

PROSPECTUS
KATY HOCKLEY MITIGATION BANK

HARRIS COUNTY, TEXAS

HCFCF Project ID K700-01-00-Y001

Prepared for:

Harris County Flood Control District

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1 GENERAL INFORMATION

1.1 Bank Name and Sponsorship

The mitigation bank will be known as the Katy Hockley Mitigation Bank (KHMB). Harris County Flood Control District (HCFCD) is the bank's Sponsor. SWCA Environmental Consultants (SWCA) will act as the Sponsor's agent.

Contact information for the Sponsor and their Agent are as follows:

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1.2 Sponsor Qualifications

The proposed KHMB will follow Greens Bayou Wetlands Mitigation Bank (GBWMB) and Harris County Umbrella Mitigation Bank (HCUMB) as the third wetlands mitigation bank proposed for development by the Sponsor. Approved by the U.S. Army Corps of Engineers (USACE) in 1995, GBWMB is a 1,400-acre tract containing a mosaic of riparian forest, forested wetlands, sloughs, and native herbaceous wetlands. To date, HCFCD has created or restored approximately 880 acres of the tract as productive wetland. For over 20 years, HCFCD has provided developers, state and local governments, and utility providers the opportunity to purchase credits from GBWMB, thereby satisfying statutory wetland mitigation requirements. Currently, HCFCD has submitted the final umbrella mitigation banking instrument (UMBI) instituting the HCUMB. The HCUMB is an umbrella mitigation bank consisting of multiple sites located on publicly owned lands throughout and adjacent to Harris County.

SWCA has extensive experience designing and developing mitigation sites, conducting wetland and stream functional assessments, and working with clients and regulatory personnel to establish high-quality mitigation options for unavoidable aquatic resource impacts. SWCA has successfully assisted multiple clients with mitigation bank establishment and permittee-responsible mitigation (PRM) planning in and around Harris County. For over ten years, SWCA has monitored the vegetation, wildlife, and water quality at GBWMB for HCFCD. SWCA has also provided services for HCUMB, Gin City Mitigation Bank, Danza del Rio Mitigation Bank, Katy Prairie Stream Mitigation Bank, and dozens of PRM sites along the Gulf Coast and throughout the country.

2 GENERAL NEED

Mitigation banks are considered preferable to other mitigation mechanisms, such as in-lieu fee and permittee-responsible mitigation. According to 33 CFR 332.3(b)(2):

Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable.

The Harris County area is in need of mitigation bank opportunities. Currently, there are four approved mitigation banks with credits available for private or county projects that share portions of the same service area as that proposed for KHMB (USACE 2017). Furthermore, there are no approved wetlands mitigation banks with service areas that incorporate the watersheds of Addicks and Barker reservoirs, where the proposed KHMB is located.

GBWMB, which is located within Harris County and owned by HCFCD, currently has credits, but all are reserved for pending projects (Jonathan Holley, pers. comm.). Mill Creek Mitigation Bank (Austin County) has a service area that covers the western portion of Harris County, but also has very few remaining credits (Larry Gremminger, pers. comm.). Katy Prairie Stream Umbrella Mitigation Bank (Harris County) has approved stream credits for projects located in the San Jacinto River watersheds, but all available credits for Phase 1 have been allocated or reserved (Restoration Systems, pers. comm.). The USACE recently approved the Houston-Conroe Mitigation Bank (Liberty County), but the secondary service area includes only a portion of western Harris County.

The Sponsor is aware of three other pending mitigation banks in the region that could serve portions of Harris County and the surrounding area: HCUMB, Town Creek Stream and Wetland Mitigation Bank (Montgomery County), and Tarkington Bayou Mitigation Bank (Liberty County).

The first site within the HCUMB will only serve northern Harris County and southern Montgomery County. Town Creek is proposing stream and wetland re-establishment and enhancement with a service area of Spring Creek and Buffalo-San Jacinto Watersheds in Harris County. Tarkington Bayou Mitigation Bank proposes Spring Creek Watershed as a secondary service area.

In 2014, the Greens Bayou Wetlands Mitigation Bank's service area was amended to no longer include portions of the Buffalo-San Jacinto watershed. This exclusion consists of watersheds that the USACE had determined to contribute potential flooding concerns for Addicks and Barker reservoirs. Specifically, the area included portions of the upper Cypress Creek watershed and the Addicks and Barker watersheds (Study Area). Based on this study, USACE required impacts to wetlands in the Study Area to be mitigated within the Study Area. Under this ruling, mitigation for the Study Area cannot be purchased from GBWMB and there are currently no other wetlands mitigation banks serving these watersheds.

The western portion of Harris County is expected to experience extensive real estate development in the next several decades, which is likely to result in significant wetland impacts. A credit need analysis was performed using data from the US 290 Major Thoroughfare Plan (revised in March 2016), in addition to anticipated development data through 2050, National Wetland Inventory (NWI) data, and a potential wetlands map. The Study Area was defined as the area unserved by GBWMB or other mitigation banks. The potential wetlands were identified by SWCA through aerial photograph analysis. Although difficult to predict, Table 1 enumerates potential impacts that are anticipated over the next 30 years.

Table 1. Potential wetland impacts in the Study Area.

Potentially Impacted	Acres
Road Impacts	
Potential Wetlands	51.39
NWI Wetlands	445.23
Development Impacts	
Potential Wetlands	961.86
NWI Wetlands	6377.91

Given predicted population increases and infrastructure development in Harris, Fort Bend, and Waller counties, the Sponsor believes that there is a clear need to develop mitigation credits within the Barker and Addicks Reservoir watersheds and that the existing and proposed banks will not be sufficient to provide enough credits over the next 30 years. The Sponsor therefore believes there is a sound general need for the KHMB.

3 MITIGATION PLAN

3.1 Location

The site is in rural western Harris County, Texas approximately 7.15 miles south of Hockley, Texas and 9.89 miles north of Katy, Texas (Figure 1). Specifically, it is an approximately 152-acre tract located immediately west of the intersection of Katy-Hockley Road and House and Hahl Road. The approximate center of the site is located within the geographic limits of the Warren Lake, Texas U.S. Geological Survey (USGS) 7.5-minute quadrangle at latitude 29.93069° North and longitude 95.81083° West. The proposed site is located within the Western Gulf Coastal Plains Level III Environmental Protection Agency (EPA) Ecoregion (Griffith et al. 2004) and is within the Katy Prairie. The broader landscape context of the site is dominated primarily by agricultural lands (especially pasture and row-crop farm) with a few nearby quarries and scattered residences. Additionally, several of the adjacent and nearby properties are mitigation projects or otherwise protected by conservation measures.

The Katy Prairie lies in the Texas Coastal Plain and encompasses over a thousand square miles, bounded by the Brazos River on the southwest, pine-hardwood forest on the north, and the city of Houston on the east (Wermund 1994). The topography typical of the Katy Prairie was created by a series of meandering channels and associated floodplains creating inland deltas transporting and depositing sediments from northern geologic formations onto the Lissie and Beaumont Geological formations (Moulton and Jacob 2000). Typical microtopography of the Katy Prairie includes abandoned channel scars, mounds, deposition ridges, and depressions. The diversity of soil types, elevations, and hydroperiods supports diverse flora assemblages hypothesized to be an outlier of tallgrass prairie (Noss 2013).

Over the last 100 years, most of the Katy Prairie, including the wetlands, has been impacted by various forms of agriculture including rice, corn, and cattle grazing. Noss et al. (1995) identify Texas coastal grasslands as an endangered ecosystem with a greater than 98% reduction from historic areal coverage. A majority of the depressional wetlands were drained for dry-land farming or filled during land-leveling operations for rice production. Few examples of undisturbed Katy Prairie depressional wetlands or their surrounding native grassland communities exist today.

In addition, urban development spreading westward from the City of Houston has claimed more than half of the Katy Prairie's open space. Much of that development occurred within the last 20 years, but the potential for additional urban development impacts to the Katy Prairie exists based on the City of Houston's Major Thoroughfare and Freeway Plan. In short, the entire Katy Prairie, its associated wetlands, and their functions and values have been and continue to be under significant development pressure. Therefore, projects that preserve, restore, or create native upland and wetland habitats within the remaining Katy Prairie help maintain ecological functions in western Harris County.

3.2 Existing Conditions

Historically, the 152-acre KHMB site was native tallgrass prairie characteristic of native Gulf Coast prairie ecosystems (Wilcox et al, 2011). Likely used for livestock grazing prior to 1930, the site began to be farmed for rice sometime prior to 1944 (Figure 2). Rice production ended prior to 1989 and the tract reverted to improved pastureland, with grazing continuing until 2012. Since the removal of livestock, the site has been fallow and the establishment of native species is being encouraged via mowing, removal of invasive species, and prescribed burns (Figure 3).

Surrounding land use is still limited primarily to open-space, prairie preservation and restoration, livestock grazing, and low-density residential areas. HCFCF PRM projects (SWG-2008-00769, SWG-2008-00777, SWG-2011-00139) border the KHMB immediately to the north and west, within HCFCF's property. A private land owner controls the property to the south. Areas to the east of Katy-Hockley Road, on either side of House and Haul Road, are owned by Bridgeland Development Corporation or are small single-residence lots of an acre or more.

3.2.1 Vegetation

SWCA identified two wetland features: one linear wetland that bisects the tract and forms the southern portion of the property's western boundary and a small depression in the southwest of the tract. During a delineation verification, the USACE indicated that the linear feature was non-jurisdictional because it is an abandoned agricultural irrigation ditch; however, the smaller wetland depression was deemed to be jurisdictional. Based on subsequent field work, HCFCF identified an additional wetland depression on the northeastern portion of the tract; however, this wetland has not yet been verified by USACE. No waterbodies were identified or delineated on this site.

The site is typified by improved pasture species and is dominated by common carpetgrass (*Axonopus fissifolius*), bahiagrass (*Paspalum notatum*), and Bermudagrass (*Cynodon dactylon*). The dominance of these three species is the result of years of agricultural disturbance and continued mowing. Since the removal of cattle in 2012, remnant prairie species are beginning to emerge from the seed bank and include broomsedge bluestem (*Andropogon virginicus*), ovateleaf cactalia (*Arnoglossum ovatum*), littletooth sedge (*Carex microdonta*), needleleaf rosette grass (*Dichanthelium aciculare*), velvet rosette grass (*D. scoparium*), coastal lovegrass (*Eragrostis refracta*), narrowleaf primrose-willow (*Ludwigia linearis*), Hall's panicum (*Panicum hallii*), brownseed paspalum (*Paspalum plicatulum*), anglestem beaksedge (*Rhynchospora caduca*), globe beaksedge (*R. globularis*), and longspike tridens (*Tridens stictus*). The north central portion of the tract was used for cattle feeding and supports a predominance of ruderal species such as spiny aster (*Chloracantha spinosa*), annual sunflower (*Helianthus annuus*), perennial rye (*Lolium perenne*), May grass (*Phalaris caroliniana*), and curly dock (*Rumex crispus*). The site was burned in the fall of 2016 to remove thick duff accumulation and encourage the germination and growth of native vegetation from the seed bank.

3.2.2 Soils

According to the NRCS Soil Survey for the site (NRCS 1988), the entire project area is made up of Katy fine sandy loam, 0 to 1 percent slopes (Kf), which meets the hydric soil criterion (NRCS 2015). Kf is a moderately well drained fine sandy loam with a relatively shallow water table (typically 14 to 33 inches below surface).

Because the site was leveled for rice farming, HCFCD contracted with New Tech Global Environmental, LLC to perform a detailed soil boring study of the property. The study identified argillic horizons within the property that would act to restrict infiltration of surface water. These were then used to guide restoration plans by identifying areas that are most conducive to the re-establishment of wetland characteristics (Appendix B).

3.2.3 Hydrology

Historically, the site was mapped in the Cypress Creek watershed using 5-foot USGS topographic contours. Subsequently, HCFCD has delineated floodplain boundaries utilizing 1 foot LIDAR data. Based on current available data, the site is situated in the Addicks Reservoir watershed, south of the divide between the Cypress Creek and Addicks Reservoir watersheds. Based on the FEMA Flood Hazard Map (FEMA 2013), the entire site is located within the 100-year floodplain.

The property is located in the area described as the Cypress Overflow Zone, a prominent part of the Katy Prairie that is so-named because the lack of topographic relief which causes poorly defined watershed boundaries. Areas within this zone drain southeastward towards Addicks reservoir during normal rainfall events. However, during moderate to severe storm events (between the 20% annual chance (5-year) and 10% annual chance (10-year) storm event), land within the Cypress Overflow Zone experiences local runoff as well as overflow from Cypress Creek when flows carried in Cypress Creek overtop the watershed divide and drain southward into the Addicks Reservoir watershed. Once the overflow into the Addicks Reservoir watershed occurs, the stormwater that originated in the Cypress Creek watershed will continue to drain towards the southeast, away from Cypress Creek, into Addicks Reservoir before reaching Buffalo Bayou. During the 10% annual chance and 1% annual chance storm events, approximately 56% and 83% of the respective stormwater volume generated upstream of the Cypress Overflow Zone leaves Cypress Creek and drains into the Addicks Reservoir watershed, which is located in the Buffalo-San Jacinto watershed (HCFCD 2015).

The site is relatively flat with very little elevation change. There are no USFWS National Wetlands Inventory (NWI) areas located on the site (USFWS 2011); however, there are numerous NWI wetlands located both upstream and downstream.

3.3 Objectives

3.3.1 Resource Type and Amount

KHMB will re-establish previously degraded prairie wetland flats and depressions by mechanically restoring the site's microtopography. These activities will result in the re-establishment of diverse herbaceous communities occupying niches determined by soil characteristics, duration of hydroperiods, and frequency of disturbance. These wetlands will retard surface water and reduce runoff to both the Cypress Creek and Addicks Reservoir watersheds. Decreased runoff velocity will provide longer periods of water retention, thereby increasing contact time with vegetation and sediment accretion (Mitsch et al. 1995; Koskiaho 2003; Kjellin et al. 2007). Additionally, high detention times provide the potential for the degradation of a wide variety of chemical contaminants (Chapman 2003; Birch et al. 2004; Vymazal 2007). A total of approximately 122 acres of wetlands are expected to be established on the site. The remaining 30 acres will be restored to mesic long grass prairie. More precise estimates of the wetland and upland acreages will be derived from detailed site plans that will be provided in the draft mitigation banking instrument.

3.3.2 Ecological Suitability

The KHMB site is conducive to wetland establishment. Adjacent PRM wetlands constructed with methods similar to those that will be proposed for KHMB are exhibiting sustained hydroperiods, anaerobic soil conditions, and increased areal hydrophyte coverage. Restored PRM wetlands and prairies are providing habitat for a diverse array of wildlife including waterfowl, marsh birds, shorebirds, wading birds, sparrows, wrens, frogs, snakes, and dragonflies. Notable species observed include state listed Sprague's pipit (*Anthus spragueii*), white-tailed hawk (*Buteo albicaudatus*), wood stork (*Mycteria americana*), and white-faced ibis (*Plegadis chihi*). The addition of restored mosaic prairie wetlands at KHMB will increase available habitat for wildlife on the Katy Prairie and compound acreage available on adjacent PRM projects and Katy Prairie Conservancy (KPC) properties. Adjacency to KPC properties and PRM projects should increase the ability of the sites to attract species with life histories that require large expanses of grassland/wetland habitat and reduce the impact of edge effects (Hamer et al. 2006; Walk et al. 2010).

3.3.3 Wetland Vegetation Re-establishment/Enhancement

Past farming practices have altered the topography of the site. To restore historic microtopography to the site, depressions will be excavated to a depth consistent with the argillic soil strata while leaving topsoil sufficient to restore wetland flora (Appendix B). The spoil of these excavations will form gradual slopes surrounding the excavations to recreate mima mounds and depositional ridges. These features will ensure that precipitation is directed into the deeper portions of the property and will result in diverse hydrological regimes. It is anticipated that anaerobic, thus reducing conditions, are likely to occur in late winter through early spring, fall, and after large precipitation events during summer (Griffin et al., 1996).

Wetland re-reestablishment activities will include the removal of invasive species and the re-establishment of vegetation communities associated with the target hydrological conditions. While there is an anticipated continuum of hydroperiods and soil conditions that will ultimately determine an individual plant species' ability to survive, the Sponsor anticipates re-establishing two distinctive prairie wetland communities: prolonged inundation depressions and saturated wet prairies. Potential planting lists were developed by observation of flora within depressional wetlands/flats at KPC properties, Deer Park Prairie, Nash Prairie, and Mowotony Prairie.

Prolonged inundation depression communities often are less floristically diverse due to few species being evolved to cope with sustained inundation, nutrient deficiencies, and anaerobic conditions. The Sponsor anticipates utilizing squarestem spikerush (*Eleocharis quadrangulata*), horsetail spike-rush (*E. equisetoides*), maidencane (*Panicum hemitomom*), shortbristle horned beaksedge (*Rhynchospora corniculata*), and powdery thalia (*Thalia dealbata*) as dominate species within this wetland type. Other species that might be seeded/plugged in these communities include ovate false fiddleleaf (*Hydrolea ovata*), spring spiderlily (*Hymenocallis liriosme*), water-primrose (*Ludwigia* spp.), local genotype switchgrass (*Panicum virgatum*), tall horned beaksedge (*Rhynchospora macrostachya*), and arrowheads (*Sagittaria* spp.).

Reference saturated wet prairies in the area are typically highly diverse and vegetation re-establishment efforts will be modeled to restore this diversity on the site (Rosen 2007; Singhurst et al. 2014a; Singhurst et al. 2014b). While not an exhaustive list, HCFCD anticipates the following graminoids could be selected for seeding: Bush's sedge (*Carex bushii*), Cherokee sedge (*C. cherokeensis*), false hop sedge (*C. lupuliformis*), flatsedges (*Cyperus* spp.), spikesedges (*Eleocharis* spp.), rushes (*Juncus* spp.), southern cutgrass (*Leersia hexandra*), Nealley's sprangletop (*Leptochloa nealleyi*), redtop panicgrass (*Panicum rigidulum*), switchgrass, Florida paspalum (*Paspalum floridanum*), anglestem beaksedge (*Rhynchospora caduca*), clustered beaksedge (*R. glomerata*), gaping grass (*Steinchisma hians*), and longspike tridens. Dominant forbs selected would likely include ovate-leaf prairie plantain (*Arnoglossum ovatum*), swamp sunflower (*Helianthus angustifolius*), musky mint (*Hyptis alata*), sharp gayfeather (*Liatris acidota*), narrowleaf primrose-willow (*Ludwigia linearis*), winged loosestrife (*Lythrum alatum*), and Texas coneflower (*Rudbeckia texana*),

For areas designated to be created as herbaceous (PEM) wetlands, the Sponsor will sow seeds at densities sufficient to maximize wetland function scores (i.e., at least 75 percent cover when mature). In addition, supplemental plugs may be utilized to augment seeding and introduce species with life histories typified by vegetative growth. All disturbed areas within the site will be seeded with a seed mix intended to establish native vegetation cover.

The MBI will contain performance standards, monitoring provisions, and reporting protocols to gauge the success of the mitigation site.

3.3.4 Mesic Prairie Vegetation Re-establishment/Enhancement

Coastal prairie floral restoration activities for the site will be accomplished by continued burning to remove existing vegetation and fuel while preserving existing seed banks, increasing nutrient availability, and providing bare ground for seed germination. Following wetland construction activities, upland areas will be seeded and/or plugged during the dormant period to restore diversity to the herbaceous community. While not all-encompassing, the following species will be the focus of prairie establishment: big bluestem (*Andropogon gerardii*), Illinois bundleflower (*Desmanthus illinoensis*), purple lovegrass (*Eragrostis spectabilis*), rattlesnake master (*Eryngium yuccifolium*), Maximilian sunflower (*Helianthus maximiliani*), prairie blazingstar (*Liatris pycnostachya*), Gulf Coast muhly (*Muhlenbergia capillaris*), brownseed paspalum (*Paspalum plicatulum*), Texas prairie parsley (*Polytaenia texana*), azure blue sage (*Salvia azurea*), little bluestem (*Schizachyrium scoparium*), slender rosinweed (*Silphium gracile*), yellow indiagrass (*Sorghastrum nutans*), and eastern gamagrass (*Tripsacum dactyloides*). Species selection were derived from Smeins et al. (1991) and species inventories from remnant prairies within the upper Texas coast including Nash prairie (Rosen 2007), Mowotony prairie (Rosen 2010), Deer Park prairie (Singhurst unpublished), Candy Abshier Wildlife Management Area (Singhurst et al. 2014a), and Jack Road and Warren prairie (Singhurst et al. 2014b).

3.4 Potential Functional Lift

Due to the paucity of existing wetlands, the greatest ecological lift for KHMB will be realized as wetlands and associated mesic uplands are re-established. Based on the preliminary hydrologic analysis, HCFCD expects these areas to meet the USACE requirement for wetland hydrology after implementation of the wetland mitigation work plan. HCFCD will provide functional lift projects for the project as part of the Mitigation Banking Instrument.

4 GOALS AND OBJECTIVES

The goal of the KHMB is to re-establish and preserve self-sustaining, functional emergent wetland resources sufficient to replace the function and values lost due to unavoidable adverse impacts to wetlands within the service area.

The objective of the KHMB is to establish approximately 152 acres of prairie depressional wetlands and adjacent mesic prairie vegetation (Appendix B). This will expand the existing wetland resources in the riparian corridors of Cypress Creek and Bear Creek, thereby providing downstream benefits for Spring Creek, West Fork of the San Jacinto River, Lake Houston, and Buffalo Bayou. Specifically, restoration and management practices within the site will provide significant biological, chemical, and physical benefits to the downstream watersheds.

5 ESTABLISHMENT AND OPERATION

5.1 Bank Establishment

The Sponsor will procure the financial resources, planning, and scientific professional services required to successfully re-establish wetlands for KHMB. The Sponsor will perform all restoration, provide for financial assurances (per 33 CFR 332.3 (n)) and long-term protection mechanisms (per 33 CFR 332.7 (a)), administer the sale and accounting of credits, and complete all record-keeping and reporting requirements for the KHMB.

As part of the review process, the Sponsor will draft an MBI for review and approval by the USACE and the Interagency Review Team (IRT) in accordance with 33 CFR 332.8(d)(6-8). The MBI shall establish and outline the operating agreement for KHMB. The MBI will detail KHMB's service area, accounting procedures, provisions stating the Sponsor's legal responsibility for providing compensatory mitigation upon secured credits, default and closure provisions, reporting protocols, mitigation plans, credit release schedules, as well as other information required for inclusion by the USACE.

5.2 Credit Determination

Credits will be determined using the Interim Hydrogeomorphic Model (HGMi) for Riverine Herbaceous/Shrub for proposed restoration activities. These functional assessments will be run on the existing conditions of the site (baseline condition), then compared to those conditions expected to occur following site restoration (post-activity). The difference between the baseline condition and post-activity scores will determine the amount of functional capacity units (FCUs) or "credits" that may be generated for sale as bank credits. In addition, the Sponsor anticipates developing a credit release schedule tied to defined milestones in the operation, construction, and maintenance of the KHMB during the review process with the USACE and the IRT.

5.3 Easements and Encumbrances

According to oil and gas well records reported by the Railroad Commission of Texas, there are no wells located on the KHMB site. Furthermore, a title review of the site indicates that a pipeline easement of unknown width for United Gas Pipeline Company (1946) lies southwest of the site. Because the centerline of this easement is outside the boundaries of the site, the easement is not believed to have an impact on the generation of mitigation credits. The sponsor is in the process of requesting abandonment of the easement.

6 OWNERSHIP AND LONG-TERM MANAGEMENT

The KHMB is owned by the Sponsor which has the financial capability to satisfy the required financial obligations. The Sponsor has demonstrated such a commitment for their first wetlands mitigation bank, the GBWMB. The Sponsor is a special-purpose district created by an act of the Texas Legislature and has been in operation for over 75 years, demonstrating a long history in this community and a continued presence into the future.

The Sponsor will manage KHMB to be self-sustaining with long-term management activities limited primarily to items such as inspections, controlling invasive species, and boundary maintenance.

7 SERVICE AREA

The service area for KHMB is based on its size, unique watershed position, ecoregion setting, and location in the Katy Prairie. Based on the relatively restricted size of the property and its location in the, HCFCD proposes a service area that includes the Little Cypress Creek-Cypress Creek (HUC #1204010201), Addicks Reservoir (HUC #1204010402), Barker Reservoir watershed (HUC #1204010401), and White Oak Bayou-Buffalo Bayou (HUC #1204010403) watersheds, based on their 10-digit HUC boundaries. These watersheds are hydrologically connected via the Cypress Creek Overflow and their connection to the Buffalo Bayou system. This Service Area is encompassed by the Katy Prairie and Western Gulf Coastal Plain Level III EPA Ecoregion (Figure 4). Impacts within the service area will be debited on a 1:1 basis. At this time, HCFCD is not requesting a secondary service area.

On a case-by-case basis, the USACE, after coordination with the IRT, may authorize use of the site outside the service area, when unique circumstances make use of the site appropriate, practicable, and environmentally preferable. Alternate debiting ratios may be required on a case-by-case basis by the USACE for a project located outside of the service area.

All U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) properties, as well as wetlands and waterbodies located on Texas barrier islands and peninsulas, are excluded from the service area. In addition, the service area excludes all National Wildlife Refuges, National Forests, State Parks, and Wildlife Management Areas.

8 WATER RIGHTS

A water rights permit from TCEQ is not required because the project will not involve placing structures within any watercourse to take waters of the state. In accordance with Texas Civil Statutes, Article 5414a (Small Bill), the Sponsor has not planned changes to, will not derive credits from, or place a conservation easement on any public streambed.

9 **CITATIONS**

- Birch, G.F., C. Matthai, M.S. Fazeli, and J.Y. Suh. 2004. Efficiency of a constructed wetland in removing contaminants from stormwater. *Wetlands* 24 (2): 459-466.
- Chapman, H. 2003. Removal of endocrine disruptors by tertiary treatments and constructed wetlands in subtropical Australia. *Water Science and Technology* 47(9) 151-156.
- Federal Emergency Management Agency (FEMA). 2007. Digital Flood Insurance Map Database, Harris County, Texas. U.S. Department of Homeland Security, FEMA. Oakton, VA.
- Griffin, R.W., L.P. Wilding, W.L. Miller, G.W. Crenwelge, R.J. Tucker, L.R. Drees, and W.C. Lynn. 1996. Preliminary investigations of hydric soil hydrology and morphology on the Texas Gulf Coast Prairie. in *Preliminary Investigations of Hydric Soil Hydrology and Morphology in the United States*. J.S. Wakely, S.W. Sprecher, and W.C. Lynn (eds.). Tech. Rep. WRP-DE-13. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. 9-30.
- Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D. 2004. Ecoregions of Texas (color poster with map, descriptive text, and photographs). Reston, Virginia, U.S. Geological Survey (map scale 1:2,500,000).
- Hamer, T.L., C.H. Flather, and B.R. Noon. 2006. Factors associated with grassland bird species richness: the relative roles of grassland area, landscape structure, and prey. *Landscape Ecology* 21: 569-583.
- Harris County Flood Control District (HCFCD). 2015. Final Study Report: Cypress Creek Overflow Management Plan. Texas Water Development Board Contract Report Number 1248321466.
- Kjellin, J., A. Worman, H. Johansson, and A. Lindahl. 2007. Controlling factors for water residence time and flow patterns in Ekeby treatment wetland, Sweden. *Advances in Water Resources* 30: 838-850.
- Koskiaho, J. 2003. Flow velocity retardation and sediment retention in two constructed wetland-ponds. *Ecological Engineering* 19: 325-337.
- Mitsch, W.J., J.K. Cronk, X. Wu, and R.W. Nairn. 1995. Phosphorus retention in constructed freshwater riparian marshes. *Ecological Applications* 5(3): 830-845.
- Moulton, D.S. and J.S. Jacob. 2000. *Texas Coastal Wetlands Guidebook*. Texas Sea Grant. 66pp. TAMU-SG-00-605. College Station.
- Noss, R.F., E.T. LaRoe III, J.M. Scott. 1995 *Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation*.
- Noss, R.F. 2013 *Forgotten Grasslands of the South: Natural History and Conservation*. Island Press, Washington. 317 pp.

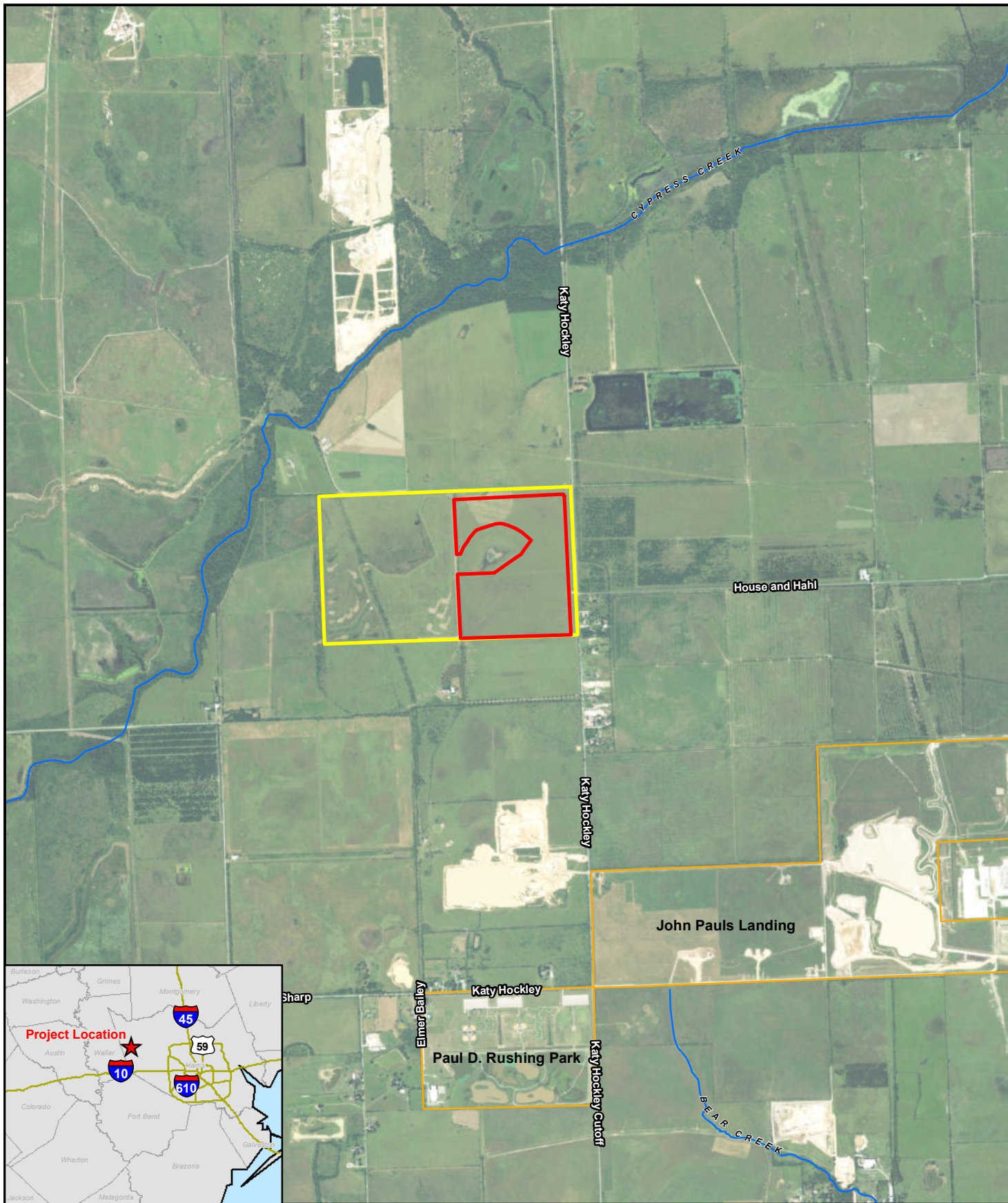
- NRCS. 1988. [National Resources Conservation Service]. Soil Survey of Harris County, Texas. USDA Soil Conservation Service and Forest Service in cooperation with Texas Agricultural Experiment Station and Texas State Soil and Water Conservation Board.
- _____. 2012. [National Resources Conservation Service]. National List of Hydric Soils. <ftp://ftp-fc.sc.egov.usda.gov/NSSC/Hydric_Soils/Lists/hydric_soils.xlsx>. Site accessed 4 April 2013. US Department of Agriculture, Natural Resources Conservation Service.
- Rosen, D.J. 2007. The vascular plants of Nash Prairie: a coastal prairie remnant in Brazoria County, Texas. *Journal of the Botanical Research Institute of Texas* (2007): 679-692.
- Rosen, D.J. 2010. The vascular plants of Mowotony Prairie: A small remnant coastal grassland in Brazoria County, Texas. *Journal of the Botanical Research Institute of Texas* 4(1): 489-495.
- Singhurst, J.R., D.J. Rosen, A. Cooper, W.C. Holmes. 2014a. The vascular flora and plant communities of Candy Abshier Wildlife Management Area, Chambers County, Texas, USA. *Journal of the Botanical Research Institute of Texas* 8(2): 665-675.
- Singhurst, J.R., N. Shackelford, W. Newman, J.N. Mink, and W.C. Holmes. 2014b. The ecology and abundance of *Hymenoxys texana* (Asteraceae). *Phytoneuron* 2014-19: 1-19.
- Smeins, F.E., D.D. Diamond, and C.W. Hanselka. 1991. Coastal Prairie pages 269-290 in R.T. Coupland, ed. *Ecosystems of the World 8. A natural grasslands-introduction and Western Hemisphere*. Elsevier Press, New York, New York, USA.
- U. S. Fish and Wildlife Service. 2011. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. <http://www.fws.gov/wetlands/>. Site accessed 26 April 2013.
- U.S. Army Corps of Engineers. 2015a. Public Notice for Tarkington Bayou Mitigation Bank Prospectus. Permit Application No. TBD. Issued 25 February 2015.
- U.S. Army Corps of Engineers. 2015b. Public Notice for Town Creek Stream and Wetland Mitigation Bank Prospectus. Permit Application No. SWG-2015-00804. 8 December 2015.
- U.S. Army Corps of Engineers. 2017. Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS). <https://rsgisias.crrel.usace.army.mil/ribits/>. Site accessed 13 January 2017.
- Vymazal, J. 2007. Removal of nutrients in various types of constructed wetlands. *Science of the Total Environment* 380(1): 48-65.
- Walk, J.W., E.L. Kershner, T.J. Benson, and R.E. Warner. 2010. Nesting success of grassland birds in small patches in an agricultural landscape. *The Auk* 127(2): 328-334.
- Wermund, E.G. 1994. Geology and Physical Features of the Katy Prairie. Katy Prairie Conference 1994. Katy Prairie Conservancy p.1.

Wilcox, B.P., D.D. Dean, J.S. Jacob, and A. Sipocz. 2011. Evidence of Surface Connectivity for Texas Gulf Coast Depressional Wetlands. *Wetlands* 31(3), 451-458.

Appendix A

Figures

Path: S:\Projects\32832_Katy_Hockley_HCUMB_Site\MAPS\REPORT MAPS\Draft Prospectus\1 - Katy Hockley Prospectus_Visibility.mxd





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**KATY HOCKLEY
MITIGATION BANK SITE
(K700-01-00-Y001)**

VICINITY MAP
HARRIS COUNTY, TEXAS

 Katy Hockley Mitigation Bank Site

 HCFCF Property



Background:	ESRI World Imagery (2015)
Scale:	1:36,000
Created By:	JS
Approved By:	RH
SWCA Project No.:	32832
Date Produced:	May 11, 2017

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

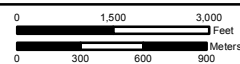
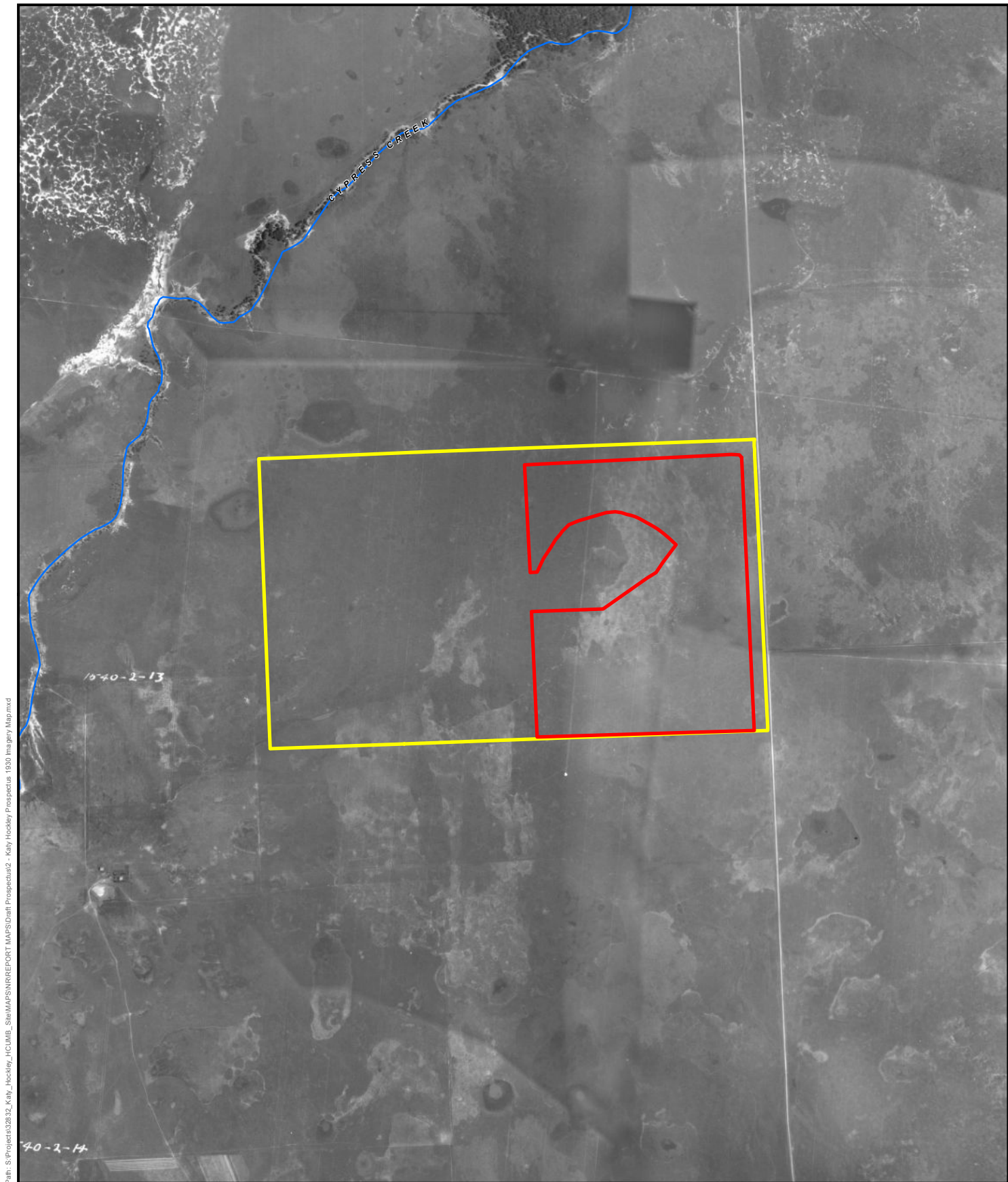


FIGURE 1



Path: S:\Projects\32832_Katy_Hockley_HCFCF_Site\MAPS\REPORT MAPS\Draft Prospectus\2_Katy Hockley Prospectus 1930 Imagery Map.mxd



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**KATY HOCKLEY
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(K700-01-00-Y001)**
1930 AERIAL IMAGERY MAP
HARRIS COUNTY, TEXAS

FIGURE 2



Katy Hockley Mitigation Bank Site

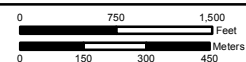


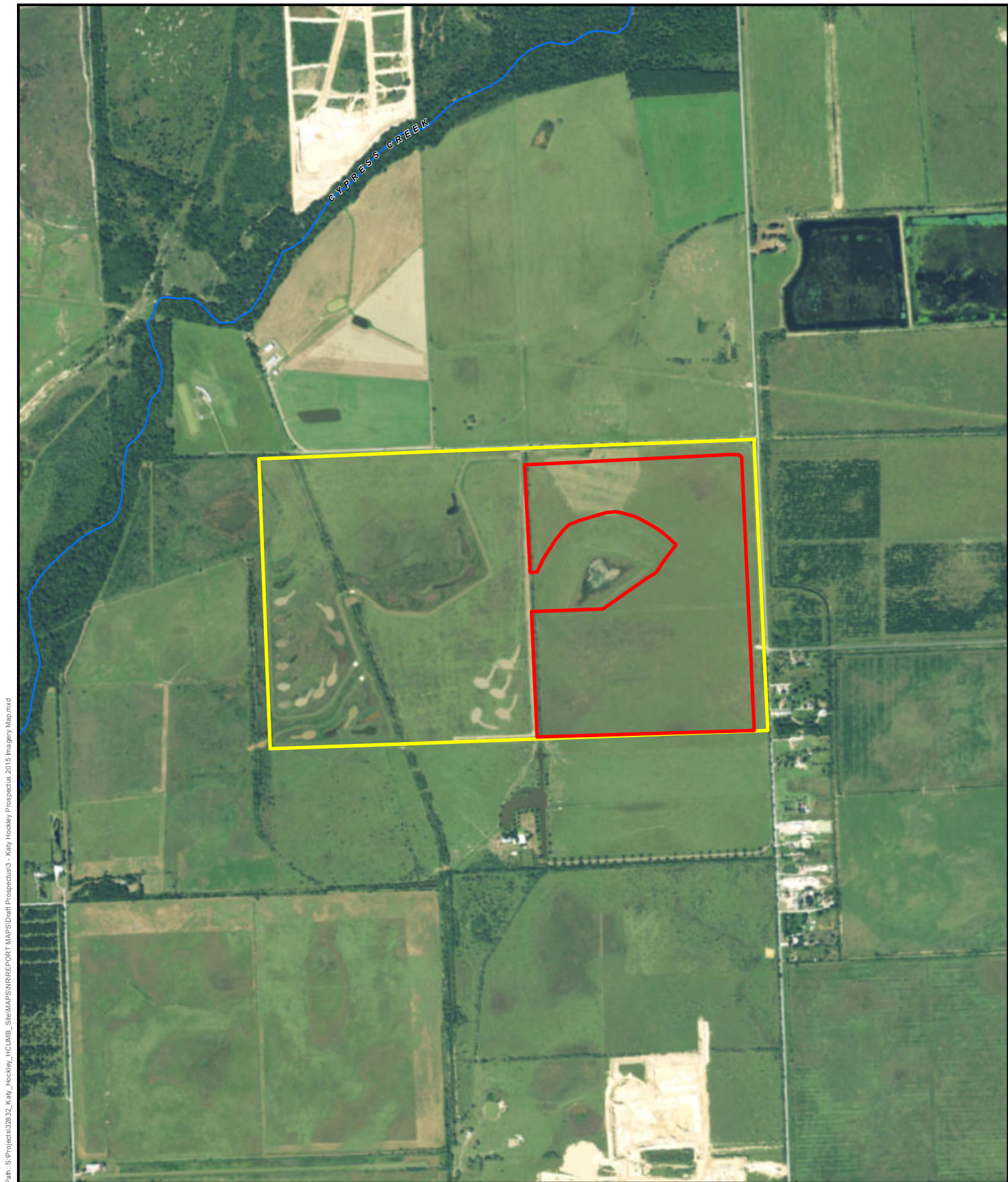
HCFCF Property



Background:	1930 Aerial Imagery
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Created By:	JS
Approved By:	RH
SWCA Project No.:	32832
Date Produced:	May 11, 2017

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet





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**KATY HOCKLEY
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2016 AERIAL IMAGERY MAP
HARRIS COUNTY, TEXAS



Katy Hockley Mitigation Bank Site



HCFCF Property



Background:	ESRI Aerial Imagery (2016)
Scale:	1:18,000
Created By:	JS
Approved By:	RH
SWCA Project No.:	32832
Date Produced:	May 11, 2017

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

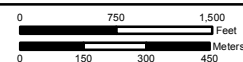
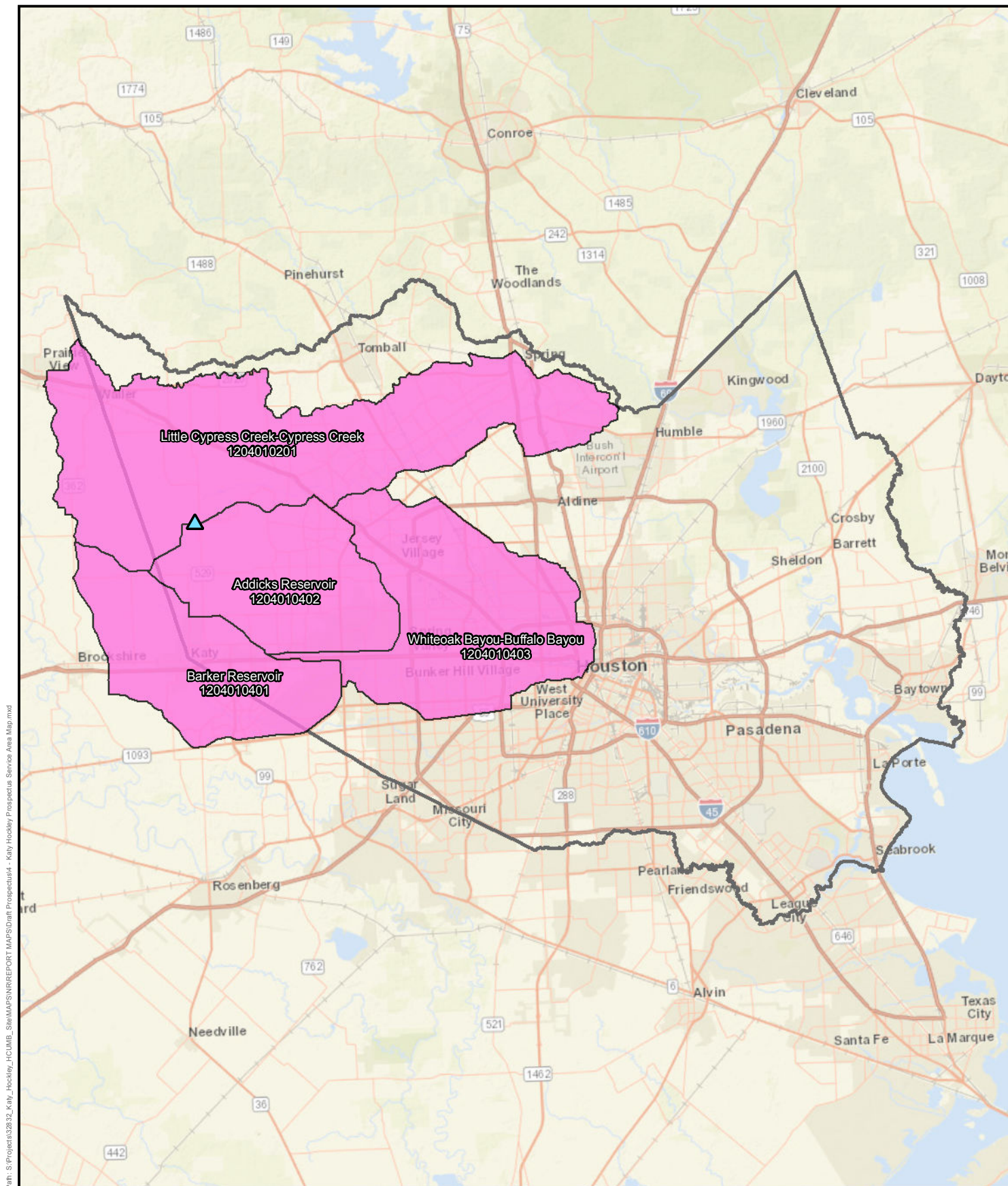


FIGURE 3





Path: S:\Projects\32832_Katy_Hockley_HCOUB_Site\MAPS\REPORT MAPS\Draft Prospectus - Katy Hockley Prospectus Area Map.mxd



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PROPOSED SERVICE AREA MAP
HARRIS COUNTY, TEXAS

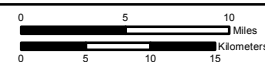
FIGURE 4

-  Katy Hockley Mitigation Bank Site
-  Primary Service Area

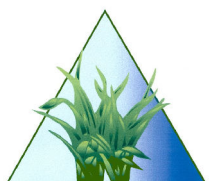
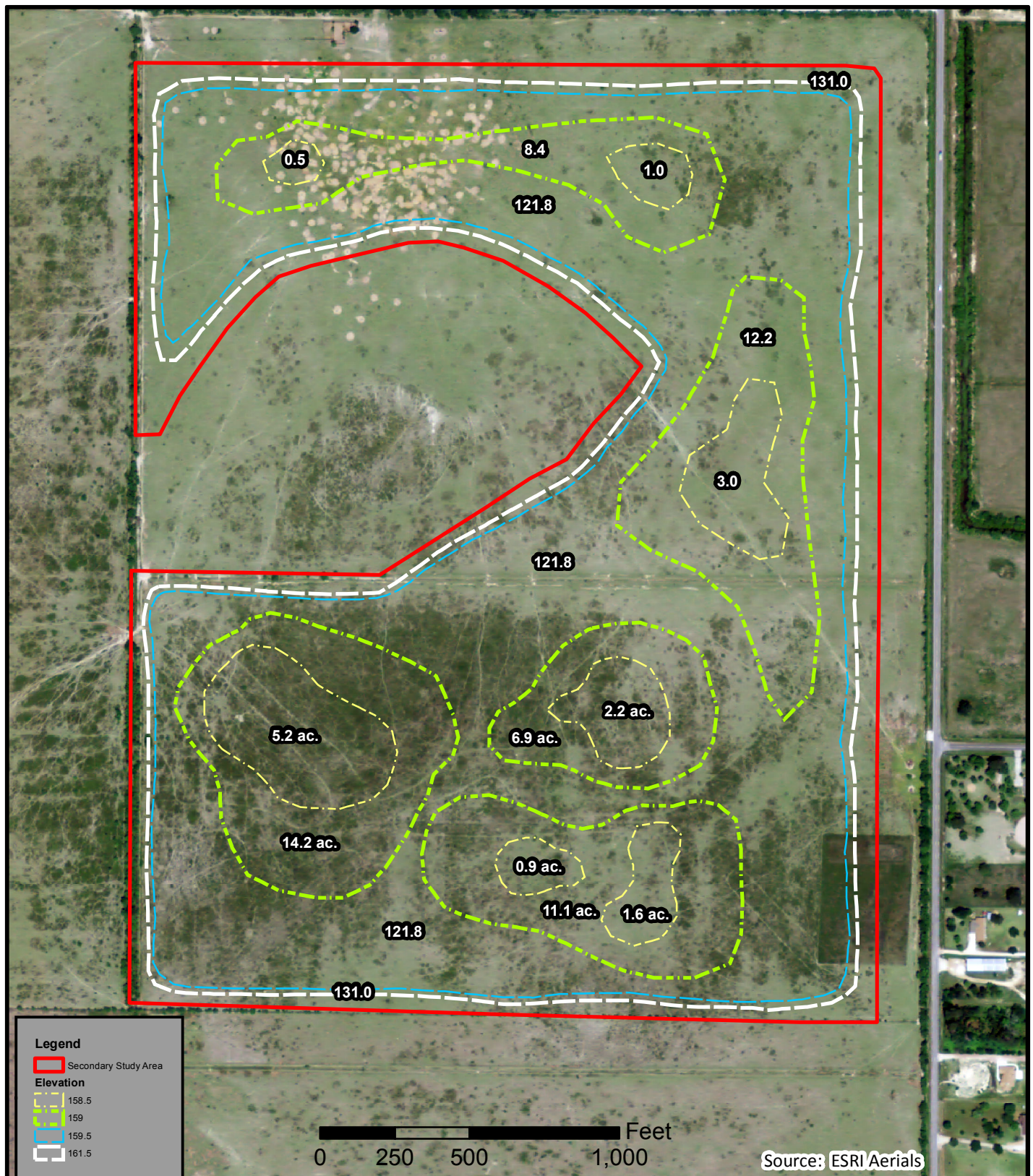


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Created By:	JS
Approved By:	RH
SWCA Project No.:	32832
Date Produced:	May 11, 2017

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Appendix B
Conceptual Wetland Reestablishment Topography



Mitigation Resources

Katy-Hockley Wetland Creation Area **Proposed Topography** **Secondary Study Area** **Harris County, Texas**

M:\Projects\Katy-Hockley Wetland Creation Area\Water Budget Report\Revised Report 09-26-2014\Figures\Figure 5 - Proposed Topography - Secondary Study Area

Figure No. 5
 Project No. KHWC-021-14



Scale:
 As Shown

Date:
 09/25/2014

Drawn By:
 TFO

Approved By:
 TFO