Mitigation Banking Instrument for Hues Ranch Mitigation Bank Hardin County, Texas

Permit No.: SWG-2019-00237

Sponsor

Toledo Summerlin Hues Investment
27993 Bays Cemetery Road
Richards, Texas 77873

Prepared for

U.S. Army Corps of Engineers
Natural Resources Conservation Service
U.S. Fish and Wildlife Service
Texas Parks and Wildlife Department
U.S. Environmental Protection Agency
Texas General Land Office
Texas Commission on Environmental Quality

Prepared by

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1 INTRODUCTION

1.1 Bank Purpose

All mitigation banks require a Mitigation Banking Instrument (MBI or Instrument), which is the legal document for the establishment, use, operation, and maintenance of the proposed mitigation bank. The proposed mitigation bank will be used to provide compensatory mitigation for unavoidable impacts to waters of the U.S., including wetlands, that result from activities authorized under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, provided such activities have met all applicable requirements and are authorized by the U.S. Army Corps of Engineers (USACE). All mitigation banks must comply with 33 Code of Federal Regulations (CFR) Part 332 if they are to be used to provide compensatory mitigation for USACE permits. The Sponsor is responsible for developing, operating, and maintaining the bank subject to the requirements of this MBI and the Sponsor agrees to satisfy and assume the legal responsibility for the mitigation requirements assigned to a respective permit by the USACE.

Hues Ranch Mitigation Bank (HRMB or Bank) is a mitigation bank sited on private lands. Bank credits for USACE permits may also be used to satisfy the requirements of other programs (e.g., tribal, state, or local wetlands regulatory programs, USACE civil works projects, Department of Defense military construction projects, Endangered Species Act), consistent with the requirements of the programs, if the appropriate credits required by a USACE permit is supplemental to such programs. Under no circumstances may the same credits be used to provide mitigation for more than one permitted activity.

This MBI serves to ensure compliance with Section 404 of the Clean Water Act 33 United States Code (USC) 1344 et seq, Section 10 of the Rivers and Harbors Act 33 USC 401 et seq, and the implementing regulations found at 33 CFR 320-332, which are controlling in any conflict between the MBI and those laws and regulations. The USACE role is regulatory only; the MBI should not be construed as a contract with the Government enforceable by the applicant or any third party. The Sponsor agrees to the extent allowed by the laws of the State of Texas to defend, indemnify, and hold the United States harmless in any action where any party, including the Sponsor, the beneficiary or any third party brings a claim, monetary or otherwise, against the United States that relates in any way to the USACE execution of mitigation banking documents for the establishment of this mitigation bank.

Through the approval of this MBI by the USACE, Toledo Summerlin Hues Investment (Sponsor) is instituting the HRMB. The Sponsor shall 1) implement and maintain the Bank as specified in the MBI, 2) execute and file an approved Conservation Easement on lands associated with the Bank, 3) maintain current accounting records for the Bank, 4) manage and monitor the Bank for ecological sustainability, and 5) conduct required remedial activities.

1.2 Bank Information

The purpose of the HRMB is to provide compensatory mitigation for impacts to waters of the U.S. (e.g., forested wetlands) resulting from actions permitted by the USACE under Section 404 of the Clean Water Act (33 USC 1344 et seq.) and Section 10 of the Rivers and Harbors Act (33 USC 403), provided that such activities have met with all other applicable permitting requirements. HRMB is not intended to provide mitigation for impacts to areas that are under tidal influence.

HRMB consists of three adjoining tracts totaling approximately 1,292 acres located approximately 4.7 miles south of Saratoga, approximately 6.5 miles northwest of the City of Sour Lake, and 3.5 miles south of the intersection of Farm to Market Road (FM) 105 and Old Sour Lake Road in Hardin County, Texas (Figure

1, Appendix A). The Universal Transverse Mercator coordinates for the center of the Bank are North 3342673.99 meters and East 355621.46 meters, which is equivalent to 30.207° North by 94.500° West using the 1983 North American Datum (Zone 15, NAD83). Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map (FIRM) Numbers 48199C0475F and 48199C0500F depict the project site to be within an unincorporated area of Hardin County where flood hazards are undetermined, but possible (FEMA 2023). Jackson Creek, a relatively permanent waterbody, bisects the center of the property and both Little Pine Island Bayou and Pine Island Bayou are approximately 1 mile northeast and 1.8 miles west of the property boundary, respectively. The site is within the U.S. Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC) 12020007 (Pine Island Bayou) (Figure 2, Appendix A).

As described in *Ecoregions of Texas* (Griffith et al. 2007), the Bank is located in the South Central Plains U.S. Environmental Protection Agency (EPA) Level III Ecoregion near the boundary of the Western Gulf Coastal Plain ecoregion. In particular, HRMB is situated in the Flatwoods EPA Level IV Ecoregion, just north of the Northern Humid Gulf Coastal Prairies EPA Level IV Ecoregion, providing an important transitional habitat between bottomland hardwoods forests, palmetto hardwood flats, and mixed pine-hardwood forests (Figure 2, Appendix A).

1.3 Bank Contact Information

Mitigation Bank Name:	**Hues Ranch Mitigation Bank**
Name of Sponsor/Owner/Long-term Steward:	**Toledo Summerlin Hues Investment**
Mailing Address:	27993 Bays Cemetery Road Richards, Texas 77873
Phone Number:	713-865-3631
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Mailing Address:	10245 West Little York Road, Suite 600 Houston, Texas 77040
Phone Number:	281-617-3217
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Point of Contact:	Richard Howard
Name of Conservation Easement Holder:	**Texas Land Conservancy**
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Point of Contact:	Stephen Ramirez

1.4 Regulatory Authorities

The establishment, use, and operation of the HRMB will be carried out in accordance with the following authorities:

- Clean Water Act (33 USC 1251 et seq.)

- Rivers and Harbors Act (33 USC 403)
- Fish and Wildlife Coordination Act (16 USC 661 et seq.)
- Regulatory Programs of the U.S. Army Corps of Engineers, Final Rule (33 CFR 320-332)
- Guidelines for Specification of Disposal Sites for Dredged and Fill Material (40 CFR 230)
- Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army Concerning Determination of Mitigation Under the Clean Water Act, Section 404(b)1 Guidelines (February 6, 1990)
- Final Rule for the Compensatory Mitigation for Losses of Aquatic Resources issued by the U.S. Army Corps of Engineers and Environmental Protection Agency (April 10, 2008)
- Water Resources Development Act of 2007 – Section 2036: Mitigation for Fish and Wildlife and Wetlands Losses
- Section 7 of the Endangered Species Act
- Section 106 of the National Historic Preservation Act
- Food Security Act of 1985, as amended
- Texas State Water Quality Certification [30 Tex. Admin. Code §279.12 (2001)]
- Texas State Water Quality Standards [30 Tex. Admin. Code §307 (2000)]
- Texas Parks and Wildlife Code Chapter 14 Powers and Duties Concerning Wetlands

1.5 Interagency Review Team

The Interagency Review Team (IRT) for the HRMB is composed of the individuals representing the agencies listed below:

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1.6 Legal Responsibility Statement

The Sponsor assumes all legal responsibility for satisfying all mitigation requirements of USACE permits for which the Bank has been utilized, or fees have been accepted (i.e., the implementation, performance, and long-term management of the compensatory mitigation project approved under this agreement). The transfer of liability from permittee to the Sponsor is established by the following: 1) the approval of this MBI by the Sponsor and USACE District Engineer (DE), 2) receipt of a credit transaction report by the DE that is signed and dated by the Sponsor and the Permittee, and 3) the transfer of fees required from the Permittee to the Sponsor.

The responsibility for financial success and risk to the investment initiated by the Bank Sponsor rests solely with the Bank Sponsor. The IRT agencies administer their regulatory programs to best protect and serve the public's interest, and not to guarantee the financial success of banks, specific individuals, or entities. Accordingly, there is no guarantee of profitability for any individual mitigation bank. Bank sponsors should not construe the MBI as a guarantee in any way that the IRT agencies will ensure sale of credits or that the IRT agencies will forgo other mitigation options that may also serve the public interest. Since the IRT agencies do not control the number of banks proposed or the resulting market impacts upon success or failure of individual banks, in depth market studies of the potential and future demand for bank credits are the sole responsibility of the Sponsor.

USACE approval of this Instrument constitutes the regulatory approval required for the HRMB to be used to provide compensatory mitigation for USACE permits pursuant to 33 CFR 332.8(a)(1). This Instrument is not a contract between the Sponsor or Property Owner and USACE or any other agency of the federal government. Any dispute arising under this MBI will not give rise to any claim by the Sponsor or Property Owner for monetary damages. This provision is controlling notwithstanding any other provision or statement in the MBI to the contrary.

1.7 Ownership Documentation

Neither this MBI nor any USACE permit convey any property rights, either in real estate or material, or any exclusive privileges. Furthermore, this MBI or USACE permit does not authorize any injury to property, or invasion of rights or any infringement of federal, state, or local laws or regulations. The Sponsor's signature on the MBI is an affirmation that the Sponsor possesses or will possess the requisite property interest to undertake all activities discussed and required in the MBI (33 CFR 320.4(g)6).

Sponsor agrees that there are no encumbrances on the property that have not been identified and fully disclosed to USACE and the IRT.

The HRMB shall protect in perpetuity approximately 1,290 acres of the approximately 1,290-acre tract of land in the required ecological condition which is to be guaranteed by the execution of a legally binding conservation easement. Approximately 1.364 acres, which will include the road entrance and several structures near the entrance, will be excluded from the Conservation Easement. There are no liens, mortgages, or security interests on the property. To ensure that the Conservation Easement is conveyed without encumbrances that would affect the viability of the Bank, the Sponsor has provided the following documents in Appendix B: 1) general warranty deed; 2) title to the property and title policy insurance; 3) affidavit of ownership; 4) executers deeds with the legal descriptions of the tract; 5) maps of the tract from the real estate transaction; and 6) chain of pipelines.

All real property to be included within the Bank is owned in fee simple by Toledo Summerlin Hues Investment and is pledged for use in HRMB consistent with this MBI. Any liens affecting the HRMB will be satisfied or subordinated to the recorded Conservation Easement, which will be included in Appendix C. The Sponsor agrees that there are no encumbrances on the property that have not been identified and fully disclosed to USACE and the IRT. The Sponsor shall be responsible for developing, operating, and maintaining the Bank subject to the requirements of this MBI. No lien shall be allowed on the Bank property that is not subordinated to the Conservation Easement (Appendix C).

The inclusion of the landowner's property and the granting of a Conservation Easement restricting future land uses for the benefit of the Bank shall not convey or establish any ownership interest in the property on the part of any party to this instrument nor to any purchaser of Bank credits. The MBI does not authorize, nor shall it be construed to permit, the establishment of any lien, encumbrance, or other claim with respect to the property, with the sole exception of the right on the part of the USACE under Section 404 of the Clean Water Act. This exception shall be used to require the Sponsor to implement components of the MBI, including recording any Conservation Easement, required as a condition of the issuance of a USACE permit for discharges of dredged and fill material into waters of the U.S., including wetlands, associated with construction, operation, and maintenance of the Bank.

1.7.1 Easements and Encumbrances

Although the Sponsor shall make no attempt to encourage the placement of utility easements and transportation corridors within the site, there are several existing easements within the property that must be honored. The rights-of-way (ROWs) associated with each easement will be maintained as specified in the ROW agreements. No mitigation credits are being requested from ROW easement acres because these areas will not be subordinate to the conservation easement. However, the Sponsor will continue to maintain these areas as open space and will control invasive species within the ROWs. Should these easements be relinquished, the Sponsor may seek approval from USACE in coordination with the IRT to restore wetlands within these areas and receive additional credits. The Sponsor will coordinate with easement holders to ensure potential negative impacts of the existing ROWs will be minimized.

There are no known unlocated easements on the mitigation site. If yet-unknown easements should be discovered, their associated ROWs will be excluded from credit calculations because they will not be subject to protection by a Conservation Easement.

There are no known liens associated with the mitigation site.

1.7.1.1 Located Easements

Based on a land title search performed on March 7, 2022 for existing ROWs and easements, the property has two active pipeline easements (Figure 3, Appendix A). The creditable acreage within the bank is decreased because of these easements that transect the property.

The Black Lake Pipeline (now operated by ARCO) transects the central portion of the property, entering from the western boundary of the southwestern most portion of the property and exits at the eastern boundary (Appendix B). According to the Railroad Commission of Texas (RRC) viewer, this pipeline easement is operated by DCP Operating Company, LP (RRC 2023). A second pipeline easement, the Gulf Pipeline/Gulf Refining Pipeline, operated by Sunoco and Chevron, runs along the northeastern boundary of the property (Appendix B). The RRC viewer indicates this pipeline easement is operated by Sunoco Pipeline L.P. (RRC 2023).

Three additional pipeline ROWs were identified in the land title search for the property and included the Paraffine Oil Company, Security Oil Company, and Sun Pipeline Company. The Paraffine Oil Company (dated February 24, 1904) was to be three feet wide and contain a pipeline, telegraph, and telephone utilities. The legal description describes this pipeline as running in a northwest to southeast direction and encroaches the southwestern most corner of the property by a few feet. The pipeline contains no markings at the road crossing and is believed to be abandoned due to disuse. The Security Oil Company (dated January 21, 1904) was to be three feet wide and contain a pipeline, telegraph, and telephone utilities. The pipeline rights under the agreement were to cease in ten years (January 1, 1914) and is believed to be abandoned because there is no evidence that the infrastructure was implemented. The Sun Pipeline Company was to be 16 feet wide and contain a pipeline, telegraph, and telephone utilities. The description describes the pipeline entering the southern boundary of the property and exiting on the western boundary. The document is called a “Lease” and the pipeline appears to be non-operational and abandoned. It appears that the three easements have been abandoned as all legal pipelines must be marked at crossings in accordance with the Texas Administrative Code (TAC) §18.8b. It stands to reason that these easements should rightfully be removed because there are no associated pipeline markings or associated structures that are currently known, let alone are maintained, within the bank property. The Sponsor will continue to work to remove these easements from the property based on abandonment.

The Sponsor believes that these abandoned easements will not impact the proposed bank. However, in the unlikely event that these easements become active and they are within the bank’s conservation easement, HRMB will subtract any mitigation credits associated with the easements from the property and provide appropriate compensatory mitigation for any lost wetland functions should any acreage within such easements are sold as credits.

2 MITIGATION PLAN

2.1 Objectives

The goal of HRMB is to provide appropriate compensatory mitigation for unavoidable impacts to wetlands and waterbodies identified as waters of the U.S. and authorized by the USACE within the Pine Island Bayou watershed and adjacent areas.

The objectives of HRMB are to 1) preserve 375.2 acres of high-functioning palustrine forested (PFO) wetlands, 2) enhance 64.4 acres of partially degraded wetlands, and 3) restore 508.2 acres which were historically PFO wetlands converted to agricultural use. Specifically, the HRMB will improve chemical, physical, and biological functions within the Pine Island Bayou watershed by implementing a mitigation work plan that focuses on preserving forested wetlands, managing previously impacted forested wetlands (enhancement), and restoring forested wetlands that were converted to pastureland over the past century (re-establishment) to maintain and improve riparian zones adjacent to Jackson Creek, a named tributary to Pine Island Bayou. Furthermore, stream functions will be improved by re-establishing the riparian corridor along Jackson Creek and the unnamed tributaries within the property. Functional increases from the practices detailed in this MBI will be quantified and used to replace functions lost or degraded through permitted impacts to waters of the U.S. within the service area.

The Sponsor has developed individual measurable objectives for the site presented in the Mitigation Work Plan (Section 2.7). This plan stipulates the amount of resources being preserved, restored, and enhanced, and the mechanisms by which the mitigation will be achieved. Detailed ecological performance standards and credit calculations are also discussed below (Sections 2.6 and 2.9) and are used as measures to assess the functional enhancement and success of the Bank.

2.2 Site Selection

The property for HRMB was selected based on technical (e.g., ecological, chemical, and logistical) and economic considerations. The most important reason the site was considered as a mitigation bank is based on the ability to provide feasible, ecologically suitable mitigation to forested wetlands within the Pine Island Bayou watershed. As such, the Sponsor considered previous and current land use, hydrology, landscape context, and connectivity with existing natural resource preservation areas. The following discussions present reasons for the selection of the property.

2.2.1 Ecological Considerations

The ecological services and values provided by the HRMB site extend beyond compensatory mitigation for unavoidable impacts to waters of the U.S. The site would provide important physical, chemical, and biological functions for the Pine Island Bayou watershed. The heavily forested bottomlands will aid in sequestering sediments, nutrients, and pollutants from upstream impaired waters. Likewise, the forests mitigate flooding events by slowing flood flows and increasing upstream water storage capacity. Biodiversity would be augmented as the Bank abuts the Lance Rosier Unit of Big Thicket National Preserve, a federally-preserved high-quality wildlife habitat conservation area. Preservation and restoration of the HRMB site would contribute to the ecological initiatives of the local and regional riparian conservation projects. Given the contamination threats in multiple stream segments of the Pine Island Bayou watershed, including segments of Pine Island Bayou and Little Pine Island Bayou, it is important to conserve the remaining unimpaired waters and protect them from future development and degradation. The site already supports significant wetland resources of value to the watershed that will be preserved and enhanced to provide on-going ecological value to the Pine Island Bayou watershed.

2.2.1.1 WATERSHED THREATS

The USGS defines Pine Island Bayou's watershed as HUC 12020007, measuring approximately 449,452 acres (702.3 mi^2) (Figure 4, Appendix A). Jackson Creek, the main waterbody bisecting the HRMB site, and the other tributaries within the property convey flow to Pine Island Bayou, which winds its way through eastern Liberty County to western Hardin County before discharging into the Neches River approximately 6 miles north of Beaumont, Texas (USGS 2023a). Pine Island Bayou is hydrologically connected to a number of modified streams, irrigation canals, and ditches that are part of the Lower Neches Valley

Authority's canal systems. Furthermore, Pine Island Bayou is a significant tributary to the Neches River, a major water supply servicing much of Jefferson County.

Norris and El-Hage (2005) describes Pine Island Bayou as follows:

> *Historically, the narrow channel and dense overhanging vegetation shaded much of the water's surface and provided abundant woody debris for instream cover (Adsit and Hagen 1978). However, development within much of the riparian zone has decreased the density of vegetation, resulting in an increase in the amount of light penetration and a decrease in the amount of woody debris within the stream channel (Rizzo et al. 2000). The Bayou's close proximity to the city of Beaumont has made it a popular waterway for recreational activities and has likely contributed to historical water quality concerns. Rizzo et al. (2000) found Pine Island Bayou to have the poorest water quality of seven streams studied within the Big Thicket National Preserve. Water quality concerns have been attributed to the naturally slow currents within the bayou, saltwater intrusion, substantial development within the riparian zone, and nutrient inputs from sewage outfalls and septic tanks within the basin (Harrel 1975; Hughes et al. 1986; Rizzo et al. 2000).*

As development in Hardin County's watersheds increases, runoff rates to streams are likely to increase dramatically (Paul and Meyer 2001). Considering the Pine Island Bayou system's history of water quality concerns documented in the 2020 and 2022 Texas Integrated Report - Texas 303(d) List (Category 5) (TCEQ 2020, 2022), increasing runoff threatens to further degrade bacterial and chemical pollutant discharges, as well as in-stream erosion for the tributaries to Sabine Lake and the Gulf of Mexico. Pine Island Bayou and Little Pine Island Bayou, in particular, exhibit depressed dissolved oxygen levels beyond the state's water quality standards (TCEQ 2020, 2022). Although not currently listed in the recent 303(d) list for bacteria, both Pine Island Bayou and Little Pine Island Bayou have been listed as impaired for demonstrating high concentrations of bacteria from 2006 to 2010 and from 2008 to 2016, respectively (TCEQ 2011, 2018).

2.2.1.2 WATERSHED BENEFITS

Neighboring properties to the northeast of the proposed HRMB are dominated by conservation areas that are under restrictive easements; however, agricultural land abuts the site to the west and south. The Lance Rosier Unit of the Big Thicket National Preserve abuts the northeast boundary of the proposed HRMB, containing 24,828 acres of conserved land in Hardin County, the largest of the land units which make up the Big Thicket National Preserve, which covers 113,122 acres throughout southeast Texas (Figure 1, Appendix A). The addition of the proposed HRMB would provide an additional 1,290 acres of continuous forested habitats, representing approximately 5.8 percent of the Pine Island Bayou watershed. Although not shown as part of the Big Thicket National Preserve, land abutting the southeastern portion of the site is currently owned by the National Park Service as well (Hardin County Appraisal District 2023). Establishment of the HRMB will expand the contiguous conservation footprint of the region, increasing beneficial watershed functions such as flood flow attenuation, pollutant transformation, sediment trapping, and wildlife habitat.

Furthermore, the Sponsor has expressed interest in participating in the restoration and preservation of the Jackson Creek riparian corridor. Although not an expressed goal, HRMB may help to expand wildlife habitat for state and federally protected species on the adjacent conservation easements through the restoration of the Jackson Creek riparian corridor. This effort may provide not only valuable conservation of natural resources but also the establishment of Louisiana pine snake (*Colinus virginianus*), swallow-tailed kites (*Elanoides forficatus*), bald eagles (*Haliaeetus leucocephalus*), and red-cockaded woodpeckers

(*Picoides borealis*) populations, some of which have been documented within the Big Thicket National Preserve.

2.2.2 Hydrological and Chemical Considerations

The FEMA FIRM Numbers 48199C0475F and 48199C0500F depict the property to be within an unincorporated area of Hardin County where flood hazards are undetermined, but possible (Figure 5, Appendix A) (FEMA 2023). Jackson Creek, a relatively permanent waterbody, bisects the center of the property and both Little Pine Island Bayou and Pine Island Bayou are approximately 1 mile northeast and 1.8 miles west of the property boundary, respectively. Historical images show periodic flooding of these waterbodies which influences the hydrology of wetlands, streams, and ponds on-site (Figures 6-1 to 6-13, Appendix A). Most notably, the aftermath of Hurricane Harvey in August 2017 exhibits a 500-year or potentially greater floodplain area surrounding Jackson Creek (Figure 6-13, Appendix A). The light detection and ranging (LIDAR) data also depicts the low elevation surrounding Jackson Creek creating a widened floodplain across the majority of the property (Figure 7, Appendix A). As such, restoration, enhancement, and preservation of wetlands within the property provide important physical benefits to Jackson Creek and other surrounding channels. Among these benefits are the retention of stormwater which decreases in downstream velocity and scouring, reduction in stream eutrophication, and decreased sediment loads in receiving streams.

On a landscape scale, hydrological alteration has led to a variety of concerns for the Pine Island Bayou watershed including altered drainage patterns and the recent exceedance of Total Maximum Daily Loads (TMDL) for depressed dissolved oxygen and bacteria related to contact recreational use, as identified in the TCEQ's Texas Integrated Report – Texas 303(d) List (Category 5). Areas surrounding the proposed HRMB site have or are being converted to agricultural, residential, commercial, or industrial developments resulting in altered flow regimes including increased runoff rates to streams in the watershed. The floodwater detention capacity of wetlands makes them valuable in reducing downstream flooding from stormwater runoff (Mitsch and Gosselink 2000).

Although not listed as a waterbody that is tested for surface water quality standards by TCEQ, Jackson Creek converges with Pine Island Bayou approximately 6.75 miles southeast of HRMB. Furthermore, according to the current topographic map (Figure 8-3, Appendix A), an unnamed tributary at the northeastern extent of the property converges with Little Pine Island Bayou off-site, within the Big Thicket National Preserve, approximately 0.97 mile southeast of HRMB. Based on the 2020 and 2022 Texas Integrated Report - Texas 303(d) List (Category 5), Pine Island Bayou approximately 1.68 miles west and Little Pine Island Bayou approximately 0.94 mile east of HRMB, are both listed as impaired waterbodies for depressed dissolved oxygen (TCEQ 2020, 2022). Although not currently listed in the recent 303(d) list for bacteria related to contact recreational use, both Pine Island Bayou and Little Pine Island Bayou have been listed as impaired for demonstrating high concentrations of bacteria from 2006 to 2010 and from 2008 to 2016, respectively (TCEQ 2011, 2018). Restoring the chemical wetland functions of HRMB increases the potential nutrient and chemical retention of the watershed (Casey et al. 2001; Jordan et al. 2003; Vymazal 2007). Of particular importance, is the ability of low flow rate wetlands to reduce enteric bacteria (Perkins and Hunter 2000) and assimilate the organic compounds that contribute to biological oxygen demand in downstream areas (Hemmond and Benoit 1988). Additionally, restored wetlands play an important role in removing sediments from downstream systems (Gleason and Euliss 1998; Jordan et al. 2003). Although not an explicit design element of these wetlands, implementation of HRMB will provide incidental water quality improvements beneficial to aiding the prevention of downstream water quality degradation.

2.2.3 Logistical Considerations

Based on on-site studies, the Sponsor evaluated the hydrologic conditions, soil characteristics, existing vegetative communities, and opportunities for maximizing gains in ecological functions to determine the extent to which it would successfully serve as a wetland mitigation site.

The principal consideration for establishing the Bank on the site is the previous landcover. The earliest available aerial photograph of the site from the 1943 and 1955 historical topographic maps (Figures 6-1 and 8-1, Appendix A) strongly suggest that the Bank boundaries were historically dominated by forested floodplains/wetlands and uplands. The only areas not forested in the 1943 aerial photograph (along the western Bank boundary) had already been cleared to make pasture prior to the earliest available aerial photograph. The property's forests continued to be cleared through 1995 (Figures 6-1 to 6-8, Appendix A) to create additional pastures and ROWs. Subsequent historical aerial photographs from 1995 to 2017 (Figures 6-8 to 6-13, Appendix A) indicate this basic pasture footprint has been maintained to the present day. The site hydrology and soil nutrient content of the cleared forest/pasture areas has been altered through land clearing and leveling practices and cattle hoof damage to on-site streams and wetlands. This likely led to a significant decrease in wetland and riparian buffer functions below those that would have been associated with the undisturbed state. Therefore, the presence of historical forest cover makes the restoration of the forested wetlands and riparian buffer habitat features across the majority of site appropriate and practicable.

Further evidence that the site is conducive to forested wetland preservation and restoration is borne by the presence of climax forested wetland vegetation in the unconverted eastern portion of the site that covers approximately 375 acres of the site. As shown in Figure 5 (Appendix A), eight soil map units are present within the property, with League clay (LeaA) being the most dominant and accounting for approximately 63 percent of the site. All eight soil map units within the property are listed as hydric or include hydric components according to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) (USDA NRCS 2017, 2019). The nature of the soils, wetland vegetation, the cessation of grazing, restoration of surface topography, construction of shallow earthen berms to promote water retention, and planting processes should sufficiently hold water on the site to allow the soils to demonstrate the redoximorphic features associated with wetlands within the HRMB.

2.2.4 Financial Considerations

The functional benefits of a wetland mitigation bank with this service area are particularly relevant when compared with real estate and infrastructure development trends for the area. Demand for mitigation credits is directly linked to development activities incurring impacts to waters of the U.S. This development includes residential, commercial, and industrial growth as well as the municipal infrastructure (e.g., roads, drainage, utilities) that support them. This development can be correlated at a broad level in growing areas using population and job growth numbers, which are readily available from governmental sources. The potential opportunity for development rests upon numerous growing communities within the service areas including Chambers, Hardin, Jasper, Jefferson, Liberty, Orange, Polk, San Jacinto, Trinity, Tyler, and Walker Counties. Across these 11 counties is a combined increase in business growth of 4.9 percent from 2002 to 2012 (Table A1, Appendix D) (U.S. Census Bureau [USCB] 2023; Infoplease 2020). Hardin, Jasper, Orange, Trinity, and Tyler Counties have a combined decrease in business growth of -14.7 percent from 2002 to 2012 (Table A1, Appendix D) (USCB 2023; Infoplease 2020). However, the USCB (2012, 2023) population growth statistics, as indicated within Table A2 (Appendix D), exhibit a total population growth of 9.7 percent from 2000 to 2019 across all 11 counties. Additionally, the total housing units for this area has increased 14.0 percent from 2000 to 2019 (Table A3, Appendix D) (USCB 2012, 2023). This evidence of population and housing growth implies that a successive growth in businesses will likely result. The housing growth also displays some resiliency despite recent variability in oil and gas prices, largely by

midstream operations and transportation involvement rather than dependence on oil and gas extraction, which remains a common commercial practice within the service area.

Within the southeast corner of the service area lies the Sabine-Neches Waterway, which is home to both the Port of Beaumont and the Port of Port Arthur. As the nation's third-largest waterway by tonnage, the Sabine-Neches Waterway is home to several manufacturing, refining, and petrochemical companies, as well as links to an extensive energy pipeline system (Sabine Neches Navigation District 2023). Significant economic growth is expected to follow the $1.4 billion Sabine-Neches Waterway channel improvement project (Sabine Neches Navigation District 2023). The waterway, granted federal approval in 2014 with construction beginning in 2020, will be deepened, enabling larger material shipments to reach local ports. A direct boost of economic benefits and employment opportunities will follow throughout its construction. In 2015, the Texas Transportation Commission was authorized funding for port capital improvement projects selected by the Port Authority Advisory Committee (Senate Select Committee on Texas Ports 2016). Since Texas Department of Transportation districts are working with ports to develop Advance Funding Agreements and to initiate the projects, Port of Beaumont was eligible for this funding. The Port of Beaumont will have Old Highway 90 widened and intersections between Interstate 10 and Port Access Road updated. These projects are projected to cultivate further potential within the Beaumont area with widespread industrial development and regional growth. As such, the Sponsor has deemed this area to be financially viable for the establishment of a mitigation bank to meet the needs of a growing community.

2.2.4.1 SITE-SPECIFIC THREATS

There are several property uses that could be realized instead of mitigation banking. Firstly, real estate development pressures in the area make the property attractive for development. Development impacts to wetlands and streams on the property would likely require a CWA (Section 404) permit from the USACE and require mitigation. However, forested wetlands within the property could be converted to marketable real estate or storm detention areas through logging activities. Such a scenario would lead to a marked decrease in the biological value of these forested wetlands.

A more pressing use of the property is in implementation of silviculture operations or developing the property for increased agriculture use. Silvicultural practices would cause the reduction in biodiversity of the vegetation as well as the loss of old-growth timber within the forested wetlands, thereby decreasing their ecological value. Alternatively, the remaining forested wetlands could be cleared, and the land converted to agriculture for hay farming and/or pastureland. Though the timber sale of these trees would create a favorable margin and subsequent agricultural use would make the property economically valuable, the impact to wetland functions would be extensive and detrimental to the watershed. Additionally, expanding cattle grazing within the property would increase hoof-shear impacts to the waterbodies within the property.

Although preserving the existing high-quality forested wetlands, enhancing the lower quality wetlands, and restoring the riparian corridor along the streams might be the highest ecological aspirations for the property, there remain economically viable options for the property owner.

2.3 Service Area

The service area is the watershed, ecoregion, physiographic province, and/or other geographic area within which the mitigation bank is authorized to provide compensatory mitigation required by USACE permits. Service areas must be appropriately sized for each credit type to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area.

The service area described herein was developed with consideration of regional watersheds and ecoregions following the guidelines in 33 CFR 332.8(d)(6)(ii)(A) for the establishment of service areas for mitigation banks, as well as 33 CFR 332.3(c) for employing a watershed approach. The HRMB is located in the southern extent of the EPA Level 3 South Central Plains and Level 4 Flatwoods Ecoregion as described in *Ecoregions of Texas* (Griffith et al. 2007) (Figure 2, Appendix A).

The entire service area for HRMB occurs within the limits of the USACE Galveston District (District) and is intended to service mitigation requirements specific to permits issued by the District.

HRMB is intended to provide mitigation credits for impacts to riverine forested wetland habitats within the service area. Compensatory mitigation will be provided in the form of credits assessed using the Riverine Forested Interim Hydrogeomorphic Assessment (HGMi) method (USACE 2010a).

The Bank shall not compensate for any adverse impacts 1) to waters of the U.S. including wetlands that are under tidal influence, 2) to lacustrine habitats, or 3) that occur on barrier islands or peninsulas. The service area excludes all publicly funded National Wildlife Refuges, National Forests, State Parks, Wildlife Management Areas, and all other lands and facilities owned or managed by the Texas Parks and Wildlife Department (TPWD).

On a case-by-case basis, the USACE, after coordination with the IRT, may authorize use of the Bank outside the primary and secondary service areas or for out-of-kind mitigation when doing so is appropriate, practicable, and environmentally preferable.

2.3.1 Primary Service Area

The primary service area for HRMB, as shown on Figure 9 (Appendix A), is identified as the Pine Island Bayou watershed USGS 8-digit HUC 12020007 within the USACE Galveston District. The primary service area watershed lies within the South Central Plains Level III Ecoregion, within which the HRMB site lies, and within the Western Gulf Coastal Plain Level III Ecoregion.

The primary service area includes portions of Hardin, Jefferson, Liberty, and Polk Counties. Impacts occurring within the primary service area shall be debited on a 1:1 basis.

2.3.2 Secondary Service Area

The secondary service area for HRMB is identified as the Lower Neches (HUC 12020003), Village (HUC 12020006), Lower Trinity-Kickapoo (HUC 12030202), Lower Trinity (HUC 12030203), Sabine Lake (HUC 12040201), and East Galveston Bay (HUC 12040202) watersheds where these are inside the USACE Galveston District, within Texas, and within the South Central Plains Level III Ecoregion and Western Gulf Coastal Plain Level III Ecoregion (Figure 9, Appendix A). The secondary service area watersheds lie within the South Central Plains Level III Ecoregion, within which the HRMB site lies, and the Western Gulf Coastal Plain Level III Ecoregion.

The secondary service area includes portions of Chambers, Hardin, Jasper, Jefferson, Liberty, Orange, Polk, San Jacinto, Trinity, Tyler, and Walker Counties. Impacts occurring within the secondary service area shall be debited on a 1.5:1 basis.

2.3.3 Watershed and Ecoregion Basis for Service Area

The Sponsor has developed the service area defined by the USGS HUC watersheds and EPA Ecoregion maps with the goal of establishing a mitigation area for riverine forested wetland impacts occurring within these ecosystems. The service area was determined by utilizing the watershed approach combined with

ecological, hydrological, and economic considerations for compensatory mitigation in accordance with the 2008 mitigation banking rule (USACE 2008) by considering comprehensive scientific justifications, appropriate supporting data, and references to peer reviewed literature to support these assertions. The following are the major justifications for the determination of the service area for HRMB.

A watershed and ecoregion approach was utilized to determine all service areas. The development of the primary and secondary service areas follows federal and local practices. Specifically, the primary service area is the 8-digit HUC in which the bank is found. The secondary service area consists of the adjoining 8-digit HUCs within the same ecoregions of the primary service area. Consistent with regulations and guidance, the Galveston District in coordination with the IRT have agreed to a watershed approach when developing service areas for mitigation banks.

As defined by the EPA, the HRMB is situated in the South Central Plains Level III Ecoregion and near the boundary of the Western Gulf Coastal Plain Level III Ecoregion. In particular, HRMB is situated in the Flatwoods Level IV Ecoregion and approximately 9.12 miles northwest of the Northern Humid Gulf Coastal Prairies Level IV Ecoregion (Figure 2, Appendix A) (Griffith et al. 2004, 2007). According to Griffith et al. (2007), the Flatwoods Level IV Ecoregion is characterized as mostly flat to gently sloping with low gradient and sluggish streams that typically contain sand and silt substrates. Some landscapes within the Flatwoods Level IV Ecoregion are characterized by small, undrained depressions and pimple mounds, small hillocks, and a few surface mounds from salt domes. The terrestrial substrates are typically clay with poor drainage. Historical vegetation communities consist of longleaf pine (*Pinus palustris*) flatwoods, savannas, and mixed pine-hardwood forests. The mixed pine-hardwood forests historically included hickory (*Carya* sp.), sweet-gum (*Liquidambar styraciflua*), southern magnolia (*Magnolia grandiflora*), blackgum (*Nyssa sylvatica*), longleaf pine, loblolly pine (*Pinus taeda*), white oak (*Quercus alba*), southern red oak (*Q. falcata*), swamp chestnut oak (*Q. michauxii*), and willow oak (*Q. phellos*). This ecoregion has a history of land modification, particularly by the lumber, railroad, and oil and gas industries, which have contributed to development and occupancy within this area. The region typically receives between 47 and 58 inches of precipitation annually. Griffith et al. (2007) characterized the Northern Humid Gulf Coastal Prairies Level IV Ecoregion as flat or gently sloping coastal plain with low relief. The low relief and flat topography result in low gradient streams and rivers with broad floodplains. Historical vegetation was mostly grasslands with a few clusters of oaks, known as oak mottes or maritime woodlands. The dominant grassland species were gulf muhly (*Muhlenbergia capillaris*), switchgrass (*Panicum virgatum*), brownseed paspalum (*Paspalum plicatulum*), little bluestem (*Schizachyrium scoparium*), and yellow Indiangrass (*Sorghastrum nutans*). The majority of the remnant coastal prairies have been converted to cropland (e.g., rice, soybeans, grain sorghum, cotton, corn), pasture, rangeland, urban land uses, or industrial land uses. The exotic Chinese tallowtree (*Triadica sebifera*) and Chinese privet (*Ligustrum sinense*) have invaded large areas in this region. In the transition to the South Central Plains Level III Ecoregion in the northern part of the region, some loblolly pine occurs. The riparian vegetation in the northern part of the region is similar to the floodplain forests of the southern part of the South Central Plains Level III Ecoregion, where fewer bottomland oaks and hickories occur, and pecan (*Carya illinoensis*), sugar hackberry (*Celtis laevigata*), ash (*Fraxinus* sp.), southern live oak (*Quercus virginiana*), and cedar elm (*Ulmus crassifolia*) are important overstory species. The Northern Humid Gulf Coastal Prairies Level IV Ecoregion typically receives an annual precipitation from 37 inches in the southwest portion of the region to 58 inches in the northeast portion of the region.

According to TPWD's 2005-2010 *Texas Wildlife Action Plan* (TPWD 2005), the Bank is located in the Pineywoods Ecoregion near the boundary of the Gulf Coast Prairies and Marshes Ecoregion. Although similar to the *Ecoregions of Texas* (Griffith et al. 2007), the 2005-2010 *Texas Wildlife Action Plan* (TPWD 2005) defines the Texas ecoregions slightly differently. The TPWD Pineywoods Ecoregion is considered a secondary priority ecoregion for TPWD efforts and threats to this ecoregion include a high projected population growth, fragmentation, and land conversion (TPWD 2005). Conservation efforts have been

limited due to timber interests in the ecoregion, with the conversion of native longleaf pine and hardwood forest habitats to loblolly pine plantations (TPWD 2005). The Pineywoods Ecoregion is mainly composed of forest habitats, native and introduced grass habitats, and woodland, forest, and grassland mosaic habitats, with scattered urban areas and cropland within the southern portion of the ecoregion (TPWD 2005). The Gulf Coast Prairies and Marshes Ecoregion, just south of the Bank site, is considered a high priority ecoregion for TPWD efforts and the inland prairies, coastal woodlands, and beach habitats are not well preserved within the ecoregion (TPWD 2005). Population growth has led to land fragmentation, converted prairies, river flow changes, decreased water quality, and increased sediment loads and pollutants (TPWD 2005). The Gulf Coast Prairies and Marshes Ecoregion, just south of the HRMB and within the East Galveston Bay watershed, Sabine Lake watershed, and a portion of the Lower Trinity watershed, is mainly composed of cropland with scattered urban areas and forest habitats (TPWD 2005).

Ecological "in-kindness" and significance extends beyond the limits of the mapped watershed boundaries. In-kind aquatic wetland habitats are present throughout the Pine Island Bayou watershed. In addition, ecoregion habitats are not static, and the boundaries make a transition area, therefore, the same in-kind aquatic habitat is present outside of the ecoregion boundary.

Significant hydrologic connectivity exists between mapped HUC boundaries within the proposed service area. The HRMB lies entirely within the Neches River Basin. The Neches River Basin flows from headwaters in Van Zandt County, in northeast Texas, to its confluence with Sabine Lake, in southeast Texas, and which ultimately drains to the Gulf of Mexico (TPWD 2005; Texas Water Development Board [TWDB] 2023). Within the Galveston District, this Basin encompasses the Pine Island Bayou watershed (HUC 12020007, primary service area), a portion of the Lower Neches watershed (HUC 12020003, secondary service area), and the Village watershed (HUC 12020006, secondary service area). The Trinity River Basin, approximately 14 miles west of the Bank, flows from the confluence of its Elm and West Forks southeast to Trinity Bay, and ultimately drains to the Gulf of Mexico (TPWD 2005; TWDB 2023). This Basin encompasses a portion of the Lower Trinity-Kickapoo watershed (HUC 12030202, secondary service area) and the Lower Trinity watershed (HUC 12030203, secondary service area). Approximately 13 miles south of HRMB, lies the northern extent of the Neches-Trinity Coastal Basin, bounded by the Neches River Basin and Trinity River Basin, and extends to the Gulf of Mexico (TPWD 2005). The Neches-Trinity Coastal Basin encompasses the Sabine Lake watershed (HUC 12040201, secondary service area) and the East Galveston Bay watershed (HUC 12040202, secondary service area).

The Sabine Lake watershed (HUC 12040201) and the East Galveston Bay watershed (HUC 12040202) are heavily utilized for cropland and contain a network of waterways. In the past, as well as currently, these areas were utilized for rice production which led to the construction of approximately 200 miles of canals in Jefferson County between 1899 and 1906 to provide freshwater to farmers (Lower Neches Valley Authority [LNVA] 2019; Gomez 2016). In 1933, the State Legislature granted authority to the LNVA to operate within Tyler, Hardin, Liberty, Chambers, and Jefferson Counties and to develop and manage the waters of the State (LNVA 2023). Today, these canals still remain in use as part of the Lower Neches Valley Authority's canal system and continue to pull water from Pine Island Bayou (LNVA 2019), indicating a continued hydrologic connection between the Pine Island Bayou watershed (HUC 12020007) and the Sabine Lake and East Galveston Bay watersheds.

The Gulf Coast Aquifer, which underlies the Bank, parallels the Gulf of Mexico coastline and is mapped as far north as the southern extent of Angelina and Sabine Counties. Groundwater is a major contributor to the perennial and intermittent streams within these watersheds. Due to the significant connection between surface water and groundwater, groundwater withdraws throughout the watershed contribute to reductions in surface water levels throughout the watershed. Surface water and groundwater interactions include the exchange of water and the chemicals that may be present in the water, which can lead to issues with water supply and water quality. According to the Texas Water Development Board (TWDB), all major and minor

aquifers within Texas have groundwater levels that have declined from predevelopment levels in response to development of groundwater resources for agricultural, municipal, and industrial uses (Bruun et al. 2016). The TWDB noted that from 1995 to 2015, groundwater levels have been relatively low but have increased slightly in Hardin County (Bruun et al. 2016). Although this may indicate a decrease in demand for groundwater in Hardin County, as shown in the Texas Aquifers Study (Bruun et al. 2016), groundwater levels can change over time and demand may increase. With the HRMB's location in the watershed and near areas seeing an increase in development, it could decrease water flow intensity and allow for greater infiltration of surface water to groundwater, helping to maintain surface water flows throughout the Pine Island Bayou watershed.

Wetlands on the HRMB site will provide direct and tangible aquatic resource benefits to the service area. Wetlands are natural pollutant filters. HRMB will provide a substantial benefit to Pine Island Bayou and Little Pine Island Bayou, two channels in the vicinity of HRMB that are currently listed as impaired waterbodies for depressed dissolved oxygen in the 2020 and 2022 Texas Integrated Report - Texas 303(d) List (Category 5) (TCEQ 2020, 2022). Wetland restoration, enhancement, and preservation will have a positive impact on water quality. Wetland restoration within the HRMB will provide water quality improvement and protection for Jackson Creek, Little Pine Island Bayou, and Pine Island Bayou. The water quality improvements and protections will mitigate the inputs from impacts in the Neches River Basin. By reducing the intensity of surface water before it enters a stream, the amount of sediment and nutrient load is decreased. Wetlands can also contribute to reducing the peak flows of Jackson Creek which will reduce erosion rates in Jackson Creek and improving water quality in Jackson Creek, Little Pine Island Bayou, and Pine Island Bayou.

According to the Geologic Atlas of Texas (GAT) (Bureau of Economic Geology [BEG] 2014; USGS Texas Water Science Center [TWSC] 2014), the Beaumont Formation (Pleistocene) underlies a majority of the Pine Island Bayou watershed (HUC 12020007), which includes the Bank site, the Lower Neches watershed (HUC 12020003), the Lower Trinity watershed (HUC 12030203), the Sabine Lake watershed (HUC 12040201), and the East Galveston Bay watershed (HUC 12040202). Although the Lower Trinity watershed, the Sabine Lake watershed, and the East Galveston Bay watershed lie within different basin systems, these watersheds are largely derived from the same geologic formations. The Beaumont Formation includes sand, silt, and clay derived mainly from stream channel, point-bar, natural levee, backswamp, and, to a lesser extent, coastal marsh and mud-flat deposits (USGS TWSC 2014). The surface, which is almost featureless, is characterized by relic river channels shown by meander patterns and pimple mounds on meanderbelt ridges (USGS TWSC 2014). Specifically, for HRMB, the majority of the site is underlain by the Beaumont Formation sand [Rock Unit Code (RUC): Qbs] with the western boundary being underlain by Beaumont Formation clay (Rock Unit Code: Qbc) (USGS TWSC 2014). The RUC Qbs is defined as being dominated by clayey sand and silt with moderate permeability and drainage, low shrink-swell potential, and level relief with local mounds and ridges (USGS TWSC 2014). The RUC Qbc is defined as being dominated by clay and mud with low permeability and poor drainage, high water-holding capacity, high to very high shrink-swell potential, and level to depressed relief (USGS TWSC 2014). The Lissie Formation (Pleistocene), which does not underly the Bank site but occurs approximately 1.18 miles northeast, includes sand, silt, clay, and very minor siliceous gravel within the upper part and sand, silt, clay, and gravel in the lower part (USGS TWSC 2014). The surface is defined as being flat and featureless with the exception of numerous rounded shallow depressions and pimple mounds (USGS TWSC 2014).

The watersheds in this region are under increasing pressure from development, which would convert many areas of the watersheds to impervious cover and remove native vegetative cover, which increases peak flows, sediment, and nutrients entering streams. Based on the Multi-Resolution Land Characteristics (MRLC) Consortium National Land Cover Dataset (NLCD), as of 2019, approximately 25 percent of the combined primary and secondary service areas have been converted to urban and agricultural uses (MRLC 2023). Although 75 percent of the service area is considered herbaceous, scrub-shrub, forest, barren land

(rock/sand/clay), and open water, the NLCD does not account for the percent of forested areas that are pine plantations. Restoring, enhancing, and preserving wetlands along Jackson Creek would help mitigate the effects on water quality that have or will occur in other parts of the watersheds due to deforestation related to development. These areas include Beaumont, Port Arthur, Liberty, and other developing but unincorporated areas.

Proximity to other protected areas, such as the adjacent Big Thicket National Preserve, increase the ecological effectiveness of the site. Additionally, according to TPWD's 2005-2010 *Texas Wildlife Action Plan* (TPWD 2005), approximately 6.72 percent of the Pineywoods Ecoregion and approximately 5.69 percent of the Gulf Coast Prairies and Marshes Ecoregion are considered conservation land. The location of the HRMB would benefit the abutting protected areas and increase the contiguous forested habitats of the existing preserved lands. In addition to benefitting the Big Thicket National Preserve, the addition of HRMB will increase the area of protected land within the Ecoregion. The addition of HRMB to the conserved land near Pine Island Bayou and Little Pine Island Bayou will provide a greater swath of land that will reduce future water quality losses within the watershed.

Wetland restoration and preservation will reduce flooding downstream of the Bank. According to the stream gauge at Pine Island Bayou near Sour Lake (USGS 08041700), approximately 11 miles southeast of HRMB, the stream has experienced two major floods and two moderate floods between 2015 and 2020 (USGS 2023b). Wetlands and other open spaces mitigate flooding. These areas absorb water during rainfall events, unlike more developed areas that shed rainfall directly to surface water flow. These areas also slow surface runoff entry into streams, helping to reduce flood peaks and flash floods. During major flood events like Hurricane Harvey, the increased speed of water runoff may cause more severe flooding, affecting developed areas downstream.

The proposed service area is based on needs within the watershed. The area encompasses all of Hardin and Jefferson Counties and portions of Chambers, Jasper, Liberty, Orange, Polk, San Jacinto, Trinity, Tyler, and Walker Counties. As discussed in Section 2.2.4, the economic, population, and housing growth within these counties has increased by 4.9 percent from 2002 to 2012, 9.7 percent from 2000 to 2019, and 14.0 percent from 2000 to 2019, respectively (USCB 2012, 2023; Infoplease 2020). Of the 11 counties within the proposed service area, Chambers, Hardin, Liberty, Polk, San Jacinto, and Walker Counties have exhibited a 15 percent or greater population and housing growth from 2000 to 2019 (USCB 2012, 2023). The HRMB, located centrally within the proposed service area, and approximately 17 miles from the Beaumont city limits, can help mitigate the impact of development associated with economic, population, and housing growth. More importantly it could improve spatial quality by allowing mitigation closer to areas of impact than existing banks currently offer. In the case of large mitigation banks, the spatial quality can be low if the bank is distant from impacted sites.

The proposed service area has experienced significant wetland function losses over the years with limited, nearby, mitigation banking options. This indicates that there may still be a need for banks that can cover a large service area in the region. HRMB can improve the temporal quality by offering accessible credits in an area of development and demand.

2.4 Site Protection Instrument

In accordance with Texas Law (Natural Resources Code, Title 8 Chapter 183 Subchapter A), upon approval of the MBI the Sponsor shall dedicate the Bank as an aquatic ecosystem preserve in perpetuity with a conservation easement. The draft conservation easement is provided in Appendix C. Once executed and recorded, the conservation easement, which is to be held by Texas Land Conservancy, will be incorporated by replacement of the draft conservation easement in the MBI.

The conservation easement provides that the site will be protected from land uses that are inconsistent with the MBI. With the exception of USACE-approved activities (in coordination with the IRT), the Bank shall not be disturbed by activities that would adversely affect the intended extent, condition, or function of the Bank.

The Sponsor shall record a conservation easement with the Hardin County Clerk that has been approved by USACE, in coordination with the IRT and provide a copy of the recorded conservation easement to the USACE Galveston District.

2.5 Baseline Information

Historical images and current conditions suggest that the Bank Site has been impacted by agricultural use since at least the 1940s (Figures 6-1 to 6-13, Appendix A). Channelization of natural waterways, deforestation and conversion to agriculture, soil grading, and subsequent alteration of hydrology have decreased the potential wetland functions, particularly for the western portion of the site at present. Despite the presence of soils conducive to wetland establishment, a legacy of ranching on the site has resulted in the presence of degraded and disturbed wetlands and waterbodies. A USACE verified delineation of waters of the U.S. determined that there are 439.612 acres of wetlands and 42.525 acres of waterbodies on-site (Appendix E). Of these, 145.131 acres of wetlands and 4.997 acres of waterbodies are considered jurisdictional features (Appendix E). Detailed information on the wetlands and waterbody types and vegetation are described below and in Appendix E. A detailed description of the baseline conditions for the site follows.

2.5.1 Historical Land Use

The historical aerial photographs (Banks 2019) and topographic maps (USGS 1955a, 1955b, 1984a, 1984b, 2016a, 2016b) show a significant change from 1943 (the oldest aerial images known) to the present (Figures 6-1 and 6-13, Appendix A). The 1943 historical aerial photograph indicates the majority of the site was forested, including the significant riparian buffers associated with Jackson Creek, its associated tributaries, and an unnamed tributary of Little Pine Island Bayou (Figure 6-1, Appendix A). The vegetation community remains relatively consistent (Figures 6-2 and 6-3, Appendix A) until 1967 when the western portion of the site began to be clear-cut for agricultural use, agricultural ditches and ponds were constructed, and linear features appear to cross through the property indicating pipeline easements (Figure 6-4, Appendix A). Small sections of the forested landscape continue to be clear-cut (Figures 6-5 to 6-8, Appendix A) until 1995, which appears to be relatively consistent with the current vegetation community as delineated by SWCA (Figures 6-9 to 6-13, Appendix A) (Banks 2019).

The 1955 topographic map indicates the site was heavily forested with Jackson Creek, two of its associated tributaries, and a tributary of Little Pine Island Bayou crossing the property (Figure 8-1, Appendix A). The historical topographic maps from 1955 to 1984 notably indicate the addition of several ponds and drainage ditches crossing the central and southwestern portions of the site for agricultural and flood control purposes (Figures 8-1 and 8-2, Appendix A). The current topographic map does not indicate significant changes between 1984 to the present (Figures 8-2 and 8-3, Appendix A) (USGS 1955a, 1955b, 1984a, 1984b, 2016a 2016b).

Agricultural practices undoubtedly caused profound hydrologic alterations to the pre-agriculture ecology of the property. Installation of ditches and ponds, leveling, compaction of soils, installation of berms, livestock trails and hoof damage, and replacement of the vegetation community altered the hydrology, soils, and vegetation community of the site to their present state. Since land clearing began, cattle ranching and other agriculture uses caused the western portion of the site to remain relatively free of woody vegetation

and consistent hydrology compared to the eastern portion of the site. The land conversion also reduced the ability of the community to recruit desirable vegetation.

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data identified 1.253, 3.191, and 270.992 acres of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) wetlands, respectively, as well as 40.971 acres of waterbodies including streams/ditches/channels, ponds, and reservoirs within the property (USFWS 2021). Most of the NWI locations are in the northeast and southeast portions of the site in areas that have experienced minimal clearing over the last century (Figure 5, Appendix A). The forested wetlands are broad-leaved deciduous, temporary or seasonally flooded (PFO1A, PFO1C) and a few scrub-shrub seasonally flooded (PSS1C) wetlands are along Jackson Creek. The emergent wetlands are temporary and seasonally flooded (PEM1A, PEM1C) wetlands and are present within the northwest portion of the site (USFWS 2021). The NWI data is incomplete and an inaccurate estimate of the existing wetlands on-site based on the USACE verified wetland delineation (Appendix E).

2.5.2 Current Conditions

2.5.2.1 Vegetation

SWCA conducted an on-site wetland and waterbody delineation from October 11 through October 26, 2018, to determine the presence, location, and extent of potential waters of the U.S. within the HRMB property and to assist in determining potential credits for a mitigation bank. A copy of the delineation report is included in Appendix E. A USACE verification of the wetland and waterbody delineation occurred on February 25 and July 9, 2020. The USACE verified the wetland delineation and provided an Approved Jurisdictional Determination (AJD) of the wetlands in a letter dated February 25, 2021, a copy of which is included in Appendix E. During these delineations, biologists demarcated five vegetation communities within the planned HRMB site, including three palustrine wetland communities totaling 439.612 acres and two upland communities comprising 809.863 acres (Figure 10, Appendix A and Appendix E). Of these, the USACE AJD determined that 3.456 acres of PSS wetlands and 141.675 acres of PFO wetlands were jurisdictional.

As shown in Figure 10 (Appendix A), PFO wetlands are the most common wetland community on-site and are mainly located along the northern and eastern portions of the property. The PFO wetlands comprise approximately 420.630 acres and are dominated by pecan (*Carya illinoinensis*), green ash (*Fraxinus pennsylvanica*), sweet-gum, loblolly pine, laurel oak (*Q. laurifolia*), overcup oak (*Q. lyrata*), swamp chestnut oak, water oak (*Q. nigra*), willow oak, Chinese tallowtree, American elm (*Ulmus americana*), and cedar elm. The sapling and shrub strata are dominated by yaupon (*Ilex vomitoria*), dwarf palmetto (*Sabal minor*), and the juveniles of the aforementioned tree species. The herbaceous stratum is generally dominated by long-leaf wood-oats (*Chasmanthium sessiliflorum*) and angle-stem beak sedge (*Rhynchospora caduca*).

PEM wetlands make up the next largest wetland community on-site and comprise approximately 14.805 acres (Figure 10, Appendix A). The PEM wetlands consist primarily of woodrush flat sedge (*Cyperus entrerianus*), Virginia buttonweed (*Diodia virginiana*), mountain spike-rush (*Eleocharis montana*), sand spike-rush (*E. montevidensis*), swamp smartweed (*Persicaria hydropiperoides*), pinkweed (*P. pensylvanica*), and gaping grass (*Steinchisma hians*).

PSS wetlands are the least common wetland community and are mainly located abutting the streams. The PSS wetlands comprise approximately 4.177 acres (Figure 10, Appendix A) and are dominated by sapling and shrub species of common buttonbush (*Cephalanthus occidentalis*), water oak, and Chinese tallowtree with Frank's sedge (*Carex frankii*), lamp rush (*Juncus effusus*), and swamp smartweed dominating the herbaceous layer.

Herbaceous uplands contain a variety of forb and grass species including Bermuda grass (*Cynodon dactylon*), woodrush flat sedge, southern crab grass (*Digitaria ciliaris*), golden crown grass (*Paspalum dilatatum*), bahia grass (*P. notatum*), brown-seed crown grass (*P. plicatulum*), southern dewberry (*Rubus trivialis*), and smut grass (*Sporobolus indicus*). Forested upland communities are relatively rare within the property; however, where they exist, they are dominated by Chinese tallowtree with bahia grass providing herbaceous cover.

The forested wetlands within the HRMB property appear to reflect the climax wetland vegetation community historically associated with the South Central Plains Level III Ecoregion and the Western Gulf Coastal Plains Level III Ecoregion pine-hardwood flatwoods. The larger, old-growth trees in these communities are primarily dominated by trees native to the watershed and ecoregion. Although these trees provide a generally closed canopy, the shrub and sapling strata within the wetlands are relatively sparse and include relatively little of the invasive Chinese tallowtree that pervades many of the wetlands throughout southeast Texas. Therefore, the Sponsor asserts that the forested wetlands on the property represent historical, native riparian conditions and constitute a rare, significant, and desirable resource for the watershed and ecoregion. Other areas of the site are primarily pasture dominated by an upland herbaceous community. The majority of the site is dominated by species common to improved pastures including bahia grass and golden crown grass, that are ubiquitous on the site.

2.5.2.2 Soils

The soils within the HRMB site are derived from the Beaumont Formation (Pleistocene) which are typified by Vertisols and Alfisols (USGS TWSC 2014). Overall, the topography of the site is relatively flat and characteristic of the Beaumont Formation. HRMB soils vary based on geomorphic position and frequency of inundation, though both upland and wetland soils remained within a restricted range of soil types. Upland soils typically consisted of yellow-red hues with brown to grayish brown values and chromas. Wetland soils exhibited similar hues but showed a wider range of values and chromas ranging from very dark gray to grayish brown. Soil textures consisted primarily of clay and clay loam in uplands, with clays, clay loams, and silty clay loams in wetlands. Redoximorphic characteristics had yellow-red hues and were observed as matrix and pore lining concentrations with values and chromas ranging from strong brown, yellowish brown, and dark yellowish brown. A copy of the delineation report is included in Appendix E.

There are eight soil map units within the property boundary, as shown on Figure 5 (Appendix A): Aris-Levac complex, 0 to 1 percent slopes (ArsA); Bevil clay, 0 to 1 percent slopes (BevA); Evadale-Aldine complex, 0 to 1 percent slopes (EvdA); Evadale-Gist complex, 0 to 1 percent slopes (EvgA); League clay, 0 to 1 percent slopes (LeaA); Leton loam, 0 to 1 percent slopes, occasionally flooded, frequently ponded (LetA); Sourlake loam, 0 to 1 percent slopes, frequently flooded (SovA); and Vamont clay, 0 to 1 percent slopes (VamA) (USDA NRCS 2019). All of these soils are listed as hydric or include hydric components according to the National List of Hydric Soils (USDA NRCS 2017, 2019). The NRCS Soil Unit Descriptions are included in Appendix D of the Wetland Delineation Report (Appendix E).

2.5.2.3 Hydrology

The FEMA FIRM Numbers 48199C0475F and 48199C0500F depict the HRMB site to be within an unincorporated area of Hardin County where flood hazards are undetermined, but possible (FEMA 2023). Jackson Creek, a relatively permanent waterbody, bisects the center of the property and both Little Pine Island Bayou and Pine Island Bayou are approximately 1 mile northeast and 1.8 miles west of the property boundary, respectively. Historical images show periodic flooding of these waterbodies which influences the hydrology of wetlands, streams, and ponds on-site (Figures 6-1 to 6-13, Appendix A). Most notably, the aftermath of Hurricane Harvey in August 2017 exhibits a 500-year or potentially greater floodplain area surrounding Jackson Creek (Figure 6-13, Appendix A). In addition to overbank flooding, direct

precipitation and overland sheet flow runoff from uplands are the primary drivers of hydrology on-site. The LIDAR data also depict the low elevation surrounding Jackson Creek creating a widened floodplain across the majority of the site (Figure 7, Appendix A).

The topography of the site, as shown in Figures 8-1 to 8-3 (Appendix A), also influences the overall hydrology of the site. The site is relatively flat with elevations ranging from approximately 52 to 63 feet above mean sea level (amsl). The northwestern extent of the Bank boundary has maximum elevations at approximately 58 to 59 feet amsl and gradually slopes in elevation towards Jackson Creek and the southern Bank boundary. A slight topographic ridge of higher elevation bisects the northeastern section of the Bank. The northeastern extent, north of this ridge, ranges in elevation from 55 to 62 feet amsl and gradually slopes towards an unnamed tributary of Little Pine Island Bayou. The highest elevations on-site are the constructed berms containing the two man-made ponds in the western section of the Bank, with the lowest elevation on-site being at the southern extent of Jackson Creek where the channel flows off-site. The topographic relief on-site provides a relatively shallow drainage gradient. Streams and ditches within the western section of the site generally form on the northern or western side of the boundary and generally flow east or south across the floodplain before they outfall to Jackson Creek (Figures 7, 8-1 to 8-3, Appendix A).

SWCA delineated 21 waterbodies on-site consisting of 14 ephemeral streams/ditches, three intermittent streams, two ephemeral ponds, and two perennial ponds (Appendix E). Of these, the USACE AJD determined that three intermittent streams were jurisdictional, one of which is Jackson Creek (SA004a/SA004b), a named tributary to Pine Island Bayou that bisects the length of the HRMB site. Culverts have been placed in some streams/ditches to allow road access across the site.

The majority of ephemeral streams have been channelized to facilitate drainage to the eastern and southern portions of the site. Most of the streams' hydrology are dependent upon precipitation and overland sheet flow; however, the northwest portion of the property has a high water table and contains a seep that empties into Jackson Creek. Thus, there is a likely exchange of surface and groundwater discharge, and potential groundwater recharge on-site. Some streams/ditches currently lack any flow and have transformed into wetlands. Additional information regarding the hydrology of the site is included in the Hydrologic Analysis Report (Appendix F) and discussed further in Section 2.7.1 below.

2.5.2.4 Threatened and Endangered Species

A threatened and endangered species review was conducted by SWCA in October 2018 and the findings compiled in a report included in Appendix G. Based on this review, HRMB should have no negative effects on threatened and endangered or otherwise protected species due to the lack of suitable habitat on the property. It is expected that afforestation practices will eventually provide suitable foraging and nesting habitat for the bald eagle and the red-cockaded woodpecker, as well as extend habitat for a wide range of species found within the Jackson Creek riparian corridor.

2.5.2.5 Cultural Resources

SWCA has completed a Cultural Resources Constraints Analysis for the HRMB (Appendix H). SWCA submitted this constraints analysis with a request for concurrence to State Historic Preservation Office (SHPO) consultation to the Texas Historical Commission (THC) on August 2, 2023. Although no historic properties have been identified, due to the nature of the ground disturbing activities to create the bank, SWCA believes that a cultural resources survey and SHPO consultation will be necessary to make a determination of no historic properties affected. A cultural resources survey will be completed as the mitigation plan is developed.

2.6 Determination of Credits

2.6.1 Functional Values

The functional value of the aquatic resources for this site will be defined by a USACE-accepted method, namely, the currently accepted Riverine Forested HGMi method for wetlands (USACE 2010a), and the extent of the classified resources (i.e., acreage). SWCA performed a baseline functional assessment of the existing conditions for all of the wetlands identified on the site as part of the waters of the U.S. delineation, which was discussed above in Section 2.5.2.1 and is included in Appendix E. The baseline functional assessment for wetlands was conducted using the Riverine Forested HGMi wetland functional assessment methodology to determine the Functional Capacity Index (FCI) and corresponding Functional Capacity Units (FCUs) of the existing wetlands. The results of the baseline functional assessment for wetlands are presented in the SWCA report dated May 2021. A USACE site visit was conducted on March 12, 2024 to verify the HGMi wetland functional assessment. As a result of this verification, the HGMi wetland functional assessment was revised and resubmitted in March 2024. In April of 2024, the USACE requested edits to show that all non-jurisdictional wetlands scored as zero for the baseline values, a copy of which is included in Appendix I. A copy of the USACE AJD is included in Appendix E. A copy of the USACE verified baseline functional assessments for wetlands will be provided when completed (prior to submittal of the final MBI) in Appendix E. Functional assessments may be calculated at any time in the future by the Sponsor. When completed, a copy of the functional assessment report will be submitted to the USACE at the time of additional credit request, which will not exceed once annually.

2.6.2 Determination of Wetland Preservation Credits

For the Bank to be considered acceptable for mitigating wetland impacts associated with USACE permits, the vegetation, soils, and hydrology therein must at least meet the wetlands criteria described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0* (Regional Supplement) (USACE 2010b).

The Sponsor proposes to preserve 375.169 acres of high-functioning PFO wetlands, (Figure 11, Appendix A). Although preservation does not result in a gain of aquatic resources, the USACE DE may decide to allow preservation assuming that the five criteria outlined in 33 CFR 332.3(h)(1) are met by the project.

1) *The resources to be preserved provide important physical, chemical, or biological functions for the watershed*;

As described above, existing wetlands within the property provide important physical, chemical, and biological functions such as detention of floodwaters, providing high-quality aquatic and wildlife habitat within Jackson Creek and its riparian corridor, as well as sequestration of sediments, pollutants, and nutrients. According to the FEMA Firm Numbers 48199C0475F and 48199C0500F, the site is located within an unincorporated area of Hardin County where flood hazards are undetermined, but possible (FEMA 2023). Although flood hazards for this area are currently undetermined by FEMA, the elevation of the Bank, as depicted by LIDAR (Figure 7, Appendix A), indicates that most of the site occurs within the floodplain of Jackson Creek. This floodplain is further supported by the August 2017 aerial imagery of the aftermath of Hurricane Harvey (Figure 6-13, Appendix A), which exhibits a 500-year or potentially greater floodplain area surrounding Jackson Creek and the unnamed tributaries to Jackson Creek and Little Pine Island Bayou. The low-lying areas on the floodplain support a broad flat that supports the growth of hydrophytic herbaceous and woody (forested) vegetation and ponding promoting the storage of surface water. These areas also contain hydric soils and organic material facilitating the filtration of the water prior to its flow into Jackson Creek. HRMB has biological and hydrological connectivity to existing conservation easements (Big Thicket National Preserve) and the existing ecological conditions suggests it will be self-

sustaining. Along with the Lance Rosier Unit of the Big Thicket National Preserve, the HRMB would result in the protection of a large, approximately 25,203-acre, contiguous forested corridor along Jackson Creek. The preservation of this area would provide continuity in the Jackson Creek riparian buffer and expand the forested corridor to existing conservation easements (Big Thicket National Preserve) located on the adjacent property, providing a greater area of habitat for wildlife. The broad swaths of wetlands within the property delay floodwater on its way to Pine Island Bayou. The mast producing hickory, oak, and elm species, as well as green ash, sweet-gum, and loblolly pine, offer forage and nesting habitat for wildlife. Based on these observations, preserving the HRMB will maintain the important physical, chemical, and biological functions of Jackson Creek as well as its receiving waters.

2) *The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;*

As described in the preceding paragraph, preserving portions of the HRMB site offers significant benefits to the Jackson Creek riparian corridor and the larger Pine Island Bayou watershed. Preserving this corridor provides valuable migratory and permanent habitat, foraging space, and dispersal corridors for animals as well as providing important flood buffers for the floodplain.

As discussed above, flood hazards for this area are undetermined by FEMA but LIDAR elevation data (Figure 7, Appendix A) and the August 2017 historical aerial imagery of the aftermath of Hurricane Harvey (Figure 6-13, Appendix A) exhibits a 500-year or potentially greater floodplain area surrounding Jackson Creek and the unnamed tributaries to Jackson Creek and Little Pine Island Bayou. Furthermore, approximately 34 percent of the site has been delineated and verified as wetland habitat with low to high physical, biological, and chemical functions as determined by an HGMi assessment. Given the site is situated in the central portion of the Pine Island Bayou watershed, preservation of these wetlands would provide important flood mitigation and pollutant filtration from upstream agriculture for the more populous downstream communities. Loss of these wetlands due to alternative land use may compound the downstream water quality problems (i.e., depressed dissolved oxygen, bacteria and nutrients loads) previously mentioned in Section 2.2.1.1 and Section 2.2.2 and reduce habitat for wildlife.

3) *Preservation is determined by the district engineer to be appropriate and practicable;*

When the USACE Galveston District assesses proposed preservation sites, it is primarily looking for mature, fully functioning, high quality aquatic resources that are likely to be adversely impacted without protection. The Galveston District also considers the difficulty of replacing wetland resources when approving preservation sites. In the case of a mature forested wetland, such as those in the HRMB site, restoration efforts may require decades before a mature forest with peak functions is re-established.

Additional site-specific characteristics that would make a site a good candidate for preservation include habitat for threatened and endangered species, notable species diversity for both plants and animals, or regional/watershed importance. The USACE has eliminated otherwise suitable sites because of a lack of biological and/or hydrological connectivity, the site was too small in size to be self-sustaining, or the site did not include the entire wetland. HRMB has biological and hydrological connectivity to existing conservation easements (Big Thicket National Preserve) and the existing ecological conditions suggests it will be self-sustaining. Along with the Lance Rosier Unit of the Big Thicket National Preserve, the HRMB would result in the protection of a large, approximately 25,203-acre, contiguous forested corridor along Jackson Creek.

4) *The resources are under threat of destruction or adverse modifications; and*

In regard to threat, the Galveston District has defined a threat as an activity that can be completed without authorization from the USACE regulatory authority. Historical examples of recognized adverse threats include silviculture and agriculture as discussed previously in Section 2.2.4.1.

The entirety of the site has historically been, and is currently being, used for agriculture. The forested eastern portion of the site could potentially be used for silviculture which would be economically profitable. Alternatively, this area may be cleared for expansion of existing agricultural activities including hay farming or pastureland.

The HRMB's mature pines and hardwoods make the site suitable for silviculture. According to the most likely plan for silviculture practices, a full clear-cut would be incorporated rather than a rotational cutting system. Wetlands would be affected simultaneously with loss of functional capacity in chemical, physical, and biological functions. As such, silviculture represents a real threat to the continuing function of the aquatic resources within the site.

Typically, silviculture activities are exempt from the permit requirements of Section 404 of the Clean Water Act. In general terms, this exemption applies as long as all best management practices (BMPs) are followed, and no areas are directly and intentionally converted from wetlands into uplands. Realistically, however, even silviculture practices that follow all BMPs are likely to influence wetland functions in some manner (e.g., degraded wildlife habitat, community structure, and/or vegetative composition). Additionally, silviculture continues to be a land practice that results, directly as well as incidentally, in the net loss of wetlands (Dahl and Johnson 1991; Dahl 2000, 2006). Dahl (2000, 2006) identified silviculture as resulting in the net loss of 172,860 acres of wetlands from 1986 to 1997 (13,465 acres/year) with the additional net loss of 18,000 acres of wetlands (3,000 acres/year) between 1998 and 2004. Moulton et al. (1997) demonstrated that approximately 18,820 acres of palustrine wetlands (forested and emergent) were converted to silviculture practices between 1955 and 1992 within the Gulf Coastal Region of Texas (509 acres/year). This represents a loss rate of approximately 2.7 percent of the wetland acreage per year.

5) *The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).*

In accordance with Texas Law (Natural Resources Code, Title 8 Chapter 183 Subchapter A) and upon approval of the MBI, the Sponsor shall protect the Bank property in perpetuity by placing it under a restrictive Conservation Easement to be held by Texas Land Conservancy.

2.6.2.1 Wetland Preservation Credits

Wetland preservation credits are based on the functional value of the preserved wetlands. FCUs are calculated based on functional capacities defined in the USACE's HGMi tools (USACE 2010a, b). This model assigns the physical (represented in the model as Temporary Storage and Detention of Storage Water), chemical (represented in the model as Maintain Plant and Animal Community), and biological (represented in the Model as Removal and Sequestration of Elements and Compounds) functions of a wetland based on a variety of measured variables. Once these values are calculated, the scores are multiplied by the respective acreage of the wetland represented to quantify the wetlands' functions. Based on consultation with the USACE Galveston District and the IRT, a ratio is applied to the preserved wetland FCUs. The ratio for physical, chemical, and biological FCUs are 5:1, 5:1, and 5:1, respectively. Based on the HGMi functional assessment and approved ratios, SWCA determined that the 375.169 acres of PFO wetlands provide 24.823 physical, 60.915 biological, and 36.606 chemical FCUs of mitigation credit.

2.6.3 Determination of Wetland Enhancement and Restoration Credits

The enhancement and restoration mitigation credits will be established as FCUs, which will be released to the Bank once the USACE verifies, in coordination with the IRT, an increase of FCUs. As such, data from monitoring efforts will be used to determine and adjust the HGMi to reflect the actual conditions as the Bank develops and will, therefore, be used to determine the number of credits that will be made available to the Bank in future credit releases. Adoption of this framework for the assessment of wetlands dictates the benchmarks outlined in the performance standards (Section 2.9).

The Sponsor proposes to enhance 64.443 acres of partially degraded PEM, PSS, and PFO wetlands for the purpose of generating PFO FCUs (Figure 11, Appendix A). Wetland enhancement areas were scored with Forested Riverine HGMi to establish baseline FCUs. Based on the HGMi functional assessment, SWCA determined that the current wetland enhancement areas exhibit 1.545 physical, 0.777 biological, and 1.764 chemical FCUs. The credit determination tables are in Appendix J.

The enhancement activities discussed below in the Mitigation Work Plan (MWP) (Section 2.7) are anticipated to create a functional lift of these wetlands increasing the FCUs (Table 1). After calculating the potential lift in wetland quality via the HGMi functional assessment, SWCA anticipates that the wetland areas post-enhancement will exhibit 383.786 physical, 503.853 biological, and 451.789 chemical FCUs.

Historical images from 1943 indicate that a majority of the site was previously riparian forested habitat that was cleared for agricultural use (Figure 6-1, Appendix A). The Sponsor proposes to restore 508.155 acres of herbaceous upland habitat to forested wetlands which will generate 359.320 physical, 445.271 biological, and 414.993 chemical FCUs.

Table 1. The Current and Potential Future FCUs Based on an HGMi Assessment and Proposed Mitigation Work Plan for Enhanced and Restored Wetlands

Wetland Type	Current FCUs			Potential Lift			Future FCUs		
	TSSW*	MPAC**	RSEC***	TSSW	MPAC	RSEC	TSSW	MPAC	RSEC
Enhanced Wetlands	1.545	0.777	1.764	22.921	57.805	35.032	24.466	58.582	36.796
Restored Wetlands	0.000	0.000	0.000	359.320	445.271	414.993	359.320	445.271	414.993
Total	**1.545**	**0.777**	**1.764**	**382.241**	**503.076**	**450.025**	**383.786**	**503.853**	**451.789**

* TSSW = Temporary Storage & Detention of Storage Water = Physical

** MPAC = Maintain Plant & Animal Community = Biological

*** RSEC = Removal & Sequestration of Elements & Compounds = Chemical

2.6.4 Credit Accounting

The Bank will establish a ledger to track all wetland mitigation credits (in FCUs). Credits will be allotted to the Bank according to the credit release schedule presented in Section 3.3 once the USACE, in coordination with the IRT, approves the Bank and the Sponsor executes the conservation easement.

Credits for preservation, enhancement, and restoration will be established as FCUs and allotted to the Bank in the types and quantities indicated in Table 2.

Table 2. Preserved, Enhanced, and Restored Wetland Credits

Wetland Type	Potential FCUs		
	TSSW	MPAC	RSEC
Preserved Wetlands	24.823	60.915	36.606
Enhanced Wetlands	22.921	57.805	35.032
Restored Wetlands	359.320	445.271	414.993
Wetland Totals	407.064	563.991	486.631
Projected Increase	407.064	563.991	486.631

2.7 Mitigation Work Plan

Figure 11 (Appendix A) shows the overall mitigation plan for the site, including wetland preservation, enhancement, and restoration. The MWP provided in this section describes the earthwork, hydrologic controls, planting, and other improvements necessary to implement wetland enhancement and restoration on the proposed Bank. A MWP is not necessary for the proposed wetland preservation areas. However, other sections of the Mitigation Plan (Section 2.0) address requirements that do pertain to not only restoration efforts (in terms of wetland enhancement and restoration), but also preservation efforts.

The proposed improvements for the site include wetland hydrologic improvements and vegetation management and planting. The following sections describe in detail these proposed improvements. Table 3 presents a schedule of activities to implement the tasks required by the MWP.

2.7.1 Wetland Hydrologic Improvements

To establish compensatory mitigation credits, hydrological improvements will be made that 1) regulate the duration of inundation and saturation suited to hydrologic requirements of wetland vegetation and the criterion of a functional wetland according to the USACE, 2) increase wetland/aquatic habitat diversity, and 3) restore site topography and typical floodplain relief within the site. Wetland hydrology performance standards (USACE 2005) require that the site is inundated (flooded or ponded) or the water table is ≤12 inches below the soil surface for ≥14 consecutive days during the growing season at a minimum frequency of 5 years in 10 (≥50% probability). Any combination of inundation or shallow water table is acceptable in meeting the 14-day minimum requirement. The *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) defines "growing season" as the portion of the year when soil temperature (measured 20 inches below the surface) is above biological zero (5°Celsius [C] or 41°Fahrenheit [F]). This period "can be approximated by the number of frost-free days." This was determined for the Bank site using the moderate freeze temperature threshold of 28°F for 2010 to 2020 from the Lumberton weather station (Global Historical Climatology Network [GHCN]: USC00415435), located approximately 18.5 miles northeast of HRMB (National Oceanic and Atmospheric Administration [NOAA] 2023; USDA NRCS 1997). The growing season for the Bank site has been determined to be February 2 through December 9 (Malone and Williams 2010, NOAA 2023, USDA NRCS 1997). The following sections describe the hydrologic improvements to be constructed at the site.

To assess the hydrologic viability of the proposed wetland enhancement and restoration activities at the site, the Sponsor commissioned a Hydrologic Analysis study by SWCA (Appendix F). This study indicates that the proposed hydrologic improvements described in this section will result in the improved wetlands meeting the USACE's requirements for wetland hydrology as described above.

2.7.1.1 Terraced Berms with Passive Hydrologic outlet Control Structures

A primary hydrologic improvement at the Bank will be the creation of a series of isolated, terraced wetland cells (also referred to as Wetland Assessment Areas, or WAAs) through the construction of low profile earthen berms equipped with passive hydrologic outlet control structures that integrate with existing topographic features on the site. These terraced WAAs will be constructed on areas of tended pasture that had been previously cleared in the western sections of the Bank, as shown on Figure 11 (Appendix A). The low-profile terrace berms will generally be located on every 2-foot drop in elevation on the floodplain and each WAA may or may not outflow to a lower, downstream WAA and ultimately to either a jurisdictional waterbody (e.g., Jackson Creek) or a jurisdictional wetland, located within the Jackson Creek floodplain.

The Hydrologic Analysis Report is included in Appendix F. This report describes the wetland restoration and enhancement hydrologic improvements proposed for the Bank and presents a hydrologic analysis documenting the ability of the wetlands to achieve the required hydrologic conditions as a result of implementing the proposed hydrologic improvements at the Bank. Wetland Restoration – 30% Design Permit Drawings (Wetland Permit Drawings) are included in an appendix to the Hydrologic Analysis (Appendix F) and provide construction details on the proposed terraced berms and passive hydrologic outlet control structures. A passive outlet control structure will be installed in each low-profile terrace berm.

All constructed terraced berms will be low-profile with a shallow, parabolic shape to emulate natural swales and hummocks, as shown in the Wetland Permit Drawings included as an appendix to the Hydrologic Analysis Report (Appendix F). The berms will be approximately 5 feet wide across the top and will vary in elevation from 56.5 to 59.5 feet amsl, as illustrated in the berm construction plans. The toes of each berm will have a shallow slope (e.g., 1:2.5 to 1:3) and will extend approximately 15 feet to each side. The berms will be constructed using any available on-site material and off-site fill material as needed and approved by the Engineer.

Each passive outlet control structure will consist of a broad-crested overflow outlet and a slow release, v-notch outlet (it may be necessary to use more than one v-notch outlet to meet the release requirements described below) located immediately below the invert of the overflow outlet. The invert of the broad-crested overflow outlet will generally be 0.5 feet below the top of the terrace berm and the invert of the slow-release v-notch outlet(s) will be one foot below the invert of the overflow weir. Construction details for the passive outlet control structures are included in the Wetland Permit Drawings, which are included as an appendix to the Hydrologic Analysis Report (Appendix F). The passive hydrologic outlet control structures will be designed to pass large storm events out of each WAA quickly creating wetland conditions throughout the entire WAA. The outflow structures will also ensure a depth of water, in smaller storm events, suitable for the survival of wetland vegetation. Because of the intricacy of these structures, they will be designed in future phases of the project.

As shown on Figure 11 (Appendix A) and detailed in the Wetland Permit Drawings, the Bank site includes ten WAAs (A, B1, B2, B3, C1, C2, C3, D1, D2, and E).

These hydrologic improvements and re-vegetation are expected to convert approximately 510.2 acres on the Jackson Creek floodplain to hardwood forested wetlands.

2.7.1.2 Ditch Channel Plugs

Several agricultural ditches have been constructed in the past in the western section of the site as drainage features. Numerous earthen channel plugs will be installed within the existing ditches to eliminate drainage across the site as well as slightly raise the groundwater table in the vicinity of the ditches. The exact location of these plugs will be determined at later phases of design following a topographic survey. Construction

details for the ditch channel plugs will be included in the Wetland Permit Drawings following the aforementioned survey.

2.7.1.3 Microtopography

An additional hydrologic improvement will be the construction of microtopography within the WAAs to be restored and enhanced on the previously cleared areas of the Jackson Creek floodplain in the western and eastern sections of the Bank. Past agricultural practices have created relatively uniform topography throughout these areas. Restoration of surficial roughness (microtopography) will increase floral and habitat diversity by fostering the development of tussocks and shallow depressions. Furthermore, the diversity of microtopography influences hydroperiods, soil permeability, and will help establish a more complex wetland vegetation community and a more diverse assemblage of wildlife species. Additionally, microtopography may improve nutrient cycling and removal (Wolf et al. 2011).

Table 3. Schedule of Activities for the First 10 Years of Operations for HRMB

Item	Activity	Predecessors	Year and Quarter																																							
			Year 0				Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8				Year 9				Year 10			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.0 – Administrative Commitments																																												
1.0a	Approval of MBI																																											
1.0b	Conservation Easement																																											
1.0c	Establish Short-term FA	1.0a, 1.0b																																										
1.0d	Establish Long-term FA	1.0a, 1.0b																																											
1.0e	Fund Long-term FA	1.0d																																										
2.0 – Hydrologic Enhancements																																												
2.0a	Berm Construction																																											
2.0b	Microtopography																																											
2.0c	Low-water Crossings																																											
2.0d	Hydrology Monitors																																											
2.0e	Establish Wetlands	2.0a, 2.0b, 2.0c, 2.0d																																										
3.0 – Enhanced/Restored Forest Vegetation																																												
3.0a	Trees Planted at ≥435 and ≤500 Stems/Acre, Maintained at ≥400 Stems/Acre																																											
3.0b	Trees >250, <400 Stems/Acre	3.0a																																										
3.0c	Trees >100, ≤250 Stems/Acre	3.0b																																										
3.0d	Forest Aerial Coverage >11%	3.0a																																										
3.0e	Forest Aerial Coverage >34%	3.0d																																										
3.0f	Forest Aerial Coverage >67%	3.0e																																										
3.0g	Woody Shrubs Planted (If Needed)	3.0a																																										
3.0h	Woody Shrub Coverage >10%	3.0g																																										
3.0i	Herbs Planted	3.0a																																										
3.1 – Enhanced/Restored Bank Operation																																												
3.1a	Quantitative Monitoring																																											
3.1b	Qualitative Monitoring																																											
3.1c	Maintenance																																											
3.2 – Enhanced/Restored Wetland Credit Release																																												
3.2a	Initial	1.0, 2.0, 3.0a																																										
3.2b	On-going	2.0e, 3.0																																										
4.0 – Preserved Forest Vegetation																																											
4.0a	Initial	1.0																																										

Item	Activity	Predecessors	Year and Quarter																																												
			Year 0				Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8				Year 9				Year 10			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4.1 – Preserved Wetland Bank Operation																																														
4.1a	Quantitative Monitoring																																													
4.1b	Qualitative Monitoring																																													
4.1c	Maintenance																																													
4.2 – Preserved Wetland Credit Release																																														
4.2a	Initial	1.0																																												

2.7.1.4 Hydrology Monitors

To assess the efficacy of hydrologic improvements, the Sponsor will install and monitor one continuous water level recorders in all enhanced and restored wetland areas at the site. Therefore, the Sponsor will monitor hydrology in 10 re-established WAAs and 7 enhanced and preserved WAAs. Water level recorders will measure surface and sub-surface hydrology within each WAA. The hydrology monitoring stations will be installed using USACE protocols (USACE 2005; Noble 2006) with the location of each hydrology monitoring station recorded using a global positioning system (GPS) and clearly marked to facilitate field identification.

The hydrographs generated by these recorders will be correlated to sampled hydrology field indicators and climatological data including local rainfall conditions, Palmer Drought Severity Index, Antecedent Precipitation Tool (APT) data, and other suitable metrics. These values will be incorporated into the HGMi to corroborate hydrologic measurements. Hydrologic improvements will be monitored until performance standards are fully achieved.

2.7.2 Vegetation Management and Planting

After completing the wetland hydrological improvements, afforestation, re-vegetation, and subsequent vegetation management processes will re-establish bottomland hardwood forested wetland communities consistent with the historical floodplain adjacent to Jackson Creek on all wetland enhancement and restoration areas.

The objective of enhancement activities of the Bank will be focused on re-vegetation of degraded non-forested wetlands with appropriate forested wetland species. The objective of restoration activities is to create fully functional, diverse, and self-sustaining communities indicative of historical hardwood forest with a mixed population of desirable species native to the EPA Level III South Central Plains Ecoregion. Because the current vegetation community of the site is not amenable to these goals, existing wetlands will be modified during the construction phase. Sub-optimal nitrate and phosphorous levels induced through previous land use may require the application of these nutrients to levels typical of area wetlands. This will be completed through application of appropriate fertilizers during the initial planting efforts. Because the Bank will not yield harvested crops, future nutrient supplementation should not be necessary.

2.7.2.1 Vegetation Sources

To the extent practicable, HRMB will preferentially source vegetation from nearby nursery facilities to provide greater control over the quantity and species composition of the seedling stock, greater assurance regarding the source of seeds, decreased seedling mortality from transportation and transplantation, and to produce supplemental seedlings, if needed. Seed, root stock, and cuttings will be gathered from within the ecoregion giving special consideration for vegetative stock within the Pine Island Bayou watershed (HUC 12020007). For species that cannot be sufficiently gleaned from native sources, stock will be purchased in Texas or Louisiana, preferentially from stock derived from the South Coastal Plains Ecoregion. To reduce shock to the plants, planting activities will be performed during the dormant season.

2.7.2.2 Forest Overstory

Prior to planting, GPS guided equipment will plow, prepare, and sub-soil the site to create rows approximately 9 to 10 feet apart that can be accurately planted and easily located in the future. Performed during dry conditions, sub-soiling will fracture the clay soils on-site to facilitate seedling establishment and

survival. After preparing the soil, seedlings will be planted at a density of between 435 and 500 stems per acre (9- to 10-foot centers).

The trees planted on the Bank will consist of native species adapted to the floodplain environments within the South Central Plains (Table 4). For the initial planting, the exact species composition will depend upon seedling availability but will be composed of at least 70 percent hard mast producing tree species (e.g., oak and hickory) planted in mixed-species rows to maximize the within-stand heterogeneity. Overstory tree species composition will consist of at least five species with no single species accounting for more than 25 percent of the cumulative cover. Whenever possible, seedlings will be planted according to wetness tolerance to minimize mortality (McLeod et al. 2000). If encountered, Chinese tallowtree and other exotic and/or undesirable species will be targeted for removal (Section 2.10.3). Pioneer tree species such as American sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoides*), and black willow (*Salix nigra*) will also be targeted for removal, though they may intentionally be left onsite during overstory tree establishment (through approximately year 5) if monitoring reveals these species are functioning as a beneficial nursery crop.

Table 4. Overstory Tree Species Selected for Planting in HRMB

Species Name	Common Name	Wetland Status**
Carya aquatica	water hickory	OBL
Nyssa aquatica	water tupelo	OBL
Nyssa biflora	swamp tupelo	OBL
*Quercus lyrata**	overcup oak	OBL
Taxodium distichum	southern bald-cypress	OBL
*Celtis laevigata**	sugar-berry	FACW
*Fraxinus pennsylvanica**	green ash	FACW
*Quercus laurifolia**	laurel oak	FACW
Quercus pagoda	cherry-bark oak	FACW
*Quercus phellos**	willow oak	FACW
Quercus similis	bottom-land post oak	FACW
Quercus texana	Texas red oak	FACW
Gleditsia triacanthos	honey-locust	FAC
*Liquidambar styraciflua**	sweetgum	FAC
Nyssa sylvatica	black tupelo	FAC
*Quercus michauxii**	swamp chestnut oak	FAC
*Quercus nigra**	water oak	FAC
Quercus shumardii	Shumard's oak	FAC
*Ulmus americana**	American elm	FAC
*Ulmus crassifolia**	cedar elm	FAC

*Naturally occurring native species at HRMB.

**OBL = Obligate, FACW = Facultative Wet, FAC = Facultative

2.7.2.3 Forest Woody Midstory

Over time, HRMB expects that production of propagules from the dominant overstory trees and supplemental planting efforts will fill in the midstory (shrub-sapling stratum) and understory (herbaceous

stratum) to provide a wide variety of habitat and resources to the community. However, supplemental plantings at the Sponsor's discretion will add midstory trees, understory shrubs, and vines to the site following stand thinning events (after approximately year 3) and as initially planted trees begin to reach sexual maturity (approximately year 5). If necessary, native seedlings of midstory trees and woody shrubs (Table 5) will be planted in the gaps between rows or in locations where initially planted seedlings did not survive or were culled. Woody vines (Table 5) may also be planted as they become available. HRMB anticipates maintaining a woody midstory coverage greater than 10 percent to optimize functional lift.

Table 5. Supplemental Vegetation Selected for Planting in HRMB

Stratum	Species Name	Common Name	Wetland Status**
Midstory	*Gleditsia aquatica*	water-locust	OBL
Midstory	*Planera aquatica*	planertree	OBL
Midstory	*Crataegus viridis*	green hawthorn	FACW
Midstory	*Persea borbonia*	red bay	FACW
Midstory	*Acer negundo*	ash-leaf maple	FAC
Midstory	*Acer rubrum**	red maple	FAC
Midstory	*Carpinus caroliniana*	American hornbeam	FAC
Midstory	*Cornus drummondii*	rough-leaf dogwood	FAC
Midstory	*Crataegus marshallii*	parsley hawthorn	FAC
Midstory	*Crataegus spathulata*	little-hip hawthorn	FAC
Midstory	*Diospyros virginiana**	common persimmon	FAC
Midstory	*Zanthoxylum clava-herculis*	Hercules'-club	FAC
Shrub	*Cephalanthus occidentalis**	common buttonbush	OBL
Shrub	*Forestiera acuminata*	eastern swamp-privet	OBL
Shrub	*Persea palustris*	swamp bay	FACW
Shrub	*Ilex decidua*	deciduous holly	FACW
Shrub	*Sabal minor**	dwarf palmetto	FACW
Shrub	*Viburnum nudum*	possumhaw	FACW
Shrub	*Forestiera ligustrina*	upland swamp-privet	FAC
Shrub	*Ilex vomitoria**	yaupon	FAC
Shrub	*Sambucus nigra*	black elder	FAC
Vine	*Brunnichia ovata*	American buckwheatvine	FACW
Vine	*Ampelopsis arborea*	peppervine	FAC
Vine	*Berchemia scandens*	Alabama supplejack	FAC
Vine	*Campsis radicans**	trumpet-creeper	FAC
Vine	*Cocculus carolinus*	Carolina coralbead	FAC
Vine	*Smilax rotundifolia*	horsebrier	FAC

*Naturally occurring native species at HRMB.

**OBL = Obligate, FACW = Facultative Wet, FAC = Facultative

2.7.2.4 Herbaceous Vegetation

The exact mixture of species will be determined at the time of planting but will represent species found in hardwood wetlands within the South Central Plains ecoregion. No attempt will be made to restrict the growth of native volunteer plants unless they grow to densities that are undesirable, are invasive species, or are considered a threat to sapling survival in forested areas.

Although the total dry biomass of the herbaceous layer may be relatively small compared to woody vegetation, soft-stemmed plants often account for the majority of the biodiversity of a forest and are critical to nutrient cycling (Gilliam 2007). Additionally, herbaceous cover provides important wildlife habitat, food sources, natural erosion control, and may reduce invisibility by exotic species.

Typical forest restoration projects focus heavily on natural herbaceous recruitment subsequent to sapling establishment, during which time herbaceous cover is suppressed. However, this passive relay model may be inappropriate for sites where the native seed bank is destroyed because there is limited endemic recruitment or connectivity with other communities (Young et al. 2005). To avoid a depauperate herbaceous forest floor community that poorly reflects native vegetation, HRMB plans to apply native seeds and seedlings to the site after the dominant trees are established. The lag in planting time will provide the tree saplings a growth advantage and prevent aggressive soft-stemmed plants from rapidly outgrowing tree seedlings (Barbier et al. 2008).

At the Sponsor's discretion, herbaceous species may be planted in two consecutive years coincident with initially planted trees reaching sexual maturity (approximately year 5). Seeds representing native herbaceous vegetation (Table 6) will be planted at densities sufficient to optimize functional lift. HRMB anticipates establishing an herbaceous layer that provides greater than 30 percent cover. The exact mixture of species will be determined at the time of planting but will represent species found in hardwood wetlands within the South Central Plains Level III Ecoregion. No attempt will be made to restrict the growth of native volunteer plants after the trees reach sexual maturity unless they are considered a threat to sapling survival, grow to densities that are undesirable, or are invasive species.

Table 6. Herbaceous Species Selected for Planting within Forested Areas of HRMB

Species Name	Common Name	Wetland Status*
Asclepias perennis	aquatic milkweed	OBL
Carex lupulina	hop sedge	OBL
Echinodorus cordifolius	creeping burrhead	OBL
Hygrophila lacustris	gulf swampweed	OBL
Persicaria hydropiperoides	swamp smartweed	OBL
Persicaria punctata	dotted smartweed	OBL
Phanopyrum gymnocarpon	savannah-panic grass	OBL
Saururus cernuus	lizard's-tail	OBL
Arundinaria gigantea	giant cane	FACW
Carex cherokeensis	Cherokee sedge	FACW
Chasmanthium laxum	slender wood-oats	FACW
Cyperus virens	green flat sedge	FACW
Persicaria pensylvanica	pinkweed	FACW
Sabal minor	dwarf palmetto	FACW

Species Name	Common Name	Wetland Status*
Chasmanthium latifolium	Indian wood-oats	FAC
Persicaria virginiana	jumpseed	FAC
Scleria oligantha	little-head nut-rush	FAC
Vernonia missurica	Missouri ironweed	FAC
Viola sororia	hooded blue violet	FAC

*OBL = Obligate, FACW = Facultative Wet, FAC = Facultative

2.7.2.5 Herbicide Application

Pre-emergent herbicide applications will be made in coordination with tree planting as a BMP to control and suppress grassy and broad-leaved weeds and thereby reduce herbaceous competition with newly-planted saplings. Immediately preceding planting, Barricade® (prodiamine) and Gallery® (isoxaben) or their generic equivalents will be applied at the rate described on the product labels. These chemicals will be applied with ground equipment as the label directions do not permit aerial application. Following planting, foliar herbicide will be applied between rows for two years to suppress herbaceous competition for nutrients and light. These herbicides act synergistically and can control a large number of herbaceous weed species.

Toxicological information indicates that prodiamine has a relatively high LD_{50} in tested animals. Furthermore, prodiamine has a water solubility of 0.013 parts per million (ppm), making this herbicide unlikely to move laterally with sheet flow or percolate into ground water. Based on reactivity, isoxaben is considered slightly toxic. Although isoxaben has a relatively high-water solubility (1,000 ppm), the adsorption coefficient Koc is moderately high (1,400 ppm) meaning that the heavy clay soils on the site should retard movement off the site or into groundwater. The half-lives of prodiamine and isoxaben are both approximately 110 days in aerobic soils.

The Sponsor will make every effort to avoid adverse impacts when using herbicide. Preventative measures may include a no-spray buffer around the perimeter, timing of herbicide application to avoid sensitive environmental conditions, and planned management actions.

2.8 Maintenance Plan

The Sponsor will be responsible for all maintenance activities required for the Bank through the final credit release. This section outlines specific maintenance activities that will be undertaken to ensure the Bank continues to exhibit the biological and physical characteristics described in the following sections until all credits are released or until the end of all required monitoring, whichever is later. Regularly scheduled site visits and monitoring activities will identify areas of concern. When necessary, corrective action plans will be submitted to the USACE and IRT for review, comment, and approval.

2.8.1 Site Condition

The Sponsor will make annual inspections of the property to verify that use of the property is consistent with this MBI and the Conservation Easement as well as to assess any damage caused by flood, fire, storm, wind, accident, trespass, vandalism, negligence, or other act or event that causes damage to the Bank. The Bank will ensure that all structures and facilities (i.e., berms, roads, trails) will be properly maintained for as long as necessary to reach performance standards and provide effective access for management and monitoring activities identified in the MBI and Conservation Easement. The patrol of structures and access controls within and around the Bank site will occur as part of these inspections. This includes road, culvert,

berm, and low water crossing inspections. Any structural maintenance needs will be addressed within 30 days of discovery. In addition, these inspections will serve to remove trash.

2.8.2 Site Accessibility

Current neighboring land northeast of the proposed HRMB is protected through Conservation Easements (i.e., Lance Rosier Unit of the Big Thicket National Preserve) which presents little direct threat to the establishment of hardwood forested wetlands. Neighboring parcels to the north, east, south, and west are private residences, farms, or residential subdivisions that may result in potential access points for humans, wildlife or domestic animals that may cause damage to the site. Protective fencing may be required to deter trespass. The need for fencing and other access controls (e.g., gates, barbed wire) will be based on monitoring efforts and evidence that vegetation or topography has been damaged. All Bank site boundaries shall be marked with a metal post which reads "Wetland Conservation Area" to prevent casual trespass while allowing necessary access. Inspections will serve to note the condition of signs, crossings, and property boundaries and address fence inspection and repair.

2.8.3 Terrace Berm and Passive Hydrologic Control Structure Maintenance

Based on the design and construction of the terrace berms (Appendix F), the site should not require on-going maintenance activities once vegetation becomes established. The risk of erosion on the earthen berms is minimized by designing shallow approaches and allowing plant growth along the berms. However, the Sponsor will conduct annual inspections of the berms to verify structural integrity. Berm inspections may also be necessary following unusual events (e.g., floods, storms, and unauthorized access). The passive hydrologic control structures should likewise require minimal maintenance. However, the structures will also be inspected annually for damage and signs of wear. Because the structures act as water conveyance points, it may be necessary to remove materials that snag on the crossings so that the structures remain operational. Damaged or impassable hydrologic control structures will be cleared, repaired, or replaced by the Sponsor as needed.

2.8.4 Water Management

Based on the Hydrologic Analysis (Appendix F), typical rainfall seasons will provide sufficient water throughout the Bank to exceed the wetland hydrology criteria specified by the USACE. Filling and plugging existing ditches and construction of terrace berms with passive hydrologic control structures according to the MWP (Section 2.7) will reduce rainfall runoff rates which will prolong inundation events and increase soil moisture. The passive hydrologic control structures will provide a means by which out-of-bank flood events on Jackson Creek may be conducted onto the Bank for retention and controlled discharge back into the creek.

2.8.5 Vegetation Management

Long-term vegetation management practices such as mechanical vegetation control, selective herbicide treatments, prescribed burning, temporary plantings intended to suppress invasive or weed species or to stabilize exposed soil, and selective tree removal are valuable management tools available to the Sponsor. As such, these tools offer flexibility in initiating appropriate adaptive management strategies, when needed. The Sponsor will ensure that the USACE and IRT will not be held responsible for vegetation management practices including, but not limited to, herbicide application, controlled burn activities, or other potentially hazardous activities related to vegetation management at HRMB.

2.8.5.1 Woody Community Management

Consistent with the Bank's performance standards, described later in Section 2.9, a minimum surviving density of at least 400 stems per acre of trees will be achieved within one year of submittal of the as-built report, and at least 250 stems per acre of trees within five years. As the stand matures and canopy closure commences, light limitation and competition will decrease population densities which, in concert with forest management strategies, will produce a sustainable and productive community of native tree species with a population density between 100 and 250 stems per acre (the optimal score for forest density in the HGMi, and an expected density per Rosen et al. [2008]). Areal canopy coverage will be optimized as the forest stand matures (i.e., >67% by Year 10).

If the forest overstory (tree stratum) or midstory (shrub-sapling stratum) becomes too densely populated, selective thinning and clearing of competing vegetation may be needed. Thinning emulates plant community dynamics, promotes healthier forest stands, and allows for succession to drive future forest composition. If needed, thinning cuts will be performed selectively and will not be used until the forest canopy has closed and species reach sexual maturity (approximately Year 5). Any thinning cuts will be performed using hand-held equipment. In general, felled trees will be left in place to provide coarse woody debris that will act as habitat for ground-dwelling organisms. If stand composition warrants, interplanting of desirable tree species may be used to increase their proportion of the stand composition and improve species diversity. Planting trees at varying times introduces vertical structural diversity and the natural patchiness that is important to wildlife and stand stability. If needed, interplantings will attempt to replace trees lost from the original planting effort with similar (hard or soft mast) trees.

The Sponsor will ensure that the mature forest stand composition is dominated by desired hardwood species as described in the MWP (Section 2.7). Monitoring activities will confirm that the Performance Standards identified in Section 2.9 are upheld and undesirable and invasive species are controlled as required in Section 2.8.6.

The efficacy of the forest management strategies will be based on data collected from field monitoring stations and will be reported to the USACE and IRT following the schedule specified in Section 2.7. Data gathered from annual surveys will establish demographic trends for the tree populations and will inform management decisions. If a negative trend is detected, the Sponsor will report this to the USACE and IRT along with suggested management activities for correcting the trend. Corrective actions will be implemented after approval by the USACE in coordination with the IRT.

2.8.5.2 Herbaceous Community Management

Site preparation activities may result in an herbaceous stratum that may initially comprise little of the forest community. Supplemental planting and natural regeneration from the seed bank should allow increases in herbaceous vegetative cover.

Herbaceous vegetation will be managed to maintain a diverse community that has an average cover of between 31 and 50 percent. Therefore, relative species richness and evenness (e.g., Shannon-Wiener index values) derived from measured field conditions, relative percent cover, and the species composition detected during monitoring efforts will inform management decisions. Trends toward decreasing biodiversity or unfavorable relative cover will indicate that corrective actions, such as introducing moderate disturbance regimes (Dial and Roughgarden 1988) or selective replanting, may be necessary to maintain a highly functional herbaceous community. Proposed corrective actions will be provided to the USACE and IRT for comment and will not be implemented without concurrence by those organizations.

2.8.6 Invasive Species Control

Exotic, noxious, and invasive plant species compete with desirable plants for resources, thereby reducing the growth potential for desired vegetation (D'antonio et al. 1998). Among other life history aspects, the genetic plasticity of invasive species and release from herbivory often allow them to out-compete native species which, in time, may lead to reduced biodiversity within the community. In extreme cases, invasive species can produce monocultures that have detrimental effects on the wildlife that would otherwise use the native habitat (Forseth and Innis 2004). Therefore, the control of invasive species is a high priority.

In addition to the species identified in the most recent Noxious Plant List in 4 TAC 19.300 (Appendix K), HRMB will initiate management efforts for other invasive species if they are detected within the site. As species are identified by the IRT, USACE, and peer-reviewed journals, they will be added to the list of invasive species that will be monitored and controlled.

HRMB will employ biological, manual, mechanical, physical, and/or chemical control methods based on the BMPs for the removal of undesirable target species in consideration. For all invasive species, HRMB will implement control techniques based on published research regarding the timing and efficacy of treatment options (Conway et al. 1999) and will provide descriptions of these treatments through the Bank's annual report to the USACE. In particular, HRMB anticipates the use of herbicides such as Garlon, Roundup, Arsenal, Accord, and Clearcast. Integrating these approaches will help control invasive species, prevent ecological damage within the site, and decrease incidental export of these species to neighboring sites. Regardless of the techniques employed, the focus will be to use the least ecologically damaging option available that will effectively achieve the management objectives specified.

2.8.6.1 Manual Removal

The use of hand tools is an effective way of removing some unwanted species and typically exerts minimal impact on neighboring vegetation. Due to the cost of labor, manual removal is often cost-prohibitive at large scales but may serve as an effective spot treatment. As such, manual removal will be employed in smaller areas or in areas where herbicide treatments must be kept to a minimum and machinery should be avoided.

2.8.6.2 Mechanical Removal

For larger areas and areas dominated by monocultures of unwanted species, the use of machinery (e.g., bulldozers, backhoes, or mowers) may be a more effective method. Mechanical removal can be costly in terms of time and physical labor, but it may be cost-effective if large areas require significant vegetation removal. It is also important to note that mechanical removal does not target particular species and the large-scale disruption caused by such techniques may facilitate the growth of weedy species, including the invasive species that are targeted.

2.8.6.3 Chemical Removal

Chemical control involves the use of EPA-approved herbicides and is considered the most cost-effective, long-term control method available. Chemical compounds function by interrupting normal biological processes within the plant, thereby reducing growth or inducing mortality. Herbicide applications are relatively inexpensive across large scales and can provide some specificity, but the control of specific plants will require judicious application. For instance, treatments must be made when growth stages and weather conditions are optimum. Wind direction and speed must be monitored to prevent drift onto desirable vegetation. Chemical applications will not be done if rain is expected within 48 hours because rain can wash the herbicide off the target vegetation or dilute the herbicide to a concentration that is ineffective.

2.8.7 Wildlife Management

The site is expected to function as a wetland area and, as such, it will be attractive to a wide range of organisms. Therefore, it is expected that the site will serve as high quality habitat for a rich community of animals in addition to plants, fungi, and microorganisms. The animals within a community provide numerous intrinsic benefits including nutrient cycling, seed dispersal, and pollination. The benefit of wildlife to humans includes aesthetic values as well as resources for outdoor education, fishing, and hunting. However, the interaction of animal and plant communities can be fragile and may be sensitive at various seral and phenological stages. As such, wildlife management strategies may be necessary to ensure the long-term ecological function of the wetland.

Overgrazing and overbrowsing of vegetation by wildlife can lead to stunting of growth, girdling, and direct consumption of trees by wildlife. This, in turn, degrades the vegetative community and may reduce biodiversity through uneven feeding pressure. Large- and small-scale land cover conversion may also be caused by wildlife (beavers and feral hogs, respectively) in wetland areas. Abnormally high animal population densities, even if only for a brief period, may also cause lasting impacts on aquatic systems (Unckless and Makarewicz 2007). Significant wildlife impacts on-site will be documented as part of the vegetation and infrastructure monitoring (Section 2.10).

If physical, chemical, or biological functions of the wetland are experiencing significant negative effects, the Sponsor will take actions to control any detrimental impacts by wildlife. Management actions may include installing fences, using deterrents, live trapping, and/or harvesting to prevent the undesirable activity of animals that pose a material threat to people, native animals, or habitat conditions within HRMB. The Sponsor will harvest exotic species (i.e., those that are not known to be native to the area based on historical county records) to prevent establishment of these organisms within the Bank. Invasive native species (i.e., those species that grow to populations that negatively affect other species in the community) will be controlled to prevent loss of biodiversity. Nuisance or problem species include species that are native or naturalized that have demonstrated a negative effect on the establishment and survival of the wetland forest stand (e.g., pigs, beavers that graze on freshly planted saplings) and the hydrologic function of the passive hydrologic control structures in the terrace berms (e.g., beavers) rather than those traditionally considered problematic (e.g., foxes, coyotes). For species to be controlled, the Sponsor will act in accordance with state and federal regulations and will provide the USACE and IRT notice of intent to carry out control measures for native species before implementing any such activities.

2.9 Performance Standards

2.9.1 General Success Criteria

The general success of the HRMB requires the Sponsor to comply with the administrative commitments agreed upon by the USACE and IRT. Administrative commitments are the legal and procedural actions taken to ensure the site is reasonably protected from failure due to poor planning, improper land use, or improper funding. The standards listed below further provide the minimum level of success to comply with the terms of this MBI.

1. The Sponsor shall record a Conservation Easement with the Hardin County Clerk that has been approved by the USACE in coordination with the IRT and provide a copy of the recorded Conservation Easement to the USACE SWG Regulatory Division Chief, prior to initial credit release.

2. The Sponsor shall establish and execute financial assurances, approved by the USACE in coordination with the IRT, and provide copies of the respective executed documentation to the USACE SWG Regulatory Division Chief prior to initial credit release.

3. The Sponsor shall establish and execute the long-term management fund prior to initial credit release and shall fully fund the long-term management endowment within three years of the date the MBI is signed by the USACE.

4. Within two calendar years of the date the MBI is signed by the USACE, the Sponsor must provide the USACE and IRT an as-built report with plan drawings (to scale) that include elevations and horizontal distances, and a signed statement demonstrating that construction and planting is complete and compliant with the MBI.

5. Deep-rooted sedge (*Cyperus entrerianus*), Macartney rose (*Rosa bracteata*), trifoliate orange (*Citrus trifoliata*), privets (*Ligustrum* spp.), elephant ear (*Colocasia esculenta*), Johnson grass (*Sorghum halepense*), cogon grass (*Imperata cylindrica*), China-berry (*Melia azedarach*), Chinese tallowtree (*Triadica sebifera*), and all noxious and invasive species currently listed by the Texas Department of Agriculture (TDA 2007) (Texas Register. Volume 32, Number 23. June 8, 2007. Pages 3077-3422) must comprise no more than five percent (5%) actual cover of the herbaceous or other strata.

6. Sponsor shall submit all monitoring, transaction, and other reports on time in accordance with the requirements of this MBI.

2.9.2 Wetland Success Criteria

Implementation of the enhancement and restoration activities on HRMB are expected to result in substantial lift in wetland functions through expanding the extent and improving the function of wetlands under USACE jurisdiction. The Sponsor must demonstrate positive gains in wetland functions to warrant the release of credits by the USACE to the Bank for sale or use as compensatory mitigation. Preserved wetlands on HRMB are considered medium to high-quality wetlands and are not expected to significantly increase or decrease in function. At a minimum, the Sponsor must maintain all wetland parameters described in the Regional Supplement (USACE 2010b) within the Bank at the functional levels credited. Enhancement and restoration credits will be established as a suite of FCUs and released to the Bank once the USACE verifies, in coordination with the IRT, the increase of FCUs from either the initial baseline assessment or a subsequent credit release amount. FCUs will be added or, if necessary, subtracted from the Bank's ledger pursuant to future functional assessments. Wetlands which score lower in FCUs or that do not meet minimum requirement to be classified as wetlands will result in a proportionate reduction of credits/FCUs from the ledger. MBI performance standards, financial assurances and long-term funding requirements are USACE permit conditions and notwithstanding any economic assumptions, the Sponsor remains responsible to ensure success of the compensatory mitigation, maintenance and preservation in perpetuity. If the USACE determines that the Sponsor has failed to meet the required performance standards, submit monitoring reports on time, establish and maintain ledgers and reports in accordance with the provisions of this MBI, and/or otherwise comply with the conditions of the Permit, the USACE will take appropriate action to enforce compliance. Such actions may include suspending credits sales, decreasing available credits, requiring adaptive management measures, utilizing financial assurances or contingency funds, terminating the MBI, or referring the non-compliance to the Department of Justice. The performance standards for the enhancement and restoration of wetlands at the HRMB are listed below and provide the minimum level of success to comply with the terms of this MBI.

1. The Sponsor shall maintain a vegetation community consistent with the baseline composition and cover within preserved forested wetland areas. This will be substantiated by calculating the

Shannon diversity index based on the species endemic to the site and the region immediately following approval and comparing this to following years.

2. Within one year of USACE receipt of the as-built report, the Sponsor must achieve a minimum density of 400 live stems per acre of species identified in the planting list (Section 2.7), with no single species representing more than 33 percent of live stems within enhanced and restored forested wetland areas.

3. Within five years of USACE receipt of the as-built report, the Sponsor must achieve a minimum density of 250 live stems per acre of species identified in the planting list (Section 2.7) that are greater than 3 feet tall, with no single species representing more than 33 percent of live stems within enhanced and restored forested wetland areas.

4. Within 10 years of USACE receipt of the as-built report, the Sponsor must achieve 67 percent areal cover of woody vegetation (e.g., trees, saplings, and shrubs) comprised of a minimum of five tree species identified in the planting list or other natively recruited hydrophytic species within enhanced and restored forested wetland areas.

5. The Sponsor must maintain wetland parameters at a functional level consistent with the verified HGMi functional assessment of baseline conditions or subsequent USACE approved assessments.

6. The Sponsor shall conduct the hydrologic improvements in accordance with the specifications of the MBI. To assess hydrologic improvements, the Sponsor will install, maintain, and monitor continuous water level recorders at locations indicated in the MBI. Hydrographs produced from data collected will be correlated to the field indicators sampled and be provided in all monitoring and credit release reports. This will include documentation of precipitation conditions (normal, wet, dry) during annual monitoring periods using a National Food Security Act Manual WETS analysis, the Palmer Drought Severity Index, or other suitable metric.

2.10 Monitoring Requirements

Monitoring during the establishment and operation of the Bank (active phase) will be performed annually for the first 20 years following submittal of as-built drawings or until all performance standards have been met, whichever is later. During active phase monitoring, the Sponsor shall monitor the Bank to document whether or not performance standards are being or have been achieved. However, supplemental monitoring may be necessary in conjunction with potentially damaging events (e.g., floods, fires, and severe drought). Upon successful completion of the active phase, the Bank will enter into the long-term management phase during which time the Sponsor, the USACE, the IRT, and the Conservation Easement holder may reduce monitoring requirements by mutual consent (Section 2.11).

Monitoring will assess the physical and biological aspects of the Bank as described in the following sections and identify any problems that may need to be corrected. Monitoring activities may identify areas requiring long-term management practices such as: 1) no action, 2) control of nuisance or exotic species, 3) herbicide treatment, 4) prescribed fire, 5) planting or replanting native woody and/or herbaceous vegetation, 6) selective tree harvesting, or 7) other resource management activities. These data will also serve to justify requests for credit releases through HGMi assessments. Unanticipated challenges identified through monitoring activities will be addressed in accordance with the adaptive management plan (Section 2.12). Monitoring will be conducted as described in the following sections.

2.10.1 Infrastructure

Monitoring of infrastructure will consist of inspection and operations checks of all terrace berms, passive hydrologic control structures, and any other necessary hardware and equipment (e.g., access controls) in use. Monitoring activities must be sufficient to examine evidence of natural (e.g., wildlife impacts) and anthropogenic damage to any infrastructure in place. If deficiencies are found, they will be documented and corrective actions implemented within 30 days, with USACE approval.

2.10.2 Wetland Monitoring

2.10.2.1 Hydrology

To determine the efficacy of hydrologic restoration efforts, below-ground water level recorders will be installed in all areas of wetland enhancement and restoration, as described in Section 2.7.1.4, capturing lowest, median, and highest elevations (Noble 2006; USACE 2005). Data from these recorders will be continuously collected and will be compiled annually. The hydrographs generated by these recorders will be correlated to hydrology field indicators sampled and observed throughout the site as well as climatological data from nearby data sources, such as local rainfall gauges, Palmer Drought Severity Index, and NRCS WETS data.

Water level measurements will be graphed and compared with previous monitoring data to determine the level of conformance with performance standards. Indicators of hydrology (as described in the *1987 Corps of Engineers Wetlands Delineation Manual and the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0*) and soil profiles will also be recorded for all vegetation monitoring stations during each monitoring event. If the data indicate the Bank is failing to demonstrate adequate soil moisture measurements, additional hydrology improvements may be warranted. The degree to which soil hydrology is being maintained will be incorporated in the HGMi model to provide validation of mitigation credit availability.

2.10.2.2 Wetland Growth

Transects positioned perpendicular to the wetland/upland boundary will be established prior to annual monitoring throughout the western section of the Bank and will be monitored for wetland growth and/or decline. Wetland growth/decline will be monitored for the first 10 years following approval.

2.10.2.3 Vegetation

2.10.2.3.1 Preserved Vegetation

Vegetation assessments will be conducted within the preserved wetland areas during annual surveys prior to the end of each growing season (October-November) for 10 years following approval. Species richness and evenness data will be gathered from permanent monitoring stations to allow for inter-annual comparisons of the Shannon diversity index and species composition. One permanent monitoring station will be installed for every 100-acre section of the preserved wetland areas. The GPS coordinates of each station will be recorded, and each will be identified with a T-post sheathed with an 8-foot polyvinyl chloride (PVC) pipe.

Quantitative surveys associated with HGMi modeling efforts will occur in Monitoring Years 1, 5, and 10 and this data will be included in the corresponding annual monitoring report. To ensure repeatability of HGMi measurements, one permanent 0.1-acre, fixed-radius (37 feet, 3 inches) stand monitoring station will be randomly placed in each WAA of the preserved wetland areas. This sampling protocol ensures an

accurate measure of tree stem density, properly estimates basal area, and avoids increased expenses associated with larger plot sizes (Becker and Nichols 2011). The data necessary to complete HGMi assessments will be gathered for each sample plot.

In the years that qualitative analysis is used (Monitoring Years 2, 3, 4, 6, 7, 8, and 9), the vegetation monitoring stations will be visited to assess the relative status (alive or dead, general health) of the vegetation and to obtain a photographic record. The qualitative surveys will also assess wildlife use and damage to the forest, the condition of infrastructure, and the overall operability of the site.

2.10.2.3.2 Enhanced and Restored Vegetation

Following initial planting of the wetland enhancement and restoration areas of the Bank, permanent monitoring stations will be established throughout these areas. To sufficiently represent the area, 0.1-acre, fixed-radius (37 feet, 3 inches) sample monitoring station plots will be located within approximately 100-acre blocks of the wetland enhancement and restoration areas of the Bank.

This sampling protocol ensures an accurate measure of stem density, properly estimates basal area, and avoids increased expenses associated with larger plot sizes (Becker and Nichols 2011). Assessment data that substantiates the degree of compliance with the performance standards will be gathered from these monitoring stations. The GPS coordinates of each station will be recorded, and each will be identified with a T-post sheathed with an 8-foot PVC pipe.

Vegetation assessments, as described below, will be conducted immediately after initial planting and during annual surveys prior to the end of each growing season (October–November) for the first 20 years following submittal of as-built drawings or until all performance criteria are met. These assessments will provide feedback on the success of past management activities and provide notice of any need for adaptive management measures. Long-term management phase monitoring may or may not follow the protocols below.

Quantitative surveys associated with HGMi modeling efforts will occur in years 1, 3, 5, 7, 9, 11, 13, 15, 18, and 20 following the submittal of as-builts. Although HGMi analyses may not be applied in the intervening years, qualitative analyses will be provided to the USACE and IRT to indicate continuing ecological success. For quantitative analyses, the Sponsor will survey forest demographic variables (including identification of trees and saplings by species, survival, diameter at breast height, height class, and cover) using sampling methods commonly applied in forest surveys and similar to those recommended in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987), the Regional Supplement (USACE 2010b), and Ainslie et al. (1999). Images will be taken facing up, down, north, east, south, and west for comparison with planted and maturing stand images. Planted trees within each station will be located using GPS and will be tagged and labeled with a unique identifier. The species, height, and diameter at breast height of each tagged stem, as well as trees and shrubs generated by volunteer recruitment, will be recorded with each assessment. The status (alive, dead, missing) and condition (qualitative numeric rating) of each planted and volunteer tree within the plot will be classified. Any significant impacts from domestic animals or wildlife (e.g., overbrowsing or overgrazing) will be recorded. These data will then be used to make direct comparisons as well as to generate indices of vegetative status (e.g., basal area) that indicate growth rates.

Concurrent with forest vegetation assessments, shrubs, vines, and herbaceous vegetation will be quantified using transects extending 10 m in a random direction from the center of the station. Shrub and vine (woody understory) cover will be determined using the transect intercept method. The total length of shrub coverage along the transect will be used to estimate density within the stand. Herbaceous vegetation will be assessed using quadrats (1 m^2) placed on alternating sides of the transect at each of the odd-numbered intervals (1 m, 3 m, 5 m, etc.). The herbaceous cover within each of the five quadrat samples will be identified and

relative percent cover will be estimated for each transect. All vegetation will be identified to the lowest possible taxonomic group and will be categorized by wetland status (scaled from obligate to upland).

In the years that qualitative analysis is used, the vegetation monitoring stations will be visited to assess the status (alive or dead, general health) of planted and volunteer trees and to obtain a photographic record. The qualitative surveys will also assess wildlife use and damage to the forest, the condition of berms, and any other variable of note that may affect the sustainability of the Bank. Qualitative surveys may be supplanted by quantitative surveys at the Sponsor's discretion; however, the schedule for quantitative surveys will not be altered.

2.10.3 Invasive Species

When performing annual vegetation monitoring, the location and condition of exotic, invasive, and noxious species will be noted. These data will indicate the relative success of control measures and identify areas that may require treatment or additional management activities. In accordance with the adaptive management plan, specific monitoring needs and treatment plans for these plants will be identified as necessary and will be approved by the USACE and IRT.

2.10.4 Monitoring Report

Monitoring and reporting requirements are to be in accordance with USACE Regulatory Guidance Letter (RGL) 08-03 "Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment, and/or Enhancement of Aquatic Resources." Reports presenting documentation of monitoring findings will be submitted to the USACE by January 31 of each year, for the first 20 years following signature of the MBI by the Sponsor and the USACE, or until all Performance Standards are met, whichever is later.

2.10.4.1 Project Overview

This section of the report identifies the Bank and the party that conducted monitoring activities. An adequate description (acreage, type of aquatic resources, location, etc.) of the project will be provided to identify the Bank. The overview will also contain a timeline of commencement, scheduled actions, and corrective actions. The overview will include a statement of whether the performance standards are being met and specific recommendations for any additional corrective or remedial actions.

2.10.4.2 Requirements

The report will list the monitoring actions as they pertain to each performance standard listed in Section 2.9. The report will provide data to substantiate the progress in meeting the performance standards for the Bank. All raw quantitative and qualitative data collected for hydrology and vegetation (see Sections 2.10.2.1 and 2.10.2.3) will be included in each monitoring report. Data will be summarized in tables illustrating the degree to which each performance standard has been achieved. Reported hydrology data (Section 2.10.2.1) will include data gathered from water level recorders, hydrology field indicators, soil profiles, and additional hydrology improvements, if warranted. Likewise, vegetation data (Section 2.10.2.3) substantiating the degree to which the Bank is meeting the performance standards will be provided. Vegetation data will include vegetation assessments, GPS coordinates, HGMi model data, vegetation demographics (e.g., tree/sapling identification, survival, diameter at breast height, cover, condition, height, basal diameter, herbaceous species cover and composition), photographs, and evidence of wildlife use. Other data, including overall forest condition, condition of berms, and Bank operability, will be assessed and summarized in the report.

2.10.4.3 Summary Data

Summary data will be provided to substantiate the success and potential challenges associated with the Bank. Photo documentation will be provided to support the findings and recommendations and to assess compliance with performance standards for the monitoring period.

2.10.4.4 Maps and Plans

Maps will be provided to show the location of the Bank relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, and/or other features.

2.10.4.5 Conclusions

A general statement will be included that describes the conditions of the Bank. If performance standards are not being met, a brief explanation of the difficulties and potential remedial actions proposed by the Sponsor, including a timetable, will be provided.

2.11 Long-term Management and Funding Plan

2.11.1 Long-term Stewardship

Once all performance standards are achieved and the required 20 years of monitoring have been completed, the Bank will enter into the long-term management phase. The goal of the long-term management plan is to maintain the preserved, restored and enhanced forested wetlands within the Bank Site in perpetuity. This will be accomplished by the long-term steward maintaining the ecological characteristics of the site and the conservation easement holder (Texas Land Conservancy) monitoring the Bank site and ensuring that no prohibited activities take place.

The primary role of the conservation easement holder will be to ensure enforcement of the conservation easement, which prohibits uses of the land that are detrimental to the conservation values of the property (Appendix C). This will include baseline documentation and ongoing monitoring of the Bank site. As described in Appendix C, the conservation easement holder has the responsibility to identify actions or conditions that are detrimental to the long-term sustainability of the ecological functions of the site; and the right to require restoration by the long-term steward of any damages due to activities that are inconsistent with the conservation easement. The conservation easement holder will be responsible for legal defense of the conservation easement.

The long-term steward will carry out monitoring and management activities required to maintain the ecological functions of the Bank site. Consistent with 33 CFR 332.7(b), the Bank is designed to minimize requirements for ongoing management following the active phase and to be self-sustaining to the maximum extent practicable. The long-term steward will be responsible for tasks including but not limited to

- inspections;
- management of invasive species and herbivory;
- stand thinning and vegetation management;
- trash removal; and
- maintenance of berms, boundaries, and signs.

Site maintenance methods are described in Section 2.8. The long-term management will be consistent with Section 2.8 but reduced in frequency and scope to meet the reduced needs of the established site. When necessary, the long-term steward will work in coordination with the USACE and IRT to determine what, if

any, changes are required for the site to maintain or regain wetland functions, similar to the MBI's Adaptive Management Plan (Section 2.12). Property taxes and insurance will be the responsibility of the landowner.

If requested by the USACE, the long-term steward will prepare an annual report to be submitted to the USACE. The report may include information such as completed tasks for anticipated and unanticipated site conditions and a financial summary including project accounting and a summary of the long-term management fund's balance and performance. Section 2.11.2 describes the long-term management funding in more detail.

The Sponsor, after receiving approval from the USACE in coordination with the IRT, may appoint a separate long-term steward in accordance with 33 CFR 332.7(d)(1). Until such time as a steward is appointed, the Sponsor shall fulfill all stewardship roles.

2.11.2 Long-term Management Funding

In order to ensure that funds are available to provide a source of funding for the perpetual maintenance of the Bank, the Sponsor shall establish an investment endowment account for long-term management funds. This financial assurance will be sufficient to provide for the perpetual maintenance and operation of the Bank's activities, including but not limited to site protection, management, monitoring, reporting, and remedial actions that might be necessary. The long-term management fund investment account will be established and executed prior to the initial credit release and will be fully funded within 3 years of MBI approval. A cost estimate created using the Nature Conservancy Stewardship Calculator is presented in Appendix L-1. The sponsor calculated the long-term funding amount by estimating the labor, materials, and equipment costs for those items necessary to comply with the successful long-term management of the Bank. The Sponsor adjusted maintenance cost based on a 2.67 percent annual inflation rate from 2000 to 2022 (Coin News 2023) and used a 3.50 percent capitalization (cap) rate. The account will be capitalized through annual deposits and funded in the amount of $506,087.69 within 3 years of the MBI approval. The requirement is not contingent on credit sales. The Sponsor included investment returns in its planning, and based on past experience and estimated future performance, assumed a 6 percent annual return. The sponsor will invest the funds into a long-term management endowment managed by National Fish and Wildlife Foundation. This fund is expected to return an average annual rate of return of 3.5 percent and is projected to produce a balance of $506,087.69 when long-term management begins (Appendix L). Notwithstanding economic indicators, projections, or future performance, the Sponsor remains legally and financially responsible for maintaining the Bank pursuant to the DA permit conditions including this MBI.

The Sponsor is responsible for ensuring that the funding of the long-term maintenance and protection account is sufficient. In the event capitalization of the account proves insufficient to meet the long-term management needs of the Bank, the Sponsor, or USACE approved long-term steward, remains liable for such costs. Prior to approving a request to transfer liability to a 3rd party long-term steward, the USACE in coordination with the IRT, will determine whether any additional funding by the Sponsor is necessary and if so, in what amount. The USACE may not approve a transfer of liability until the long-term maintenance account is sufficiently funded.

In the event the financial assurance or long-term funding mechanism is due to expire, or the sponsor proposes to replace the respective mechanism with another type, the sponsor shall notify the USACE at least 120 days prior to the expiration or replacement to allow for USACE review and approval. If a USACE approved funding mechanism has not been established, mitigation bank credits will be suspended until such time financial assurances are approved. Failure to maintain adequate long-term funding shall constitute good cause for suspending or terminating operation of the Bank. The Sponsor is considering the use of an evergreen trust account to complete the long-term maintenance with financial protection. Once obtained,

the long-term funding agreement will be presented in Appendix L-3 when obtained, prior to the submittal of the final MBI.

2.12 Adaptive Management Plan

Adaptive management necessitates stated management objectives to guide decisions about what actions to take and explicit assumptions about expected outcomes to compare against actual outcomes. The linkages among management objectives, learning about the system, and adjusting direction based on what is learned distinguish adaptive management from a simple trial and error process. Therefore, success in adaptive management ultimately depends on effectively linking monitoring and assessment to objective-driven decision making during the operational phase of the Bank. Prior to and during long-term management, adaptive management is not a short-term fix, an assumed resolution to non-compliance or failure to meet a performance standard(s) or responding to single events or short-term problems caused by weather, normal cyclical fluctuations in plant and animal populations, or human interruptions. Accordingly, the conditions and components of adaptive management will be a product of analyzing whether the Bank is currently progressing toward desired outcomes; whether new or improved methods are available to prescribe; and predicting the expected effects of the plan.

The adaptive management framework for the site is based upon the performance standards that serve to indicate the success of the management activities through annual monitoring. Implementation of any adaptive management plan will be based upon the analytical process established by Martin et al. (2005) and will include the following:

1. Compare the analysis of the monitoring data to the performance standards
2. Evaluate whether the site is progressing toward the desired outcome(s)
3. Determine whether any corrective measures are necessary, and, if so, what type
4. Implement any prescribed corrective measures
5. Continue monitoring site progression toward the desired outcome(s)

The process is recursive and allows for the management of the wetlands under unstable and uncertain conditions. In the event that monitoring or other information indicates that the site is not progressing towards meeting the performance standards as anticipated, the Sponsor shall notify the USACE as soon as possible. The Sponsor will submit to the USACE the necessary adaptive management plans that identify the adaptive management considerations, proposed measures, and an appropriate schedule for implementation of any such measures.

The USACE, in coordination with the Sponsor and IRT, shall determine what changes to the site will be in the best interest of the Bank before approving proposed alterations in the management plan based on site-specific conditions. These measures may include, but are not limited to, site plan modifications, design changes, revisions to maintenance requirements, revised monitoring requirements, revised performance standards, and a resulting reduction or increase of credit calculations. The measures must be designed to ensure that the modifications provide resource functions comparable to those described in the mitigation plan objectives. Any management change shall be specified in a revised MBI or other appropriate document and will require the approval of USACE, after coordination with the IRT.

With the approval of the USACE, in coordination with the IRT, performance standards may be revised in accordance with adaptive management to account for measures taken to address deficiencies in the Bank. Performance standards may also be revised to reflect changes in management strategies and objectives if new standards provide for ecological benefits that are comparable or superior to those approved for the Bank.

2.13 Financial Assurances

Per 33 CFR 332, the Sponsor must provide sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed and maintained in accordance with applicable performance standards. The Sponsor will secure sufficient financial resources, taking into account inflation, to ensure compliance with the requirements of the MBI in the event that the Sponsor is no longer able or willing to operate the Bank in compliance with the MBI. This financial assurance should be sufficient to provide for construction, maintenance, and operation of the bank's activities, monitoring, reporting, and any remedial actions that might be necessary. Site-specific considerations, such as the position of the bank within the watershed, normal hydrology, soils, type and extent of site development activities proposed, and expected relative ease or difficulty of achieving the performance standards, may affect the size of the financial assurance. Failure to maintain an adequate financial assurance shall constitute good cause for suspending or terminating operation of the bank.

A cost estimate of the financial assurance requirements for the project through the successful completion of the construction and establishment (i.e., performance monitoring, maintenance, and adaptive management) phases of the Mitigation Plan has been developed based on the experience of the Sponsor's Agent relative to the labor, materials, and equipment costs for those items associated with construction and establishment of the project as well as a 10 percent contingency. Summary cost estimate tables for each of these components are shown in the respective tables in Appendix L-2 of Appendix L, and the total estimated costs are $1,305,261.71, as shown in Table L-2a. The Sponsor estimates that initial construction and planting costs are $423,363.06, as shown in Table L-2a of Appendix L-2 (Appendix L). Detailed summaries of the construction and planting costs are provided in Table L-2b (Wetland Enhancement & Restoration Construction Costs) of Appendix L-2 (Appendix L). Because the financial assurance account must be sufficient to fund establishment activities throughout the first 20 years of the bank, the Sponsor estimated annual costs for this period and accounted for inflation at a rate of 3 percent for each of the first 20 years after the completion of construction. The assumed 3 percent inflation rate is based on the U.S. Federal Reserve's published long-term goal and Consumer Price Index reported annual inflation rates from 2013 to 2022. Based on this, the 20-year cost of establishment (i.e., performance monitoring, maintenance, and adaptive management) is estimated to be $881,898.65 (Table L-2a). Detailed cost estimates by year for the 20-year monitoring period are shown in Table L-2c of Appendix L-2 (Appendix L).

The Sponsor will secure financial assurance to provide for the total estimated construction and establishment costs, including a 10 percent contingency of $1,305,261.71, as described above and as shown in the tables in Appendix L-2 of Appendix L. The value would be reduced upon successful completion (as approved by the USACE) of the construction and each of the 20 years of monitoring by the amounts shown in Table L-2c of Appendix L-2 (Appendix L). The details of the financial assurance mechanisms will be provided in Appendix L-4, prior to the submittal of the final MBI.

In the event that the use of short-term financial assurance becomes necessary, all amounts paid by the short-term financial assurance provider shall be deposited directly into a stand-by trust fund for distribution to a designated trustee in accordance with 33 CFR 332.3(n)(6). The Bank's land, released credits, sold credits, and long-term management funds shall not be used as collateral for the performance bond.

3 BANK OPERATIONS

3.1 Accounting Procedures

Sponsor will establish and maintain a system for tracking the production of credits, credit transactions, and financial transactions between Sponsor and permittee. Credit production, credit transactions, and financial

transactions must be tracked on a Bank basis and separately for each individual permit. Credits will be debited from the ledger once a financial transaction has occurred. The Sponsor will notify the USACE of each transaction and provide the USACE a copy of the ledger entry within 15 days of each transaction. Sponsor will inform the IRT of the status of credits reserved on an independent submittal.

Each ledger entry will include the following information:

- Date of submittal,
- USACE-permit applicant's name, address, and telephone number,
- USACE-permit and/or other identification number,
- Brief description of the location and type of authorized work (8-digit HUC),
- Brief description of the nature and extent of adverse project impacts,
- Sponsor assumes legal responsibility for the mitigation requirements,
- Account balance before transaction,
- Date of transaction,
- Number of credits currently available,
- Number of credits debited from the credit availability account, and
- Account balance after transaction.

The Sponsor shall also provide an annual statement of the account to USACE by January 31 of each year until all credits have been withdrawn and the Bank is closed.

The Sponsor shall be responsible for maintaining the Bank's credit ledger in the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS). All credit transactions shall be entered into the database no later than seven calendar days after the transaction has occurred or the USACE reserves the right to suspend credit sales until sales transactions are deemed current and compliant. RIBITS mandatory information fields include the following:

1. Jurisdiction
2. Transaction Date
3. Credits Debited
4. USACE Permit Number [Format: SWG-Year-Permit # (e.g., SWG-2019-00237)]
5. Name of Permittee
6. Credit Classification (if applicable, with functional assessment subcategories identified (e.g., HGMi identify amounts within each functional category: TSSW = Temporary Storage & Detention of Storage Water = Physical; MPAC = Maintain Plant & Animal Community = Biological; and RSEC = Removal & Sequestration of Elements & Compounds = Chemical)

Compliance with RIBITS reporting does not supersede the requirement of the Sponsor to submit individual transaction reports.

By definition (USACE-EPA 2008), mitigation credits quantify the aquatic functions of mitigation sites. Typically, these are calculated using a model that accounts for the biological, chemical, physical, or other capacities of an aquatic resource. In the case of HRMB, a single credit ledger will be used to record preservation, enhancement, and restoration. The Riverine Forested HGMi (USACE 2010a) functional assessment method will be used to determine the functional capacity of wetlands at the Bank (credits) by quantifying the current and future functional assessment scores resulting from implementation of this MBI.

With the exception of advanced credit, bank credits are released to HRMB once the USACE verifies the increase of FCUs from the initial baseline or subsequent credit release amount. FCUs will be added or, if necessary, subtracted from the appropriate ledger according to USACE determination. The Bank scoring

lower in FCUs or failing to meet minimum requirements to be classified as a wetland will result in a reduction of credits from the ledger. No more than one credit release that necessitates an HGMi verification from the USACE shall be requested per year.

The Sponsor has requested "advanced credits" (or advanced debiting) of 30 percent of the projected lift for the enhanced/restored wetlands (Appendix M). Accordingly, upon executing the MBI, filing a USACE-approved Conservation Easement, and the execution of a USACE approved financial assurance, the USACE will release 10 percent of the enhanced/restored wetlands projected credits and 100 percent of the preserved wetlands and upland buffer credits. Additionally, completion of construction and planting activities will result in the release of an additional 20 percent of the enhanced/restored wetlands projected credits. All subsequent credit releases for the enhanced/restored wetlands will occur only when future functional assessments submitted by the Sponsor are verified by USACE, in coordination with IRT, to show an increase in FCUs of the three functional categories that exceed the respective number of the advanced credit released.

Credits must be traded as a suite of functions (i.e., TSSW, MPAC, and RSEC). Therefore, once credits from any functional category are exhausted, remaining credits in the other functional categories are unavailable as compensatory mitigation until such time as additional credits for any exhausted categories are released by the USACE and added to the account.

The number of credits for each functional category (TSSW, MPAC, and RSEC) for the enhance/restored wetlands shall be debited on a 1:1 basis for impacts within the primary service area or on a 1.5:1 basis for impacts within the secondary service area. On a case-by-case basis, the USACE, after coordination with the IRT, may authorize use of the Bank outside both the primary and secondary service areas when unique circumstances make use of the Bank appropriate, practicable, and environmentally preferable. Alternate debiting ratios may be required on a case-by-case basis by the USACE for a project under consideration that is located outside of the service areas. A minimum of one-tenth (0.1) FCU for each functional category shall be debited from the enhanced/restored ledger for each transaction. If the number of credits required for compensation is a non-integer, then it shall be rounded up to the nearest one-tenth. Applicants have the option to assume a 1.0 surrogate functional capacity index value for each functional category if they choose not to conduct an HGMi functional assessment.

All credit transactions will be recorded by the Sponsor to the nearest 0.1 FCU.

3.1.1 Financial Accounting

The full balance of the long-term management fund must be supplied within 3 years of approval of the MBI. As stipulated in Section 2.11, the Sponsor will deposit $506,087.69 within 3 years of approval of the MBI to ensure long-term viability. To demonstrate that these deposits are made, the Sponsor will provide the USACE written notification from the Bank of each deposit made into the long-term management fund within 15 days of any such deposit. The notification will include the date, amount, and transaction receipt as evidence of compliance with the funding requirements.

The long-term management funds will be invested, managed, and accounted for using standard accounting procedures including annual independent audits. Investment of the long-term management funds is defined in Section 2.11.

3.2 Reporting Protocols

In accordance with USACE Regulatory Guidance Letter 08-03 (USACE 2008), the Sponsor will provide a financial assurance statement to USACE by January 31 (or the following business day, if that date falls on

a holiday or weekend) of the following year of each year in which financial assurances and/or Long-Term funding reports are required. In the financial assurance statement, the Sponsor will discuss the status of the fund/assurance and propose any reduction or increase that the Sponsor deems appropriate in light of the requirements of the MBI. USACE will evaluate the proposal and, after coordination with the IRT, provide the Sponsor a decision. Along with the report, the Sponsor will include a signed statement that their account is (or is not) in compliance. Annual reports will be submitted until all credits have been withdrawn or the Bank is closed.

3.2.1 Monitoring Report

The annual report will include a monitoring report that will serve to determine the degree to which HRMB is meeting performance standards and the need for any additional measures necessary to ensure the Bank is accomplishing its objectives. Annual ledger reports and the most recently completed Conservation Easement Monitoring Report will also be included.

3.2.2 Financial Assurance and Long-term Management Funding Report

The Sponsor shall provide an itemized, annual financial report to the USACE SWG by June 30 of each year in which financial assurances are required. The annual financial report will include:

- For each year in which financial assurance is required – itemization of any and all activity associated with the construction and establishment of financial assurance and an assessment of that assurance including current status and potential expiration.
- A statement as to whether the long-term management fund investment account is in compliance with the MBI.
- A distribution schedule of the long-term management fund investment account.
- Itemization of any and all account activity associated with the long-term management endowment and an assessment of the endowment's current performance to reasonably ensure perpetual funding for long-term management.

In accordance with 33 CFR 332.3(n)(5), the Sponsor is required to give the USACE at least 120 days advance notice if the financial assurance instrument will be amended, terminated, or revoked. In addition, the financial assurance instrument must be written in such a way that it is the obligation of the bonding company or financial institution to provide USACE SWG notice. Inclusion of a summary of any changes to the financial assurance instrument in the reporting year does not alter this separate obligation. Both provisions are clearly stated in the financial assurance documents contained in Appendix L.

3.3 Credit Release Schedule

Credit releases are contingent on the attainment of performance standards and fulfillment of administrative requirements specified in the MBI for each wetland assessment area according to the following schedule:

1. *Administrative:* Sponsor may apply for a release of 10 percent of the 20-year projected available FCUs for the enhanced/restored wetlands and 100 percent for the preserved wetland FCUs upon the execution of this MBI, filing of the USACE approved Conservation Easement, ceasing all land uses that are not consistent with this MBI, establishment of appropriate USACE approved financial assurance mechanisms, and establishing a long-term management fund.
2. *Construction/Planting Activities:* Sponsor may apply for a release of 20 percent of the 20-year projected available FCUs for the enhanced/restored wetlands upon construction of hydrologic

improvements (e.g., microtopography), site preparation, and vegetation re-establishment as specified in the MWP, per verification of the as-built report.

3. S*ubsequent Credit Release:* Sponsor may apply for a release of additional enhanced/restored wetland FCUs based on quantified increases in the functional values of the wetlands within the Bank. Each credit release request will be for the entire Bank. Functional assessments will be conducted on each unit a minimum of ten times, at approximately years 1, 3, 5, 7, 9, 11, 13, 15, 18, and 20 following submittal of as-built drawings to the USACE. Release of these credits at years 3, 5, 7, 9, 11, 13, 15, 18, 20, and beyond may be approved following USACE verification of the Sponsor's determination. No more than one credit release per year that necessitates an HGMi verification will be authorized.

Upon signature of this MBI, credits will be released in accordance with the requirements and release schedule described above and in Appendix M, after approval by USACE in coordination with the IRT. Under no circumstances will credits be sold before they are released by the USACE, in coordination with the IRT. If at any time this occurs, HRMB will be immediately suspended. All credit releases shall be contingent on the Sponsor being in compliance with the terms and conditions of the permit and MBI with all associated documents.

3.4 Contingency Plans and Remedial Actions

In the event HRMB or a specific part of the Bank fails to achieve success criteria as specified in this MBI, the Sponsor shall notify USACE and develop necessary contingency plans to implement appropriate remedial actions for approval by USACE, in coordination with the IRT. In the event the Sponsor fails to implement remedial actions within the USACE-approved timeframe, USACE will take appropriate actions to enforce compliance with the terms of the MBI. If reasonable efforts by the Sponsor fail to bring the Bank into compliance with the requirements of the MBI, the USACE will notify the Sponsor and the agent responsible for the transfer of financial assurances, and the Conservation Easement holder of non-compliance. The Conservation Easement holder may then collect the funds necessary to correct the deficiency and cause corrective action to be taken. Any remedial action may, but will not automatically, demonstrate compliance with USACE Permit SWG-2019-00237 which has independent compliance and enforcement provisions.

3.5 Provisions Covering the Use of the Land

The Conservation Easement shall act as the mechanism that protects the Bank from land uses contrary to establishment of wetlands. Uses compatible with the purpose of HRMB as approved by USACE (e.g., hiking, nature viewing, academic pursuits, hunting, and fishing) may be specifically authorized on a case-by-case basis by the Sponsor. The draft conservation easement is provided as Appendix C.

The USACE and IRT are granted permission to perform periodic site inspections to ensure the Bank is being operated in accordance with this MBI. In conjunction with the USACE, the IRT will coordinate site visits with the Sponsor by requesting a site visit. Upon receiving a request for a site visit, the Sponsor will schedule a visit for a time that is mutually acceptable to the USACE and the Sponsor.

3.6 Approved Credit Quantities

Upon signature of the document, the USACE, in consultation with the IRT, grants the sponsor the proposed quantities of wetland credits, as described in Section 3.3 and Appendix M or the attached mitigation plan. The release of these credits shall follow the schedule described in Section 3. In accordance with the Final Rule for the Compensatory Mitigation for Losses of Aquatic Resources issued by the USACE and the EPA,

dated April 10, 2008, these quantities can be adjusted downward if ecological performance standards are not met or adjusted upward if the ecological performance standards are significantly exceeded.

3.7 Force Majeure

Any delay or failure of the Sponsor to comply with the terms of the MBI shall not constitute a default if and to the extent that such delay or failure is primarily caused by any force majeure event, as determined by the USACE, resulting in conditions beyond the Sponsor's reasonable control and significantly adversely affects its ability to perform its obligations hereunder. Force majeure conditions may include severe flooding, drought, lightning, earthquake, landslide, arson, wildfire, civil disorder, condemnation, or other taking by any governmental body. The Sponsor shall give written notice to the USACE and IRT if affected by any such event within 60 days in order to restore compliance. Following a force majeure event, the Sponsor should not expect the Bank to be in compliance with the MBI, therefore, the Bank may be suspended, terminated, or closed. Because of a force majeure event, the Bank may not be in compliance or meet performance standards. If the USACE agrees that a force majeure event occurred, the Bank will be suspended until remedial actions and remaining mitigation obligations are approved. In the event that the Bank is not in compliance, not meeting performance standards, and ultimately if the result of the force majeure event is that the Bank is suspended, terminated, or closed, the Sponsor remains liable for fulfilling all remaining mitigation obligations including maintenance, monitoring, reporting, and long-term management requirements.

As some disasters are reasonably expected to occur as part of the natural climate regime of the Texas Gulf Coast, they are discussed in the Adaptive Management section of this MBI (Section 2.12). In the event of a condemnation or other governmental taking which results in the loss of wetlands, the remedy shall include mitigating for lost ecological functions by the condemning party as calculated by the appropriate hydrogeomorphic model and determined by USACE.

3.8 Validity, Modification, or Termination of the Mitigation Bank

This MBI will become valid upon signature by the USACE and Bank Sponsor. This MBI may be amended, altered, released, or revoked only by written approval by USACE to the parties hereto or their heirs, assigns or successors-in-interest. The amendment must follow the appropriate procedures listed in 33 CFR 332.8 unless the DE determines that the streamlined review process described in 33 CFR 332.8(g)(2) is warranted. Any of the IRT members may terminate their participation upon written notification to all signatory parties. Participation of IRT members will terminate 30 days after written notification.

Subject to restrictions dictated by the Conservation Easement, the landowner may convey fee simple title to, or other forms of property interest in, any property included within the Bank provided the necessary protective mechanisms are recorded respective to this MBI. In the event of a transfer in land ownership, the landowner will make a reasonable effort to ensure that the property is conveyed to an environmentally responsible party.

The Sponsor may request to transfer sponsorship of HRMB to another entity, such as a non-profit land trust, governmental entity, or private party provided that the new Sponsor agrees to abide by the terms of the MBI or a USACE-approved, modified MBI. Upon transfer of sponsorship, all obligations for future performance of the original Sponsor shall be terminated and the successor Sponsor shall provide all such obligations. Unless a substitute financial assurance mechanism is established, all unused funds in the long-term endowment, as well as the right to draw against the account, will be transferred to the successor Sponsor. USACE must be notified as to the proposed transfer 60 days in advance. Any transfer/change of

Sponsor can only be completed with advanced USACE approval and all obligations of the Sponsor as provided in USACE Permit SWG-2019-00237 and the MBI remain unchanged.

Nothing in this instrument shall be construed as altering the responsibilities or empowering new authority in favor of the signatory agencies as specified in existing law, regulation, and policy. The Sponsor will be allowed, with USACE approval, to implement supplemental mitigation actions or activities to protect or enhance ecological services on the property provided that such activities are consistent with the conservation purposes of the MBI.

Notice of instrument termination will be sent to all signatories. In the event of termination of the instrument, the Sponsor or successor Sponsor shall maintain on-site mitigation to the degree required by the applicable Section 404 permit(s). With regard to any future termination, revocation, or modification of this instrument, the protective mechanisms that direct the Bank to protect the aquatic ecosystem shall remain effective in perpetuity.

3.9 Controlling Language

To the extent that specific language in this document or appendices changes, modifies, or deletes terms and conditions contained in those documents that are incorporated into the MBI by reference, and are not legally binding, the specific language within the USACE Permit SWG-2019-00237 and MBI shall be controlling.

3.10 Default and Closure Provisions

If the USACE/IRT determines that the Sponsor has failed to provide the required compensatory mitigation performance standards, submit monitoring reports on time, establish and maintain ledgers and reports in accordance with the provisions in Section 2.9, and/or otherwise comply with the terms of the MBI, the USACE will take appropriate action to enforce compliance with the terms of the MBI. Such actions may include suspending credits sales, decreasing available credits, requiring adaptive management measures, utilizing financial assurances or contingency funds, terminating the MBI, or referring the non-compliance with the terms of the instrument to the Department of Justice. The Sponsor shall remain responsible for fulfilling these obligations until such time as the long-term financial obligations have been met and the long-term liability of all mitigation has been transferred to a party approved by USACE, in coordination with the IRT.

Bank closure shall be the first date that all of the following have occurred:

1. all performance standards have been achieved and verified by USACE,
2. all monitoring requirements have been met and verified by USACE,
3. all financial responsibilities have been met, including 100 percent of long-term management funding in place for not less than one year, and
4. USACE approval, in coordination with the IRT, of either the Sponsor's written request for Bank closure or otherwise determined closed by discretion of the DE.

4 ADDITIONAL INFORMATION

4.1 Water Rights

Based on preliminary assessments of the mitigation site, the Sponsor asserts that pursuant to Section 11.142(b) of the Texas Water Code, the HRMB qualifies for an exemption from water rights permitting. The proposed plan will ensure that surface water continues to flow into Jackson Creek, as well as other

tributaries, in a controlled manner. All hydrologic improvements in the restoration area will result in additional retention/ponding of no more than 200 acre-feet of surface water on the site. Section 11.142(b) of the Texas Water Code states that:

> "Without obtaining a permit, a person may construct on the person's property a dam or reservoir with normal storage of not more than 200 acre-feet of water for fish and wildlife purposes if the property on which the dam or reservoir will be constructed is qualified open-space land, as defined by Section 23.51, Tax Code. This exemption does not apply to a commercial operation."

The mitigation site will be constructed in such a way that the maximum volume of water that will be detained from surface flows will be no more than 200 acre-feet. Additionally, Section 23.51 (7)(C) of the Texas Tax Code states that:

> "'Wildlife management' means: actively using land for a conservation or restoration project to provide compensation for natural resource damages pursuant to … the Federal Water Pollution Control Act (33 U.S.C. Section 1251 et seq.)…"

The HRMB will serve as a wetland mitigation bank for impacts authorized under the Federal Water Pollution Control Act (33 U.S.C. Section 1251). As such, the bank will provide benefits to the terrestrial and aquatic flora and fauna of the area. The Texas Water Code does not provide a definition of "commercial operation"; hence, the 30 Texas Administrative Code §297.21(e) Domestic and Livestock and Wildlife Permit Exemptions is referred to. The 30 Texas Administrative Code §297.21(e) Domestic and Livestock and Wildlife Permit Exemptions states that:

> "For the purposes of this subsection, commercial operation means the use of land for industrial facilities, industrial parks, aquaculture facilities, fish farming facilities, or housing developments."

The HRMB will not be categorized as a commercial operation under the definition in the Texas Administrative Code in that it will be placed under a permanent conservation easement. Furthermore, the site will function as a conservation area.

TCEQ has confirmed with the SWCA that the HRMB does not require a water rights permit at this time. Should modifications be made to the MBI, the Sponsor will comply accordingly with the water rights permitting pursuant to the Texas Water Code once the wetland restoration design permit drawings are at 60 percent. A copy of TCEQ's response is provided in Appendix N.

4.2 Mineral Resources

Valuable mineral resources may exist under the land in this Bank; however, the subsurface mineral rights for the property are not currently owned by the Sponsor. Recognizing that surface landowners in the State of Texas cannot wholly control a mineral owners' access to those minerals, the Sponsor has developed a Mineral Management Plan to reduce the risk of impinging on the mitigation bank (Appendix O).

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Signature Page

SPONSOR: Toledo Summerlin Hues Investment

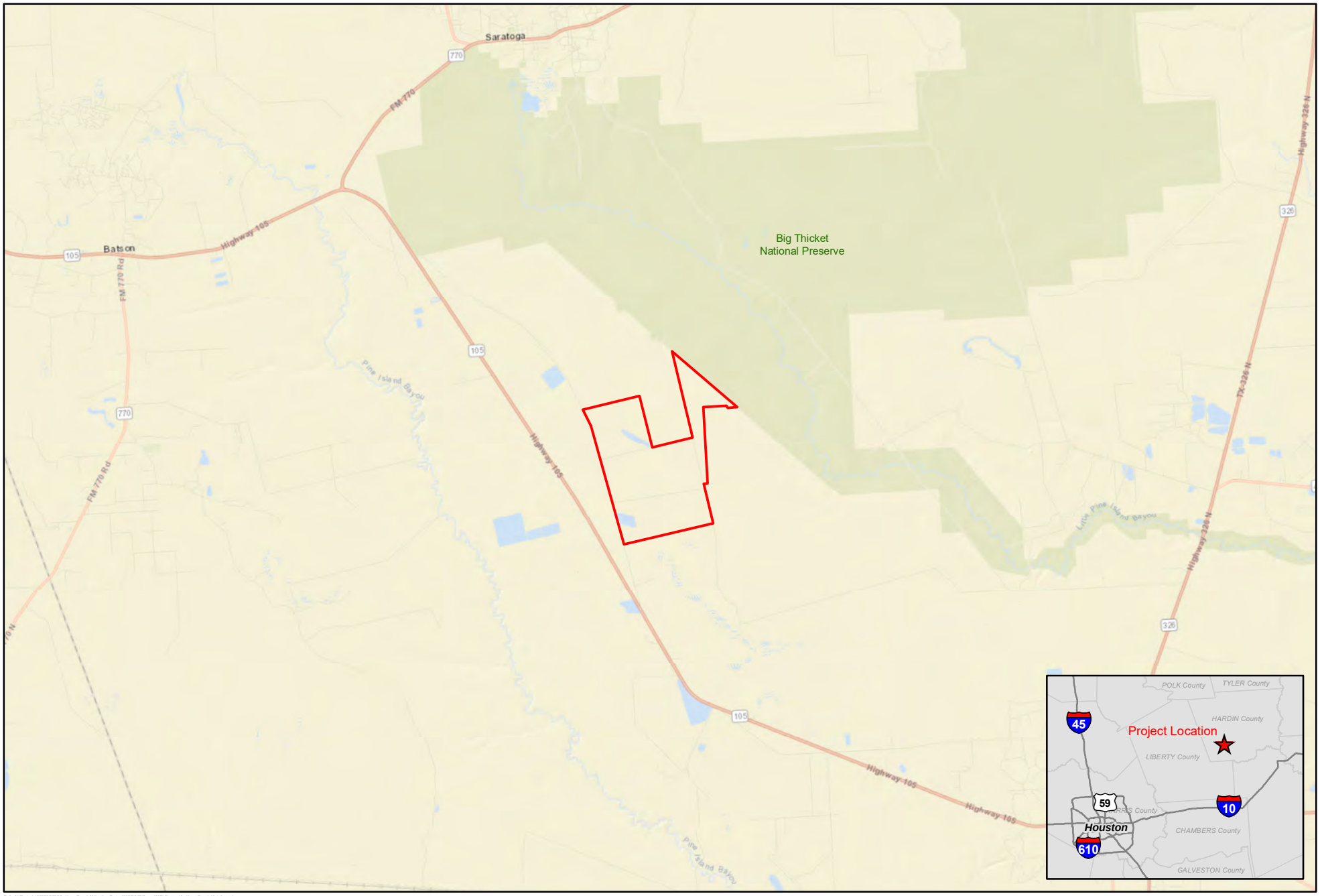
Alton Hues	Date

U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT

Joe A. McMahan Chief, Regulatory Division	Date

APPENDIX A

FIGURES



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

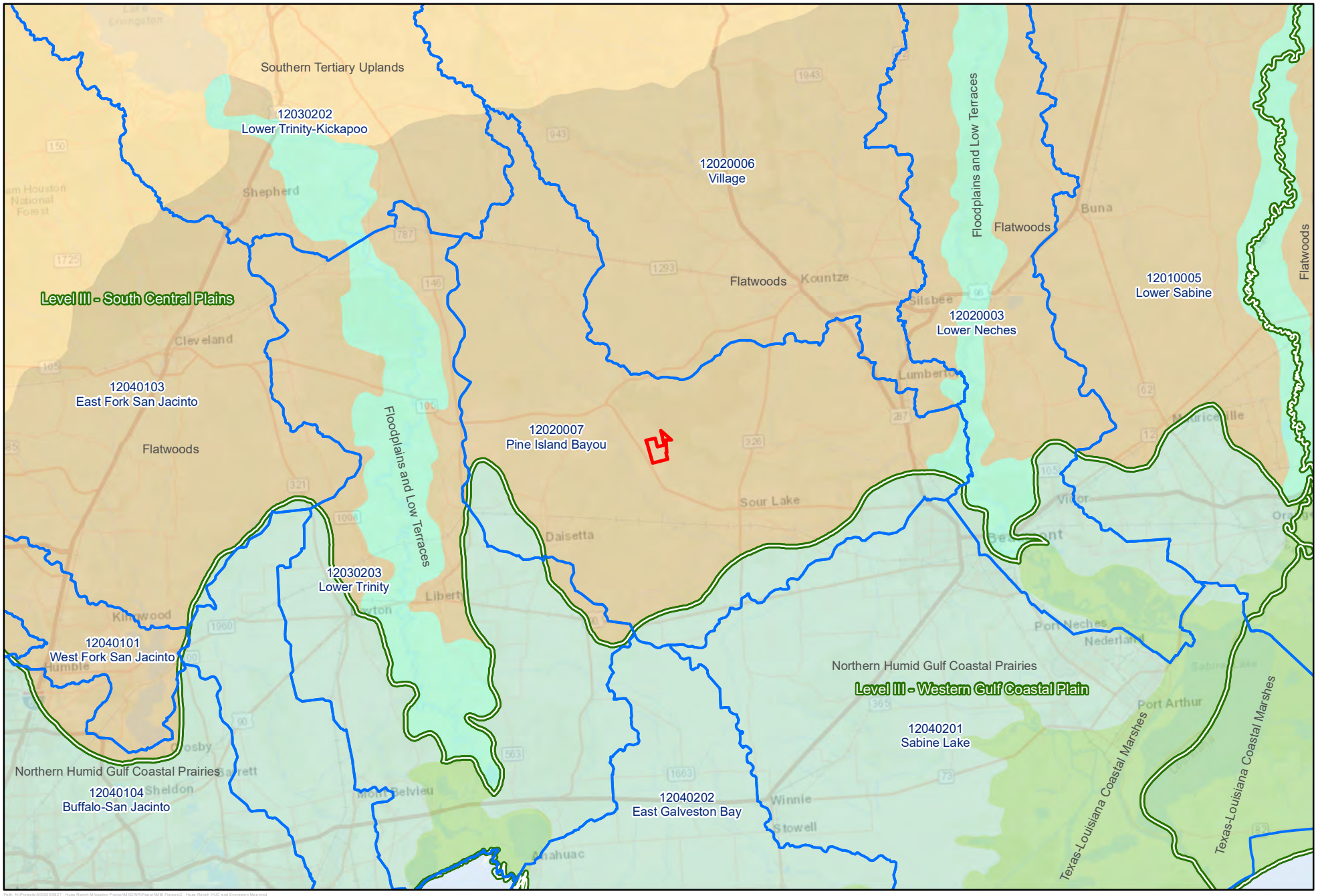
VICINITY MAP
HARDIN COUNTY, TEXAS
FIGURE 1

Project Boundary

1:100,000

Created By: JS
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 0.5 1 Miles
0 0.5 1 1.5 Kilometers



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

HUC & ECOREGIONS MAP
HARDIN COUNTY, TEXAS
FIGURE 2

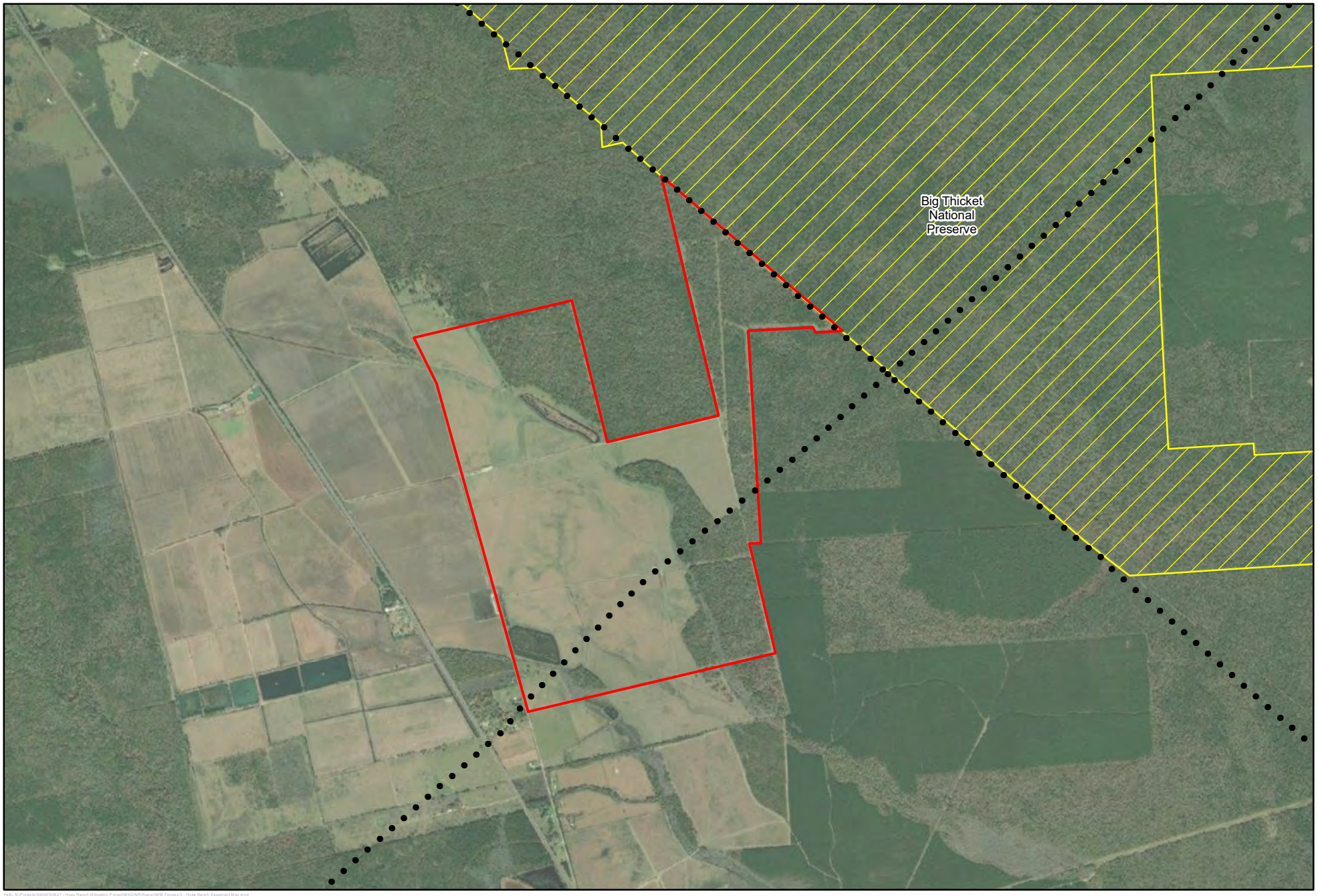
Project Boundary
HUC 8 Boundary
Ecoregion Level III Boundary

Ecoregion Level IV Boundary
Flatwoods
Floodplains and Low Terraces
Southern Tertiary Uplands
Northern Humid Gulf Coastal Prairies
Texas-Louisiana Coastal Marshes

1:600,000

Created By: JS
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 2.5 5 Miles
0 3 6 9 Kilometers



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

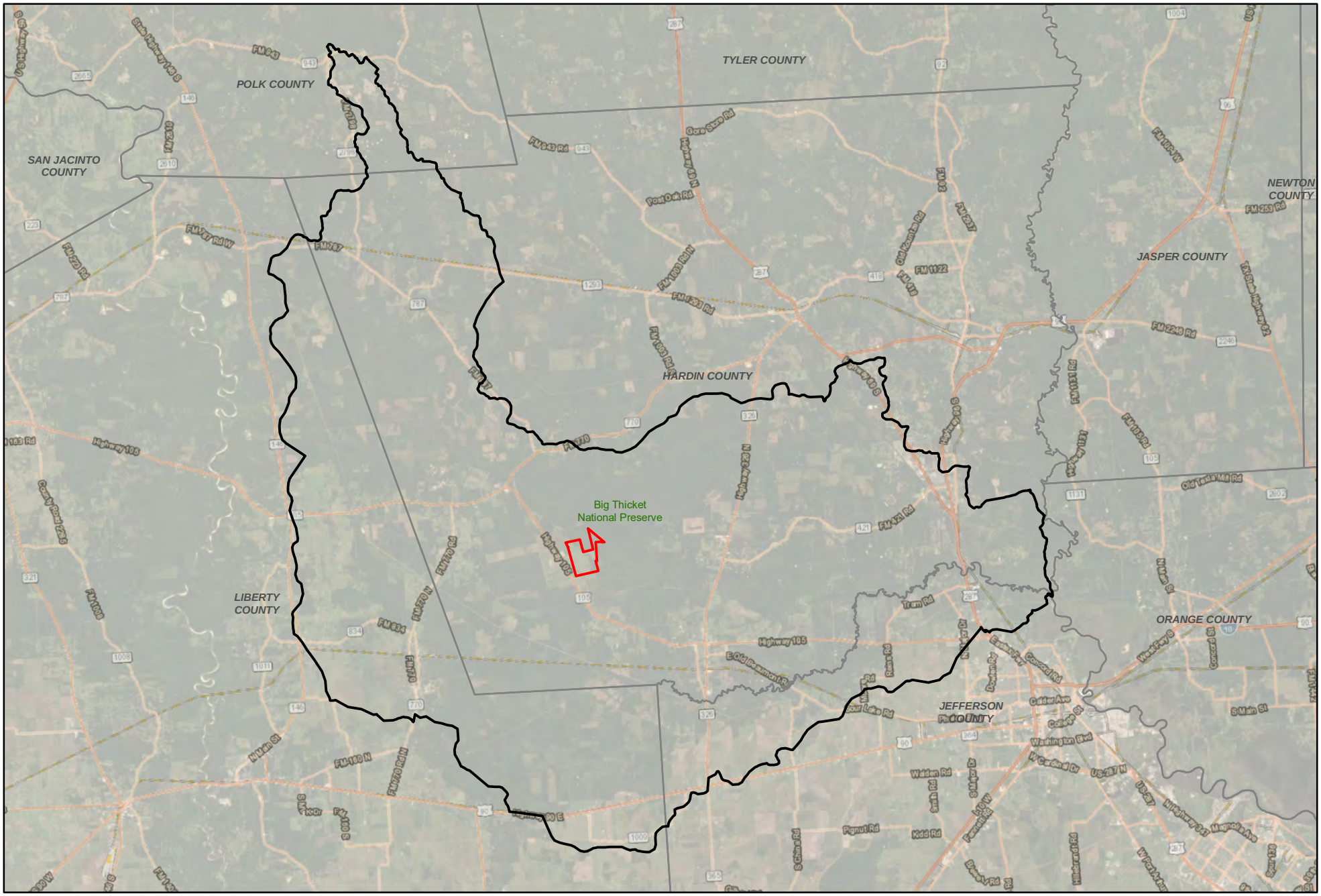
EASEMENT MAP
HARDIN COUNTY, TEXAS
FIGURE 3

Project Boundary
National Park Service Boundary
Pipelines

1:36,000

Created By: JS
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

WATERSHED MAP
HARDIN COUNTY, TEXAS

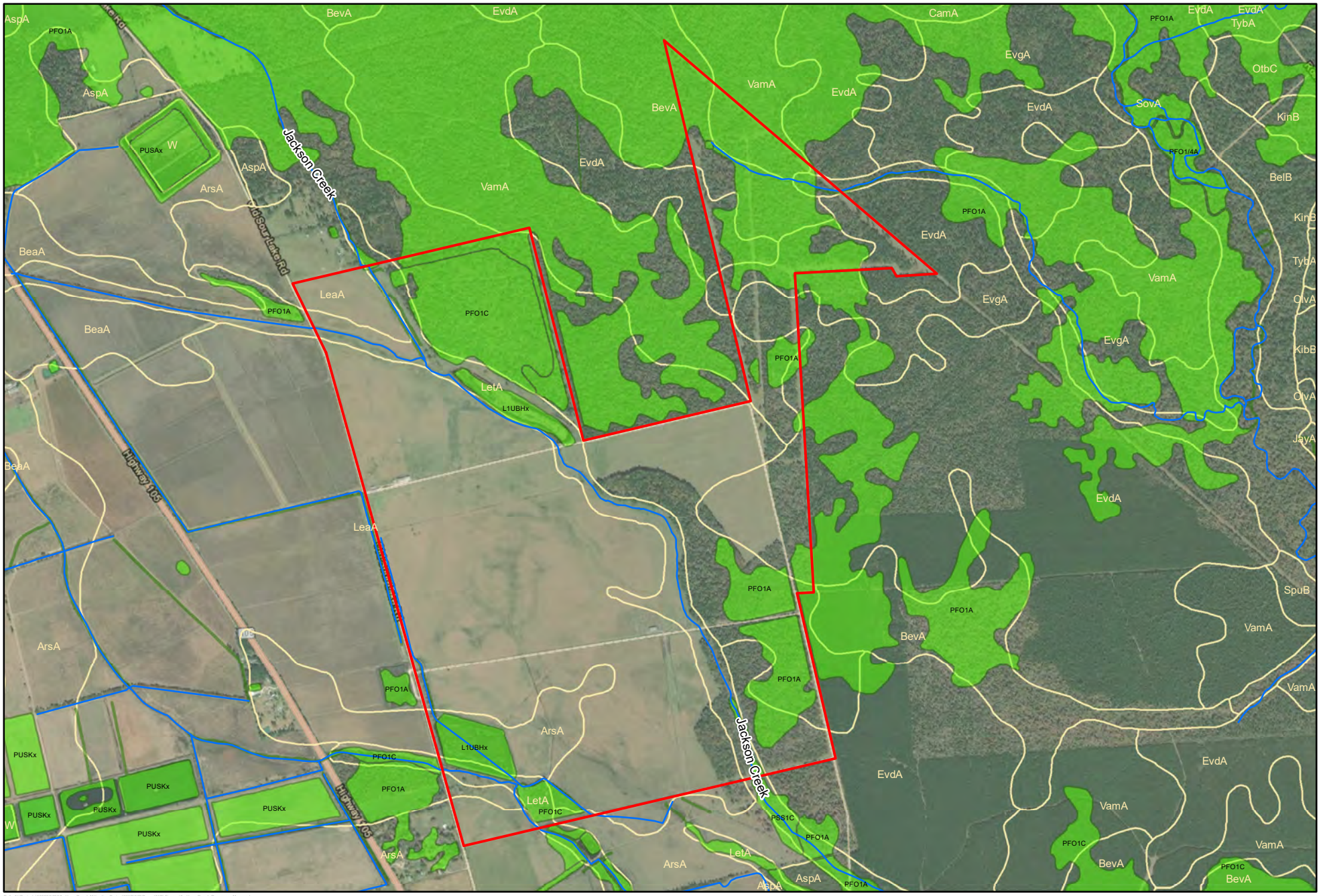
FIGURE 4

- Project Boundary
- Pine Island Watershed (HUC 12020007)
- County Boundary

1:404,561

Created By: K. Shields
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 2.5 5 Miles
0 3 6 9 Kilometers



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

RESOURCES MAP
HARDIN COUNTY, TEXAS
FIGURE 5

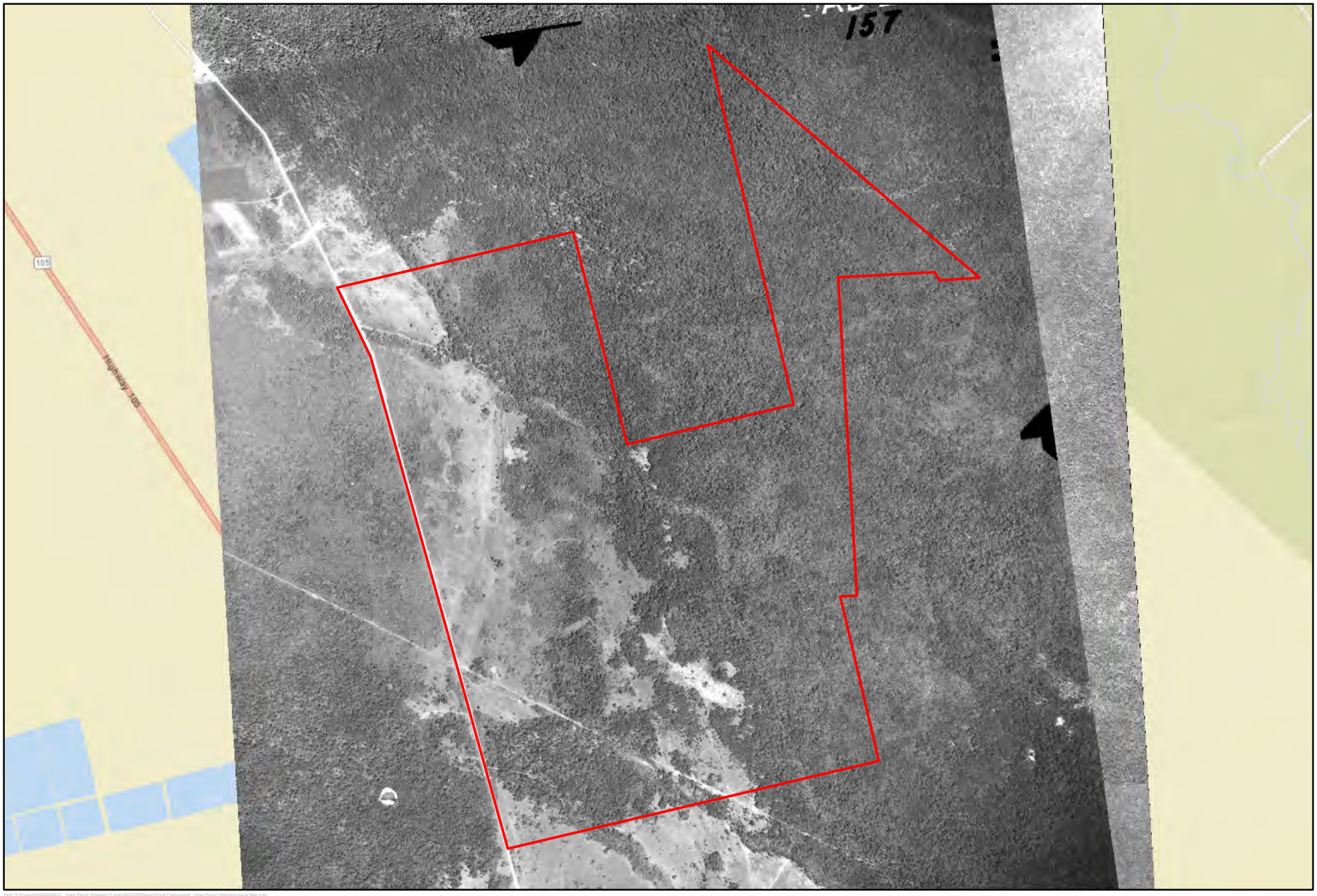
Project Boundary
Soil Map Unit Boundary
NHD
NWI

Note: Unincorporated area of Hardin County, no 100-year floodplain within project vicinity.

1:24,000

Created By: JS
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

1943 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-1

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters

SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

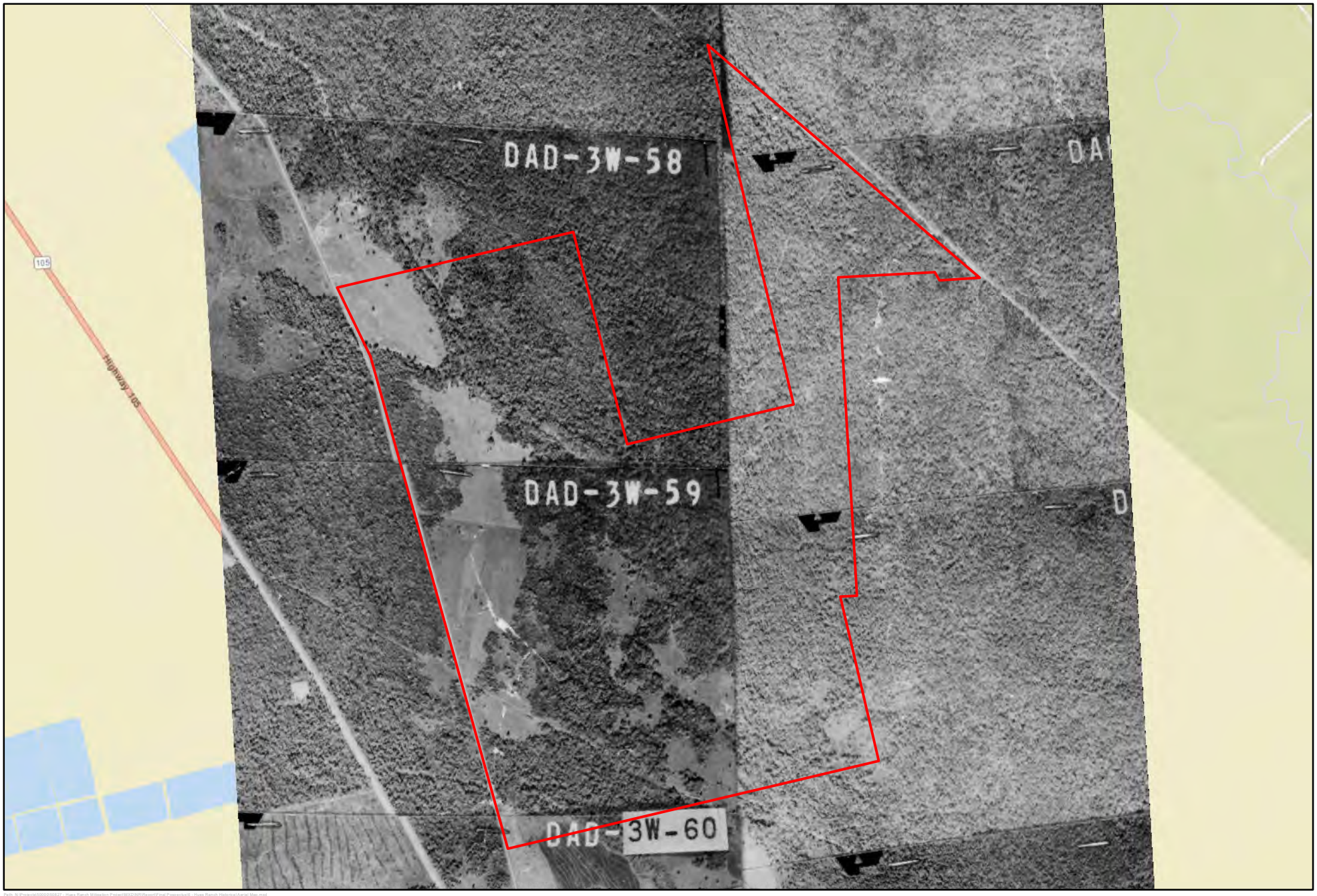
1952 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-2

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

1958 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS

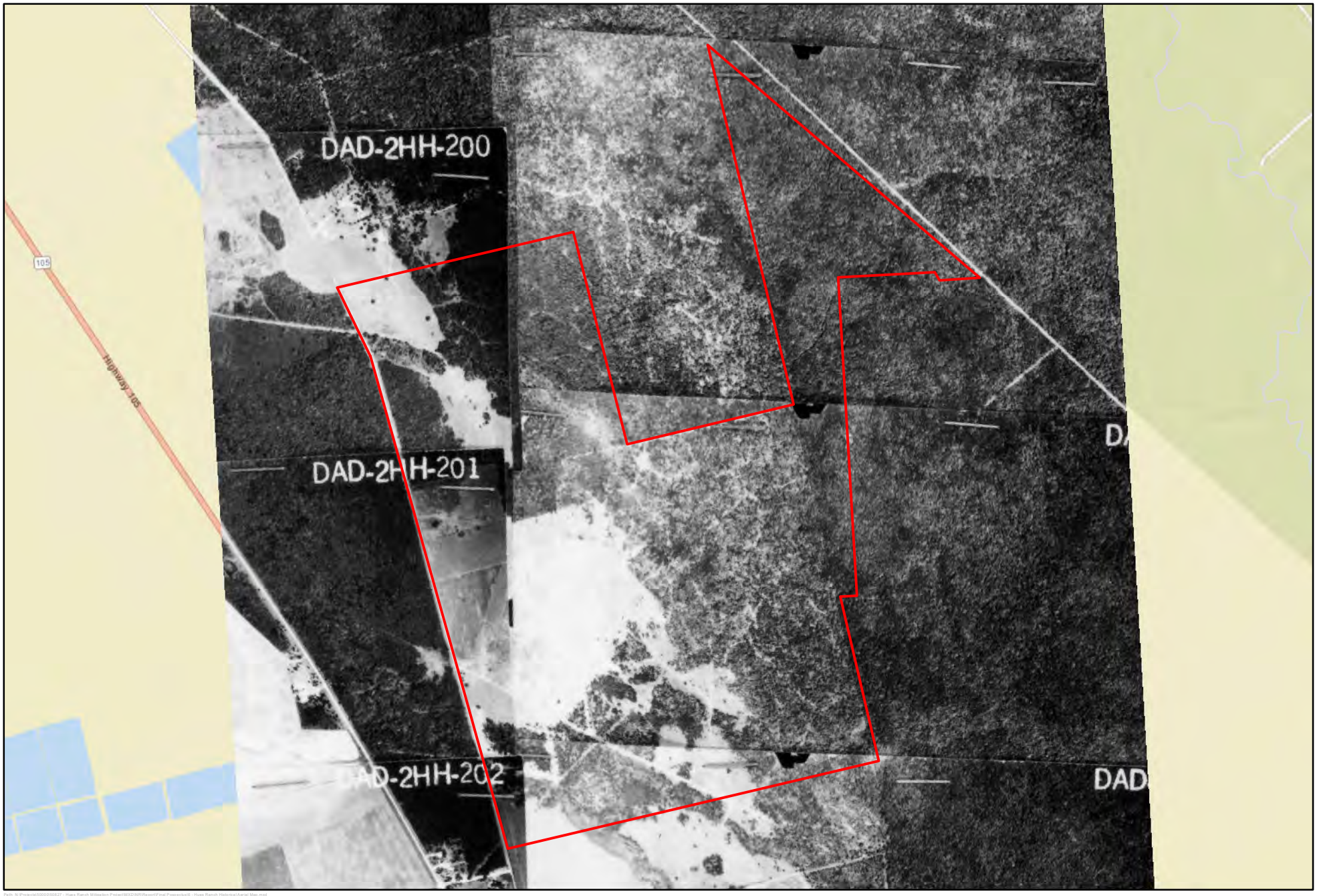
FIGURE 6-3

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

1967 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-4

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters

SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

1970 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-5

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters

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HUES RANCH MITIGATION BANK

1974 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-6

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters

SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

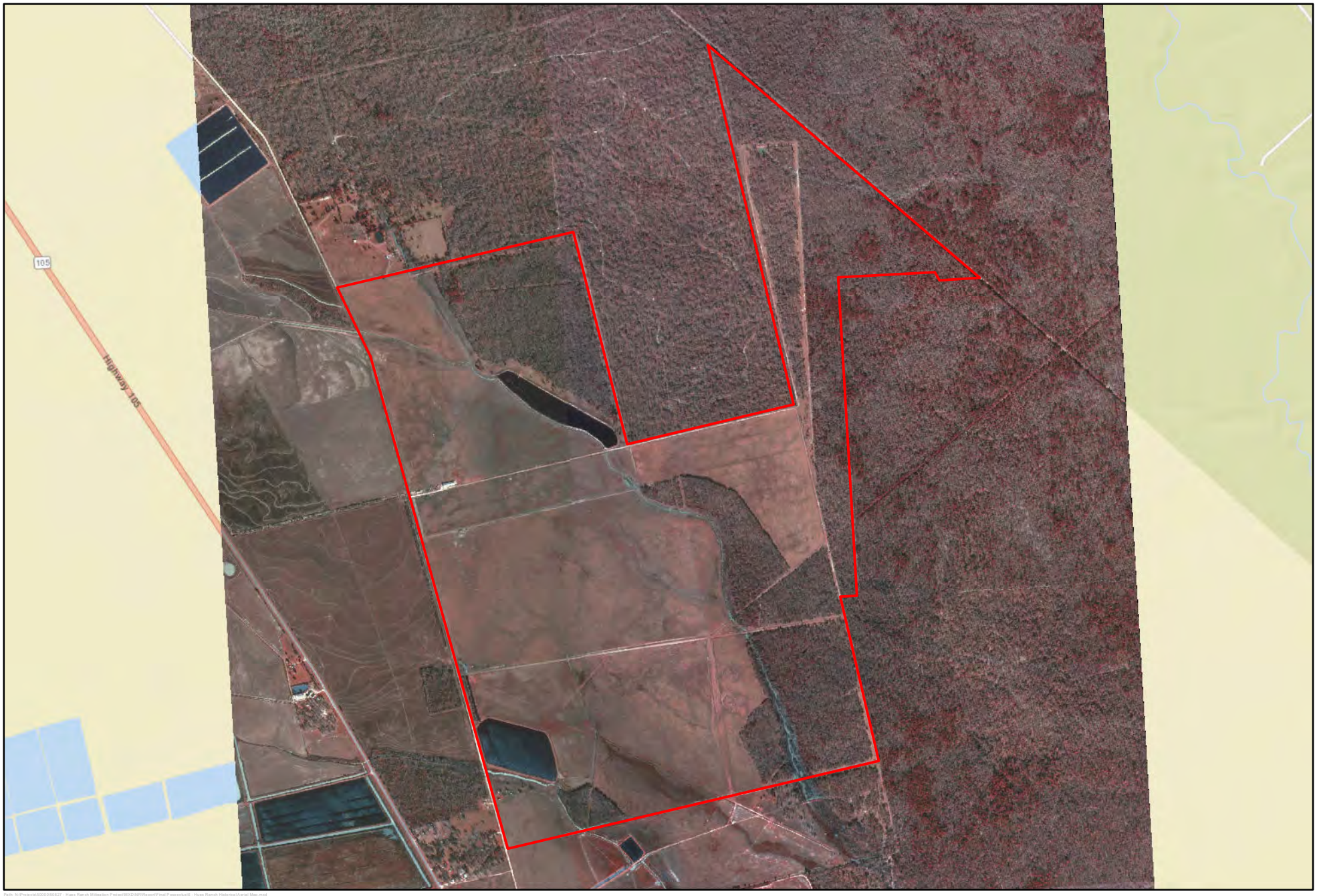
1981 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-7

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

1995 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-8

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters

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HUES RANCH MITIGATION BANK

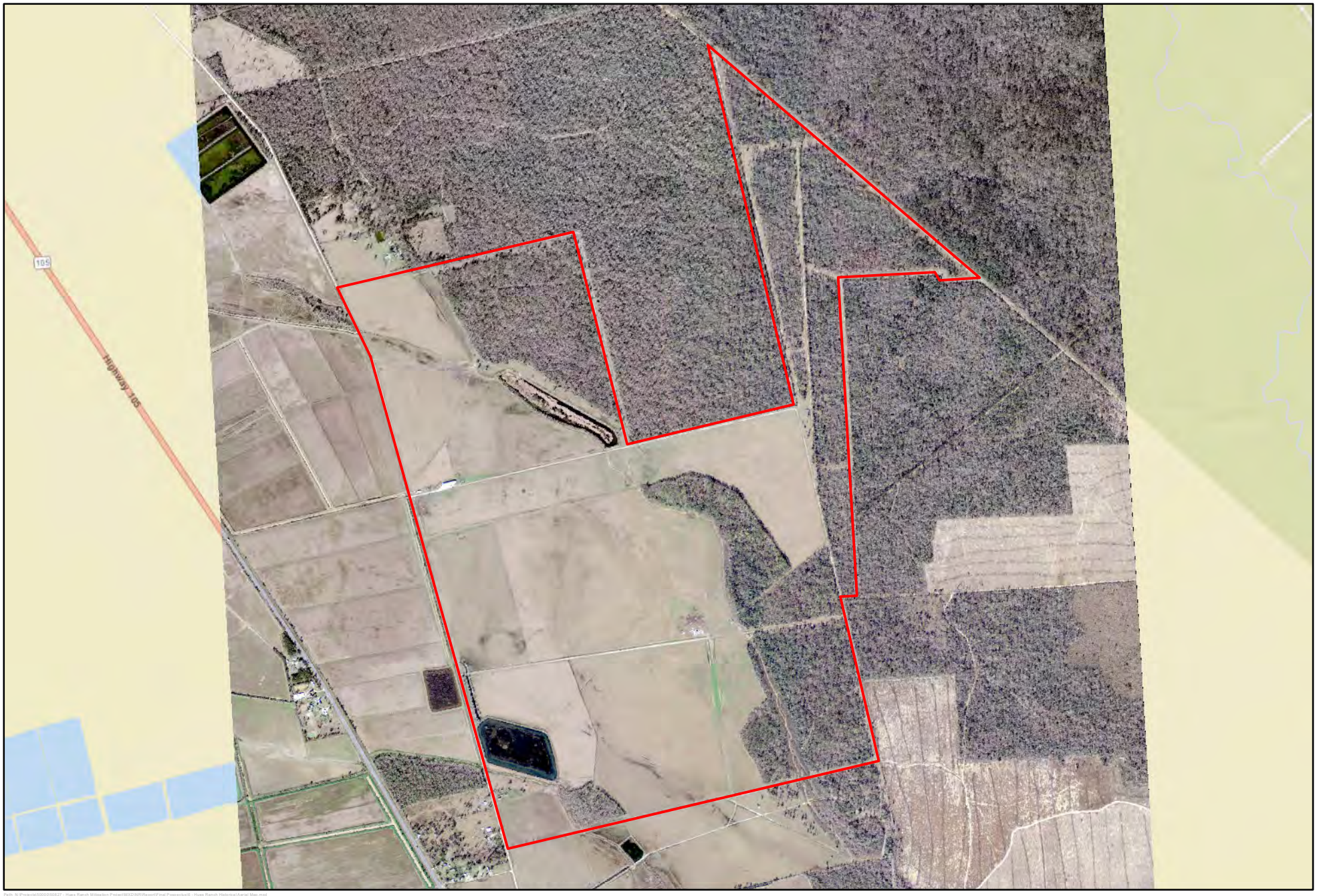
2004 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-9

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

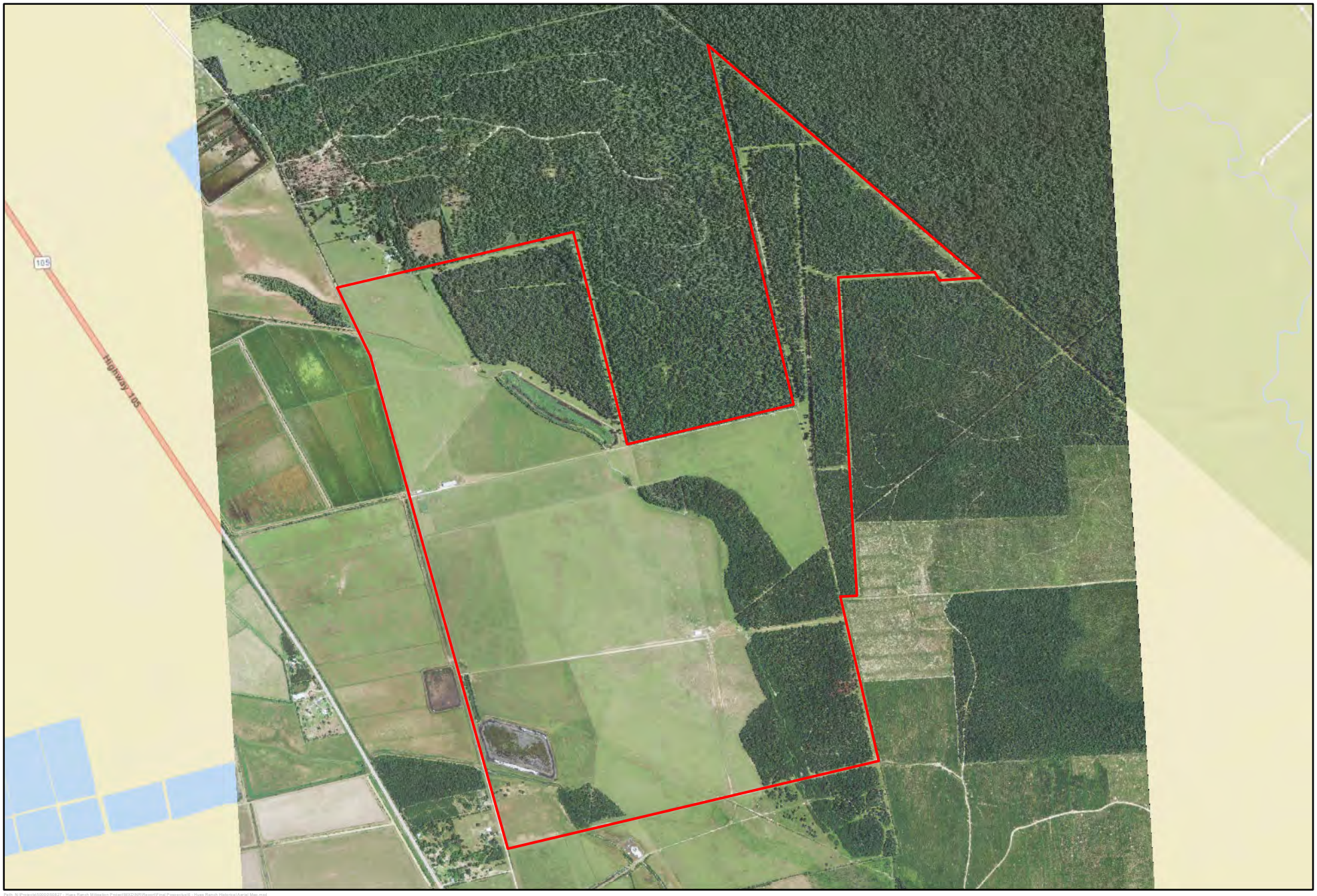
2009 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-10

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

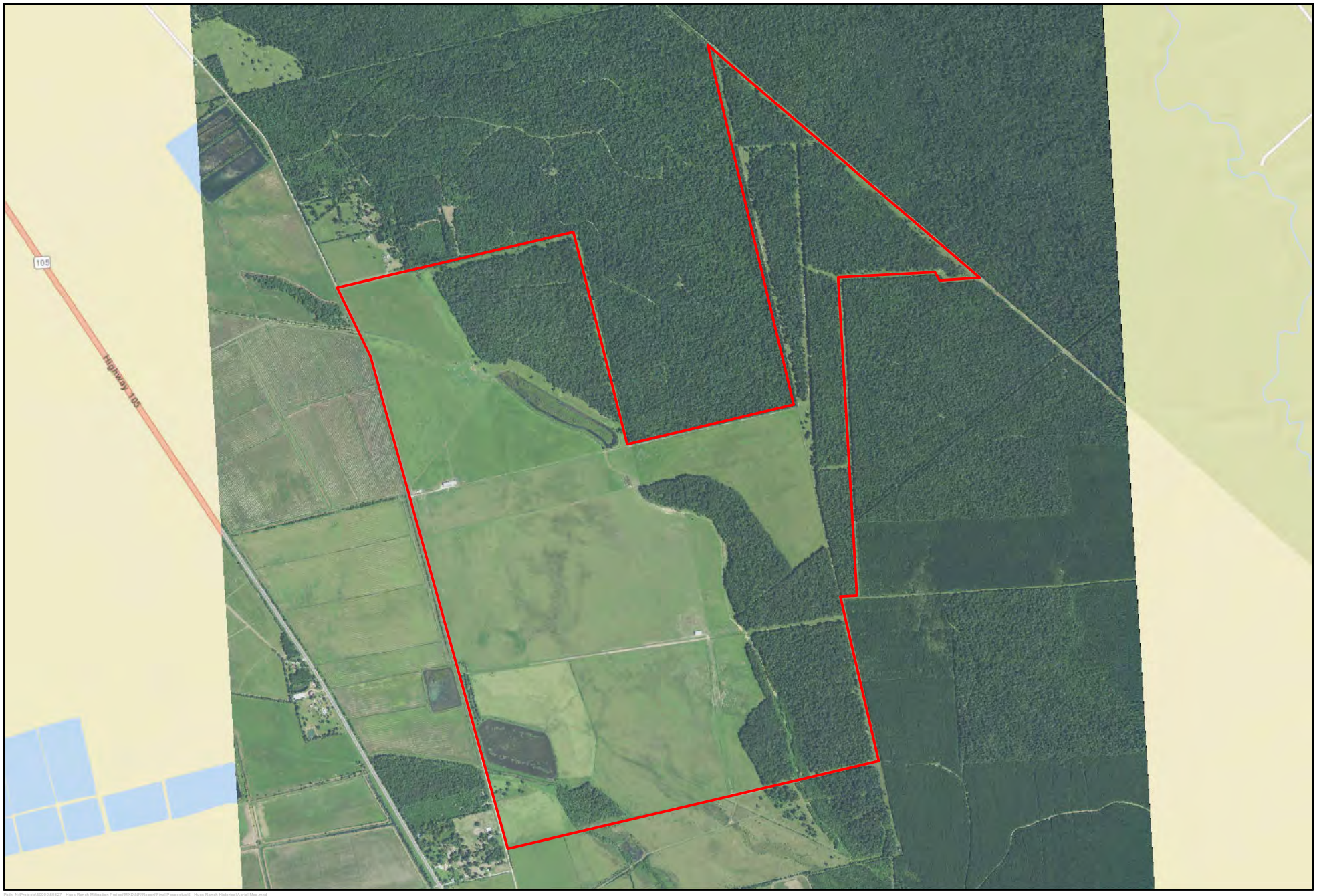
2012 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-11

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

2016 HISTORICAL AERIAL MAP
HARDIN COUNTY, TEXAS
FIGURE 6-12

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters

SWCA ENVIRONMENTAL CONSULTANTS

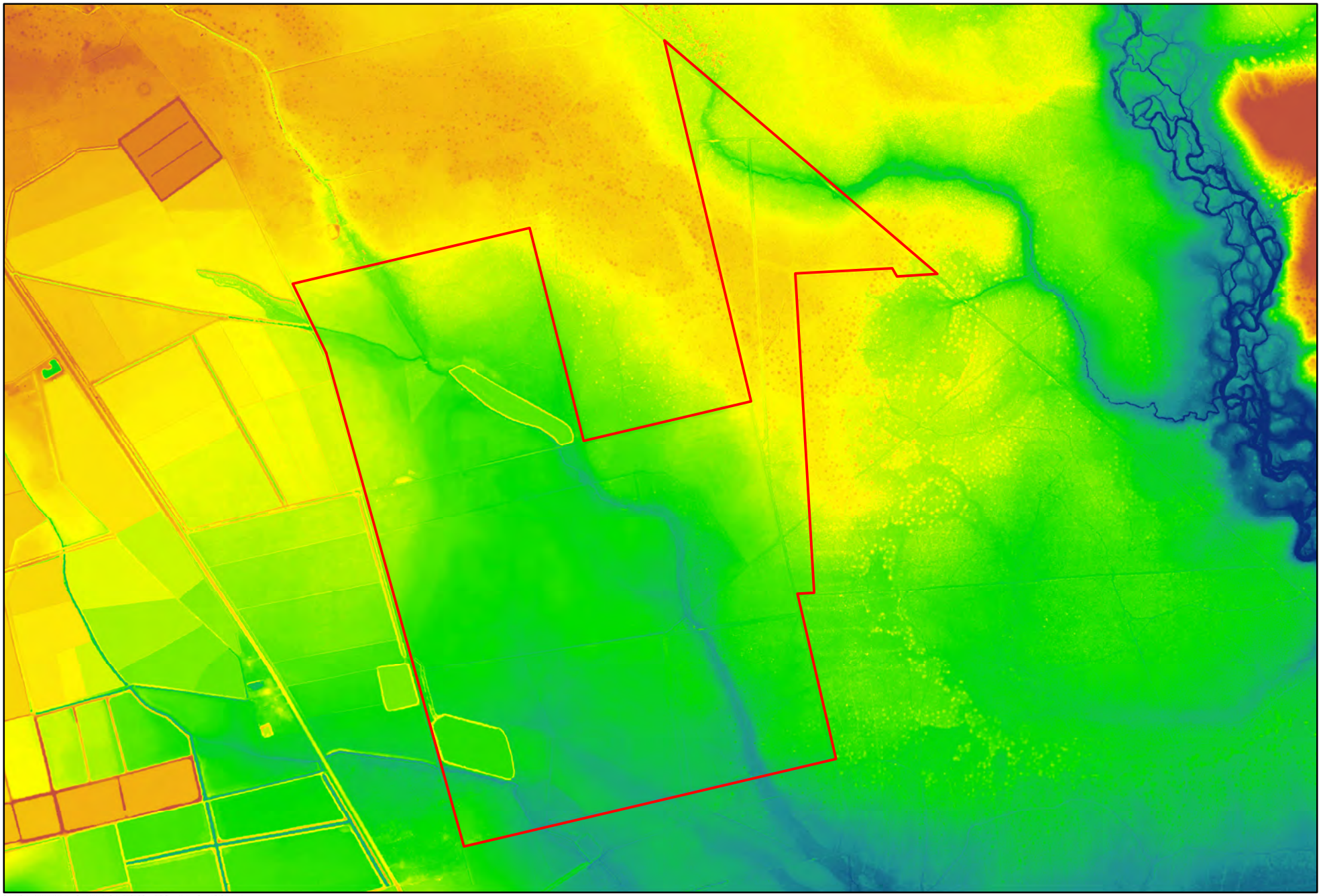
HUES RANCH MITIGATION BANK
2017 HISTORICAL AERIAL MAP: AFTERMATH OF HURRICANE HARVEY
HARDIN COUNTY, TEXAS
FIGURE 6-13

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 2/27/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

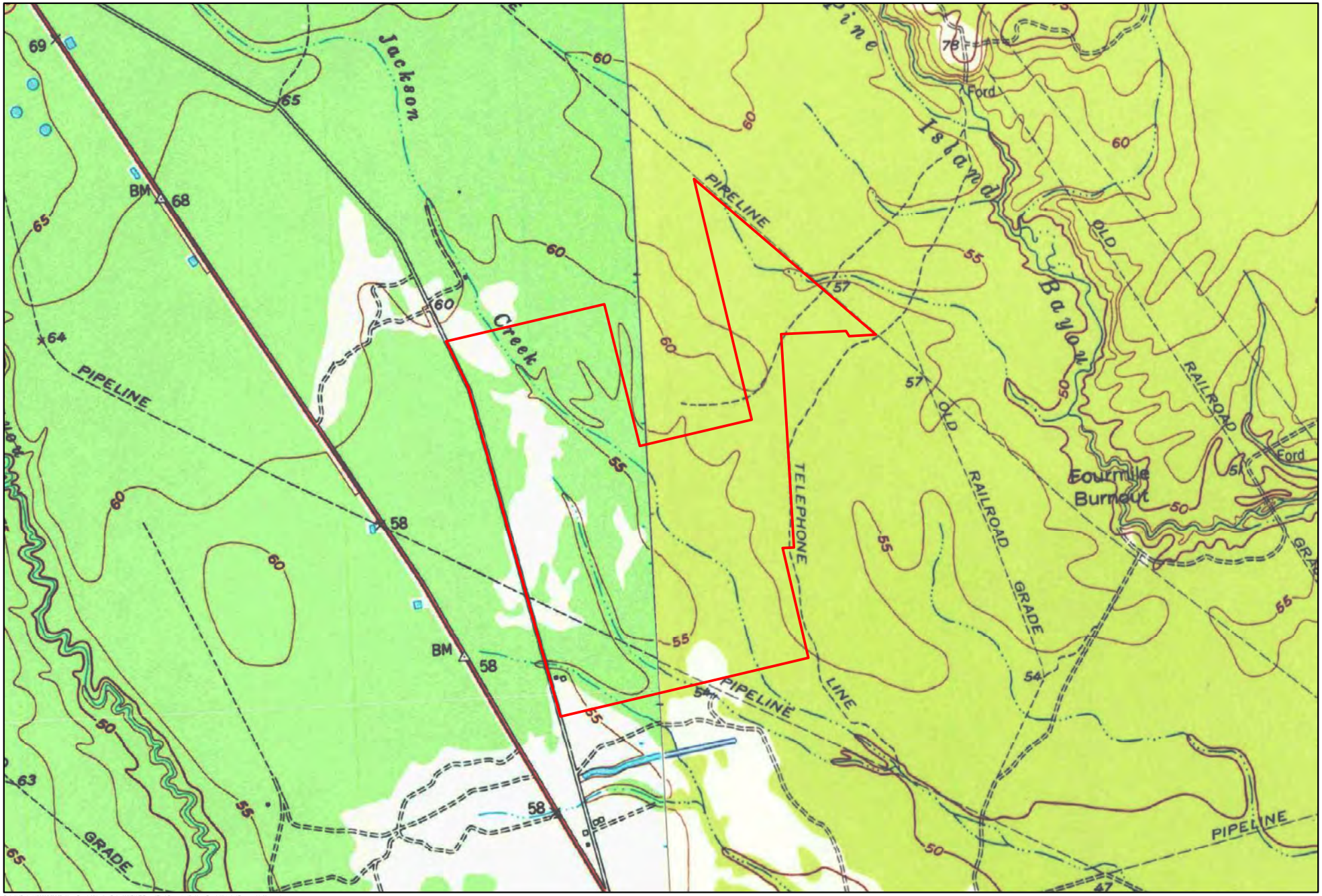
2018 LIDAR MAP
HARDIN COUNTY, TEXAS
FIGURE 7

Project Boundary

1:24,000

Created By: JS
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

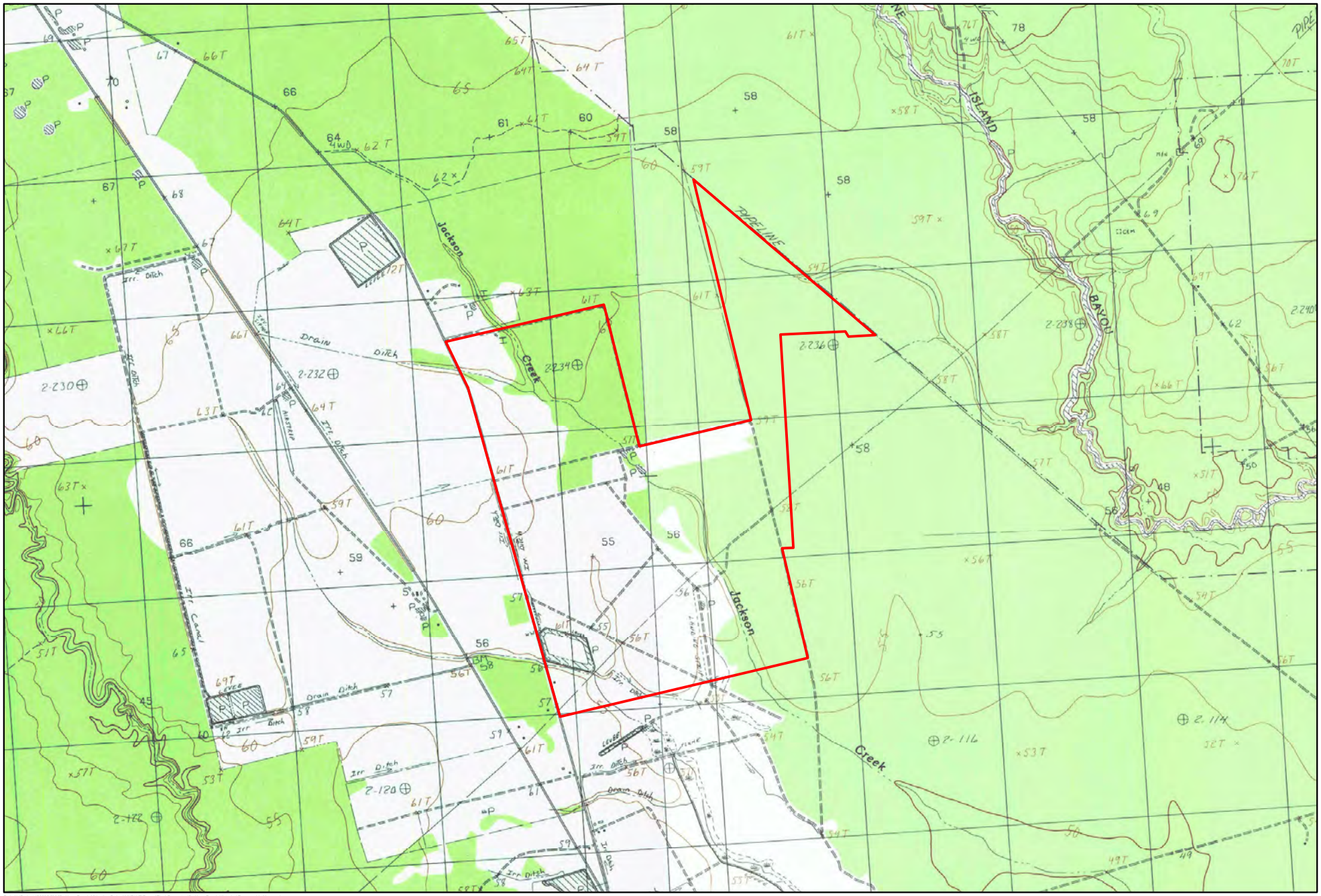
1955 HISTORICAL TOPOGRAPHIC MAP
HARDIN COUNTY, TEXAS
FIGURE 8-1

Project Boundary

1:36,000

Created By: JS
Project Number: 50872
Date: 2/14/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

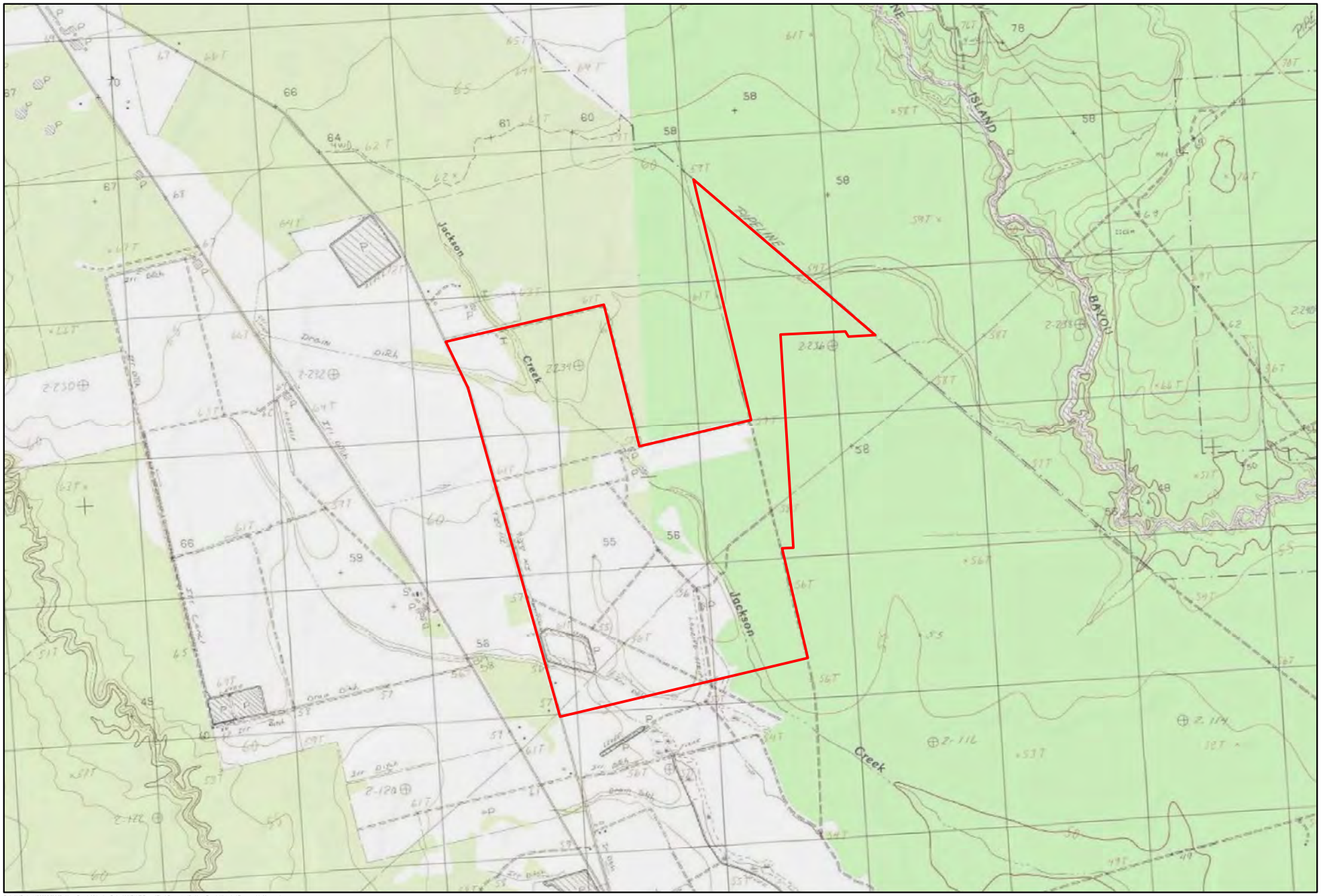
1984 HISTORICAL TOPOGRAPHIC MAP
HARDIN COUNTY, TEXAS
FIGURE 8-2

Project Boundary

1:36,000

Created By: JS
Project Number: 50872
Date: 2/14/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

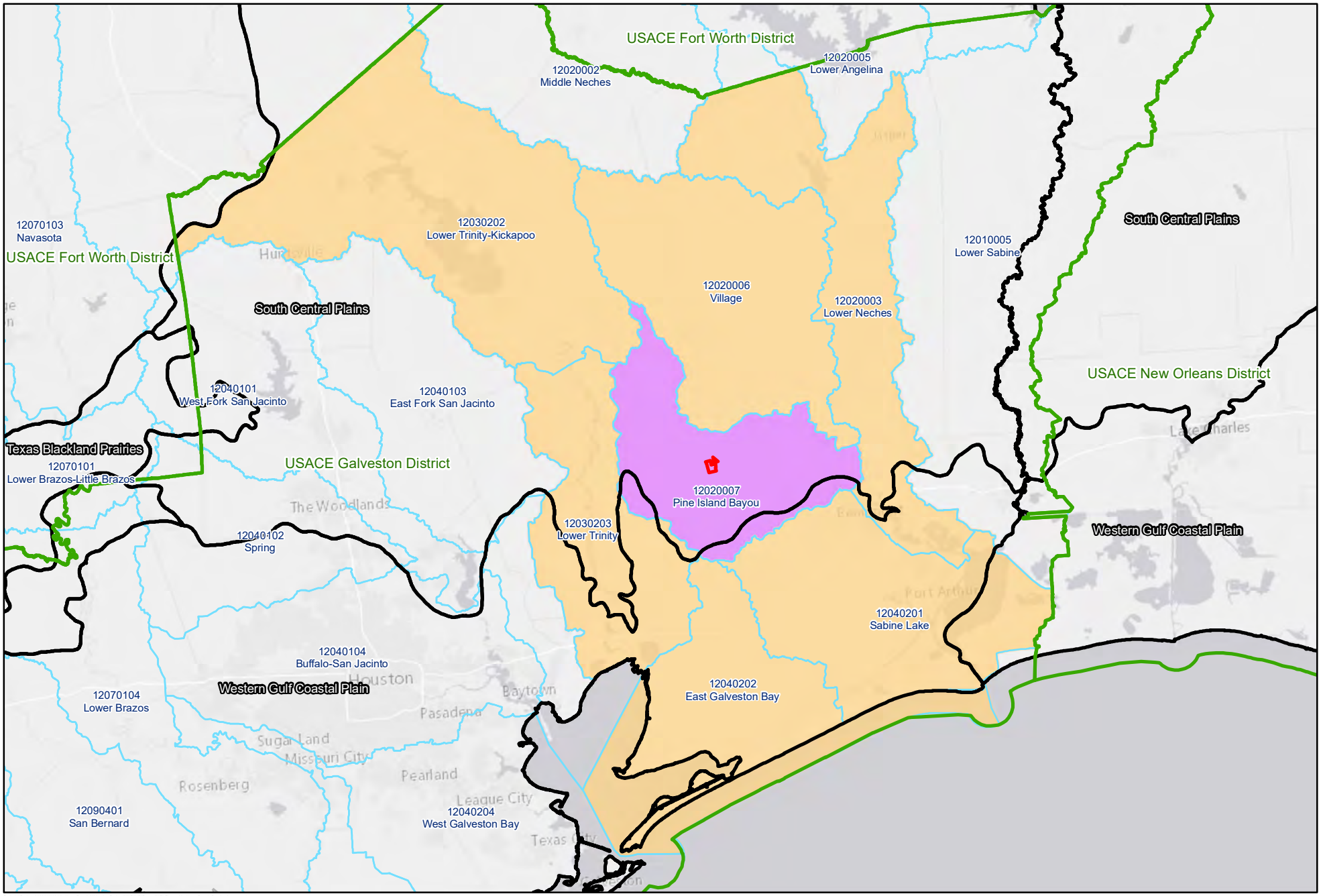
CURRENT TOPOGRAPHIC MAP
HARDIN COUNTY, TEXAS
FIGURE 8-3

Project Boundary

1:36,000

Created By: JS
Project Number: 50872
Date: 2/14/2019
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

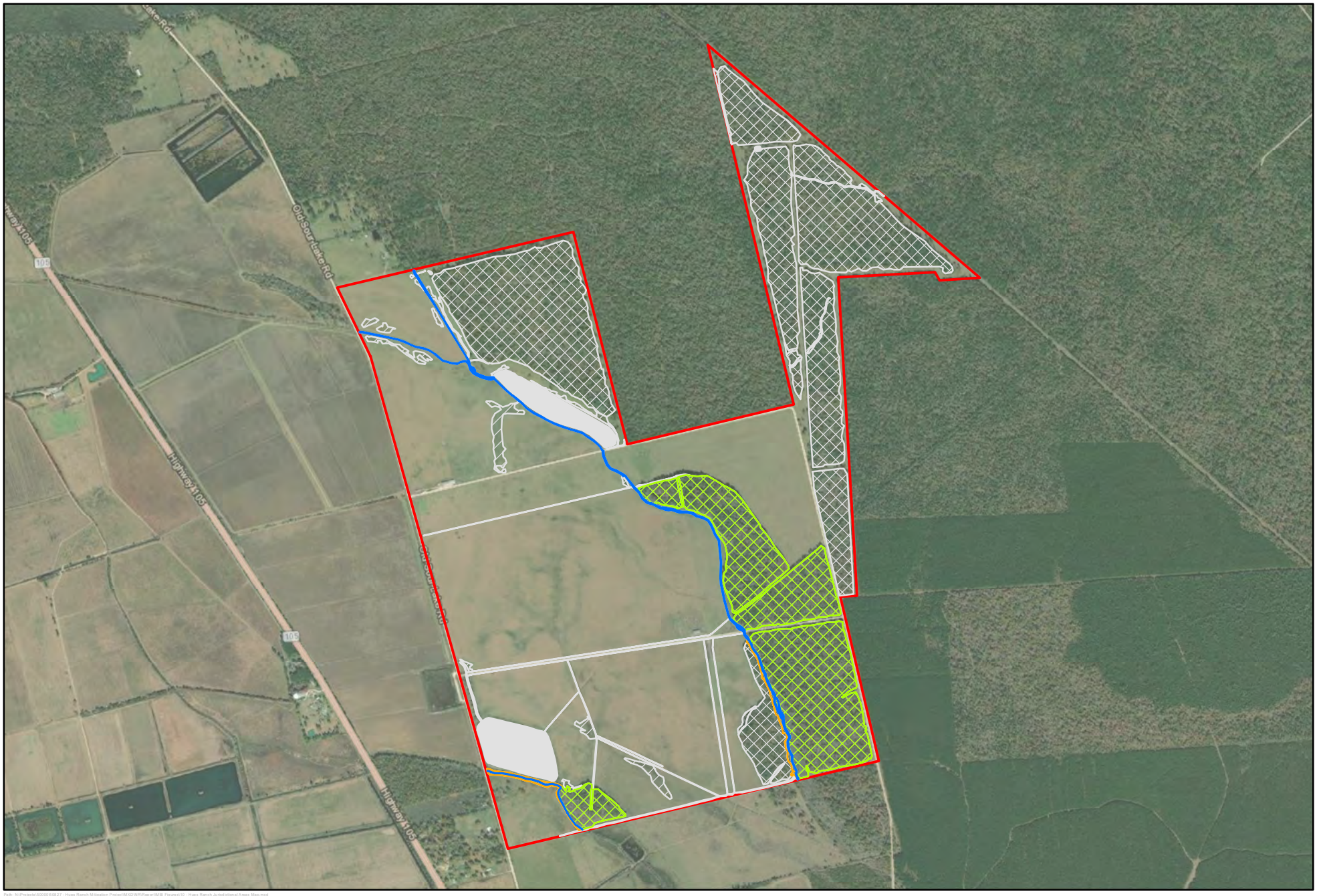
SERVICE AREA MAP
HARDIN COUNTY, TEXAS
FIGURE 9

Primary Service Area
Secondary Service Area
Project Boundary
HUC 8 Boundary
USACE District Boundary
Ecoregion Level III Boundary

1:1,250,000

Created By: JS
Project Number: 50872
Date: 12/6/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 5 10 Miles
0 5 10 15 Kilometers



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION PROJECT

JURISDICTIONAL AREAS MAP
HARDIN COUNTY, TEXAS

FIGURE 10

Project Boundary
Non-Jurisdictional Waterbody

Jurisdictional Waterbodies
Ephemeral Waterbody
Intermittent Waterbody
Perennial Waterbody

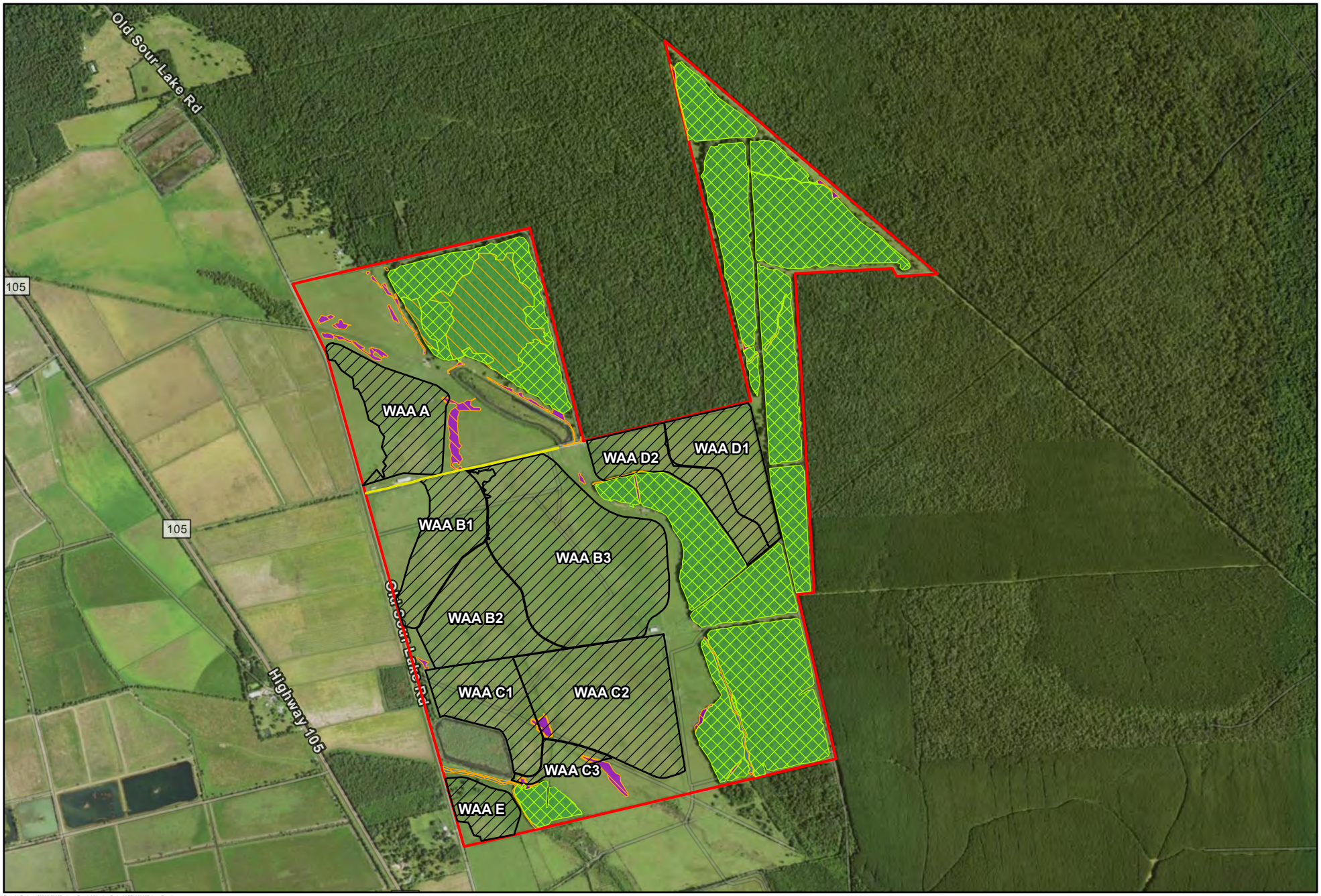
Jurisdictional Wetlands
Emergent Wetland
Scrub-shrub Wetland
Forested Wetland

Non-Jurisdictional Wetlands
Emergent Wetland
Scrub-shrub Wetland
Forested Wetland

1:24,000

Created By: JS
Project Number: 50827
Date: 12/10/2021
NAD 1983 StatePlane Texas Central FIPS 4203 Feet

0 1,000 2,000 Feet
0 200 400 600 Meters



SWCA ENVIRONMENTAL CONSULTANTS

HUES RANCH MITIGATION BANK

MITIGATION PLAN
HARDIN COUNTY, TEXAS

FIGURE 11

- Forested Wetland Preservation Areas - 375.169 Acres
- Forested Wetland Enhancement Areas - 64.443 Acres
- Forested Wetland Reestablishment Areas - 508.155 Acres
- Bank Boundary
- Access Road
- Emergent Wetland
- Scrub-shrub Wetland
- Forested Wetland

1:24,000

Created By: JS
Project Number: 50872
Date: 4/29/2024

0 1,000 2,000 Feet
0 200 400 600 Meters