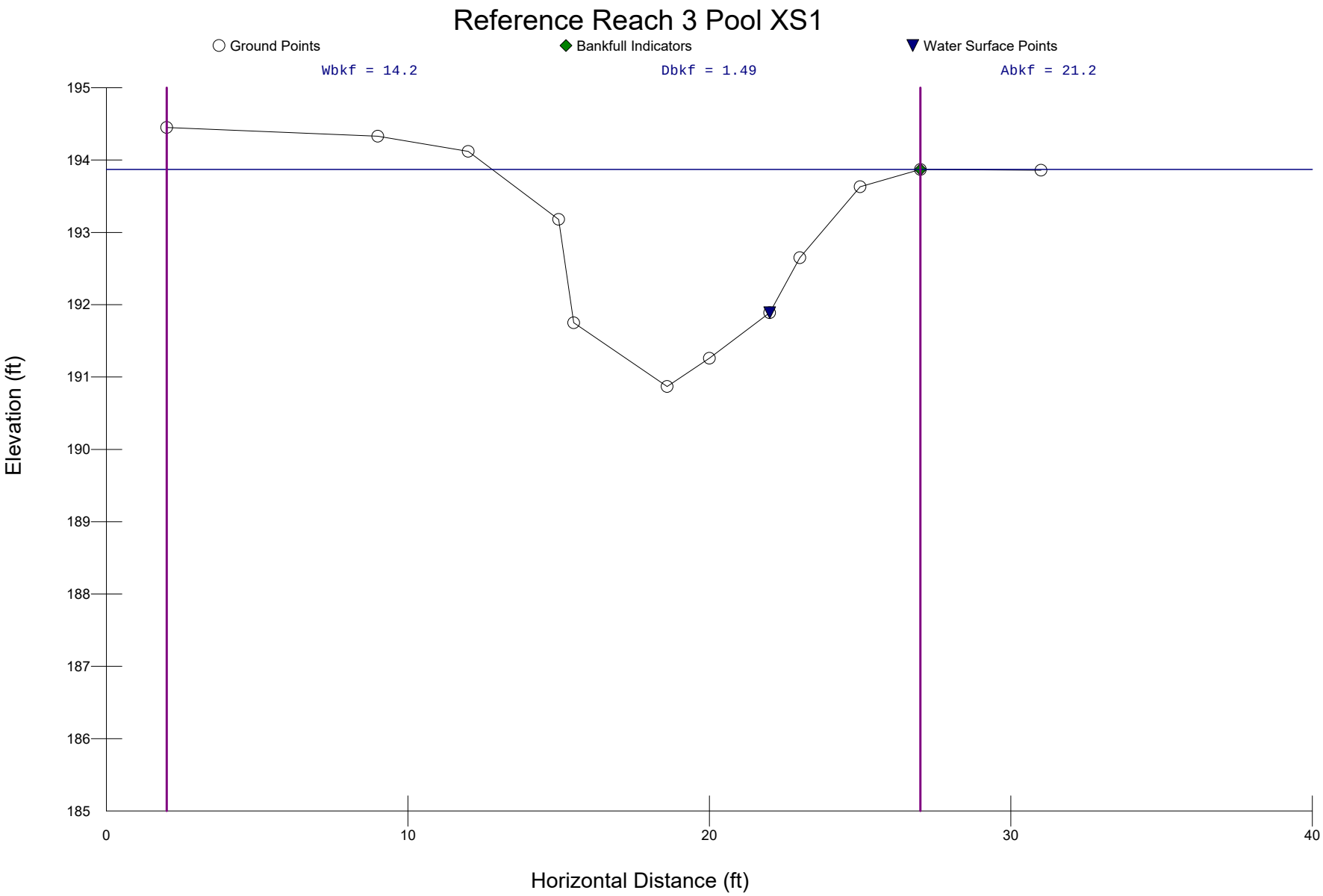

Reference Reach 3 Riffle XS2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 13.4
Dbkf = 1.67
Abkf = 22.4
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
5
10
15
20
25
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 3 Riffle XS2**				
Basin:	**Lower Sabine**	Drainage Area:	**985.6** acres	**1.54**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/19/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation, in a riffle section.	**13.42**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bkf} = A / W_{bkf}).	**1.67**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.	**22.41**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.	**8.04**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.	**2.79**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined in a riffle section.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}) (riffle section).	**7.45**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.00178**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.81**	

Stream Type **E 5** (See **Figure 2-14**)

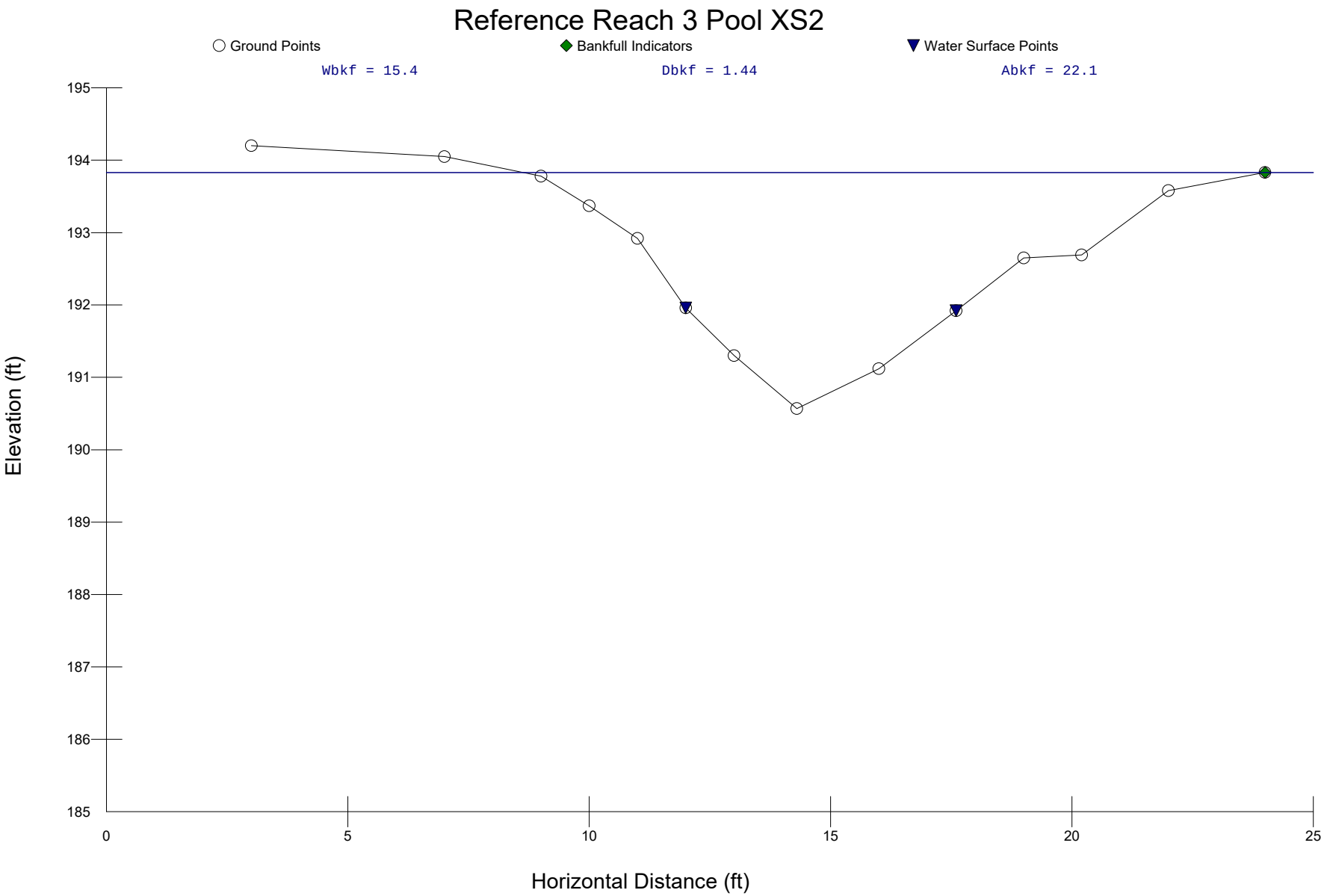

Reference Reach 3 Pool XS1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 14.2
Dbkf = 1.49
Abkf = 21.2
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
10
20
30
40
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 3 Pool XS1**				
Basin:	**Lower Sabine**	Drainage Area:	**985.6** acres	**1.54**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/19/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation.	**14.2**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation (d_{bkf} = A / W_{bkf}).	**1.49**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation.	**21.22**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH.	**9.53**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations.	**3**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}).	**7.04**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.00178**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.81**	

Stream Type **E 5** (See **Figure 2-14**)

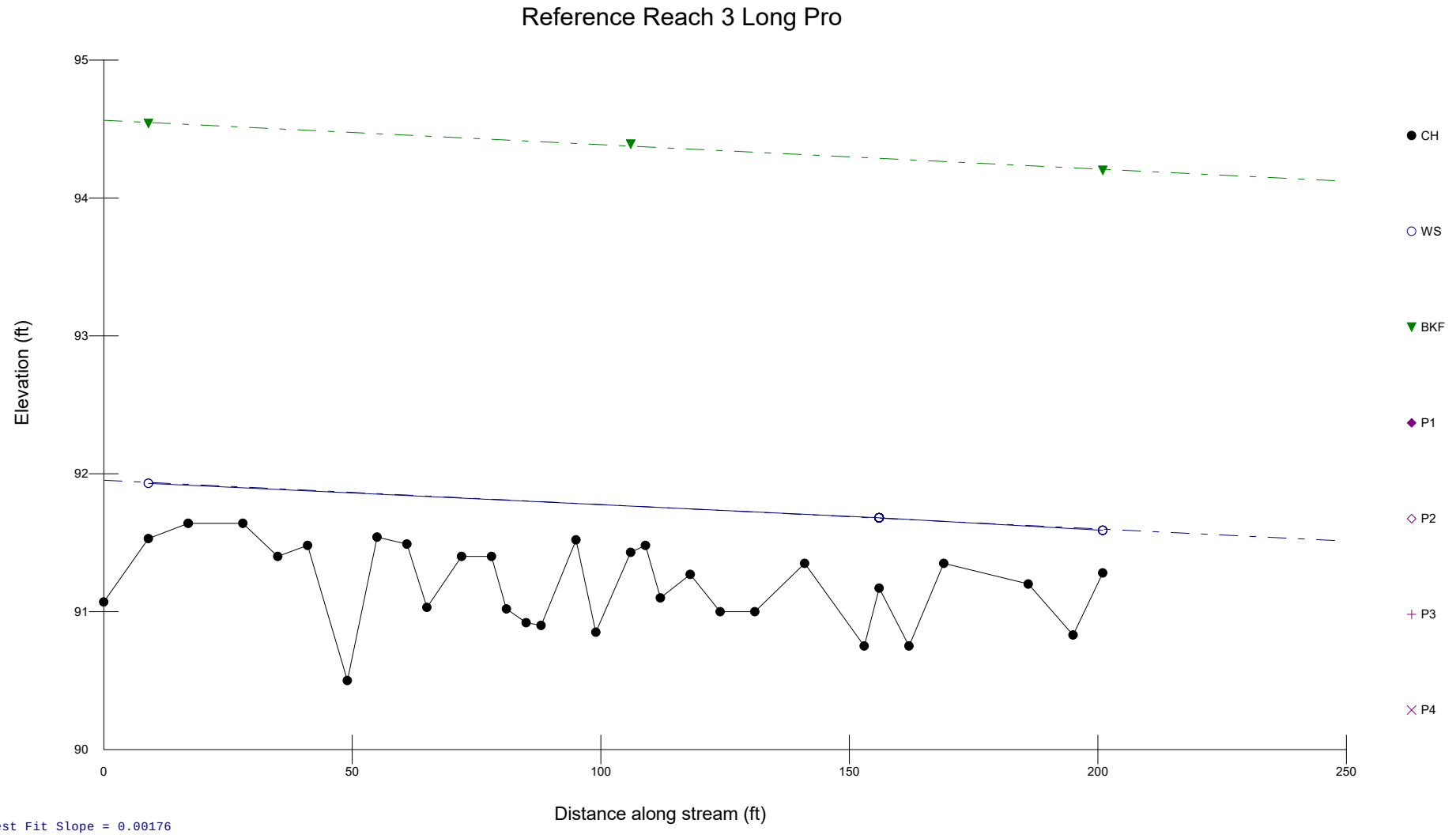

Reference Reach 3 Pool XS2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 15.4
Dbkf = 1.44
Abkf = 22.1
Elevation (ft)
195
194
193
192
191
190
189
188
187
186
185
0
5
10
15
20
25
Horizontal Distance (ft)

Worksheet 2-3. Field form for Level II stream classification (Rosgen, 1996; Rosgen and Silvey, 2005).

Stream:	**Reference Reach 3 Pool XS2**				
Basin:	**Lower Sabine**	Drainage Area:	**985.6** acres	**1.54**	mi^2
Location:	**Newton, Texas**				
Twp.&Rge:	**;**	Sec.&Qtr.:	**;**		
Cross-Section Monuments (Lat./Long.):	**0 Lat / 0 Long**			Date:	**11/19/19**
Observers:				Valley Type:	U-AL-FD

Bankfull WIDTH (W_{bkf}) WIDTH of the stream channel at bankfull stage elevation.	**15.37**	ft
Bankfull DEPTH (d_{bkf}) Mean DEPTH of the stream channel cross-section, at bankfull stage elevation (d_{bkf} = A / W_{bkf}).	**1.44**	ft
Bankfull X-Section AREA (A_{bkf}) AREA of the stream channel cross-section, at bankfull stage elevation.	**22.13**	ft^2
Width/Depth Ratio (W_{bkf} / d_{bkf}) Bankfull WIDTH divided by bankfull mean DEPTH.	**10.67**	ft/ft
Maximum DEPTH (d_{mbkf}) Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations.	**3.26**	ft
WIDTH of Flood-Prone Area (W_{fpa}) Twice maximum DEPTH, or (2 x d_{mbkf}) = the stage/elevation at which flood-prone area WIDTH is determined.	**100**	ft
Entrenchment Ratio (ER) The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH (W_{fpa} / W_{bkf}).	**6.51**	ft/ft
Channel Materials (Particle Size Index) D_{50} The D_{50} particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and Thalweg elevations.	**1**	mm
Water Surface SLOPE (S) Channel slope = "rise over run" for a reach approximately 20–30 bankfull channel widths in length, with the "riffle-to-riffle" water surface slope representing the gradient at bankfull stage.	**0.00178**	ft/ft
Channel SINUOSITY (k) Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL / VL); or estimated from a ratio of valley slope divided by channel slope (VS / S).	**1.81**	

Stream Type **E 5** (See **Figure 2-14**)



WS Best Fit Slope = 0.00176
BKF Best Fit Slope = 0.00177

Appendix D

Phase I Cultural Survey Report

A Phase I Cultural Resources Survey of the Big Cow Creek Mitigation Area Project, Newton County, Texas

Prepared for

Delta Land Services

Prepared by
Sarah Boudreaux, MA, RPA
Abby Peyton, MA, RPA

Principal Investigator
Abby Peyton, MA, RPA

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February 2020

Perennial Report No. 20-003

ABSTRACT

Perennial Environmental Services, LLC (Perennial), on behalf Delta Land Services, LLC (DLS) conducted an intensive Phase I cultural resources survey for the proposed Big Cow Creek Mitigation Area Project (Project), located in Newton County, Texas. The Project is located 2.3 miles (mi) (3.7 kilometers [km]) west of Newton, Texas directly adjacent to Big Cow Creek (Figure 1). The Project will entail the restoration/re-establishment and enhancement of ephemeral and intermittent streams and associated riparian communities within the broader 188.0-acre property. Following the restoration activities, the Project area will be protected in perpetuity as a stream conservation site.

The survey investigations were conducted in accordance with Section 106 of the *National Historic Preservation Act* (NHPA) of 1966, as amended (36 CFR 800), and Texas State Historical Preservation Office (SHPO) standards and guidelines should state or federal permitting be required in the future.

The area of potential effects (APE) for the Project encompasses the entire 188.0-acre (76.0-ha) Project area, however ground disturbances will occur primarily within an approximately 86.2-ac (34.8-ha) area centered on the ephemeral and intermittent streams. Depths of impact are anticipated to range from 0.5 to 1.5 feet (ft) (0.15 to 0.45 meters [m]) along stream courses, with limited impacts across upland settings for sporadic tree planting.

Abby Peyton served as the Principal Investigator (PI) for the Project, and field investigations were conducted by Perennial Staff Archaeologists Chelsea Reedy, Keith Faz, and Colene Knaub from January 21-23, 2020. The intensive Phase I survey efforts included pedestrian surveys augmented by an intensive shovel testing regime across the entirety of the Project area.

In all, the survey investigations included the excavation of a total of 102 shovel tests, the revisit of a previously recorded site (41NW11), the documentation of a single archaic-age dart point (Isolated Find [IF]-1) in isolated contexts. Site 41NW11 was originally recorded in 1959 as a low-density lithic scatter located on the western banks of Big Cow Creek. No evidence of the site was documented as a result of the revisit efforts, and it is likely that the site has been entirely destroyed in the past decades due to episodic flooding of Big Cow Creek. Based on these factors, site 41NW11 is recommended as ineligible for listing in the NRHP within the Project area. The recovered dart point was not recorded as an archeological site as no additional artifacts or features were documented following intensive delineation efforts. Both site 41NW11, and IF-1 are located near the eastern Project area boundary beyond the limits of the stream restoration activities. All project records and collected materials will be housed permanently at Perennial's Austin office. To date, the cultural resources survey investigations have been completed, and no further work is recommended for the Project.

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FIGURES

TABLES

INTRODUCTION

Perennial Environmental Services, LLC (Perennial), on behalf Delta Land Services, LLC (DLS) conducted an intensive Phase I cultural resources survey for the proposed Big Cow Creek Mitigation Area Project (Project), located in Newton County, Texas. The Project is located 2.3 miles (mi) (3.7 kilometers [km]) west of Newton, Texas directly adjacent to Big Cow Creek (Figure 1). The Project will entail the restoration/re-establishment and enhancement of ephemeral and intermittent streams and associated riparian communities within the broader 188-acre property. Following the restoration activities, the Project area will be protected in perpetuity as a stream conservation site.

The survey investigations were conducted in accordance with Section 106 of the *National Historic Preservation Act* (NHPA) of 1966, as amended (36 CFR 800), and Texas State Historical Preservation Office (SHPO) standards and guidelines should state or federal permitting be required in the future. The objectives of the Phase I cultural resources survey were to locate cultural resources within the area of potential effects (APE), delineate the vertical and horizontal extent where possible, provide a preliminary evaluation of the National Register of Historic Places (NRHP)-eligibility of each resource, and assess potential for the Project to directly or indirectly affect historic properties or other sensitive cultural resources.

The area of potential effects (APE) for the Project encompasses the entire 188.0-acre (76.0-ha) Project area, however ground disturbances will occur primarily within an approximately 86.2-ac (34.8-ha) area centered on the ephemeral and intermittent streams. Depths of impact are anticipated to range from 0.5 to 1.5 feet (ft) (0.15 to 0.45 meters [m]) along stream courses, with limited impacts across upland settings for sporadic tree planting.

Abby Peyton served as the Principal Investigator (PI) for the Project, and field investigations were conducted by Perennial Staff Archaeologists Chelsea Reedy, Keith Faz, and Colene Knaub from January 21-23, 2020. The intensive Phase I survey efforts included pedestrian surveys augmented by an intensive shovel testing regime across the entirety of the Project area.

The following sections provide an overview of the environmental and cultural setting of the Project area, followed by a discussion of pre-field research, field survey methods, results of the survey investigations and conclusions. Mapping exhibits are provided in Appendix A, while shovel test data is provided in Appendix B, and the TexSite form and accompanying documentation for 41NW11 is provided in Appendix C.

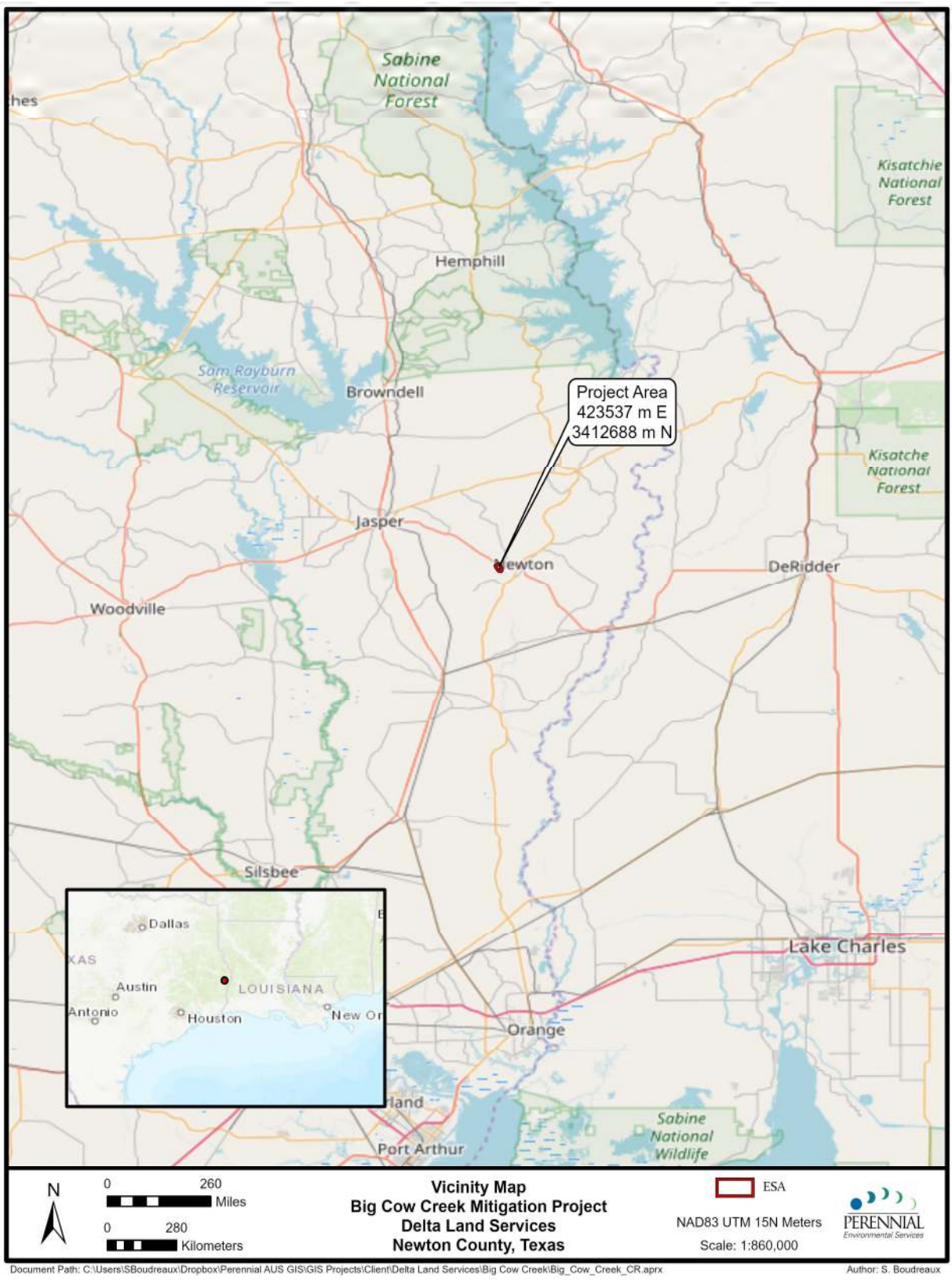

Figure 1. Project location and vicinity map

PROJECT DESCRIPTION

ENVIRONMENTAL SETTING

The Project is located within the Southern Tertiary Uplands ecoregion of Texas (Griffith et al. 2007). This ecoregion is a part of the broader, South Central Plains region. The Southern Tertiary Uplands is currently and has historically been dominated by various longleaf pine species which thrive on the sand ridges and uplands characteristic of this region. There are more hills in this region than the area to its south, and vegetation is dominated by pine forest rather than the oak-pine and pasture to the north (2020).

GEOLOGY AND SOILS

The Project area is underlain on the West by the Fleming geological formation and on the east by the Beaumont formation. The sedimentary Fleming formation consists of thick bedded calcareous clay and medium to coarse grained sandstone, the clay forming brownish-black soils. The formation is light yellow-gray in color and tends to weather light gray to medium gray. This formation dates to the Miocene epoch and can contain reworked Cretaceous invertebrate fossils locally (USGS 2020).

The Beaumont formation consists of very fine to fine quartz sand, silt and minor fine gravel which is intermixed and interbedded. Components are yellowish to brownish gray in color and can be reddish orange locally. The formation contains ridge deposits formed from fluvial processes including stream channels, point bars, crevasse splays and natural levees and can leave meander belt ridges and pimple mounds present on the landscape. Abandoned channels within the formation fill with organic rich laminated clay and silt. This formation dates to the Late Pleistocene epoch of the Quaternary period (USGS 2020).

The soil setting for the Project consists of three soil units (NRCS 2020). Table 1 details the soil profiles that comprise the three soil units within the Project Area. Overall, soils for the Project vary from well drained to somewhat poorly drained soils found on gently sloping stream terraces and floodplains with textures consisting primarily of a shallow A-horizon comprised of loamy sands underlain by clays. Several of these soil types are characterized as hydric, which formed under saturated conditions as a result of flooding or ponding of sufficient duration to develop anaerobic conditions (NRCS 2020).

Table 1
Soil Mapping Units Located within the Project Area - Newton County, Texas

Mapping Unit	Texture and Drainage	General Location	NRCS Hydric Rating
Bienville series, gently undulating	The Bienville series consists of very deep, somewhat excessively drained, moderately rapidly permeable soils. Loamy fine sand.	Nearly level or gently sloping stream terraces	Not Hydric
Alaga series, gently undulating	The Alaga series consists of very deep, excessively drained, rapidly permeable soils. Loamy sand.	Nearly level or gently sloping stream terraces	Not Hydric
Mantachie series, frequently flooded	The Mantachie series consists of very deep, somewhat poorly drained, moderately permeable soils. Fine sandy loam.	Floodplains of streams	Hydric
Bleakwood series, frequently flooded	The Bleakwood series consists of very deep, poorly drained, moderately permeable soils. Fine sandy loam.	Floodplains of streams	Hydric
Doucette series, undulating	The Doucette series consists of deep, well drained, moderately permeable soils. Loamy fine sand.	Gently sloping to sloping uplands	Not Hydric
Boykin series, undulating	The Boykin series consists of deep, well drained, moderately permeable soils. Loamy fine sand	Gently sloping to moderately steep uplands	Not Hydric

CULTURAL SETTING

PALEOINDIAN PERIOD (CA. 11,500 TO 10,000 B.P.)

The Paleoindian period marks the first presence of human populations living on the American continents. Chronologically, this period extends from the terminal Pleistocene into the early Holocene. Paleoindian groups were likely composed of loosely affiliated bands of highly mobile familial units that foraged for plants as well as hunted small game. The early population density during this time was low, with archaeological sites reflecting camps of small transient groups situated within the valley of major stream basins (Perttula 2004). Lithic technology during this time consisted of distinctive expertly crafted lanceolate projectile points, such as, Clovis, Folsom, and Plainview. These points exhibit finely worked surfaces, with some fluted types. Paleoindian sites are relatively sparse across East Texas, however the widely dispersed nature of the cultural material found across variable settings within the landscape suggest that these groups were highly mobile hunters and gathers rather than specialized in tracking and hunting extinct megafauna such as mammoths (*Mammuthus* sp.) and bison (*Bison antiquus*).

ARCHAIC PERIOD (CA. 6,000 TO 200 B.C.)

The Archaic period is broadly defined by the development of novel tool assemblages and the intensification and greater diversity of subsistence strategies. During this time, reliance on smaller game, such as deer and rabbits, increases as well as greater utilization of edible botanicals.

The Archaic Period can be further subdivided into three subperiods; the Early Archaic (6.000 to 4,000 B.C.), Middle Archaic (4,000 to 2,000 B.C.), and Late Archaic (2,000 to 200 B.C.). These subperiods are differentiated by the continued development of subsistence strategies and projectile point styles (Saunders 2003). While the Early Archaic period does not reflect a dramatic departure from the lifeways of the Paleoindian period, a few important cultural developments define the subperiod, including increased specialization as reflected by lithic technology (Miller et al. 2000; Smith et al. 1983; Watkins 2006). During the Early Archaic period the manufacture of fluted points ceased, and the use of notched points increased with a greater focus on exploitation of the microenvironment.

As the climate became warmer and dryer during the Middle Archaic, more sedentary lifestyles developed along with increased exploitation of riverine resources. The Middle Archaic is most notably characterized by open campsites with distinctive blade-notched hunting tools as well as generalized cutting and scraping tools, debris, groundstone tools and cores (Perttula 2004:375). The occurrence of burned rock features increases during the Middle Archaic demonstrating an importance on cooking and food processing as a subsistence strategy. The Middle Archaic period also marks the first construction of earthen mounds in Louisiana (Gibson 2006). Numerous mounds have been observed in Louisiana, the majority of which are located within northern

Louisiana. This mound construction suggests the development of increasing more complex societies.

Late Archaic period sites are widely distributed in the Pineywoods along both major and minor stream bodies and upland formations. The distribution of sites across the landscape suggests that Late Archaic groups extensively exploited the region during this time. However, there are only a few well-dated Late Archaic sites located in northeast Texas (Perttula 2004: 376). Such sites as 41CS151, 41RK222, and 41TT150 all have Late Archaic components. Burned rock features and pits still characterize the Late Archaic, however there is no paleobotanical evidence to suggest that these groups were cultivating native plant species like as seen in populations further to the east (Perttula 2004:376).

EARLY CERAMIC OR WOODLAND (CA.200 B.C. TO 800 B.C.)

The Early Ceramic period, also known as the Woodland or the Fourche Maline period, is characterized by plain and relatively thick-walled ceramic bowls and flowerpot-shaped jars, double-bitted axe heads, smaller and thinner projectile points, (such as Gary points) and corner-notched arrow points (Perttula 2004: 376; Thurmond 1990).

While there is still much to learn about the Woodland period populations in East Texas, evidence does suggest that these groups were becoming decreasingly less mobile through time. Excavations at Woodland period sites, like the Ray Site, have revealed several structures and large midden deposits.

Evidence suggests that Woodland period populations utilized root/tubers and both terrestrial and aquatic animal sources, predominantly white-tail deer (Perttula 2004:377). Some maize cultivation strategies were also utilized towards the end of the Early Ceramic.

According to Perttula (2004), no Woodland Period burials have been recorded in the northeast Texas Pineywoods region. However, Woodland burials have been observed further north and east along the Red River and within Arkansas and northwestern Louisiana. The setting for these burials typically include blufftops and alluvial settings (Perttula 2004:377).

LATE PREHISTORIC (CA. A.D. 800 TO 1700)

The Formative, Early, Middle, and Late Caddo periods define the Late Prehistoric in the Pineywoods and Post Oak Savanna in northeastern Texas. Caddo sites are typically located within alluvial settings and rises along both major and minor stream settings. The majority of Caddo period sites represent permanent settlement. Excavations of many of these sites have recorded well-preserved villages and hamlets consisting of earthen mound features, residential structures, cemeteries, and midden deposits. The diversity of cultural material among these Caddo groups is quite extensive. Common tools observed at these sites include well-made, corner-notched, and

rectangular-stemmed arrow points; along with silt-stone and greenstone celts, perforators, and borers (Perttula 2004: 386).

A well-known Formative and Early Caddoan period site in the area is the George C. Davis site. This site consists of a large village site with numerous mounds and structures. An extensive burial complex was also noted at the site (Perttula 2004). Well defined radiocarbon dates demonstrate a long, continual occupation sequence at the site. Two additional well known sites within the Texas Pinewoods include Oak Hill Village (41RK214) and Tyson (41SY92). Both of these sites contain extensive residential and burial complexes.

Late Caddo period sites consist of small farmsteads, hamlets, and mound centers. A culturally distinctive group of these sites, located between Sabine and Sulphur Rivers, northeast of the Project ESA, has been identified as the Late Caddoan Titus phase (ca. AD 1430-1680) (Perttula 2004, 396). Titus phase components also include family cemeteries and larger community cemeteries. One of the most widely studied community cemetery with high-status burials is the Tuck Carpenter site (41CP5), which contains over 70 internments dating between A.D. 1350 and 1550 (Perttula 2004, 402). Maize cultivation appears to be the main food source with some deer and other animals supplemented. Local lithics were primarily used for tool manufacture and ceramics contained considerable variation with respect to surface treatments and decorations (Perttula 2004).

HISTORIC (CA. A.D. 1700 TO 1950)

Lorenzo de Zavala's 1829 grant from the Mexican government included present-day Newton county (Mexal 2007; Wooster 2016). Twenty-one land titles were given to settlers between 1834 and 1835 (Mexal 2007; Wooster 2016). In 1846, the Texas State legislature divided Jasper County, making the eastern portion Newton County in honor of John Newton, a veteran of the American Revolution.

By 1860, Newton County residents participated in a mixed agricultural economy, including corn, cotton, potatoes, and animal husbandry (Buenger 2001; Wooster 2016). Many citizens also participated in plantation life, and supported secession overwhelmingly during the Civil War (Buenger 2001; Wooster 2016). After the war, Newton County's economy remained stable and focused on agriculture, enabling the people to feel little impact of the economic struggles during Reconstruction (Buenger 2001; Wooster 2016).

Since Newton county's economic stability, population rose steadily between the late 1800's into the early 20th century (Buenger 2001; Texas Almanac 2020; Wooster 2016). At the turn of the century, Newton County took advantage of the natural resources of east Texas and started diversifying their economy by including large-scale lumber production activities (Askins-Cook 2011; Buenger 2001; Wooster 2016).

The expansion of the lumber industry also created a need for better transportation systems in the area (Wooster 2016). Railroads were expanded between the mid-1800s until the early 1900s, creating an economy mostly based on the lumber industry instead of agricultural activities (RRC 1914; Wooster 2016). This was detrimental during the Great Depression, when the availability of timber became scarce. Mill closures became rampant, creating unemployment throughout East Texas (Buenger 2001). The population began to wane during this time, as people moved out of the area in search of work. Most people moved south to the Texas coast where the oil and gas industry remained economically strong (Wooster 2016).

The population decline settled during the 1950s with the discovery of small oil fields. Today, agriculture and lumber production remain the economic staples in the area. The restoration of the forest and proper forest management has revived the lumber industry in Newton county (Wooster 2016).

ETHNOHISTORY

Tribes indigenous to Texas include the Apache, Bidai, Coahuiltecan and Carrizo, Caddo, Comanche, Jumano, Suma, Piro and other eastern pueblos, Karankawa, Kiowa, Kitsai, Tawakoni, Tonkawa, and Wichita tribes (Redish 2015). There have also been numerous emigrant tribes who were forcibly moved or pressured to move to the region after being displaced from their original homelands. Emigrant tribes in Texas include the Alabama, Cherokee, Coushatta, Kickapoo, and Tigua tribes. Currently, there are three federally recognized tribes in Texas, which include the Alabama-Coushatta Tribe of Texas, Kickapoo Traditional Tribe of Texas, and the Ysleta Del Sur Pueblo (National Conference of State Legislation 2016).

Alabama-Coushatta Tribe of Texas

The Alabama-Coushatta Indian Tribe of Texas is made up of two separate tribes, the Alabamas and Coushattas (Alabama-Coushatta Tribe 2020; Martin 2018). Despite some differences, the two tribes have been closely connected throughout their history by social collaboration, intermarriage, and mutually understandable languages (derived from Muskhogean language) (Martin 2018). Both tribes migrated together from present-day Alabama to the Big Thicket area of Texas around 1763. Today, the Alabama-Coushatta Tribe of Texas's reservation is located near Livingston, Texas in Polk County and is the oldest reservation in the state of Texas (Alabama-Coushatta Tribe 2020; Martin 2018).

METHODS

BACKGROUND REVIEW

Perennial conducted a records and literature review of the THC's Texas Archeological Sites Atlas (Atlas) online database and the NRHP database to identify previously recorded cultural resource sites, historic-era structures, properties listed in the NRHP, designated historic-era districts, or State Antiquities Landmarks (SAL) that could potentially be affected by the proposed undertaking. Previously recorded cultural resource site forms, reports of archaeological investigations, general historical documents, and secondary sources concerning the background of the area were reviewed. The records search included a review of all previously recorded site forms, cemetery data, and surveys on file within a 1.0-mi (1.6-km) review radius of the Project.

In addition to a records and literature search, Perennial gathered information from secondary sources concerning the prehistoric and historical background of the area. Documents associated with the history of the area were used to model prehistoric and historic settlement patterns in relation to the landscape and terrain characteristics as well as cultural patterns and regional trends. Natural Resources Conservation Service (NRCS) soil data, USGS 7.5-minute topographic quadrangles, aerial photographs, and contemporary geologic and physiographic features were also examined.

FIELD SURVEY

The cultural resources survey of the Project was performed by a Perennial Staff Archaeologist on November 7, 2019. Perennial's investigations consisted of an intensive pedestrian survey and shovel testing efforts within the Project area. Shovel tests were excavated where possible in accordance with the Texas State Minimum Archeological Survey Standards (TSMASS).

For project between 25 and 200 acres in size, the TSMASS requires the excavation of 50 shovel tests for the first 25 acres, and one shovel test per every five subsequent acres. Based on these standards, a total of 82 shovel test would be warranted to meet these standards for the approximately 188.0 ac (76.0 ha) project area. Perennial exceeded these standards.

In general, shovel tests measured approximately 12 inches (in) (30 cm) in diameter and were excavated by natural strata. Shovel tests were excavated to a depth of 3.28 ft (1.00 m) where possible per the THC/Council of Texas Archeologists (CTA) survey standards, or to where pre-Holocene sterile substrates were encountered, unless manual shovel testing was unable to penetrate hard clay soils. All soil matrices were sifted through 0.25-in (0.64-cm) mesh hardware cloth unless dominated by clay. Clayey matrixes were finely divided by trowel and visually inspected.

For each of the shovel tests, the following information was recorded on shovel test logs: location, maximum depth, and the number of soil strata. For each soil stratum, thickness, texture, color,

and the presence or absence and nature of cultural materials was recorded. All shovel test locations, isolated finds, archaeological sites, and associated features were collected using a handheld GPS device.

If an archaeological site was identified, the appropriate delineation techniques were systematically applied to identify the horizontal and vertical limits of each site's boundary. Site boundaries were determined based on both surface artifact density and the presence or lack of subsurface components. For subsurface sites, a series of shovel tests were excavated radiating in the four cardinal directions or, if more appropriate, along perceived major and minor topographic and site axes. In practice, shovel tests within potential sites were placed along transects at 33.00 ft (10.00m) intervals to determine the depth and potential integrity of cultural deposits, and to carefully examine for the presence of intact archaeological features and/or discrete episodes of occupation. In the absence of subsurface deposits, controlled pedestrian surface inspections were conducted and site boundaries defined based on a marked reduction in surface artifact density. Shovel testing or pedestrian surveys were not conducted beyond the Project boundary to ensure no trespassing onto private property occurred. All project records and collected materials will be housed permanently at Perennial's Austin office.

The Project area is underlain by ancient geological formations that pre-date human occupation in North America. Additionally, soils documented through shovel testing across the Project area noted a shallow and A-Horizon, underlain by a dense clayey substratum at depths ranging from 80 to 90 cm below the surface. Based on these factors, coupled with the shallow depth of impact (not to exceed 1.5 ft [0.45 m]), mechanical trenching was not deemed necessary for the Project area.

RESULTS

BACKGROUND REVIEW

The background and literature review of the THC's Altas database determined that on previously recorded archeological site (41NW11) is mapped in the northeastern corner of the Project area. One additional previously recorded site (41NW13) is located in the broader 1.0-mi (1.6-km) review radius. Additionally, the Project area has not been previously surveyed for cultural resources.

Site 41NW11 was originally recorded in 1959 as a sparse lithic scatter on the western banks of Big Cow Creek (Atlas 2020). The site was noted to have been impacted by a logging road, as well as outwash flooding of Big Cow Creek. No additional information was available on the Atlas regarding the NRHP eligibility of the site.

Site 41NW13 is located approximately 0.5-mi (0.8-km) north of the Project area. Similar to 41NW11, SITE 41NW13 was recorded in 1960 and very little information was available. The site was reported to consist of a small sample of sherds, non-diagnostic lithic debris, 1 fossilized tooth, and petrified wood core (Atlas 2020).

Reviewing historical USGS topographical maps (USGS 2020), there are no historic structures within the vicinity of the Project. This is confirmed by reviewing aerial imagery from 1952 (NETR 2020). However, the Project area was covered in forest prior to 1952 (Figure 3). The landowner states that his father purchased the land over 50 years ago and was forested at the time of purchase in 1970. Shortly after the purchase, the land was cleared and burned. This account is confirmed by comparing historic aerial imagery and imagery from today.

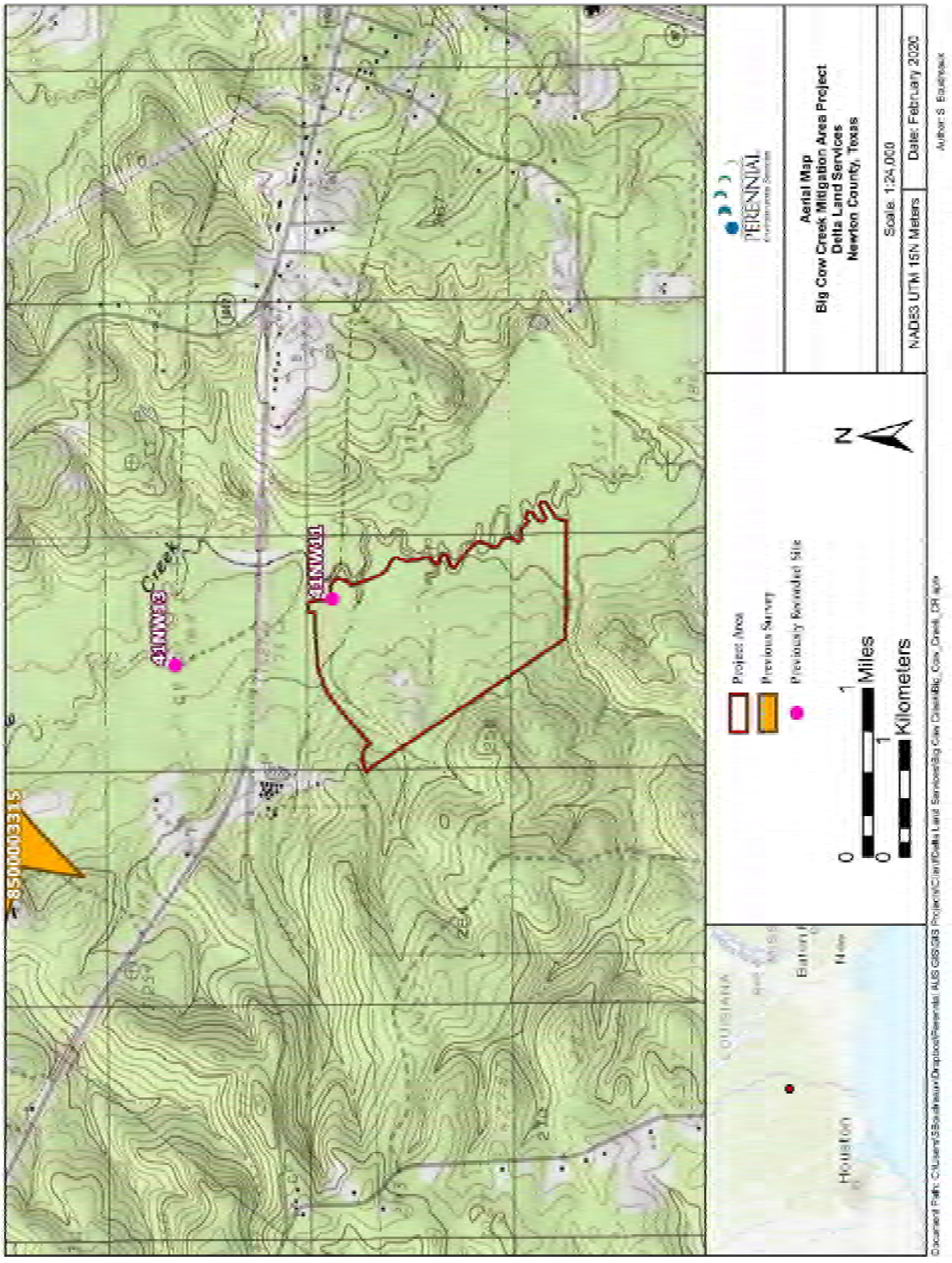

Figure 2. Background review results map

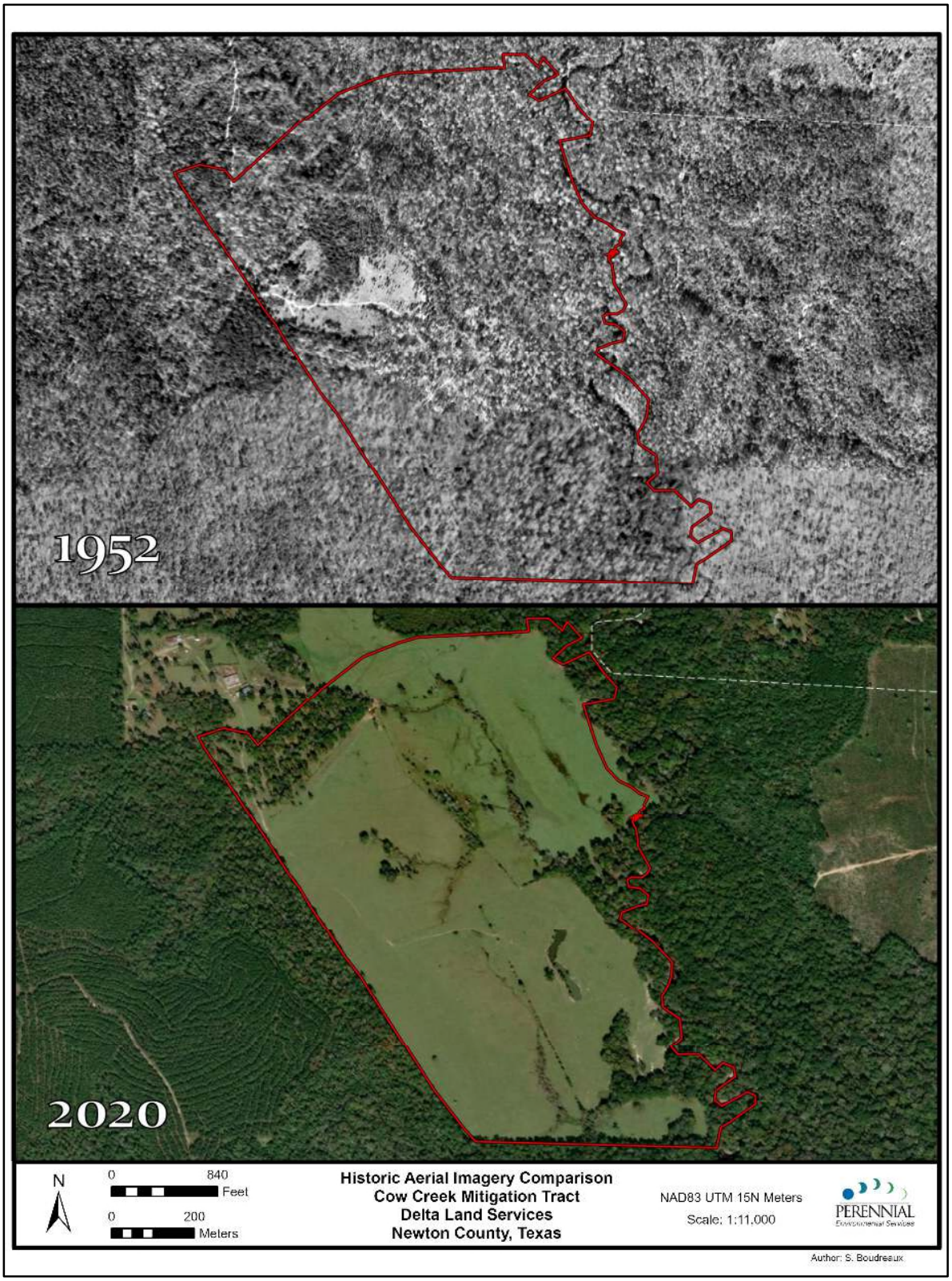

Figure 3. Historic Aerial Imagery Comparison.

FIELD SURVEY

A field crew composed of three Perennial archaeologists conducted an intensive surface and subsurface cultural resources investigation between January 21-23, 2020. The objectives of the survey were to (1) locate cultural resource sites within the Project area; (2) delineate the vertical and horizontal extent of any newly identified sites within the Project's APE; (3) provide a preliminary evaluation of each site's eligibility for listing in the NRHP; and (4) assess any potential for the Project to directly or indirectly affect historic properties, or other sensitive cultural resources.

The Project area consists of cleared open pasture situated within densely wooded setting comprised of pine plantations and hardwood forests. Big Cow Creek serves as the eastern Project area boundary, and several intermittent and ephemeral streams flow eastward across the Project area into Big Cow Creek. Ground surface visibility across the Project area was typically low (10 to 15 percent) due to grassy ground cover. Inundated settings were noted in the vicinity of stream channels creating pockets of marshy lowlands. The topography was undulating consisting of a combination of uplands bisected by incised stream channels flanked by narrow riparian corridors (Figures 4 and 5). Artificially-constructed berms and shallow borrow pits were noted across the Project area, likely a product of past clearing episodes.

As mentioned previously, the Project will entail restoration activities in the vicinity of intermittent and ephemeral drainages that flow eastward to Big Cow Creek in order to create a stream conservation easement. While survey investigations were conducted across the broader 188.0 ac (86.2-ha) property, ground disturbance would be limited to the approximately 88.2-ac (34.8-ha) area centered on the stream features. In all, a total of 102 shovel tests were excavated across the Project area on a 50.0 to 75.0-m (164.0 to 246.0-ft) grid across the Project area (Appendix A). Of these, 40 were placed within, or directly adjacent to the stream restoration areas. Documented soils within these shovel tests exhibited a shallow A-horizon that conformed to the NRCS soil profile data consisting of 50.0 to 85.0 centimeters (cm) of sandy loam underlain by the dense and blocky orange clayey substratum. In some cases, the shovel tests were terminated at shallower depths due to the infiltrating water table. Shovel test data is provided in Appendix B.

Charcoal flecking was also consistently noted in shovel tests excavated across the Project area. These inclusions are interpreted to be a product of modern clearing and burning activities, and are not representative of prehistoric activity associated with cooking features.

In all, the survey investigations included a revisit of site 41NW11, and the documentation of a single Archaic-age dart point in isolated contexts (IF-1). No cultural resources were documented within the stream restoration areas. These resources are discussed in more detail below.

Figure 4. Overview of the Project Area setting

Figure 5. View of marshy setting encountered in the Project area

SITE 41NW11

Site 41NW11 was originally recorded in March 30, 1959 as an archaic-age, low density lithic assemblage located on the western terrace of Big Cow Creek. The reported artifact assemblage consisted of the distal tip of a knife, one modified flake, and an unknown quantity of non-diagnostic lithic debris. The site was noted to have been bisected by a logging road, with additional disturbance by creek over wash. The depth of the cultural deposits was also not specified, only that soils consisted of approximately 1.4 feet of tan sand underlain by orange clay (Atlas 2020).

Site 41NW11 was revisited by Perennial archeologists on January 23, 2020 to reassess the current condition of the site. During the re-visit, evidence of extreme flooding was encountered, which created heavy undercutting of Big Cow Creek near the reported site location. A total of nine shovel tests were excavated within the mapped site location, and all shovel test were negative for cultural materials. Additionally, no evidence of the site was encountered in the immediate vicinity of the site location. The site location was noted to have been heavily impacted by stormwater surges of Big Cow Creek, and it is likely that the site has been entirely destroyed or washed away in the 60 years since it was originally recorded. Documented soils within shovel tests consisted of sand and sandy loam, with an abrupt boundary demarcating the clayey substratum at 80 to 90 cm below the surface. Soils also exhibited varying degrees of mottling throughout indicating intermingling as a result of high-capacity stormwater surges.

No evidence could be found to suggest that 41NW11 could meet the potential for Criteria A-D. Overall, the site area lacks diagnostic data, integrity, and research value to meet any of the criteria to be eligible for listing in the NRHP. Based on the investigations as detailed herein, Site 41NW11 is recommended as ineligible for inclusion in the NRHP within the Project area.

Figure 6. Overview of the presumed location of 41NW11

IF-1

One archaic-age Kirk corner-notched projectile point was recovered from a shovel test (012320CR14) at 20 cm below surface (Figures 7 and 8). IF-1 is located on the margins of the Big Cow Creek riparian corridor approximately 0.45-mi (0.72-km) south of the location of site 41NW11. An additional 8 shovel tests were excavated at 15-m intervals in the cardinal directions to probe for additional cultural materials. These delineation efforts were entirely negative for cultural materials, and as such IF-1 was not documented as an archeological site.

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Figure 7. Kirk corner -notched projectile point

Figure 8. Overview of IF-1

CONCLUSIONS AND RECOMMENDATIONS

Perennial, on behalf of DLS conducted an intensive Phase I cultural resources survey for the proposed Big Cow Creek Mitigation Area Project, located in Newton County, Texas. The Project is located 2.3 miles (mi) (3.7 km) west of Newton, Texas directly adjacent to Big Cow Creek. The Project will entail the restoration/re-establishment and enhancement of ephemeral and intermittent streams and associated riparian communities within the broader 188.0-acre property. Following the restoration activities, the Project area will be protected in perpetuity as a stream conservation site.

The survey investigations were conducted in accordance with Section 106 of the NHPA of 1966, as amended (36 CFR 800), and Texas SHPO standards and guidelines should state or federal permitting be required in the future.

The APE for the Project encompasses the entire 188.0-acre (76.0-ha) Project area, however ground disturbances will occur primarily within an approximately 86.2-ac (34.8-ha) area centered on the ephemeral and intermittent streams. Depths of impact are anticipated to range from 0.5 to 1.5 feet (ft) (0.15 to 0.45 meters [m]) along stream courses, with limited impacts across upland settings for sporadic tree planting.

Abby Peyton served as the Principal Investigator (PI) for the Project, and field investigations were conducted by Perennial Staff Archaeologists Chelsea Reedy, Keith Faz, and Colene Knaub from January 21-23, 2020. The intensive Phase I survey efforts included pedestrian surveys augmented by an intensive shovel testing regime across the entirety of the Project area.

In all, the survey investigations included the excavation of a total of 102 shovel tests, the revisit of a previously recorded site (41NW11), the documentation of a single archaic-age dart point (IF-1) in isolated contexts. Site 41NW11 was originally recorded in 1959 as a low-density lithic scatter located on the western banks of Big Cow Creek. No evidence of the site was documented as a result of the revisit efforts, and it is likely that the site has been entirely destroyed in the past decades due to episodic flooding of Big Cow Creek. Based on these factors, site 41NW11 is recommended as ineligible for listing in the NRHP within the Project area. The recovered dart point was not recorded as an archeological site as no additional artifacts or features were documented following intensive delineation efforts. Both site 41NW11, and IF-1 are located near the eastern Project area boundary beyond the limits of the stream restoration activities. To date, the cultural resources survey investigations have been completed, and no further work is recommended for the Project.

In the event that historic properties and/or human remains are encountered during construction, work in the immediate area will cease and a qualified archaeologist will be called to evaluate the finding(s) and provide recommendations for how to manage the resource under the appropriate state's Historic Preservation Plan. All findings will be reported to, and activities coordinated with, the USACE, as well as the State Archaeologist. In the event that human remains are encountered,

all activity that might disturb the remains shall cease, and may not resume until authorized by appropriate law enforcement or the State Archaeologist.

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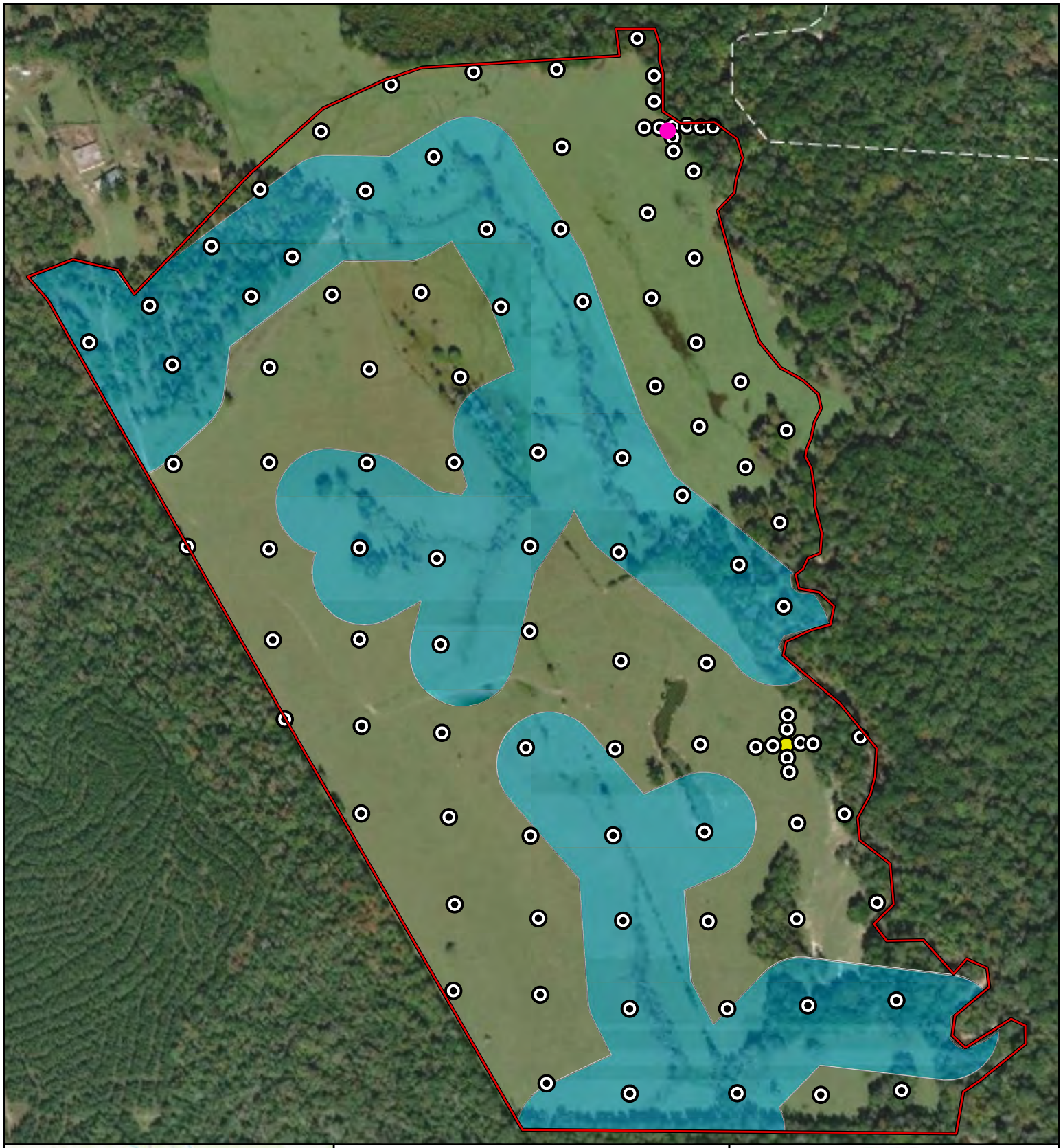
APPENDIX A: SURVEY RESULTS MAPS



PERENNIAL
Environmental Services

Aerial Map - Overview
Big Cow Creek Mitigation Area Project
Delta Land Services
Newton County, Texas

Scale: 1:4,450

NAD83 UTM 15N Meters | Date: February 2020

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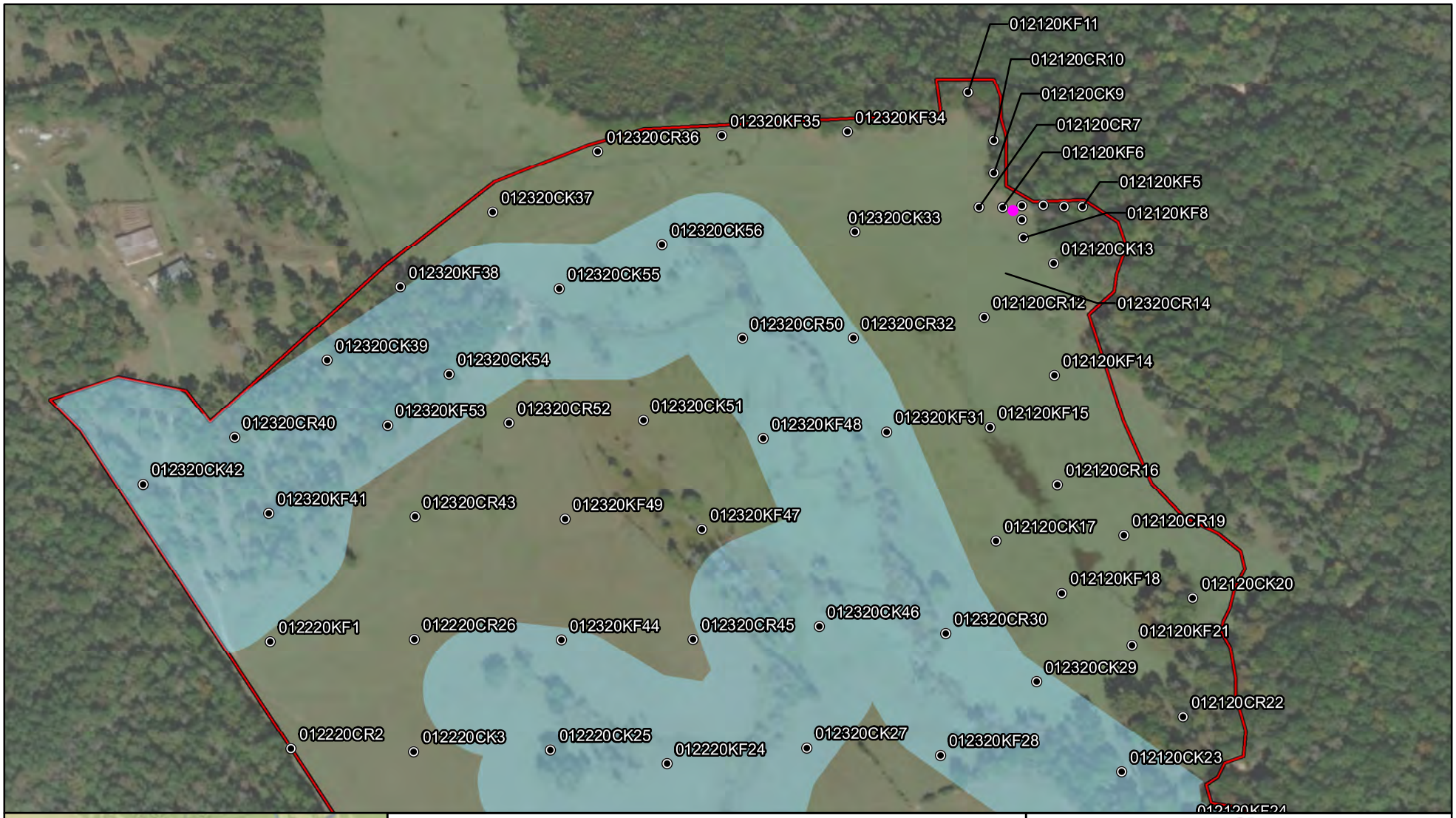
Author: S. Boudreaux



PERENNIAL
Environmental Services

Aerial Map - Detail
Big Cow Creek Mitigation Area Project
Delta Land Services
Newton County, Texas

Page 1 of 2	Scale: 1:5,000
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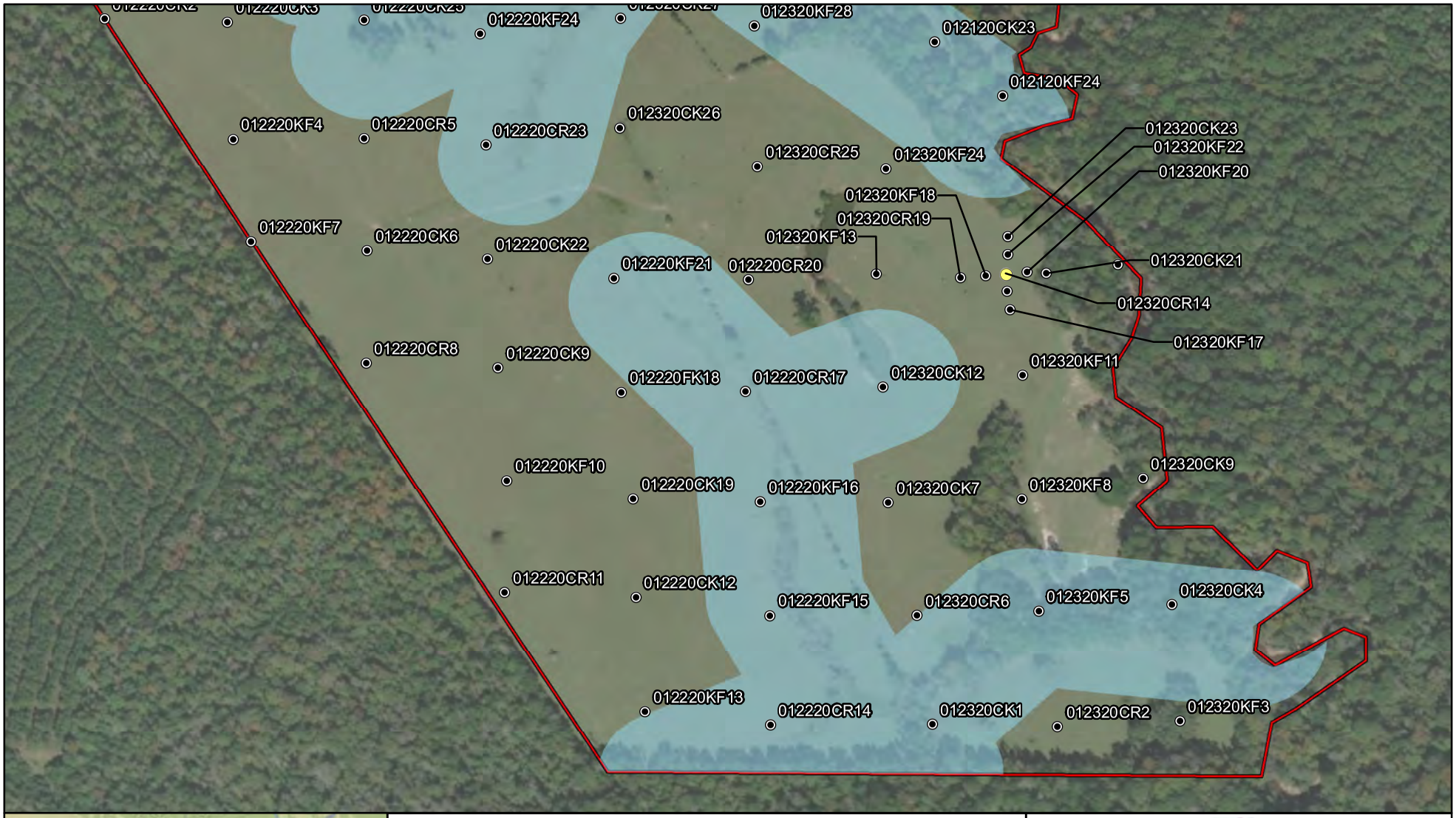
Author: S. Boudreaux



PERENNIAL
Environmental Services

Aerial Map - Detail
Big Cow Creek Mitigation Area Project
Delta Land Services
Newton County, Texas

Page 2 of 2	Scale: 1:5,000
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APPENDIX B: SHOVEL TEST DATA

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Fine Sandy Loam	Edge of cleared field and creek - Site	Soil Change
				Negative		Fine Sandy Loam		Soil Change
				Negative		Fine Sandy Loam		Soil Change
				Negative		Fine Sandy Loam		Subsoil
				Negative		Sandy Loam	Delineation south from site pasture	Soil Change
				Negative		Sandy Loam		Subsoil
				Negative		Sand	South Bank of Main Cow Creek, Heavily mottled throughout, evidence of recent flooding	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Fine Sandy Loam	2nd radial from center of site. Towards creek	Soil Change
				Negative		Fine Sandy Loam		Soil Change
				Negative		Fine Sandy Loam		Soil Change
				Negative		Fine Sandy Loam		Subsoil
				Negative		Sand	Delineation east of site. Wooded	Soil Change
				Negative		Sandy Loam		Subsoil
				Negative		Sand	Delineation west of site. Pasture, 10m from site	Soil Change
				Negative		Sandy Loam		Subsoil
				Negative		Sand	2nd radial from center of site. Towards creek	Soil Change
				Negative		Sandy Loam		Soil Change
				Negative		Sandy Clay Loam		Subsoil

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sand	Delineation west of site. Pasture, 10m from site	Soil Change
				Negative		Sandy Loam		Subsoil
				Negative				
				Negative		Sand	North Bank of main cow creek, heavy deposition	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Loam	Highly Mottled	Subsoil
				Negative		Sandy Clay Loam	Next to pond inundated at 60cm	Soil Change
				Negative		Sandy Clay Loam		Subsoil
				Negative		Sandy Clay Loam	Center of Lower cleared field	Soil Change
				Negative		Clay Loam		Soil Change
				Negative		Sandy Clay Loam		subsoil
				Negative		Sand	North Bank of main cow creek, heavy deposition	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Clay Loam	Pasture	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Clay	Depression, mottled, inundated	Subsoil
				Negative		Sandy Clay Loam	Center of Lower cleared field	Soil Change
				Negative		Clay Loam		Soil Change
				Negative		Sandy Clay Loam		subsoil
				Negative		Sand	Open field cow pasture, surrounded by inundation	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Clay	Pasture	Soil Change
				Negative		Clay		Subsoil

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sandy Clay Loam	Center of Lower cleared field	Soil Change
				Negative		Clay Loam		Soil Change
				Negative		Sandy Clay Loam		subsoil
				Negative		Sand	Open field cow pasture, surrounded by inundation	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Clay	Pasture, between pond and creek	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Clay Loam	Wooded pasture, with surrounded pond water	Soil Change
				Negative		Clay Loam		Soil Change
				Negative		Sandy Clay Loam		subsoil
				Negative		Sand	Open field cow pasture, surrounded by inundation	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Clay	Wallow, horseshoe creek surround	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	Bands of sand @ 20cmbs. Top of Ridge	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Clay Loam	Near tree line, surface water, water at 35cmbs	Soil Change
				Negative		Sandy Clay Loam		Subsoil
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Soil Change
				Negative		Sandy Clay Loam		Subsoil
				Negative		Sandy Loam	Increase clay towards depth	Soil Change
				Negative		Sand		Subsoil

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sandy Clay Loam	Open field, hit water at 45cmbs	Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Clay		Subsoil
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Soil Change
				Negative		Sandy Clay Loam		Subsoil
				Negative		Sandy Loam	Increase clay & mottled to depth next to tree line	Soil Change
				Negative		Sandy Loam		Soil Change
				Negative		Sandy Clay Loam		Subsoil
				Negative		Sandy Clay Loam	On highest terrain, near tree line, open field	Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Soil Change
				Negative		Sandy Clay Loam		Subsoil
				Negative		Sandy Loam	Increase clay to depth	Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Clay Loam	Open field, near end of transect, fence line	Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Soil Change
				Negative		Sandy Clay Loam		Subsoil

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sandy Loam	On slope, very moist soils	Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Clay Loam	Lowlands near creek.	Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Loam	Inundated	Subsoil
				Negative		Sandy Clay Loam	Off creek, near water, very moist soils	Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Clay Loam	Lowlands near creek.	Soil Change
				Negative		Sandy Clay Loam		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Clay Loam	Gray, Inundated	Soil Change
				Negative		Sand		Inundated
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Inundation
				Negative		Sandy Clay Loam	Lowlands near creek.	Subsoil
				Negative		Sand	Gray, Inundated	Inundated
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Inundation
				Negative		Sandy Clay Loam	Lowlands near creek.	Subsoil
				Negative		Sandy Loam	Inundated at 50cm	Inundated
				Negative		Sandy Loam		
				Negative		Loamy Sand	On upper plateaued, very compact - Fe02 Stain, very saturated	Soil Change
				Negative		Loamy Sand		Inundation
				Negative		Sandy Clay Loam	Lowlands near creek.	Subsoil
				Negative		Sandy Clay Loam		
				Negative		Sand		

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sand	Mantachie soil series, heavily inundated, evidence of tree fall, disturbance.	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth
				Negative		Silty Sand	Open field near creek, water table @ 75cmbs	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Sandy Clay		subsoil
				Negative		Sand	Inundation @ 40cmbs, modern trash	Inundated
				Negative		Sand	Mantachie soil series, heavily inundated, evidence of tree fall, disturbance.	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth
				Negative		Sandy Loam	White mottles, roots to 20cmbs, inundated at 50	Soil Change
				Negative		Sand		inundated
				Negative		Silty Sand	Open field near creek, water table @ 75cmbs	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Sand	Mantachie soil series, heavily inundated, evidence of tree fall, disturbance.	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth
				Negative		Sandy Loam	White mottles, roots to 20cmbs, inundated at 50	Soil Change
				Negative		Sand		inundated
				Negative		Sand	Mantachie soil series, heavily inundated, evidence of tree fall, disturbance.	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Silty Sand	Edge of creek bank, deep sandy deposits	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Loam	On hill top	Soil Change
				Negative		Sand		inundated
				Negative		Sandy Loam	Surrounded by inundation, very saturated, close to Hydric, Flat plain on lowest plateau	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Clay Sand		Terminal depth
				Negative		Sandy Loam	Mottled, inundated @20cmbs	Inundation
				Negative		Silty Sand	Edge of creek bank, deep sandy deposits	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Positive		Sand	Positive @10-20cm with charcoal, edge of terrace in open filed	Subsoil
				Negative		Sandy Loam	Surrounded by inundation, very saturated, close to Hydric, Flat plain on lowest plateau	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Clay Sand		Terminal depth
				Negative		Sandy Loam	012320.1 delineation 15m South. Clay more compact to depth	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	012320.1 delineation 30m South. Clay more compact to depth	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	012320.1 delineation 30m South. Clay more compact to depth	Soil Change
				Negative		Clay		Subsoil

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Silty Sand	Edge of creek bank, deep sandy deposits	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Sandy Loam	012320.1 delineation 3015m East. Clay more compact to depth	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	Surrounded by inundation, very saturated, close to Hydric, Flat plain on lowest plateau	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Clay Sand		Terminal depth
				Negative		Sandy Loam	012320.1 delineation 3015m East. Clay more compact to depth	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	Surrounded by inundation, very saturated, close to Hydric, Flat plain on lowest plateau	Soil Change
				Negative		Sand		Soil Change
				Negative		Sand		Soil Change
				Negative		Clay Sand		Terminal depth
				Negative		Sandy Loam	Inundated at 20cmbs	inundation
				Negative		Silty Sand	Edge of creek bank, deep sandy deposits	Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Loam	Located adjacent to creek, soil heavily saturated, evidence of heavy erosion	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sandy Loam	Located adjacent to creek, soil heavily saturated, evidence of heavy erosion	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy Loam	Lowland	Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Loam	Located adjacent to creek, soil heavily saturated, evidence of heavy erosion	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Clay	Water table at 10cmbs	inundation
				Negative		Clay	Water table at 10cmbs	inundation
				Negative		Sandy clay Loam	Open field near creek, water table at 40cm	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	Located adjacent to creek, soil heavily saturated, evidence of heavy erosion	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy Loam	Inundated, heavily mottled, compact	Inundated
				Negative		Sandy Loam	Inundated	Inundated
				Negative		Sandy Loam	Inundated	Inundated
				Negative		Sandy Loam	Located on 2nd highest platue, adjacent to wetland, distinct subsoil transition	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy Loam	On a slope, roots	Soil Change
				Negative		Sand		Subsoil

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sandy Loam	Located on 2nd highest plateau, adjacent to wetland, distinct subsoil transition	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy clay Loam	Redux, wooded area on slope of creek	Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	Next to creek	Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Loam	Located on 2nd highest plateau, adjacent to wetland, distinct subsoil transition	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy clay Loam	Surface Water	Inundation
				Negative		Sandy Loam	Increase clay to depth	Soil Change
				Negative		Sand		Subsoil
				Negative		Sandy Loam	Edge of slope into creek.	Soil Change
				Negative		Sandy Loam		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Loam	Located on 2nd highest plateau, adjacent to wetland, distinct subsoil transition	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy Loam	Located on 2nd highest plateau, adjacent to wetland, distinct subsoil transition	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy Loam	Inundated	Inundated
				Negative		Sandy Loam	Inundated	Inundated

Appendix B

Shovel Test Number	Level (Strat)	Depth (cmbs)		Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
				Negative		Sandy Loam	Located on 2nd highest plateau, adjacent to wetland, distinct subsoil transition	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Inundation
				Negative		Sandy Loam	Located on transition zone from plateau to flood zone	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth
				Negative		Sandy Loam	Edge of slope into creek.	Soil Change
				Negative		Sandy Loam		Soil Change
				Negative		Clay Loam		Subsoil
				Negative		Sandy Loam	On a ridge by fence line	Soil Change
				Negative		Sandy Loam		Soil Change
				Negative		Clay		Subsoil
				Negative		Sandy Loam	Located on transition zone from plateau to flood zone	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth
				Negative		Sandy Loam	Located on transition zone from plateau to flood zone	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth
				Negative		Sandy Loam	Located on transition zone from plateau to flood zone	Soil Change
				Negative		Sand		Soil Change
				Negative		Clay		Terminal depth

APPENDIX C: SITE REVISIT FORM FOR 41NW11

TexSite Archeological Site Form

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General/Sources Work Location Culture Conditions Registration

41NW11

Date: 2/5/2020
Trinomial: 41NW11
SiteR evisit: True
FieldI d: 41NW11

SiteT ypes

SiteT ype: lithic scatter

Explanation: Low density Archaic age site comprised of a partial knife, modified flake and numerous undiagnostic lithic material.

ProjectI nformation

Name: Big Cow Creek
Number:
Funding: Delta Land Services

PermitI nformation

Name:
Number:

Recorder Information

Recorder: Colene Knaub
Affiliation: Perennial Environmental Services
Address: 5424 W. Hwy 290
City: Austin
State: Texas
Zip: 78735
Phone: 6144254631
Fax:
Email:
Recorder VisitedS ite: True

Owner Information

InformantI nformation

AdditionalS ourceso f Information

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General/Sources Work Location Culture Conditions Registration

41NW11

Observation/Collection Date: 01/21/2020

Surface Inspection/Collection
Date(s): 01/21/2020 **Method:** Pedestrian Survey

Mapping
Date(s): **Method:**

Testing
Date(s): 01/21/2020 **Method:** Systematic Shovel Testing

Excavation
Date(s): **Method:**

Kinds of Materials Collected ☐ **Materials Collected**
No materials collected

Special Samples

Housing
Temporary: **Permanent:**

Records Made
Records: shovel test notes, digital photos, daily journal, photo logs

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General/Sources Work Location Culture Conditions Registration

41NW11

County

Primary County: Newton **Other Counties:** **Location in Primary:** 2.3 miles West of the city of Newton near center of county

USGS Map Quad

Newton West (3093-331)

UTM

Zone: 15 **Easting:** 423693.11 **Northing:** 3413100.15

UTM Datum: NAD 1983

Description of Location

2.3 Miles west of the city of Newton and .22 miles South of Hwy 190. The site is located on the west bank of Big Cow Creek.

Elevation in feet: 147 **Elevation Range:** 147-150

Drainage

Nearest Extant Water Type, Distance, Direction: 200ft West of Big Cow Creek

Major Drainage Basin: Sabine River **Creek Drainage:** Big Cow Creek

Soil

Soil Description and Reference:

Soil is Mantachie series fine sandy loam, very deep, somewhat poorly drained, moderately permeable soils on flood plains of the Southern Coastal Plain.

Soil Surface Texture: Fine sandy loam **Percentage Ground Surface Visible:** 0%

Soil Source/Derivation

☑ Alluvial ☐ Colluvial ☐ Eolian ☐ In Situ ☐ Marine

Other:

Environmental/Topographical Setting

Southern Tertiary Uplands ecoregion of Texas, part of the South Central Plains region. Dominated by longleaf pine species on the sand ridges and uplands. There are more hills in this region than the area to its south, and vegetation is dominated by pine forest. Land cleared for cattle grazing.

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Time Periods of Occupation
Time Periods: Early Archaic, Middle Archaic, Late Archaic
Basis for Determination: Un-typed distal end of knife

Component (discrete occupations)
☐ Single ☐ Multiple ☑ Unknown
Basis for Determination:

Cultural Features
Previous survey recovered the distal end of a knife, a modified flake and recorded numerous non-diagnostic flakes. Site revisit recorded no cultural features.

Approximate Site Size
Site Size: 1 acre
Basis for Determination: Extent of lithic scatter as reported in original site report

Depth of Cultural Deposit
Top of Deposit Below Ground Surface: N/A
Basis for Determination:

Bottom of Cultural Deposit
Bottom of Deposit Below Surface: N/A
Basis for Determination:

Artifactual Material Observed
No material observed on revisit.

Discussion of Site
Possibly Archaic age Lithic scatter, unable to relocate upon revisit.

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41NW11

Circumstances Affecting Observation

Soil was extremely moist throughout.

Site Condition/Approximate Amount of Site Remaining Intact

Unable to relocate site.

Current Land Use

livestock grazing.

Natural Impacts

Evidence of extreme flooding from the creek to the North and South. Heavy undercutting of river towards the site. Possibly impacted by extreme soil depositions from flooding and undercutting.

Artificial Impacts

Agricultural impacts.

Known or Perceived Impacts

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General/Sources Work Location Culture Conditions Registration

41NW11

Registration Detail

State Archeological Landmark	National Register	Registered TX Historical Landmark	Conservation Easement
Not Eligible	Not Eligible	Not Eligible	Not Eligible

Comments

Recommended Actions

Research Value of Site Minimal

Recommendations of Further Investigation

Attachments

☐ **Submitted**

Edit